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STEEL

ESTABLISHED 1882

Contents

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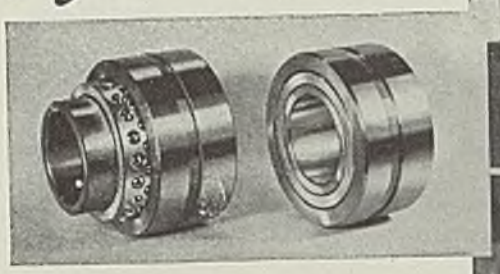
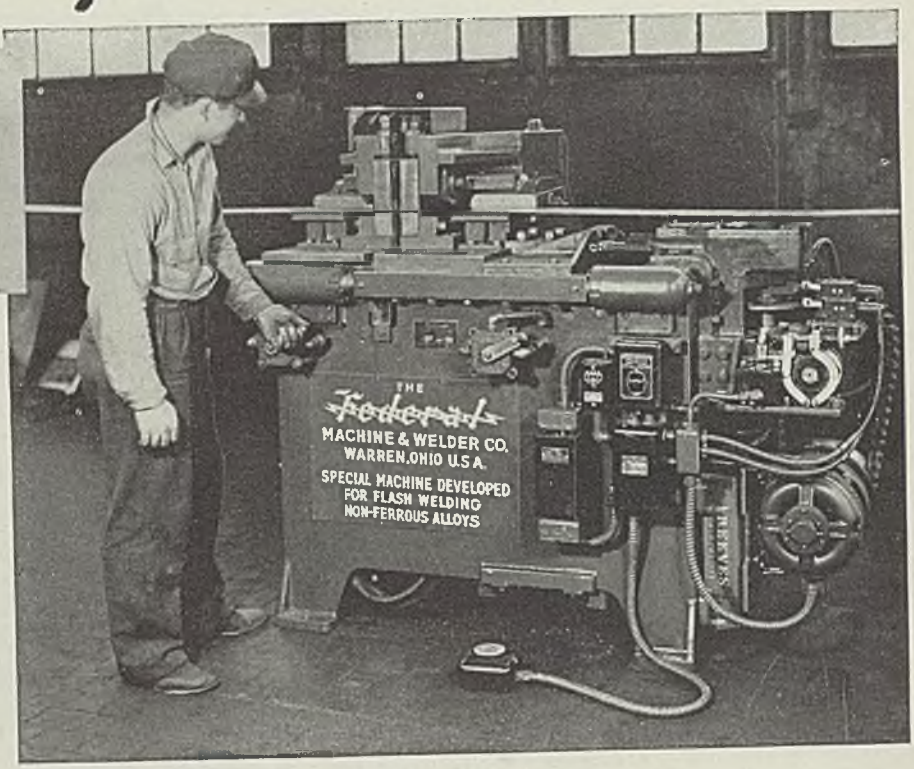
PRODUCTION · PROCESSING · DISTRIBUTION · USE

"With the Greatest of Ease"





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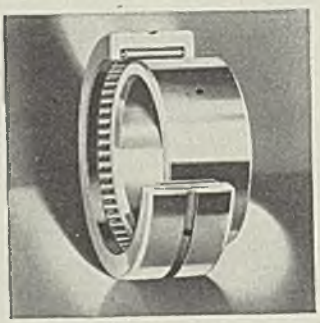

(*Left*) **BANTAM'S QUILL BEARING** is admirably adapted for handling heavy loads in a limited space. It is easily mounted, low in cost. For further information write for Bulletin B-104. For Needle Bearings to be used in lighter service, write our affiliate, The Torrington Company, Torrington, Conn., and ask for Circular 21-H.

(*Right*) **LADDER TYPE BEARINGS,** also used on Federal Welders, are specially designed by Bantam for applications where friction must be held to a minimum in service involving reciprocating motion.

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STEEL
PRODUCTION • PROCESSING • DISTRIBUTION • USE

As the Editor Views The News

■ EUROPE'S war continues to influence business here in various respects. Steel ingot output (p. 29) last week jumped 5 points to 75 per cent, stimulated both directly and indirectly by developments abroad. First official move by the steel industry to co-operate in the government's defense program was taken by the American Iron and Steel institute last week (p. 21) when it elected Walter S. Tower, recently executive secretary, as full-time president in anticipation of extra duties that will be faced by the institute and member company heads. . . . Need for training machine operators to meet defense demands was stressed (p. 39) at the annual convention of the National Metal Trades association.

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Further upturn in steelmaking is imminent (p. 83) as both export and domestic demand continues to increase. The latter is being stimulated by prospects for delayed mill deliveries this summer. Foreign purchases last week included 70,000 tons of shell steel for England and France. Pig iron buying has increased sharply here, while scrap prices have advanced to the highest level since last December. Industrial and residential work is outstanding in building contruction gains. Outlook for a revival in railroad equipment building is more favorable. . . . Building of 50,000 airplanes (p. 33) would require only about 180,000 tons of steel.

Steel Trend Is Upward

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The administration has failed to provide proper national defense despite huge expenditures, the American Iron and Steel institute (p. 23) was told last week by E. T. Weir, retiring president. Although pointing out the need for defense measures, Mr. Weir voiced opposition to entanglement in the European war. . . . Steel distributors view various mill extras as a "crazy quilt," it was declared at last week's annual meeting (p. 25) of the American Steel Warehouse association. . . . Much loose thinking is current (p. 35) regarding influence of defense spending. . . .Seventy-fifth anniversary of rolling of the first steel rail in the United States (p. 38) will be celebrated June 10 at Chicago.

Hits U. S. Defenses

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With war restricting supply of Swedish iron powder, research discovers source of steel powder (p. 54) possessing superior properties. . . . Automatic bending, followed by electrical resistance stress relieving, of a tubular part (p. 56) is speeding production of an army rifle. . . . Changing conditions as regards production of dies, tools, jigs and fixtures has brought independent specialists in this work into prominence (p. 50). . . . Electric welded, forged hoist chain (p. 70) is assured high strength by close control of fabricating operations, heat treatment and prestretching. . . . Ability to machine alloy steels of exceptional hardness (p. 74) is making it profitable to use these steels for high-strength, light-weight applications.

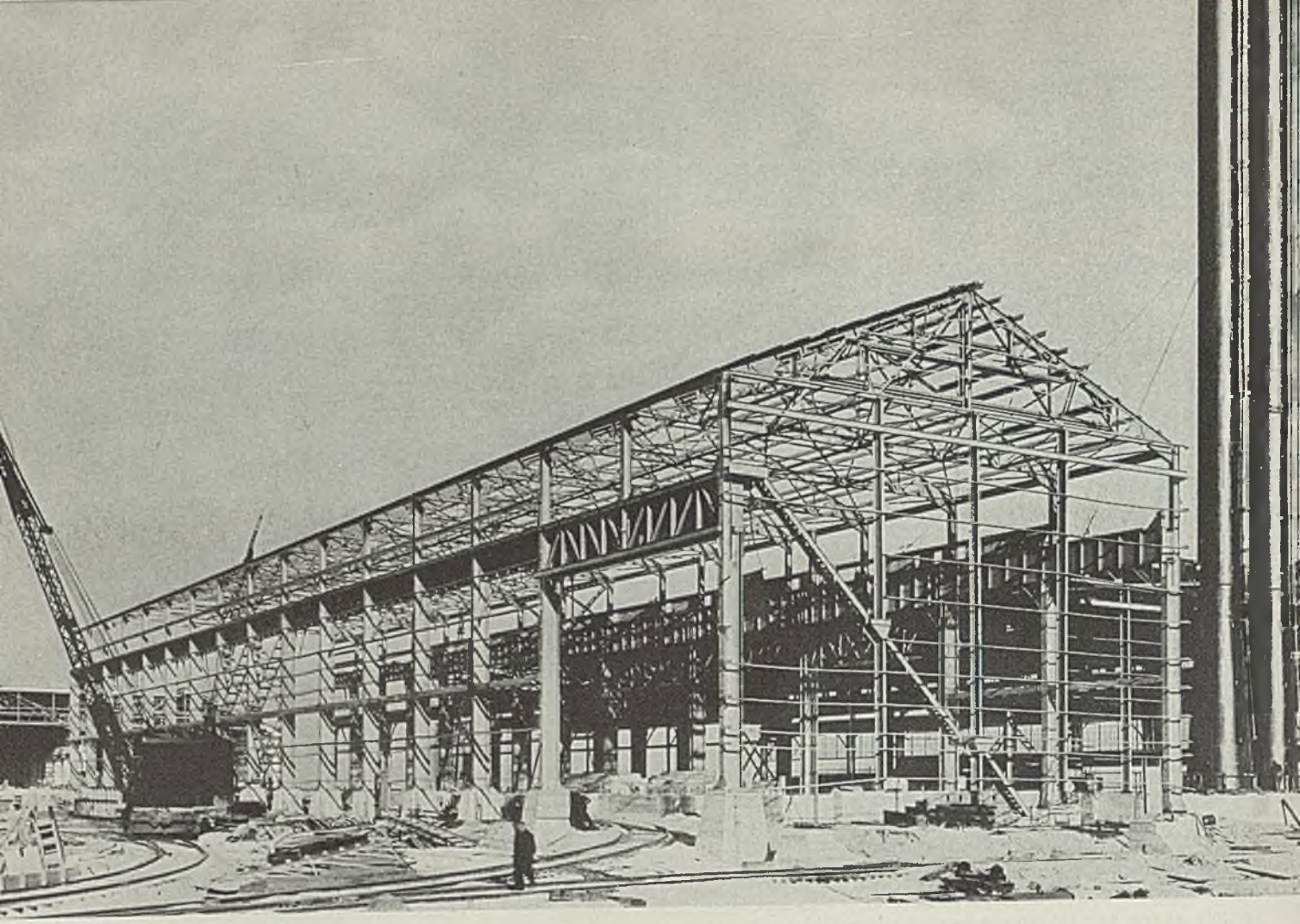
Steel Powder Developed

• • •

Development of a new series of firebrick shapes (p. 58) makes it possible to lay up arches, domes and various circular structures with exactness heretofore unattainable. . . . Lower shell of a Pittsburgh blast furnace undergoes replacement (p. 63) without disturbing its upper structure. . . . New method of firing (p. 64) permits gas convection-type heat treating furnaces to operate through a temperature range of 600 to 2000 degrees Fahr., increasing flexibility. . . . Economies and safety which can be achieved through mechanical handling facilities for power presses are well illustrated by a recent installation (p. 66) which doubles production. . . . Possessing definite advantages, steel is used more widely for electrical switchgear (p. 52).

Refractory Shapes New

E C Kreutzberg



An Opportunity for Fabricators to *Increase* Sales!

Manufacturers of machine tools long ago adopted the sound selling practice of proving to their customers that machine tools of new designs make better products at lower costs. The reward for these alert and untiring sales efforts has been a vastly greater volume of machine tool orders.

Fabricators of structural steel can take that page from the machine tool industry's "success book." Never before have fabricators had so many good arguments, including low interest rates, with which to get new business. Thousands of manufacturing plants are doing business in buildings which are a handicap to efficient manufacturing. Today the industrial architect, contractor and fabricator do far more than simply build. They can make structures that are really "tools" for manufacturing, tools that will give the manufacturer a valuable advantage in lowered costs and higher profits.

Yet, thousands of manufacturers are not fully aware of these facts. Many are struggling along in outmoded structures that are a definite business handicap. Fabricators who will step out and sell structures in which better products can be made at lower cost will open a new realm of opportunity. Inland engineers are especially equipped by many years of practical experience to give fabricators valuable engineering assistance. It is free for the asking.

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INLAND STRUCTURAL STEEL

Steel Institute Moves To Aid Defense Program

Industry gears itself to handle requirements of program and offer government full co-operation. Elect full-time president in anticipation of extra demands on chief executive's time. Spokesmen at forty-ninth general meeting reiterate opposition to United States' entanglement in foreign wars

■ PROBLEMS that will confront industry as result of the war in Europe and our domestic defense program held the spotlight at the forty-ninth general meeting of the American Iron and Steel institute at the Waldorf-Astoria hotel, New York, May 23. About 1000 attended.

The institute itself moved to gear the industry for full co-operation with the defense program by electing Walter S. Tower, executive secretary since 1933, as president, chief executive officer and a director. Mr. Tower succeeds E. T. Weir, chairman, National Steel Corp., Pittsburgh, who has served as president for the past year.

In naming Mr. Tower, the directors adopted a policy of electing a paid president. During the past seven years executives of member companies have served as heads of the institute. In that period, presidents in addition to Mr. Weir have been E. G. Grace, president, Bethlehem Steel Co., Bethlehem, Pa., and T. M. Girdler, chairman, Republic Steel Corp., Cleveland.

The election of a paid president of the institute, who will devote all his time to its affairs, is regarded as the first official move by the industry in gearing itself to be in a position to co-operate in the fullest measure in the government's huge national defense program.

The development of that program is expected to place heavy demands upon the time of the chief executive of the institute in dealing with problems of the industry and of relationships with other industries and with the government. Moreover the time and energy of each executive of the member companies will be fully occupied in their respective production problems. For that reason none of them would be able to find the time to guide the industry as president of the institute.

Mr. Tower has been associated with the steel industry since 1919 except for three years after the war when he was commercial attache for the United States department of commerce at the American embassy in London.

His first association with the steel industry was with the Consolidated Steel Corp.; later he was associated with the Bethlehem Steel Co.

A fundamental change in the administration's attitude toward industry is the first essential in the country's huge defense program, declared Mr. Weir in his presidential address (For abstract see p. 23).

Hold Labor Forum

An innovation at the meeting was an industrial relations session held under the chairmanship of George T. Fonda, assistant to the president, Weirton Steel Co., Weirton, W. Va. This comprised a panel discussion of questions on labor and industrial relations.

Members of the panel included: E. F. Blank, Jones & Laughlin Steel Corp., Pittsburgh; R. C. Cooper, Wheeling Steel Corp., Wheeling, W. Va.; L. S. Harding, Crucible Steel Co. of America, New York; J. M. Larkin, Bethlehem Steel Co., Bethlehem, Pa.; J. E. Laughlin Jr., Thorp, Bostwick, Reed & Armstrong, Pittsburgh; C. A. McLain, Cravath, de Gersdorff, Swaine & Wood, New York; C. H. Murray, American Rolling Mill Co., Middletown, O.; T. F. Patton, Republic Steel Corp., Cleveland; J. A. Stephens, United States Steel Corp., New York; J. A. Voss, Republic Steel Corp., Cleveland.

The industrial relations forum was an off-the-record session.

Edward L. Ryerson Jr., chairman, Inland Steel Co., Chicago, urged a more intelligent competitive sales policy. Speaking as a former buyer of steel and as a present producer, Mr. Ryerson declared there never has been any doubt about the active competitive nature of steel selling policies but that he had not found the competition as intelligent as it was keen.

A fair price based upon a reasonable profit must be the keynote of steel sales, said Mr. Ryerson.

"In recent times we seem to have developed a retail store sales policy of offering great spring and fall bargain sales to stimulate trade, in spite of the fact that as far as I can learn we have never maintained a habit in the steel industry of building up large mill inventories of finished goods that call for quick or distress liquidation."

Mr. Ryerson added that "if we persist in these so-called 'bargain sales' of our products it seems to me that before long we will have 'bargain sales' of our plants." Speaking from his experience as both a buyer and producer of steel, he stoutly defended the basing point system of pricing and said that the industry was indebted to United States Steel Corp. officials "for their comprehensive presentation of this difficult question at the temporary national economic committee hearings."

Mr. Ryerson also warned the steel

industry that it was time for the industry to publicize just what "extras" mean.

"The public generally and even many of our friendly customers have the opinion that extras are 'gravy,' added to the base price for no reason whatsoever but for increased profit and that this is a clever method the steel industry uses to hide its real price."

"It is time," Mr. Ryerson declared, "we publicize the fact widely that this industry makes thousands of products and that only through a system of base prices and extras can we avoid having thousands of prices. We must somehow or other convince everyone who talks about the steel industry that the extras added to our prices are added solely because they properly reflect added costs that are involved in the manufacture of the type of merchandise to which the extras apply. If we cannot convince them of this fact we had better develop an entirely new method of pricing steel products."

Commenting on the financial problems of the steel industry, Frank Purnell, president, Youngstown Sheet & Tube Co., Youngstown, O., advised the steelmakers to consider total cost instead of devoting so much attention to so-called manufacturing costs.

Earnings Have Dwindled

"Unless all necessary items of outgo such as selling, administrative and general expenses, depreciation, return on fixed interest bearing obligations, taxes, and the like, are kept in mind and included in all cost accounting there cannot be any very intelligent approach to a sound financial policy for any member of the industry."

Commenting on the poor rates of steel earnings in recent years, Mr. Purnell said:

"We must admit that for 30 years the return on invested capital in this industry has been steadily declining. In the decade, 1910 through 1919, the average annual return on its invested capital was 8 per cent. In the next decade, 1920 through 1929, it was 5¼ per cent. In the decade closing with 1939, the average annual return on capital invested in the steel industry was 1.8 per cent.

"There are more than 500,000 shareholders in the various steel companies. In 1929 they received $202,193,000 in dividends. By 1933 their dividends had dwindled to $14,500,000, a decline of 93 per cent. In 1939 dividends increased to approximately $70,000,000 but even that total is a small return on the amount invested.

"New money, unless earned in the business, has to come in one of two forms—through the sale of shares or through the sale of bonds. If one considers an issue of preferred stock as creating a fixed obligation in the form of dividends, there is little difference in the financial problem presented by the sale of preferred stock and that presented by the sale of a bond issue.

"The equity risk in the steel industry has been unduly high because of inadequate earnings and for that reason the average steel company would find it difficult under present conditions to dispose of an issue of equity shares.

"In the four years, 1927 through 1930, new steel company common stock issues approximated $475,000,000. In the nine years that followed the total of such issues approximated only $18,000,000 and included several scattered offerings of relatively small amounts each. Equity shares, therefore, have been supplanted in financing new construction by overhead debt with its burden of fixed charges.

"In order to attract venturesome capital, there must be a definite improvement in earnings for the industry. We all know that during the past decade reduced volumes, increased costs and inadequate prices have hampered our industry and other industries in efforts to make reasonable earnings. The cost factor in production has been growing steadily more serious. Cost rigidities, such as taxes, freight rates and wages, have become more pronounced. The continuously increasing aggregate of these fixed burdens and their effects on profit margins have lessened the attractiveness of equity risks in the industry.

"Another increasingly important factor in the financial problems of industry is taxes. The tremendous government spending of recent years have made it necessary to find new sources of tax revenue, and the end is not yet. Such spending ultimately must be paid for out of earnings of the people and our tax burden will be much worse before it becomes lighter. Government spending at best is illusive; it does not create new enterprises or new products and the employment resulting from it is entirely temporary. It knows no such thing as turnover and reduces itself to the dole or construction in a short concentrated period of time of various public works, which should be built over a long period.

James E. Lose

Mr. Lose, vice president, Carnegie-Illinois Steel Corp., was awarded the institute's medal for 1939 in recognition of his paper, "Problems in the Manufacture and Use of Steel in the United States," delivered at the 1939 session.

Mr. Lose began his business career in 1910 with Carnegie Steel Co., and has been associated continuously with that company and its successor, Carnegie-Illinois Steel Corp. He started at Carrie Furnaces, Rankin, Pa., the blast furnace department of Homestead Steel Works, as a tracer in the drawing room and progressed to superintendent of blast furnaces.

He became general superintendent of Homestead works in 1930; three years later he was made vice president in charge of operations, Carnegie Steel Co., and retained that title with Carnegie-Illinois when the latter was organized in 1935.

Taxes Exceed Earnings

"As shown by a compilation of the institute, covering 89 steel companies, their total tax bill last year was $141,123,000 and their net earnings were $140,394,000. Of that tax bill, $89,000,000, or more than 60 per cent, were state and local taxes, representing a burden upon the companies which is fixed regardless of rates of operation or of earnings.

"The matter of rate of turnover of capital in the industry, as compared with other industries, also has a bearing upon the question of costs, prices and profits. The average capital turnover in the steel industry is about once in 24 months, as compared with once in 12 months for certain other major industries. The margin of profit, in terms of gross sales, naturally should be substantially more, where the rate of turnover is less frequent. A profit margin on gross sales adequate for a business turning its capital once a year, may be inadequate to enable the steel industry, with its slower turnover, to make a profit.

"The failure of the steel industry to recognize that basic fact and the necessity for a better percentage of profit margin, in terms of gross

(*Please turn to Page* 28)

F.D., a Laggard in Defense, While Provoking Bad Foreign Relations

By E. T. WEIR

■ FOR the second time in the history of the Institute we hold our meeting while the world is at war. . . . To find anything approaching a parallel experience we must go back to the opening stages of the last World war when the German armies were making their headlong advance to the Marne.

So far, thank God, the American people are not disposed to regard this war as our war. It is plain that they are far from believing that American intervention can contribute anything more of lasting value now than it did in 1917. Despite overwhelming pro-Ally sympathy, despite the emotional impact of events in Poland, Finland and Norway, and even the invasion of Holland and Belgium, there is no indication that our public would sanction our participation. This commonsense attitude of rank and file America is our surest guaranty against involvement.

Last September, I was among those who spoke out against this country's doing anything that held the faintest possibility of entanglement in Europe's war. I am still just as firmly convinced that the United States has no place in that war. Only one reason can justify war for America—jeopardy to the integrity and independence of the United States or invasion of this hemisphere.

Only One Interest Is Paramount

It is now of extreme importance that we, and all Americans, recognize clearly that America has one paramount interest to which all others are secondary. That is the preservation of the American way of life here in America. . . .

Preservation of the American ideals of life involves adequate preparation for effective defense. Whatever the outcome of the present war, the ruthlessness of its instigators has impressed upon us the necessity of thorough preparation for defense. With our unlimited resources, industrial power, and natural advantages, it is inexcusable that we are not better prepared at this moment, if competent observers may be believed—and I, for one, think they may—this nation could be another Finland or Norway were it not for the barriers of ocean and distance.

Monroe Doctrine Works Both Ways

With all the warning we have had, why has the present administration failed so glaringly to discharge one of the most vital functions of federal government—the provision of proper national defense? For seven years, the administration has had at hand everything necessary for the building of real defenses. Billions have been appropriated for this purpose. What has been done with them? Why, after spending all this money, do our military and naval establishments lack modern weapons, equipment and material? Why have our armed forces not been trained in methods of modern warfare?

This delinquency can not be attributed to ignorance. For years, persons whose competence is not open to question have been pointing out the weakness of our national defense condition and urging corrective measures. A short time ago General Hugh Johnson wrote that in 1933 he tried to secure a program that would provide national defense and at the same time give employment and recovery. His effort failed. But in that same year, Harry Hopkins was given the bulk of a three billion, three hundred million dollar appropriation for—as the general says—raking leaves. Within the past year, men who knew from experience in the previous war how poorly the country was prepared from both military and industrial standpoints, urged that the administration take immediate and effective steps to build a real defense system. Again the administration did nothing.

And during these seven years, when the administration has been doing nothing to increase our defense facilities, it has been provoking bad foreign relations. In 1937, the President in his "Quarantine" speech in Chicago evidenced hostility to certain foreign powers, and he has been outspoken in his opinions regarding the European controversy.

He seems to have completely forgotten that the Monroe doctrine is a two-way proposition. It not only declares our opposition to foreign aggression in this hemisphere but pledges us not to intermeddle with European affairs. Granting that a private citizen may freely express his opinions on foreign matters, it is a very dangerous thing for the President of the United States to inflame foreign nations against us by declarations and speeches, and this in utter defiance of the intent of congress in passing neutrality legislation.

Domestic Spending Misdirected

The administration also is responsible for the country's weakened ability to meet an emergency in other ways than by neglect of direct military preparedness. It has placed the nation in the worst fiscal position in its history. Despite awareness of the dangerous international situation, the administration continued its lavish domestic spending. It never stopped pouring billions down rat holes of political waste, social experimentation and our socalled government planning.

Now we face the need for huge new expenditures with an already back-breaking burden of taxation and a federal debt that has shattered

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Abstract of address delivered by Mr. Weir as president of American Iron and Steel institute at institute's annual meeting, New York, May 23.

the forty-five billion dollar limit. Likewise our industrial system must try to accept the monumental job that will be imposed on it by defense preparations under the handicaps that have been and are now imposed on it by governmental restrictions and interference. And perhaps most serious, this administration is directly to blame for a disunity among the American people such as never existed before.

And thus because of administration inefficiency, blindness, devotion to its pet brands of social and political philosophy, and disinclination to accept any advice from business or industry, this country is faced with the problem of doing on a hurry-up basis a job that should have been in normal progress for the past seven years.

I say this not in any sense of crying over spilt milk. The important thing is the lesson this record holds for the immediate future. That lesson is that the methods and personnel of the present administration can not set this nation to work as one man on the gigantic task of building real defenses. In this great program, which will cost billions, the people of this country have the right to demand that it be carried out effectively, economically and promptly. The first essential step toward preparedness must be a fundamental change in the attitude of government—and particularly in its attitude toward industry.

Industry is an arm of national defense just as much as the army, navy or air force. In fact, industrial preparedness must precede direct military preparedness. Industry must provide the weapons, the equipment and material of all kinds necessary to the training and maintenance of the armed forces. In addition, of course, industry must be prepared to supply the normal requirements of the country.

Industry Now Basic Defense

Large-scale defense preparation will require an infinite amount of planning and readjustment throughout the industrial system. The staggering size of the job has evoked forecasts that it will be two years before industry can function effectively. It can be said confidently that these forecasts are entirely too pessimistic. If government will decide on a definite defense policy; if it will let industry know exactly what is wanted; and then entrust to men who know industry the task of getting performance from industry, the country will be pleasantly surprised at the speed and efficiency with which industry will do its share of the job.

At the present stage, industry is our basic line of defense, and there must be a minimum of red tape and delay in permitting industry to gear itself up to meet defense necessities.

The steel industry, of course, will be of major importance in any program to prepare the country for defense. Not only is it a direct source of military and naval requirements, but it also is foundational to all other industry. To meet these demands, I am happy to say that our industry is at the highest state of technological development in its history. I shall discuss this in greater detail a little later. But first, against the background of the war and our own defense needs, let us consider some of the immediate problems faced by the steel industry.

Some war-created problems now on our doorsteps hold potentials of extreme danger. One is the maintenance of adequate raw material supplies. Seven of the 12 principal nonferrous materials used by the steel industry come largely or entirely from foreign sources. The most important are manganese and tin and the latter metal comes almost entirely from Dutch and British territories. Needless to say, all steel companies are aware of the situation and have been doing what they can to protect themselves against shortages of these vital materials.

Limit Scrap Export

But, unfortunately, no company and no industry can solve this problem alone. Negotiations with foreign governments are involved. Therefore, the accumulation of strategic raw materials is a problem of national defense and a proper function of federal government.

This segment of the problem, like the whole defense problem, has been badly mishandled. Economists estimate that we need reserve stocks of at least $800,000,000 worth of vital materials that must be imported. Congress appropriated $100,000,000 to be spent in four years. That program is in its second year. So far, less than $13,000,000 worth of these strategic materials have been purchased. Our position in respect to these vital materials is one that justifies grave concern.

Of a similar nature, except that it is susceptible to domestic control, is the situation with regard to steel scrap. With the beginning of 1939, there was a tremendous increase in the export of scrap to foreign countries. During the first nine months of last year, the average tonnage of scrap exported per month was 229 per cent of the monthly average from 1930 through 1938. This average monthly export was more than 13 per cent of the total accumulation of scrap steel in the hands of United States dealers on Sept. 30, 1939. Since then there has been a decline in scrap export, but it is still very high. Latest available figures show a monthly average of foreign shipments equal to approximately 180 per cent of the average of the period 1930-1938.

At various times, steel men have warned that it is against the interests of industry and the nation to permit this heavy exportation of scrap. The importance of scrap as a raw material in the steel industry is not fully realized by the public. Yet it is so important that it may be considered a vital "natural resource." Ton for ton it is actually more valuable than iron ore. It can be quickly converted into new steel because it has already gone through the refining process.

Under normal conditions, about 50 per cent of scrap is used in making new steel. It is unwise to allow too much scrap to leave our shores, because such exports represent the depletion of an extremely valuable resource. In my opinion, our stocks of scrap steel are now too low. In the interest of national safety, a limitation should be placed on export.

The world situation has also affected steel production. The war, of course, was the indirect cause of the extremely high rate of operations in the last months of 1939, which resulted in the establishment in the final quarter of the steel industry's all-time record for the number of ingot tons produced. Exports, however, were a minor influence.

The real demand for steel was occasioned by domestic buying to protect inventories against steel shortages such as occurred in the previous war. Since the first of the year, the reverse has been true. Domestic buying has decreased, apparently with the intention to reduce inventories to normal levels. Foreign buying, on the other hand, has greatly increased. During the first quarter of this year, exports trebled the volume of the same period in 1939. They constituted 14 per cent of total steel production and thus helped importantly to offset the decline in domestic consumption.

Export Demand May Rise

Contrary to experience in the last war, belligerents have not been taking the major portion of steel exports. Should the war continue, become even more extensive and more active, we may assume that export demands will greatly increase. Steel consumption of belligerents will multiply beyond their capacity to produce and neutrals will turn increasingly to the United States as the most important source of steel for their domestic requirements and for re-export.

Should this come to pass, there

(*Please turn to Page* 28)

"Crazy Quilt of Steel Mill Extras"

Discussed at Warehouse Meeting

■ "THIS crazy quilt of mill quantity and item extra charges"—as it was expressed by Walter S. Doxsey, executive secretary—was the main subject of discussion at the American Steel Warehouse association's thirty-first annual convention in New York, May 21-22.

"This crazy quilt . . . " he said, "stands as a challenge to all interested in bringing steel mill products to ultimate consumers through well-conceived channels of distribution. From the experiences arising with these extras, there should be a wealth of information available both from the mills and from the warehouses. If we will take advantage of this information and apply it to serve the best interests of all concerned with the production, distribution, and use of steel, the marketing machinery of our industry can be streamlined and synchronized with the pace-making advancements in production processes.

"The steel mills, as a whole, have no policies to govern constructively their relationships with distributor customers. With very few exceptions, the steel warehouses must pay the same price for the steel they buy from the mills as the customers to whom they must resell their merchandise.

Extras May Handicap

"And further, the steel distributor must contend with a weird and fascinating array of mill item extras, order extras, less-carload extras, and a perplexing combination of all these, which may help him in some instances and seriously handicap him in others. These mill extras are of such basic importance to the individual steel warehouse and to the distributing industry as a whole that they warrant earnest consideration.

"From many aspects, the grotesque array of mill extras now applied to various steel products are but gestures to manifest policies that are not always practiced nor enforced. As we look at the mill extras for each individual product, both fallacies and good features are apparent. If we examine them collectively, the complete absence of uniform, sound, and constructive planning to assure the producers equitable compensation for handling costly small orders and to promote efficiently and economically through secondary outlets the distribution of all steel products is amazing. . . .

"Compared with the simple item extras applied to cold-rolled strip, stainless sheets, and cold-finished bars, the quantity extra combinations applied to hot-rolled sheets appear tremendously complex.

Variations Are Geographical

"First, there are item extras on quantities under 2000 pounds; then there are order extras on the combined items weighing less than 7000 pounds; and finally, the purchaser may add to his order any other flat rolled items such as galvanized or cold-finished sheets, as well as roofing and sidings, to make up a carload.

"Just why the figure of 2000 pounds was selected for item extras no one knows. The figure of 7000 pounds suggests a truckload, and legend has it that this figure originated in Texas to facilitate shipments of sheets to inland communities in trucks that had delivered cotton to the seaboard.

"Of course, these extras make it easily possible to make up a mixed carload without paying any item or quantity extras. Still, the amount of compensation to the mill for handling undesirable quantities is practically nil and so is the degree of protection to the distributor against below-cost mill competition. The possibility of combining roofings and sidings with flat sheets gives the sheet metal distributor who sells these products along with flat sheets a buying advantage over the steel warehouse that handles flat sheets exclusively. The question may well be raised why reinforcing bars should not be combined with cold-finished bars or floor plates with stainless steel.

"If we add a few more flourishes to the extras for hot-rolled sheets, we come to the extras for galvanized sheets. The item extras consist of three brackets instead of two and they apply on quantities of 1500 instead of 2000 pounds. The order extras are in two brackets instead of one: Under 7000 pounds, and under carload to 7000 pounds. As with hot-rolled sheets, other kinds of sheets and roofings and sidings may be included to make up a carload.

"Here is an innovation—one set of extras for one part of the country and another set for the rest of the country. The set used in the southern, mountain, and Pacific coast states applies on items of less than 6000 pounds. The base price is available on items of 6000 pounds or more. The extras used in the rest of the country apply to items up to 40,000 pounds. In some brackets the differences between these two schedules are as much as $10 a ton.

Criticizes Selling to Peddlers

"The order extras on plates, floor plates, and structural shapes are presented here today as a distinct type of mill extras, in contrast to the others you have already seen. Both in theory and in practice the result of order extras of this kind is to invite and encourage customers to combine as many items as they can entice any mill to accept to make up an order whose total weight is 6000 pounds or more, and thus obtain all the desired items regardless of the diminutive size of any single item at the mill base price. These order extras afford little or no protection to the mill for handling small orders and there is little question about their diverting from the warehouse to the mill

many orders involving several items and totaling 4000, 6000, or 8000 pounds."

Failure or refusal of steel mills to recognize or protect their distributors by selling promiscuously to any "peddler having the money to pay for a small lot of steel" was criticized by A. Oram Fulton, president, Wheelock, Lovejoy & Co. Inc., Cambridge, Mass. Former president of the association, Mr. Fulton took issue with common mill practice enabling "irresponsible peddlers" to establish themselves, at the expense of responsible distributors, as being in the warehouse business because they "are able to get enough money together to put in a few tons of steel."

Following the report of the committee on hot-rolled carbon bars by J. Frederick Rogers, Beals, McCarthy & Rogers, Inc., Buffalo, chairman, the association went on record in favor of efforts to establish uniform mill extras throughout the United States, eliminating differentials now operative in several regions. Material reduction in the mill base quantity extra-limit with a base bracket of from 3 to 5 tons also was approved, as well as a suggestion that equitable extras be placed on orders under 1 ton. An order extra applicable to car-load shipments or an additional charge of 25 cents on less-than-car shipments was opposed by the membership which also favored no change in the cutting extra recently established.

Changes made in extras have not added to the profit of secondary distributors of alloys, according to F. W. Krebs, Super Steels Inc., Cleveland, chairman, alloy committee, but rather have increased costs to warehouses. The growing list of S.A.E. steels tends to increase jobber inventories. Mr. Krebs also noted an increase in buying from warehouses by aircraft manufacturers, although such volume is subject to strict inspection tending to higher costs of handling tonnage for this industry. Mill parity on small orders of alloys tends to show the high cost of such orders to the mill and is a step to aid jobbers in securing such purchases, he said.

Mill parity on cold finished bars on lots of 1500 pounds or less and the reduction of $5 a ton on the warehouse base prices has not yet worked to the advantage of the steel warehouse, according to George L. Stewart, Edgar T. Ward's Sons Co., Pittsburgh. Aggregate volume last year did not increase to any extent from that of 1938 and the reduction and changes resulted in a net lower return to the jobber of approximately $7.50 per ton, Mr. Stewart said, although an order extra in some districts works to reduce this decline. Profit in cold finished bars is centered largely in the workings of one or more extras.

Lewis Elected President

T. W. Hager, Peter A. Frasse & Co., New York, chairman, mechanical tubing committee, revealed a suggestion had been made that efforts be considered to establish a standard list of mechanical tubing sizes to be carried by warehouses. He questioned what could be classified as standard, saying this varied widely as to districts and the association took no formal action.

Q. Forest Walker, economist, R. H. Macy & Co. Inc., New York department store, spoke on pricing and suggested some methods in the retail trade which might be applied to small-lot steel selling by secondary distributors of the country.

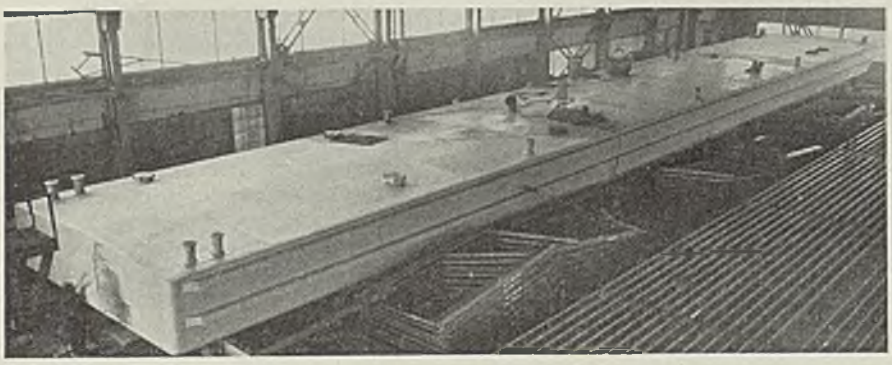
J. Halsey McKown, assistant vice president, United States Steel Corp. of Delaware, presented the corporation's motion picture "Making and Shaping of Steel," speaking on "The Steel Warehouse, a Necessity," as a preamble.

Richmond Lewis, Charles C. Lewis Co., Springfield, Mass., was elected president of the association. C. H. Bradley, W. J. Holliday & Co., Indianapolis, and E. Jungquist, Percival Steel & Supply Co., Los Angeles, were named vice presidents and the following were chosen as members of the executive committee:

Lester Brion, Peter A. Frasse & Co. Inc., New York; A. C. Castle, A. M. Castle Co., Chicago; E. D. Graff, Joseph T. Ryerson & Son, Inc., Chicago; Charles Heggie, Scully Steel Products Co., Chicago; E. L. Parker, Edgar T. Ward's Sons Co., Pittsburgh; Phil Pidgeon, Pidgeon-Thomas Iron Co., Memphis, Tenn., and Mr. Fulton.

A. W. Herron, Jr., Jones & Laughlin Steel Corp., Pittsburgh, was elected treasurer. Mr. Doxsey continues as executive secretary. New directors for three years are President Lewis and Bud Lowenstine, Central Steel & Wire Co., Chicago. Mr. Fulton was re-elected a director for a three-year term. The three are directors-at-large.

Welded Steel Docking Float Built in 14 Days



■ Fourteen days after the contract was awarded, Dravo Corp., Neville Island, Pittsburgh, had completed this 6 x 26 x 175-foot welded steel docking float for Lawrence Pipe Co., Mt. Vernon, Ind. Speed of the job was attributed largely to data given by employes in papers in the Lincoln Foundation award program, with which Dravo's management is co-operating by offering similar prizes for best papers written by its employes

To Study Design Problems In Welded Building Field

■ A structural steel welding research committee to study problems of design and fabrication in the welded building field has been formed by the welding research committee of Engineering Foundation, 29 West Thirty-Ninth street, New York, in co-operation with American Institute of Steel Construction. Leon S. Moisseiff, consulting engineer, New York, was appointed chairman.

Program of the committee includes establishment of research fellowships in American universities. The first fellowship will go to Lehigh university, Bethlehem, Pa., and will be directed toward developing a satisfactory design procedure for beam-to-girder and beam-to-column connections for all kinds of welded building construction.

Correction

■ Lining for tunnel in the gate system of Mud Mountain dam, near Seattle, described in STEEL, April 22, page 39, is cast iron and not steel as reported. Lining is manufactured by the Olympic Foundry Co., Seattle.

Gear Makers Pledge Support to Government's Armament Plan

■ FORMAL approval of and a pledge for active support of the extensive program for national defense now being launched by the United States government was voted by the American Gear Manufacturers' association at its twenty-fourth annual convention at Grove Park Inn, Asheville, N. C., May 20-22.

It was pointed out that in the building up of highly-mechanized defense facilities gears and related products play a part beyond anything in past history. They are at the heart of mechanisms ranging all the way from precision range-finding and sighting instruments to the heaviest tanks and battleships.

The meeting, which embraced the presentation of numerous technical papers and committee reports, election of new officers and annual dinner, was attended by more than 100 members and guests of the association.

U. Seth Eberhardt, vice president, Newark Gear Cutting Machine Co., Newark, N. J., was elected president for the coming year to succeed Charles F. Goedke, president, Ganschow Gear Co., Chicago. W. P. Schmitter, chief engineer, Falk Corp., Milwaukee, was named vice president.

Elected members of the executive committee were: F. B. Drake, president, Johnson Gear & Mfg. Co., Berkeley, Calif.; W. A. Barr, president, Foote Bros. Gear & Machine Corp., Chicago; R. C. Ball, president, Philadelphia Gear Works Inc., Philadelphia; A. H. Candee, gearing engineer, Gleason Works, Rochester, N. Y.; and Mr. Eberhardt.

President Goedke reported that the junior mechanics training course sponsored by the association is now proving its worth by having made available to the industry at a most critical time many skilled men who otherwise would not have had the advantages of highly-specialized training in the difficult technique of gear production.

He also declared that the association's monthly index, initiated a year ago, has gained wide recognition—being presented in graphical form in leading business journals, including STEEL. Incidentally, the method by which this index is compiled month by month was later made clear to the members in a paper, "How's Business?", by W. L. Schneider, sales manager, Falk Corp., Milwaukee, and chairman of the association's commercial committee.

U. Seth Eberhardt
Elected president, American Gear Manufacturers association

Referring to the difficult days through which we are now passing, President Goedke said: "May we regain the confidence which sustained the American pioneers!"

Something of a similar note was sounded by George F. Nordenholt, editor, *Product Engineering*, New York, in addressing the annual dinner on "New Products—A Threat or a Promise?" He emphasized that it was only through co-operative efforts of many people working together in large companies which grew up under our system of free enterprise that discoveries such as those of Charles Goodyear and other American industrial pioneers grew "out of the attic" and developed into vast industries.

The speaker pointed out that the day of the lone inventor has passed, because of the highly complicated nature of modern science in industry, and that the hope for the future lies in the highly organized and expensively equipped research laboratories of much-abused "big business."

In addition to the usual attention to the theory of gearing, the practical side of gear production was dealt with specifically in two papers contributed by well-known members of the machine tool industry. One of these, "Boring Mills in a Gear Shop," by E. P. Blanchard, sales manager, Bullard Co., Bridgeport, Conn., was concerned with the machining of gear blanks—especially those of medium and relatively large size.

This paper, which gave consideration principally to use of vertical boring mills of turret-type and to vertical multiple-spindle chucking machines of station-type, illustrated effective tooling and work-holding setups on various sizes and shapes of blanks—including those sawed from solid bar stock.

To get maximum efficiency with modern cutting materials, it by no means is uncommon to have to run the machine at speeds giving 225 to 250 surface feet per minute when cutting steel, Mr. Blanchard stated. While 40-horsepower motors have been common enough for several years on 60-inch boring mills, the time has come when they likewise are necessary on 30-inch machines. On the latest machine, it not only is possible to combine the vertical and

cross feeds so as to generate accurate angular surfaces, but it also is possible through differential control to generate irregular contours such as those of torpedo sections, bottle molds, etc.

Going to the other extreme as far as size of work is concerned, Douglas T. Hamilton, Fellows Gear Shaper Co., Springfield, Vt., covered "Developments in Production of Fine-Pitch Gears." The speaker explained that the field for fine-pitch gears lately has been greatly extended by the broadening use of such mechanisms as motion picture cameras, geared camera shutters, projectors, recording devices, etc.

For these and many other similar purposes the tooth forms developed in the watch industry have not been found altogether satisfactory, Mr. Hamilton said. Therefore, the involute system has penetrated the realm of small gearing and a heavy demand has arisen for equipment and tools for cutting fine-pitch gears on this system rapidly and to high accuracy.

In work of this kind, the problem is not only one of cutting the teeth, which after all involves merely the application to small work of more or less conventional methods which have been perfected on larger work, but it also involves the holding of parts so small that some of them literally can be lost under a thumb nail. Therefore, a considerable portion of Mr. Hamilton's paper was devoted to work-holding systems which have been worked out in cooperation with the Eastman Kodak Co. and other makers of small gears.

In some of these setups the parts are gripped and ejected by pneumatic means; in others, stacks of blanks are "ganged-up" for multiple cutting—the ganged-up blanks in some cases being magazine fed to cutting position and automatically ejected therefrom.

Of the several papers dealing with more highly technical phases of gear making, that by Dr. Stewart Way, research engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., covered roller and gear pitting tests conducted recently. This paper involved a mass of mathematical analyses based upon test results and many practical conclusions were drawn.

Through study of the progressive development of circular and ring-shaped pits from tiny fatigue cracks, the writer has concluded that the crack is extended and widened through the action of an hydraulic wedge, that is, lubricant forced into the crack under the rolling pressure between contact surfaces. Thus a section of metal literally is pried out of the surface, forming a pit.

Contributing a paper on "My Experience With Gear Tooth Forms," A. A. Ross, in charge of manufacture of turbine gearing, General Electric Co., West Lynn, Mass., touched upon his own "adventures" dating back to 1902 and covering in particular railway and marine applications. The speaker stated that 38 years ago, interchangeability of gears and pinions was almost impossible because of the prevalence of incorrect tooth profiles.

"I might here mention," he added, "that if there are those of you who today show lack of interest in the work of your standardization committee, just bear in mind that if the conditions of those days existed today, you would be forced to cooperate whole-heartedly with that committee to save your own necks."

Another highly technical paper, based on extensive laboratory tests, was "Tooth Bearings in Bevel Gears," by Allan H. Candee, gearing engineer, Gleason Works, Rochester, N. Y. While the subject is one involving considerable complicated theory, Mr. Candee succeeded in clarifying it by photographs and diagrams showing exactly what happens between a pair of mating bevel gears when conditions are right and when wrong. This paper is of great value not only to those concerned with making gears but also to those concerned with their mounting and assembly.

It was pointed out in a paper, "Diesel and Gas Engine Load Characteristics," by Austin Kuhns, executive engineer, Farrel-Birmingham Co. Inc., Buffalo, that the violent torque fluctuations more or less inherent in these engines are inclined to build up dangerous resonant and critical vibrations. This throws responsibilities upon gear manufacturers which properly are not theirs, or which at least should be shared by the engine designers and builders.

Therefore, Mr. Kuhns suggested, before accepting gear contracts in this field, gear manufacturers should make sure that the engine designers have done everything possible to correct or overcome the undesirable operating characteristics of the prime mover in connection with which the gear drive is intended to function.

Steel Institute Moves To Aid Defense Program

(*Concluded from Page* 22)

sales value, are fundamental reasons why the industry's return on its investment has been chronically inadequate."

Another problem said Mr. Purnell is the determination of a proper depreciation policy. This problem is complicated further by tax regulations governing depreciation. These regulations, Mr. Purnell said, unfortunately are subject to constant change, are based upon inadequate practical experience and are motiviated by a desire for revenue.

Gov. Raymond E. Baldwin, Connecticut, the guest speaker at the annual dinner, declared that government policies over the past seven years have weakened the backbone of our national defense, industry and sound economy.

"This administration has spent millions for every conceivable purpose, and there have been some expenditures for national defense but nothing like what we now see is necessary. . . . We are seeing now that the first line of our national defense is industry, and the second line, the support line, is a sound economy. These are the backbone of our national defense and they have been weakened—terribly weakened—by the processes, the attitude of government over the past seven years."

B. F. Fairless, president, United States Steel Corp., and Mr. Purnell were re-elected vice presidents of the institute and H. L. Hughes, vice president, United States Steel Corp., was re-elected treasurer.

The technical session included the presentation of three papers: "The Control of Steel Composition and the Problems it Presents," by Earle C. Smith, chief metallurgist, Republic Steel Corp., Cleveland; "Dimensional Variations in Rolled Steel Products and the Problems of Control," by A. C. Cummins, general superintendent, Youngstown district, Carnegie-Illinois Steel Corp.; "Producing Steel to Meet Physical Test Requirements," by C. H. Herty Jr., research engineer, Bethlehem Steel Co., Bethlehem, Pa.

Weir's Address

(*Concluded from Page* 24)

will be the temptation to regard it as one ray of sunshine on an otherwise dismal world. This would be understandable. Heavy export demand undoubtedly would stimulate domestic trade. Employment, national income and governmental revenues would improve, and therefore, our most important economic problems might seem superficially to be on the way to solution. How-

ever, not only the steel industry, but all industry and our people as a whole, should look on such seeming benefits with cold caution.

Let us remember the lesson of the last war. No real permanent benefit may be expected from destruction and waste. Whoever wins, war will not solve the fundamental problems of nations or their peoples. That can come only through constructive and co-operative effort. Perhaps this war will bring people to their senses and eventually produce just such an effort. Before that, however, we may look for an aftermath of world prostration which will largely or totally cancel any possible war gains.

The belligerents will have to rehabilitate themselves in world markets. They may be expected to fight savagely with economic weapons to recapture customers lost to neutrals during the war. By that time, let us hope, peoples will have lost enthusiasm for totalitarian methods of all kinds. But, even so, with their resources and credit exhausted, the war nations probably will continue to resort to totalitarian economics.

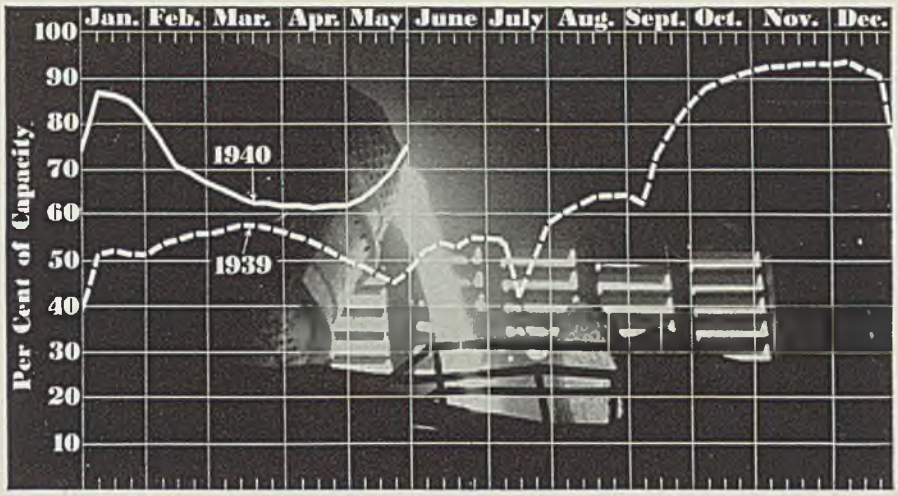
Under American standards of living, our country had a difficult time meeting competition of Europe in its days of peace. Certainly we may anticipate a much tougher assignment in meeting the kind of competition we will get after this war.

Let us keep this in mind for it is no less serious than our more immediate problems. This will be particularly true in any consideration of adding to capacity. Of course, where our own national defense needs require expansion, then we must provide additional capacity regardless of future consequences.

But aside from this, let us remember that the rapid and uneven expansion stimulated by the last war was a major factor in producing the depression of 1920 and 1921 and also the current depression. In many cases the negative economic consequences of this type of expansion are still with us. So far as possible, therefore, the wise course for industry is to strive only for a sound growth predicated on domestic requirements plus normal export trade.

American Steel & Wire To Reline Donora Stack

■ American Steel & Wire Co., Cleveland, a United States Steel Corp. subsidiary, will reline No. 1 blast furnace at Donora Steel Works, Donora, Pa. to permit improved practice. A new primary gas washer will be installed and the three stoves will be changed in design to eliminate one stove and attain higher blast furnace temperatures.



PRODUCTION... Up

■ STEELWORKS operations last week advanced 5 points to 75 per cent, the highest point since the first week in February. Seven districts showed gains, two declined slightly and three were unchanged. A year ago the rate was 48 per cent; two years ago it was 28.5 per cent.

Chicago—Rose 5 points to 75 per cent, the highest rate since the last week of January, an increase of 18 points in four weeks.

Birmingham, Ala.—Unchanged at 83 per cent for the fifth consecutive week with 18 open hearths in production.

Detroit—Off 1 point to 79 per cent because of slight midweek adjustment.

Central eastern seaboard—Gain of 7 points to 67 per cent with one producer near full capacity and others adding open hearths, presaging a further rise.

Pittsburgh—Advanced 8½ points to 73.5 per cent, with further upward movement during this week expected.

Wheeling—Declined 3 points to 85 per cent, with little change expected this week.

New England—Steady at 56 per cent, the same schedule expected to hold this week.

St. Louis—Jumped 7½ points to 55 per cent as addition of two large furnaces more than offset withdrawal of one small unit.

Cleveland—Expanded 6 points to 78 per cent, all producers contributing to the upturn. A further upturn of 5 to 6 points is indicated for this week.

Cincinnati—Continues at 61 per cent, with the average for most plants considerably higher.

Youngstown, O.—Up 3 points to 57 per cent with 54 open hearths and three bessemers active. Schedule for this week indicates a further gain. Carnegie-Illinois Steel Corp. blew in its second blast furnace at Farrell, Pa., last week.

Buffalo—Increased 11½ points to 65 per cent as several open hearths were added.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended May 25	Change	Same week 1939	Same week 1938
Pittsburgh	73.5	+ 8.5	36	22
Chicago	75	+ 5	49	29
Eastern Pa.	67	+ 7	37	27
Youngstown	57	+ 3	45	27
Wheeling	85	— 3	59	41
Cleveland	78	+ 6	54	26
Buffalo	65	+11.5	42	21
Birmingham	83	None	57	69
New England	56	None	45	30
Cincinnati	61	None	52	28
St. Louis	55	+ 7.5	39	33.3
Detroit	79	— 1	57	18
Average	75	+ 5	48	28.5

April River Traffic Heavier at Pittsburgh

■ River commerce in the Pittsburgh district showed little change in April over March figures, according to the United States engineer's office. Tonnage was boosted somewhat in March by the breaking up of ice jams which had stalled shipping during February. Coal tonnage dropped considerably during April.

However, steel shipments rose on the two major streams. Ohio river steel shipments were 160,400 net tons, against 134,000 in March, while on the Monongahela 99,700 tons moved against 84,800 in March. Both totals are well ahead of April, 1939.

Windows of WASHINGTON

By L. M. LAMM
Washington Editor, STEEL

WASHINGTON

■ INDUSTRIAL mobilization program proceeded with lightning rapidity in Washington last week, dealing largely with legislative action.

Senate passed army appropriation bill for 1941, recalling it from committee so that President Roosevelt's requests for additional appropriations could be added before final action was taken. Navy appropriations bill was likewise passed later in the week.

Army bill passed by house provided $784,999,094. Additional $712,712,274 was added by senate after President's request, making a total of $1,497,711,368 as finally enacted into law.

Plan Naval Air Facilities Expansion

Bill, as passed by senate, was based on regular estimates amounting to $853,356,754, plus additional appropriations asked by Mr. Roosevelt in his special message to congress. In addition to cash appropriations authority was granted for making additional contracts totaling $323,229,636, divided as follows: Airplane procurement, $103,300,000; military posts, $6,000,000; ordnance equipment, $133,774,679; chemical warfare, $2,036,910; seacoast defenses, $10,418,047; signal corps, $1,700,000; and emergency funds, $66,000,000.

Navy appropriations bill passed by senate totaled $1,302,472,577. This included $34,000,000 appropriated for the President's use, plus a like sum for contractural authority. Total appropriations for Mr. Roosevelt's use, for both army and naval expenditures, are $200,000,000.

Naval air facilities expansion requested by the President would increase naval planes from 3000 to 10,000. Number of pilots would be increased from 2602 to 16,000 and about $124,132,000 would be spent immediately in building air bases in continental United States and on American-owned islands in the Caribbean, mid-Pacific and Aleutian Islands.

In a joint statement, Senator Walsh, chairman, senate naval affairs committee, and Representative Vinson, house naval affairs committee, said the program had been agreed upon at a conference with President Roosevelt and naval officials. They said Mr. Roosevelt wants it clearly understood the plan "is not in its entirety to be undertaken at once," but looks toward future.

There is no doubt President Roosevelt plans calling industrial leaders to Washington to help with the proposed industrial mobilization program. He stated definitely, however, at a press conference last week, that he does not contemplate setting up any commission such as the World war industries board.

Chief Executive declared at the same press conference that one bottleneck hindering program's rapid consummation at present is production of high-speed military engines. He asserted it would be necessary for the country to increase materially production of 1000-horsepower airplane engines.

Mr. Roosevelt added he does not expect labor to take advantage of the present situation. He stated emphatically, however, he does not want government to weaken social gains made during past few years and that he favored a 40 to 42-hour week.

ADMINISTRATION HAS SPENT $6,265,000,000 FOR DEFENSE

Present administration has spent $6,265,000,000 for national defense, according to figures made public by the government last week after recent criticism in the senate.

Budget bureau has released preliminary statement covering seven years' national defense expenditures. Report shows that although appropriations' greater share has gone into pay, rations, subsistence and maintenance of existing military establishments, expenditures already have resulted in 130 new warships, nearly 3200 new airplanes for army, navy and marine corps and a 270,434 increase in officers and men in the three services.

War department figures show that in fiscal years 1937-1939 more than 65 per cent of its expenditures were for pay, rations, forage and similar items, including maintenance of more than 100 army posts and stations. Current fiscal year expenditures for those purposes, despite great increases for new equipment, will still aggregate more than 45 per cent of total military expenses.

New Equipment Allocation Higher

Only 2.8 per cent of war department's 1937 military expenditures, totaling $380,000,000, was for purchase of new equipment, including airplanes, tanks, antiaircraft guns, artillery and other items. Fourteen per cent was spent to replace and modernize wornout or obsolete equipment, 5 per cent for maintenance of equipment and ammunition. Remainder was expended for pay, clothing, rations, subsistence, travel, army post maintenance, building construction, similar items.

Expenditures in 1938 aggregated $402,000,000, of which only 1.66 per cent was spent for new and additional equipment. Replacement and modernization that year remained at 14 per cent. During past fiscal year, with appropriations totaling $455,000,000, expenditures for new equipment increased to 5 per cent. Replacements and modernization declined to 13.5 per cent; equipment and ammunition maintenance received 5.5 per cent.

Current fiscal year appropriations and obligations total $838,000,000. Allocation for new equipment will increase to 24 per cent of the total, including the $300,000,000 army air corps expansion program. Gains for new equipment are partially at

"I want Easy Roll MonoRail!"

"You mean American?"

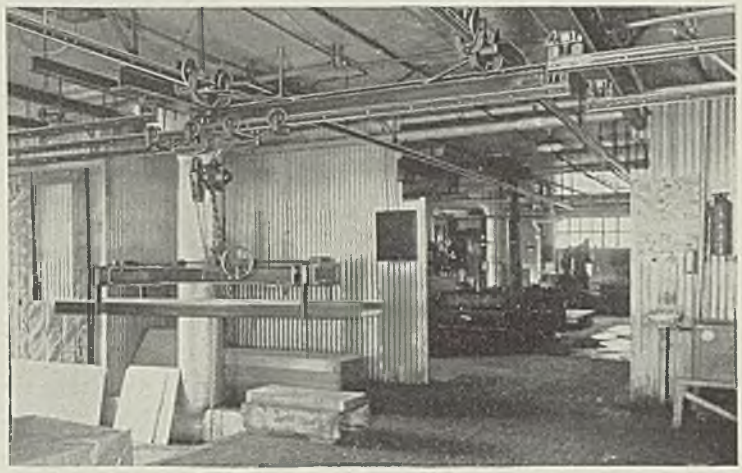
"Sure, that's it! The track we put up the other day—the gang in the shop says the trolleys are so easy to push."

"That's right! I saw the first guy try it out. His load got away from him and rolled 30 feet down the track before it stopped. I guess he was used to our old rail."

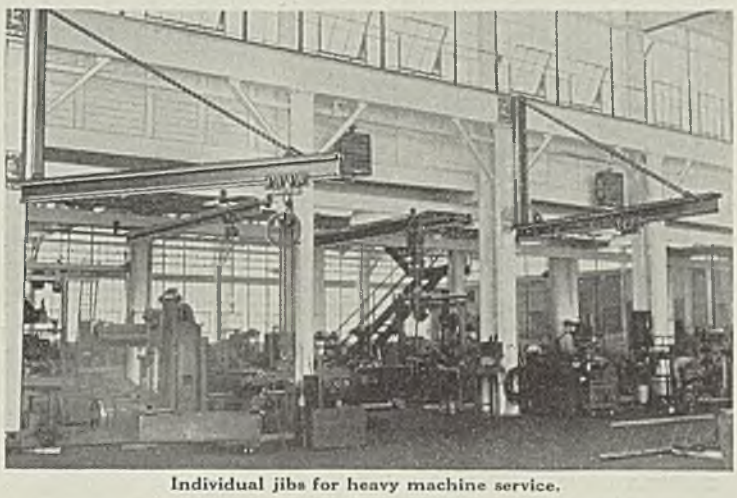
This actually happened in a large automotive plant where they originally installed their own overhead system. They now call for "Easy Roll" track, a name they coined after the above experience.

American MonoRail is "Easy Roll" because it's a high carbon, twin section rail, with overlapping splice to eliminate butt joints and a one piece forged hanger clamped in the rail head to prevent interference with trolleys. Trolleys "Roll Easy" because they contain precision bearings.

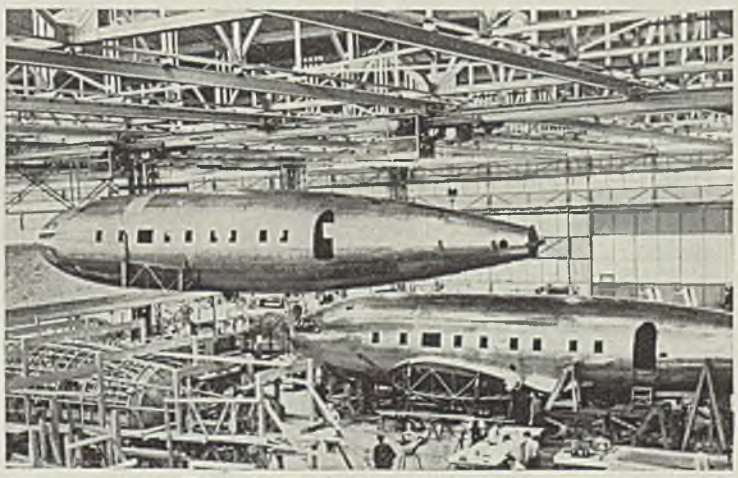
Let an American MonoRail engineer show you these features and explain the cost saving advantages of specialized overhead handling equipment.



Small system in sheet metal plant.



Individual jibs for heavy machine service.



Two cabs operate on long span crane.

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expense of replacements and modernization, that fund having been decreased to 9 per cent of the total. Equipment and ammunition maintenance allocations also were decreased to 3.6 per cent.

Navy department likewise made public figures showing how naval appropriations for the past three years have been expended, and illustrating defensive trends in recent years.

Regular and deficiency naval appropriations in 1937 totaled $530,184,932. Expenditures for new ship construction aggregated $155,008,729; emergency funds for shipbuilding totaled an additional $25,513,345. Maintenance expenditures were $329,419,997, plus emergency total of $920,573. Pay, subsistence, transportation, other personnel items aggregated $177,630,366.

Appropriations in 1938 totaled $530,710,450; expended for new ship construction, $178,716,262; maintenance, $362,073,547; emergency ship construction, $12,369,036; emergency maintenance, $17,798; pay, $187,181,399.

Last fiscal year appropriations totaled $592,150,744; new ship construction expenditures aggregated $222,484,222; maintenance, $374,797,873; emergency ship construction, $4,225,083; emergency maintenance, $68,008; pay, $197,917,436.

Naval appropriations for current fiscal year total $931,684,504; total national defense appropriations for this year are $1,297,000,000, according to the budget bureau.

Army has obtained an increase, says the bureau, of 1200 airplanes; 107,000 men in the regular army; 62,000 in the national guard, and nearly 20,000 in the reserve; 8200 motor vehicles; 700 tanks, armored cars and combat cars; 400 antiaircraft guns and 750 antitank guns.

Navy has gained 2 aircraft carriers; 7 cruisers; 7 light cruisers; 13 submarines; nearly 2000 aircraft; 55,250 manpower, regular navy, 16,150 reserves, and 11,400 marines.

These total gains include the replacement of many over-age and obsolete vessels, which have been retired, it was pointed out.

REVENUE DEPARTMENT LEVIES EXCESS PROFITS ASSESSMENT

Commissioner of internal revenue has advised Senator Tobey, New Hampshire, excess profit tax totaling $3,583,069 has been assessed against aircraft and shipbuilding contracts, as required by the Tobey amendment to Vinson naval bill and subsequent legislation. Act restricts profits under government contracts to 10 per cent in shipbuilding and 12 per cent in aircraft contracts.

Tobey amendment to Vinson naval bill was enacted in 1934. Prior to enactment of this law, profits as high as 90 per cent had been made on government contracts for aircraft and war vessels.

SUPREME COURT GRANTS REPUBLIC LIMITED REHEARING

United States Supreme Court last week granted Republic Steel Corp., Cleveland, a limited rehearing in connection with the company's national labor relations board case.

Rehearing is to be limited to questions raised pertaining to the board's order directing Republic to pay back wages to discharged employes without deducting from the back pay money employes received from WPA or other relief agencies. Labor board's order has held this relief work money was not deductible.

TIN PLATE SCRAP EXPORTS THIS YEAR TOTAL 2589 TONS

Tin-plate scrap exports during first four months this year totaled 2589 tons, valued at $49,853.38, according to state department. April exports were 160 tons, worth $2960.

Japan, in all cases, was the destination for tin-plate scrap exports. Forty licenses have been issued for export of this material during the present calendar year; only four were granted in April.

WAGE-HOUR ADMINISTRATION CRITICIZED BY SHIPBUILDERS

Spokesmen for private shipbuilding concerns now working on naval warship contracts told house naval affairs committee last week there has been considerable improvement since 1933 in methods and time required to build naval vessels. They told the committee they still are hampered, however, by restrictive labor legislation.

Witnesses agreed wage-hour administration's interpretation of the wage-hour law is interfering seriously with training of skilled workmen for shipyards, which now have 68 ships on the ways.

A. B. Homer, Bethlehem Shipbuilding Corp., said his company had been compelled to stop its training program because it was required to pay time-and-a-half overtime to men who voluntarily pursued the training course after hours.

J. B. Woodward, vice president and general manager, Newport News Shipbuilding & Drydock Co., suggested the navy's local inspectors be given greater authority to make decisions to save time now spent in referring relatively minor matters to Washington.

It will do little good for congress to put government and private shipyards on a 48-hour week if hundreds of subcontractors supplying them with materials are held to 40 or 42 hours a week, H. G. Smith, president, National Council of American Shipbuilders, testified.

Mr. Smith said one of the most serious bottlenecks in naval construction was delivery of ordnance, armor and other equipment furnished by the government.

COURT MANDATE ON MINIMUM STEEL WAGES HANDED DOWN

Procurement division, treasury department, sent a notice to all government contracting officers last week calling their attention to Supreme Court's ruling upholding labor secretary's wage determination in the iron and steel industry. Mandate enjoining companies that contract to sell goods to United States government under the Walsh-Healey act to abide by Madame Perkins' wage ruling was handed down late last week.

Counsel for Lukens Steel Co., Coatesville, Pa., and other steel companies who had taken their fight against Secretary Perkins' wage ruling to the Supreme Court had not filed motion for reargument by last Friday, the deadline.

HOUSE COMMITTEE FAVORS SCRAP EXPORT LICENSE BILL

House military affairs committee has favorably reported out a bill introduced by Representative Smith, Connecticut, empowering the President to prohibit iron and steel scrap and pig iron exports except under license. Hearings on the bill, introduced early this year, were held several months ago.

Reporting the bill, house committee provided that "any material which is included in the war department's list of critical and strategic materials" shall not be exported except under license issued by the President. List includes, also, aluminum, antimony, ferrograde manganese, tin and tungsten.

GOVERNMENT WALSH-HEALEY PURCHASES TOTAL $498,735

During week ended May 11, government purchased $498,735.42 worth of iron and steel products under Walsh-Healey act as follows: Bourlier Sheet Metal Works Inc., Louisville, Ky., $10,764; A. Finkl & Sons Co., Chicago, $23,400; Columbia Steel Co., San Francisco, $100,000; Philips & Davies Inc., Kenton, O., $22,700; Indiana Steel & Wire Co., Muncie, Ind., $91,434 (estimated).

Joshua Hendy Iron Works, San Francisco, $17,657; American Bridge Co., Pittsburgh, $99,794.32; Pittsburgh Steel Drum Co., Butler, Pa., $14,945.10; Commercial Shearing & Stamping Co., Youngstown, O., $26,400; American Car & Foundry Co., New York, $81,167; and Osgood Co., Marion, O., $10,374.

50,000 PLANES

Their Production May Require Aid from Automakers

DETROIT

■ FIFTY THOUSAND airplanes are small potatoes in the automotive sense of the word "production", where output is reckoned in thousands per day, but under present manufacturing methods used in the airplane industry, the assembly of this many planes in one year would be a difficult task.

Observers here point to two glaring difficulties which confront aircraft builders to varying degrees. One is the woeful lack of standardization in parts and subassemblies. The other is the serious shortage of skilled labor, conversant with production methods and tools.

It is said no two airplane builders can agree on any one phase of design, and there is even universal disagreement on such an apparently small item as the proper design of engine test houses. If mass production of planes is to be started, the first need is for a meeting of minds on what is to be built and how it can be standardized so necessary jibs and fixtures, tools and equipment can be provided to the end that supply of parts and subassemblies can be farmed out to high-production parts manufacturers.

Adopt Automotive Methods

This calls for a fairly complete upheaval in present concepts of what an airplane is and how much it is to cost. And in the opinion of many, such an upheaval is only a matter of weeks, Conferences now under way at Washington, at which the benefit of automobile production minds will be available, are likely to lead to some completely new manufacturing principles for airplanes, from engines all the way down to tail and wing assemblies.

There is talk of priority systems being established on manufacturing facilities and manpower, so that aircraft production will get the first call, even to the subjugation of automotive production.

As far as manpower and skilled labor are concerned, it is quite true present technicians, such as skilled tool and die makers, are in foreign territory when transferred to aircraft work, as it is now practiced. Remedy here is simply to change aircraft work to conform with what is now being done in the automotive field, and not to attempt any reschooling of skilled labor.

As far as assembly plants for aircraft are concerned, there is no bottleneck here. Plenty of idle plants now are available, and new ones can be built in short order. The 450,000 square feet added to Glenn L. Martin facilities in Baltimore recently was in production in 11 weeks, from the time the contract was placed until operations started. The 600,000-odd square feet set up for Curtiss-Wright was turning out production in only 13 weeks.

Engine Manufacture Slow

There is however, a certain bottleneck in aircraft engines, principally because of the long drawn out and costly methods necessitated in their manufacture. For example, one type of current engine follows through a devious sequence of production steps about as follows: Parts are finished to precision tolerances and oiled before assembly. Oil then is removed and the parts assembled, followed by reoiling after assembly. Then after the primary test, engine is completely disassembled for a minute inspection, and parts are reoiled, pending reassembly to prevent any corrosion. Cleaned before final assembly, the parts are fitted back together, the assembly oiled again and a final quick test given before the engine is approved.

Such a procedure probably yields engines that are well nigh perfect and with a safety factor against failure of probably 5 or 6 to 1. But engines for 50,000 planes in a year at such a slow pace with existing facilities is almost impossible.

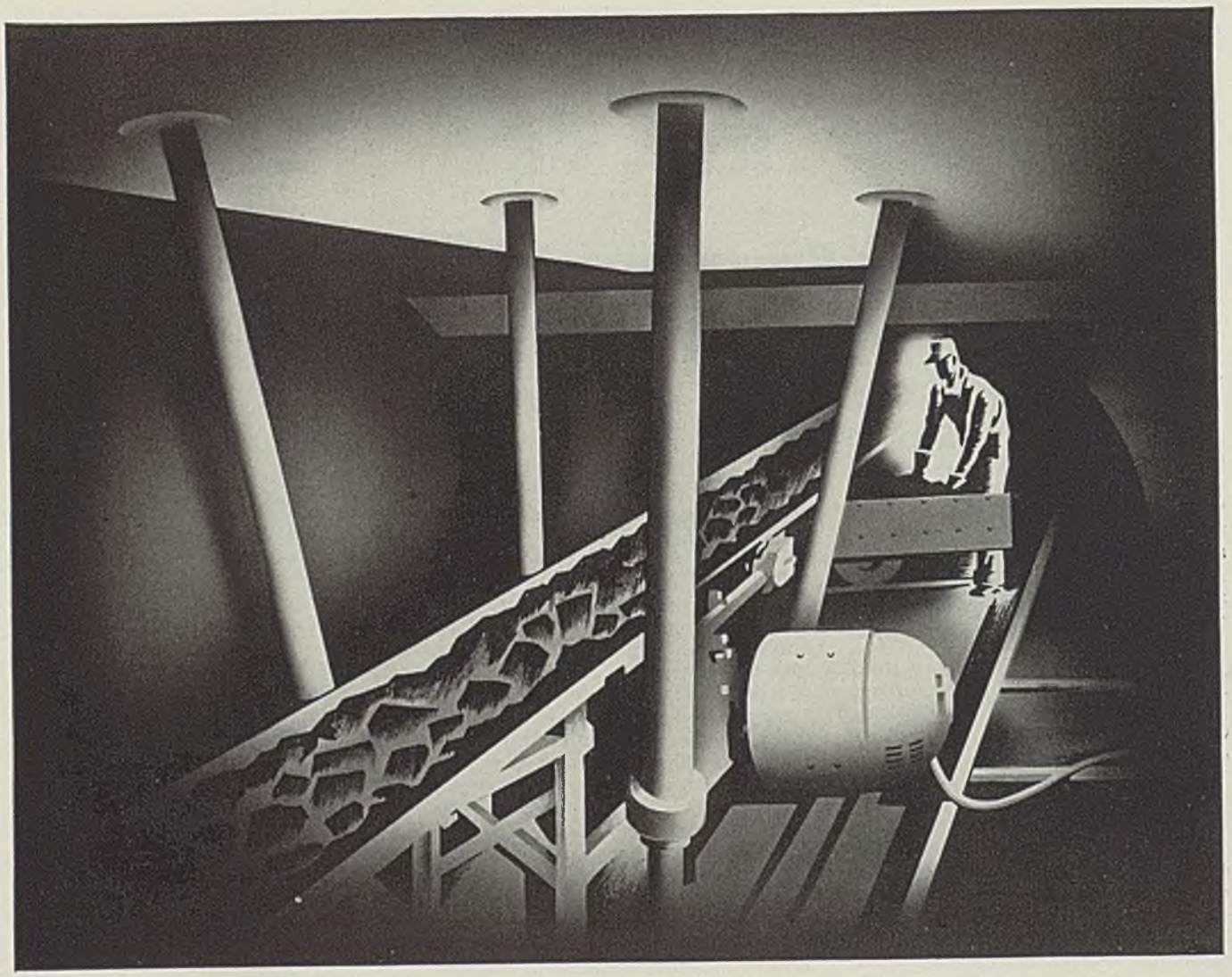
German plane production of a reported 4000 per month appears awesome, but German planes are built at no such exacting standards as those outlined above. They are built in droves and at comparatively low cost. The Germans have adopted American automotive manufacturing technique to aircraft production, and while some of their equipment is good for only 12 hours or so in the air before overhauling, nevertheless there are a dozen more planes ready to take to the air each time one comes back for servicing or collapses.

Expansion Feared

All large airplane plants in this country have plans drawn up for extensive expansion programs, but will not appropriate funds until government assistance is guaranteed. One manufacturer relates he would like to double his plant capacity but is not going out and borrow the money, for fear that any one of a dozen things might happen: First, the war might end and leave him with nothing but cancellations. Second, he probably would lose control of his plant to financial interests. Third, it is futile to expand production without definite orders for definite types of ships in hand, and as yet he does not have these. And so on.

A revolution in aircraft manufacture, under the stimulus of an emergency, real or fancied, appears to be at hand. Automobile builders, with their skill at cutting ruthlessly across miles of red tape, at cutting costs to reasonable levels, and at getting a huge job done efficiently and in a hurry, probably soon will be drawn actively into the picture.

In 1939 the automobile industry used 5,993,590 net tons of steel or 18.1 per cent of total output. Assuming this country will build 5000 super bombers and 45,000 light planes, conservative estimates indicate this is likely to involve less than 300,000 tons of metal, of which about 180,000 tons probably would be steel, including armor plate. On this basis, the aircraft industry with an output of 50,000 planes a year would only use 3 per cent of the amount of steel used by the auto industry and less than 1 per cent of the annual steel ouput on the 1939 basis.



MEETING A SERVICE CHALLENGE

Coal mine shaker conveyors work in cramped quarters. If a conveyor fails, everything stops until repairs or replacements are made. So conveyors must be capable of continuous operation.

One manufacturer now meets the challenge by using Chromium-Molybdenum (SAE 4140) Steel for the all-important crank shafts of his shaker conveyors.

When properly heat treated, the steel develops good tensile and fatigue strength in the 5¾" section used, together with adequate hardness. Conveyor crank shafts made of this steel are achieving remarkable service records.

If anywhere in your product there is a part which presents special difficulties it may likewise pay you to investigate the possibilities of Molybdenum steels. Complete data will be found in our technical book, "Molybdenum in Steel," which is sent free to interested production executives and engineers on request.

PRODUCERS OF MOLYBDENUM BRIQUETTES, FERRO-MOLYBDENUM, AND CALCIUM MOLYBDATE

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MOLY

Mirrors of MOTORDOM

By A. H. ALLEN
Detroit Editor, STEEL

DETROIT

■ AT THIS stage it looks like a busy summer for Detroit, if the forecast of a war department spokesman becomes fact. This party said last week, "Detroit plants should get enough orders from the army to keep every plant in the area going 24 hours a day, six days a week for ten months."

It is assumed that this interpretation figures in the normal complement of passenger car manufacture, but even so it represents a virtual impossibility. In the first place, there are not enough men available to meet such a production. In the second place, the mere placing of orders or appropriating of funds does not mean that production can be started at once. Detailed specifications are needed, including standardization of what various plants are to build. Material is needed, machines are needed. On both the latter scores there would be serious hindrances to anything like 24 hours a day production.

Red Tape Delays Spending

The army is reported to have budgeted $89,000,000 for "ground mechanization," equipment which will be concentrated in Detroit plants. Well, this sum, if it were all spent for vehicles, probably would not cover much over 85,000 units, and if some passenger car facilities were pressed into service this total could be whipped out in a couple of months on a normal production basis.

Exaggerated statements such as the one above, emanating from Washington, are typical of much of the loose thinking in the current hysteria. It is true there is going to be some substantial defense business placed in this area, but what is called for now is some calm, intelligent planning under supervision of industrial leaders, and less brash boasting of what is going to be done overnight.

A little recognized phase of government business is that the appropriation of fantastic sums of money for material and equipment does not mean the spending of such sums. This is probably the answer to what has happened to the reported $7,000,000,000 appropriated for military purposes in the past seven years—the appropriations have been made but lie around rotting while official red tape holds up actual expenditures.

Nevertheless a number of Detroit manufacturers are scrambling around Washington to see what they can grab off in the way of business. Officials of various companies—Briggs, Packard, Continental Motors, etc.—have been conferring with Louis Johnson, assistant secretary of war in charge of procurement of supplies. It is still too early, however, to learn of any definite awards.

Ford Motor Co. is stated to have offered the services of its huge plant on 24-hour notice for government assignments. A Chevrolet plant in Saginaw already is completing a consignment of machine guns for the army.

■ SUGGESTION of Gen. Hugh Johnson that the shortage of skilled pattern, tool and die makers, termed one "bottleneck" in industrial armament expansion, be forestalled by freezing the creation of new and changed models of automobiles caused many an eyebrow to lift around here. Of course it is too late now to do any freezing of 1941 models because they are nearing the finishing touches as far as tools and dies are concerned, but a year hence the story may be different, if the international crisis hangs on. When the hump on new model preparations is passed, about July 1, much of the pressure on tool and die shops will be lessened, and their facilities should be readily available for armament work. Right at the moment, though, these shops are jammed to the hilt with work, many of them working three shifts, and this situation could not be relieved unless by sudden establishment of priority systems by government edict. This is not likely for a while.

With much of the emphasis on airplane production in the defense program, the tool and die shops may be called on to lend assistance to production of tools, dies, jigs and fixtures for plane builders. A disconcerting angle is that many skilled workers in the automotive tool and die trade have been found to be entirely unsuited to working on aircraft parts. Airplane companies have raided the local supply of such skilled workmen in recent months, and many of these men have proved ill adapted to their new field.

Aircraft Technique More Exacting

One reason for this may be that aircraft and automobile design and production techniques are far apart. The one calls for a jeweler's precision, slow, laborious, high-cost methods. The other demands intense speed, permits reasonable tolerances on work, and entails cutting costs at every turn. Perhaps one solution may be to revise entirely the concept of aircraft manufacture, and pattern it more along automotive lines.

Speaking of tool and die shops, a new plant recently was built on the outskirts of this city to specialize on aircraft work. From the day the first shovelful of earth was turned at the plant site until the machines were whirring inside the finished building was only a matter of three weeks. Last Wednesday a crew of machine operators were

hard at work while out front the company's name still had not been painted on the office entrance.

Some production steel tonnage for initial runs of 1941 models has been placed by the early starters like Packard, Buick and Studebaker. More is expected to be released in the next 30 days. Die tryout lots are being requisitioned regularly, indicating that work is proceeding on schedule for new models. The large-volume producers—Chevrolet, Ford and Plymouth—still are releasing materials and parts for 1940 models and unless the retail market takes a nose-dive Ford and Chevrolet probably will continue producing through July.

Chevrolet's last parts release was No. 9 and was scaled down sharply from No. 8. Two more releases are scheduled for the current model, there being usually 11 releases throughout the model year. No. 10 is expected to be back up to the normal level.

Appreciable stiffening in the steel market was observable last week, one company issuing hold-up instructions on all new business, ostensibly because of mounting scrap prices and a complete congestion of its order department. More than one steel company representative in this district is predicting a steel shortage by the third quarter of the year, assuming the European war does not suddenly scuttle itself. Higher costs of raw materials seem to point to higher finished steel prices, probably in the fourth quarter. Those companies which have been offering steel at price concessions applying to shipments before June 30 have shut off the bargain rates, but so far the predominant participation in the steel market has been by a flood of small-tonnage users who have feared being cut off without supplies when the automobile companies come into the market in a larger way.

■ AS IN all years when "volume selling" is the watchword, excessive allowances for used cars are being offered by dealers who follow the questionable plan of "losing money on the individual sales and making it up on the volume." Bulletin just issued by the Detroit dealers' association describes the local retail scene as the "battle of Wayne—the battle for volume sales through wild trading, the battle for abnormal registrations." The Wayne county battle now is said to be waging furiously and will continue on through next month. Figures are offered to support the contention, showing increases in dealer sales November through February of 1940 models 64.9 per cent over the same period in the 1939 model year, comparing with a national average of 21 per cent. Hysteria and gullibility of dealers' over customers' reports of "wild" allowances on used cars explain the situation.

As published in the *N.A.D.A. Bulletin,* the matter is summed up in the words of a Chicago dealer group: "The buying public when it comes to our agencies must feel like Alice in Wonderland. And it is a wonderland where a dealer will use his entire markup to make a sale, or where he will allow as much or more for a used car of a certain year than he did twelve months ago."

Canvass of several Detroit dealers indicates used car stocks are building up to high levels. This is true in most "new car" years such as the present, but new problems are presented, such as how to move merchandise in the $50-$200 price range. Formerly such inexpensive used cars found a good market among workmen in plants here who for a down payment of $5 or $10 could have transportation to and from their jobs. This merchandise is not moving this year for some reason, one explanation being that these buyers have stepped up a notch because of better financing arrangements possible through banks and loan companies, and are now buying cars in the $200-$500 range.

Dive of the stock market in the past few weeks is expected to have an adverse effect on car sales, many buyers always being forced into hiding because of the unsettling effect of bad news, whether is affects them personally or not. This would suggest an immediate tapering in the rate of new car assemblies.

However, April retail sales of new cars and trucks in the United States totaled 410,921 units, a gain of 3 per cent over March, and 31.9 per cent higher than April, 1939, according to the Automobile Manufacturers association.

Pontiac's demon statisticians have been at it again. They announce, after much pencil work, that the 2,000,000th car to be built by this division will leave the final assembly line at 11:03 a.m., June 5; further that the rear axle of this milestone-marking car will be made on the afternoon of June 3, that the motor block was poured in the Pontiac foundry on May 15 and will come off the bank on June 3. Three hundred veteran employes, in company with high GM officials, will greet No. 2,000,000 as she rolls from the line. By way of diversion, the car's tires will be filled with air shipped in cylinders from California, the radiator will brim with water sent from New York city, the fuel tank will have Michigan gasoline, the engine Pennsylvania oil.

Oldsmobile Buys Foundry

Oldsmobile division of General Motors Corp. has announced purchase of former properties of Ryan Bohn Foundry Co. in Lansing, including buildings and 50 acres of land for construction of forge shop. Remodeling and new buildings will require several months for completion and installation of equipment. Eventual employment will be 400. Property adjoins Fisher Body plant in Lansing and brings total area devoted to Olds manufacturing work in Lansing to 183 acres. The project was outlined in these columns March 4.

Ford Motor Co. last week filed its balance sheet as of Dec. 31, 1939, with the Massachusetts commissioner of corporations and taxation, Boston, showing a profit and loss account of $601,239,506 and total assets of $691,911,949. This compares with the 1938 profit and loss account of $588,821,275 and total assets of $673,496,284. The profit and loss increase of $12,418,231 is equal to $3.59 a share, par is $5, on 3,452,900 shares of capital stock. The most significant item in the 1939 balance sheet was the increase of more than $18,000,000 in the machinery and equipment account.

The figures above do not take into consideration any dividends that may have been paid. There is no information available on this point as the company is a closed corporation with the Ford family owning all of the stock.

Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

	1938	1939	1940
Jan.	226,952	356,962	449,314
Feb.	202,597	317,520	421,820
March	238,447	389,495	439,911
April	237,929	354,266	.....
May	210,174	313,248	.....
June	189,402	324,253	.....
July	150,450	218,494	.....
Aug.	96,946	103,343	.....
Sept.	89,623	192,678	.....
Oct.	215,286	324,688	.....
Nov.	390,405	368,541	.....
Dec.	406,960	469,120	.....
Year	2,655,171	3,732,608	.....

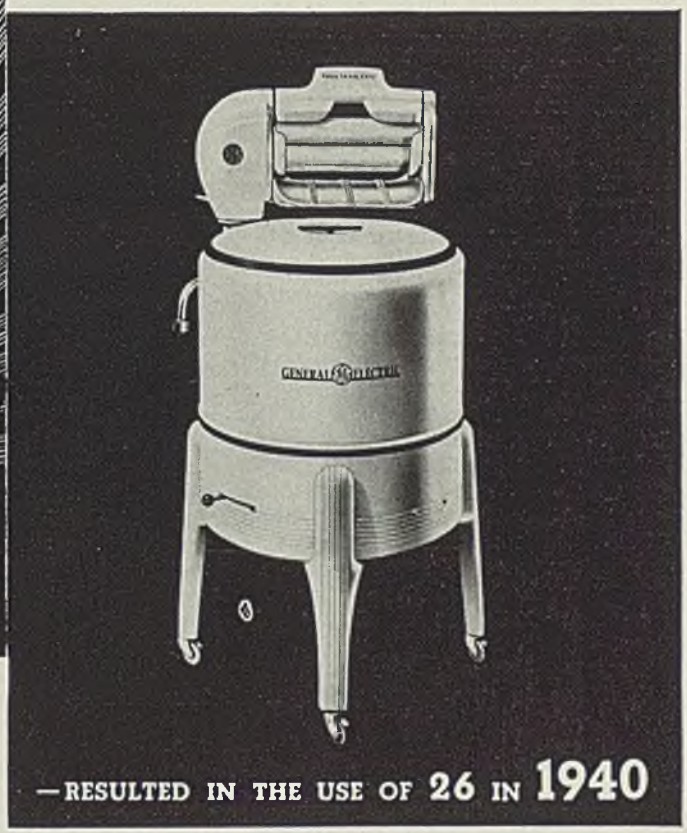
Estimated by Ward's Reports

Week ended:	1940	1939†
April 27	101,405	86,640
May 4	99,305	71,420
May 11	98,480	72,375
May 18	99,030	80,145
May 25	96,810	67,740

†Comparable week.

STAMINA

—DIE CASTINGS STAY ON THE JOB



Many eyebrows were raised when 9 ZINC Alloy Die Castings were specified for decorative and working parts of the 1931 washing machine shown here. But the fact that 26 die castings are similarly employed on a 1940 model—produced by the same manufacturer—is of greater significance to design engineers.

To those unfamiliar with ZINC Alloy Die Castings, this progress story offers convincing evidence of their suitability for metal parts that are under mechanical stress. To the thousands of present users of die castings, the story gives additional assurance that they are taking advantage of one of the most economical and efficient methods of parts manufacturing.

The successful application of ZINC Alloy Die Castings to washing machine production is just one of hundreds of similar case histories to be found in the files of the country's commercial die casters. If you are not thoroughly informed on the physical and economic advantages offered by this modern metal and production method, we suggest that you consult a commercial die caster—or write to The New Jersey Zinc Company, 160 Front Street, New York City.

Copies of earlier advertisements in this series gladly mailed on request.

The Research was done, the Alloys were developed, and most Die Castings are made with

HORSE HEAD SPECIAL (99.99+% Uniform Quality) ZINC

War Requirements Increasingly Divert Canada's Steel Output

TORONTO, ONT.

■ CANADA'S iron and steel industry is being increasingly turned over to war materials production, with new business appearing in continually greater volume. Industry in general throughout the Dominion is operating at virtual capacity. Government officials promise still greater expansion in activities, necessitating a general increase in output.

Finance Minister Ralston reports Canada will expend more than $1,100,000,000 during fiscal year ending March 31, 1941. This includes war expenditures and ordinary public service expenses. Naval expenditures are estimated at more than $100,000,000.

Contracts let in Canada by the Canadian and Allied governments to May 15 totaled $275,000,000. Canadian government placed more than $200,000,000, Allies about $75,000,000. Approximately $50,000,000 was placed outside of Canada, largely in the United States; remaining contracts went to Dominion firms.

Twenty shipyards are engaged in building 9 war vessels, with production well in advance of schedule. Also under construction are 82 airdromes and 175 other projects, including coastal fortifications, submarine defences and airplane hangars. Motor vehicles totaling 9000 are on order at $14,000,000 cost; 3000 have already been delivered overseas. War munitions totaling $80,000,000 are in process of manufacture, and one large explosive plant is being constructed, another is in course of organization.

Order-in-council, published at Ottawa, empowers Finance Minister Ralston to issue certificates to a $179,760,000 maximum, covering requisitions required in the British Commonwealth air training plan to March 31, 1943. Action was taken to guard against possible handicaps to purchase of airplanes, other necessary equipment. Air program expenditure to March 31, 1941 has been set at $116,658,000, with arrangements being made to accelerate air training scheme's operation.

Contracts numbering 937 and aggregating $15,399,613 were placed last week by munitions and supply department, Ottawa. Mechanical transport facilities, aircraft supplies and machine tool orders formed the bulk of contracts placed.

Dominion Steel & Coal Corp. Ltd., Sydney, N. S., has contracted for disposal of about 15 per cent of its ingot production in United Kingdom, according to Arthur Cross, president. Contract calls for approximately 90,000 tons annually, represents the company's excess ingot production over its own rolling mill capacity. Company's rolling mills, said Mr. Cross, are operating at capacity, not only retaining normal domestic and foreign business but also handling its share of the enhanced market in Great Britain.

1939 Rail Tonnage Nearly Double 1938

■ Steel rail output in 1939 amounted to 1,312,647 net tons, almost double the 697,642 net tons rolled in 1938 and since 1930 was exceeded only in 1936 and 1937, according to figures by the American Iron and Steel institute. Seventeen rail mills operated in 1939, one more than in the previous year. Five were located in Pennsylvania, three in Alabama, two each in Ohio and Indiana and one each in New York, Maryland, West Virginia, Illinois and Colorado.

Nearly half the rails made in 1939, or 620,992 tons, weighed between 100 and 120 pounds per yard, 480,675 tons were between 120 and 136 pounds, 34,375 tons were 136 pounds and over and the remainder were under 100 pounds. Comparisons with previous years follow:

PRODUCTION OF RAILS BY PROCESSES

Net Tons

	Open Hearth						
		Rolled				Included in Total	
Years	Rolled from ingots	from new seconds, etc.	Bessemer and Electric	Rolled from old rails	Total	Girder and high tee	Alloy
1920	2,590,280	24,049	160,379	141,902	2,916,610	113,019	14,458
1925	2,999,960	14,881	10,850	93,797	3,119,488	110,454	4,490
1926	3,470,629	10,322	14,037	108,779	3,603,767	130,339	4,722
1927	3,037,761	6,247	1,754	97,502	3,143,264	111,576	1,417
1928	2,882,441	7,317	3,535	71,899	2,965,192	126,728	7,227
1929	2,969,565	12,058	4,714	62,458	3,048,795	122,839	2,201
1930	2,048,640	6,485	2,444	40,452	2,098,021	78,192	5,249
1931	1,268,325	3,492	927	23,937	1,296,681	50,010	597
1932	437,714	2,462	72	10,626	450,874	32,483	633
1933	435,030	10,497	336	20,389	466,252	19,668	489
1934	1,086,879	13,043	2,276	29,253	1,131,451	33,587	1,790
1935	766,820	7,844	633	21,624	796,921	29,053	582
1936	1,317,380	10,017	324	38,507	1,366,228	46,349	502
1937	1,568,931	12,123	700	37,474	1,619,228	43,813	848
1938	675,339	5,471	61	16,771	697,642	19,505	378
1939	1,281,380	6,392	209	24,666	1,312,647	35,618	316

To Commemorate First American Steel Rail

■ Seventy-fifth anniversary of the rolling of the first steel rail in the United States on May 24, 1865, will be commemorated by the Traffic Club of Chicago on June 10 at a luncheon in the Palmer House. Ralph Budd, president, Burlington railroad, and Clarence Randall, vice president, Inland Steel Co., will be featured speakers at the luncheon.

Capt. E. B. Ward's Chicago Rolling Mill will be recalled as having touched off a new era in steelmaking and railroad building when it rolled the first steel rail and as having had a leading part in the great steel expansion that followed. Although various forms of iron rail sections were in use in the eighteenth century, it wasn't until the discovery of the pneumatic process for purification of iron that a steel rail was economically possible. The process, discovered independently by Henry Bessemer in England and William Kelly in this country, attracted Captain Ward's attention who became associated with William Kelly as one of the directors of the Kelly Pneumatic Process Co.

In 1864 the Kelly company built an experimental plant at Wyandotte, Mich., where Ward operated a rolling mill. First American commercial ingots of pneumatic process steel were poured in this mill and one of these ingots was used a few months later in rolling the first steel rail in Chicago.

Ford Will Rebuild River Rouge Furnace

■ Ford Motor Co., Dearborn, Mich., will reline and modernize its "Henry" blast furnace at the River Rouge plant. Reconstruction of the furnace, which has been in continuous operation for six and one-half years, will begin June 15 and should be completed by Aug. 23. Contract for the work has been awarded to Arthur G. McKee Co., Cleveland.

Metal Trades Group Stresses Need For Operator Training Programs

■ URGENCY for developing skilled machine operators to cope with increases in demand for metal products was stressed at the forty-second annual convention of the National Metal Trades association, Hotel Biltmore, New York, on May 21-22.

An acute shortage already exists, members reported, and with emergency action on the new national defense program being urged, an intensive short-range program is imperative. This should supplement a longer term program, it was agreed.

More than 300 heard speakers discuss this and other training and personnel problems. Raymond E. Baldwin, Connecticut governor, and guest speaker at the annual dinner, urged industry and the country at large to make sure that it has a government in which it can place its fullest confidence in what he called more difficult days to come.

Need "Stronger Horse"

The coming election, Governor Baldwin pointed out, would establish the government leadership for at least the next four years. In that period, he predicted, problems confronting us will far surpass anything now being experienced.

"You probably will hear much over the next few weeks," he said, "about the inadvisability of 'swapping horses in the middle of the stream.' My contention is, let's get a stronger horse before getting to the stream."

He charged the present administration has failed miserably in solving the country's domestic problems. "Hence what right have we to believe that it will be any more successful in coping with the still graver problems which loom abroad?" The governor accused the present administration "which is so proud, so boastful of its grasp of foreign affairs, had permitted our national defense to come to such a pass that today we face a dire emergency."

Nelson W. Pickering, president, Farrel-Birmingham Co. Inc., Ansonia, Conn., and retiring president of the association, outlined progress the organization is making in the field of labor relations. He regarded it as significant that while industry generally has not been so fortunate, very few members of the association have been involved in strikes in the past year.

He presented statistics for 1939, remarking that "even in the face of the continuous conservative swing of public opinion against 'wild cat' union organizing activities, the department of labor reported that in that year there were 2613 strikes affecting 1,171,000 employes, the third largest number of strikes in recent years."

A. H. Timmerman
Elected president, National Metal Trades association

This, he continued, was approximately 150 less strikes than in 1938 but about 400,000 more employes were involved than during the preceding year. The strikes in 1939 were approximately half of the total of 4740 which occurred in 1937, when there were more disturbances than in any other year in the history of the United States. For the period of 1933-1939, inclusive, there was a loss of 121,000,000 man-days, on account of strikes, which, calculated on the basis of average earnings of $5 per day, represented a loss to workers alone of approximately $605,000,000.

Discussing management's responsibilities, he said that it was important that top management in every plant stand for a definite, constructive policy in its employe relations. The supervisory force should understand and appreciate the complexity of its job and recognize the part the foreman must play in selling industry to the employe.

Forum Is Held

A feature of the program was a question-and-answer panel relating to various subjects as health programs, job rating, apprenticeship versus specialist training, older employes, credit unions and employe rating. The foreman came in for special attention in a series of questions relating to his compensation and the part the foreman should play in promoting sound industrial relations.

Panel comprised G. W. Cannon, vice president, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.; Col. J. P. Gillard, general superintendent, Cleveland Twist Drill Co., Cleveland; A. L. Fost, assistant general manager, Sargent & Co., New Haven, Conn.; A. W. Hawkes, president, Congoleum-Nairn Inc., Kearny, N. J.; H. H. Kerr, president, Boston Gear Works, North Quincy, Mass.; and N. R. Knox, vice president, Bucyrus-Erie Co., South Milwaukee. Wis.

Asserting mutual understanding is the key to sound employer-employe

relations, William A. Carson, president, Sunbeam Electric Mfg. Co., Evansville, Ind., said it is essential that the employer frankly advise the employe of the company problems and make a point of knowing the problems of the employe.

"Particular concern," he said, "should be directed toward the development of those policies which employes consider most vital to their own particular welfare. These in the order of their importance are: Security of employment, rates and amount of pay, opportunity for advancement, good working conditions."

Noting the disposition of employers to tempt skilled workers from one another, a disposition which always arises in times of labor shortage as at present, Charles H. Edgar, Otis Elevator Co., New York, and chairman of the association's committee on apprenticeship condemned the practice roundly and said that the only true solution to the problem was in the training of men from within a company's own organization.

He said that it not only was not fair to the other employer to take away his skilled men, but that it was costly to the company doing it.

Need Training Programs

Mr. Edgar also stressed the need for development of intensive programs for training specialists in view of the present scarcity and referred to measures being taken by the Warner & Swasey Co., Cleveland, and others in shaping up short-term programs. He urged closer co-operation between industry and civic and state educational interests and said it was important that "top management" of industry become more directly interested in this problem.

A. S. Redway, vice president, Farrel-Birmingham Co. Inc., reported on his company's experience in "Putting Job Rating to Work." A. S. Davis, Dexter Folder Co., Pearl River, N. Y., submitted a preliminary report on the progress of the establishment of a salary rating plan, which, it was believed, will prove particularly useful in rating of supervisory, office and engineering personnel. Howard Goodman, vice president, Goodman Mfg. Co., Chicago, discussed "A Branch Program on Industrial Relations."

A. H. Timmerman, Wagner Electric Corp., St. Louis, was elected president of the association. He succeeds Nelson W. Pickering, president, Farrel-Birmingham Co., Ansonia, Conn.

Roe S. Clark, Package Machinery Co., Springfield, Mass., was named first vice president and H. H. Kerr, Boston Gear Works Inc., North Quincy, Mass., second vice president and treasurer.

Councilors for two years include: Ralph H. Illingworth, Boston, Machine Works Co., Lynn, Mass.; D. P. Sommer, Keystone Steel & Wire Co., Peoria, Ill.; Arthur E. Blackwood, Norton Lasier Co., Chicago; George A. Seyler, The Lunkenheimer Co., Cincinnati; T. H. Doan, The Foote-Burt Co., Cleveland; and R. W. Gillispie, Jeffrey Mfg. Co., Columbus, O.; S. Owen Livingston, Gallmeyer & Livingston Co., Grand Rapids, Mich.; A. E. Newton, The Collins Co., Collinsville, Conn.; N. R. Knox, Bucyrus-Erie Co., South Milwaukee, Wis.; R. G. Wilson, The Challenge Machinery Co., Grand Haven, Mich.; J. L. Kopf, Jabez Burns & Sons Inc., New York; Ernest Dunford, Landis Machine Co., St. Louis; D. Norris Benedict, Frick Co., Waynesboro, Pa.; N. W. Pickering, Farrel-Birmingham Co. Inc., Ansonia, Conn.; and W. F. Newhouse, Saranac Machine Co., Benton Harbor, Mich.

First Quarter Production of Iron and Steel Products for Sale as Analyzed by Institute

		Number of companies	Items	Annual Capacity Net tons	Production for Sale—Net Tons First Quarter - 1940			
					Total	Per cent of capacity	Shipments: Export	Shipments: To members of the industry for conversion into further finished products
Steel Products	Ingots, blooms, billets, slabs, sheet bars, etc.	32	1	x x x x x x x	1,073,843	x x x	316,210	364,615
	Heavy structural shapes	8	2	5,205,300	536,714	41.5	40,746	-
	Steel piling	4	3	328,000	29,178	35.8	3,133	-
	Plates—Sheared and Universal	19	4	5,855,450	880,496	60.5	87,843	10,098
	Skelp	7	5	x x x x x x x	118,204	x x x	20,162	39,548
	Rails—Standard (over 60 lbs.)	4	6	3,647,600	490,614	54.1	21,205	-
	Light (60 lbs. and under)	6	7	306,800	25,180	33.0	6,985	-
	All other (Incl. girder, guard, etc.)	2	8	118,000	10,976	37.4	1,420	-
	Splice bar and tie plates	14	9	1,300,200	166,156	51.4	2,755	-
	Bars—Merchant	35	10	x x x x x x x	1,045,903	x x x	79,151	86,720
	Concrete reinforcing—New billet	14	11	x x x x x x x	226,072	x x x	75,061	-
	Rerolling	18	12	x x x x x x x	27,030	x x x	3,478	-
	Cold finished—Carbon	13	13	x x x x x x x	163,632	x x x	2,477	-
	Alloy—Hot rolled	15	14	x x x x x x x	207,557	x x x	12,924	15,429
	Cold finished	14	15	x x x x x x x	23,496	x x x	499	-
	Hoops and baling bands	5	16	x x x x x x x	21,317	x x x	1,196	-
	TOTAL BARS	53	17	12,355,730	1,715,007	55.8	174,777	102,149
	Tool steel bars (rolled and forged)	15	18	110,220	16,596	60.6	732	-
	Pipe and tube—B. W.	13	19	1,665,860	196,154	47.4	21,060	-
	L. W.	10	20	1,360,360	73,113	21.6	9,822	-
	Electric weld	5	21	731,520	53,719	29.5	6,974	-
	Seamless	15	22	3,347,590	455,401	54.7	45,580	-
	Conduit	5	23	133,145	15,006	45.3	551	-
	Mechanical Tubing	12	24	367,475	52,273	57.2	2,986	-
	Wire rods	19	25	x x x x x x x	253,839	x x x	60,407	38,691
	Wire—Drawn	37	26	2,255,350	336,122	59.9	40,395	5,057
	Nails and staples	19	27	1,091,690	133,441	49.2	14,664	-
	Barbed and twisted	16	28	438,270	41,712	38.3	6,372	-
	Woven wire fence	15	29	772,791	57,518	29.9	612	-
	Bale ties	11	30	119,050	11,331	38.3	45	-
	All other wire products	6	31	27,030	2,286	34.0	-	-
	Fence posts	12	32	145,800	11,429	31.5	230	-
	Black plate	12	33	653,295	91,933	56.6	3,941	31,287
	Tin plate—Hot rolled	9	34	1,201,960	144,319	48.3	51,283	-
	Cold reduced	10	35	2,930,860	554,495	76.1	122,503	-
	Sheets—Hot rolled	26	36	x x x x x x x	1,334,759	x x x	134,978	40,306
	Galvanized	16	37	x x x x x x x	309,137	x x x	45,392	-
	Cold rolled	18	38	x x x x x x x	570,661	x x x	25,875	-
	All other	15	39	x x x x x x x	149,856	x x x	4,679	-
	TOTAL SHEETS	27	40	13,233,770	2,364,413	71.8	210,924	40,306
	Strip—Hot rolled	24	41	3,524,750	350,929	40.0	19,401	41,632
	Cold rolled	35	42	1,305,360	177,088	54.6	4,592	-
	Wheels (car, rolled steel)	5	43	419,035	58,853	56.5	1,649	-
	Axles	5	44	472,280	27,909	23.8	1,350	-
	Track spikes	11	45	327,275	29,595	36.4	1,505	-
	All other	4	46	9,100	3,095	136.8	-	-
	TOTAL STEEL PRODUCTS	133	47	x x x x x x x	10,558,957	x x x	1,302,814	673,383
	Estimated total steel finishing capacity based on a yield from ingots of 68.9 %	-	48	53,714,800	x x x x x x x	74.0	x x x x x	x x x x x x x
Iron Products	Pig iron, ferro manganese and spiegel	27	49	x x x x x x x	1,309,597	x x x	76,958	357,225
	Ingot moulds	4	50	x x x x x x x	87,238	x x x	453	-
	Bars	9	51	160,600	7,974	20.0	34	704
	Pipe and tubes	3	52	109,377	8,647	31.8	370	-
	All other	2	53	71,180	3,294	18.6	810	1,004
	TOTAL IRON PRODUCTS (ITEMS 51 to 53)	11	54	276,247	19,915	29.0	1,214	1,708

Total steel products produced for sale, less shipments to members of the industry for conversion into further finished products: Current month 9,885,374 *N.T.,* 74.0 *% of Finishing Capacity.*
To date (Quarter) N.T.: % of Finishing Capacity.
The above tonnages represent 68.9 *% of the ingots produced by companies whose products are included above.*

Total number of companies included - 153

MEN of INDUSTRY

■ URLIN K. BECKER, vice president and formerly secretary, Continental Steel Corp., Kokomo, Ind., has been elected treasurer, succeeding the late Niles Chapman. William G. Harter has been made secretary, also retaining the position of assistant treasurer. Garland L. Rathel, purchasing agent of Continental since its formation, has been named vice president in charge of purchases.

D. A. Williams, president, has been made chairman, executive committee, a position held by the late Mr. Chapman, and Mr. Becker becomes a member of the committee to fill the vacancy created by Mr. Chapman's death.

Mr. Becker has been identified with the steel industry about 32 years. When Continental Steel was incorporated in 1927, Mr. Becker was chosen secretary, becoming assistant treasurer in 1930, vice president in 1931, and a director in 1933.

Mr. Harter's first association with the steel industry began 18 years ago, when he joined the engineering department of Chapman Price Steel Co., Indianapolis. A year after formation of Continental he was transferred to Kokomo, serving successively as assistant purchasing agent; credit manager, and assistant treasurer.

Mr. Rathel has a record of 27 years in the steel industry, most of this period being spent in the purchasing side of the business.

♦

E. L. Parsons has been appointed sales manager, Winfield H. Smith Inc., Springville, N. Y.

♦

George M. Alexander, formerly associated with the John Wahl Commission Co., St. Louis, recently dissolved, has been named St. Louis district representative for the George Birkenstein Corp., Chicago.

♦

E. J. Parker has been elected president, Howard Aircraft Corp., Chicago, succeeding Ben O. Howard, resigned. Mr. Parker formerly was with the Fisher Body division of General Motors Corp.

♦

Charles E. S. Dickerson has been appointed manager of sales of cold finished steel bars, Edgar T. Ward's Sons Co., Pittsburgh. He has been associated with the company in an executive capacity since January of this year, and before that was president and general manager, Miami-Dickerson Steel Co., Dayton, O. He began his career in the steel industry in 1928, joining Dickerson Steel Co., Dayton, and shortly became vice president and general manager. In August, 1936, when that firm was combined with Miami Iron & Steel Co., Dayton, to form Miami-Dickerson Steel Co., he became president and general manager. Mr. Dickerson has also served as secretary, vice president and president of the Cincinnati chapter, American Steel Warehouse association.

Urlin K. Becker

William G. Harter

Garland L. Rathel

♦

James F. McNamara, manager of monel and rolled nickel sales, International Nickel Co., New York, and J. E. Baker, vice president, Blair & Co. Inc., New York, have been named directors, Harvil Aircraft Die Casting Corp., Los Angeles.

♦

Otto L. Lehecka, formerly with Latrobe Electric Steel Co., Latrobe, Pa., has been appointed sales representative for Braeburn Alloy Steel Corp., Braeburn, Pa., and will be associated with Braeburn's Cleveland office.

♦

James H. Herron, president, James H. Herron Co., Cleveland, has been made an honorary member, Cleveland Engineering society. He is a past president of the society and a past president, American Society of Mechanical Engineers.

♦

E. J. Eldridge has resigned as traffic manager, Truscon Steel Co., Youngstown, O., to become traffic manager, Certain-Teed Products Corp., New York. Mr. Eldridge served Truscon 12 years and also was director of purchases.

♦

J. A. St. Clair has been made chief sales engineer, industrial division, E. C. Atkins & Co., Indianapolis. The past several years he has worked as engineer in the engineering department and was in charge of the service department.

♦

James C. Stewart, president, James Stewart & Co., New York, has been elected chairman of the board. Harry D. Watts, heretofore executive vice president, becomes president, and Roger Peabody, vice president, has been named a director.

♦

Charles G. McCabe has joined the technical staff of Battelle Memorial institute, Columbus, O., and will assist in work being undertaken on the chemistry of the open-hearth steel process. He has had ten years open-hearth experience with American Rolling Mill Co., Middletown, O.

♦

W. B. Coullie, assistant to the president and general sales manager, Harbison-Walker Refractories

Co., Pittsburgh, has been elected vice president. He has been identified with the sales division of the company 34 years. H. S. Robertson, formerly an assistant general sales manager, has been named general sales manager.

♦

A. L. Moses, formerly vice president and sales manager, Great Lakes Forge Co., Chicago, has been elected vice president, American Forge division, American Brake Shoe & Foundry Co., with offices in the New Center building, Detroit.

♦

O. P. Robinson, heretofore associated with the Chicago sales office of Cutler-Hammer Inc., Milwaukee, has been transferred to the company's Pittsburgh sales engineering staff. Mr. Robinson is an electrical engineering graduate of Armour Institute of Technology, Chicago, and a member, Association of Iron and Steel Engineers.

♦

C. R. Hale has been named purchasing agent, Air Reduction Co., New York, and its subsidiary and affiliated companies. He succeeds H. M. Daggett, retired. Mr. Hale, a graduate of Columbia university, joined the purchasing department of Air Reduction in 1925, and has been assistant purchasing agent since 1936.

♦

Charles N. Fitts, of Boston, has been elected an honorary member, American Institute of Steel Construction, New York. Until his retirement last year, Mr. Fitts was a director of the institute from the time it was organized, and was a member of the executive committee the past ten years. He also served as president from 1928 to 1932. Mr. Fitts was treasurer, New England Structural Co. from 1895 until its liquidation in 1939.

♦

J. Roy Porter, since 1928 president, Marshall & Huschart Machinery Co., Chicago, was named chairman of the board recently at a banquet honoring his 50 years of service to the machine tool industry. George Habicht Jr., heretofore assistant to Mr. Porter, has become president and general manager. Frank Seese, secretary-treasurer, has relinquished his duties as secretary to his former assistant, C. P. Stollstorff, who becomes secretary and remains assistant treasurer.

♦

Arthur S. Knoizen, vice president, Joy Mfg. Co., Franklin, Pa., was elected chairman, manufacturers' division, American Mining congress, at a meeting held during the recent coal show in Cincinnati. The following were named to other offices in the division: First vice chairman, E. J. Burnell, Link-Belt Co., Chicago; second vice chairman, E. F. Carley, E. I. du Pont de Nemours & Co., Wilmington, Del.; third vice chairman, J. W. Haddock, Sullivan Machinery Co., Michigan City, Ind.

♦

J. R. Kumer has been appointed manager of stainless bar and wire sales, Allegheny Ludlum Steel Corp., Pittsburgh. Mr. Kumer entered the steel business in 1919 with Union Steel Casting Co., Pittsburgh, with which firm he was associated until joining the former Allegheny Steel Co. in 1926. In 1933 Mr. Kumer was placed in charge of the general sales department, and in 1939 was promoted to assistant manager of sales, stainless bar and wire products of Allegheny Ludlum.

♦

Max W. Lightner has been named assistant to general superintendent, Homestead, Pa., works, Carnegie-Illinois Steel Corp. He was formerly chief metallurgist at Homestead.

C. R. Hale

Mr. Lightner, who received degrees in metallurgy from Pennsylvania State college and Carnegie Institute of Technology, began his corporation service as an assistant metallurgist at Homestead in 1933. He was made assistant chief metallurgist in 1934, became assistant superintendent of open hearth No. 4 in 1936, and chief metallurgist in 1937.

♦

E. V. Creagh, sales promotion manager, American Chain & Cable Co., Bridgeport, Conn., has been re-elected president, Industrial Advertising and Marketing council, a chapter of the National Industrial Advertisers association. Other officers elected are: A. W. Tucker, Henry G. Thompson & Sons Co., New Haven, Conn., re-elected first vice president; D. M. Davidson, Fafnir Bearing Co., New Britain, Conn., second vice president; and Galen Snow, Snow, Bates & Orme Inc., Springfield, Mass., re-elected secretary-treasurer. Alexis Doster, Torrington Mfg. Co., Torrington, Conn., and E. N. Bidwell, Whitney Chain Co., Hartford, Conn., have been elected directors for a term of two years.

♦

Warren W. Scherer has been appointed superintendent of industrial relations, and Arthur M. Krieger, superintendent of maintenance, Irvin works, Carnegie-Illinois Steel Corp. Other promotions at Irvin works are: John A. Drgon, assistant superintendent of maintenance; Thomas W. Hunter, assistant division superintendent, flat products finishing; Charles A. Larkin, general foreman, cold reduction; William Springfield, lubrication foreman, maintenance; and John Sturdy, maintenance foreman, flat products finishing.

♦

Directors of Sharon Steel Corp., Sharon, Pa., recently made the following title changes among its officers: Position of secretary-treasurer has been split, J. Reid Evans, who served many years with the dual title, being named treasurer, and A. J. Watson, assistant secretary being elected secretary.

Mason Evans Jr. was elected assistant treasurer, and G. R. Johnston, auditor, was named assistant secretary and auditor.

J. H. Carter was elected operating vice president to succeed J. Milton Hughes, recently transferred to the corporation's Pittsburgh office.

M. F. Coon has been made assistant chief engineer, serving both the Sharon and Lowellville plants.

♦

E. J. Skinner, associated with Renown Stove Co., Owosso, Mich., 31 years, working in various departments, has been named factory superintendent. He succeeds the late Claude J. Sperry. The past several years Mr. Skinner has been assistant factory superintendent.

♦

Pierre S. du Pont, 70, has retired as chairman of the board, E. I. du Pont de Nemours & Co., Wilmington, Del., after 21 years in that position. Succeeding to the chairmanship is Lammot du Pont, 59, who has resigned from the presidency he held since 1926. Walter S. Carpenter Jr., 52, has resigned as chairman of the executive committee to become president, the second man other than a Du Pont to head the company in its 138-year history.

Irenee du Pont, 63, has resigned as vice chairman, but with his oldest brother, will continue a member of the board and the finance committee.

Angus B. Echols, vice president, has become chairman, finance committee, and J. B. Eliason, treasurer, has also been elected a vice president and director.

Activities of Steel Users, Makers

■ WESTINGHOUSE ELECTRIC & Mfg. Co. will expand its household refrigerator capacity at Mansfield, O., by 33 per cent in a program to cost over $500,000. A new metal stamping building 70 x 360 feet 3 stories, designed by Albert Kahn Inc., Detroit, will be erected beside the present vitreous enameling plant. Porcelain-enameled parts manufactured in this building will be carried by conveyor through a 1220-foot overhead bridge, to be completed soon, to the assembly line in the main building.

In addition, a third and fourth story, 80 x 80 feet, will be built atop the wire goods building to increase production facilities for refrigerator wire shelves.

Work on the foundation will start in June and structural work in July. Program will be completed early in September and production should begin in November. General contractor will let bids within three weeks.

♦

Gedson Steel Products Co. Inc., New York, has been formed by W. F. Evans to engage in export business in iron and steel products, with offices at 67 West Forty-fourth street. Mr. Evans, in the export business 30 years, was formerly associated with American Steel Export Co. and Pennsylvania Steel Products Co.

♦

Sawhill Mfg. Co. has moved its offices and plant from Bridgeville to Wheatland, Pa.

♦

Cutler-Hammer Inc., Milwaukee, has moved its Minneapolis office and warehouse to larger quarters at 532 South Seventh street.

♦

Fire-Brick Engineers Inc., Milwaukee, has been appointed sales representative in Wisconsin for Charles Taylor Sons Co., Cincinnati.

♦

Kaukauna Machine Corp., Kaukauna, Wis., manufacturer of machine tool castings and machine tools, has been licensed to use the Sorbo-Mat process, by Sorbo-Mat Process Engineers, St. Louis.

♦

Cowles Detergent Co., Cleveland, maker of industrial alkalies and soaps, has appointed Mau-Sherwood Supply Co., Cleveland, distributor for its line of metal cleaners in northern Ohio and northwestern Pennsylvania.

♦

New England Metallurgical Corp., South Boston, Mass., specializing in heat treatment of steel, has purchased the Greenman Steel Treating Co., Worcester, Mass., and will continue operations at the latter plant. A. Dudley Bach, president of the parent and subsidiary organizations, will be in charge of both plants, L. P. Greenman, retiring.

♦

Welding table and positioner division of Ransome Concrete Machinery Co., Dunellen, N. J., has appointed the following representatives to handle its line of welding tables and positioners: Arcway Equipment Co., Philadelphia, covering Pennsylvania, Delaware, West Virginia, Maryland, Virginia and part of New Jersey; Hobart Welder Sales & Service, Cleveland, covering northeastern Ohio.

Died:

■ GEN. OTTO H. FALK, 74, chairman of the board, Allis-Chalmers Mfg. Co., Milwaukee, May 21 in Milwaukee. He had been ill since last fall of a heart ailment. Born in Milwaukee, June 18, 1865, General Falk attended the German-English academy there and Northwestern college at Watertown, after which he enrolled in Allen Military academy, Chicago, and was graduated a captain. The early years of General Falk's life were devoted to a military career, and he advanced rapidly in the national guard until he reached the rank of brigadier general in 1911. He then retired to enter industry, and in 1912 was appointed receiver for the old Allis-Chalmers Co. A year later he was elected president of the reorganized company, and some years ago was made board chairman. General Falk was an active figure in Wisconsin's civic affairs; was a director, First Wisconsin National bank and affiliated corporations, a director of Wisconsin Manufacturers association, and an officer and director in many other organizations.

Gen. Otto H. Falk

♦

Walter T. Lamb, 51, manager, Kewanee Iron & Metal Co., Kewanee, Ill., in that city, recently.

♦

Haddon G. Carlson, 45, the past 17 years purchasing agent, Milcor Steel Co., Milwaukee, May 19 in Milwaukee.

♦

James W. Watson, 50, transportation manager, Monroe, Mich., plant of Republic Steel Corp., Cleveland, in Monroe, May 4.

♦

James H. Cranwell, 83, retired industrialist, May 15 in Baltimore. He was in charge of the Baltimore division of Continental Can Co. from 1917 to 1928 when he retired.

♦

Percy H. Knight, 72, a retired employe of Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., at his home in Costa Mesa, Calif., May 4. He had been with the company 40 years.

♦

S. C. Rebman, vice president and general sales manager, Jersey Shore Steel Co., Jersey Shore, Pa., May 9. Mr. Rebman was associated with the steel and steel tube business over 40 years.

♦

J. E. Hamilton, 88, founder, Hamilton Mfg. Co., Two Rivers, Wis., and chairman of the board, Aluminum Goods Mfg. Co., Two Rivers and Manitowoc, Wis., recently in Pasadena, Calif., where he had lived since retirement from the chairmanship of the Hamilton company four years ago.

♦

Conrad M. Conradson, inventor and machine tool designer, May 20 in Detroit. He was associated with Vickers Inc., Detroit, as consulting engineer. He is credited with being one of the early originators to apply the hydraulic principle in machine tool designing, obtaining his first patent on the process 40 years ago.

♦

John Milton McKinley, 57, vice president in charge of operations, North American Refractories Co., Cleveland, May 19 in that city. Prior to becoming identified with the fire brick industry in 1910, he was associated with the former Carnegie Steel Co. at Clairton, Pa., where he advanced from draftsman to superintendent of construction. He had been with North American Refractories since 1929.

1939 Production of Steel Ingots, Castings and

All Figures in Net Tons

ANNUAL STEEL PRODUCTION (Ingots and steel for castings)

Years	Open Hearth			Bessemer	Crucible	Electric	Total
	Basic	Acid	Total				
1910	17,127,408	1,357,642	18,485,050	10,542,305	136,979	61,975	29,226,309
1915	24,985,772	1,534,822	26,520,594	9,281,678	127,436	79,452	36,009,160
1920	35,140,810	1,451,712	36,592,522	9,949,057	80,937	566,370	47,188,886
1925	41,537,823	1,060,804	42,598,627	7,530,837	21,910	689,373	50,840,747
1929	52,900,309	1,254,926	54,155,235	7,977,210	7,442	1,065,603	63,205,490
1930	38,380,514	874,559	39,255,073	5,639,711	2,523	686,111	45,583,421
1931	24,786,046	424,668	25,210,714	3,386,259	1,733	460,255	29,058,961
1932	13,151,804	184,406	13,336,210	1,715,925	722	270,044	15,322,901
1933	22,464,004	363,469	22,827,473	2,720,246	763	471,747	26,020,229
*1934	26,047,187	307,651	26,354,838	2,421,840	595	404,651	29,181,924
1935	34,004,585	396,695	34,401,280	3,175,235	719	606,471	38,183,705
1936	48,288,605	471,858	48,760,463	3,873,472	914	865,150	53,499,999
1937	51,265,211	559,768	51,824,979	3,863,918	1,046	947,002	56,636,945
1938	28,774,999	305,017	29,080,016	2,106,340	7	565,627	31,751,990
1939	47,828,700	581,100	48,409,800	3,358,916	931	1,029,067	52,798,714

ANNUAL STEEL INGOT PRODUCTION

Years	Open Hearth			Bessemer	Crucible	Electric	Total
	Basic	Acid	Total				
1910	16,641,355	876,742	17,518,097	10,476,969	120,592	56,919	28,172,577
1915	24,612,696	1,084,326	25,697,022	9,178,105	110,909	52,281	35,038,317
1920	34,637,560	850,194	35,487,754	9,831,480	79,000	388,925	45,787,159
1925	41,027,907	543,024	41,570,931	7,470,544	19,857	376,295	49,437,627
1929	52,241,511	645,560	52,887,071	7,942,681	6,454	596,279	61,432,485
1930	37,966,340	411,243	38,377,583	5,623,058	1,751	344,308	44,346,700
1931	24,625,365	217,715	24,843,080	3,372,761	931	263,621	28,480,393
1932	13,092,235	117,369	13,209,604	1,711,969	270	158,287	15,080,130
1933	22,369,542	218,954	22,588,496	2,716,872	447	335,785	25,641,600
1934	26,023,970	225,202	26,249,172	2,421,840	595	390,986	29,062,593
1935	33,974,575	278,333	34,252,908	3,175,235	719	581,436	38,013,298
1936	48,239,427	311,815	48,551,242	3,873,472	914	788,718	53,214,346
1937	51,205,848	373,490	51,579,338	3,863,918	1,046	912,027	56,356,329
1938	28,746,725	218,227	28,964,952	2,106,340	7	524,843	31,596,142
1939	47,788,763	437,307	48,226,070	3,358,916	931	951,522	52,537,439

PRODUCTION OF DUPLEX STEEL

Years	Net tons	Years	Net tons	Years	Net tons
1915	1,995,270	1931	1,059,345	1936	2,350,994
1920	3,672,613	1932	323,975	1937	3,256,837
1925	3,132,996	1933	432,492	1938	1,325,658
1929	3,316,647	1934	662,338	1939	2,317,382
1930	2,290,710	1935	1,075,222		

PRODUCTION OF ALLOY STEEL INGOTS AND CASTINGS

Years	Ingots	Castings	Total	Years	Ingots	Castings	Total
1910	603,077	32,880	635,957	1933	1,652,448	80,397	1,732,845
1915	1,034,041	109,644	1,143,685	*1934	1,787,009	18,739	1,805,748
1920	1,782,972	76,555	1,859,527	1935	2,337,918	36,099	2,374,017
1925	2,598,837	126,093	2,724,930	1936	3,122,672	106,985	3,229,657
1929	4,216,001	216,071	4,432,072	1937	3,332,670	63,871	3,396,541
1930	2,595,245	141,263	2,736,508	1938	1,606,977	46,533	1,653,510
1931	1,529,931	100,692	1,630,623	1939	3,120,859	91,096	3,211,955
1932	848,467	45,969	894,436				

PRODUCTION OF ALLOY STEEL INGOTS AND CASTINGS BY PROCESSES

Years	Open Hearth			Bessemer	Crucible	Electric	Total
	Basic	Acid	Total				
1929	3,629,393	120,968	3,750,361	107,870	2,607	571,234	4,432,072
1935	1,829,566	82,208	1,911,774	.....	172	462,071	2,374,017
1936	2,508,671	129,658	2,638,329	.....	234	591,094	3,229,657
1937	2,559,200	164,455	2,723,655	.....	270	672,616	3,396,541
1938	1,179,031	102,089	1,281,120	13	5	372,372	1,653,510
1939	2,302,273	156,581	2,458,854	3,486	231	749,384	3,211,955

*The figures for 1934 and subsequent years include only that portion of the steel for castings which was produced in foundries operated by companies producing steel ingots.

PRODUCTION OF TIN PLATE AND TERNE PLATE

Years	Tin plate	Terne plate	Total
1920	1,539,976	39,984	1,579,960
1925	1,729,288	45,532	1,774,820
1929	2,034,170	43,503	2,077,673
1930	1,859,564	23,055	1,882,619
1931	1,559,294	17,451	1,576,745
1932	1,104,563	12,188	1,116,751
1933	1,888,125	21,245	1,909,370
1934	1,683,268	36,941	1,720,209
1935	1,898,578	98,382	1,996,960
1936	2,355,531	142,303	2,497,834
1937	2,708,373	161,610	2,869,983
1938	1,601,679	127,827	1,729,506
1939	2,505,636	181,537	2,687,173

PRODUCTION OF HOT ROLLED IRON AND STEEL PRODUCTS BY STATES

States	1935	1936	1937	1938	1939
Maine, Mass., Rhode Island, Conn.	222,645	276,546	258,610	151,829	240,358
New York	1,074,186	1,612,842	2,051,368	1,087,130	1,868,642
New Jersey	105,389	124,373	126,562	84,030	119,639
Pennsylvania	7,304,097	11,235,879	12,507,869	6,583,138	11,024,195
Delaware, Md., Va.	1,094,644	1,531,053	1,980,982	1,453,271	2,206,873
West Virginia	1,170,457	1,334,371	1,260,428	812,768	1,364,430
Kentucky, Tenn., Ga., Texas	640,340	737,812	666,098	411,483	605,385
Alabama	815,797	1,217,904	1,420,356	1,121,256	1,665,451
Ohio	6,050,182	8,620,971	8,685,531	5,200,010	8,609,872
Indiana	3,669,923	4,962,821	5,484,020	2,899,327	4,996,518
Illinois	2,117,081	2,811,479	3,103,713	1,523,309	2,721,429
Michigan, Wis., Minn.	1,643,445	1,913,984	2,218,543	1,274,028	2,080,614
Missouri, Okla.	225,523	353,574	323,465	216,751	376,510
Colorado, Wash.	317,848	598,677	610,458	286,271	606,531
California, Canal Zone	388,741	525,258	480,353	399,230	517,109
Total	26,840,298	37,857,544	41,178,356	23,503,831	39,003,556

PRODUCTION OF HOT ROLLED IRON AND STEEL PRODUCTS IN 1939

	Net tons
Flat Rolled Products:	
Plates (sheared and universal)	3,101,981
Sheets	9,978,637
Strip	1,826,696
Hoops	72,971
Cotton ties and baling bands	34,580
Strip and sheets for cold reduced black plate and tin plate	2,662,193
Black plate	795,607
Total	18,472,665
Bars:	
Merchant	4,871,891
Concrete reinforcement	1,266,459
Total Bars	6,138,350
Structural shapes	3,358,985
Sheet piling	158,296
Rails	1,312,647
Long splice bars, tie plate bars, etc.	519,075
Skelp	2,330,128
Blanks or pierced billets for seamless tubes	2,018,502
Wire rods	3,680,297
Car wheels (rolled steel)	148,382
Cross ties	14,692
Rolled forging blooms, billets and axle blanks	600,566
Blooms, billets, slabs and sheet bars for export	150,377
All other finished hot rolled products	100,594
Total	14,392,541
Grand total	39,003,556

Finished Products, Announced by Steel Institute

All Figures in Net Tons

PRODUCTION OF FLAT HOT ROLLED PRODUCTS BY CLASSES

	1936	1937	1938	1939
PLATES:				
Universal	758,015	936,573	382,629	690,128
Sheared	2,071,935	2,695,865	1,537,206	2,411,853
TOTAL	2,829,950	3,632,438	1,919,835	3,101,981
Black sheets	7,835,413	8,780,247	5,314,869	9,978,637
Hoops	122,392	115,284	74,578	72,971
Cotton ties and baling bands	42,315	70,017	38,127	34,580
Strip	3,611,906	3,243,028	1,153,861	1,826,696
Strip and sheets for cold reduced black plate and tin plate	.....	.....	1,815,294	2,662,193
TOTAL	11,612,026	12,208,576	8,396,729	14,575,077
BLACK PLATE:				
For tinning and terne plate	2,557,381	2,923,631	702,778	670,729
All other	387,848	384,945	88,732	124,878
TOTAL	2,945,232	3,308,576	791,510	795,607
GRAND TOTAL	17,387,208	19,149,590	11,108,074	18,472,665

PRODUCTION OF PLATES, SHEETS AND STRIP BY SIZES

	1936	1937	1938	1939
	(a)	(a)	(a)	(a)
UNIVERSAL PLATES:				
Over 6" to 48" wide—¼" and thicker	673,270	839,766	345,843	615,067
Over 48" wide—0.1875" and thicker	84,745	96,807	36,786	75,061
TOTAL	758,015	936,573	382,629	690,128
SHEARED PLATES:				
Over 6" to 48" wide—¼" and thicker	759,750	849,060	464,050	762,011
Over 48" wide—0.1875" and thicker	1,312,185	1,846,805	1,073,156	1,649,842
TOTAL	2,071,935	2,695,865	1,537,206	2,411,853
Black sheets (c)	.....	.....	5,314,869	9,978,637
STRIP (d):				
To and including 6" in width	1,130,609	1,030,931	504,535	980,740
Over 6" and including 24" in width	2,481,297	2,212,094	649,326	845,956
TOTAL	3,611,906	3,243,028	1,153,861	1,826,696

(a) New classification adopted January 1, 1938.

(b) Over 6" to and including 12" from January 1, 1938.

(c) Hot-rolled sheets—3½" and less in width by 0.0254" and less in thickness; over 3½" to 6" inclusive in width by 0.0343" and less in thickness; over 6" to 12" inclusive in width by 0.0567" and less in thickness; over 12" to 32" in width by 0.2499" to 0.0142" inclusive in thickness; over 32" to 48" inclusive in width by 0.2499" and less in thickness; over 48" in width by 0.1874" and less in thickness.

(d) Hot-rolled strip—3½" and less in width by 0.2499" to 0.0255" inclusive in thickness; over 3½" to 6" inclusive in width by 0.2499" to 0.0344" inclusive in thickness; over 6" to 12" inclusive by 0.2499" to 0.0568" inclusive in thickness.

PRODUCTION OF IRON AND STEEL MERCHANT BARS

Years	Total	Years	Total
1920	6,865,869	*1936	5,670,502
1925	6,338,433	*1937	5,809,108
1929	7,235,084	*1938	2,607,181
1930	4,627,810	*1939	4,871,891
*1935	4,142,944		

*Includes bolt, nut and rivet, spike and chain, toe calk, horseshoe, finger, staybolt and all other miscellaneous bars which in 1933 and prior years were included in "all other" miscellaneous hot rolled products.

PRODUCTION OF IRON AND STEEL CONCRETE REINFORCEMENT BARS

Years	Rolled from new steel	Rolled from old material	Total
1920	*	*	641,138
1925	*	*	917,937
1929	*	*	1,079,232
1930	764,603	187,566	952,169
1935	453,950	170,293	624,243
1936	918,985	233,005	1,151,990
1937	758,527	187,377	945,904
1938	727,173	150,569	877,742
1939	1,049,793	216,666	1,266,459

*Data not available.

PRODUCTION OF HEAVY AND LIGHT STRUCTURAL SHAPES

Years	Heavy shapes	Light shapes	Total
1929	4,542,289	809,093	5,351,382
1930	3,372,149	561,821	3,933,970
1935	1,460,047	499,662	1,959,709
1936	2,482,277	763,069	3,245,346
1937	2,852,172	817,896	3,670,068
1938	1,653,648	429,037	2,082,685
1939	2,677,967	681,018	3,358,985

PRODUCTION OF NAILS

Years	Wire nails	Cement coated wire nails (a)	Cut nails and cut spikes
1929	655,052	105,937	26,692
1930	478,071	75,406	22,996
1935	443,596	52,301	19,748
1936	595,999	70,738	26,314
1937	543,329	70,494	24,425
1938	481,980	46,733	19,662
1939	673,914	65,705	24,913

(a) Included in production of wire nails.

PRODUCTION OF SEAMLESS, LAP-WELD, BUTT-WELD, AND ELECTRIC-WELD PIPE AND TUBES IN 1939

SEAMLESS PIPE AND TUBES*

	Standard pipe	Line pipe	Oil country goods	Boiler tubes	Mechanical tubes	Miscellaneous	Total
Hot finished†	117,957	444,778	857,278	96,326	78,167	17,053	1,611,559
Cold drawn	5,323	788	1,948	26,431	84,045	5,117	123,652
Total	123,280	445,566	859,226	122,757	162,212	22,170	1,735,211

LAP-WELD, BUTT-WELD AND ELECTIC-WELD PIPE AND TUBES*

Lap-weld ¶	202,530	100,376	49,972	16,832	.....	11,996	381,706
Butt-weld¶	1,104,766	33,181	42	.....	.....	41,505	1,179,494
Electric-weld ¶	134,076	61,833	140,843	.....	68,645	62,464	467,861
Total	1,441,372	195,390	190,857	16,832	68,645	115,965	2,029,061

*Production of black pipe, including stainless steel pipe and black pipe subsequently galvanized, sherardized, or enameled.

†Does not include hot finished tubes subsequently cold drawn.

¶Includes Iron and Steel.

Manufacturers Are Puzzled

■ MANY manufacturers throughout the country are deeply concerned over the part they will be expected to play in the execution of the national defense program. They would like to be able to make policies with respect to their activities in the immediate and near future. They are handicapped by a setup which makes it extremely difficult to get—from responsible representatives of the government—adequate answers to the questions they have in mind.

Last week's developments at Washington afford very little encouragement to those who favor quick and efficient action in a matter so vitally important as the national defense.

The President stated that a three-point policy would govern execution of the defense program. Not a single war millionaire will be created in this country, he declared, as a result of the war disaster. Labor will not be allowed to take advantage of its collective power by fomenting strikes and squeezing higher wages from employers in the so-called war industries. Under no circumstances will the administration sanction a weakening of the social legislative gains of the past seven years. Labor standards prescribed in the Walsh-Healey act and the wages-hours law must not be relaxed in the name of national defense, the President said.

Business Experts To Be Enlisted In Defense Program Development

Among last week's moves to strengthen the national defense effort was the navy's authorization of a 48-hour work week in navy yards, and the hiring of 15,000 more civilian employes. Congress went into action to provide as soon as possible the necessary funds. John L. Lewis served notice that CIO would organize the airplane industry and all others having to do with national defense. The President said he hoped for a 40 or 42-hour work-week as standard in the national defense program, with as little overtime as possible, so as to provide maximum employment for idle workers.

In the near future, said the President, he would call to Washington a number of industrial and other experts to aid the government in carrying out the defense program. He rejected suggestions that he might set up something resembling the war industries board of 1918. There is no blueprint, he explained, that could describe the type of organization he has in mind.

Another highlight last week was the President's expressed desire to strengthen the country against "fifth column" activities. Another was the joint conclusion, at a conference participated in by the President, members of congress and representatives of the army and navy, that two to three years would be required to develop adequate facilities for training air pilots in sufficient numbers and that development of the necessary air bases would require three to five years.

Situation Confused but Industry Is Ready To Mesh with National Plan

Adding up all these different factors that affect the national defense program, we get a confused and rather discouraging picture. Just what we are going to do, how we are going to do it, who is going to do it, how soon we will get started, are not at all clear at the moment. It seems that certain groups—CIO, for example—have a vested interest in the program.

The present situation recalls that which has prevailed in France over the past decade, when national defense work was made to conform to the demands of the communist and labor fronts. History undoubtedly will have much to reveal about the extent to which this situation made it possible for the Germans to cut through to the English channel on the eleventh day of their drive on the Western front.

American industry is ready to mesh into the national defense program as soon as it knows what it is to do.

The *BUSINESS TREND*

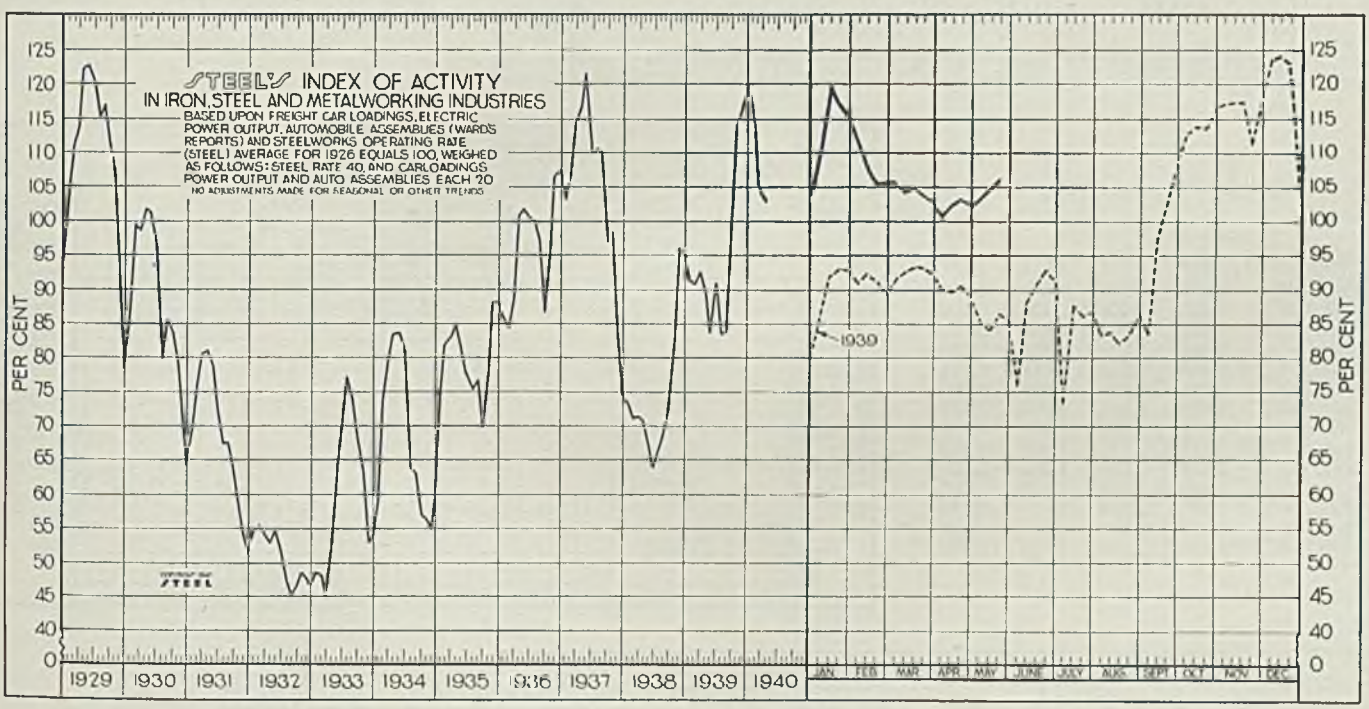
Index Registers Third Consecutive Weekly Gain

■ INDUSTRIAL activity recorded further gains during the past week, with advances developing in steelmaking operations, electric power consumption and in a number of other lines.

Another encouraging factor in the current outlook is the expansion of activity in the aircraft and machine tool industry. The rearmament program recently requested by President Roosevelt is expected to materially expand the large backlog of orders already accumulated in the shipbuilding, aviation and machine tool industries.

STEEL'S index of activity in the iron, steel and metalworking industries recorded the third consecutive weekly increase during the period ended May 18. The index now stands at 106.8, a gain of 2 points over the 104.8 level recorded in the previous period and is well above the 86.6 index figure registered at this time a year ago. In the corresponding weeks of 1938 and 1937, the index stood at 67.1 and 122.2 respectively.

Steelmaking operations during the week ended May 18 advanced 3½ points to 70 per cent, the highest level since the week ended Feb. 10, and still further improvement is indicated over the coming weeks.



STEEL'S index of activity gained 2 points to 106.8 in the week ended May 18:

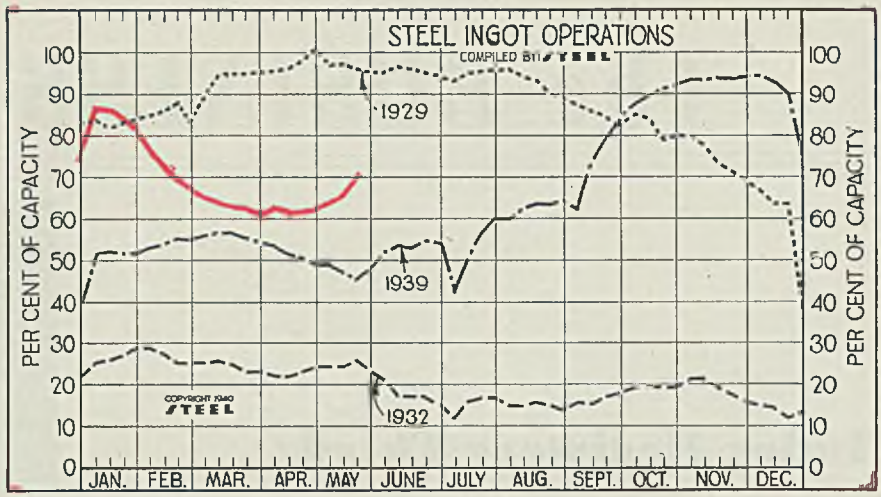
Week Ended	1940	1939
Mar. 9	104.7	92.7
Mar. 16	104.9	93.3
Mar. 23	103.7	93.2
Mar. 30	103.2	92.2
Apr. 6	101.8	90.0
Apr. 13	102.7	89.7
Apr. 20	103.4	90.4
Apr. 27	102.8	89.2
May 4	103.3	85.1
May 11	104.8	84.2
May 18	106.8	86.6

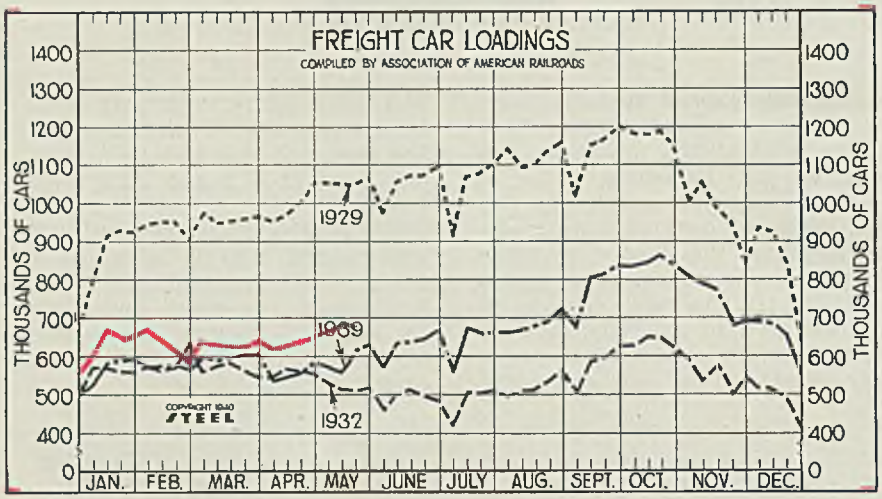
Mo. Data	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Jan.	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6	104.1
Feb.	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2	111.2
March	104.1	92.6	71.2	114.4	88.7	83.1	78.9	44.5	54.2	80.4	98.6	114.0
April	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0	101.7	122.5
May	.....	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6	101.2	122.9
June	.....	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1	95.8	120.3
July	.....	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3	79.9	115.2
Aug.	.....	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4	85.4	116.9
Sept.	....	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3	83.7	110.8
Oct.	....	114.0	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2	78.8	107.1
Nov.	.....	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4	71.0	92.2
Dec.	....	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3	64.3	78.3

Steel Ingot Operations

(Per Cent)

Week ended	1940	1939	1938	1937
Feb. 17....	69.0	55.0	31.0	83.0
Feb. 24....	67.0	55.0	30.5	84.0
Mar. 2....	65.5	56.0	29.5	86.0
Mar. 9....	63.5	56.5	30.0	87.0
Mar. 16....	62.5	56.5	32.0	89.0
Mar. 23....	62.5	55.5	35.0	90.0
Mar. 30....	61.0	54.5	36.0	91.5
Apr. 6....	61.5	53.5	32.0	91.5
Apr. 13....	61.0	51.5	32.0	91.5
Apr. 20....	61.5	50.5	32.5	91.5
Apr. 27....	61.5	49.0	32.0	91.0
May 4....	63.5	49.0	31.0	91.0
May 11....	66.5	47.0	30.0	89.0
May 18....	70.0	45.5	30.0	91.5





Freight Car Loadings

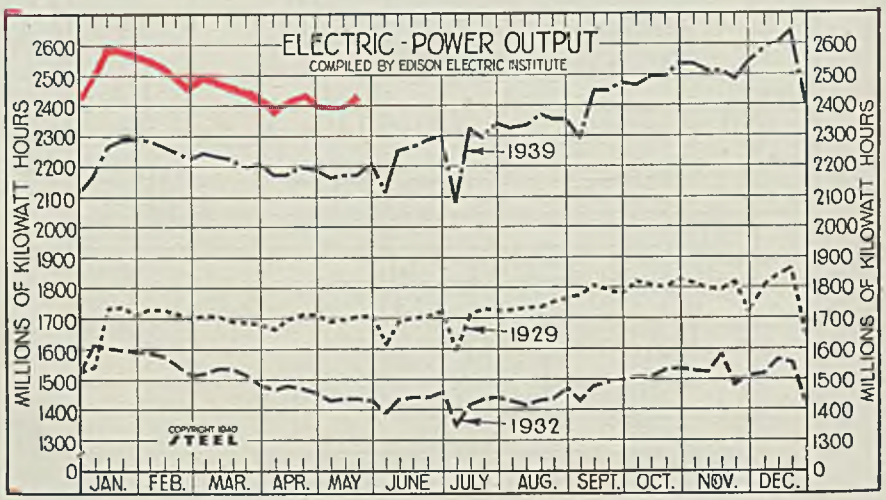
(1000 Cars)

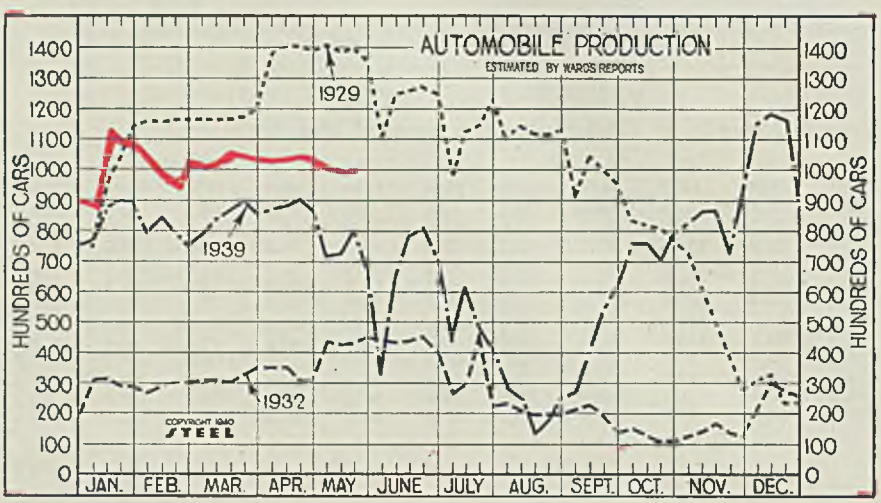
Week ended	1940	1939	1938	1937
Feb. 17.....	608	580	536	715
Feb. 24.....	595	561	512	697
Mar. 2.....	634	599	553	734
Mar. 9.....	621	592	557	749
Mar. 16.....	619	595	540	759
Mar. 23.....	620	605	573	761
Mar. 30.....	628	604	523	727
Apr. 6.....	603	535	522	716
Apr. 13.....	619	548	538	751
Apr. 20.....	628	559	524	761
Apr. 27.....	645	586	543	782
May 4.....	666	573	536	767
May 11.....	681	555	542	774
May 18.....	679	616	546	779

Electric Power Output

(Million KWH)

Week ended	1940	1939	1938	1937
Feb. 17...	2,476	2,249	2,059	2,212
Feb. 24...	2,455	2,226	2,031	2,207
Mar. 2....	2,479	2,244	2,036	2,200
Mar. 9....	2,464	2,238	2,015	2,213
Mar. 16...	2,460	2,225	2,018	2,211
Mar. 23...	2,424	2,199	1,975	2,200
Mar. 30...	2,422	2,210	1,979	2,147
Apr. 6....	2,381	2,173	1,990	2,176
Apr. 13...	2,418	2,171	1,958	2,173
Apr. 20...	2,422	2,199	1,951	2,188
Apr. 27...	2,398	2,183	1,939	2,194
May 4....	2,386	2,164	1,939	2,176
May 11...	2,388	2,171	1,968	2,195
May 18...	2,422	2,170	1,968	2,199

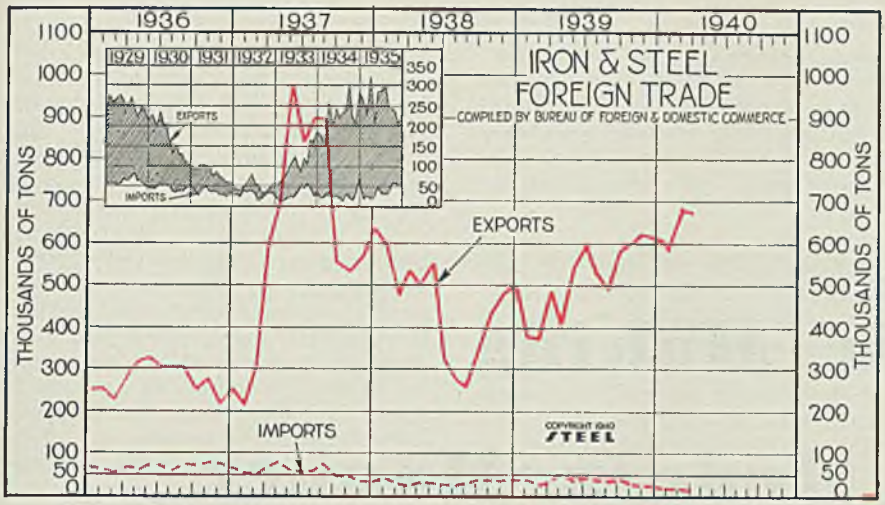




Auto Production

(1000 Units)

Week ended	1940	1939	1938	1937
Feb. 17....	95.1	79.9	59.1	95.7
Feb. 24....	102.6	75.7	57.0	111.9
Mar. 2....	100.9	78.7	54.4	127.0
Mar. 9....	103.6	84.1	57.4	101.7
Mar. 16....	105.7	86.7	57.5	99.0
Mar. 23....	103.4	89.4	56.8	101.0
Mar. 30....	103.4	86.0	57.5	97.0
Apr. 6....	101.7	87.0	70.0	99.2
Apr. 13....	101.9	88.0	62.0	125.5
Apr. 20....	103.7	90.3	60.6	133.2
Apr. 27....	101.4	86.6	50.7	139.5
May 4....	99.3	71.4	53.4	140.2
May 11....	98.4	72.4	47.4	140.4
May 18....	99.0	80.1	46.8	131.3



Iron and Steel Foreign Trade

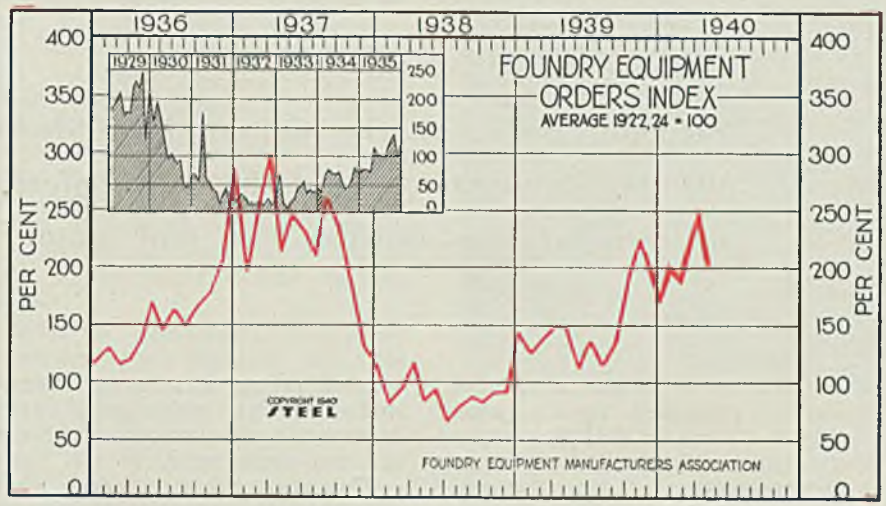
(Thousands of Tons)

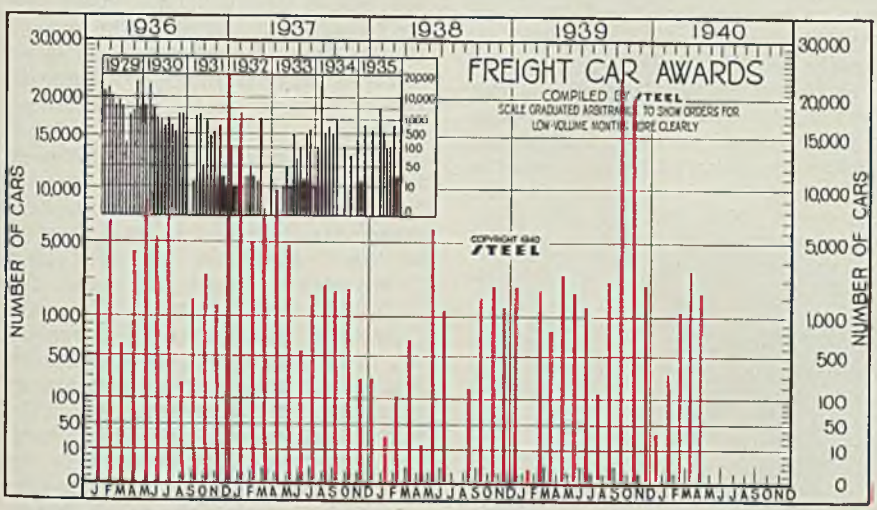
	Exports			Imports		
	1940	1939	1938	1940	1939	1938
Jan.	583.6	362.7	586.3	8.3	27.7	29.6
Feb.	671.3	359.7	460.6	6.7	19.1	19.6
Mar.	664.0	474.4	526.9	5.1	25.4	11.8
April	.....	394.0	489.2	...	44.1	21.2
May	.....	532.6	540.6	...	28.1	20.8
June	.....	588.9	312.0	...	32.6	15.9
July	.....	513.7	263.7	...	30.8	14.7
Aug.	.....	477.1	242.1	...	28.3	20.0
Sept.	.....	575.6	346.1	...	29.9	28.0
Oct.	.....	591.9	425.4	...	19.2	26.4
Nov.	.....	605.6	6.46.2	...	15.2	27.6
Dec.	.....	600.4	490.1	...	14.7	28.8
Tot'l.	.....	6076.4	5152.7	...	315.2	264.6

Foundry Equipment Orders Index

1922-24 = 100

	1940	1939	1938	1937	1936
Jan.	197.9	122.3	76.8	190.9	127.0
Feb.	179.4	135.3	90.4	249.5	110.4
Mar.	243.4	146.6	114.6	294.2	115.0
April	192.9	146.0	79.3	208.3	134.0
May	.....	108.8	90.6	242.0	165.4
June	.....	134.6	61.2	228.2	141.4
July	.....	111.9	74.2	204.0	159.5
Aug.	.....	131.4	83.3	257.5	144.8
Sept.	.....	184.4	78.7	231.8	161.0
Oct.	.....	220.4	87.9	185.2	173.8
Nov.	.....	203.1	89.7	128.0	200.4
Dec.	.....	164.8	141.8	111.2	283.3
Ave.	.....	150.8	89.4	210.9	159.7





Freight Car Awards

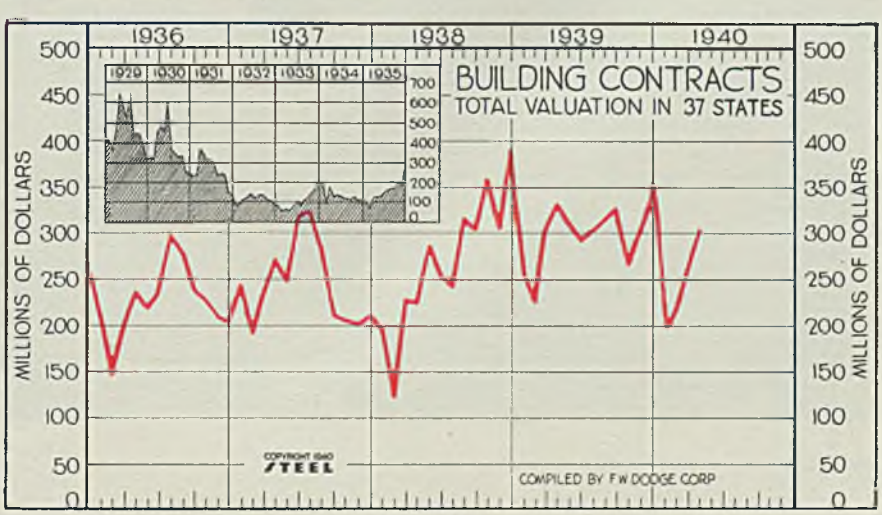
(Hundreds of Cars)

	1940	1939	1938	1937
Jan.	3.60	.03	.25	178.06
Feb.	11.47	22.59	1.09	49.72
Mar.	31.04	8.00	6.80	81.55
April	20.77	30.95	.15	97.72
May	.....	20.51	60.14	47.32
June	.....	13.24	11.78	5.48
July	.....	1.10	.00	10.30
Aug.	.....	28.14	1.82	14.75
Sept.	.....	230.00	17.50	12.16
Oct.	.....	196.34	25.37	13.55
Nov.	.....	26.50	12.32	2.75
Dec.	.....	.35	25.81	2.75
Total	.....	577.75	163.03	516.11

Construction Total Valuation In 37 States

(Unit: $1,000,000)

	1940	1939	1938	1937	1936
Jan.	$196.2	$251.7	$192.2	$242.7	$204.8
Feb.	200.6	220.2	118.9	188.3	142.1
Mar.	272.2	300.7	226.6	231.2	199.0
April	360.5	330.0	222.0	269.5	234.8
May	.....	308.5	283.2	243.7	216.1
June	.....	288.3	251.0	317.7	232.7
July	.....	299.9	239.8	321.6	294.7
Aug.	.....	312.3	313.1	281.2	275.3
Sept.	.....	323.2	300.9	207.1	234.3
Oct.	.....	261.8	357.7	202.1	225.8
Nov.	.....	299.8	301.7	198.4	208.2
Dec.	.....	354.1	389.4	209.5	199.7
Ave.	.....	$295.9	$266.4	$242.8	$222.3



Die Making
In the Modern Manner

Seasonal peaks in the automotive industries mean tool and die requirements cannot be met effectively by plant tool departments, so independent tool shops have grown rapidly

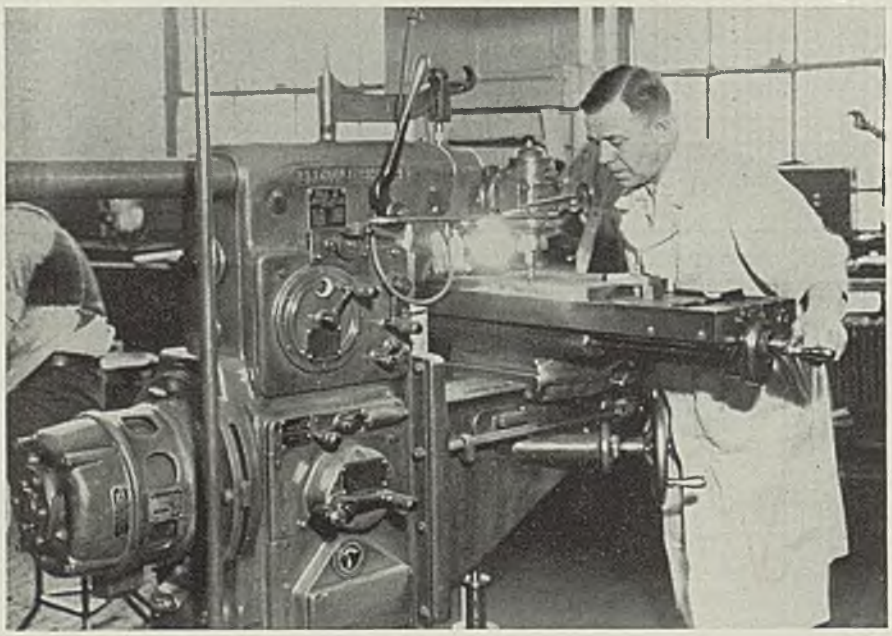
By FRED B. JACOBS

■ WHILE some of the basic tool designing principles remain practically the same as they were fifty years ago, methods followed in actual construction of jigs, fixtures, gages, punches and dies of all kinds have been changed greatly in recent years. In the old days, every manufacturer in the metalworking industry maintained his own tool room, equipped with what were considered accurate machine tools. These were manned by skilled "all-around" workmen. Seasonal rushes as we know them today were practically nonexistent. Toolmaking was carried on in a leisurely manner and the work was spread out to keep the toolmakers busy throughout the entire year.

The great change came about with the development of the modern automobile produced through intensive production methods in "yearly models." This resulted in a three-months-yearly rush to get the jigs, fixtures and other tools out in time to put the new models into production, followed by nine months of comparative inactivity in the tool room. This state of affairs resulted in the rise of independent tool and die shops specializing in the manufacture of special tools for the production metalworking industries. Many of these independent tool shops are well organized and well equipped, and so are in a position to turn out special tools of all kinds cheaper than it is possible to produce them in the conventional toolroom.

Representative methods followed in the production of such special tools in these independent tool shops are reflected in the practice of the J. C. Ulmer Co., 1791 East Thirty-eighth street, Cleveland, the history of which dates back to 1893. Originally this company began as a maker of surveying, engineering and other accurate instruments of precision. A department still is devoted to that work. Its major efforts, however, are devoted to designing and building special machinery and special tools of all kinds. The plant is equipped with about 75 high-grade machine tools, the facilities enabling at least 75 men to work on one shift. The designing staff ordinarily is 10 men.

Conditions under which work is accepted vary. In some instances clients desiring special tools present



The vertical milling attachment is used for a diversity of intricate milling operations where it is advantageous to have the work directly before the toolmaker's eyes at all times. The operation shown consists of milling an intricate die casting

only general ideas, on the basis of which the company designs the tools practically "from the bottom up." In other cases companies submit their own complete blueprints. Sometimes work is done on an hourly basis, and then again it is done on contract.

It is obvious that the basic tool making force must be composed of skilled, experienced men. Therefore the company has a number of key men constantly on its payroll. These can be depended upon to get satisfactory results under all conditions. A number of junior mechanics also are employed. These men are selected from the ranks of the most promising of high and trade-school graduates. Many of these young men develop remarkable skill in a relatively short time.

Bonus System Followed

The work is specialized to a great extent. For example, there are some men who devote their time to lathe, planer and shaper, and milling machine work, while others devote considerable time to bench work. This reflects the modern trend in machine shop practice. It hardly could be expected that an all-around toolmaker could be as skilled in boring accurate jigs as a man who devotes all his time to this work. By the same token, a man who devotes all his time to making punches and dies naturally will turn out better work faster than one who has not specialized on this kind of thing. Efficiency brought about through specialization is likewise reflected in the making of various kinds of gages, gage making having become a trade in itself.

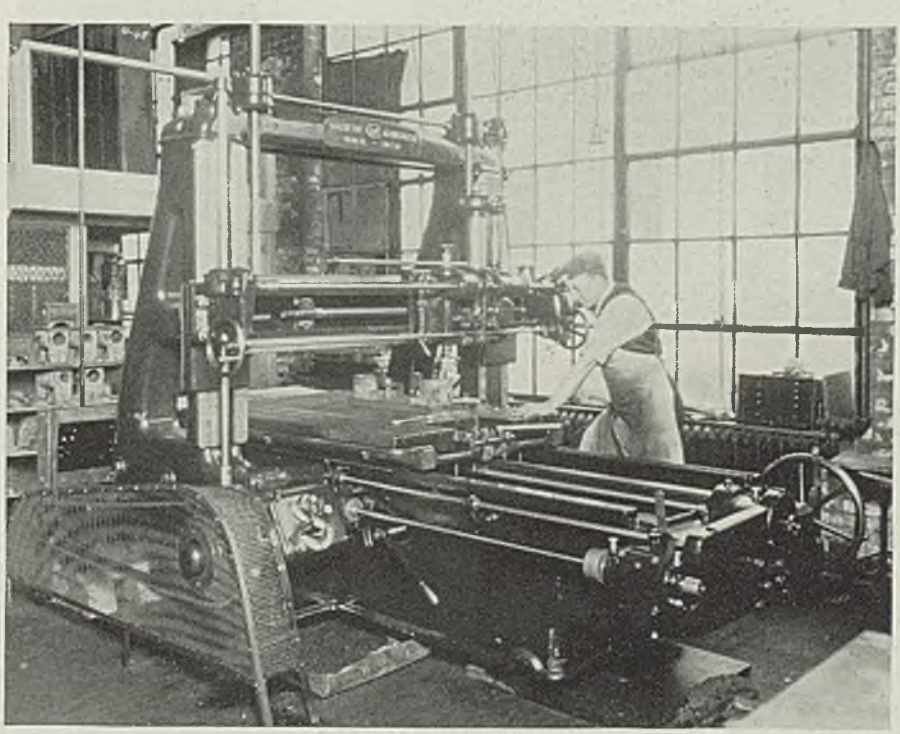
It is possible to keep the entire regular shop force busy month in and month out because the company serves many industries that are not seasonal. To offer an inducement for the men to keep production up to a given standard, a bonus system is followed. The production engineers figure the reasonable time required to carry out each job, their conclusions being based on long experience. Thus the man who gets a certain job knows how many hours the management expects him to devote to the work. If the job is done in less than the allotted time, the workman gets a bonus.

The building of special machinery also is an important part of the company's business. This often involves considerable experimental and development work, especially when an individual or a firm comes to them with only an idea for a new labor-saving machine of some kind. Then again, when the client does have complete drawings of the unit, it is necessary in many cases to make many changes in the initial machine before it meets its designer's expectations. Through long experience and with a staff of skilled men, it is possible for an organization such as this company to carry out this kind of work more economically than the average manufacturing company can do it in its own shop. While development work always has been necessary throughout the entire metalworking industry, it is only of late years that it has become recognized as an important branch of tool and die-shop work.

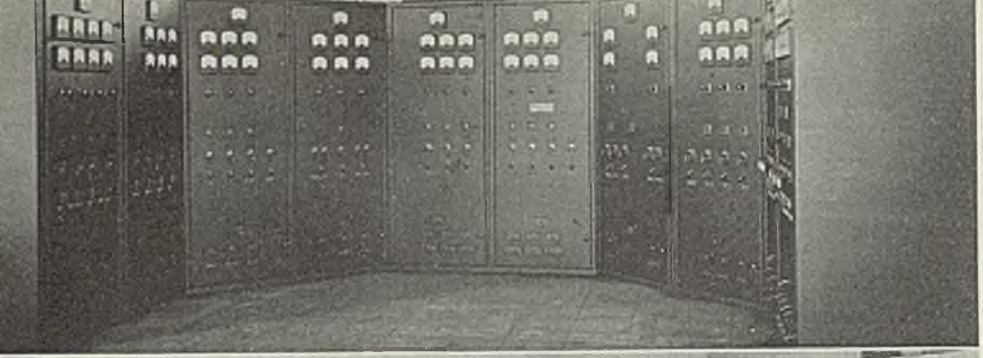
When an individual or a firm developing a new machine does not want any outsider to become acquainted with its essential working principles, the experimental model often is constructed piecemeal, the work being divided up among a number of tool and die shops. Because of the accuracy of parts made in such shops, its assembly and testing can be done satisfactorily in the secrecy of the machine owner's plant.

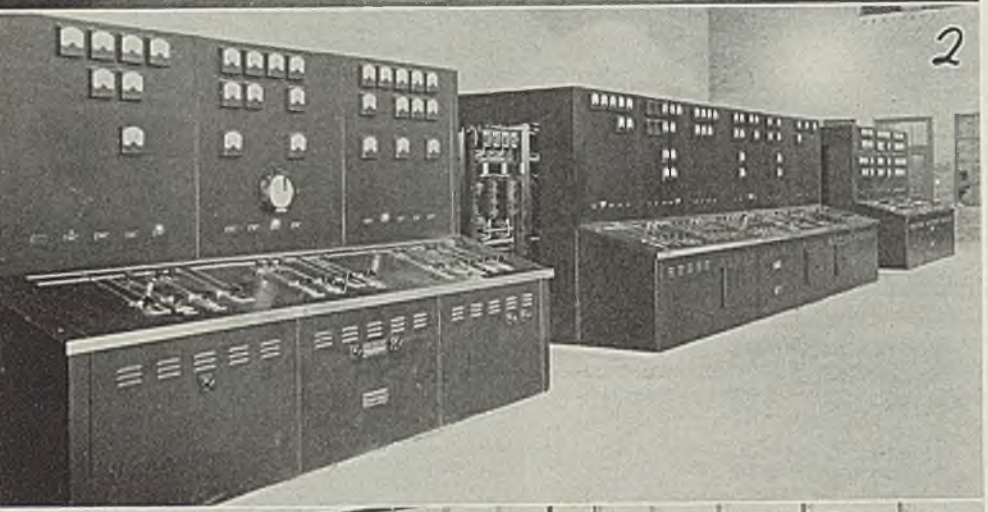
Sometimes it is advantageous to make a small working model of a new machine or appliance because it will be cheaper to make a model than a full sized machine. Tool and die shops today do a considerable amount of this kind of work as well as the making of working models of machines to be used for display purposes.

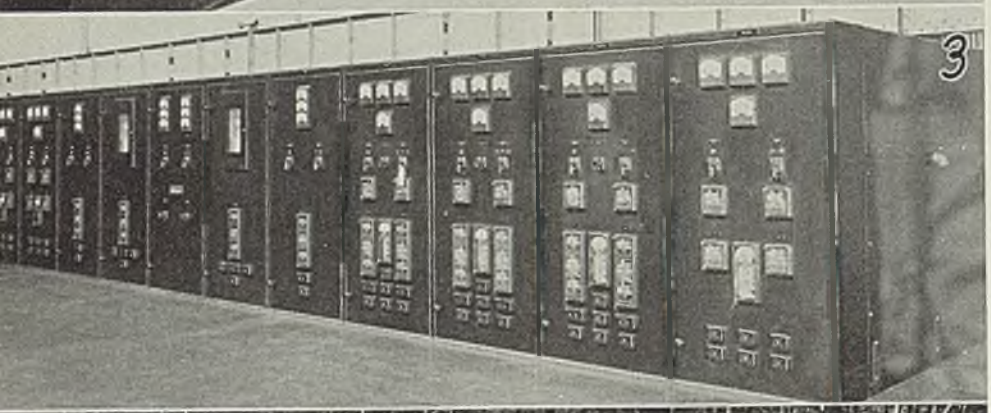
Partial view of gage-making department. This is accurate work of the highest order so men must have much experience. Surface plates scraped to true planes must be used when taking measurements and laying out work

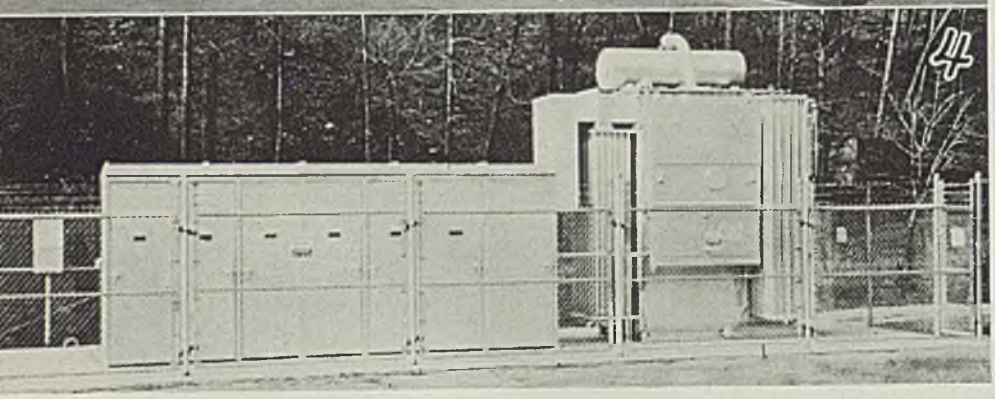


This Swiss jig borer is used for majority of jig boring work. Each spacing screw is fitted with an accurate compensating device to assure maximum accuracy. Limits less than 0.0005-inch can be maintained when necessary









Steel

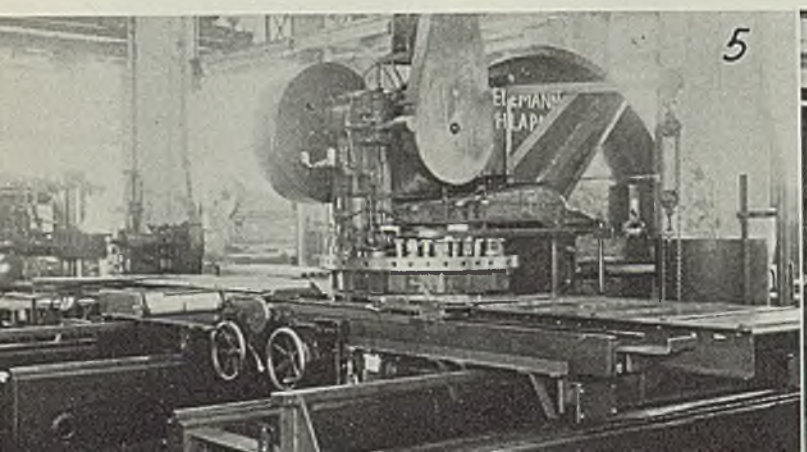
By L. F. DYTRT
General Electric Co.
Philadelphia Works

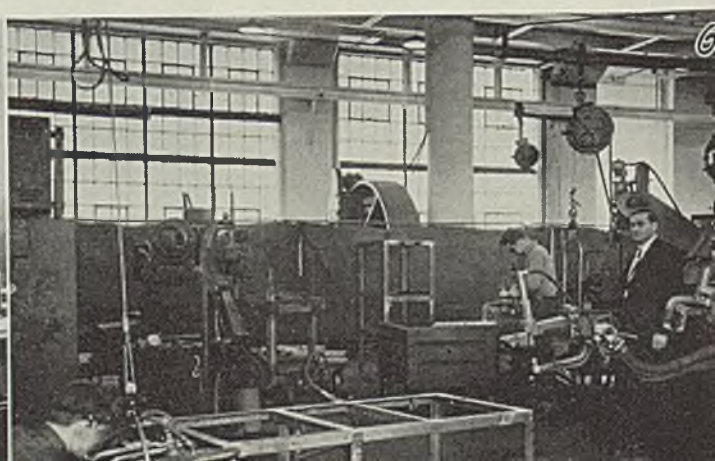
INCREASED use of steel in switchgear is due primarily to its extremely high resistance to arc burning. Tests have demonstrated that steel employed in framework, partitions and enclosing sheets offers greater resistance to destruction by arcs than most common metals and many of their alloys. Steel also is superior to insulating materials in this respect. In addition, dead-front steel-enclosed switchgear assures maximum safety to operators and is fireproof. Self-supporting steel switchgear can be shipped completely fabricated, requires minimum installation expense, can be moved about as occasion demands without modifying building structures.

From manufacturer's standpoint, steel is desirable because it is readily obtainable, is exceedingly uniform and has high structural strength. Possibly more important is its easy fabrication.

For these reasons, steel is used almost exclusively for frameworks, enclosing and partitioning plates, reinforcing members, gussets and device mountings. Although not adopted exclusively for panels, it is widely used there. Further, it is generally employed for accessories and device parts such as instrument cases, circuit-breaker tanks, operating mechanisms, etc.

Three grades of steel are used. All are free of rust, scale and other blemishes and, in sheet or plate form, are ready for immediate fabrication with no additional processing. Structural forms, however, are first given a sandblast to assure good paint bond. Steel for panels, doors, enclosures, benchboards, etc., is





Switchgear

usually soft open-hearth sheet with 0.10 to 0.15 per cent carbon. Yield point varies from 22,000 to 25,000 pounds per square inch, tensile strength between 45,000 and 50,000 pounds per square inch and elongation about 25 per cent in 8 inches.

Framework and reinforcing members employ channels, angles, I-beams and structural sections made from a medium open-hearth steel with 0.25 per cent carbon; yield point, 30,000 to 36,000 pounds per square inch; tensile strength, 60,000 to 72,000 pounds per square inch; elongation, 22 per cent in 8 inches.

Open-Hearth Steel Employed

For device mountings, gussets, strengthening plates, oil circuit-breaker tanks, etc., soft open-hearth sheet or plate is employed with carbon content from 0.15 to 0.22 per cent, yield point around 25,000 pounds per square inch, tensile strength about 50,000 pounds per square inch, 22 per cent elongation in 8 inches.

First step in fabrication of sheets, angles and channels is to shear or cut to required length. Next, framework steel undergoes necessary punching, drilling, tapping and matching operations. Sheet material for the most part follows a similar course, although here punching work may be rather elaborate. In fact, so much punching is necessary that much of this work is done in large turret-type presses such as the unit in Fig. 5.

This machine punches a wide variety of sizes and shapes of holes, has an extremely deep jaw, is equipped with a work-table having rollers on face to permit easy movement of material. In addition, guides and indicators are provided for accurately locating holes punched, thus eliminating layout work.

After being punched, sheets are ready for bending, preceded in a few cases by drilling. Bending brakes of several types are used to form corner flanges which reinforce the sheets and form mounting surfaces. In bending notched angles and similar structural pieces, a special hydraulic press is used. Formed to the desired shape, angles, channels and sheet are ready to be joined together.

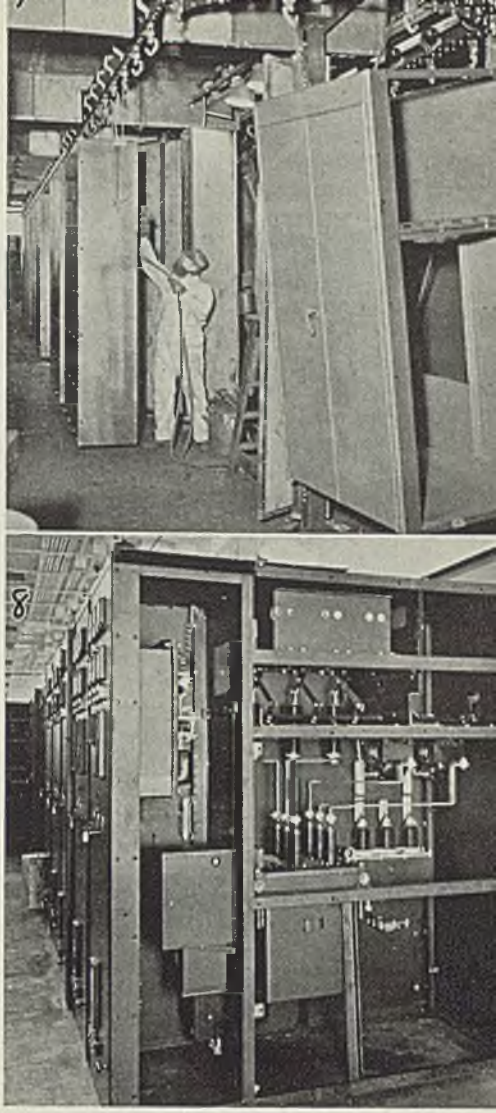
Most assembly work is done by electric welding using both resistance and arc methods. Most resistance welding uses heavy-duty portable welding guns or heads shown in Fig. 6. These guns are trigger operated and employ air pressure to produce the desired force between the welding electrodes. An automatic timer that accurately controls time current is applied. Note in Fig. 6 the counterbalancing arrangement for the two heads at the right, each gun being supported on an overhead swivel arm which gives extreme flexibility in moving the head about to reach the various points on the frame structure. As much assembly of structural elements as possible is done on the welding floor. Occasionally a structure will be assembled completely. More often, however, the material ends in the form of frameworks or partially covered frameworks which are passed on to subsequent operations.

Rough spots acquired in welding are buffed off to make clean smooth surfaces for painting. Fig. 7 shows switchgear being sprayed in the paint shop. The partially completed units are painted progressively. The chain conveyor passes through a number of spray booths in which three coats are applied and baked successively.

Enclosures Attached

Final assembly involves the setting up and wiring electrical parts, attaching plates and other elements that serve either to enclose or to form part of the switchgear equipment. Fig. 8 is an oblique end view of a typical switchgear cubicle of the all-steel-enclosed dead-front type as used for alternating-current motors and feeders. Although substantially the same manufacturing procedure is followed in all cases, switchgear differ widely according to type of application as each type has certain special characteristics.

For instance, the vertical panel type shown in Fig. 8 consists merely of a punched and flanged steel sheet on which are mounted the various meters and electrical devices. Sometimes, as in Fig. 8, circuit breakers and other equipment are included in cubicles behind the face of the board. Wide flanges on panels provide sufficient strength to withstand bending stresses of the weights of material and operation loadings involved so further strengthening or stiffening measures seldom are necessary. Steel's inherent strength and workability render unnecessary the use of brackets, bolts and other appearance-detracting items. Except for the essential devices appearing on them, steel panel faces are bare, giving an effect of streamlined unity.



Practically all wiring between devices and terminal box is carried in vertical steel ducts or conduits of rectangular cross section.

Duplex switchboards such as in Fig. 1 are self-supporting, completely enclosed and make efficient use of small space. Main steel sections of such equipment perform the dual function of panels and doors leading to structure interior, thus called "duplex."

Frequently combined with simple panel and duplex types of switchboards are control desks or bench boards, Fig 2. Like other units, bench boards are constructed of angle frames with sheet steel enclosing surfaces. Top front surfaces contain most of the electrical devices. The sloping bench surface contains the operating controls. Sheet-steel skirts completely enclose fronts and ends.

Oil-blast and air-blast circuit breakers having 500,000 kilovolt-ampere interrupting capacity are

(*Please turn to Page* 68)

Steel Powder for Iron . . .

Restriction of Swedish sponge supply spurs American search for substitute material, with gratifying success. Granulated pig iron is decarburized to produce steel powder. May be commercial soon

■ FIRST public announcement of the prospective availability of a new type of iron powder, exceeding in physical properties and equaling in purity the Swedish sponge iron powders, was made by Gregory J. Comstock, associate professor of metallurgy, Stevens Institute of Technology, Hoboken, N. J., and engineering consultant, speaking before the Saginaw Valley group, American Society for Metals, May 21, in Saginaw, Mich.

Mr. Comstock announced results of tests on the new powder, tentatively known as NY 100, and said that rights to the manufacturing process had been acquired by N. K. G. Tholand, president of Ekstrand & Tholand, New York, importers of Swedish iron and steel specialties.

With American supplies of the former Eto (contraction of Ekstrand & Tholand) powder restricted because of European hostilities, it became apparent to the importers that some arrangements would have to be made to fill domestic demands for the high-purity powder. Recent experiments abroad indicated that iron powder, or in fact steel powder, could be produced as a by-product of the Kalling-Rennerfelt process for converting granular pig iron into a low-carbon melt material. Hence steps have been taken to initiate this process in this country, assuring supply of an even higher grade powder for compressed and sintered parts, according to Mr. Tholand.

How Powder Is Made

The Kalling-Rennerfelt process was described before the annual meeting of the British Iron and Steel institute last fall in a paper which was subsequently published in Vol. II of the *Journal* of the Iron & Steel institute for 1939. Inventors are Count Bo Kalling and Ivar Rennerfelt of Stockholm. Essentially the process comprises tapping molten iron from the blast furnace, granulating it by spraying into a water bath, feeding it continuously into a rotary furnace where it is decarburized without melting in a gas mixture of carbon dioxide and carbon monoxide, proportioned so that decarburization occurs without simultaneous oxidation of the iron or other metallic constituents.

Discovered by Research

At the time the process first was described it was not revealed that it had possibilities as a source of iron powder, but research sponsored by Mr. Tholand has confirmed this fact, although the situation abroad made necessary announcement of the process somewhat ahead of the sponsor's plans.

The rotary furnace used and the end effect accomplished suggest that the method is somewhat similar to the bessemer process, with the exception that the product is not molten. Unit built at the Fagersta Bruks Aktiebolag in Sweden was designed for 6 to 10 tons per day output. It is 14 feet in length, 4½ feet in diameter. Diagrammatic sketch of the installation, together with certain details of operation in the production of melting stock, appeared in *The Iron Age* for Nov. 2, 1939, p. 40.

NY 100, the powder which Ekstrand & Tholand say will be available commercially in a short time, comes in three grades, A, B and C, varying principally in carbon content, A being practically carbon-free and C containing carbon in approximately the amount of eutectoid steel. The most interesting feature of the new powders is that actually they are steel powders and not iron powders, containing "normal" amounts of manganese and silicon in addition to carbon. Eventually it may be possible to include other alloying elements in the analysis.

Mr. Tholand said the price of the powder would be comparable to that of the former Swedish sponge iron, if not somewhat lower; the latter has been bringing 8-9 cents a pound, with a guaranteed maximum gangue content of 0.5 per cent silica. Commenting on the subject of iron powder prices in general, Mr. Tholand said there were three types of powder—carbonyl iron powder which brings around $1 per pound; electrolytic or hydrogen reduced powder which costs 35-60 cents a pound; and the sponge iron powder already referred to. Low cost of the latter has been possible chiefly because it is the by-product of production of melting sponge and yearly output of this material has ranged from 20,000-25,000 tons in Sweden. Yearly consumption of high-purity iron powder in this country at the present time probably does not average much over 1000-2000 tons, if that.

Superior Physical Properties

Density tests reported by Mr. Comstock on the NY 100 material showed that under compression of 50 tons per square inch on 100-mesh powder, followed by sintering for 30 minutes at 2100 degrees Fahr., a figure as high as 89.46 per cent of solid density could be achieved, considerably above the best possible with the Eto powders. Tensile strengths following a single pressing and heat treatment as high as 58,000 pounds per square inch were realized. Tests on the Eto powder compacts, under same pressures and sintering conditions showed ultimate strength of around 21,000

pounds per square inch with 8 per cent elongation, further increased to 38,000 pounds tensile and 0.5 per cent elongation after cold coining and resintering, and still further raised to 64,000 pounds tensile after pack carburizing at 1700 degrees Fahr. for 12 hours.

In reviewing the subject of iron powder metallurgy, Mr. Comstock pointed to the crying need for more fundamental research on phenomena encountered in pressing and sintering. No clear explanation has been offered for why powdered iron compacts shrink after sintering, yet photomicrographs reveal a definite agglomeration of the iron particles after heat treatment. Recrystallization effect or the result of latent surface energy on each particle have been suggested as explanations, but no definite proofs are available. In the making of compressed and sintered parts, allowance of about 1 per cent must be made for shrinkage.

Mr. Comstock said much remains to be done with regard to the alloying of iron powders to obtain special properties. Also he forecast that some new compressing technique is called for to avoid the inordinately high pressures required, particularly in the molding of larger pieces. Limitations in press design and the high cost of such equipment are obstacles. Another "bugaboo" in this work is the danger of entrapped air in the compact, giving rise to blisters on the surface or even explosion of the part itself.

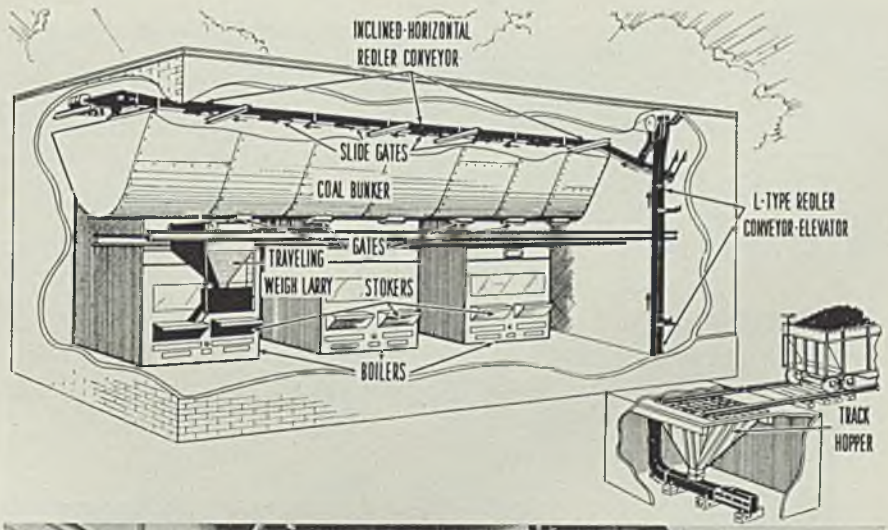
Careful regulation or modulation of particle size to obtain special effects in compacted powder parts was cited by Mr. Comstock as the "ultimate refinement" in iron powder metallurgy.

Dust-Tight Conveyors Help Keep Boiler Room Spotless

■ AT THE Hopkins, Minn., plant of Minneapolis Moline Power Implement Co., an installation of dust-tight conveyors handles coal from the track hopper to storage bunker over the boiler room from which point it is delivered to the stokers in the three boilers by means of a traveling weigh larry. Diagrammed in Fig. 1, coal is discharged from freight cars through a large-mesh grating into a hopper directly below the track, subsequently entering a Redler conveyor which takes it vertically to the horizontal inclined distributing conveyor feeding the overhead coal bunkers through slide gates at six points.

This system handles coal up to 1½ inches at a rate of 32 tons per hour with conveyors traveling at the speed of 62 feet per minute. The ability of the Redler type conveyor to handle material in any direction permits the entire coal handling job in this power plant to be accomplished with only two conveyors. The first conveys the coal horizontally from under the track hopper and around a bend corner to elevate it to the upper level. Here, the lower end of a horizontal inclined conveyor takes coal on a slight incline up to the top of the coal bunker and distributes it throughout the length of the bunker in any required quantities. The first conveyor has a horizontal run of 23 feet 3 inches and a vertical lift of 59 feet 7 inches. The inclined horizontal conveyor is 75 feet 4 inches long.

On this installation, no feeders are necessary below the track hopper or at the start of the horizontal run across the bunker. The coal merely choke-feeds into the units which automatically take only as much coal as can be handled in their casing which is 9 inches square in cross section. The conveyors are totally enclosed and so handle the coal without any dust entering the atmosphere. Fig. 2 is evidence that the system actually is dust-tight as the spotlessly clean surfaces of boilers and equipment in the boiler room testify.



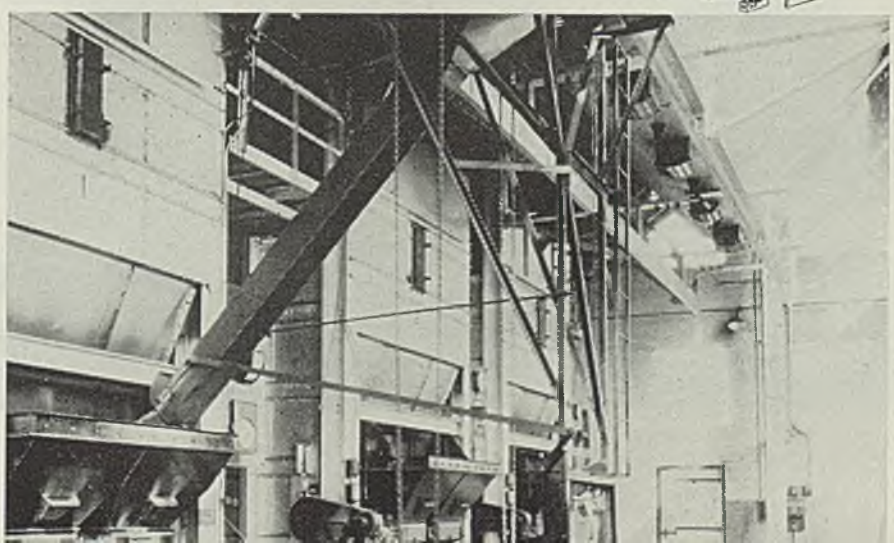


Fig. 1. (Upper)—Diagram shows how two conveyors handle entire movement of coal in this power plant
Fig. 2. (Lower)—Bright clean surfaces attest to effectiveness of this method of keeping a boiler room in top condition

Adherent Lubricating Coating Announced

■ A stable and adherent lubricating coating for use in prelubricating surfaces is announced by Acheson Colloids Corp., Port Huron, Mich. It is applied in liquid form, either by dipping, brushing or spraying and hardens on exposure to light.

Basic element providing the lubrication is colloidal graphite. The coatings may be applied at normal temperatures or to surfaces heated up to 100 degrees Cent. for rapid drying.

Automatic Bender Produces Rifle Part at Rate of 2000 Per Day

■ NOW OPERATING in a United States armory where it is being utilized to produce a part for one of the newer military rifles is an automatic bending machine introduced by Thomas-Gibb Electric Welding Co., Lynn, Mass. Function of machine is to bend a small part previously shaped or stamped out. It is daily meeting successfully its contract requirement by producing some 2000 pieces per 8-hour day.

Parts are bent by applying pressure to air operated sliding dies which clamp the work and which can be adjusted to produce any required angle. As soon as the bending is complete, heat is applied automatically to relieve the stresses which would otherwise cause the part to spring back out of shape.

Clamps Serve as Electrodes

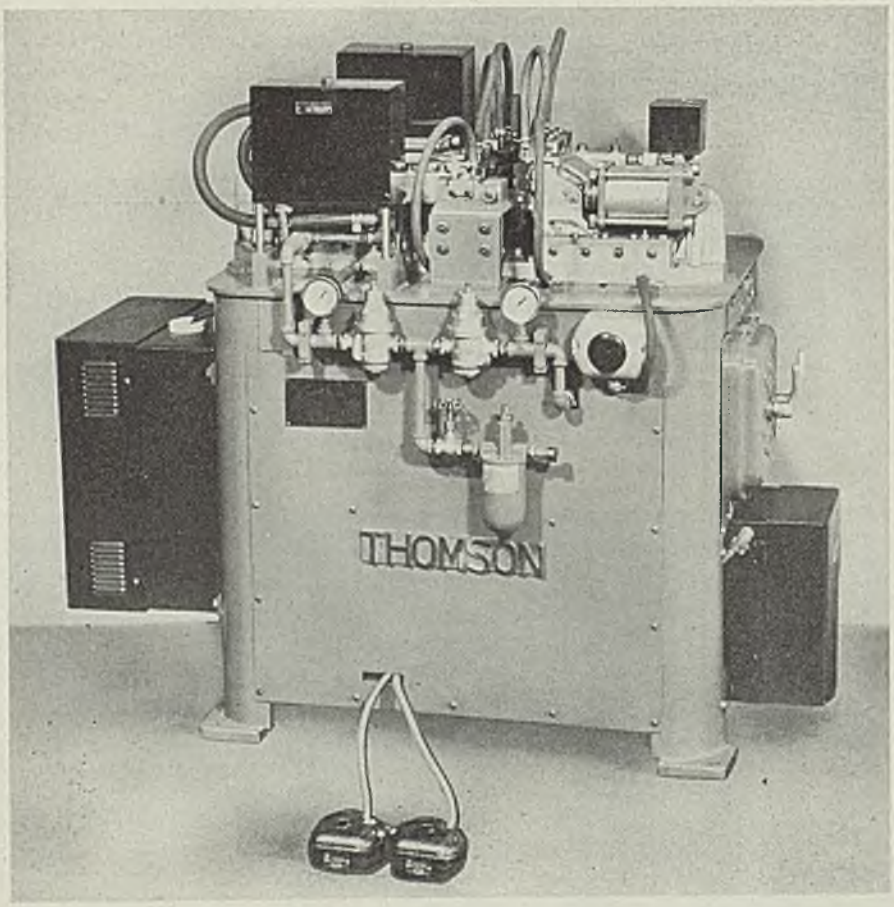
The machine is powered with a 30 kilovolt-ampere transformer and is equipped with four sets of clamps which also serve as electrodes.

In operation, the work is first clamped in the stationary electrodes which grip it in the center so it can be offset at either end. Then the end electrodes clamp and slide to bend the work while still cold. Pressure switches in the air cylinders turn on the heat automatically. An adjustable timer governs the duration of the current flow and a time delay unit permits work to cool after current is cut off and before clamps release the work.

Clamps are connected in series to provide uniform heat on either end, and the current flows from the outside clamps to the inside and is shunted around the middle section of the work so that it is not heated.

Although the rifle part is tubular in section, work of any uniform section could be handled in the same manner provided it was equipped with dies of proper shape. In this case, dies are arranged for easy adjustment so operator can keep the offsets within close limits permitted, but if necessary the same feature could be used to adapt the machine for making a variety of bends in the work of about the same size.

High production and extreme accuracy in the finished product are features of the illustrated bending machine. All operations are controlled automatically with minimum of handling



Thermoplastic Resin Prevents Corrosion

■ A new dark, thermoplastic resin, Polyxile, made from chemical derivatives of wood and other cellulosic materials has been developed by Polyxor Chemical Co., New Haven, Conn. It can be used as an anti-corrosive on metals, a paper waterproofing agent and as a protective coating on concrete and stone against the influence of the sun and rain.

The resin is manufactured in several grades of different hardness. It is dissolved by many of the usual organic solvents such as ketones, pinene and chlorinated hydrocarbons.

Solutions can be applied by spraying, brushing or dipping and further processed by heat treatments, especially when using on steel surfaces. Coatings are stable at temperatures over 150 degrees Cent. They are not attacked by caustic and organic acids, with the exception of highly concentrated sulphuric or acetic acids at elevated temperatures. Special grades are stable against nitric acids.

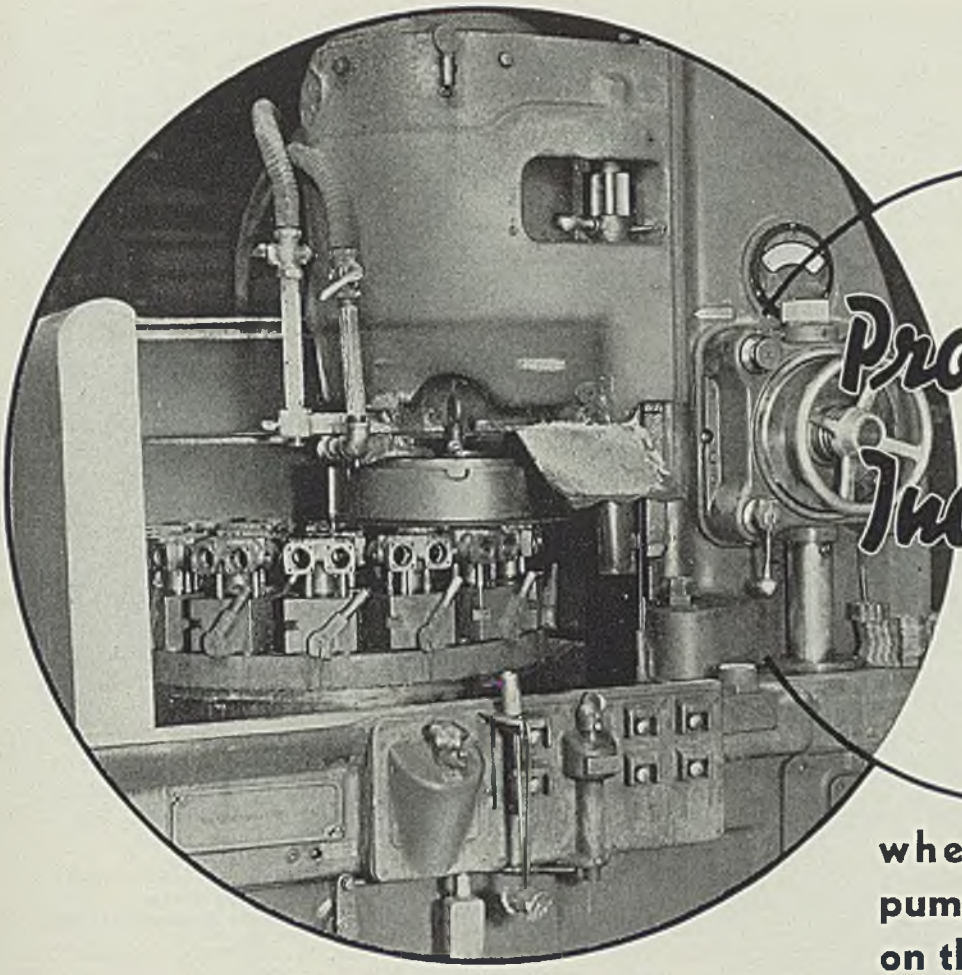
Develops Pellets for Governing Temperatures

■ Thermometric pellets developed by Tempil Corp., 132 West Twenty-second street, New York, may now be used in controlling temperatures in industry. These have a sharp, rapid melting action and are said to be accurate within 3 per cent of the temperature stamped upon them. In using them the user simply selects the pellet marked with the temperature corresponding to that he wishes to obtain and places it on or against the heated object.

The pellets, known as Tempils, are not corrosive to metal and do not pit or leave stains which cannot be removed. They come packed in unbreakable, transparent tubes and are available in whole hundred degree ranges from 200 to 1500 degrees Fahr.

Introduces Nonslip Steel Running Boards

■ Made from solid steel plate, the new A. W. slotted type super-diamond steel running board developed by Alan Wood Steel Co., Conshohoken, Pa., provides faster drainage and insures protection against falling accidents. The slots are hand-hold size for extra security and their arrangement minimizes the possibility of slipping. While developed especially for railroad use, the running boards incorporate features suitable for a variety of applications.



Production Increased 71%

when this oil burner pump body was ground on the Blanchard No. 18.

Group of parts ground on the Blanchard No. 18 shown at the left.

THE BLANCHARD NO. 18 is a versatile machine — versatile because of the variety of parts it will handle — versatile in that it may be used for both roughing and finishing cuts. The 6-inch diameter cast iron pump body, shown above, is ground to limits of +.0003″ and −.0001″. In this operation .012″ of stock is ground off one side of each piece.

Blanchard cylinder grinding wheels, manufactured by the Blanchard Machine Company, are used on this job. This was another reason for being able to increase the production from 28 to 48 pieces per hour.

A second Blanchard No. 18 Surface Grinder was recently sold to this same shop on the basis of the performance of the first machine.

A complete study of your own grinding requirements will be made without obligation — just send us samples of your work with grinding instructions.

THE BLANCHARD MACHINE COMPANY
64 STATE ST., CAMBRIDGE, MASS., U.S.A.

SEND FOR YOUR FREE COPY OF THE BLANCHARD WORK BOOK

Tailored Firebrick

System of refractory shapes is developed to permit formation of circumferential dimensions with exactitude. Face to face bearing reduces uneven stresses and pinching of brick under expansion

By WALLACE A. STUART
Refractory Sales Division
Babcock & Wilcox Co.
Cleveland

■ FIREBRICK have been manufactured for nearly half a century according to standard sizes which were originally more or less arbitrarily established. Two standard series of shapes are common, the 2½-inch and the 3-inch series. The former is perhaps most generally used and all of the standard shapes in it are derived by variations of the "straight" which is 9 x 4½ x 2½ inches. In the 3-inch series, the basic "straight" is 9 x 4½ x 3 inches. These series are shown in any manufacturer's catalog of standard shapes.

These standardizations of shapes and dimensions represent more or less a "rule of thumb," or practical compromise between manufacturing requirements and the necessity of laying up firebrick shapes into curved or circular structures such as arches, domes, etc.

Common practice is to effect circularity in a structure by combining "straights" with wedges, or keys, or arch shapes, depending upon the thickness desired. Obviously, by reason of the difference in the dimensions of the ends of a wedge-shape firebrick, for example, the shapes will form a circle if laid in face-to-face contact with each other and with their small ends facing in the same direction. The introduction of one or more straights (having parellel faces) increases the diameter of the circle which the wedges describe. Thus circles of almost any diameter are approximated.

In estimating the number of straights and wedges or arch shapes, etc. required for any given construction, tables are in general use, such as Table I.

TABLE I—9 x 4½ x 2½-Inch Wedge Brick

Inside diameter	Number required to turn circle: No. 2 Wedge	No. 1 Wedge	Straight	Total
2'-3"	57	..	..	57
2'-6"	51	10	..	61
3'-0"	38	30	..	68
3'-6"	25	51	..	76
4'-0"	13	71	..	84
4'-6"*	..	91	..	91
5'-0"	..	91	7	98
5'-6"	..	91	15	106
6'-0"	..	91	22	113
6'-6"	..	91	30	121
7'-0"	..	91	38	129
7'-6"	..	91	45	136
8'-0"	..	91	53	144
8'-6"	..	91	60	151
9'-0"	..	91	68	159
9'-6"	..	91	75	166
10'-0"	..	91	83	174

*See Fig. 1.

In this table it is shown that fifty-

Fig. 1—Refractory tables call for 91 No. 1 wedge brick to form a 4½-foot diameter circle

91 x 2.5" =227.5" brick for 226.19" circum.
91 x 1.875"=170.63" brick for 169.65" circum.

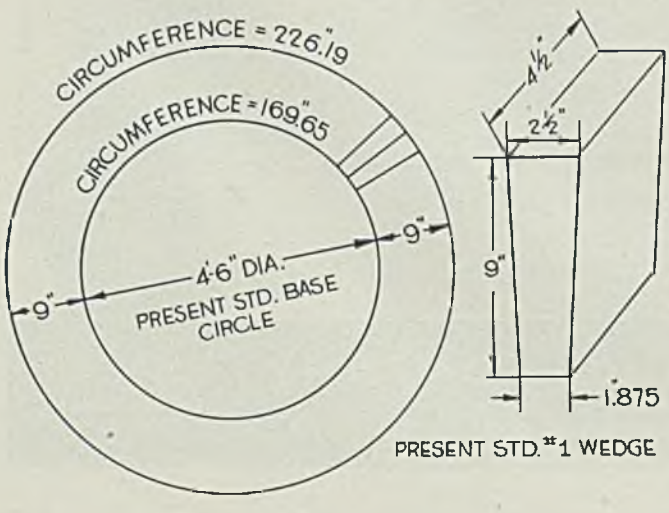
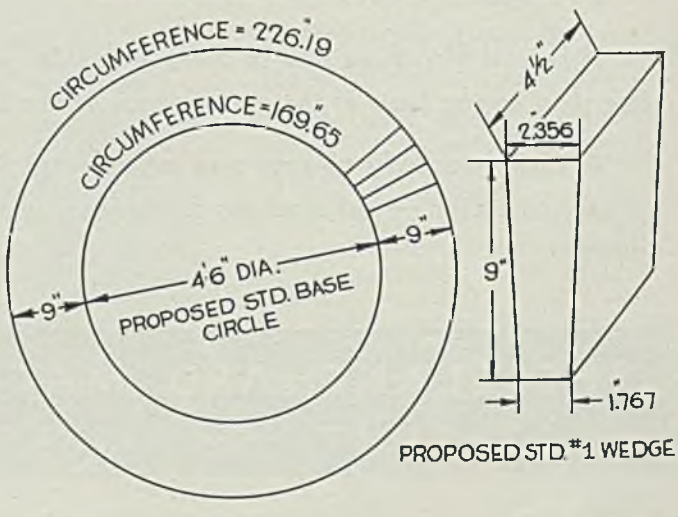


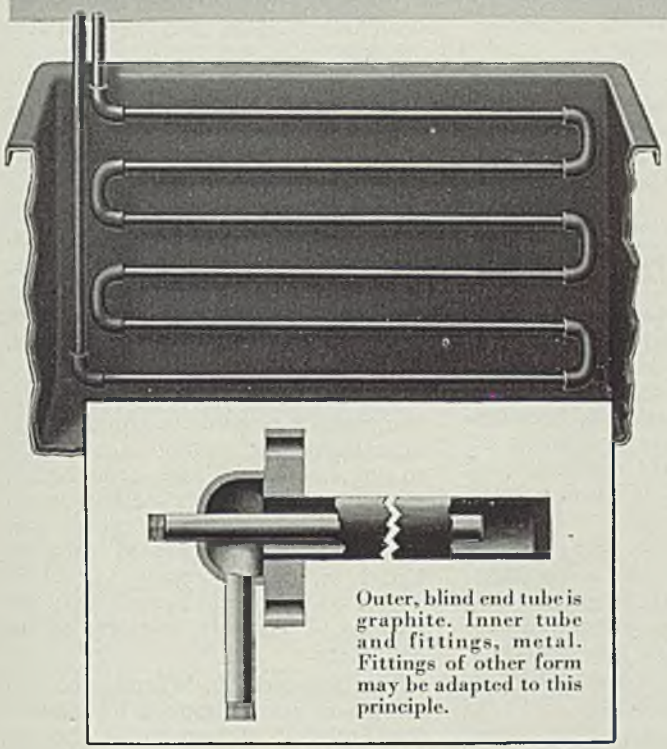
Fig. 2—Proposed system calls for 96 No. 1 wedge brick to form a 4½-foot diameter circle

96 x 2.356"=226.17" brick for 226.19" circum.
96 x 1.767"=169.63" brick for 169.65" circum.

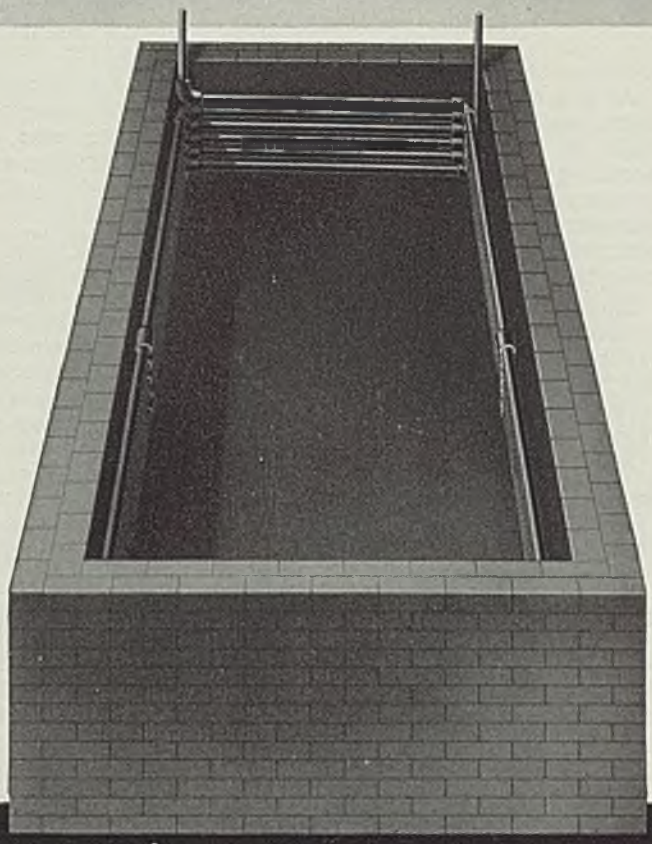


AVOID DILUTION OF CORROSIVE BATHS

AND SOLUTIONS HEATED BY INJECTION OF LOW PRESSURE STEAM



Outer, blind end tube is graphite. Inner tube and fittings, metal. Fittings of other form may be adapted to this principle.



- Graphite pipe and fittings have high heat conductivity, low coefficient of thermal expansion and good mechanical strength.
- They are sufficiently impervious to carry low pressure steam without disturbing seepage.
- They are immune to reaction with most of the materials encountered in chemical manufacturing industries at the concentrations and temperatures ordinarily employed.

USE NATIONAL GRAPHITE PIPE AND FITTINGS

TRADE-MARK

If a less pervious material than graphite is required, "Karbate" No. 2, a graphite base, corrosion resistant product, can be used on most applications.

"Karbate" Valves are also available in 1 inch to 4 inch sizes.

"NATIONAL" Carbon and Graphite Brick, Tile and Special Structural Shapes are used for lining vats and tanks and for other types of construction where resistance to corrosion is an essential property.

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seven No. 2 wedges (9 x 4½ x 2½ x 1½ inches) describe a circle of 2 feet 3 inches inside diameter. This is proved as follows:

Circumference = π × diameter
where π = 3.1416
then 2'-3" × 3.1416 = 84.8" circumference

To find the number of No. 2 wedges, divide by the smaller (inside end dimension), 1½ inches:

$$\frac{84.8}{1.5} = 56.5$$

As it is customary (because many first quality firebrick are undersized or oversized) to count fractional parts of one-tenth of a brick or more as an entire brick, and to disregard smaller fractions, 56.5 is counted as 57 No. 2 wedges required, as indicated in the table.

Similar calculations show that, for a circle 4½ feet inside diameter (169.6 inches inner circumference), 90.4 No. 1 wedges are required which is shown in the table as 91 such shapes, (9 x 4½ x 2½ to 1⅞ inches).

In other words,

57 × 1½" = 85.5", or 0.7" more than π × 2'-3"
91 × 1⅞" = 170.6", or 1.0" more than π × 4'-6"

For a further increase of inside diameter, it is customary to assume the basic circle "turned" by 91 No. 1 wedges (4 feet 6 inches) and allow for further increase by the insertion of 9 x 4½ x 2½-inch straights. For a circle of 5 feet inside diameter:

	Circumference, inches
5' × 3.1416	= 188.5
91 × 1.875 (for No. 1 wedges)	= 170.6
To be made up by straights	17.9

17.9 ÷ 2.5 inches (thickness of straights) = 7.16 straights needed, although in practice assumed to be 7.

The present tables employed for bricks are based on the formula that there is a base diameter around which the present radial brick are supposed to fit (see Fig. 1) and for any increase in diameter the opening created is now filled with straight bricks whose thickness is 2½ inches, and these straights will not fit the true circumferential increase.

The foregoing paragraph is more clearly explained with a circle made up of only 9-inch radial brick by the following example:

Inner base diameter × π = Inner circumference
Outer base diameter × π = Outer circumference

To accommodate a circle whose diameter has increased 1½ inches over the base circle we find the following circumferential increase:

	Increase, inches
Inner base diam. + 1½" × π (Inner circum.)	= 4.71
Outer base diam. + 1½" × π (Outer circum.)	= 4.71

From the foregoing it is readily seen that two straight brick of the present standard 2½ inches dimension will give a total of 5 inches to fill an opening of only 4.71 inches while two of the straight bricks of the author's standard dimension of ¾ pi or 2.35 inches will give a total of 4.70 inches and will positively fit in the opening created. See Fig. 2.

Brick shapes, which accomplish the forming of circular sections of all sizes exactly, have been developed and patented. The proposed shapes are dimensioned with regard to the mathematical law:

Circumference = 3.1416 diameter

The proposed method for forming arches and other circular sections calls for the use of tapered-shaped bricks whose sides are radial to a circle of base diameter. For every ¾-inch increase over the base diameter, one straight brick whose thickness is ¾ × 3.1416 = 2.35 inches is added. This thickness for straights has been adopted because it nearly conforms to the present 2.50 inches thickness of standard straight brick as now used. This, of course, applies to arches, etc. which are 9 inches thick. For thinner thicknesses at present arbitrarily-dimensioned arch brick are used for thickness of 4½ inches. Under the proposed system tapered shapes whose sides are radial to a circle of basic diameter would be used and one straight brick of 2.35 inches thickness added for each ¾-inch increase over the basic diameter.

Likewise, if key brick are to be used the formula may be similarly applied.

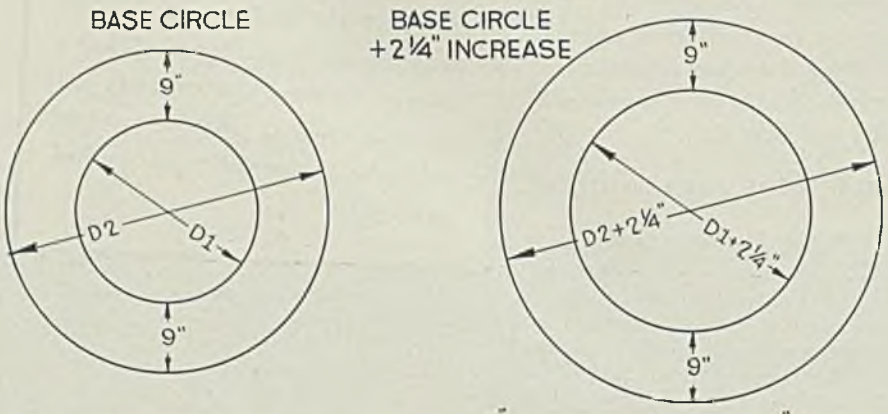
From the foregoing, it can be seen that the proposed method requires one set each of arch, key and wedge shapes whose respective nonparallel faces are radial to a circle of some basic diameter; and further, that it is not necessary to carry the present standard sizes. A further change in the dimensions of straights is required, so the thickness, instead of being 2.50 inches as at present, would be 2.35 inches.

The advent of insulating firebrick has made it possible to supply brick of uniform size, as they are ground to dimension. While grinding, it seems that the proper method would be to adopt standard radial and straight dimensions which, when adhered to, would result in bricks which truly fit and permit easy assembly of circular sections of all diameters.

The Babcock & Wilcox Co. has for many years supplied its insulating firebrick ground to fit the exact circumference of arches where this has been specified. The success of this method as a special application strengthens the belief that failures of sprung arches, instead of being attributable to faulty brick occur chiefly because present standard shapes and sizes of brick do not fit. This gives rise to irregular point contact rather than face-to-face contact between them. In turn, such contact sets up uneven stresses and pinching of the brick when expansion of the arch takes place when heated.

Grinding insulating firebrick to fit arches of specified diameters, while successful and desirable, requires special grinding for each individual radius encountered on each installation. The same results can be obtained more easily by the use of the proposed method of standard sizes which makes for universal application of standard shapes.

The shapes used permit accurate circumferential dimensions with an even number of radial tapered shapes and "pi" straights. By this means, a majority of the shapes in



D1 π = CIRCUMFERENCE
D2 π = CIRCUMFERENCE
BASE CIRCLE OF ALL-RADIAL BRICK

(D1+2¼) π = CIRCUMFERENCE +7.06" INCREASE
(D2+2¼) π = CIRCUMFERENCE +7.06" INCREASE
BASE CIRCLE RADIAL BRICK +3 STRAIGHTS OF 2.35" = 7.05" TO FIT 7.06" INCREASE

Fig. 3—Outer and inner circumferences have the same increase when the diameters are increased the same

an arch or a circular structure would be radial shapes which, when used alone, would turn a circle of a given or base diameter. Where the diameter of the arch or circular structure is in excess of this base diameter, one "pi straight" 2.35 inches would be inserted for each ¾-inch increase of this base diameter.

As most furnace dimensions are given in feet and inches and since the present firebrick series bears no dimensional relationships to the mathematical formula for a circle of given diameter, the present firebrick series never truly turns a circle of given dimensions by the use of a whole number of tapered and straights. By the proposed system, insofar as the thickness of the "pi straight" is chosen because of its relationship to the mathematical formula of a circle, a whole number of shapes will always result from the use of the number of radial tapered shapes for the circle of basic diameter plus one "pi straight" for each ¾-inch increase in diameter over the base diameter (or ⅜-inch increase in radius).

As an illustration, assume a base diameter of 4 feet 6 inches. Assume, further, that 96 radial shapes alone will turn this circle. With these data as a basis, the proposed system will permit the following combinations of whole shapes:

Diam. of circle	Radial shapes	"Pi" straights
4'-6"	96	0
4'-6¾"	96	1
4'-7½"	96	2
4'-8¼"	96	3
4'-9"	96	4
5'-0"	96	6
5'-6"	96	16

By the contrast, the present series does not turn circles of the same diameters without fractional parts:

Diam. of circle	No. 1 wedges	Straights
4'-6"	90.4	0
4'-9"	91	3.37
5'-0"	91	7.07
5'-6"	91	14.69

Thus, since it is impracticable to use, for example, 3.37 or 14.69 straights, either the whole number is used and the fractional part made up by mortar, or the next highest whole number of straights is chosen. This results in a firebrick arch or circle which does not conform to the circle desired and is, therefore, impossible to make good face-to-face contact between the firebrick shapes.

These involved calculations, and the foregoing tabulation of shapes, indicate the difficulty of obtaining an accurate count of the several shapes involved in any arch or circular structure. On the other hand, the rule which the proposed system involves, "one pi straight for each ¾-inch excess above the base diameter," is simplicity itself, involves no tables, and only the simplest calculations, and always gives a whole number of brick shapes.

While the desirability of building arches or other circular structures with the use of radial shapes is apparent, this can only be done at present when the shapes are especially ground to the specified radius or in those few instances where standard series shapes exactly turn the desired circle.

With the proposed system, it would only be necessary to carry "pi straights" and radial shapes. From these stocks, orders for arches of any dimension could be shipped according to a simply-determined brick count and without the necessity of "custom grinding" but with results comparable to such special work.

One large steel company has used the author's design in all of its blast furnace linings for several years. It is found that the bricks of the proposed dimensions are easy to lay and that they actually fit the constantly changing diameters encountered in blast furnace structures.

♦

Engineering Problems In Plastics Discussed

■ *Plastics in Engineering,* by J. Delmonte; cloth, 616 pages, 6 x 9¼ inches; published by Penton Publishing Co., Cleveland; supplied by STEEL, Cleveland, for $7.50.

Progress and extent of applications of plastics to design problems are emphasized in this work. The author is a recognized authority who has gained much of his knowledge through first-hand experimental work and actual application. At present assistant to the chief engineer, Chicago Flexible Shaft Co., Mr. Delmonte also conducts a course on plastics at Armour Institute graduate school, Chicago.

Since successful applications are achieved only when the designer understands the potentialities, as well as the limitations, of the materials with which he deals, advantages and disadvantages of plastics are discussed at length in terms of various engineering problems. Numerous tests conducted by the author are cited to bear out these distinctions and data conveniently tabulated and classified for easy reference aid in understanding. Analysis of some important engineering properties of plastics also is made in terms of the fundamental nature of the materials and correlated phenomena, such as condensation and polymerization.

In addition to the survey of engineering features, several chapters have been devoted to chemistry of plastics and the art of molding. Review of the raw materials employed in plastics, chemical reactions involved in their formulation and methods of compounding serves as an introduction. This information is organized conveniently for ready reference. The chemical background is essential to the correct scientific analysis of problems arising in the molding of materials and their behavior in service. Inasmuch as most plastics utilized in design are applied as molded articles, a comprehensive analysis is given of molding problems and mold designs. The laminating, casting and extruding of organic plastics are discussed similarly.

While designers may not ordinarily consider surface coatings and synthetic rubbers in terms of plastic materials there are many close relationships. A chapter devoted to each of these subjects bears out these connections and discusses the engineering properties.

This work takes rank as the first prepared directly for the designer on the subject of plastics and their potentialities and applications. As the plastics industry continues to expand through development of new materials and refinements in the art of forming them, this book will be found increasingly valuable.

A.S.T.M. Standards in Three New Volumes

■ *A.S.T.M. Standards,* 1939, *Part I;* cloth, 1335 pages, 6 x 9 inches; published by American Society for Testing Materials, Philadelphia; supplied by STEEL, Cleveland, for $8; in connection with Parts II and III, nonmetals, any two at $15, all three $22.

Part I in the series of three relates only to metals. It has been extensively revised and enlarged, containing both standard and tentative specifications and tests. It covers 300 specifications, tests and definnitions, 180 of ferrous metals, 105 of nonferrous metals and alloys and 15 applying to both.

Specifications, methods and definitions presented in this volume are used as standards for engineering materials because they are competent, unbiased, widely applicable and authoritative. They are based on best commercial practices, adequate scientific research and sound engineering judgment. Each is formulated and recommended by a standing committee of technologists well informed on the subject.

The new edition contains many new features, including double-column format, improved editorial style, simplified subject indexes and two tables of contents, one by subject and one by serial designations.

Part II is devoted to constructional nonmetallic materials, 351 specifications; Part III to general nonmetallic materials, 245 specifications.

BETWEEN HEATS WITH Shorty

■ Say Fellers:

While brousin' through the sheet mill last week, noticed a picture of a feller I hadn't seen or heard of for a long stretch. There 'twas hangin' on one of the locker doors not far from the doublin' machine servin' No. 4 hot sheet mill.

"Bill Melaney, sure as I live," I sez, and turnin' to "Dinty" Moore, a catcher takin' his spell on the 'nitial carved bench, I sez, "Dinty, what 'as become of the Ol' Timer?"

"Oh, Melaney," sez he, "understand he retired first of the year and now 's livin' in Pittsburgh. Fine ol' gentleman, Melaney is. 80 years ol' this Dec. 10. As a kid he first started doublin' in the hot mill. In those days 'twas nothin' for a roll to let go now 'n then, and when they did you'd see the Ol' Timer walkin' down the hot mill floor with the boss the next day or so 'xplainin' what the trouble was all 'bout. An' Melaney always 'peared to have the right dope."

"Didya ever hear where he learned the business, Dinty?"

"Naw, never did 'xactly, but he'll tell ya if you'll ask 'im. And boy, he'll keepya settin' on the edge of your chair when you get 'im started talkin' sheet mill stuff."

Never Gotta Better Welcome

You know fellers, this is 'xactly what he did. I rang his door bell few days later and when he grabbed my hand and drew me over the door mat I knew then I was in the presence of the wholesome gentleman that the boys up at the mill calls the "Ol' Timer."

He directed me to a red leather fireside chair, and with a hand outstretched he sez, "Take a seat, Shorty, in the chair some of the ol' hands in the business gave me at a luncheon at the Duquesne Club in Pittsburgh last Dec. 27."

Then I understood. The best was none too good for his guests. No wonder he had won his way into the hearts of his associates and friends engaged in the manufacture of rolls—J. S. Ervin, W. E. Troutman, W. H. Seaman, D. H. Slonaker, Frank Cordes, William Goudy, W. C. Snyder, an' the like.

After seatin' himself opposite me and clasping his two hands over his right knee, he sez, "How's the mill rollin' now? How's the boys standin' it these warm days? How much iron you knockin' off the hot mill rolls in an 8-hour trick?"

Tells 'bout Ol' Days

I sure was on the edge of that red chair holdin' on to the sides for all I was worth as the "Ol' Timer" turned his memories back to the days when the wrought iron roll was the "village queen," when they used rope drives and other things 'fore I ever heard a pair of sheet bars bump into the roughin' mill rolls.

The "Ol' Timer" was 17 when he left high school to get a job so as he could lighten the financial load of his Dad. He started servin' a 4-year 'prenticeship in roll turnin' and design under his Dad at a mill on the Ohio river near Portsmouth, O. Roll turnin' then was secret stuff, chuck full of guesswork and, he got $3 for a week's work of 10 to 12 hour tricks. When he laid down his tools after usin' them 4 years, he was a full-fledgd roll turner. Things started comin' his way.

He packed his belongin's, went to Pittsburgh and started roll turnin' for a firm makin' chilled and other type rolls. They were havin' lotza trouble in the roll foundry and when the "Ol' Timer" tried to set 'em straight, the super sez "Kid, your supposed to turn rolls, not to tell a guy 50 years in the game how to make 'em."

Next day the kid put on his walkin' clothes and went over to 'nother shop makin' chilled rolls. He sold what he had in his head and started workin' as foreman and roll designer. After many years on this job, he decided to take a correspondence course and every evenin' from 7 until 10 o'clock, six nights a week for two years he burned the ol' student's lamp when the dinner dishes were cleared 'way.

Few years later they untied the strings on the shoes of the general manager, slipped the "Ol' Timer's" feet in and he wore those shoes for eight years when the plant was sold. In 1909 he went to work for the National Roll & Foundry Co., Avonmore, Pa. They printed "Sales Manager" after his name on the door, and that name was there for 31 years. On Jan. 1, 1940 he closed down the roller top of his desk, turned the key over to the boss and walked away from the plant with the tread of a conqueror toward home after more than 62 years out in the world on only four jobs brushin' shoulders with the roll makin' fellers. An' all the time he kept studyin' how to take the "guess" out of roll makin'. Not bad I'd say. Huh?

Before 'im was the temptation to be satisfied with meager attainments and the inducement to turn 'side to softer and easier situations. But this wasn't in the makeup of the "Ol' Timer." He restrained every temptation to relieve his task and continued to push his way ever up to the heights.

When I got back to the mill, I was tellin' some of the fellers 'bout my visit with the "Ol' Timer"—how he grasped life with strong and eager hands and shaped it well, jus' like the fellers over on the open-hearth floor shape up their heats of steel.

"Yeh," sez Red Brown, "you gotta light another's torch before your own goes out and thats 'xactly what the "Ol' Timer" has been doin' all these years with the young fellers comin' up through the ranks."

"You've got the right dope, Red," sez Zeke Webster, the slab yard craneman. "You can't begin too early to share your faith with the younger generation."

"Son, you're sayin' some true words. Got some kids up home myself and I find you gotta make friends with youth. You gotta help 'em see the vision and at the same time to set their feet in the way of its conquest."

Well, fellers, thats the story of the 'Ol Timer, W. G. Melaney. Drop in on 'im at 5357 Broad street, Pittsburgh, and pay 'im a call. If it's on a Monday, you'll find 'im readin' STEEL, I betcha.

All the fellers up at the mill are sayin', "Good luck, Ol' Timer". And I'm addin' a couple of compliments of the day myself. I'll be seein' you.

"Shorty" Long

Porcelain Enamel Acid Test is Revised

■ Product standards section of Porcelain Enamel institute, 612 North Michigan avenue, Chicago, recently issued a revised edition of the bulletin on acid resistance of porcelain enamels. Revision now makes it possible to check the finished porcelain enameled product by means of a spot test.

Lower Shell of J & L Eliza Stack Replaced with Little Disturbance

■ WHEN Jones & Laughlin Steel Corp.'s No. 5 Eliza stack at Pittsburgh was repaired and relined recently, an interesting replacement of most of the shell and mantle was made without disturbing the top structure, incline or downcomers. Upper shell and top structure had been replaced a number of years ago and were in good condition. Lower shell and mantle were considerably older and required replacement which was done by welding a new shell together outside the old for a height of 51 feet. This new shell was laid up against the old and riveted to it at the bottom and again at the upper level of the new shell.

The method used by the contractors, H. A. Brassert & Co., 310 South Michigan avenue, Chicago, was as follows:

The bustle pipe was adequately supported by heavy timber posts. Then its hangers, as well as interfering butt plates and angles, were burned from the shell and removed. Then one section of the outside shell angle at the mantle, extending from one column to the next column, was removed. The shell is supported by 12 columns equally spaced. A new plate section was fitted to the outside of the old bottom ring, the top edge being tight under the bottom edge of the second ring of old plates. A new section of heavy angle was fitted in at the mantle level and welded to the outside of the new plate.

Sides Replaced Separately

This operation was repeated on the opposite side of the furnace. It was not considered advisable to replace the plates in continuous succession around the shell on account of the possibility of "winding" and thus throwing the furnace out of plumb and level. Finally the new bottom ring and its outside mantle angle were all fitted in place and securely welded together but resting on the old mantle. The outside rivet heads in the top horizontal seam of the old first ring plate were burned off along with any other interferences and the second ring, consisting of eight plates, was erected. The bottom of the second ring was securely fastened to the top of the first new ring with 1-inch drift pins securely driven in closely spaced holes reamed through both the old and new plates. Later, these pins were replaced with rivets.

A horizontal inside butt plate was shop welded to the top edge of this second ring of shell plates and heavy butt plates were field welded over the outside vertical joints, which also were welded continuously. In this manner seven rings of plates were successively erected and welded together. Holes were provided in the horizontal butt plates and bolts were used for helping in assembling of the plates in the next upper ring.

The top ring of the new shell was drawn in to fit against the lower ring of the plates which did not require renewal. A horizontal row of holes was reamed in the top edge of this new top ring and through the old shell plates, and drift pins were driven to help take the load of the furnace top. As soon as the brick had been removed down to this point, these pins were replaced with rivets.

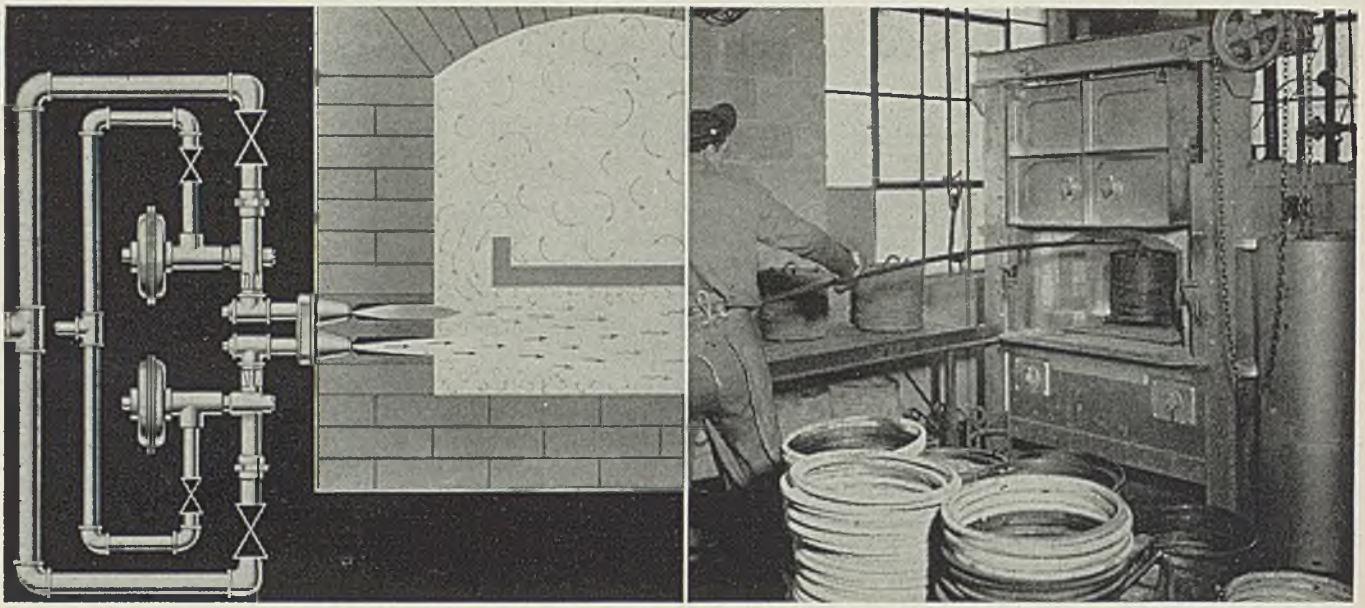
The old shell then was burned out in pieces of a size that could be safely handled to clear the workmen's rigging, and the inside joints of all new plates welded.

The old mantle was cut out, one section at a time, extending from the center of one column to the center of the next column, and 12 sections of mantle plate, with 12 splice plates over the columns were worked into place, until the whole ring was assembled and completely welded together. The old bottom or first shell ring with its inside angle was removed, a new inside angle was securely welded to the new mantle and shell plate, the drift pins at the top of the first ring were replaced with rivets, and 12 heavy brackets equally spaced between columns were welded to the inside of the shell and mantle.

An interesting feature was the erection of the new shell plates around the brackets which supported the downcomer pipes and which were riveted to the old shell. Slots were provided in the new plates, and these new plates were slipped over the old brackets. The edges of the slots were 100 per cent continuously welded to the old brackets, new bracket angles were fitted on the outside of the old bracket angles, and after the old shell plate had been burned away with the old angles, a large reinforcing plate was welded on the inside of the new shell, producing a tight shell and a satisfactory job. The time required to complete the work was seven weeks.

Pigeonholing Bar Steel

■ Illustrated is a horizontal storage rack system for bar steel together with facilities provided for reaching the higher tier of pigeonholes. Main portion of storage is divided vertically into six levels. Bar stock is stored in these divisions according to size, shape and analysis. Above main body of the storage are additional racks in which similar steel is placed. An ingenious method of handling is provided in form of a rubber tired truck or trailer. Trailer is constructed so it can be hooked behind a truck and pulled any distance. In the illustration, a quantity of steel bars has just been delivered by overhead crane to a position on the truck where it may be counted and shoved into one of the pigeonholes comprising the upper tier storage. In order to increase the height of the truck a trestle has been set up on its platform



Left, diagram showing how air is injected at low temperatures to give a large volume of hot gases for uniform and rapid heating of work. For high temperatures, both nozzles function in the usual manner. Right, this Conjecto-Firing unit at Wohlert Corp., Lansing, Mich., reduced cost of normalizing starter ring gears by $5 per ton. Furnace also used for many drawing operations

Firing System Has Wide Temperature Range

■ A NEW method of firing convection type gas furnaces throughout a wide temperature range has been developed. Now it is possible to do most heat-treating work in the same furnace as a furnace can be constructed to operate over the entire range from 600 to 2000 degrees Fahr. efficiently.

It is commonly accepted that for the lower temperature operations such as drawing, heating by convection is most satisfactory, being faster and more uniform. In recent years this has accounted for the widespread use of batch-type and continuous recirculated air furnace for temperatures up to approximately 1350 degrees Fahr.

Convection heating, however, is dependent on the circulation of a large volume of hot gases. When operating a conventional furnace at low temperatures, the burners necessarily must be turned down. This immediately reduces the volume of hot gases or products of combustion. Hence, at the lower temperatures when it is most desirable to have a large volume of hot gases to promote heating by convection, the conventional furnace produces a minimum volume of hot gases.

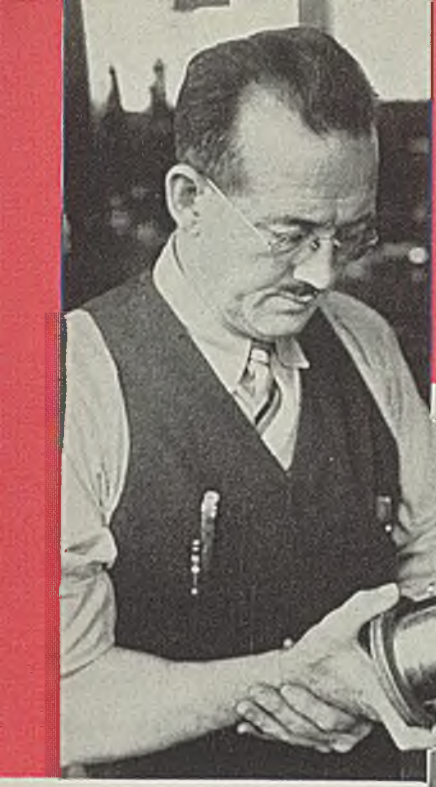
To overcome this difficulty a new system of firing, known as Conjecto-Firing has been developed by Surface Combustion Corp., Toledo, O. With this system, an additional volume of air is introduced at low temperature and, immediately upon being introduced to the furnace, is automatically mixed with the hot products of combustion.

This is accomplished by using twin nozzle burners cast into an integral casting as shown in an accompanying illustration. Each nozzle has an individual tunnel, one tunnel being vertically above the other. At low temperatures, one nozzle functions in the usual manner to completely burn the air-gas mixture within the tunnel. At the same time, the gas supply to the other nozzle is shut off and air is injected through the nozzle and tunnel. As the air leaves the tunnel at a fairly high velocity, it creates an inspirator effect to combine quickly with the hot products of combustion coming from the other tunnel, either immediately above or below. Injection of the air causes no appreciable oxidation or scaling since it is mixed intimately with the hot products of combustion and further because the furnace is below the temperature at which oxidation takes place with any appreciable speed.

Hence, at the lower temperatures it is possible to produce a large volume of hot gases which results in quicker and more uniform heating through convection.

At the higher temperatures required for annealing, hardening, normalizing and carburizing, both nozzles function in the usual manner, completely burning a correctly proportioned air-gas mixture. However, the double nozzle feature makes possible a unique system for close temperature control. The burners can be adjusted so the upper and lower nozzles are of different capacity. When operating at higher temperatures, it then is possible through automatic or manual control to shut off only the high-capacity burners as the temperature of furnace approaches the desired value. When the heat input to the furnace thus is reduced, there remains little possibility of overshooting the desired temperature. This temperature control system also automatically operates a control valve to introduce auxiliary air through the high-capacity burners when they are not needed for firing, thus automatically obtaining the desired convection currents for efficient heating.

It is evident that use of burners employing this principle allows a furnace to operate effectively over a much greater temperature range. It is easy to construct a furnace using these burners so it has a temperature range from 600 to 2000 degrees Fahr. In such a furnace it is possible to perform almost any heat-treating operation since this range covers practically all heat-treating work.



"You can take out just what yo put into these furnaces—a essential in producing allo

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The two Ajax-Northrup Furnaces shown above have been added recently. Th plant can melt down a ton of alloy in 1½ hours.

Besides greatly improving the product and insuring uniformity, this compar reports a saving of both time and money.

Most of our newest alloys and many other metallurgical laboratory achievemen have been made with Ajax-Northrup Furnaces, and in the realm of heatin startling production possibilities are being uncovered every day.

For instance, RCA Victor increased the production of rotors 1000 percent. plant swedging 5" hollow cylinders increased daily production 2½ times.

Razor blades are treated in a continuous strip, and Ajax-Northrup Furnaces ar replacing other methods for selective hardening and annealing of small part If you use heating or melting in your plant it will pay you to send for the Aja Northrup bulletins.

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Handling in Press Work

The application of simple mechanical handling facilities often can completely eliminate hazards to the operator, cut rejects and increase output. One such installation doubles production

■ PRESS operations offer a field where materials handling equipment—often of the very simplest nature—sometimes can be utilized to effect startling improvements, not only in production, but in elimination of restacking operations and increased safety for the operator. While various schemes have been developed to increase the operator's safety, there are still far too many press setups in which the operator must place his hands beneath the dies, either in inserting or removing work or both.

In many such instances, it would be a simple matter to tilt the press so work could be fed to the dies by permitting it to slide down a short chute against stops which would position it accurately, ready for the press operation.

In many setups it is common practice to clear the dies or guides by prying the stamped, punched or notched piece out by hand. Here again the hazard to the operator can be eliminated by introduction of knockout rings and pins to strip the work from the dies automatically, thus freeing the operator from necessity of inserting his hands under the dies.

This also introduces another important factor—the possibility of increased output. By use of self-stripping die attachments, the work can be made to clear itself automatically from the press and to discharge through a chute where a conveyor can be provided to carry it to the next work point. By making it unnecessary for the operator to strip the work from the dies by hand or pick it up and remove it from the press, it is possible for the entire cycle press operation to be accomplished faster, often resulting in important increases in output.

With press inclined at a sufficient angle and with strippers provided to clear the work, it is easy to make provision for the pieces to be stacked automatically as they come from the press. Gathering or stacking flat punched or blanked work may often be quite a time-consuming operation if pieces are small. Also it constitutes a definite hazard where sharp edges may be involved. With the work automatically transferred by the conveyor setup at the discharge side of the press, a stacking device can be installed. Often special attachments can be applied to line up the pieces where these should be stacked in a certain position such as when assembling motor and generator laminations.

Installation Very Modern

Perhaps the installation recently completed at plant of Reliance Electric & Engineering Co., Cleveland, is one of the most complete layouts of the type discussed. The first consideration in designing this installation was to provide maximum protection for the operator who in the previous setup had to insert and remove the blanks by hand from beneath the dies. In addition it was desired to make provision so the blanks could be segregated and stacked automatically as they emerge from the press. The press work in this instance consists of what is known as "separating" or parting with a die, a rotor and a stator lamination from each blank fed into the press. These are laminations for alternating-current motors.

A third requirement in this instance was to provide means to increase the output from the press sufficiently so it would be feasible to operate the press as an integral part of a smoothly moving production line.

In the actual arrangement shown in accompanying illustrations, these requirements have been met to an exceptionally satisfactory degree. The blanks come to the separating press from other stamping operations which have provided the proper sized shaft hole, the correct outside diameter for the finished stator lamination and a succession of notched openings around the periphery of the blank, these openings serving as coil slots for the stator lamination. The "separating" operation performed by the press follows notching of the stator coil slots and precedes the assembly of the stator laminations into finished stator frames.

Before modernizing handling operations in connection with separating, the blank was placed by hand over a plug in the center of the die and the press clutch tripped. After the press had operated, the stator sections slid out through the back of the press into a tote box since the press was tilted at an angle. However the rotor section had to be pried off the plug in the die by hand, constituting a hazard to the operator and slowing down work.

Both types of lamination then had to be picked up by hand, separated into two stacks and lined up—both as to indexing keyways and as to the proper side with relation to the press burrs which had been raised. This again was necessarily a slow operation and offered considerable hazard to the operator's fingers and hands from the sharp edges.

The hazard incurred by presence

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of the operator's hands beneath the press die was eliminated by revising the construction of the dies so blanks are now fed into the press through a chute as shown in the illustrations. The blanks are positioned mechanically beneath the dies by the use of stops. Knockout rings and pins are used to strip the rotor sections from the die automatically after the separating operation.

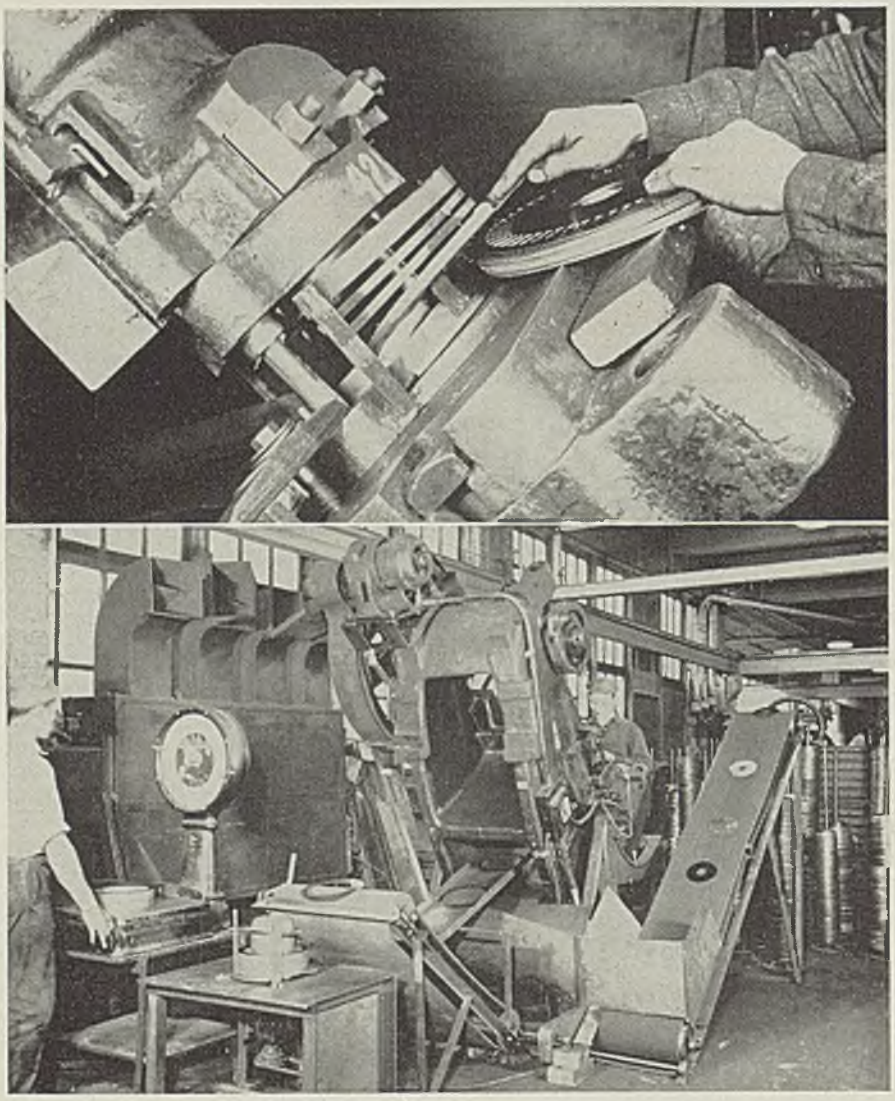
The rotor lamination then drops through the die and onto a discharge chute. The stator lamination slides off the dies onto the same discharge chute. This chute, however, is provided with a hole of sufficient size to allow the rotor lamination—the smaller piece—to drop through into a second lower chute.

The stator lamination, which is the larger piece, slides on down the upper discharge chute. Stator laminations emerge from this chute and are picked up on a moving rubber belt conveyor which carries them to the stacking unit shown. Here, stacks of lined-up stator laminations can be removed from the spindle without stopping either the press or the stacker unit. A nearby scale permits weighing the laminations out into piles of the correct size to produce finished stators.

As the rotor laminations slide down the lower discharge chute, they are tilted on edge, rolled sidewise and picked up by another rubber belt conveyor which carries them up and onto spindles on which they are simply stacked. From this point they are removed for notching as required by the specifications of orders going into production at the time.

The complete press, conveyors and stacking unit are used to handle blanks of various sizes in diameters up to 16 inches. For larger blanks up to 22 inches in diameter, the rotor sections are handled as described but the stator laminations, being too big to pass back through the press, are taken out of the dies at the front and are shoved down a special chute provided along the

(*Please turn to Page* 79)



Upper, a short chute delivers work to dies. Guard prevents operator's hands from being inserted between dies. Lower, layout of automatic belt conveyors and stacking units which doubled production at Reliance Electric & Engineering Co.'s plant

Story of Electricity Told for the Layman

■ 48 *Million Horses*, by Humphrey B. Neill; 241 pages, published by J. B. Lippincott Co., 227 South Sixth street, Philadelphia; supplied by STEEL, Cleveland, for $2.50.

This book is the story of the rapid progress in development of electricity since Thomas Edison opened the first central station in New York in 1882. The story is presented in nontechnical terms for the information and education of the reader unacquainted with terms of kilowatts and ohms. It is divided into six parts: Energy, light, comfort, tele-magic, transportation and industry, with 82 photographs supplementing the text.

New Preparation Seals And Protects Floor

■ A transparent penetrating floor seal, Bakeflex, announced by Flexrock Co., 2300 Manning street, Philadelphia, not only makes nearly all types of floors fire and dirt resistant but also increases their life. The seal has a faint amber color and may be used as a filler. No preparation is required in its application. It is applied either by a cloth or brush.

Steel Switchgear

(*Concluded from Page* 53)

part of many enclosed equipments such as the metal-clad switchgear; Fig. 3.

Metal-clad switchgear is a type completely enclosed in a sheet-steel structure. Here transformers, buses and connections are placed in separate, grounded compartments and isolation of parts by steel barriers is even more complete. A feature of steel in such equipment is that it localizes any damage due to circuit faults. Provision is made by means of self-coupled disconnecting devices for mechanically removing the breaker from the housing for inspection or replacement of contacts.

For outdoor installations, metal-clad and so-called steel "switchhouses" have been in general use for some time. Fig. 4 shows a typical outdoor "unit sub-station," all steel enclosed. To weather-proof such a structure, special ventilating measures, compact and exceptionally rigid device mountings and heavy base designs are utilized.

Electric Welded Chain

Links shaped automatically to form chain. Success of highly developed resistance welding procedure depends on operator's skill. Links forged as welded. Chain heat treated, prestretched

By A. G. ANDERSON

Foreman, Chain Department
Yale & Towne Mfg. Co.
Philadelphia

■ MANUFACTURE of high-strength chain for Yale hoists is a most important part of production operations at the Yale & Towne plant, 4530 Tacony street, Philadelphia. Here an entire floor is given over to manufacture of chain in sizes to handle rated loads from ¼ to 3 tons.

Raw material comes into the plant in the form of coils of hot-rolled bar stock which has been drawn down accurately to the size desired.

In the first machine, the stock is fed through straightening rolls and cut into lengths of correct size for the chain in which the links are to be used. A special cutting-off mechanism is used which produces a pointed or conical end as shown in Fig. 1 instead of a nonuniform wedge-shaped end as would be produced by ordinary shearing methods.

Shape of the ends is most important for successful resistance welding. By utilizing a slight conical

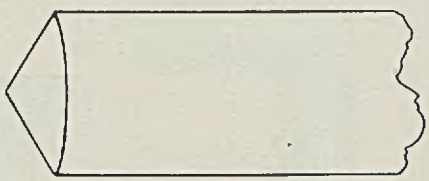


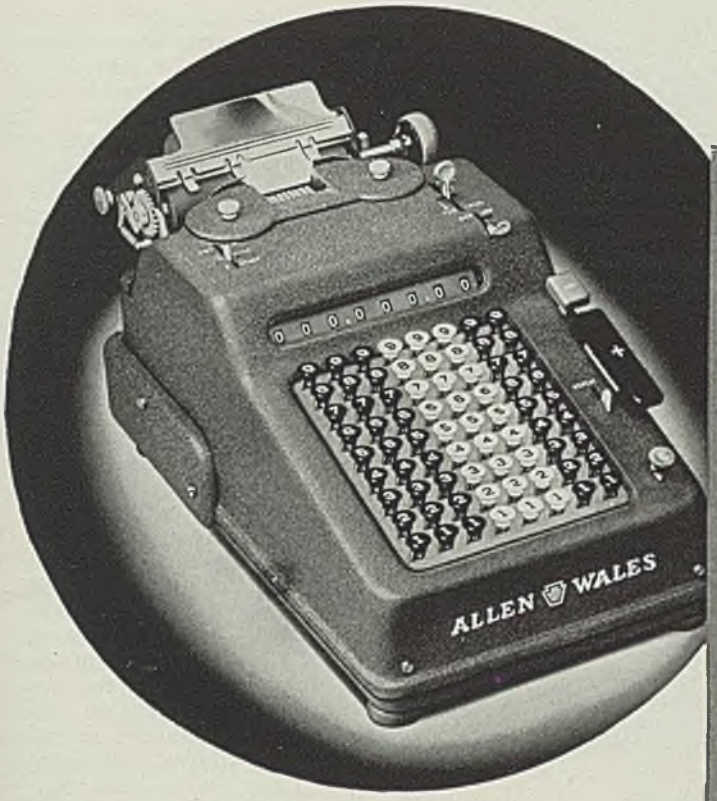
Fig. 1—Rod is pointed as shown to improve quality of weld

end with the point exactly centered, heating during welding starts at these points and progresses toward the circumference of the cross section so when the metal is forced out during upset there will be no inclusions or improperly heated sections of metal in the weld. Thus shaping of ends is watched carefully to see that this operation is done correctly.

After links have been straightened, cut to length and ends prepared, they are fed into a chute on a second machine which forms the links into the continuous chain.

Figs. 3, 4, 5 and 6 show four consecutive views of forming operations in this machine. In Fig. 3, a formed link is being removed from the mandril by two arms which grip it at each end. As these arms retract, pulling the link from the mandril, they also turn the link 90 degrees to the vertical position shown in Fig. 4. At the right in each of these four figures may be seen the chute carrying a supply of unformed links ready to be fed into the machine. The end of the next straight bar (unformed link) can be seen emerging from the chute in Fig. 3 part way be-

Fig. 2—Flashing off excess metal in making the resistance welded joint in a link



PENNSALT CLEANER

cuts metal cleaning cost 60% for Allen Wales Adding Machine Corporation

ALLEN WALES Adding Machines are precision instruments requiring extreme care and the highest standards of quality in their manufacture. The cleaning of metal parts, such as springs, bearings, key arms, and others must be perfectly done if accuracy and excellence of finish are to be maintained through the finishing operations.

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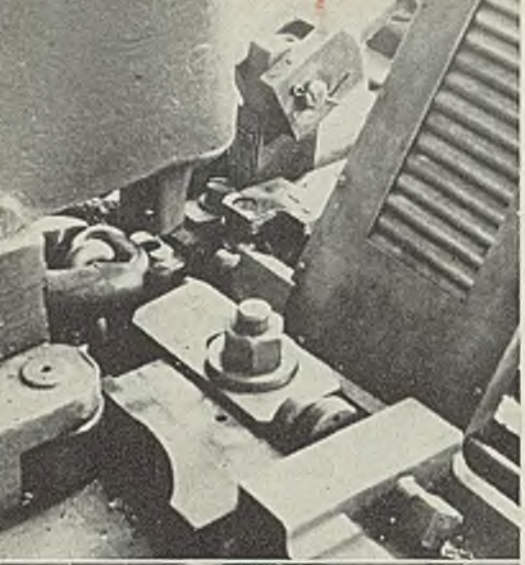
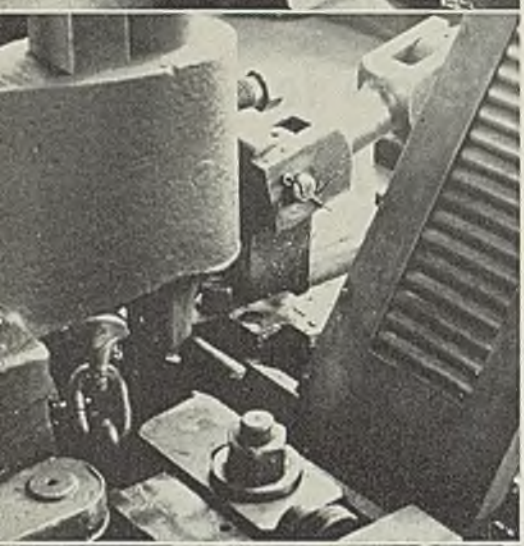
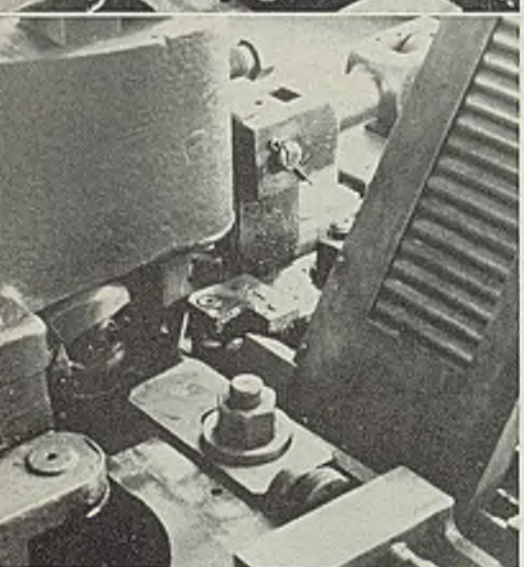
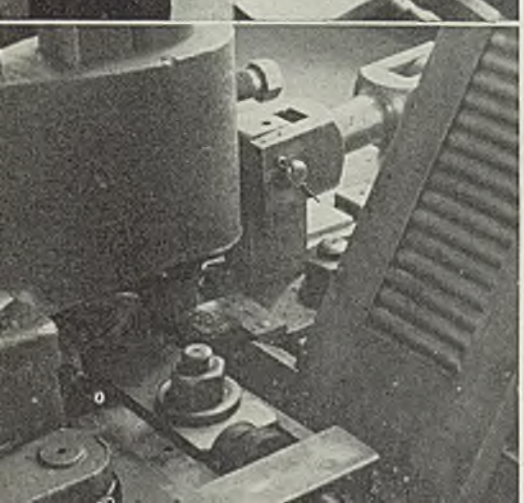








tween the bottom of the chute and the mandril.

In Fig. 4 this straight link can be seen in position completely discharged from the chute. Here the carrier holding the link just formed has revolved 90 degrees to the vertical position, the mandril has closed, the toggle clamp mechanism just behind the mandril has started to close, clamping the new blank securely in position ready for forming. The toggle mechanism in extreme open position can be seen at top center of Fig. 3. In Fig. 4 the toggle is partly closed, and in Figs. 5 and 6 it will be noted that the toggle is completely closed.

In Fig. 5, the two back slides parallel with the toggle have started to form the new link. The slide on the side of the mandril visible here has advanced to bend the end of the link about 45 degrees. Note slide carries a circular forming guide pivoted in the slide to reduce wear at that point and to roll the link around the mandril. A second slide on opposite side of the toggle mechanism has bent the other end of the link the same amount.

In Fig. 6 the rear slides have done their portion of the link forming. They have bent each end of the bar approximately 90 degrees and the slide in the immediate foreground has been operated to wrap the end of the bar completely around its half the mandril. At the same time, a second slide on the opposite side from that shown in Fig. 6 has closed that end up also, forming a completely closed link ready for welding.

When the slides in Fig. 6 retract, the side grippers will release their hold on the previous link and grip the newly formed link to remove it from the mandril as shown in Fig. 3. From this point on the operation is repeated.

Entire series of operations takes place at the rate of about 30 per minute in the forming of ½-inch diameter bars to make what eventually will be 2-ton chain. In actual operation, the entire series of forming movements takes place so smoothly and rapidly that it is impossible for the eye to follow them.

Chain from the forming machine is discharged into a box in any continuous length desired. Of course there is a separate forming machine available for each size bar. Bar or rod sizes include ¼-inch diameter to make ¼-ton chain, ⅜-inch diameter for 1-ton chain, ½-inch diameter for 2-ton chain and 9/16-inch diameter for 3-ton chain.

From this point the chain goes through the welding machines, one of which is seen in Fig. 8 with a close-up of the same machine in Fig. 7. These welding machines are unusual in that they not only provide for actual resistance welding of the joint, but have built into them a mechanism which trims off upset metal or flash and forges the joint while still hot. This flash trimmer and forging equipment are built into upper portion of the machine which employs massive construction to withstand the terrific vibration set up during trimming and forging.

Every Other Link Welded

Trimming and forging operation is done by four pairs of dies carried on two rotating members, one above and one below the chain, both of which can be seen clearly in Fig. 7.

Thus operator not only controls actual welding operation but trimming and forging of the weld as well. The chain passes from right to left past the operator who welds every other link. Then when the entire length of chain has been passed through the machine, the chain is turned 90 degrees and the links that were missed the first time then are welded. This procedure makes it unnecessary to turn the chain 90 degrees for each link as would be required if each link were welded in succession.

The operator initiates making of the joint by pressing a foot pedal which moves the contactors in to engage the link. Then he trips a switch with his left hand, which starts the current to flow through the link, causing its temperature to rise at the point where the two ends touch. The large lever shown at the right in Fig. 8 controls the movement or "squeeze" applied to the link. It is movement of this lever which upsets the metal at the weld.

At this point, the cone shaped ends of the link play their important part. As the current heats the small amount of metal where the points of the two ends touch each other, the metal softens and, the operator, by exerting pressure on the upset lever, causes this metal to flow toward the circum-

Fig. 3. (Top)—Here a finished link is being removed from the mandrel which has parted to permit closed link to pass

Fig. 4 (Next to top)—Finished link is rotated and positioned against mandrel ready for new link to be formed interlocking with it. New blank is seen emerging in line with bottom of magazine at right

Fig. 5. (Next to bottom)—Ends of new blank have been bent approximately 45 degrees here

Fig. 6. (Bottom)—Link is being completed by wrapping ends around mandrel. Slide in immediate foreground is finishing the forming of the link

ference. As additional metal is heated to a temperature at which it will flow, it also is forced outward with subsequent movement of the upsetting lever. This causes only clean, correctly heated metal to remain in the joint and eliminates the inclusions and foreign matter which otherwise might be left in the joint to reduce its strength.

Upsetting lever also is connected to a cam which opens the contactor controling application of the welding current. Thus when metal is soft enough to flow and permit upsetting lever to be moved a certain distance, current is turned off automatically. Amount of upset is determined by the operator, his experience telling him by the "feel" of the lever when sufficient heating and upsetting have occurred.

"Y" Stamped in Each Link

At this point, the operator sets the forging hammers into operation. Four sets of forging dies located on two wheels above and below the work are hammered down on the still white-hot joint in rapid succession. Mechanism is connected with ratchetting device to change the die sets in unison after about five strokes of the head. First die set trims off flash roughly, second die set trims to closer tolerance, third set forms the metal to cross section nearly identical with that of the rest of the link and fourth set includes a die stamping the letter "Y" on each link. This is the identifying mark of Yale chain. Working the metal while hot as is done by these forging hammers has a very beneficial effect on the weld and adjoining metal.

Entire series of operations is performed rapidly to make up to 5000 links of ¼-ton chain per 8-hour day. Production from machines welding links from ⅜-inch material is about 4200 per day. Similarly, the 2-ton chain utilizing ½-inch material is welded at the rate of 3400 links per day, the 3-ton chain utilizing 9/16-inch material, the largest welded here, is welded into chain at the rate of 1600 links per day. This latter chain has elastic limit of 18,000 pounds with a breaking point between 28,000 and 29,000 pounds.

Fig. 2 is a view of the welding operation and illustrates how some of the excess metal is burned off or "flashed" during the welding process. Fig. 8 also shows a link being welded.

After welding, all links are inspected carefully for chips which might be pressed into the weld during forging and which would leave a hole when they subsequently fell out during use. Any rough spots on or near the weld also indicates an unsatisfactory link.

(*Please turn to Page* 80)

Machining Hard Alloy Steels

Certain high-strength steel alloys appear to be machinable even after they are heat treated to high hardness levels. Use of such materials in gears, for example, permits their redesign to save appreciable weight in addition to obtaining the important advantage of avoiding possible distortion and warpage from heat treatment after machining as is conventional practice

■ INDUSTRIAL development in the art of machining alloy steels has progressed to the point where heat-treated parts can be machined with conventional high-speed-steel cutting tools at hardnesses hitherto considered commercially impractical. This new advance in processing technique, facilitated by modern machine tools of more rigid construction to insure smooth operation under heavy loads, is largely dependent upon the use of nickel-chromium-molybdenum steel of SAE 4340 or allied types for parts that must be machined at 450 brinell or higher.

Until recently, the upper limit of commercial machinability was considered to be between 350 and 375 brinell under normal circumstances, and stressed parts were designed with this maximum limit in mind. When hardness in excess of this proved necessary, usual practice involved machining the parts prior to heat treatment.

For removing large amounts of metal with maximum speed and efficiency, machining while the steel is in a relatively soft condition (prior to heat treatment) is undoubtedly the most economical practice. Nevertheless, under certain circumstances machining before heat treatment has inherent disadvantages. Distortion and warpage are factors which accompany heat treatment and while their effects may be minimized by various means, complete elimination of dimensional changes is extremely difficult. Consequently it is usually necessary to resort to straightening operations after heat treatment or to leave sufficient excess metal in the initial machining operations to allow for possible warpage and then grind or otherwise finish the part to the required dimensions.

Either of these procedures has undesirable aspects. The straightening operation can introduce strains in the finished part which may be detrimental to service properties. The finishing operation subsequent to heat treatment requires setting up and realigning the part once more in the machine tool. This may endanger dimensional accuracy if the surfaces ground or shaved in this final operation must be related accurately to surfaces finished prior to heat treatment.

Another factor to be considered is the danger of strains resulting from the quenching operation. When a finished or even rough-machined part is quenched or otherwise cooled rapidly, internal stresses are developed which can be particularly severe at edges, sharp corners and fillets, at the periphery of holes, or abrupt changes in section thickness.

Obviously, any technique permitting the economical machining of heat-treated steel at high hardness levels has the advantage of avoiding the undesirable features just described and simplifies heat treating and machining practice. In some instances it may permit elimination of slower, more expensive grinding operations. The use of nickel-chromium-molybdenum steel has proved useful in these respects and is becoming increasingly popular for commercial applications in which machinability at high hardness is desirable.

In the automotive industry, heavy-duty truck axle shafts are produced of SAE 4340 and splined on a hobbing mill at a hardness of 400 to 444 brinell to avoid necessity for repeated heat treatment of the splined end after machining. Cutter speed for this operation is reported as 72 revolutions per minute with a feed of 0.0057-inch per revolution per minute and a surface speed of 84 feet per minute. An average of 46 pieces per cutter grind is obtained. In certain cases the hardness of the shaft was increased to 500 brinell and machining conducted satisfactorily at reduced speeds and feeds.

The aircraft industry has found it profitable to use SAE X-4340 which is heat treated to between 415 and 450 brinell for propellor shafts, crankshafts, propellor spiders, undercarriage parts and engine mount fittings, all of which are highly stressed in service. Fig 1 shows hydromatic propellor

TABLE I

Chemical Composition—SAE X-4340

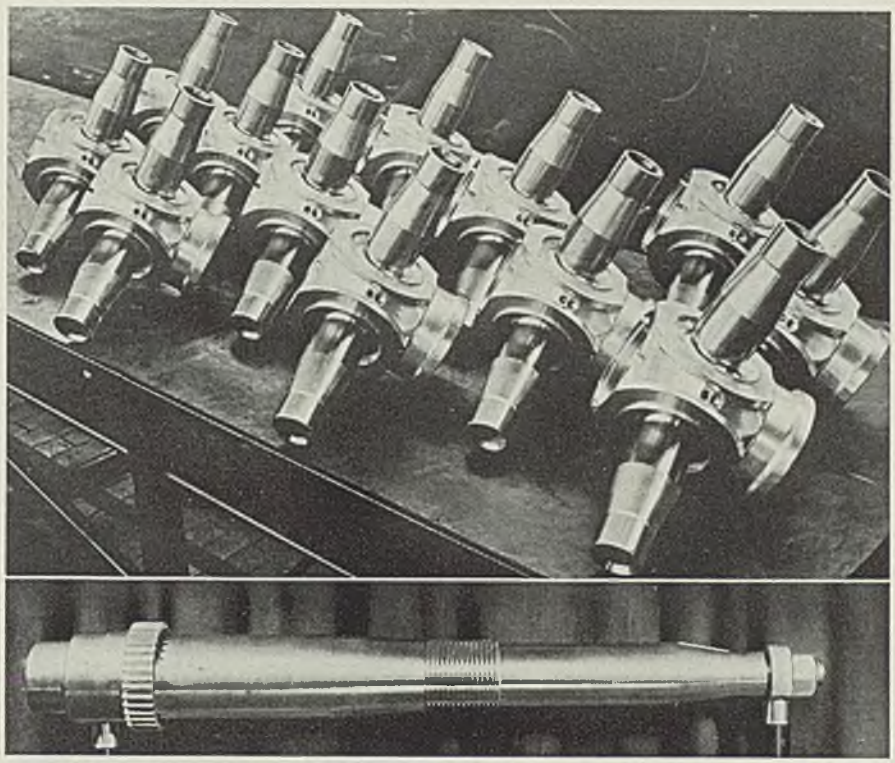
Carbon	0.35-0.45%
Manganese	0.50-0.80%
Nickel	1.50-2.00%
Chromium	0.60-0.90%
Molybdenum	0.20-0.30%

TABLE II

Mechanical Properties—SAE X-4340

Tensile Strength, p.s.i.	230,000
Yield point, p.s.i.	210,000
Reduction of area, per cent	47
Elongation, per cent in 2 inches	12
Izod impact, ft. lbs.	17
Brinell hardness	477

Fig. 1. (Upper)—Hydromatic airplane propellor spiders machined at 415 brinell. Fig. 3. (Lower)—Gear shaft completely machined from bar stock at 477 brinell

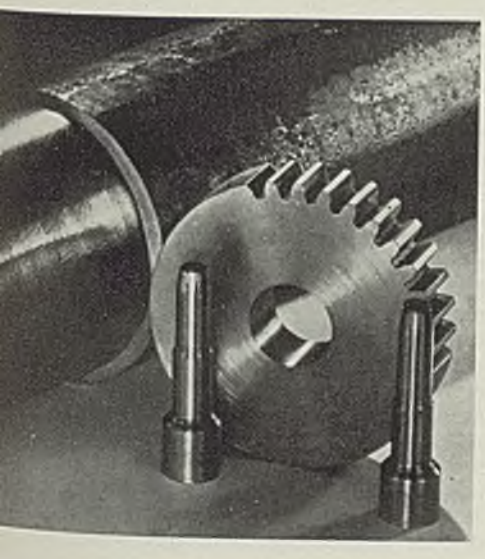


spiders machined at 415 brinell at the East Hartford plant of Hamilton Standard Propellors division of United Aircraft Corp.

Instances have been reported in which industrial gear manufacturers have developed successful commercial practice for machining gears of SAE 4340 at hardnesses as high as 500 brinell. Fig. 2 illustrates a gear blank partially machined from bar stock of Ryerson's "Nikrome M" nickel-chromium-molybdenum steel, heat treated to 477 brinell. Turning in this instance was accomplished in an ordinary lathe using a standard ⅝-inch square high-speed-steel tool with a 3/16-inch cut and a 1/32-inch feed at a speed of 18 surface feet per minute. A shaft completely machined at 477 brinell is shown in Fig. 3.

The machining at high hardness of gears and other wearing parts offers many interesting commercial possibilities. Machine tool gears, for instance, benefit by this increased hardness because they must be wear resistant to maintain the accuracy and smooth-running characteristics of the machine over a long service life. If advantage is taken of the higher strength accompanying the increased hardness, gears may be redesigned to save appreciable weight. Heavy gears such as turbine reduction gears are ordinarily produced at relatively low hardness to avoid machining difficulties. Redesign of such gears on a higher strength basis permits reduction in the face width without exceeding the safe unit tooth load and with resultant saving in weight and economy of material.

Fig. 2—Partially machined gear from nickel-chromium-molybdenum bar stock heat treated to 477 brinell. Completed shaft shown in Fig. 3



In a recent demonstration at the laboratory of the International Nickel Co., SAE X-4340 steel heat treated to 450 brinell was machined on a standard Warner & Swasey turret lathe, using conventional high-speed-steel cutting tools of the 18-4-1 type. A cutting oil containing an appreciable percentage of saponifiable oil and sulfur was employed. The machining operations were designed to illustrate a wide variety of cutting work and included chamfering, turning, drilling and form tooling. A turning cut, in which the bar was reduced in diameter from 2 to 1½ inches, was performed at a speed of 49 feet per minute with a feed of 0.0075-inch. These figures were used for demonstration purposes and are not combinations which would be useful in commercial practice. A tightly wound helical chip with no tendency to tear, check or burn resulted and a smooth surface was produced on the bar.

In addition to satisfactory machinability, this nickel alloy steel possesses high mechanical properties. The accompanying tables illustrate the good ductility and resistance to impact characteristic of SAE X-4340 at high strength levels.

♦

Lock Nut Increases Sheet Thread Area

■ A new method of increasing thread area in sheet metal, making practical the use of lighter gage metals and simplifying assembly in inaccessible places is provided by Fast-On lock nuts manufactured by Fabristeel Products Inc., Kerr Machinery building, Detroit.

In assembling, the small square portion of the nut is inserted in the hole previously cut in the metal, protruding just enough for the four corners to be clinched with a swaging tool. This locking is a positive action and the nut will not work loose, variation in the thickness of the metal being taken care of automatically. As the thread runs to the edge of the nut, it is practical to use with shorter screws and closer clearances.

Thirty-three different kinds of lock nuts are available in #6, 8, 10, 12; ¼, 5/16 and ⅜-inch sizes and various thread pitch diameters.

Discussion by Experts On Cost Accounting

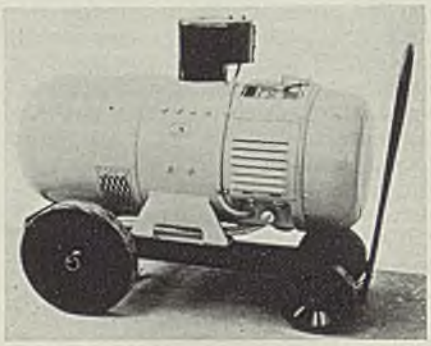
■ *National Association of Cost Accountants* 1939 *Yearbook*, 406 pages; published by National Association of Cost Accountants, New York; supplied by STEEL, Cleveland, for $3.

Issued primarily for association members, this volume is being made available for others as long as the supply lasts. These yearbooks have been issued for the past 20 years. The present volume is based on the technical sessions of the twentieth international cost conference in June, 1939.

The contained papers relate to development of industrial prices, product pricing, cost control, etc. Roundtable discussions on various subjects are also included.

Remote Control Device For Arc Welders

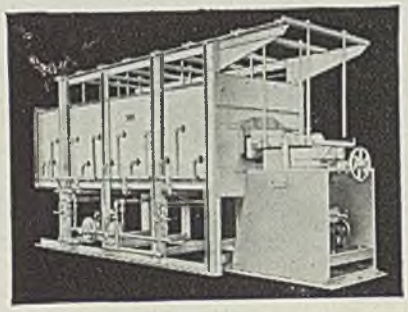
■ Wilson Welder & Metals Co. Inc., 60 East Forty-second street, New York, has introductd a new device for remote control of its Hornet arc welders. To utilize the new device, handwheel which governs the control pole of the welder is simply replaced by the reversible motor-driven type SC remote control device. Device allows minute



adjustments in current output by merely touching one of two contacts on the electrode holder to the ground. The contact buttons are shaped differently, so operator can locate the correct one easily even in poor light. The 1/80-horsepower electric motor, which operates the control pole, is protected by two limit switches and by a slip clutch. Generator may be preset by push buttons mounted on the control itself.

Hardening Machine

■ American Gas Furnace Co., Elizabeth, N. J., announces a new, larger size, reciprocating full muffle clean hardening machine for capacities of 400 to 600 pounds of work hardened per hour. Its combustion space has been increased to insure temperature uniformity and with the various means available for regulating the heating time. The time-temperature cycle can be adjusted readily to meet any requirements. Machines are furnished either with a full muffle having a ribbon flame seal at the work entering end or a special seal where the reciprocating muffle meets the stationary discharge chute. Where atmosphere control need not be so exacting, machines are supplied with an open hearth having high side ribs to eliminate possibility of work dropping off into combustion chamber. For long thin cylindrical pieces, the hearth or bottom of the muffle is grooved to insure such parts travelling with their long axis parallel with the hearth. An-



other feature of these machines is the cascade in the discharge to prevent smoke or oil fumes backing up into the muffle.

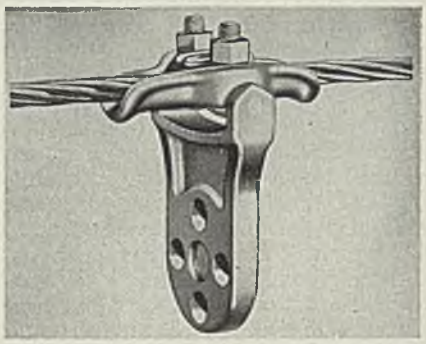
Motor Starter

■ Cutler-Hammer Inc., 315 North Twelfth street, Milwaukee, announces an improved across-the-line starter for the control and protection of polyphase squirrel cage motors up to 5 horsepower. Model now embodies simplified hook-on cover, held by one fastening screw, which can be removed for easy installation. Loosening one screw also permits

removal of operating mechanism for wiring and conduit work. The contacts, dust safe vertical type, are now of heavier "fine" silver. Lava insulators protect contact springs against minor heat transmission. Contact springs and contact supports are all of stainless steels. Other metal parts are cadmium plated. The C-H "drop of solder" overload relay has been made smaller in size with better operating characteristics. Starter is available in reset only for 2 or 3-wire remote control, start and stop reset buttons for 3-wire control and 3-position selector switch for manual-off-automatic local control or 2 or 3-wire remote control.

Ground Wire Bracket For Steel Towers

■ Ohio Brass Co., Mansfield, O., announces a ground wire bracket for steel towers. It has four holes to allow bolting to a steel tower, a fabricated steel pole or a bayonet extension. Known as Clamptop, bracket permits an increase of spacing between ground wire and conductors of 6 inches or more. Bracket proper has two pintles on which clamp body rests. Two carriage bolts hold clamp to bracket and



secure the keeper piece over the ground wire. Since clamp pivots 15 degrees above or below the neutral position, ample clearance for rocking action is provided. It holds any wire from ¼ to 9/16-inch.

Auxiliary Switch

■ Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has placed on the market electrically operated auxiliary switch for making and breaking several circuits simultaneously such as on a differential bus protection system where several circuit breakers are tripped at once. Switch is provided with any arrangement of make and break contacts up to 10, however, by means of geared switches and parallel or series arrangement of switch coils any desired number or combination of circuits can be handled. Two operating arrangements are provided as standard. One type can be tripped from front of panel by rotating handle, as well as by energizing shunt

trip coil. Other type can be tripped only by operating mechanism behind panel. Position of handle provides visual indication of last operation of switch. Switch is spring-operated with shunt trip arrangement. Contacts are held in reset or open position against force of torsional spring by a position latch. Two independent latches and springs are used to insure positive action.

Air Circulator

■ Emerson Electric Mfg. Co., 1824 Washington avenue, St. Louis, announces a new 30-inch 2-speed air circulator which delivers a maximum of 10,000 cubic feet of air per minute and 7500 cubic feet per minute on slow speed. It is available for ceiling mounting, adjustable floor column mounting, counter column mounting and wall bracket mounting. It is equipped with blades of heavy gage aluminum.

Explosion-Proof Motors

■ U. S. Electrical Motors Inc., 200 East Slauson avenue, Los Angeles, has placed on the market higher horsepower explosion-proof motors. Ratings have been increased from 25 to 75 horsepower in class I group D, while in class II group G they have been increased from 7½ to 75 horsepower. Larger motors are of shell frame construction. They have a specially designed fan which runs quietly at high speeds. The fan-end inner end bell and the outer fan cover bracket are held in place with a combination screw. This eliminates one set of holding screws and supplies rigid and secure mounting for the fan cover and bracket as well as facilitating assembly or disassembly of motor.

Metal-Clad Switchgear

■ General Electric Co., Schenectady, N. Y., has introduced improved MI-9 metal-clad switchgear for protection of circuits up to 5000 volts and 50,000 kilovolt amperes. All buses and connections are completely insulated. A screw-jack mechanism, built into housing, raises and lowers breaker. Mechanical interlocks, removable breakers and isolated current transformers, buses and connections are retained as features. Oil blast principle of circuit interruption is employed. Primary disconnecting devices are of stud-and-socket type, with silver-to-silver, high-pressure line contacts. Stationary sockets are mounted in glazed, wet-process porcelain. Movable contacts are the oil-circuit-breaker studs. Secondary disconnecting devices connect or disconnect automatically all secondary connections when the breaker is raised or lowered in the housing. Mechanical interlocks prevent disconnecting or reconnecting breaker while it is closed.

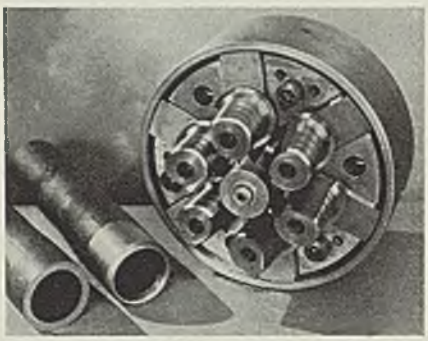
Grinding Wheels

■ Atlantic Abrasive Corp., South Braintree, Mass., announces two grinding wheels for precision grinding involved in high speed steels and similar metals. Wheel type L.B. is for fast, clean cutting on tools or dies. It comes in all grain sizes from coarse to fine. Type S. B., also available in all grain sizes, is a medium tempered wheel for grinding fine tools of high speed steel, stellite, carboloy and other alloyed steels.

Threading Cutters

■ National Acme Co., 170 East 131st street, Cleveland, has developed a complete line of end turning, end forming, combination turning and threading cutters of the circular type for use in its standard circular chaser die heads. Because each capacity head serves both threading

and hollow milling jobs, it is designated as a Double Duty head. Standard heads equipped for hollow milling have the same construction as for threading. Change from threading to hollow milling or vice versa, requires only a change of holding blocks and cutters in the same head.



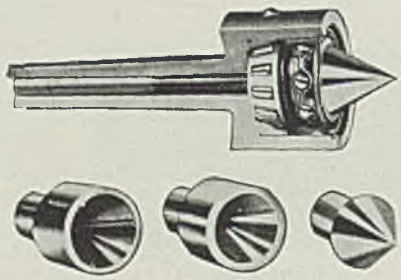
The end cutters, like chasers, are adjustable for diameters. The hollow mill cutters are of the circular form tool type. These heads are supplied for both revolving and nonrevolving spindle machines for standard and special applications in sizes of ¼ to 13⅜ inches.

Portable Potentiometer

■ J-B-T Instruments Inc., New Haven, Conn., announces a new type of portable potentiometer for measurement of temperatures by thermocouples. Model 70-PO, as it is known, also is designed for testing permanently installed temperature measuring and controlling equipment. It is light in weight and withstands vibration and adverse conditions of ambient temperature. Its circuit, for which patent has been applied, requires only a flashlight cell. Guaranteed accuracy is ½ of 1 per cent total scale deflection and the 6¾-inch temperature scale may range from minus 50 to plus 50 degrees Fahr. up to 0-3000 degrees Fahr. Knife-edge pointer with mirror scale to avoid parallax is optional; double-scale instrument is available also. Instrument is independent of thermocouple resistance (within large limits), permitting small thermocouples to be used. With scales of 0-400 degrees Fahr. and higher, once balanced and adjusted, Model 70-PO requires no further balancing operation, but is thereafter read as a deflection instrument. On scales below 0-400 degrees Fahr. but one balancing operation is needed for each temperature reading. Instrument case is mahogany and is equipped with leather carrying handle.

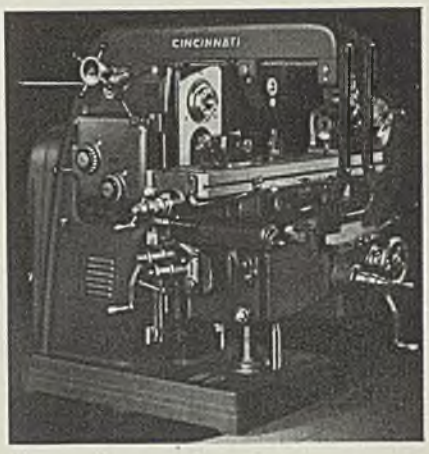
Live Center

■ Ideal Commutator Dresser Co., Sycamore, Ill., announces a live center with interchangeable inserts or center pieces for holding centered and uncentered work. Three inserts are available—male, for work already centered; plain, for uncentered work, and female, with three raised lands for uncentered work having a flat or burred keyway. All are removed quickly by knockout screw. Short overhang eliminates chatter. All cuttings, oil, dirt and chips are kept out by sealed ball bearings. Live center is adaptable to a variety of machine tools, such as lathes, millers, grinders and hard screw machines.



Milling Machine

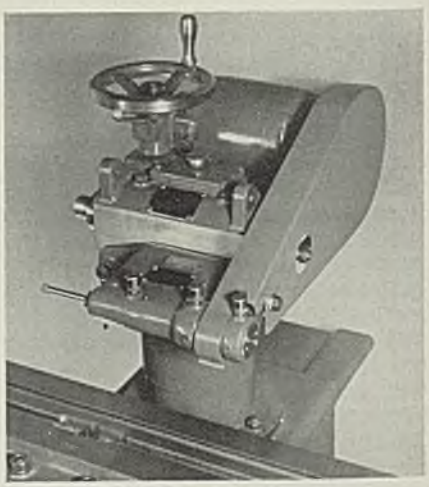
■ Cincinnati Milling Machine Co., Oakley, Cincinnati, has placed on the market its line of plain, universal and vertical dial milling machines for rapid metal removal. They are built in three sizes, Nos. 2, 3 and 4, and 2-speed feed ranges. Speeds and feeds are controlled by a single lever. Each machine does the work of shifting gears, and feeds are changed in the same manner. All power control and hand adjustment levers are grouped at the front operating position. Power feed controls at the front of the knee have been rearranged to provide greater convenience of operation. Both cross and vertical power controls are near the top of the knee. Power longitudinal, cross and vertical feeds are engaged by independent feed levers. The column of Meehanite is heavier, wider at the base and at the overarm. A new hydraulic device has been incorporated with the spindle drive starting lever. Connected with tne link mechanism, a hydraulic Servo control takes over the work



of engaging the clutch. This permits spindle to be inched along. Micrometer dials have been redesigned to provide greater convenience. A safety feature of major importance is the motor cut-out switch at the rear of the machine.

Grinding Attachment

■ Brown & Sharpe Mfg. Co., Providence, R. I., has introduced an internal grinding attachment for its No. 10 cutter and tool grinding machine. It is used in conjunction with the revolving spindle headstock and permits precision grinding of holes up to 2½ inches in length and of ½-inch minimum diameter in work of 6¾ inches maximum swing.



Spindle runs at 22,500 revolutions per minute and takes wheels of ½-inch diameter ¼-inch thick and 3/32-inch hole. A long adjustable phos-

(*Please turn to Page* 80)

Handling in Press Work

(*Concluded from Page* 68)

outside of the press. This chute carries them to the stacker unit previously described. Because of the large size of these laminations, removing them by hand does not represent the hazard involved with the smaller sizes. Naturally it is slower and it would be desirable to utilize a press of sufficient size to permit handling all of the sections automatically on the conveyors.

Throughout the entire new stator production line, roller conveyors are utilized for connecting the operations from blanking through notching, separating of rotor and stator laminations and assembly of the latter into complete stators. As a result, very little storage space is required because the work, which starts with varnishing and baking of the sheets in a conveyorized oven, flows continuously along conveyor lines throughout the entire cycle of machine operations.

Installation Doubled Output

As a typical example of what conveyors and proper arrangements of handling will do to increase press output, the arrangement at this separating press furnishes an excellent study as this application of modern handling methods actually doubled the output from the unit. This important increase in production has been due largely to the automatic handling equipment allowing the press operator to run his machine continuously instead of having to trip the clutch for each individual lamination as was necessary before the handling was modernized.

Also extremely important is the increased confidence the equipment gives the operator who knows now that the previous hazard has been removed completely from the operation.

Stacking and weighing of the laminations now is done while the press is operating. Modernizing of handling operations at this point has entirely eliminated a certain amount of spoilage of laminations formerly caused by their becoming tangled in the tote pan into which they were dumped. With continuous conveyors and stacking equipment, there is little opportunity for tangles to occur.

This equipment also has afforded a most significant saving in time required for stacking and weighing the laminations. Previously it required almost twice the time to separate the rotor and stator laminations and to line them up and weigh the latter as it did to "separate" them on the press. Now they are separated and stacked automatically so operator need only weigh them which can easily be done while the press is in full operation.

While this one example shows the advantages which can be obtained by giving special consideration to handling work in one particular press operation, the same or similar features without doubt could be incorporated in a multitude of other blanking stamping and forming operations to equal advantage. In many press shops, work is more or less on a job basis where portable power-driven conveyors and stacking units would be of advantage as they would permit quick rearrangement of production lines to accommodate any sequence of press operations that might be indicated by character of the particular job at hand. Thus important savings in handling costs could be made in addition to permitting press operations to be synchronized for higher production rates. Thus if a certain job requires only two press operations instead of three or four and if all the presses were in line, those units not needed could be bypassed by a portable conveyor setup without necessity of stacking and rehandling the work at each press.

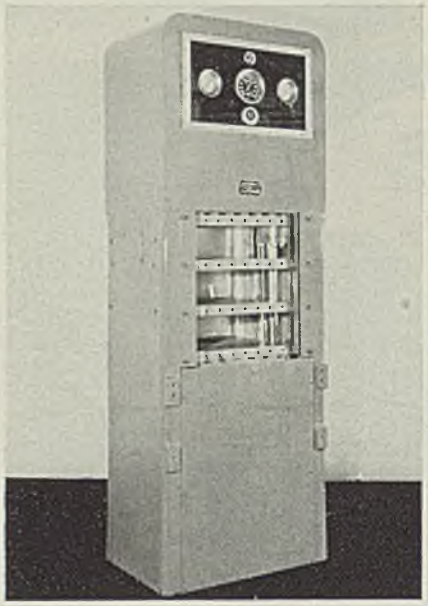
New Equipment

(*Concluded from Page* 78)

phor bronze bearing supports spindle at the wheel end and two double-row self-aligning ball bearings at the pulley end take the pull of the belt. The spindle is carried in a casting which is clamped by two bolts to the finished face of the machine column. Drive is by endless belt from a pulley mounted on the wheel motor shaft. Attachment also includes a height gage.

Hydraulic Presses

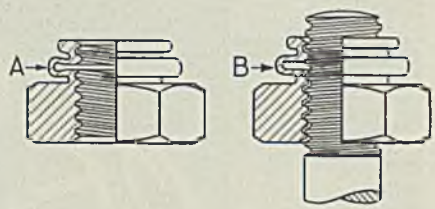
■ Farrel-Birmingham Co. Inc., Ansonia, Conn., has introduced a 20 x 20-inch hydraulic press for molding



small rubber and plastic articles. The housing, which includes the top, bottom and sides, is a single casting. Meehanite cylinder and gland are lined with bronze and gland studs. The nuts are stainless steel. Press is designed to operate at an initial water pressure of 2000 pounds per square inch, giving a total pressure of 113 tons or 563 pounds per square inch on the platens. It is equipped with three 20-inch square plates to provide a smooth finish and drilled to permit maximum steam circulation and uniform heating. Steam connections for platens are flexible tubing and are fully enclosed in the housing. Temperature of platens is controlled automatically by an air-operated diaphragm valve.

Self-Locking Nuts

■ Scovill Mfg. Co., Waterbury, Conn., has introduced the Boots self-locking nut to withstand severe vibration. It is essentially two nuts in one, with top section displaced in a downward direction so that its upper (locking) threads are out of lead with respect to the load-carrying threads of the lower section. The two sections are connected by a spring member which is an integral part of the nut. Upon insertion of a bolt, the spring member allows the top section of the nut to be extended to permit it to engage properly with threads of the bolt. In the sketches, A shows the Boots self-locking nut spring member in its displaced position when not engaged with a screw or bolt. Position of the spring member when nut is engaged is shown in B. Both sketches are exaggerated to show the principle involved. At present nuts are available in sizes from No. 8 to ¾-inch inclusive, in a variety of metals.



Small Motor Switches

■ McGill Mfg. Co., Valparaiso, Ind., announces an improved Levolier switch for fan assemblers and manufacturers of small motors with circuit control. This type of switch is not limited to one control. Other variations can be arranged.

♦

Electric Welded Chain

(*Concluded from Page* 73)

If these or any other defects are found, the link is cut out and a new link welded in place.

Next the chain is fed through a continuous heat-treating furnace where its strength is raised and weld stresses relieved.

After heat treatment, chain is tumbled in stones and chips. Then it is polished by tumbling in sawdust.

Next comes a rather unusual operation to anyone not acquainted with chain manufacture. The chain actually is stretched 1 inch to every 3 feet.

This stretching sets up the elastic limit and cuts down stretch when in use. The work is done in a special machine utilizing a toothed cam drive and arranged with exact measuring device to indicate when the desired elongation has occurred.

Result of the careful processing described above is a chain that can be relied upon to carry its rated load safely and to give full measure of service.

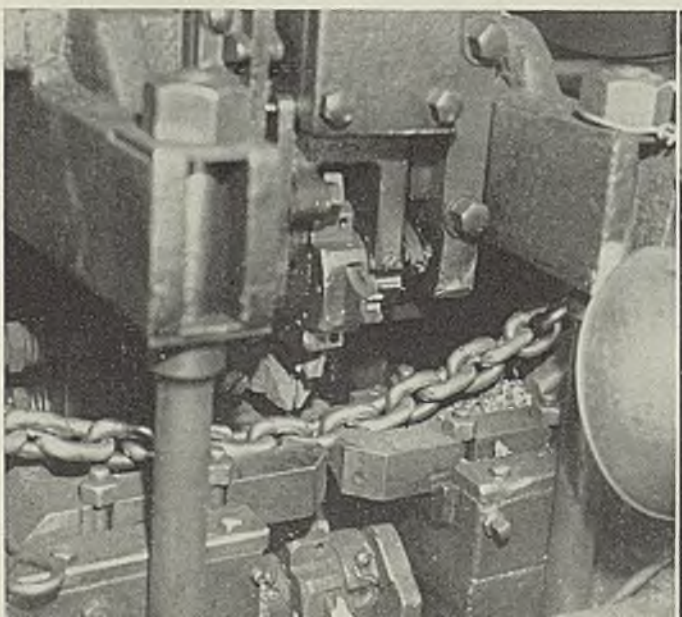


Fig. 7. (Left)—Closeup of welding machine to show welding contacts, forging hammers above and below link, movable dies for compressing link to force out excess metal as weld is made

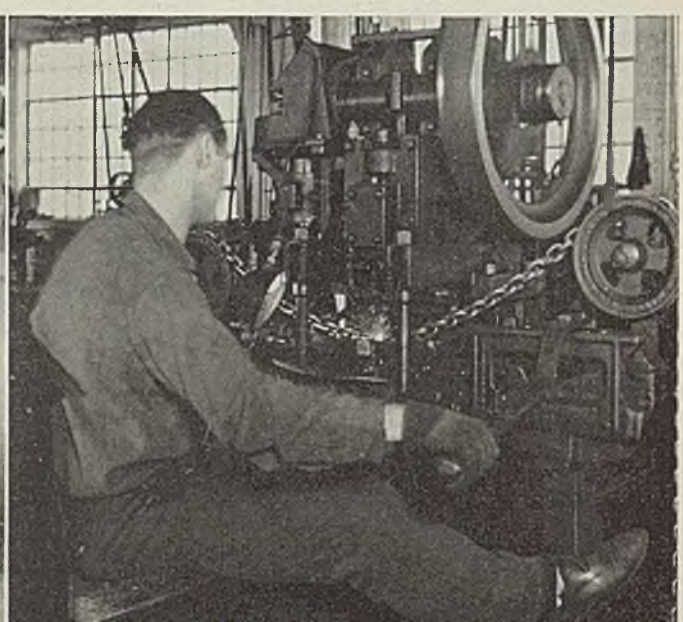


Fig. 8. (Right)—Showing operator and some of the controls he manipulates

< < < HELPFUL LITERATURE > > >

(1)—Mobile Derrick

American Hoist & Derrick Co.—4 page illustrated bulletin No. 400-R-2, describing the "American Revolver," a broad-gage, full revolving, all steel live boom traveler which combines the stability and capacity of the derrick with the mobility of the locomotive crane.

(2)—Nickel Alloys

International Nickel Co.—16 page illustrated booklet "Seven Minutes with Seven Metals" is a general guide to uses and properties of nickel and high nickel alloys such as nickel, Monel, Iconel, and associated alloys. Includes detailed tables of mechanical, chemical, and physical properties.

(3)—Industrial Capacitors

General Electric Co.—24 page illustrated bulletin No. GEA-2742A. Presents data on "Pyranol" capacitors for low-voltage industrial applications on 230, 460, and 575-volt circuits. Describes power factor improvement for profit and shows available equipment.

(4)—Materials Handling

Lewis-Shepard Sales Corp. 56 page illustrated catalog No. 21, describing entire line of materials handling equipment. Specifications are given on floor, hand, and lift trucks; skid platforms; stackers and cranes; storage racks; and wheels.

(5)—Tube Fabricators

Parker Appliance Co.—36 page illustrated bulletin No. 40E, containing description of benders and tube fabricating equipment. Includes complete instructions on use of equipment and list prices. Gives data on accessories.

(6)—Hydraulic Cylinders

Hannifin Manufacturing Co.—20 page illustrated bulletin No. 35-B, presenting full details on series N hydraulic cylinders, and improved type of high pressure units of simplified design for all classes of hydraulic power applications.

(7)—Diamond Wheels

Carborundum Co.—8 page illustrated folder No. A-975, presenting description, application and engineering data on the new metal bonded diamond wheel for sharpening and conditioning of cemented carbide tools.

(8)—Carburizing

Surface Combustion Corp.—4 page illustrated bulletin No. SC-91 presents actual operating data and costs of carburizing with the "Eutectrol" process, in continuous and batch furnaces. Describes advantages of system.

(9)—Silent Fans

B. F. Sturtevant Co.—24 page illustrated catalog No. 451, gives general description of "Silentvane" design 7 fans, which have slow rotative speeds, quiet operation, self limiting horsepower characteristic, and freedom from dust loading. Shows vane control, standard arrangements, designations, weights, high temperature and oven designs, and specifications.

(10)—Turret Lathes

Gisholt Machine Co.—98 page performance data in ring binder, covering efficient use of turret lathes, special tools and their application, how production can be increased and other valuable suggestions. Prepared for superintendents, foremen, production managers and tool engineers in metal working field. Additional data sheets are sent each month.

(11)—Cooling Controls

Sarco Co.—8 page illustrated bulletin No. 197, illustrates and describes recirculating, throttling, and refrigeration controls for brine coolers, engines, compressors, condensers, degreasers, cold storage, air conditioning, and drinking. Engineering data, piping layouts, and equipment details and prices are given.

(12)—Electrical Instruments

Leeds & Northrup Co.—66 page illustrated catalog No. E, lists and describes briefly entire line of instruments for research and routine testing in laboratory, plant and field including standards, galvanometers and dynamometers, bridges, potentiometers, accessories and miscellaneous apparatus.

(13)—Bearings

Fafnir Bearing Co.—130 page illustrated catalog No. 35X is handy data book containing dimensions, diagrams, load ratings, types and sizes of bearings in complete line of radial, thrust, precision, self-aligning and sealed bearings and housed transmission units.

(14)—Brazed Tip Tools

Fansteel Metallurgical Corp.—8 page illustrated bulletin No. G-402, contains description, data, prices and production uses of "Tantung" brazed tip tools for cutting steel at high operating speeds. Gives information on how to order and lists available standard tools and tips.

(15)—Needle Bearings

Torrington Co.—16 page illustrated catalog No. 21. Gives pertinent engineering information on needle bearings. Load capacity table, installation pointers and complete specifications and tolerances are included.

(16)—Industrial Supplies

Williams & Co.—278 page illustrated spiral bound combined stock list and catalog No. 400, gives list prices and data on products under headings of "Alcoa" aluminum, brass and bronze, copper, Monel and rolled nickel, nickel alloys and foundry supplies, boiler tubes, welding rods and equipment, safety supplies, and refrigeration and air conditioning supplies.

(17)—Small Electric Hoist

Detroit Hoist & Machine Co.—4 page illustrated bulletin No. 725, describes the new "Titan" electric hoist in capacities of 250, 500, and 750 pounds, with hoisting speeds up to 60 feet per minute. Illustrates types for hook, lug, or 4-wheel trolley suspension, and for lamp socket "plug-in" or power circuit operation.

(18)—Gear Motors

Reliance Electric & Engineering Co.—Illustrated bulletin No. 403, describes single-reduction type S "Gearmotors" for direct and alternating current application. Gives features and shows cross-section of unit for use in reduction ratios up to 6 to 1 inclusive.

(19)—Combustion Control

Republic Flow Meters Co.—90 page, ring bound illustrated data book No. S-21, describing "Republic-Smoot" automatic combustion control system as applied to all sizes of boilers and all types of fuel firing equipment. Discusses basic problems in boiler operation and evaluates importance in steam generation.

(20)—Oil-Retaining Bearings

Bound Brook Oil-Less Bearing Co.—8-page die list presenting inside and outside diameters of dies available for making Compo oil-retaining porous bronze bearings of sleeve type. Flanged, thrust, self-aligning and special bearings are available.

(21)—Air Cleaner

Logan Engineering Co.—4 page illustrated bulletin No. 340, explains in detail the operation of the "Aridifier" which removes moisture, oil, dirt and fine scale from compressed air and gas by centrifugal force. Application and installation details are given on all sizes from ⅜ to 10 inches.

(22)—Limit Switches

Micro Switch Corp.—4 page illustrated data sheet No. 8, describing type LK interchangeable precision limit switches which incorporate a strong roller actuator. Gives design details and full mechanical specifications of this compact unit.

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«« HELPFUL »» LITERATURE

(Continued)

(23)—Small Steel Valves

Crane Co.—12 page illustrated bulletin No. AD-1420, describing a complete line of "tailor-made" small forged and cast steel valves for pressures up to 600 pounds and temperatures to 1000 degrees F. Included are dimensions and specifications of wedge gate, vertical ball check, globe and angle valves, horizontal check valves for fluid, water, steam, gas, oil or air.

(24)—Roller Bearings

American Roller Bearing Co.—132 page loose-leaf, embossed leatherette ring bound illustrated catalog, fully indexed, covering industrial roller bearings. Industrial applications; lubrication; medium, heavy and super-heavy duty bearings; tolerances and resultant fits; and radial bearings are included. Design, engineering, and application data given.

(25)—Fluorescent Luminaires

Westinghouse Electric & Manufacturing Co.—Illustrated booklet No. 61-152, describes "RLM" fluorescent lamp luminaires with porcelain enameled reflectors. Gives details, data and typical spread distribution curves of this unit for general or supplementary lighting in low bay industrial areas.

(26)—Dust Control

American Air Filter Co.—16 page illustrated bulletin No. 270. Describes "Roto-Clone" dust control for elimination of process dust hazards in industry. Discusses and illustrates applications for metal grinding operations, metal working, foundry shakeout and sand conditioning, abrasive cleaning, tumbling, and for kilns and boilers.

(27)—Portable Electric Heater

Electric Air Heater Co., Div. American Foundry Equipment Co.—Illustrated bulletin No. 15 describing "Electromode," heavy-duty portable electric heaters, ranging from 1 to 9 kilowatt output. Heating element in combination with integral fan heats and circulates air where needed.

(28)—Bronze Bearings

Bunting Brass & Bronze Co.—64 page illustrated catalog No. 40, lists and describes standardized industrial cast bronze, sleeve type bearings, electric motor bearings, graphited oil-less bearings, precision bronze bars, and babbitt metals. Presents specifications and dimensions of entire line available from stock.

(29)—Air Circulators

Emerson Electric Manufacturing Co.—8 page illustrated catalog No. X3658, presenting construction features, performance data and prices on 3 and 4-blade air circulators with ceiling, wall bracket, counter-column, or adjustable floor column mountings.

(30)—Boiler and Tank Parts

Steel Improvement & Forge Co.—40 page illustrated catalog No. 10, gives complete data on sizes, shapes, working pressures, dimensions, and compliance with and approval by various boiler codes of the "Diamond-S" line of drop forged boiler and tank accessories.

(31)—Fire Brick

A. P. Greene Fire Brick Co.—4 page illustrated bulletin No. P-29, describing high heat duty "Empire" fire brick for general boiler and furnace work. These bricks are made in two textures, one by the dry process and one by the stiff mud method, in standard and special shapes.

(32)—Cross-Drum Boiler

Babcock & Wilcox Co.—16 page illustrated bulletin No. G-28 presents complete information and design features of the design 32 cross-drum boiler, a sectional-header unit of moderate cost, for pressures of 250 pounds or less; and with heating surfaces from 1000 to 6000 square feet. Discusses design features.

(33)—Welding Electrodes

Darwin & Milner, Inc.—6 page folder No. 111-40, presenting information on arc welding rods for regular and special work. Such electrodes as "Cobaltcrom PRK-HT" for press tools, "PRK-SH" for hardened tool and die steels, "Darwin-C.L. No. 1" and others for special applications are described.

(34)—Hydraulic Drives

Hydro-Power Systems, Inc.—4 page illustrated bulletin No. 1-1, describing "Hydro-Power," a new operating principle for electric furnaces. Shows application of hydraulically actuated roof mechanism carrying entire electrode operating assembly. Cross-section of radial pump is shown.

(35)—Oven and Dryers

Gehnrich Corp.—32 page illustrated catalog No. 107, describes ovens and dryers for all types of industrial heating processes. Covers design and construction features, and application data, on hand, car, truck, skid rail, and conveyor loading ovens for baking, heat treating, curing, and drying.

(36)—Hob Sharpener

Barber-Colman Co.—4 page illustrated bulletin No. F-1011-2, describing the No. 4 automatic hob sharpening machine for sharpening straight or helical gashed hobs and formed cutters up to 10-inch diameters. Machine grinds radial face on either straight or helical gashes. Lists features of unit.

(37)—Controller

Foxboro Co.—8 page illustrated bulletin No. 240, fully explains mechanism and operating characteristics of the potentiometer indicating recording controller for precise control of industrial processes. Describes electric two-position, electric throttling, and air-operated throttling mechanisms.

(38)—Steel Shafts

Bissett Steel Co.—4 page stock list of "Cumberland" turned and ground steel shafts. Gives dimensions, and specifications of special and standard ground bars and forged shafts supplied in either annealed or heat treated condition; also alloy bars and stainless or rustless shafts.

(39)—Steel Split Pulleys

American Pulley Co.—12 page illustrated catalog No. P-39. Contains list prices and dimensional details of complete line of "American" steel split pulleys, interchangeable split type bushings, special pulleys, conveyor pulleys, and ball bearing loose pulleys.

(40)—Shell Forging Presses

Baldwin Southwark Div., Baldwin Locomotive Works—4 page illustrated bulletin No. 110, describes mechanical details and gives production data on "Baldwin-Omes" shell forging presses for manufacture of artillery shells and similar forgings.

(41)—Pipe Tools

Beaver Pipe Tools—24 page illustrated catalog No. 40. Hand and machine operated pipe tools of all types are described. Design and application data on pipe and bolt threaders, pipe cutters, adjustable threaders, pipe and bolt machines, and dies are presented.

(42)—Brake and Flanging Unit

Beatty Machine & Manufacturing Co.—8 page illustrated bulletin No. 300. Gives complete data on 300-ton hydraulic press brake and ¾-inch flanging machine for flanging, V-bending, forming, pressing and straightening.

(43)—V-Belt Drives

Medart Co.—Illustrated bulletin No. 88-M, shows belt ratings of Medart V-belts to aid in selection of drives. Simple methods of calculating correct belt and sheave combinations are given. Arithmetic is all that is needed to determine combination for any drive problem.

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Steel Buying, Output Expand More Rapidly

Domestic users extend forward coverage as war continues to influence markets. Pig iron sales spurt. Scrap up further

MARKET IN TABLOID ★

Demand
Heavier for most products exports active.

Prices
Firmer; scrap highest in more than five months.

Production
Up 5 points to 75 per cent.

■ WAR influence continues to dominate iron and steel markets, stimulating foreign and domestic demand.

While domestic buying is predicated largely on current and future requirements, the prospect of deferred mill deliveries is encouraging consumers to be more liberal in specifying against previous orders and in adding to inventories. Bookings this month will be sharply higher than in April.

Possibility of delayed shipments has been strengthened by the rapid upturn in steelworks operations. Ingot production jumped 5 points to 75 per cent last week but has yet to reach a peak, further improvement being scheduled for this week. Output a year ago was 48 per cent.

While the expansion in steelmaking is comparable to that of last September, domestic demand lately has been more restrained than at the time of the war's outbreak. However, foreign buying has been heavier than last fall, and mills are pushing operations in anticipation of sustained or more active needs of both the Allies and neutrals, as well as a prospective increase in consumption at home for defense purposes. Steel requirements in the preparedness program still are indefinite and it is thought doubtful if these measures will have a marked effect on steel demand for several months.

Export inquiry continues heavy, principally from the Allies but including an impressive total from neutrals. Purchases last week included approximately 70,000 tons of shell steel for England and France.

Pig iron buying has increased sharply, stimulated by the general upturn in metalworking activity and by the fact foundries had taken delivery against most of old contracts and have had only moderate stocks lately. Third quarter pig iron inquiry is more active.

Scrap markets continue buoyant, with the price composite advancing 59 cents last week to $18.21. This is the highest since the first week of last December. A strong tone is maintained in the face of relatively light mill demand for steelmaking grades.

Building activity still is headed by industrial and residential work, both of which are in better volume than a year ago. The lag in public construction is a retarding factor, however. In some districts structural fabricators are rushed with inquiries for small jobs, principally plant additions. War developments are responsible for only a relatively minor part of such activity. Recent steel awards include 3000 tons of pipe piling for a Hartford, Conn., office building, 2000 tons of shapes for a Wilmington, Del., office building and 1500 tons of reinforcing bars for a Camden, N. J., factory addition.

Prospects for a revival in freight car building and repair work are improved by the indicated upturn in industrial activity, although few large inquiries currently are active. Terminal Railroad Association of St. Louis has bought ten diesel-electric switching locomotives, the Burlington has placed nine diesel units and the Western Maryland is in the market for 12 steam locomotives.

For the second time since 1929 almost all Great Lakes bulk freighters are in operation, the result of the pressure to quicken ore and coal shipments. Stocks of Lake Superior iron ore at blast furnaces and Lake Erie ports on May 1 were nearly 21 per cent smaller than a year ago.

Automobile production is settling more rapidly but is considerably steadier than a year ago. In fact, no previous year has matched the stability of assemblies since January. Output last week was 96,810 units, a decrease of 2220 from the week before but comparing with 67,740 units a year ago.

Tin plate shares in the rise in steel demand, with production up 3 points last week to 71 per cent. Sheet and strip output is being quickened by heavier releases in anticipation of a cessation of shipments June 30 against low-price orders. With mill schedules becoming crowded, producers find it less difficult to drive in specifications for such tonnage.

Pittsburgh and Chicago furnished most of the latest gain in steelmaking, the former's rate soaring 8½ points to 73½ per cent. Chicago was up 5 points to 75. Other gains were 7 points to 67 in eastern Pennsylvania, 3 points to 57 at Youngstown, 6 points to 78 at Cleveland, 11½ points to 65 at Buffalo and 7½ points to 55 at St. Louis. Detroit was down 1 point to 79 and Wheeling slipped 3 points to 85. Unchanged were New England at 56, Cincinnati at 61 and Birmingham at 83. Operations in several districts exceeded estimates made at the opening of last week.

COMPOSITE MARKET AVERAGES

	May 25	May 18	May 11	One Month Ago Apr., 1940	Three Months Ago Feb., 1940	One Year Ago May, 1939	Five Years Ago May, 1935
Iron and Steel	$37.51	$37.40	$37.25	$36.69	$37.21	$35.80	$32.35
Finished Steel	56.60	56.60	56.60	55.90	56.50	56.00	54.00
Steelworks Scrap..	18.21	17.62	16.83	16.00	16.98	14.05	10.27

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel, hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

COMPARISON OF PRICES

Representative Market Figures for Current Week: Average for Last Month, Three Months and One Year Ago

Finished Material

	May 25, 1940	April 1940	Feb. 1940	May 1939
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.20c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.52
Iron bars, Chicago	2.25	2.25	2.30	2.10
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.00	2.10	2.05
Sheets, cold-rolled, Pittsburgh	3.05	2.95	3.05	3.10
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	1.95	2.10	2.03
Sheets, cold-rolled, Gary	3.05	2.90	3.05	3.08
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.60
Tin plate, per base box, Pitts.	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.45

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods, No. 5 to $\frac{9}{32}$-inch, Pitts.	2.00	2.00	2.00	1.92

Pig Iron

	May 25, 1940	April 1940	Feb. 1940	May 1939
Bessemer, del. Pittsburgh	$24.34	$24.34	$24.34	$22.34
Basic, Valley	22.50	22.50	22.50	20.50
Basic, eastern, del. Philadelphia	24.34	24.34	24.34	22.34
No. 2 foundry, Pittsburgh	24.21	24.21	24.21	22.21
No. 2 foundry, Chicago	23.00	23.00	23.00	21.00
Southern No. 2, Birmingham	19.38	19.38	19.38	17.38
Southern No. 2, del. Cincinnati	22.89	22.89	22.89	20.89
No. 2X, del. Phila. (differ av.)	25.215	25.215	25.215	23.215
Malleable, Valley	23.00	23.00	23.00	21.00
Malleable, Chicago	23.00	23.00	23.00	21.00
Lake Sup., charcoal, del. Chicago	30.34	30.34	30.34	28.34
Gray forge, del. Pittsburgh	23.17	23.17	23.17	21.17
Ferromanganese, del. Pittsburgh	105.33	105.33	105.33	85.33

Scrap

Heavy melt. steel, Pitts.	$19.25	$16.45	$17.75	$14.55
Heavy melt. steel No. 2, E. Pa.	17.00	15.50	16.30	12.75
Heavy melting steel, Chicago	17.25	15.20	15.75	12.75
Rails for rolling, Chicago	21.25	18.65	18.25	17.25
Railroad steel specialties, Chicago	20.25	18.05	18.50	14.75

Coke

Connellsville, furnace, ovens	$4.75	$ 4.75	$ 4.75	$ 3.75
Connellsville, foundry, ovens	5.75	5.75	5.75	5.00
Chicago, by-product fdry., del.	11.25	11.25	11.25	10.50

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Except when otherwise designated, prices are base, f.o.b. cars.

Sheet Steel

Hot Rolled

Pittsburgh	2.10c
Chicago, Gary	2.10c
Cleveland	2.10c
Detroit, del.	2.20c
Buffalo	2.10c
Sparrows Point, Md.	2.10c
New York, del.	2.34c
Philadelphia, del.	2.27c
Granite City, Ill.	2.20c
Middletown, O.	2.10c
Youngstown, O.	2.10c
Birmingham	2.10c
Pacific Coast ports	2.65c

Cold Rolled

Pittsburgh	3.05c
Chicago, Gary	3.05c
Buffalo	3.05c
Cleveland	3.05c
Detroit, delivered	3.15c
Philadelphia, del.	3.37c
New York, del.	3.39c
Granite City, Ill.	3.15c
Middletown, O.	3.05c
Youngstown, O.	3.05c
Pacific Coast ports	3.70c

Galvanized No. 24

Pittsburgh	3.50c
Chicago, Gary	3.50c
Buffalo	3.50c
Sparrows Point, Md.	3.50c
Philadelphia, del.	3.67c
New York, delivered	3.74c
Birmingham	3.50c
Granite City, Ill.	3.60c
Middletown, O.	3.50c
Youngstown, O.	3.50c
Pacific Coast ports	4.05c

Black Plate, No. 29 and Lighter

Pittsburgh	3.05c
Chicago, Gary	3.05c
Granite City, Ill.	3.15c

Long Ternes No. 24 Unassorted

Pittsburgh, Gary	3.80c
Pacific Coast	4.55c

Enameling Sheets

	No. 10	No. 20
Pittsburgh	2.75c	3.35c
Chicago, Gary	2.75c	3.35c
Granite City, Ill.	2.85c	3.45c
Youngstown, O.	2.75c	3.35c
Cleveland	2.75c	3.35c
Middletown, O.	2.75c	3.35c
Pacific Coast	3.40c	4.00c

Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.

Chrome-Nickel

	No. 302	No. 304
Bars	24.00	25.00
Plates	27.00	29.00
Sheets	34.00	36.00
Hot strip	21.50	23.50
Cold strip	28.00	30.00

Straight Chromes

	No. 410	No. 430	No. 442	No. 446
Bars	18.50	19.00	22.50	27.50
Plates	21.50	22.00	25.50	30.50
Sheets	26.50	29.00	32.50	36.50
Hot strip	17.00	17.50	24.00	35.00
Cold strip	22.00	22.50	32.00	52.00

Steel Plate

Pittsburgh	2.10c
New York, del.	2.29c
Philadelphia, del.	2.15c
Boston, delivered	2.46c
Buffalo, delivered	2.33c
Chicago or Gary	2.10c
Cleveland	2.10c
Birmingham	2.10c
Coatesville, Pa.	2.10c
Sparrows Point, Md.	2.10c
Claymont, Del.	2.10c
Youngstown	2.10c
Gulf ports	2.45c
Pacific Coast ports	2.65c

Steel Floor Plates

Pittsburgh	3.35c
Chicago	3.35c
Gulf ports	3.70c
Pacific Coast ports	4.00c

Structural Shapes

Pittsburgh	2.10c
Philadelphia, del.	2.21½c
New York, del.	2.27c
Boston, delivered	2.41c
Bethlehem	2.10c
Chicago	2.10c
Cleveland, del.	2.30c
Buffalo	2.10c
Gulf ports	2.45c
Birmingham	2.10c
St. Louis, del.	2.34c
Pacific Coast ports	2.70c

Tin and Terne Plate

Tin Plate, Coke (base box)

Pittsburgh, Gary, Chicago	$5.00
Granite City, Ill.	5.10

Mfg. Terne Plate (base box)

Pittsburgh, Gary, Chicago	$4.30
Granite City, Ill.	4.40

Bars

Soft Steel

(Base, 20 tons or over)

Pittsburgh	2.15c
Chicago or Gary	2.15c
Duluth	2.25c
Birmingham	2.15c
Cleveland	2.15c
Buffalo	2.15c
Detroit, delivered	2.25c
Philadelphia, del.	2.47c
Boston, delivered	2.52c
New York, del.	2.49c
Gulf ports	2.50c
Pacific Coast ports	2.80c

Rail Steel

(Base, 5 tons or over)

Pittsburgh	2.05c
Chicago or Gary	2.05c
Detroit, delivered	2.15c
Cleveland	2.05c

Buffalo	2.05c
Birmingham	2.05c
Gulf ports	2.40c
Pacific Coast ports	2.70c

Iron

Chicago	2.25c
Philadelphia, del.	2.37c
Pittsburgh, refined	3.50-8.00c
Terre Haute, Ind.	2.15c

Reinforcing

New Billet Bars, Base

Chicago, Gary, Buffalo, Cleve., Birm., Young., Sparrows Pt., Pitts.	1.60-1.90c
Gulf ports	1.95-2.25c
Pacific Coast ports	2.00-2.30c

Rail Steel Bars, Base

Pittsburgh, Gary Chicago, Buffalo, Cleveland, Birm.	1.60-1.90c
Gulf ports	1.95-2.25c
Pacific Coast ports	2.00-2.30c

The above represent average going prices. Last quotations announced by producers were 2.15c, mill base, for billet bars and 2.00c for rail steel.

Wire Products

Pitts-Cleve.-Chicago-Birm. base per 100 lb. keg in carloads

Standard and cement coated wire nails	$2.55
(Per pound)	
Polished fence staples	2.55c
Annealed fence wire	3.05c
Galv. fence wire	3.40c
Woven wire fencing (base C. L. column)	67
Single loop bale tie, (base C.L. column)	56
Galv. barbed wire, 80-rod spools, base column	70
Twisted barbless wire, column	70

To Manufacturing Trade

Base, Pitts. - Cleve. - Chicago-Birmingham (except spring wire)

Bright bess., basic wire	2.60c
Galvanized wire	2.60c
Spring wire	3.20c

Worcester, Mass., $2 higher on bright basic and spring wire.

Cut Nails

Carload, Pittsburgh, keg..$3.85

Cold-Finished Bars

	Carbon	Alloy
Pittsburgh	2.65c	3.35c
Chicago	2.65c	3.35c
Gary, Ind.	2.65c	3.35c
Detroit	2.70c	*3.45c
Cleveland	2.65c	3.35c
Buffalo	2.65c	3.35c

* Delivered.

Alloy Bars (Hot)

(Base, 20 tons or over)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem	2.70c
Detroit, delivered	2.80c

Alloy S.A.E.	Diff.	Alloy S.A.E.	Diff.
2000	0.35	3100	0.70
2100	0.75	3200	1.35
2300	1.55	3300	3.80
2500	2.25	3400	3.20

4100 0.15 to 0.25 Mo.	0.55
4600 0.20 to 0.30 Mo. 1.50-2.00 Ni.	1.10
5100 0.80-1.10 Cr.	0.45
5100 Cr. spring flats	0.15
6100 bars	1.20
6100 spring flats	0.85
Cr. N., Van.	1.50
Carbon Van.	0.85
9200 spring flats	0.15
9200 spring rounds, squares	0.40

Electric furnace up 50 cents.

Strip and Hoops

(Base, hot strip, 1 ton or over; cold, 3 tons or over)

Hot Strip, 12-inch and less

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, Birmingham	2.10c
Detroit, del.	2.20c
Philadelphia, del.	2.42c
New York, del.	2.46c
Pacific Coast ports	2.75c
Cooperage hoop, Young., Pitts.; Chicago, Birm.	2.20c
Cold strip, 0.25 carbon and under, Pittsburgh, Cleveland, Youngstown	2.80c
Chicago	2.90c
Detroit, del.	2.90c
Worcester, Mass.	3.00c

Carbon	Cleve., Pitts.
0.26—0.50	2.80c
0.51—0.75	4.30c
0.76—1.00	6.15c
Over 1.00	8.35c

Worcester, Mass. $4 higher.

Commodity Cold-Rolled Strip

Pitts.-Cleve.-Youngstown	2.95c
Chicago	3.05c
Detroit, del.	3.05c
Worcester, Mass.	3.35c

Lamp stock up 10 cents.

Rails, Fastenings

(Gross Tons)

Standard rails, mill	$40.00
Relay rails, Pittsburgh 20—100 lbs.	32.50-35.50
Light rails, billet qual., Pitts., Chicago, B'ham.	$40.00
Do., rerolling quality	39.00

Cents per pound

Angle bars, billet, mills.	2.70c
Do., axle steel	2.35c
Spikes, R. R. base	3.00c
Track bolts, base	4.15c
Car axles forged, Pitts., Chicago, Birmingham	3.15c
Tie plates, base	2.15c

Base, light rails 25 to 60 lbs., 20 lbs., up $2; 16 lbs. up $4; 12 lbs. up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base plates 20 tons.

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller	68.5 off
Do. larger, to 1-in.	66 off
Do. 1⅛ and larger	64 off
Tire bolts	52.5 off

Stove Bolts

In packages with nuts separate 72.5 off; with nuts attached add 15%; bulk 83.5 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts	60 off
Plow bolts	68.5 off

Nuts

Semifinished hex.	U.S.S.	S.A.E.
½-inch and less	67	70
⅝-1-inch	64	65
1⅛-1½-inch	62	62
1⅝ and larger	60	..

Hexagon Cap Screws

Upset, 1-in., smaller	70.0 off

Square Head Set Screws

Upset, 1-in., smaller	75.0 off
Headless set screws	64.0 off

Piling

Pitts., Chgo., Buffalo	2.40c
Gulf ports	2.85c
Pacific Coast ports	2.95c

Rivets, Washers

F.o.b. Pitts., Cleve., Chgo., Bham.

Structural	3.40c
⅛-inch and under	65-10 off

Wrought washers, Pitts., Chi., Phila., to jobbers and large nut, bolt mfrs. l.c.l. $5.40; c.l. $5.75 off

Welded Iron, Steel Pipe

Base discounts on steel pipe. Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less on lap weld, 1 point less on butt weld. Chicago delivery 2½ and 1½ less, respectively. Wrought pipe, Pittsburgh base.

Butt Weld

Steel In.	Blk.	Galv.
½	63½	54
¾	66½	58
1—3	68½	60½
Iron		
¾	30	13
1—1¼	34	19
1½	38	21½
2	37½	21

Lap Weld

Steel		
2	61	52½
2½—3	64	55½
3½—6	66	57½
7 and 8	65	55½
9 and 10	64½	55
11 and 12	63½	54
Iron		
2	30½	15
2½—3½	31½	17½
4	33½	21
4½—8	32½	20
9—12	28½	15

Line Pipe

Steel	
1 to 3, butt weld	67½
2, lap weld	60
2½ to 3, lap weld	63
3½ to 6, lap weld	65
7 and 8, lap weld	64
10-inch lap weld	63½
12-inch, lap weld	62½

Iron	Blk.	Galv.
¾ butt weld	25	7
1 and 1¼ butt weld	29	13
1½ butt weld	33	15½
2 butt weld	32½	15
1½ lap weld	23½	7
2 lap weld	25½	9
2½ to 3½ lap weld	26½	11½
4 lap weld	28½	15
4½ to 8 lap weld	27½	14
9 to 12 lap weld	23½	9

Boiler Tubes

Carloads minimum wall seamless steel boiler tubes, cut lengths 4 to 24 feet; f.o.b. Pittsburgh, base price per 100 feet subject to usual extras.

Lap Welded

Sizes	Gage	Steel	Charcoal Iron
1½" O.D.	13	$ 9.72	$23.71
1¾" O.D.	13	11.06	22.93
2" O.D.	13	12.38	19.35
2¼" O.D.	13	13.79	21.68
2¼" O.D.	12	15.16	....
2½" O.D.	12	16.58	26.57
2¾" O.D.	12	17.54	29.00
3" O.D.	12	18.35	31.36
3½" O.D.	11	23.15	39.81
4" O.D.	10	28.66	49.90
5" O.D.	9	44.25	73.93
6" O.D.	7	68.14	....

Seamless

Sizes	Gage	Hot Rolled	Cold Drawn
1 "O.D.	13	$ 7.82	$ 9.01
1¼"O.D.	13	9.26	10.67
1½"O.D.	13	10.23	11.79
1¾"O.D.	13	11.64	13.42
2" O.D.	13	13.04	15.03
2¼"O.D.	13	14.54	16.76
2½"O.D.	12	16.01	18.45
2½"O.D.	12	17.54	20.21
2¾"O.D.	12	18.59	21.42
3" O.D.	12	19.50	22.48
3½"O.D.	11	24.62	28.37
4" O.D.	10	30.54	35.20
4½"O.D.	10	37.35	43.04
5" O.D.	9	46.87	54.01
6" O.D.	7	71.96	82.93

Cast Iron Pipe

Class B Pipe—Per Net Ton

6-in., & over, Birm.	$45.00-46.00
4-in., Birmingham	48.00-49.00
4-in., Chicago	56.80-57.80
6-in. & over, Chicago	53.80-54.80
6-in. & over, east fdy.	49.00
Do., 4-in.	52.00

Class A Pipe $3 over Class B Stnd. fitgs., Birm., base $100.00

Semifinished Steel

Rerolling Billets, Slabs

(Gross Tons)

Pittsburgh, Chicago, Gary, Cleve., Buffalo, Young., Birm., Sparrows Point	$34.00
Duluth (billets)	36.00
Detroit, delivered	36.00

Forging Quality Billets

Pitts., Chi., Gary, Cleve., Young., Buffalo, Birm.	40.00
Duluth	42.00

Sheet Bars

Pitts., Cleveland, Young., Sparrows Point, Buffalo, Canton, Chicago	34.00
Detroit, delivered	36.00

Wire Rods

Pitts., Cleveland, Chicago, Birmingham No. 5 to ⅝-inch incl. (per 100 lbs.)	$2.00
Do., over ⅝ to 41/64-in. incl.	2.15

Worcester up $0.10; Galveston up $0.25; Pacific Coast up $0.50.

Skelp

Pitts., Chi., Youngstown, Coatesville, Sparrows Pt.	1.90c

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur.	$4.35- 4.60
Connellsville, fdry.	5.00- 5.75
Connell. prem. fdry.	5.75- 6.25
New River fdry.	6.25- 6.50
Wise county fdry	5.50- 6.50
Wise county fur.	5.00- 5.25

By-Product Foundry

Newark, N. J., del.	11.38-11.85
Chicago, outside del.	10.50
Chicago, delivered	11.25
Terre Haute, del.	10.75
Milwaukee, ovens	11.25
New England, del.	12.50
St. Louis, del.	11.75
Birmingham, ovens	7.50
Indianapolis, del.	10.75
Cincinnati, del.	10.50
Cleveland, del.	11.05
Buffalo, del.	11.25
Detroit, del.	11.00
Philadelphia, del.	11.15

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	16.00c
Toluol, two degree	25.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c

Per lb. f.o.b. Frankford and St. Louis

Phenol (less than 1000 lbs.)	14.75c
Do. (1000 lbs. or over)	13.75c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers	7.00c

Per ton, bulk, f.o.b. port

Sulphate of ammonia	$28.00

Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25 sil.; 50c diff. below 1.75 sil. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$24.00	$24.50	$23.50	$25.00
Birdsboro, Pa.	24.00	24.50	23.50	25.00
Birmingham, Ala.‡	19.38	.....	18.38	24.00
Buffalo	23.00	23.50	22.00	24.00
Chicago	23.00	23.00	22.50	23.50
Cleveland	23.00	23.00	22.50	23.50
Detroit	23.00	23.00	22.50	23.50
Duluth	23.50	23.50	.....	24.00
Erie, Pa.	23.00	23.50	22.50	24.00
Everett, Mass.	24.00	24.50	23.50	25.00
Granite City, Ill.	23.00	23.00	22.50	23.50
Hamilton, O.	23.00	23.00	22.50	.....
Neville Island, Pa.	23.00	23.00	22.50	23.50
Provo, Utah	21.00	.....	.....	.....
Sharpsville, Pa.	23.00	23.00	22.50	23.50
Sparrow's Point, Md.	24.00	.....	23.50	.....
Swedeland, Pa.	24.00	24.50	23.50	25.00
Toledo, O.	23.00	23.00	22.50	23.50
Youngstown, O.	23.00	23.00	22.50	23.50

‡Subject to 38 cents deduction for 0.70 per cent phosphorus or higher.

Delivered from Basing Points:				
Akron, O., from Cleveland	24.39	24.39	23.89	24.89
Baltimore from Birmingham	24.78	.....	23.66	.....
Boston from Birmingham	24.12	.....	.....	.....
Boston from Everett, Mass.	24.50	25.00	24.00	25.50
Boston from Buffalo	24.50	25.00	24.00	25.50
Brooklyn, N. Y., from Bethlehem	26.50	27.00	.....	.....
Canton, O., from Cleveland	24.39	24.39	23.89	24.89
Chicago from Birmingham	†23.22	.....	.....	.....
Cincinnati from Hamilton, O.	23.24	24.11	23.61	.....
Cincinnati from Birmingham	23.06	.....	22.06	.....
Cleveland from Birmingham	23.32	.....	22.82	.....
Mansfield, O., from Toledo, O.	24.94	24.94	24.44	24.44
Milwaukee from Chicago	24.10	24.10	23.60	24.60
Muskegon, Mich., from Chicago, Toledo or Detroit	26.19	26.19	25.69	26.69
Newark, N. J., from Birmingham	25.15	.....	.....	.....
Newark, N. J., from Bethlehem	25.53	26.03	.....	.....
Philadelphia from Birmingham	24.46	.....	23.96	.....
Philadelphia from Swedeland, Pa.	24.84	25.34	24.34	.....
Pittsburgh district from Neville Island	Neville base, plus 69c, 84c, and $1.24 freight.			
Saginaw, Mich., from Detroit	25.31	25.31	24.81	25.81
St. Louis, northern	23.50	23.50	23.00	.....
St. Louis from Birmingham	†23.12	.....	22.62	.....
St. Paul from Duluth	25.63	25.63	.....	26.13

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $28.50, base; $29.74 delivered Philadelphia.

Gray Forge		Charcoal	
Valley furnace	$22.50	Lake Superior fur.	$27.00
Pitts. dist. fur.	22.50	do., del. Chicago	30.34
		Lyles, Tenn.	26.50

†Silvery

Jackson county, O., base: 6-6.50 per cent $28.50; 6.51-7—$29.00; 7-7.50—$29.50; 7.51-8—$30.00; 8-8.50—$30.50; 8.51-9—$31.00; 9-9.50—$31.50; Buffalo, $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base; Prices are the same as for silveries, plus $1 a ton.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Manganese differentials in silvery iron and ferrosilicon, 2 to 3%, $1 per ton add. Each unit over 3%, add $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$60.80

First Quality

Pa., Ill., Md., Mo., Ky.	47.50
Alabama, Georgia	47.50
New Jersey	52.50

Second Quality

Pa., Ill., Ky., Md., Mo.	42.75
Georgia, Alabama	34.20
New Jersey	49.00

Ohio

First quality	39.90
Intermediate	36.10
Second quality	31.35

Malleable Bung Brick

All bases	$56.05

Silica Brick

Pennsylvania	$47.50
Joliet, E. Chicago	55.10
Birmingham, Ala.	47.50

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$28.00
Wire cut	$26.00

Magnesite

Domestic dead - burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$50.00
Chem. bonded chrome	50.00
Magnesite brick	72.00
Chem. bonded magnesite	61.00

Fluorspar

Washed gravel, duty pd., tide, net ton	$25.00-$26.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail.	22.00
Do. barge	22.00
No. 2 lump	22.00

Ferroalloy Prices

Ferromanganese, 78-82%, lump and bulk, carlots tide., duty pd. $100.00
Ton lots 110.00
Less ton lots 113.50
Less 200 lb. lots 118.00
Do., carlots del. Pitts. 105.33

Spiegeleisen, 19-21% dom. Palmerton, Pa., spot.. 32.00
Do., 26-28% 39.50

Ferrosilicon, 50% freight allowed, c.l. 69.50
Do., ton lot 82.00
Do., 75 per cent 126.00
Do. ton lots 142.00
Spot, $5 a ton higher.

Silicomanganese, c.l., 2½ per cent carbon, 103.00
2% carbon, 108.00; 1%, 118.00
Contract ton price $12.50 higher; spot $5 over contract.

Ferrotungsten, stand., lb. con. del. cars 1.90-2.00

Ferrovanadium, 35 to 40%, lb., cont. 2.70-2.80-2.90

Ferrophosphorus, gr. ton, c.l., 17-18% Rockdale, Tenn., basis, 18%, $3 unitage, 58.50; electric furn., per ton, c. l., 23-26% f.o.b. Mt. Pleasant, Tenn., 24% $3 unitage 75.00

Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb., contained cr., del. carlots 11.00c
Do., ton lots 11.75c
Do., less-ton lots 12.00c

67-72% low carbon:

	Carloads	Ton lots	Less ton
2% carb.	17.50c	18.25c	18.75c
1% carb.	18.50c	19.25c	19.75c
0.10% carb.	20.50c	21.25c	21.75c
0.20% carb.	19.50c	20.25c	20.75c

Spot ¼c higher

Ferromolybdenum, 55-65% molyb. cont., f.o.b. mill, lb. 0.95

Calcium molybdate, lb. molyb. cont., f.o.b. mill 0.80

Ferrotitanium, 40-45%, lb., con. ti., f.o.b. Niagara Falls, ton lots $1.23
Do., less-ton lots 1.25
20-25% carbon, 0.10 max., ton lots, lb. 1.35
Do, less-ton lots 1.40
Spot 5c higher

Ferrocolumbium, 50-60%, contract, lb. con. col., f.o.b. Niagara Falls $2.25
Do., less-ton lots 2.30
Spot is 10c higher

Technical molybdenum trioxide, 53 to 60% molybdenum, lb. molyb. cont., f.o.b. mill 0.80

Ferro-carbon-titanium, 15-18%, ti., 6-8% carb., carlots, contr., net ton $142.50
Do, spot 145.00
Do, contract, ton lots 145.00
Do, spot, ton lots 150.00

15-18% ti., 3-5% carbon, carlots, contr., net ton 157.50
Do, spot 160.00
Do, contract, ton lots. 160.00
Do, spot, ton lots 165.00

Alsifer, contract carlots, f.o.b. Niagara Falls, lb. 7.50c
Do, ton lots 8.00c
Do, less-ton lots 8.50c
Spot ½c lb. higher

Chromium Briquets, contract, freight allowed, lb. spot carlots, bulk 7.00c
Do., ton lots 7.50c
Do., less-ton lots 7.75c
Do., less 200 lbs. 8.00c
Spot, ¼c higher.

Tungsten Metal Powder, according to grade, spot shipment, 200-lb. drum lots, lb. $2.50
Do., smaller lots 2.60

Vanadium Pentoxide, contract, lb. contained $1.10
Do, spot 1.15

Chromium Metal, 98% cr., 0.50 carbon max., contract, lb. con. chrome 84.00c
Do., spot 89.00c

88% chrome, contract 83.00c
Do., spot 88.00c

Silicon Metal, 1% iron, contract, carlots, 2 x ⅛-in., lb. 14.00c
Do., 2% 12.50c
Spot ¼c higher

Silicon Briquets, contract carloads, bulk, freight allowed, ton $69.50
Ton lots 79.50
Less-ton lots, lb. 3.75c
Less 200 lb. lots, lb. 4.00c
Spot ¼-cent higher.

Manganese Briquets, contract carloads, bulk freight allowed, lb. 5.00c
Ton lots 5.50c
Less-ton lots 5.75c
Spot ¼c higher

Zirconium Alloy, 12-15%, contract, carloads, bulk, gross ton $97.50
Do, spot 102.50

34-40%, contract, carloads, lb., alloy 14.00c
Do, ton lots 15.00c
Do, less-ton lots 16.00c
Spot ¼c higher

Molybdenum Powder, 99%, f.o.b. York, Pa. 200-lb. kegs, lb. $2.60
Do, 100-200 lb. lots 2.75
Do, under 100-lb. lots 3.00

Molybdenum Oxide Briquets, 48-52% molybdenum, per pound contained, f.o.b. producers' plant 80.00c

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials

	Soft Bars	Bands	Hoops	Plates ¼-in. & Over	Structural Shapes	Floor Plates	Sheets: Hot Rolled	Sheets: Cold Rolled	Sheets: Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars: Carbon	Cold Drawn Bars: SAE 2300	Cold Drawn Bars: SAE 3100
Boston	3.98	3.86	4.86	3.85	3.85	5.66	3.51	4.48	4.66	3.46	4.13	8.63	7.23
New York Met.)	3.84	3.76	3.76	3.76	3.75	5.56	3.38	4.40	4.05	3.31	4.09	8.59	7.19
Philadelphia	3.85	3.75	4.25	3.55	3.55	5.25	3.35	4.05	4.50	3.31	4.06	8.56	7.16
Baltimore	3.95	4.05	4.45	3.70	3.70	5.25	3.55	....	5.05	....	4.05	....	..
Norfolk, Va.	4.15	4.25	....	3.90	3.90	5.45	3.75	....	5.40	....	4.15	....	....
Buffalo	3.35	3.62	3.62	3.62	3.40	5.25	3.05	4.30	4.45	3.22	3.75	8.15	6.75
Pittsburgh	3.35	3.40	3.40	3.40	3.40	5.00	3.15	....	4.75	..	3.65	8.15	6.75
Cleveland	3.25	3.30	3.30	3.40	3.58	5.18	3.15	4.05	4.42	3.20	3.75	8.15	6.75
Detroit	3.43	3.23	3.48	3.60	3.65	5.27	3.23	4.30	4.84	3.20	3.80	8.45	7.05
Omaha	3.90	3.80	3.80	3.95	3.95	5.55	3.45	....	5.00	....	4.42	....	....
Cincinnati	3.60	3.47	3.47	3.65	3.68	5.28	3.22	4.00	4.67	3.47	4.00	8.50	7.10
Chicago	3.50	3.40	3.40	3.55	3.55	5.15	3.05	4.10	4.60	3.30	3.75	8.15	6.75
Twin Cities	3.75	3.65	3.65	3.80	3.80	5.40	3.30	4.35	4.75	3.63	4.34	8.84	7.44
Milwaukee	3.63	3.53	3.53	3.68	3.68	5.28	3.18	4.23	4.73	3.54	3.88	8.38	6.98
St. Louis	3.62	3.52	3.52	3.47	3.47	5.07	3.18	4.12	4.87	3.41	4.02	8.52	7.12
Kansas City	4.05	4.15	4.15	4.00	4.00	5.60	3.90	....	5.00	....	4.30	....	....
Indianapolis	3.60	3.55	3.55	3.70	3.70	5.30	3.25	....	4.76	....	3.97	....	....
Memphis	3.90	4.10	4.10	3.95	3.95	5.71	3.85	....	5.25	....	4.31	....	....
Chattanooga	3.80	4.00	4.00	3.85	3.85	5.68	3.70	....	4.40	....	4.39	....	....
Tulsa, Okla.	4.44	4.34	4.34	4.33	4.33	5.93	3.99	....	5.71	....	4.69	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.88	3.45	....	4.75	....	4.43	....	....
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	4.80	5.00	4.60	....	....
Houston, Tex.	4.05	6.20	6.20	4.05	4.05	5.75	4.20	....	5.25	....	....	....	....
Seattle	4.00	3.85	5.20	3.40	3.50	5.75	3.70	6.50	4.75	....	5.75	....	....
Portland, Oreg.	4.25	4.50	6.10	4.00	4.00	5.75	3.95	6.50	4.75	....	5.75	....	....
Los Angeles	4.15	4.60	4.45	4.00	4.00	6.40	4.30	6.50	5.25	....	6.60	10.65	9.80
San Francisco	3.50	4.00	6.00	3.35	3.35	5.60	3.40	6.40	5.15	....	6.80	10.65	9.80

	SAE Hot-rolled Bars (Unannealed): 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.18	7.50	6.05	5.80	7.90
New York (Met.)	4.04	7.35	5.90	5.65	....
Philadelphia	4.10	7.31	5.86	5.61	8.56
Baltimore	4.10	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.10	5.65	5.40	7.50
Pittsburgh	3.40	7.20	5.75	5.50	7.60
Cleveland	3.30	7.30	5.85	5.85	7.70
Detroit	3.48	7.42	5.97	5.72	7.19
Cincinnati	3.65	7.44	5.99	5.74	7.84
Chicago	3.70	7.10	5.65	5.40	7.50
Twin Cities	3.95	7.45	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.82	7.47	6.02	5.77	7.87
Seattle	5.85	....	8.00	7.85	8.65
Portland, Oreg.	5.70	8.85	8.00	7.85	8.65
Los Angeles	4.80	9.40	8.55	8.40	9.05
San Francisco	5.00	9.65	8.80	8.65	9.30

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300-4999 pounds in Portland, Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in Birmingham.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Kansas City and St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 300-4999 in San Francisco, Portland; any quantity in Twin Cities; 300-1999 in Los Angeles.

Galvanized Sheets: Base, 1500-3499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 150-1049 in Los Angeles; 300-4999 in Portland, Seattle, San Francisco; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis, Tulsa; 1500 and over in Chattanooga; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; 10 to 49 bundles in Philadelphia.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco, 1000 and over in Portland, Seattle; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

CURRENT IRON AND STEEL PRICES OF EUROPE

Dollars at Rates of Exchange, May 23

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	British gross tons U. K. ports: £ s d	Quoted in dollars at current value	Continental Channel or North Sea ports, gross tons‡‡: **Quoted in gold pounds sterling: £ s d
Foundry, 2.50-3.00 Si.	$19.20 6 0 0	$33.23	3 18 0
Basic bessemer	....	.....	.....
Hematite, Phos. .03-.05	20.00 6 5 0	.....	.....
Billets	....	$31.95	3 15 0
Wire rods, No. 5 gage	....	60.71	7 2 6
Standard rails	$33.60 10 10 0	$48.99	5 15 0
Merchant bars	1.91c 13 0 0	2.77c	7 6 0
Structural shapes	1.72c 12 2 6	2.83c	7 9 0
Plates, †¼ in. or 5 mm.	1.83c 12 17 6	3.53c	9 6 0
Sheets, black, 24 gage or 0.5 mm	2.41c 17 0 0	2.98c	7 17 0*
Sheets, gal., 24 ga., corr.	2.88c 20 6 3	3.94c	10 7 6
Bands and strips	....	2.76c	7 5 0
Plain wire, base	....	3.15c	8 6 3
Galvanized wire, base	....	3.75c	9 17 6
Wire nails, base	....	3.56c	9 7 6
Tin plate, box 108 lbs.	$ 5.12 1 12 0	....	.....

British ferromanganese $100.00 delivered Atlantic seaboard duty-paid.

Domestic Prices at Works or Furnace—

Last Reported

	£ s d	French Francs	Belgian §§Francs	Reich §§Mar
Fdy. pig iron, Si. 2.5.	$17.76 5 11 0(a)	$14.34 788	$31.44 950	$25.33 63
Basic bess. pig iron	16.72 5 4 6(a)	....	29.79 900	27.94 (b)69.50
Furnace coke	5.17 1 11 8	4.10 225	10.92 330	7.64 19
Billets	30.00 9 7 6	21.17 1,163	42.20 1,275	38.79 96.
Standard rails	1.59c 11 3 0	1.27c 1,588	2.06c 1,375	2.38c 132
Merchant bars	2.00c 14 0 0††	1.16c 1,454	2.06c 1,375	1.98c 110
Structural shapes	1.77c 12 8 0††	1.13c 1,414	2.06c 1,375	1.93c 107
Plates, †¼-in. or 5 mm.	1.79c 12 10 6††	1.48c 1,848	2.42c 1,610	2.29c 127
Sheets, black	2.50c 17 10 0§	1.75c 2,193‡	2.85c 1,900‡	2.59c 144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.	2.98c 20 16 3††	2.87c 3,589	4.80c 3,200	6.66c 370
Plain wire	2.79c 19 10 0	1.87c 2,340	3.00c 2,000	3.11c 173
Bands and strips	2.11c 14 15 0††	1.31c 1,632	2.48c 1,650	2.29c 127

†British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continent usually for basic-bessemer steel. (a) del. Middlesbrough. 5s rebate to approved customers. (b) hematite. °Close annealed. ††Rebate of 10s on certain conditions.

**Gold pound sterling not quoted. §§Last prices, no current quotations. ‡‡No quotations

IRON AND STEEL SCRAP PRICES

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated; †indicates brokers prices

HEAVY MELTING STEEL

Birmingham, No. 1.	15.00
Bos. dock No. 1 exp.	15.50
New Eng. del. No. 1	14.50-15.00
Buffalo ,No. 1.....	18.00-18.50
Buffalo, No. 2.....	16.00-16.50
Chicago, No. 1.....	17.00-17.50
Chicago, auto, no alloy	16.00-16.50
Cincinnati, dealers..	13.75-14.25
Cleveland, No. 1...	17.50-18.00
Cleveland, No. 2....	16.50-17.00
Detroit, No. 1.....†	15.00-15.50
Detroit, No. 2.....†	14.00-14.50
Eastern Pa., No. 1..	18.50
Eastern Pa., No. 2..	17.00
Federal, Ill. No. 2.	14.50-15.00
Granite City, R. R. No. 1 .....†	15.00-15.50
Granite City, No. 2.	14.00-14.50
Los Ang., No. 1, net	11.50-12.00
Los Ang., No. 2, net	10.50-11.00
N. Y. dock No. 1 exp.	14.50
Pitts., No. 1 (R. R.) .	20.00-20.50
Pittsburgh, No. 1...	19.00-19.50
Pittsburgh, No. 2...	17.50-18.00
St. Louis, No. 1....†	15.00-15.50
St. Louis, No. 2....†	14.00-14.50
San Fran., No. 1, net	11.50-12.00
San Fran., No. 2, net	10.50-11.00
Seattle, No. 1.....†	13.00-14.00
Toronto, dirs., No. 1	11.00
Valleys, No. 1.....	18.00-18.50

COMPRESSED SHEETS

Buffalo, new	16.50-17.00
Chicago, factory...	16.50-17.00
Chicago, dealers...	15.00-15.50
Cincinnati, dealers..	13.25-13.75
Cleveland	17.50-18.00
Detroit .....†	16.25-16.75
E. Pa., new mat...	18.00-18.50
E. Pa., old mat....	15.00-15.50
Los Angeles, net...	9.00- 9.50
Pittsburgh	19.00-19.50
St. Louis .....†	12.50-13.00
San Francisco, net..	9.00- 9.50
Valleys	17.50-18.00

BUNDLED SHEETS

Buffalo, No. 1.....	16.00-16.50
Buffalo, No. 2.....	14.00-14.50
Cleveland	14.00-14.50
Pittsburgh	17.50-18.00
St. Louis .....†	10.50-11.00
Toronto, dealers....	9.75

SHEET CLIPPINGS, LOOSE

Chicago	12.00-12.50
Cincinnati, dealers..	9.25- 9.75
Detroit .....†	13.00-13.50
St. Louis	†9.50-10.00
Toronto, dealers...	9.00

BUSHELING

Birmingham, No. 1	13.00
Buffalo, No. 1.....	16.00-16.50
Chicago, No. 1.....	16.50-17.00
Cincin., No. 1 deal.	9.75-10.25
Cincin., No. 2 deal.	3.75- 4.25
Cleveland, No. 2...	11.00-11.50
Detroit, No. 1, new.†	15.00-15.50
Valleys, new, No. 1	17.50-18.00
Toronto, dealers....	5.50- 6.00

MACHINE TURNINGS (Long)

Birmingham	5.00
Buffalo	10.50-11.00
Chicago	11.00-11.50
Cincinnati, dealers..	6.00- 6.50
Cleveland, no alloy.	10.50-11.00
Detroit	†9.75-10.25
Eastern Pa.	10.50-11.00
Los Angeles	4.00- 5.00
New York	†6.50- 7.00
Pittsburgh	12.50-13.00
St. Louis	†7.50- 8.00
San Francisco	5.00
Toronto, dealers....	7.00- 7.25
Valleys	11.50-12.00

SHOVELING TURNINGS

Buffalo	12.50-13.00
Cleveland	11.00-11.50
Chicago	11.50-12.00
Chicago, spcl, anal..	14.50-15.00
Detroit .....†	10.50-11.00
Pitts., alloy-free....	13.50-14.00

BORINGS AND TURNINGS
For Blast Furnace Use

Boston district.....	†4.00- 4.25
Buffalo	10.25-10.75
Cincinnati, dealers..	5.00- 5.50
Cleveland	11.00-11.50
Eastern Pa.	10.00-10.50
Detroit .....†	10.00-10.50
New York	†6.25- 6.50
Pittsburgh	10.00-10.50
Toronto, dealers....	6.75

AXLE TURNINGS

Buffalo	16.00-16.50
Boston district	†8.00- 8.50
Chicago, elec. fur...	17.50-18.00
East. Pa. elec. fur..	16.00-16.50
St. Louis .....†	10.50-11.00
Toronto	6.00- 6.50

CAST IRON BORINGS

Birmingham	7.50
Boston dist. chem..	†8.25- 8.50
Buffalo	10.25-10.75
Chicago	10.50-11.00
Cincinnati, dealers..	5.00- 5.50
Cleveland	11.00-11.50
Detroit .....†	10.00-10.50
E. Pa., chemical	14.50-15.00
New York	†7.00
St. Louis	†6.25- 6.75
Toronto, dealers ...	6.75

RAILROAD SPECIALTIES

Chicago	20.00-20.50

ANGLE BARS—STEEL

Chicago	20.50-21.00
St. Louis .....†	17.50-18.00

SPRINGS

Buffalo	21.00-21.50
Chicago, coil	21.50-22.00
Chicago, leaf.....	19.50-20.00
Eastern Pa.	22.50-23.00
Pittsburgh	22.50-23.00
St. Louis .....†	18.00-18.50

STEEL RAILS, SHORT

Birmingham	16.50
Buffalo	22.50-23.00
Chicago (3 ft.)....	20.50-21.00
Chicago (2 ft.)....	21.00-21.50
Cincinnati, dealers..	19.25-19.75
Detroit .....†	21.00-21.50
Pitts., 3 ft. and less	22.50-23.00
St. Louis, 2 ft.& less	†18.75-19.25

STEEL RAILS, SCRAP

Birmingham	16.00
Boston district.....†	14.50-15.00
Buffalo	19.00-19.50
Chicago	17.50-18.00
Cleveland	20.00-20.50
Pittsburgh	20.00-20.50
St. Louis .....†	16.50-17.00
Seattle	18.00-18.50

PIPE AND FLUES

Chicago, net.....	12.50-13.00
Cincinnati, dealers..	10.75-11.25

RAILROAD GRATE BARS

Buffalo	13.00-13.50
Chicago, net.....	12.50-13.00
Cincinnati, dealers.	8.75- 9.25
Eastern Pa.	16.00-16.50
New York .....†	11.00-11.50
St. Louis .....†	10.50-11.00

RAILROAD WROUGHT

Birmingham	14.00
Boston district	†9.50-10.00
Eastern Pa., No. 1..	19.00
St. Louis, No. 1....†	12.00-12.50
St. Louis, No. 2....†	14.00-14.50

FORGE FLASHINGS

Boston district.....†	10.25-10.50
Buffalo	16.00-16.50
Cleveland	15.50-16.00
Detroit .....†	14.50-15.00
Pittsburgh	16.50-17.00

FORGE SCRAP

Boston district	†7.00
Chicago, heavy.....	20.00-20.50

LOW PHOSPHORUS

Cleveland, crops ...	22.50-23.00
Eastern Pa. crops..	22.50-23.00
Pitts., billet, bloom. slab crops	23.00-23.50

LOW PHOS. PUNCHINGS

Buffalo	21.00-21.50
Chicago	19.50-20.00
Cleveland	19.50-20.00
Eastern Pa.	22.50-23.00
Pittsburgh	22.00-22.50
Seattle	15.00
Detroit .....†	16.50-17.00

RAILS FOR ROLLING
5 feet and over

Birmingham	16.50
Boston .....†	15.75-16.00
Chicago	21.00-21.50
New York .....†	16.00-16.50
Eastern Pa.	20.00-20.50
St. Louis .....†	18.50-19.00

STEEL CAR AXLES

Birmingham	18.00
Boston district.....†	17.00-17.50
Chicago, net	22.50-23.00
Eastern Pa.	23.00-23.50
St. Louis .....†	19.50-20.00

LOCOMOTIVE TIRES

Chicago (cut).....	20.00-20.50
St. Louis, No. 1....†	15.75-16.25

SHAFTING

Boston district.....†	17.25-17.50
New York .....†	18.00-18.50
Eastern Pa.	23.00-23.50
St. Louis, 1¼-3¾"..†	17.25-17.75

CAR WHEELS

Birmingham, iron..	13.00
Boston dist., iron...†	13.00-13.25
Buffalo, steel.....	23.00-23.50
Chicago, iron	18.50-19.00
Chicago, rolled steel	19.50-20.00
Cincin., iron, deal...	17.25-17.75
Eastern Pa., iron...	20.50-21.00
Eastern Pa., steel..	21.50-22.50
Pittsburgh, iron....	20.00-20.50
Pittsburgh, steel...	22.50-23.00
St. Louis, iron.....†	15.50-16.00
St. Louis, steel....†	18.00-18.50

NO. 1 CAST SCRAP

Birmingham	15.50
Boston, No. 1 mach.†	16.00-16.50
N. Eng. del. No. 2..	14.75-15.00
N. Eng. del. textile	18.00-18.50
Buffalo, cupola....	18.50-19.00
Buffalo, mach.	20.00-20.50
Chicago, agri. net..	14.00-14.50
Chicago, auto net..	16.50-17.00
Chicago, railroad net	15.00-15.50
Chicago, mach. net.	15.50-16.00
Cincin., mach. deal..	17.25-17.75
Cleveland, mach. ..	20.50-21.00
Detroit, cupola, net.†	16.50-17.00
Eastern Pa., cupola.	20.50-21.00
E. Pa., No. 2 yard..	17.50
E. Pa., yard fdry...	17.50-18.00
Los Angeles	16.50-17.00
Pittsburgh, cupola..	19.00-19.50
San Francisco	14.50-15.00
Seattle	12.00-14.00
St. Louis, agri. mach.†	16.25-16.75
St. L., No. 1 mach...†	16.25-16.75
Toronto, No. 1 mach., net dealers	18.00-18.50

HEAVY CAST

Boston dist. break..†	13.50-14.00
New England, del...	15.00-15.25
Buffalo, break.....	16.00-16.50
Cleveland, break, net	15.50-16.00
Detroit, auto net...†	17.00-17.50
Detroit, break.....†	15.00-15.50
Eastern Pa.	19.50
Los Ang., auto, net.	13.00-14.00
New York break...†	15.00-15.50
Pittsburgh, break..	16.50-17.00

STOVE PLATE

Birmingham	10.00
Boston district ....†	10.50-11.00
Buffalo	14.50-15.00
Chicago, net	10.50-11.00
Cincinnati, dealers..	9.50-10.00
Detroit, net. .....†	10.50-11.00
Eastern Pa.	16.00-16.50
New York fdry.....	†11.50
St. Louis .....†	11.50-12.00
Toronto dealers, net	12.00

MALLEABLE

New England, del...	21.50-22.00
Buffalo	20.00-20.50
Chicago, R. R.	20.50-21.00
Cincin., agri., deal..	14.75-15.25
Cleveland, rail.....	22.00-22.50
Eastern Pa., R. R...	22.00-22.50
Los Angeles	12.50
Pittsburgh, rail....	22.50-23.00
St. Louis, R. R. ...†	17.00-17.50

Ores

Lake Superior Iron Ore

Gross ton, 51½ %
Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer..	4.60

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract.	9.00-10.00

Foreign Ore
(Prices nominal)

Cents per unit. c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe.. 6-10% Mn.	15.00
North African low phos.	nom.
Spanish, No. African basic, 50 to 60%..	nom.
Chinese wolframite, short ton unit, duty paid .....$	23.50-24.00
Scheelite, imp.	$25.00
Chrome ore, Indian, 48% gross ton, cif. $	26.00-28.00

Manganese Ore

Including war risk but not duty, cents per unit cargo lots.

Caucasian, 50-52%..	48.00-50.00
So. African, 50-52%	49.00-50.00
Indian, 49-50%.....	nom.
Brazilian, 48-52%..	46.00-48.00
Cuban, 50-51%, duty free	61.20

Molybdenum

Sulphide conc., per lb., Mo. cont., mines	$0.75

Sheets, Strip

Sheet & Strip Prices, Pages 84, 85

Pittsburgh—Sheet and strip releases continue to increase under pressure from producers to lighten backlogs as fast as possible. War and defense developments are stimulating specifications, particularly in the East, and in many cases original orders have been boosted as buyers start to build up stocks. Mills look for little business as a result of the government preparedness campaign to develop before fall.

Cleveland—Flat-rolled steel specifications are in fair volume, although buyers still show some restraint in releasing tonnage against April's blanket commitments. Market conditions are strengthening producers' stand in requiring delivery of low-price orders to be completed by June 30.

Chicago — Sheet and strip steel specifications are increasing as mills attempt to get releases in time to make shipments by June 30. Buying is at a standstill, as practically all consumers are well covered. Furniture, household equipment and refrigerator interests are prominent among major consumers.

Boston — Cold strip mill operations are rising gradually as specifications against low-priced blanket contracts placed late last month mount. Operations next month may approach a peak. Incoming volume is well ahead of last month, but current new buying is light, activity being centered around blanket commitments. There is no change from normal on hot strip shipments to re-rollers.

New York—Further gain is noted in sheet specifications, principally for delivery late in June against contracts placed at the $4 concession late in April, although sellers are disappointed with volume of such business. Requirements for stoves, electric refrigerators and other household equipment are holding up fairly well. Though warehouses have experienced a better month, they have been slow in releasing new specifications.

Buffalo — Releases against heavy bookings of sheet and strip steel items are improved. Rolling schedules of mills have been increased to somewhere around 70 per cent of capacity.

Philadelphia — Several sheet producers report specifications now are in on approximately 70 per cent of the low-priced tonnage booked recently. Automotive body and frame makers are well along on die programs for 1941 cars and some pre-

liminary runs already have been made. Additional specifications for stainless strip for a large trailer order will be placed shortly, possibly covering requirements for the balance of the year.

St. Louis — Warehouses are awaiting further depletion of inventories of galvanized sheets before placing additional orders, and trade in that item is quiet. While protective orders were placed for hot-rolled sheets at cut prices, releases have been relatively slow.

Cincinnati—Sheet and strip releases have been heavy and insistence on delivery before June 30 on material bought at lower prices indicates even heavier production. Some buying is being done at the restored price and some classifications are being produced at 90 per cent of capacity. Automotive demand is good but electrical and galvanized sheets lag.

Toronto, Ont. — Despite the fact that Canadian mills are booked into August with deliveries about the end of July on new orders, demand for sheets continues active. The automotive industry is placing large orders in connection with big truck building operations, and there also is good call from electrical equipment makers. Most new business, however, continues to go to United States producers and it is expected that this demand will be further increased.

Birmingham, Ala. — Sheet and strip releases continue substantial, with some releases against recent blanket orders. Production is steady at probably a little better than 80 per cent. Strip, largely cotton ties, is being turned out in fairly substantial volume.

Plates

Plate Prices, Page 84

Pittsburgh—Demand has shown a considerable increase, with mill activity now at the highest point this year. Shipbuilding and railroad car construction continue to take large tonnages of plates, and pipeline demand has accounted for several recent placements of fair size.

Chicago—Demand continues good, with improvement noted by several mills. Prices are firming and operations of fabricators have improved. Business is coming from a wide range of sources, including government dam work, bridgework, the petroleum industry and heavy equipment and machinery manufacturers.

Boston — Miscellaneous consumers, buying in small lots, are stimulating demand, although volume continues to lag. Orders are more numerous, but few carload releases are being specified and prompt delivery is asked. Two water storage tanks are under consideration, and shipbuilding contracts involving destroyers and submarines now up for bids are expected.

Philadelphia — Plate demand has increased considerably, as reflected in rising operations of leading independent producers. For the first time in many weeks rolling schedules in several plants have been expanded sharply. One plant, as an example, has stepped up output 100 per cent from the rate prevailing for two months.

Bath Iron Works, Bath, Me., is low bidder at $2,198,000 each on four single screw turbine propulsion cargo vessels for American Export Lines, rated at 16½ knots. The vessels are about the same size as C-1 boats and will require about 3800 tons of bars, plates and shapes each. Sun Shipbuilding & Dry Dock Co., Chester, Pa., and Pusey & Jones Co., Wilmington, Del., advised the maritime commission they were unable to submit bids on these vessels.

Birmingham, Ala.—Even though

no strictly war plate tonnage is included, local output continues steady. Considerable volume of plates is going to tank manufacturers, and some into railroad construction. Republic Steel Corp. continues to move considerable tonnage to the Pacific coast.

Seattle — Important projects are lacking, none up for bids at the moment. Current operations at local shops are being retarded by a strike of machinists. Vancouver, Wash., has received bids for two 50,000-gallon water storage tanks, bids for one tank having previously been rejected. Tonnage is unstated.

San Francisco — The only plate award of size went to Western Pipe & Steel Co., 575 tons for outlet pipes for the Friant dam, Central Valley project, California. So far this year 25,363 tons have been booked, compared with 16,480 tons for the same period a year ago.

Toronto, Ont. — Shipbuilding, boiler and tank activities call for larger deliveries of plates. Inquiries show some improvement and local representatives of United States producers state that orders are running at record proportions for early delivery. Canadian producers report capacity for sheet production practically fully contracted for the remainder of the year.

Plate Contracts Placed

575 tons, outlet pipes, specification 903, Friant Dam, Central Valley project, California, to Western Pipe & Steel Co., San Francisco.

Plate Contracts Pending

4200 tons, 50 and 59-inch welded steel or concrete pipe, metropolitan water district, Los Angeles, J. F. Shea Co. Inc., 617 South Olive street, Los Angeles, low on general contract on welded basis at $800,867, and Southwest Welding Co., low on subcontract for welded steel pipe.

375 tons, 42, 48 and 52-inch steel riveted or welded pipe, water mains, route 6, section 9, Passaic county, New Jersey; Santaniello Bros. Jersey City, low, $85,663.30, bids May 17, Trenton.

Unstated tonnage, 200,000-gallon elevated steel tank, naval air station, Jacksonville, Fla.; bids June 11, spec. 9788.

Unstated tonnage, two welded steel barges, proposal 352, United States engineer, first district, New Orleans, bids May 31.

Ransome Concrete Machinery Co., Dunellen, N. J., has appointed Welding Engineering Sales Corp., New York, its sales representative in state of New York and a portion of of New Jersey for its line of welding tables and positioners. Ransome has also appointed Hawaiian Gas Products Ltd., Honolulu, Hawaii, exclusive representative in Hawaii.

Bars

Bar Prices, Page 84

Cricago—Carbon and alloy bars are most improved in demand. Releases and orders are heavier, according to producing mills, and further increases in purchasing are anticipated.

Pittsburgh—Orders are considerably better as many consumers are filling forward needs in anticipation of deferred mill deliveries. Some buyers have advanced release dates on old orders and placed additional tonnage on books. Cold finished bars are moving relatively slow, but some producers are expecting shell orders. Flurry in the merchant market is general, with no particular industry responsible.

While bar prices have been fairly firm there are further evidences of a strengthening, with most present business at the full published quotation of 2.15c.

Boston — Demand tends upward with consumption, particularly of alloys, mounting. Machine tool

builders continue as leading consumers, although demand has broadened in other directions. While distributors are able to meet customer needs, they are pressing mills to improve deliveries of special heat-treated alloys. Henry Disston & Sons Co., Philadelphia, has been awarded 135,000 pounds of chromium-molybdenum bars at 9.22c, delivered, Springfield, Mass., armory, where production of the Garand automatic rifle is being increased.

Philadelphia — Commercial bar tonnage has increased considerably from a number of sources, including machine tool makers, manufacturers of screw machine products and the jobbing trade. Prices are well maintained.

Birmingham, Ala. — Bar demand and production continue relatively good, bars being one of the most active products. Sales are holding at a good level and mills report additional bookings.

Buffalo — Improved demand for bars is spotty. Miscellaneous buying has been sufficient to offset a seasonal tapering in releases from automotive interests and partsmakers. Aircraft and munitions supplies are expected to increase purchases in the near future.

Toronto, Ont. — Merchant bar sales are gaining steadily as demand increases for special war materials. Consumers show more interest and inquiries are beginning to appear for delivery in third quarter although producers still have supplies available for delivery before the end of June.

Pipe

Pipe Prices, Page 85

Pittsburgh—Pipe production is up slightly, due mainly to continued increased shipments to consigned stocks of standard pipe. There is little change in oil country goods, volume running about the same as one month ago and one year ago. Line pipe is off somewhat from last month, but there has been a slight advance in mechanical tubing and in pressure tubes.

Cleveland—Standard pipe business is more active, heavier shipments to distributors resulting from further gains in private building work. Residential needs are outstanding, but requirements for public construction still lag. Export demand continues active. Markets for oil country goods disclose little change in volume.

New York — Department of purchase, New York city, closes May 28 on 12,200 tons of cement-lined cast pipe for yard stocks. Inquiry also includes 455 tons of fittings and is the largest in this district in several years. Buying in other directions is slightly heavier. Export inquiry and buying, notably by South America, is brisk.

Birmingham, Ala.—Although aggregate production is well maintained by virtue of business from municipalities, mostly from the Pacific coast, the pipe market is not as reassuring as hoped.

San Francisco—Demand for cast iron pipe has fallen off and only one letting of size was reported placed. American Cast Iron Pipe Co. took 203 tons for Fresno, Calif. Awards aggregated 385 tons and brought the year's total to 14,098 tons as compared with 11,254 tons for the corresponding period in 1939.

Seattle—Cast iron pipe is moving in small volume, no important projects being up. There is slight indication of improvement during the summer.

Toronto, Ont.—Demand for pipe in connection with sewage and waterworks is active and large tonnage orders are in prospect for early closing. Among the larger

projects is that for the $250,000 pipe line for the $3,000,000 pulp mill at Port Alberni, B. C., for Bloedel, Stewart & Welch.

Steel Pipe Placed

3000 tons, 14-inch steel pipe piling for National Mutual Insurance Co. building, Hartford, Conn., to National Tube Co., Pittsburgh.

Cast Pipe Placed

225 tons, 12 and 16-inch, Rahway, N. J., to United States Pipe & Foundry Co., Burlington, N. J.

203 tons, 4 to 10-inch, Fresno, Calif., to American Cast Iron Pipe Co., Birmingham, Ala.

Cast Pipe Pending

12,200 tons, cement-lined, 20-inch and under, yard stocks, department of purchase, New York, bids May 28. Inquiry also includes 455 tons of fittings.

458 tons, 6 to 12-inch, Santa Rosa, Calif.; city purchased steel pipe.

274 tons, 6 to 14-inch, Alhambra, Calif.; bids opened.

200 tons, 2 to 6-inch for water district, Portland, Oreg.; bids in.

150 tons, 8-inch, Yonkers, N. Y.; bids in.

Rails, Cars

Track Material Prices, Page 85

Locomotive buying is the feature of the railroad market at present with an unusual number placed last week. The Terminal Railroad association, St. Louis, has distributed ten diesel-electric locomotives among three builders, and the Chicago, Burlington & Quincy has placed nine with a Chicago builder. United States district court has authorized Missouri Pacific to buy 30 covered 70-ton cement hoppers. Western Maryland is inquiring for 12 steam locomotives.

Inquiry for 1200 to 1250 freight cars by the Gulf, Mobile & Northern has not been acted on and is the largest group now pending.

Locomotives Placed

Chicago, Burlington & Quincy, two 1000-horsepower and seven 600-horsepower diesel-electric switchers, to Electro-Motive Corp., La Grange, Ill.

Terminal Railroad association, St Louis, ten diesel-electric locomotives, as follows: Electro-Motive Corp., La Grange, Ill., four 600-horsepower and two 1000-horsepower; Baldwin Locomotive Works, Philadelphia, and American Locomotive Co., New York, two 600-horsepower each.

Locomotives Pending

Army, one 45-ton mechanical-drive diesel locomotive for Brooklyn, N. Y.; bids June 13.

Navy, two 50-ton diesel-electric locomotives for Mare Island, Calif.; bids June 7.

Western Maryland, twelve 4-6-6-4 locomotives; bids asked.

Car Orders Placed

Alaska railroad, twenty 55-ton hoppers, to Pullman-Standard Car Mfg. Co., Chicago.

Car Orders Pending

Missouri Pacific, thirty 70-ton covered cement hoppers; authorized by United States district court.

Buses Booked

Twin Coach Co., Kent, O.: Twenty-one 41-passenger for Seattle Transit System, Seattle; fifteen 33-passenger for Gray Coach Lines, Toronto, Ont.; nine 37-passenger for Pacific Electric Railway Co., Los Angeles; six 27-passenger for Georgia Power Co., Atlanta, Ga.; six 36-passenger for Cincinnati Street Railway Co., Cincinnati; three 27-passenger for York Bus Co., York, Pa.; three 31-passenger for Mill Power Supply Co., Charlotte, N. C.; three 33-passenger for Penn-Ohio Coach Lines, Youngstown, O.; two 27-passenger for South Carolina Power Co., Charleston, S. C.; two 24-passenger for Buffalo Transit Co., Buffalo; one 27-passenger for Bremerton Transportation Co., Bremerton, Wash.; one 35-passenger for Co-operative Transit Co., Wheeling, W. Va.

Wire

Wire Prices, Page 85

Pittsburgh—Buying of wire products is not active, but releases have been increased from many sources. Buyers in some sections have released all specifications for shipment as soon as possible, and in some cases have added tonnage to the original orders. Most of this buying has been in the merchant field, with warehouses interested in building stocks as much as possible.

Boston—Substantial improvement in demand for numerous wire specialties is gradually increasing finishing mill operations and general buying of the more standard products is also upward. Finishing schedules are heavier, but incoming volume is somewhat uneven with some departments operating well above others.

New York — Acorn Insulated Wire Co., Brooklyn, has been awarded contract for 24,000,000 feet, 24 carloads, field wire, type W-110-B by the procurement division, signal corps, army base, Brooklyn, at $5.96 per 1000 feet delivered. Contract carries a proviso for a 50 per cent increase in the order and was awarded under pro. 394, bids May 14. This wire has a copper core with a combination copper and steel covering, insulated and braided. Under the same bidding 160,802,400 feet is pending, award expected within the next few days.

Birmingham, Ala. — Largely on the strength of renewed buying, evident over the past few weeks, wire production is satisfactory, estimated at more than 85 per cent. All items are in good demand.

Shapes

Structural Shape Prices, Page 84

Pittsburgh — Demand has shown considerable increase over the past two weeks. Shape contracts placed have not been numerous, but inquiry has been more active. Private construction and public works jobs both account for a fair percentage of the total.

Cleveland—Fabricators are rushed with small industrial projects. While this type of expansion work quickened markedly before the serious turn in the war, the latter occasionally is a factor in the decision to proceed with certain construction. Few large private or public jobs are active here.

Chicago—Structural awards are down slightly, although there has been moderate improvement in fabricating shop operations and a greater diversity. Inquiries include many small private tonnages and several substantial projects. An overhead crossing and underpass at the Union Pacific tracks, Rock Springs, Wyo., will require 453 and 295 tons respectively. Powerhouse for Central Illinois Public Service, Hutsonville, Ill., will require 400 tons.

Boston—Carlo Bianchi & Co. Inc., Framingham, Mass., is low on the general contract for the Hoosic river bridge, a truss and stringer span, North Adams, Mass. Inquiry for

Shape Awards Compared

	Tons
Week ended May 25..	20,234
Week ended May 18.....	22,911
Week ended May 11.....	32,341
This week, 1939	14,923
Weekly average, year, 1940	17,867
Weekly average, 1939.....	22,411
Weekly average, April.....	10,851
Total to date, 1939	465,507
Total to date, 1940	375,211

Includes awards of 100 tons or more.

structural steel is growing, notably requirements for industrial shop additions, close to 3000 tons for such work now being active. Part of this is for work held in abeyance for some months, including projects at Worcester, Pittsfield and Hartford.

New York—While volume of active pending structural steel is down, inquiry is featured by several fair-sized industrial expansion projects. Bridge needs are lower, but New Jersey closes June 7 on spans and underpasses taking 530 tons. A Brooklyn brewery will erect a 1300-ton bottling plant.

Philadelphia—Structural steel requirements this spring have been below expectations although a few lots have appeared recently. Fabricators note less pressure by general contractors for price concessions.

Seattle—Colby Steel & Engineering Co., Seattle, is building two double cantilever cranes, booms 300 feet long, 11-ton capacity at end of boom, for the contractors erecting Friant dam, California, involving about 350 tons. Award is still pending for the Kettle river bridge, Washington state, requiring nearly 1700 tons.

San Francisco—Awards for structural shapes aggregated 4170 tons, bringing the total for the year to 74,247 tons, compared with 55,322 tons for the corresponding period in 1939. Pending business exceeds 22,500 tons.

Totonto, Ont.—Structural steel awards show some falling off, with awards totaling only about 3400 tons. No large orders were included, although a number of contracts ranging up to 350 tons were closed. Inquiries are holding well and several projects are under contemplation for which large tonnages will be required. Demand for structural in connection with war construction work is becoming more active and several thousand tons are pending.

Shape Contracts Placed

2511 tons, schedule 4032, Panama Canal, to United States Steel Export Co., Washington; bids May 13; also includes 68 tons plates and 24 tons bolts and washers.

2000 tons, office building, E. I. du Pont de Nemours & Co., Wilmington, Del., to American Bridge Co., Pittsburgh.

1500 tons, bridge, Dookers Hollow, Bessemer, Pa., for Allegheny county, to Pittsburgh Des Moines Steel Co., Pittsburgh.

1300 tons, bottling plant, Schaefer Brewing Co., Brooklyn, N. Y., to Bethlehem Steel Co., Bethlehem, Pa., through Turner Construction Co., New York.

1220 tons, gold dredge, South Platte Dredging Co., Colo., to American Bridge Co., Pittsburgh.

1000 tons, additional welded pots, for Aluminum Co. of America, Vancouver, Wash., to Puget Sound Machinery Depot, Seattle.

710 tons, Shelborne Hotel building, Hatfield Corp., Miami Beach, Fla., to Bethlehem Fabricators Inc., Bethlehem, Pa.

700 tons, steel piling, dike in Westfield river at West Springfield, Mass., to Carnegie-Illinois Steel Corp., Pittsburgh, through Whiteoak Excavators Inc., Plainville, Conn.

640 tons, Ford Motor Co. addition, Dallas ,Tex., plant, to Mosher Steel Co., Houston, Tex.

580 tons, addition to office and factory, for Vickers Inc., Detroit, to Austin Co., Cleveland.

555 tons, industrial buildings, air base, Jacksonville, Fla., to Ingalls Iron Works, Birmingham, Ala.

500 tons, state bridge, Croton Falls, N. Y., to Phoenix Bridge Co., Phoenixville, Pa.

500 tons, heating and seat plate assembly, Grand Coulee dam, Odair, Wash., to Schmidt Steel Co.

460 tons, tunnel ribs, spec. 902, Lyons, Colo., to Colorado Fuel & Iron Corp., Denver.

450 tons, state highway bridge, Denver, Colo., to Midwest Steel & Iron Works Co., Denver.

450 tons, building No. 9, Lockheed Air-

craft Corp., Burbank, Calif., to Bethlehem Steel Co., Los Angeles.

422 tons, including 65 tons of piling, Sand Creek bridge, Adams county, Colorado, to Midwest Steel & Iron Works, Denver, Colo.

350 tons, penstock coaster gates, specification 905, Grand Coulee dam project, Odair, Wash., to American Bridge Co., Pittsburgh.

350 tons, two double cantilever cranes for Friant dam, California, to Colby Steel & Engineering Co., Seattle.

350 tons, fertilizer plant for Eastern States Farmers' Exchange, Wilmington, Del., to Bethlehem Steel Co., Bethlehem, Pa.; J. A. Bater Co., Wilmington, general contractor.

345 tons, conveyor bridge, Aluminum Co. of America, Vancouver, Wash., to Bethlehem Steel Co., San Francisco.

250 tons, addition to plant, for North American Aviation Corp., Los Angeles, to Bethlehem Steel Co., Bethlehem, Pa.

236 tons, service station addition, New England Greyhound Lines Inc., South Boston, Mass., to American Bridge Co., Chicago.

220 tons, repairs to bridge, Walnut street, Elmira, N. Y., for city, to American Bridge Co., Pittsburgh.

190 tons, theater, Oswego, N. Y., to Buffalo Structural Steel Co., Buffalo.

190 tons, store building, Lerner Co., Pittsburgh, to Levinson Steel Co., Pittsburgh.

180 tons, addition to office building, for Interzone Corp., New York, to American Bridge Co., Pittsburgh.

175 tons, building, Brentwood, Pa., to Fort Pitt Bridge Works, Pittsburgh.

170 tons, store building, for Montgomery Ward & Co., Binghamton, N. Y., to American Bridge Co., Pittsburgh.

170 tons, state bridge 5337, Faribault, Minn., to Lakeside Bridge & Steel Co., Milwaukee.

170 tons, warehouses, army base, Tampa, Fla., to Virginia Bridge Co., Roanoke, Va.

165 tons, building, Seaman Body Corp., Milwaukee to Worden-Allen Co., Milwaukee.

160 tons, three hydraulic hoists, specification 905, Grand Coulee dam, Odair, Wash., to Consolidated Steel Corp., Los Angeles.

160 tons, bridge FAS-13E, Pushmataha county, Oklahoma, to Fort Smith Structural Steel Co., Fort Smith, Ark.

150 tons, bridge C1-74-79, Clermont county, Ohio, to American Bridge Co., Pittsburgh.

130 tons, addition public school 30, Staten Island, N. Y., to Lehigh Structural Steel Co., Allentown, Pa.; Lynn Construction Co., New York, contractor; reported May 13 as reinforcing placed.

125 tons, bridge FAGS-505B (1) Oklahoma county, Oklahoma, to Capitol Steel & Iron Co., Oklahoma City, Okla.

120 tons, state bridge, Philadelphia road, Ohio, to Fort Pitt Bridge Works, Pittsburgh.

120 tons, court enclosure, for Fisher Body division, General Motors Corp., Flint, Mich., to Whitehead & Kales Co., Detroit.

110 tons, transmission towers, Darlington, R. I., to Lehigh Structural Steel Co., Allentown, Pa., Stone & Webster Inc., Boston, contractors.

105 tons, approximate, galvanized steel skeleton towers, Civil Aeronautics authority, Washington, various deliveries, to Emsco Derrick & Equipment Co., Houston, Tex., $27,517, pro. 399; bids April 25.

105 tons, store building, F. W. Woolworth Co., Taunton, Mass., to A. O. Wilson Structural Co., Cambridge, Mass.

100 tons, addition, office building, Standard Oil Co. of New Jersey, Bayway, N. J., to B. Katchem Iron Works, Newark.

Unstated tonnage, signal bridges and electrical work, route 25, state of New Jersey, to Selbach-Meyer Co., West New York, N. J., $17,340; bids May 17, Trenton.

Shape Contracts Pending

3500 tons, Benjamin Franklin high school, New York; bids being taken.

2000 tons, Cardinal Hayes Memorial high school, Bronx; George A. Fuller Co., New York, contractor.

1400 tons, apartment, Tishman Realty Co., Eighth avenue and Eighth street, New York.

1250 tons, trusses and stringer bridge and approaches, Hoosic river, North Adams, Mass.; Carlo Bianchi & Co. Inc., Framingham, Mass., low, bids May 21, Boston.

1200 tons, state bridges, New York, bids June 12, Albany, N. Y.

1000 tons, warehouse, for American

Stores Co., Kearny, N. J.

757 tons, two overcrossings, Rock Springs, Sweetwater county, Wyo.

750 tons, plant at Centerville, Calif., Leslie Salt Co.

700 tons, grade separation bridge, Detroit, for state.

595 tons, bridge at Red Cliff, Eagle county, Colo.

570 tons, beam spans, various locations, for Great Northern railway.

465 tons, including 200 tons steel sheet piling, state highway bridge, Forest and Clarion counties, Pennsylvania; bids to state highway department, Harrisburg, Pa., May 31.

454 tons, warehouse, Chicago, Sears, Roebuck & Co. Previously estimated at 500 tons.

453 tons, overhead crossing, Union Pacific railroad, Rock Springs, Wyo.

440 tons, coal bunker, etc., for West Penn Power Co., Power, W. Va.

440 tons, extension to craneway, for Yellow Truck & Coach Mfg. Co., Pontiac, Mich.

400 tons, powerhouse, Hutsonville, Ill., Central Illinois Public Service, Springfield, Ill.

355 tons, four bridges, route 29, sections 1B and 1C, Hillside and Union townships, New Jersey; bids June 7 to E. Donald Sterner, state highway commissioner, Trenton; work involves three underpasses and widening existing bridge over Elizabeth river.

300 tons, ice rink, Berkeley, Calif.; general contract to W. A. Bechtel & Co., 155 Sansome street, San Francisco.

300 tons, bridge 367, Forge road, Providence, R. I., for state.

300 tons, garage addition to Brost Motors Inc., Buffalo.

220 tons, apartment building, for Ambler Park Terrace, Cleveland.

205 tons, two through-plate girder spans, public roads administration, Cody, Wyo.

180 tons, Kanapolis, Kans., dam, Morrison & Knudsen, Boise, Idaho, low on general contract.

175 tons, relocation project, including overpass and approaches, Pennsylvania-Reading Seashore Line, South Dennis, Cape May county, N. J., route 49, section 16; bids June 7 to E. Donald Sterner, state highway commissioner, Trenton.

170 tons, building, for Fanny Farmer Candy Shops Inc., Detroit.

170 tons, building, for Florence Oil Stove Co., Gardner, Mass.

150 tons, warehouse, garage, etc., Alaska, for United States government.

150 tons, state bridge, Hardwick, Mass.

150 tons, hospital building, Salem, Mass.

144 tons, trash racks for penstock intakes, Wheeler dam, units 3 and 4, bids June 3, Tennessee Valley authority, Knoxville, Tenn.

140 tons, recreation building, Loyola high school, Baltimore.

140 tons, factory building, for I-Sekina Co., Baltimore.

131 tons, warehouse, garage and maintenance building, cold weather experimental station, Fairbanks, Alaska.

120 tons, state bridge over Milk river, Zurich, Mont.

120 tons, additions to office and factory, for Haughton Elevator Co., Toledo, O.

120 tons, new floor in building 12, Philadelphia navy yard, for navy.

108 tons, state highway work, Allegheny county, Pennsylvania; bids to state highway department, Harrisburg, Pa., May 31.

105 tons, bridge over North Fork river, Zurich, Mont.

100 tons, control house, for Sun Oil Co., Marcus Hook, Pa.

100 tons, building, for Detroit Wax Paper Co., River Rouge, Mich.

100 tons, additions to building, for Electro-Motive Corp., La Grange, Ill.

100 tons, recreation hall, Lehigh University, Bethlehem, Pa.; bids June 3.

Unstated tonnage, 175,950 square feet steel sheet piling, improvements to locks and dams. Nos. 11, 16, 18, 20 and 21, in Mississippi river; indefinitely postponed.

Reinforcing

Reinforcing Bar Prices, Page 55

Pittsburgh—Market is fairly active, with both public and private projects contributing prominently to tonnages. Due to rapidly increasing demand, prices have risen in eastern markets. Eastern prices are at 1.70c and above, but not yet back to 2.15c, the nominal published level.

Chicago — Numerous small jobs,

mostly private, continue to come out. Prices show a firmer trend. Improved demand is reported for unidentified projects, while pending tonnage for construction here and in surrounding territory is substantially unchanged.

New York—Except for highway reinforcing, buying has slumped, most larger projects recently estimated having been placed. Close to 1000 tons of mesh for upstate New York highways has been bought. Bids are in on a housing project, Elizabeth, N. J. which coupled with a similar job at Jersey City involves close to 1600 tons. Concrete bar prices, billet and re-rolled, continue mixed and weak.

Boston—In addition to 650 tons of road mats for highway reinforcing, Connecticut, bids close June 3 at Hartford on close to 200 tons, one contract taking 165 tons. Inquiry continues to mount slowly with prospective tonnage for industrial expansions gaining. Bridge needs are more numerous, but few large tonnages are involved.

Seattle—Demand has improved materially, following three months of inactivity. New projects are coming out, including 180 tons for the Swift packing plant, Seattle, and unstated tonnage for a school at Yakima, Wash., extension of Sand Point barracks and work at the Puget Sound navy yard. Bethlehem Steel Co., Seattle, has booked 2000 tons for the naval air bases at Kodiak and Sitka, Alaska, and 260 tons for the Florence hotel, Missoula, Mont. Reclamation bureau has placed 1270 tons with the same producer for delivery at Coulee dam.

San Francisco—While awards for reinforcing bars were not heavy, more than 25,500 tons is pending. Awards totaled 2293 tons and brought the aggregate to date to 58,675 tons, compared with 75,558 tons for the same period last year.

Toronto, Ont.—Reinforcing steel awards for the week mostly were in lots under 200 tons with total around 1400 tons. New demand slowed down during the past week or ten days, although several thousand tons are pending.

Reinforcing Steel Awards

2000 tons, naval air bases at Sitka and Kodiak, Alaska, to Bethlehem Steel Co., Seattle; Siems, Drake, Puget Sound, Seattle, general contractor.

1500 tons, addition for Campbell Soup Co., Camden, N. J., to Concrete Steel Co., New York; through Thomas F. Gibson, Philadelphia, contractor; also includes 126 tons shapes.

1268 tons, bureau of reclamation, invitation B-38,232-A, Odair, Wash., to Bethlehem Steel Co., Seattle, Wash.

825 tons, mesh, state highway projects, Hamilton, Franklin, Clinton and Warren counties, New York, to Truscon Steel Co., Youngstown, O.; Louis Mayersohn, Albany, N. Y., general contractor.

570 tons, Nimrod dam, United States engineers, Ola, Ark., to Sheffield Steel Corp., Kansas City.

435 tons, overpass, Missouri Pacific railroad, St. Louis, to Laclede Steel Co., St. Louis.

321 tons, bureau of reclamation, invitation, B-46,196-A, Kremling, Colo., to Colorado Fuel & Iron Corp., Pueblo, Colo.

260 tons, Florence Hotel, Missoula, Mont., to Bethlehem Steel Co., Seattle; Allo-

Concrete Bars Compared

	Tons
Week ended May 25.....	7,899
Week ended May 18.....	10,647
Week ended May 11.....	7,945
This week, 1939	11,360
Weekly average, year, 1940	8,179
Weekly average, 1939	9,197
Weekly average, April . ..	9,875
Total to date, 1939.....	223,109
Total to date, 1940.....	171,753

Includes awards of 100 tons or more.

way & Georg, Spokane, general contractors.

247 tons, bureau of reclamation, invitation 30,799-A, La Pine, Oreg., to Judson Steel Corp., San Francisco.

198 tons, Santa Fe railroad bridge, Chicago, to Inland Steel Co., Chicago.

175 tons, building, Armstrong Rubber Co., West Haven, Conn., to Topper & Griggs, Hartford, bars to be supplied by Bethlehem Steel Co., Bethlehem, Pa.; Edwin Moss & Son, Bridgeport, contractor.

100 tons, hangar, Chanute field, Rantoul, Ill., to Laclede Steel Co., St. Louis.

Reinforcing Steel Pending

2900 tons, store house, specification 9686, naval air base, Alameda, Calif.; bids opened.

2400 tons, warehouse, Goldblatt Bros. department stores, Chicago.

1250 tons, improvements to locks and dams Nos. 11, 16, 18, 20 and 21 in Mississippi river; indefinitely postponed.

1000 tons, Kanapolis, Kan., dam, Morrison & Knudsen, Boise, Idaho, low on general contract.

650 tons, housing project, Elizabeth, N. J.; bids in.

550 tons, Cottage Grove dam, Lane county, Oregon; bids June 14.

350 tons, truss and stringer bridge, Hoosic river, North Adams, Mass.; Carlo Bianchi & Co. Inc., Framingham, Mass., low, bids May 21, Boston.

230 tons, telephone exchange building, Rogers Park, Ill.

214 tons, two over-crossings, Rock Springs, Sweetwater county, Wyo., for state; bids opened.

208 tons, library, state college, San Jose, Calif.; bids opened.

200 tons, filtration plant, Bridgeport, Conn.

185 tons, Panama, schedule 4056; bids May 31, Washington.

185 tons, mostly bars, shapes and piling, Jones Ferry pumping station, Connecticut river, Chicopee, Mass.; bids June 6, United States engineer, Providence, R. I.

180 tons, Swift & Co. packing plant, Seattle; bids at Chicago, June 3.

178 tons, mesh and bars, relocation highway project, including overpass and approaches over Pennsylvania-Reading Seashore Lines, South Dennis, N. J.; bids June 7 to E. Donald Sterner, state highway commissioner, Trenton.

165 tons, highway mesh, state projects, Norfolk, Colebrook and Winchester, Conn.; bids June 3, Hartford.

152 tons, three bridges in Yuba and Butte counties, California, for state; bids June 5.

150 tons, undercrossing, Fair Oaks avenue, Los Angeles, for state; bids June 6.

150 tons, warehouse buildings, Westover field army air base, Chicopee, Mass.

145 tons, sewer contract 2, Flushing, N. Y., Charles Bennett Co. Inc., Brooklyn, contractor.

140 tons, state highway work, Allegheny county, Pennsylvania; bids to state highway department, Harrisburg, Pa., May 31.

100 tons, three underpasses and Elizabeth river bridge widening, Hillside and Union townships, New Jersey; bids June 7 to E. Donald Sterner, state highway commissioner, Trenton.

Pig Iron

Pig Iron Prices, Page 86

Pittsburgh — Production is increasing substantially, but buying has not appeared in any volume in the merchant market. Prices are stronger, with most sellers reporting business at full prices. By-product coke activity is at a peak, but beehive coke prices disclose no stronger tone. Foundry activity is fair, with some steel foundries operating close to capacity. Railroad suppliers are busy, roll shops are rushed and jobbing steel foundries report inquiries good.

Cleveland—Buying has improved markedly the past week to ten days. Many consumers have worked down stocks, and the prospect of quickened industrial activity and better engagement of iron and steel plants is prompting renewed purchasing. Recent demand along the Great Lakes is estimated to have involved 150,000 to 200,000 tons. Foundry operations have varied little so far this month.

Chicago — A new buying move-

ment is under way, as actual sales have increased considerably and many consumers are ordering far ahead. Price is firm at $23. Last few days of last week buying was noticeably better, but the movement lacks the briskness of last fall. It is understood considerable third quarter tonnage is being booked and, in some cases, fourth quarter. Iron shipments are improved, but do not compare with the gains in buying.

Boston — Pig iron buying is slightly heavier, with individual orders larger in some instances. Some export inquiry is noted, but little business has apparently been closed in this district. Shipments are well maintained against orders. Foundry melt is gradually mounting with prospects for heavier schedules at more plants likely with development of the rearmament program.

Philadelphia — Activity in pig iron has picked up sharply, with incoming tonnage largest since last fall. Several lots ranging up to 500 tons have been reported closed recently. Largest single lot was 1500 tons of malleable. Some talk is heard of a further price advance, but this is not believed likely at the moment. Some export business is reported although total volume now is off due to closing of the Swedish market.

New York — Business has improved appreciably, although the melt has not increased greatly. Demand is stimulated by the rising trend in scrap prices, the possibility of further gains in steel production and the fact many contracts are becoming depleted .

Buffalo — Business has experienced a pronounced flurry, large consumers in particular being anxious to enter orders and showing little concern over prices. More interest also is being displayed in deliveries. Shipments are heavier.

Cincinnati—Consumers are showing more interest in third quarter pig iron, preceding announcemet of prices or opening of books for that period. Specifications are fairly steady, although a better melt among jobbing and stove foundries is in prospect. Movement of foundry coke is sustained.

St. Louis — Last week saw a revival of forward buying of pig iron. Melters had allowed their stocks to be reduced, and with better business on books and expectations of further improvement, substantial tonnages had been purchased.

Toronto, Ont.—Pig iron demand continues steady, but lacks special feature. Most current business is for spot delivery and inquiries are appearing for third quarter. Producers are giving good delivery on spot sales and melters mostly are satisfied to place orders as demands dictate.

Scrap

Scrap Prices, Page 88

Pittsburgh — Scrap markets over the past week have risen 50 cents on most items, largely out of sympathy with broker activity. A few scattered sales have been made at or above current quotations but quantities have been small and quantity buying appears as far off as ever. Short sales have virtually disappeared because of the difficulty involved in covering at any price, and most current quotations are largely nominal.

Cleveland—Scrap is quiet in this market, low phos punchings for electric furnace use advancing 50 cents per ton, the only activity in prices. Two cargoes of miscellaneous scrap were unloaded last week.

Chicago—Scrap remains firm but with prices substantially unchanged. Limited amount of mill buying has been confirmed at $17.50 for No. 1

heavy melting steel, though dealer-broker trading of this grade continues to indicate a higher value. Dealers are selling within a range of $17.25 to $17.50.

Boston — Stronger iron and steel scrap prices are accompanied by better domestic demand and heavier ship loading for export. For dock delivery, heavy melting steel grades have been advanced 50 cents while for domestic consumption, machine shop turnings, busheling, and most cast grades are up 50 cents or more a ton. Steelmaking grades have also moved up $1 a ton for shipment to New England consumers.

New York—Advances of 50 cents or more are effective on numerous grades, including heavy melting steel for domestic and export shipment, $14.50 being paid by brokers for the latter. Increased shipments to eastern Pennsylvania are noted but tonnage from this district is relatively light. Foundries are buying at slightly increased pace but are well stocked. Barge accumulations for export are about 15,000 tons, not considered excessive.

Philadelphia — Eastern scrap market now is caught in a strong upsurge, with brokers, in many instances, paying prices above present consumer market for the purpose of covering against old orders. No. 1 steel now is quoted at $18.50 on the basis of sales in the past few days, but brokers already are paying this figure to cover. Practically the entire list is sharing in the rise.

Buffalo—Supported by small undercover sales among dealers, the price upturn on steelmaking grades of scrap has been extended another 50 cents, making a gain of $1 a ton for the week.

Detroit—Scrap markets show continued strength with further increases registered in loose clippings and several foundry grades. A tonnage of heavy breakable cast has been sold well above the price prevailing for the past week, although special considerations may have been involved as far as size was concerned.

Cincinnati—Scrap prices are up 50 cents, which places heavy melting steel at $13.75 to $14.25, or slightly under the best level obtained recently on small-lot sales. Part of the recent rise had support from consumer demand, but in the main this has been a dealer market and influenced not a little by war conditions.

St. Louis — Prices have advanced 50 cents to $3.75 a ton, influenced more by increasing prices in other markets than by any tendency to buy here. No deals are pending at present with district mills since they are well fortified and are not inclined to buy except at prices dealers are unwilling to accept.

Toronto, Ont. — Interest in the scrap market is expanding. Consumers show more interest and are placing orders for all the materials they can obtain. In addition to the big tonnages being supplied by Canadian dealers, imports running between 15,000 and 20,000 tons monthly are reported from the United States. Canadian mills are taking all offerings of steel scrap

San Francisco — Movement of scrap continues limited and local steel producers are buying only for replacement. Export business is at a standstill. No. 1 heavy melting steel, f.o.b. cars, metropolitan districts, Los Angeles and San Francisco, continue at $11.50 to $12 a net ton, with No. 2 at $10.50 to $11. No change in compressed sheets or turnings and borings has occurred. Dealers buying prices on No. 1 heavy melting steel continue at $8.50 to $9.

Birmingham, Ala. — Scrap continues to show renewed activity. Inventories seem to be ample.

Behind the Scenes with STEEL

Service With A Smile

■ We've always labored under the fearful misapprehension that it would cost you a cool twenty-five bucks for a flat tire or an empty gas tank in those two great underwater bridges, the Holland and Lincoln tunnels. Now from Billings Wilson, assistant general manager of the Port of N. Y. Authority comes the soothing explanation that a 24-hour emergency service is constantly on hand at both trans-Hudson tunnels to render every conceivable type of first aid to ailing autos. Of course, they won't grind the valves or adjust your brakes, but you can be towed to the nearest service station cheerfully and without charge.

Rebuttal

■ We knew Chicago editor Jim Powell wouldn't take that hair growing crack last week lying down. He writes: "My silken tresses began dropping like parachute troops behind the Maginot line. This was first called to my attention by no one other than Shorty Long. 'Yessir,' Shorty says, between chaws of Clabber Girl, 'Your head shines like them new rolls we got on the three-high.' This was too much for me, so I determined to find a method that would grow hair even on billiard balls. This was easier than expected, as attested by my collection of some three-dozen fur-bearing eight balls, which I am no longer behind. It was not until I found Nu-Glu, however, that my hair began to grow like blue grass in Kentucky. An interesting sidelight is that for years I also had been stone deaf, but after taking 194 bottles of Nu-Glu, accompanied by small amounts of ginger ale, the next day I heard from my uncle in India."

Heckler

■ We have an anonymous subscriber down in Pittsburgh whose orange juice must be sour and shredded wheat biscuits tough every once in a while on Monday mornings as he reads STEEL in the coffee shop of the William Penn. Not long ago we ran a puzzle about the fly and the bicycle and it came smack back to us with a pointed note reading: *You just go to h——!* This week he writes: *Please quit casting any of your —— aspersions on A. H. Allen of Mirrors of Motordom. He is tops. But keep on with your column. The world is rapidly coming over to your (crazy) side.* Yeh?—then we're leavin'!

Parlor Game

■ Move one match last week and you have the square of one equals one. H. E. Frederickson saved the day on the May 13 boat and ladder puzzler with the simple explanation that boats at anchor usually float, which sounds very logical. Try this on your friends: Multiply your age by 2. Add the number of toes on your right foot. Multiply by 50. Add the amount of change under one dollar in your pocket. Add the number of toes on your left foot and subtract the number of days in a year (365). Add 115 and the first two figures in the answer are your age; the last two the amount of change in your pocket. (Note: Don't try it on any guy who had his big toe cut off with a niblick.)

Heaven

■ The E. Ingraham Co., Bristol, Conn., has developed their lobby into a veritable salesmen's paradise. Well furnished in large overstuffed yellow leather chairs, a radio brings latest news reports, ball games or soft music. A writing desk contains air mail and regular stamped envelopes, engraved letterheads, pen and ink and an ample collection of daily newspapers. Even the men's room off the lobby is finished in pink tile with very fancy indirect lighting. W. O. Warner, P. A., says they want to keep everyone happy whether they get an order or not.

SHRDLU

—The Market Week—

Warehouse

Warehouse Prices, Page 87

Pittsburgh — Business has increased less rapidly than is suggested by heavier orders from warehouses who are enlarging their stocks. However, inquiries point to further improvement. Prices are fairly steady.

Chicago — Orders are slightly heavier, but the month's total is thought unlikely to better the April tonnage by more than 5 per cent. A small upward tendency is in prospect the next 30 days.

New York — With demand well spread as to products, volume with warehouses thus far this month closely parallels April. Prices are unchanged and generally firmer, although confusion continues in galvanized sheets, aggregate stocks of which held by secondary consumers are still large. Demand for stainless and alloy bars is notable, much the result of government shop work or contracts.

Philadelphia — Warehouse business is running ahead of April but is not keeping pace with the rise in mill bookings. Prices are a shade steadier.

Buffalo — Warehouses express some surprise over failure of sales to reflect the upturn in mill operations.

Cincinnati — Warehouse sales have broadened, and May apparently will show a moderate increase over April. Prices on hot-rolled sheets and strip were adjusted upward.

Seattle—Volume is fair, having dropped slightly this week due to labor difficulties in the metal trades industries. Out of stock goods are showing seasonal turnover, only occasional car lots being placed. Prices are firm at present levels.

Iron Ore

Iron Ore Prices, Page 88

Cleveland — April consumption of Lake Superior iron ore totaled 3,934,853 gross tons, against 4,087,767 tons in March and 2,799,769 tons a year ago, according to the Lake Superior Iron Ore association. Consumption the first four months this year was 17,553,767 tons, against 11,895,706 tons a year ago.

Stocks at furnaces and on Lake Erie docks on May 1 were almost 21 per cent less than a year ago. Comparisons follow:

Gross Tons Iron Ore on Hand

	At Furnaces	On Lake Erie Docks	Total
May 1 1940	15,155,399	2,950,752	18,106,151
Month Ago	18,411,970	3,450,332	21,862,302
Year Ago	18,305,966	4,484,967	22,790,933

Steel in Europe

Foreign Steel Prices, Page 87

London—(*By Cable*)—Supplies of steel from Belgium and Luxemburg to Great Britain have been stopped and orders have been diverted to Canada and the United States. Recent arrivals from the Continent have been satisfactory but the present interruption is detrimental to British production.

Arrangements have been made with labor to intensify production for increasing war needs. Most Belgian iron and steel plants are in the war zone and some French production is also stopped. Export trade by Continental producers is disrupted and French and British available tonnage is extremely restricted. No export quotations on Continental steel are available.

Tin Plate

Tin Plate Prices, Page 84

Pittsburgh—Tin mill operations are up to 71 per cent of capacity, following larger releases from can makers. Export markets continue to expand, and reports indicate added demand for export of materials packed in cans. Local mills are building up stocks somewhat, the increase coming partially from that source. However, stocks are reported to be in good shape to carry the expected increase. Producers here see little possibility of additional mills being called into operation unless some unforeseen demand comes into the picture.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 85

Business this month has been more active than in April, reflecting better requirements from the building construction field primarily. Shipyard releases also are better although railroad requirements have been sluggish and automotive requirements are down slightly. The latter has held up better than was expected.

Nonferrous Metals

New York—European war developments continued to exert considerable influence on domestic nonferrous metal markets last week. Buying generally was on a smaller scale, pending outcome of the present phase of the war, while prices showed no definite trend. The 25-point advance in zinc on Friday was the outstanding development. For-

Nonferrous Metal Prices

May	Copper: Electro, del. Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin, New York: Spot	Straits Tin, New York: Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
18	11.50	11.50	11.12½	54.00	51.50	5.00	4.85	5.75	19.00	14.00	35.00
20	11.50	11.50	11.12½	54.00	51.00	5.00	4.85	5.75	19.00	14.00	35.00
21	*11.25	11.50	11.12½	54.00	50.87½	5.00	4.85	5.75	19.00	14.00	35.00
22	*11.25	11.50	11.00	53.87½	50.87½	5.00	4.85	5.75	19.00	14.00	35.00
23	*11.25	11.50	11.00	53.50	50.50	5.00	4.85	5.75	19.00	14.00	35.00
24	*11.25	11.50	11.00	53.00	50.00	5.00	4.85	6.00	19.00	14.00	35.00

*Based on sales by custom smelters; mine producers unchanged at 11.50c.

MILL PRODUCTS

F.o.b. mill base, cents per lb., except as specified. Copper brass products based on 11.50c Conn. copper

Sheets

Yellow brass (high) 18.31
Copper, hot rolled 20.12
Lead, cut to jobbers 8.25
Zinc, 100 lb. base 11.00

Tubes

High yellow brass 21.06
Seamless copper 20.62

Rods

High yellow brass 13.26
Copper, hot rolled 16.62

Anodes

Copper, untrimmed 17.37

Wire

Yellow brass (high) 18.56

OLD METALS

Nom. Dealers' Buying Prices

No. 1 Composition Red Brass

New York 6.87½-7.12½
Cleveland 8.00-8.25
Chicago 7.50-7.75
St. Louis 7.75-8.25

Heavy Copper and Wire

New York, No. 1 ..... 8.50-8.75
Cleveland, No. 1 ..... 9.00-9.25
Chicago, No. 1 ..... 8.75-9.00
St. Louis 8.75-9.25

Composition Brass Turnings

New York 6.50-6.75

Light Copper

New York 6.50-6.75
Cleveland 7.00-7.25
Chicago 6.75-7.00
St. Louis 6.75-7.00

Light Brass

Cleveland 3.50-3.75
Chicago 4.25-4.50
St. Louis 4.25-4.50

Lead

New York 4.50-4.75
Cleveland 3.90-4.15
Chicago 3.90-4.10
St. Louis 4.00-4.25

Zinc

New York 3.00-3.25
Cleveland 2.75-3.00
St. Louis 3.25-3.50

Aluminum

Misc., cast, Cleveland 8.00
Borings, Cleveland 6.50
Clips, soft, Cleveland 14.00
Misc. cast, St. Louis 7.75-8.00

SECONDARY METALS

Brass ingot, 85-5-5-5, less carloads .. 12.00
Standard No. 12 aluminum .. 13.75-14.00

eign silver advanced ½-cent to the basis of 35.25c an ounce, New York, following the British ban on exports and increased demand here from foreign countries.

Copper—Electrolytic prices fluctuated rather rapidly with the close quoted 11.50c, Connecticut, by mine producers; 11.25c by custom smelters and resellers; and 11.25c, f.a.s. New York, by exporters. Although the export market has shrunk, France is expected to purchase 50,000 tons or more during the next two weeks unless she meets further serious reverses.

Lead — Prices held unchanged throughout the week on the basis of 4.85c, East St. Louis, and 5.00c, New York. Sales tapered to a moderate level due to consumers' well covered position but are expected to pickup when July books are opened around May 27.

Tin—Due to uncertainty regarding the future of Netherlands East Indies, demand increased in all leading markets. Prices generally were higher with Straits spot closing at 53.00c, New York.

Zinc—Sellers raised prices ¼-cent a pound on Friday to the basis of 6.00c, East St. Louis, for prime western. This followed a period of prolonged strength and fairly heavy sales which aggregated about 23,000 tons during the past three weeks. Belgium, one of the world's largest producers, will no longer be able to supply her former customers who generally will turn to the United States during the duration of the war.

Antimony — Consumers again placed only routine business on the basis of 14.00c, New York, for American spot in cases. Chinese spot held nominally unchanged on the basis of 16.50c, duty paid New York.

Ferroalloys

Ferroalloy Prices, Page 86

New York—Ferromanganese shipments in May will be the largest since last fall, although not comparable to the peak movement at that time. In addition to heavier demand for steelmaking, prices appear likely to advance when books are opened in mid-June for third quarter. An earlier increase on spot shipments would not be surprising.

Construction and Enterprise

Ohio

ANDOVER, O.—Plans have been made by E. J. Edwards, company engineer, Nela Park, Cleveland, for a building for General Electric Co. at Andover for manufacture of glass containers for light bulbs. Site has been bought at Maple street and New York Central railroad.

CLEVELAND—Harshaw Chemical Co., 1000 Harvard avenue, is building a plant addition to double production of fluoride products. Structure will be two stories, 60 x 70 feet, brick and steel, costing about $17,000.

CLEVELAND—National Fixtures Mfg. Co. Inc., 2608 East Ninth street, manufacturer of barbecue machines and similar equipment, has leased two floors at 1600 Woodland avenue and will install manufacturing equipment. A. J. Litt, 505 Public Square building, is president and treasurer.

CLEVELAND—Otis Steel Co. will rebuild a blast furnace at Riverside plant, at cost of about $200,000.

CLEVELAND—L. C. N. Corp. has been incorporated with $100,000 by Clyde E. Hovis, 2013 Athens avenue, Lakewood, Ohio., to manufacture automotive, locomotive and steamship parts.

CLEVELAND—Lees-Bradner Co., tool manufacturer, 6210 Carnegie avenue, has leased plant of Smith Incubator Co., Elmwood avenue and West 121st street and will move operations there soon. H. T. Bradner is president. Plant has 62,000 square feet floor space on four acre site. Overhead craneway will be added.

CLEVELAND—United Screw & Bolt Corp., Cleveland division, 3590 West Fifty-eighth street, is building addition for storage space, costing about $7000.

LORAIN, O.—National Tube Co., Pittsburgh, subsidiary of United States Steel Corp., will build additional blast furnace at plant here, with sintering plant to reclaim flue dust, at total cost of about $2,000,000.

MANSFIELD, O.—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., will build another plant building and an addition to an existing structure, with installation of new equipment at plant here, costing about $500,000. C. L. Vandereau is plant manager.

NAVARRE, O.—Nickels Baker Inc. is having plans made for second addition, including new boiler plant and other units, 50 x 70 feet two stories and 60 x 60 feet one story. W. E. Long Co., 155 North Clark street, Chicago, is engineer.

SIDNEY, O.—Monarch Machine Tool Co., Wendell E. Whipp, president, has authorized addition of 20,000 square feet to increase manufacturing capacity 15 per cent. New equipment costing about $200,000 will be installed.

TOLEDO, O.—City Auto Stamping Co. has bought a ten-acre site for its proposed $500,000 plant. (Noted May 6).

WADSWORTH, O.—R. S. Ringer and Owen Ringer, Route 224, west of Wadsworth, plan refrigerated locker plant, containing large freezing room and individual lockers for rent.

WARREN, O.—Mullins Mfg. Corp., University street, will build two steel additions, for furnace building and storage, 40 x 80 and 60 x 90 feet. Bids will be taken soon.

—Construction - Enterprise—

Massachusetts

SOUTHBRIDGE, MASS.—Water department, town hall, is making a survey for a sewage treatment plant to cost over $25,000. Greeley & Hansen Co., 6 North Michigan avenue, Chicago are engineers.

SPRINGFIELD, MASS.—Monsanto Chemical Co., St. Louis, plastics division, John C. Brooks, general manager, will build a new plant here for the manufacture of Resinox plastic molding. Construction is to be started as soon as plans can be drawn.

New Jersey

CLIFTON, N. J.—Standard Oil Co. of New Jersey has given contract to Arthur G. McKee & Co., Cleveland, for construction of two pipe stills at its Bayway plant, each of 32,000 barrels daily capacity.

Pennsylvania

CORRY, PA.—Aero Supply Mfg. Corp. will build a two-story plant addition to cost $40,000. F. Fuller, Commerce building, Erie, Pa., is architect.

DENBO, PA.—Vesta Coal Co., subsidiary of Jones & Laughlin Steel Corp., Pittsburgh, will build an unloading dock, including sheet steel piling, to cost about $50,000 C. W. Little, care Jones & Laughlin Steel Corp., Third and Ross streets, Pittsburgh, is engineer.

PITTSFIELD, PA.—Warren Electric Co-operative Inc., P. H. Curry, superintendent, will build 75 to 80 miles of electric transmission lines in Warren county, to cost about $60,000. Gibbs & Hill, Pennsylvania Station, New York, are engineers.

Michigan

DETROIT—Dorr-Patterson Engineering Co., 3362 Wight street, has been incorporated with $15,000 capital to build hydraulic machinery, by George N. Dorr, 4278 Alter road, Detroit.

DETROIT—Ace Lubricating Equipment Co. Inc. has been incorporated with 3750 shares no par value, to manufacture lubricators and automobile machinery, by A. Janisso, 2345 West Grand boulevard, Detroit.

DETROIT—Enterprise Drilling Machine Corp. has been incorporated with $50,000 capital to manufacture drilling machinery, by Lysle Hazen, 2731 Jerome avenue, Detroit.

DETROIT—Gairing Tool Co. plans erection of a $250,000 plant on Hoover road near Eight Mile road, construction to be started in 90 days. R. H. Neubrecht, Detroit, is architect.

Illinois

CHICAGO—Bennett Mfg. Co., 14600 Princeton avenue, Steve Bennett, president, is opening a plant for manufacture of steel barrels and other steel containers at Harahan, La., a suburb of New Orleans. Equipment is designed for large-scale production.

CHICAGO—Brake Equipment & Supply Co. will build plant 100 x 220 feet, costing $65,000 at Sayre avenue and Sixty-sixth place, to afford larger capacity for production of air brake repairs.

CHICAGO—S. Obermayer Co., 2563 West Eighteenth street, is building two additional stories to plant at cost of $10,000. Company manufactures foundry supplies.

CHICAGO—Safety Socket Screw Corp., 4446 North Knox avenue, is building addition to increase production, at cost of $6000. Emil Larson, care owner, is architect.

HUTSONVILLE, ILL.—Central Illinois Public Service Co., 607 East Adams street, Springfield, will build a power plant costing $500,000. Sargent & Lundy, 140 South Dearborn street, Chicago, are engineers.

JOLIET, ILL.—Union Machinery Co., manufacturer of bakery equipment, is building a one-story machine shop addition to cost $20,000.

Indiana

EAST CHICAGO, IND.—United States Gypsum Co., 300 West Adams street, Chicago, will build a one-story plant addition 50 x 200 feet.

INDIANAPOLIS — Indiana Machine Corp., 23 East Ohio street, has been incorporated by William G. Sparks, same address, with 500 shares no par value, to manufacture machinery.

INDIANAPOLIS—Vonnegut Hardware Co., F. Vonnegut, president, 120 East Washington street, will build a two-story addition 160 x 240 feet at Maryland and Mississippi streets, costing $190,000. General contract has been let to Guepel Construction Co., 923 Hume-Mansur building, Indianapolis.

WEST TERRE HAUTE, IND.—Central Indiana Power Co., F. C. Cour, purchasing agent, Traction building, Indianapolis, is building a one-story 140 x 140-foot hydroelectric power plant addition. General contract has been awarded J. L. Simmons Co. Inc., 719 Union Title building, Indianapolis. Cost is estimated at $100,000.

District of Columbia

WASHINGTON—Bureau of supplies and accounts, navy department, will receive bids as follows: June 7, schedule 1724, six motor-driven sensitive drilling machines for Puget Sound, Wash.; schedule 1728, one motor-driven punch and shear for Mare Island, Calif.; schedule 1744, one motor-driven universal grinder for San Diego, Calif.; schedule 1768, four motor-driven centrifugal pumps, spare parts and tools, for Puget Sound, Wash.; schedule 1748, two motor driven centrifugal pumps and spare parts for San Diego, Calif.; June 4, schedule 1755, one motor-driven reamer and cutter hob sharpening machine for Washington; schedule 1769, three diesel engine driven generators and spare parts for Philadelphia; June 11, schedule 1750, seven motor-driven hydraulic bending and straightening presses for Brooklyn, N. Y.

Kentucky

LOUISVILLE, KY.—Buckeye Cotton Oil Co. will build plant to double capacity. $35,000 for building, $40,000 for equipment. Includes one-story warehouse 64 x 120 feet, extraction building three-story 36 x 64 feet and six-story 36 x 47 feet. R. B. Scherr is superintendent.

Florida

ORLANDO, FLA.—Orlando Aviation Industries Inc. has given contract to Kiehl & Stevens for $30,000 aircraft plant to be leased to Monocoupe Aircraft Corp., Clare W. Bunch, president, St. Louis. Building will be 150 x 150 feet.

Louisiana

LAKE CHARLES, LA.—Continental Oil Co., Ponca City, Okla., has plans nearly ready for bids for refinery here to cost $4,000,000.

West Virginia

HUNTINGTON, W. VA.—Appalachian Power Co. will install new boiler at plant at Kenova, W. Va., with 20,000 horsepower, increasing capacity from 35,000 to 50,000 kilowatts. Total cost about $260,000. Combustion Engineering Co., New York, has contract.

HUNTINGTON, W. VA.—International Nickel Co. New York, will build additions to house metallurgical and physical testing equipment and car-type electric heat treating furnace.

Missouri

NEVADA, MO.—City, Lynn M. Ewing, mayor, will vote soon on bonds to finance municipal light plant and distribution system costing $450,000. William Span. Interstate building, Kansas City, Mo., is consulting engineer.

ST. LOUIS—Chapman Knives & Saws Inc., 504 South Broadway, has bought site for erection of additional capacity.

ST. LOUIS—Preliminary plans have been approved for bridge across the Mississippi in St. Louis county, costing $3,500,000, wire cable construction. Sverdup & Parcel, St. Louis, are engineers for county court, in charge.

WAVERLY, MO. — Waterworks and sewage project to cost $100,000 has been approved by WPA; bids soon. Harrington & Cortelyou, 802 Dwight building, Kansas City, Mo., are consulting engineers.

Wisconsin

MILWAUKEE — Wisconsin Electric Power Co., 231 West Michigan street, will build a one-story 98 x 110-foot power plant addition costing $225,000. General contract has been let to Bentley Construction Co., 4022 North Port Washington road. (Noted May 6.)

Minnesota

MINNEAPOLIS — Electric Radiator Corp., 1153 Sixteenth avenue, S. E., has been organized to manufacture portable electric heaters.

ST. CLOUD, MINN.—Northern States Power Co., 15 South Fifth street, Minneapolis, will build new electric generating station 60 x 120 feet costing $600,000. Including 7500-kw. steam-driven generator and boiler. H. H. Watson, Minneapolis, is construction superintendent.

ST. PAUL—Thermal Co., manufacturer of automatic heating controls, 2434 University avenue, H. W. Small, president, plans construction of a one-story factory addition. Toltz, King & Day Inc., Pioneer building, is architect.

THIEF RIVER FALLS, MINN.—City, P. G. Pederson, clerk, takes bids to June 3 on electric generating unit of 1600 to 2050 horsepower, two cycle. Ralph D. Thomas & Associates, 1200 Second avenue South, Minneapolis, are consulting engineers.

Texas

TEXAS CITY, TEX.—Carbide & Carbon Chemicals Corp., 30 East Forty-second street, New York, has bought an additional ten-acre tract for future expansion.

Kansas

ELLSWORTH, Kans. — Morrison-Knudsen Co., Boise, Idaho, is low bidder on outlet tunnel for Kanapolis dam on Smoky Hill river. Bids to United States engineer's office Kansas City, Mo., Capt. A. M. Neilson, district engineer. Electrical and mechanical equipment will be required for intake tower and operating house.

Nebraska

OMAHA, NEBR.—Cudahy Packing Co. is taking bids for a five-story packing

and canning plant to cost about $250,000, from plans by company's engineering department, 221 North LaSalle street, Chicago.

Iowa

ALGONA, IOWA—City, Adah Carlson, clerk, plans light and power plant. Burns & McDonnell Engineering Co., Kansas City, Mo., engineer, has reported two plans, for enlargement of present plant or construction of new plant costing $250,000, including site and new diesel engine.

WATERLOO, IOWA—John Deere Tractor Co., L. A. Rowland, general manager, plans construction of an addition to its tractor plant, 120 x 220 feet.

WIOTA, IOWA—Village, Carl L. Reed, clerk, takes bids to June 5 on equipment and materials for waterworks plant. Ralph W. Gearhart, 349 Twenty-first street, Cedar Rapids, Iowa, is consulting engineer.

Colorado

LAS ANIMAS, COLO.—City, Ted Dennison, city engineer, is making survey for power plant. E. T. Archer & Co., 609 New England building, Kansas City, Mo., are consulting engineers.

Montana

KALISPEL, MONT.—City, F. J. Robischon, clerk, considers construction of sewage disposal plant costing $53,000, as recommended by state board of health.

California

LOS ANGELES — Fletcher Aviation Corp. has been incorporated with $2,000,000 capital. Albert Launer, Fullerton, Calif., is representative.

LOS ANGELES—Pacific Aviation Inc. will build a one and two-story aircraft plant on five-acre site in Hawthorne, Los Angeles suburb, at cost of $40,000.

LOS ANGELES—Harris Steel Fence Co., 8635 South Main street, has been formed by Claerence D. Harris and associates.

SOUTH GATE, CALIF.—American Concrete & Steel Pipe Co. is building an addition to its plant at 4635 Firestone boulevard, 20 x 240 feet and 20 x 80 feet.

Oregon

SALEM, OREG.—John W. Cunningham, engineer, Portland, Oreg., is making survey for proposed $300,000 municipal sewage treatment plant.

Washington

OKANOGAN, WASH.—Graves Machine Shop, George Graves, manager, will build a machine shop 50 x 70 feet, with steel truss roof.

SEATTLE—Bids will be received June 3 by Swift & Co., Chicago, for a branch packing plant at 1051 Fourth avenue South, Seattle, of reinforced concrete, to cost about $175,000.

Canada

AMHERST, N. S.—Canadian Car & Foundry Co., 621 Craig street West, Montreal, will spend $25,000 on changes and improvements to plant here to enlarge aircraft production. L. A. Peto is general manager.

HAMILTON, ONT.—Cub Aircraft Ltd. will build plant at Hamilton airport, 100 x 120 feet. Company has leased another building near airport and taken option on additional ground for further expansion. Will produce Cub and Harlow aircraft.

LEASIDE, ONT.—Lincoln Electric Co. of Canada Ltd., 65 Bellwoods avenue, has let general contract to W. B. Sullivan, 30 Bloor street West, Toronto, for 100 x 300-foot plant. Mathers & Haldenby, 96 Bloor street West, architects.

TORONTO, ONT.—Atlas Engineering & Machine Co. Ltd., 28 Eastern avenue, is having plans prepared for plant to cost $50,000. W. L. Somerville, 30 Bloor street West, is architect.

DRUMMONDVILLE, QUE.—Canadian Celanese Ltd., R. H. Sperling, manager, has let contract to Stewart Construction Co. Ltd., 7 Dufferin street, Sherbrooke, Que., for an addition to cost $100,000 and company announces a second addition at same cost will be built at once.

MONTREAL, QUE. — International Business Machine Co. Ltd. will build a three-story plant from plans by Reginald C. Tetley, architect.

MONTREAL, QUE.—Canadian Car & Foundry Co. Ltd., 621 Craig street West, will build plant addition on St. Patrick street, to cost $50,000.

ROUYN, QUE.—McWaters Gold Mines Ltd., W. J. Hosking, manager, is having plans prepared for an addition to its mill, costing $70,000.

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$2,500 to $25,000

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Help Wanted

SALES ENGINEER FOR NEW YORK company, electrical or mechanical graduate with steel mill and sales engineering experience for Pittsburgh-Chicago territory traveling for sales and service—indicating, recording and testing equipment. Address 223, STEEL, Penton Bldg., Cleveland.

EXPERIENCED IN SALES, DESIGN AND estimating plate work. Must have pleasing personality, energetic, willing to work. Capable of expediting shop work. Address Box 201, STEEL, Penton Bldg., Cleveland.

YOU CAN TELL A LOT OF PEOPLE AT once that you're looking for a job if you run a little advertisement in the Positions Wanted column. It gets distribution in 12,000 copies of STEEL for only 25c a line.

Help Wanted

MANUFACTURER OF HEAT RESISTANT and stainless steel castings requires salesman for mid-western territory. Reply with full information. Address Box 218, STEEL, Penton Bldg., Cleveland.

AN ASSISTANT FOUNDRY FOREMAN wanted by a steel foundry making small electric furnace castings. In replying state experience in rigging patterns, gating, heading etc. on both miscellaneous and productive work. Address Box 215, STEEL, Penton Bldg., Cleveland.

Positions Wanted

METALLURGICAL CHEMIST DESIRES position. Steel plant, blast furnace and foundry experience. Address Box 219, STEEL, Penton Bldg., Cleveland.

BRICKLAYER DESIRES POSITION WITH forge plant. Experienced furnace builder. Address Box 211, STEEL, Penton Bldg., Cleveland.

SALES ENGINEERING EXECUTIVE, technical graduate, with long and extensive acquaintance with industries New York and vicinity, seeks sales representations on machinery, castings and welded work. Basis salary and commission. Address Box 222, STEEL, 110 E. 42nd St., New York, N. Y.

PERSONNEL MANAGER. TECHNICAL graduate with production management background. Thoroughly experienced in all phases of personnel relations including selection, classification, job rating, occupational classification, time and rate study, apprentice training and dealing with skilled and unskilled labor. Address Box 210, STEEL, Penton Bldg., Cleveland.

Positions Wanted

MECHANICAL ENGINEERING GRADUate with 25 years of real practical experience desires change. Have been with present employer 14 years in plant manufacturing sheet metal product supervising plant operation and maintenance. Have proven ability to handle men and organize work to obtain maximum production. Well informed on technical and practical practice of purchasing, handling, shearing, braking, forming, drawing, assembling, spot and gas welding and finishing of sheet metal. Thoroughly familiar with installation and operation, both mechanical and electrical, of sheet metalworking equipment. Address Box 220, STEEL, Penton Bldg., Cleveland.

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OPEN HEARTH SUPT. OR ASST. EXperienced all phases of open hearth, technical training. Experienced as melter, metallurgist, basic and acid operations, modern slag control, top and bottom cast, forging, rimming, alloy grades, large ingots, ordnance work. Also experienced forging and rolling. Address Box 221, STEEL, Penton Bldg., Cleveland.

SALESMEN AND ENGINEERS are readers of this page—if you need a good man quickly, use the Help Wanted column of next week's issue. A four line ad will cost only $2.00.

Classified

HELP WANTED
Single Insertion—50c per line
Three to Six Insertions—48c per line
Six or more Insertions—45c per line

Seven words of ordinary length make a line.
FIRST LINE IN BOLD FACE TYPE
A box number address counts as one line.

POSITIONS WANTED
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ARE YOU SATISFIED WITH YOUR PITTSburgh representation? If not, an established firm in business for 16 years desires new accounts, preferably those selling to steel plants, foundries, and other industrial concerns. Commission basis. Address Box 214, STEEL, Penton Bldg., Cleveland.

STEEL SALES EXECUTIVE NOW CONtacting all large manufacturers in Detroit and adjacent territory is interested in adding kindred lines with large volume and repeat possibilities, preferably anything in steel including stainless. Native Detroiter, with very broad acquaintance and excellent entree. Have been associated with the automotive industry since its inception. Address Box 193, STEEL, Penton Bldg., Cleveland.

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are of equal interest to distributors and manufacturers—use an ad on this page next week to let manufacturers know you are interested in taking on new lines.

Distributors Wanted

MANUFACTUREER OF WELL KNOWN line of foundry supplies desires to negotiate with distributors or manufacturers' agents for representation in Illinois, Indiana, Southern Ohio and New England states. Address Box 216, STEEL, Penton Bldg., Cleveland.

Bids Wanted

Federal Works Agency, Public Buildings Administration, Washington, D. C., May 10, 1940.—Sealed proposals in duplicate will be publicly opened in this office at 1 P.M., Standard Time, June 11, 1940, for construction (except elevator) of the U. S. P. O. and Court House at Fairmont, W. Va. Upon application, two sets of drawings and specifications will be supplied free to each general contractor interested in submitting a proposal. The above drawings and specifications MUST be returned to this office. Contractors requiring additional sets may obtain them by purchase from this office at a cost of $10 per set, which will not be returned. Checks offered as payment for drawings and specifications must be made payable to the order of the Treasurer, U. S. Drawings and specifications will not be furnished to contractors who have consistently failed to submit proposals. One set upon request, and when considered in the interests of the Government, will be furnished, in the discretion of the Commissioner, to builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any sub-contractor or material firm interested, and to quantity surveyors, but this privilege will be withdrawn if the sets are not returned after they have accomplished their purpose. W. E. Reynolds, Commissioner of Public Buildings, Federal Works Agency.

Contract Work Wanted

We have surplus facilities to machine, assemble and/or fabricate at low labor costs. We can handle items such as light stampings, general machine products and pipe fabrication. Send blue prints and specifications for quotation, to Box 360, Youngstown, Ohio.

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BLOWERS - FANS - EXHAUSTERS

Connersville-Roots positive blowers. Centrifugals for gas and oil burning. Sand blast, grinder and dust exhausters. Ventilating fans and roof ventilators.

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No. 5 Hilles & Jones. Capacity 90" x ¾". Throat 36". Hold down-gauges. Motor drive. A-1 condition. In stock.

LANG MACHINERY CO.
28th & A.V.R.R. Pittsburgh, Pa.

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Formerly used by large airplane manufacturer. Size 21¾" diameter x 48" deep. 49.5 K.W. capacity each. Alloy work baskets. Maximum temperature 1200° F. Good operating condition.

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One used Pangborn Type GH Sandblasting Barrel

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Address Box 208, STEEL
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3000 FEET 4 x 4 x ⅜ TEE BARS 15-20 feet, like new. 1500 pieces 4 x 4 x ¾ angles 4 feet, never used. 15 tons 24-inch by ¼-inch Diamond plates 20-foot. Seffren Supply Co., Halsted & Lake Sts., Chicago, Ill.

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WELDED STEEL FABRICATION

Specialists in duplication of castings and machinery parts with rolled steel shapes.

Send blue prints and specifications for quotation.

MORRISON METALWELD PROCESS INC.
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24"x20' Lodge & Shipley Selective Geared Head, for motor drive, swing 27½", 14'9" centers. Serial over 27,000. F.O.B. Pittsburgh. Practically Good As New.

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B-36 Stanley, cap. ¼", Motor 3/60.
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1½" Acme "All Steel," Heading, Upsetting and Forging Machine, side shear, for motor drive. Used little.

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36", 42" and 62" Vertical Boring Mills.
No. 9 W&W Bulldozer, B.D.
28" x 76" Farrel Roll Grinder, M.D.
2-A and 3A W&S Turret Lathe, S.P.D.
150-ton United St.-Hyd. Forging Press.
2"-4"-6"-8"-12" Wm. Pipe Mach., M.D.
No. 5 H&J Guill. Shear 4½" rd., M.D.
10' x ¼" Bliss Sq. Shear 18" gap.
18" W-F & 36" Yoder Gang Slitters, M.D.
48" Aetna-Std. Straightener 17-3¾", M.D.

WEST PENN MACHINERY CO.
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NEW RAILS—5000 tons—All Sections—All Sizes.
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PITTSBURGH NEW YORK CHICAGO

Castings

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THE WEST STEEL CASTING CO., Cleveland. Fully equipped for any production problem. Two 1½ ton Elec. Furnaces. Makers of high grade light steel castings, also alloy castings subject to wear or high heat.

PENNSYLVANIA

NORTH WALES MACHINE CO., INC., North Wales. Grey Iron, Nickel, Chrome, Molybdenum Alloys, Semi-steel. Superior quality machine and hand molded sand blast and tumbled.

ADVERTISING INDEX

Where-to-Buy Products Index carried in first issue of month.

✦ ✦ ADVERTISING INDEX ✦ ✦

Where-to-Buy Products Index carried in first issue of month.

What do YOU want in a Press Brake?

DO YOU want faster action, extra clearance, greater rigidity, higher degree of accuracy or space-saving construction?

Must your press meet unusual requirements as to width or depth of daylight? Is quiet operation desirable? Any other special requirements?

Then come to Birdsboro. An experienced hydraulic engineering staff will gladly prepare economical designs answering your particular bending and forming needs. Furthermore, with complete facilities under one roof, we can carry actual construction forward faster. Write, wire or phone today.

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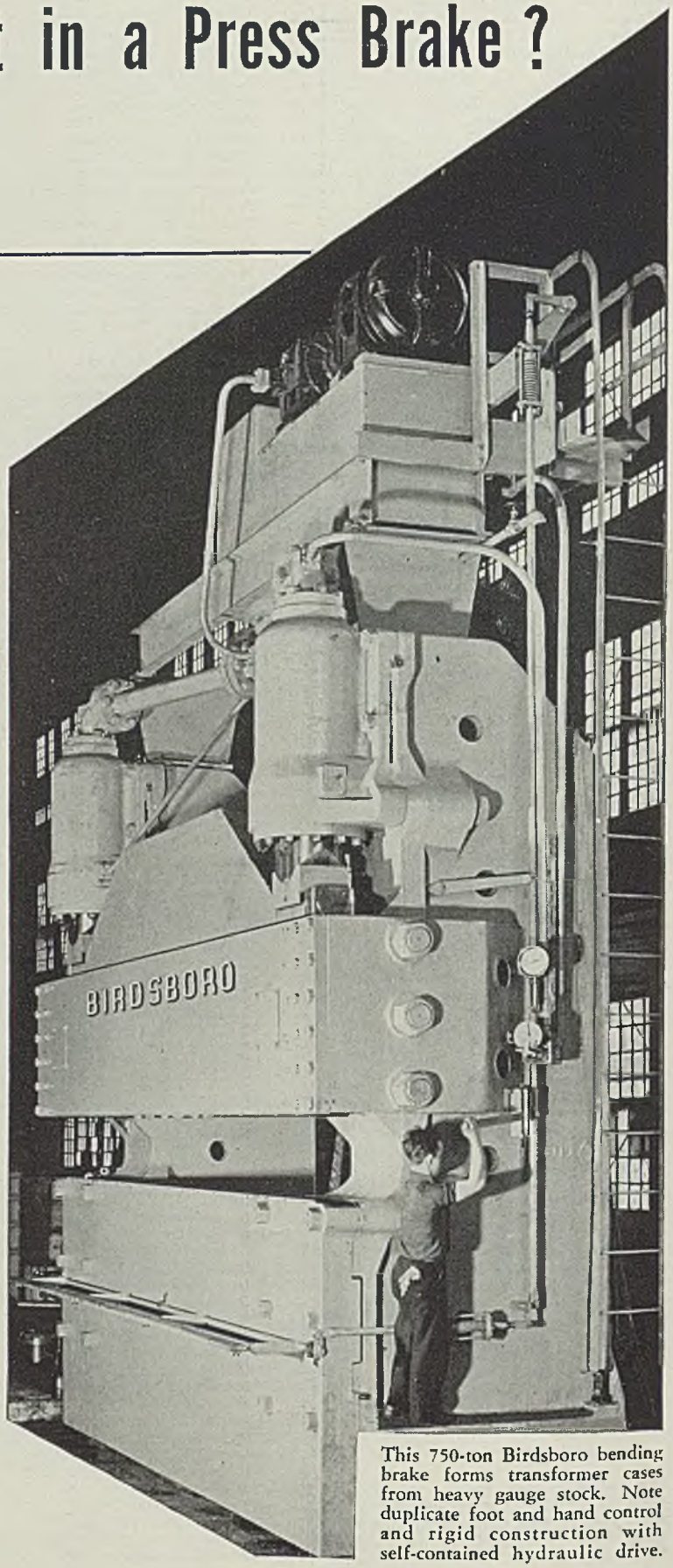
Steel, Alloy Steel, Grain and Chilled Iron Rolls
Steel Mill Equipment . Special Machinery . Crushing Machinery

BIRDSBORO
Hydraulic Presses

District Sales Offices: New York and Pittsburgh



This 750-ton Birdsboro bending brake forms transformer cases from heavy gauge stock. Note duplicate foot and hand control and rigid construction with self-contained hydraulic drive.

STEEL

ESTABLISHED 1882

Contents

Volume 106—No. 23 **June 3, 1940**

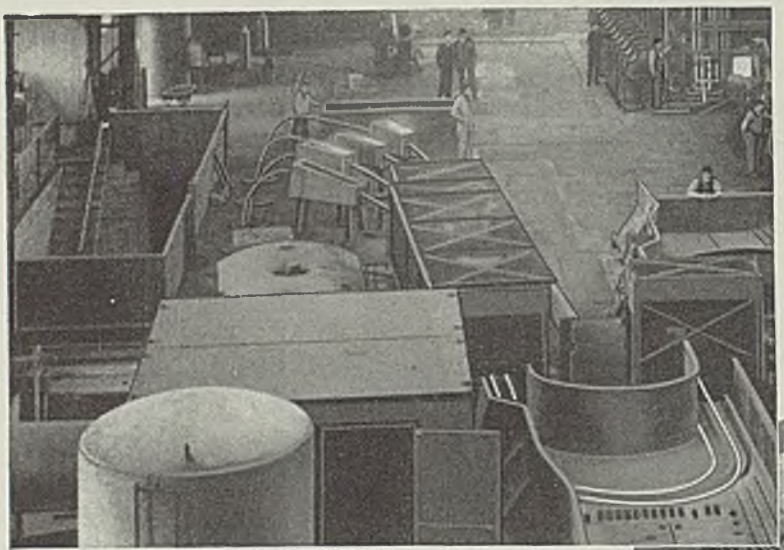
PRODUCTION • PROCESSING • DISTRIBUTION • USE

WIRE ROPE
is only as good as the rod from which it is made

WIRE rope has to be *right* to begin with. This puts a burden on wire rod that calls for modern equipment designed and built to maintain high quality standards together with high tonnage output.

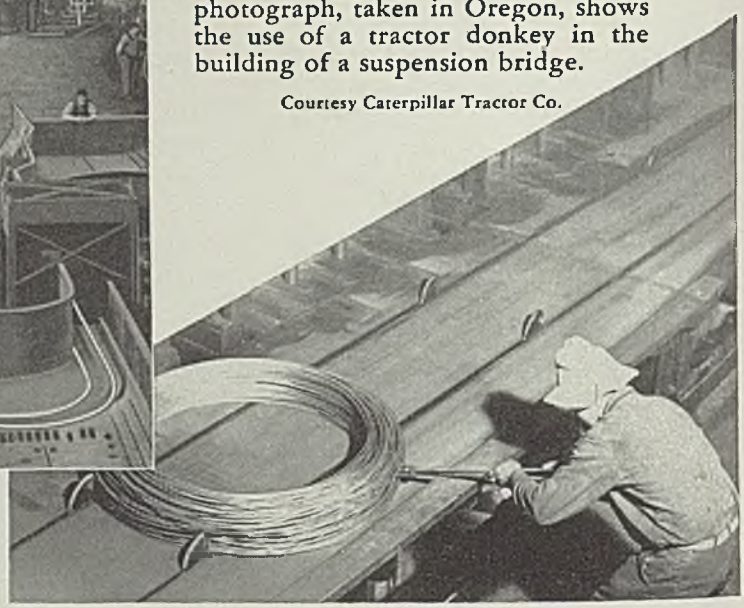
Morgan Continuous Rod Mills are rolling up new records in uniformity and capacity that meet the most exacting requirements of customers—*and stockholders.*

R-71



Steel cable plays an important part in modern logging operations. This photograph, taken in Oregon, shows the use of a tractor donkey in the building of a suspension bridge.

Courtesy Caterpillar Tractor Co.



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ENGINEERS AND MANUFACTURERS

MORGAN CONSTRUCTION COMPANY
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CONTINUOUS ROLLING MILLS

ROD · STRIP · SKELP · MERCHANT SHAPES

As the Editor Views The News

■ EXPANDED buying from foreign and domestic sources, with requests in most cases for early delivery, brought an advance of 3½ points in steel production last week, to (p. 25) 78½ per cent of ingot capacity. In the belief that domestic armament requirements and export business soon will have preferential treatment on a broad scale, many manufacturers (p. 119) are enlarging their inventories so as to protect themselves against any possible scarcity later on. With buying at the highest level since last Fall, soft spots of recent weeks are disappearing and prices are hardening toward quoted levels. Scrap prices continue their upward trend—largely in anticipation of later buying.

• • •

Billions for Defense

To revitalize our national defense (p. 21) the President has upped his demands to nearly five billion dollars, to be paid for in small part by an increase of some $656,000,000 in taxes to be raised this year. He appointed a seven-member national defense commission with E. R. Stettinius Jr. in charge of raw materials and William S. Knudsen responsible for industrial production. The President declared this commission would have all the authority of its World war predecessors and said that he hoped the execution of the program would reach top speed within six months. Manufacturers express confidence in their ability to meet any requirements if they are permitted to do so.

• • •

Await More Information

They are hoping for early answers to important questions. They want to know what will be bought, who will buy it, provisions of contracts. They want to know definitely about the need for industrial expansion, what will be done about the supply of skilled labor. They hear rumors about government participation in a drive for machine tool and other business in South America. They want to know if a priority system is in sight, and the products to which it will apply. For instance, the automobile industry wonders (p. 36) whether clogging of die shops with armament work will interfere with 1941 models. Many questions must be decided before industry can mesh into national defense.

• • •

Adds Alloy Capacity

Notable addition to alloy steel capacity in this country (p. 91) is the new plant of Copperweld Steel Co. at Warren, O. It represents the latest progress in equipment and methods. . . . About 200 instead of the many hundreds of steel compositions now furnished, says Earle C. Smith (p. 44), should be selected, codified and their suitability as well as availability publicized. Such procedure would eliminate much waste in energy and materials. . . . New vacuum melting and pouring furnaces (p. 64) facilitate the study of pure metals. A new pressure melting and pouring unit simplifies the investigation of the effects of gaseous inclusions.

• • •

Packaging For Export

Harold Lawrence discloses a procedure (p. 67) for preventing steel pickup when welding silicon bronzes to steel. . . . O. L. Maag describes a setup (p. 69) for cleaning screw machine scrap and reclaiming the cutting oil. . . . With more attention necessary in packaging for export (p. 56), W. J. Auburn's comments on the use of steel ties in simplifying this problem are timely. . . . W. E. Ruder describes a silicon steel magnetic core assembly (p. 58) which utilizes the directional effect produced by rolling steel. . . . Application of color to metal parts is simplified (p. 52) by new stencils which confine the color properly and operate almost automatically; as many as seven colors are applied simultaneously.

E C Kreutzberg

PHONE RYERSON any time . . . for any amount . . . or any kind of steel. Your order will get Immediate Action. The steel is in stock, and will be delivered promptly — where and when you need it.

When steel inventories are low, when you need unusual sizes or analyses, when non-uniform quality steel hinders production, call Ryerson. Over 10,000 sizes, shapes, and kinds of steel and allied products — from structurals to stainless, from heat treated alloys to nuts and bolts — are included in Ryerson Certified Steel products. All are closely controlled as to analysis, accuracy, finish, etc. and each represents the highest quality in that particular class and type of material.

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Ryerson Products Include:

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RYERSON

RYERSON CERTIFIED STEELS

Industry Can Do the Job If . . . . . .

■ AMERICAN industrial resources last week were pledged to revitalization of this country's defense program. Industry spokesmen expressed confidence our defense needs can be filled in reasonable time.

Machine tool, automotive, steel and other manufacturers are proceeding to prepare for their part in the program, although little definite information as to procurement procedure can be sifted from the rumors so far emanating from Washington.

Wholehearted co-operation has been offered the administration by various industry groups and individuals. Consensus of these groups and individuals is that planes, mechanized ground units, ships, arms and munitions can be built efficiently and quickly, provided industry is not hampered too much by government red tape.

Typical of industry's attitude is the statement of Henry Ford that his Rouge plant could turn out 1000 airplanes a day within six months under favorable conditions. The conditions, he said, were that the company be left to its own supervision, "without meddling by government" and that he have the counsel and help of aviation experts.

With industry ready and equipped to fulfill its part, the success of the program rests with Washington. From the Capitol last week came three definite announcements.

Asks Billion More

In a second message to congress, the President asked for "over a billion dollars" more for national defense. In asking this amount over and above nearly four billions previously requested, the President emphasized the increased gravity of the European situation and called attention to the demonstrated effectiveness of aircraft and mechanized equipment. The additional billion dollars, he said, would be used not only for acquisition of actual materials needed, but also for the creation of additional production facilities. He cited certain deficiencies in the manufacture of ammunition, guns and fire control equipment.

Army and navy officials will appear before congressional committees immediately to tell what they want done with the additional money.

New taxes are in process of being legislated at the present session of congress to at least partly finance defense expenditures. Introduced in the house Friday by Representative Doughton, North Carolina, chairman of the house ways and means committee, was a bill proposing tax increases to raise an addititonal $656,000,000. The bill provides for a 10 per cent increase in individual and corporate income, excess profits, and capital stock tax, as well as other tax increases.

To Increase Debt Limit

Treasury department and congressional tax officials also have agreed to increase the federal debt limit to permit the issuance of $3,000,000,000 in special defense obligations.

The third step by the administration was the appointment of a seven-member national defense commission which the President said will be clothed with all the authority of its World war predecessors. Members include:

Edward R. Stettinius Jr., chairman, United States Steel Corp., who will supervise production and delivery of raw materials with which to fill government orders and their treatment up to but not including production of the finished article.

William S. Knudsen, president, General Motors Corp., to take charge of industrial production.

Sidney Hillman, president, Amalgamated Clothing Workers union, to supervise employment and to direct training for non-combatant service.

Chester C. Davis, member of the federal reserve board, to take charge of farm products, and their production for both domestic consumption and export.

Ralph Budd, president, Chicago, Burlington & Quincy railroad, to take charge of transportation.

Leon Henderson, securities and exchange commission member, to watch raw material prices.

Miss Harriet Elliott, dean of women, University of North Carolina, to advise on consumer protection.

On Full Time Basis

Mr. Stettinius and Mr. Knudsen will serve on a full time basis, said Mr. Roosevelt. Mr. Hillman will be on practically a full time basis, while the others will serve part time.

The commission, the President said, will report directly to him and will not have to clear its activities through cabinet members.

No chairman for the group has been designated. William H. McReynolds, one of the President's executive assistants, will serve as secretary.

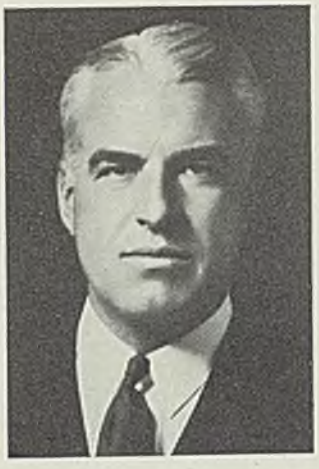
Authority for naming the commission exists in the 1917 national defense act which provides as well for a national defense council composed of six members of the cabinet, including the secretaries of war, navy, agriculture, interior, commerce, and the treasury. The President said, however, that for the present the council need not be considered as the commission will be the all-important body.

The personnel of the defense commission was for the most part considered excellent.

At a special press conference, Mr. Roosevelt said he expected to get into full production in the defense program in about six months, or half the time it took to reach that stage in the World war armament program. Most industrialists con-

William S. Knudsen

Ralph Budd



Edward R. Stettinius Jr.

curred in belief this can be accomplished.

However, a number of possible obstacles are cited. Foremost of these is a serious shortage of highly skilled labor, particularly for airplane manufacture. Aggravating the skilled labor shortage are the restraints and regulations imposed by the government and which are expected to interfere with the full use of available talent.

Another possible obstacle may be strikes, and many industrial leaders are wondering what action the government will take to prevent attempts by labor union leaders to capitalize on the situation.

Another question is, can this nation maintain simultaneously and successfully an enormous defense program and an extensive program of experimental economic, political and social reform?

Still another question is to what extent will industry in its effort to facilitate the defense program be handicapped by industry-retarding governmental bureaus such as the national labor relations board and wages and hours administration.

Urge Caution

Competition between the army and navy departments in procurement of materials again is threatening to become a serious problem, according to some manufacturers who have been attending conferences in Washington. This interdepartmental wrangling, they believe, may slow the defense program.

Several industry groups in appraising the requirements of the defense program advised caution in plant expansion. Particularly was this urged at the national aviation forum in Washington. Both John H. Jouett, president, Aeronautical Chamber of Commerce of America Inc., and Col. Edgar S. Gorrell, president, Air Transport association, warned against building new plants before top management and skilled personnel was available. They pleaded that mistakes made during the first World war be not repeated.

Resistance to over-expansion was also noted among machine tool builders. It is reported the tool makers told government officials they could meet many of the new requests for machine tools by putting extra shifts to work in existing factories, and that widespread new building or enlargement of existing ones would not be necessary.

However, a number of small expansion programs, most often to round out or expand existing facilities, are appearing.

Rumors Plentiful

Industrial mobilization for the defense program is being accompanied by a multitude of rumors as to what the government has done or will do. Many of these are officially denied in Washington. Typical is the report the government already has subjected the machine tool industry to priorities and an allocation system. With the exception of some action by the navy, which is said to have taken over some tools destined for export, no definite policy has been adopted, government authorities contend. There has, of course, been much discussion as to the probability of such action.

Similar reports have been circulated regarding allocation of other materials, but the situation in regard to them also remains to be clarified.

Another widely circulated report is that the government will work with the machinery and tool industries to gain control of the South American market. Ever since the European war started the department of commerce has been trying to increase trade with South America. With the government expecting to buy some $200,000,000 worth of machine tools this year, officials believe the industry will have no problem in disposing of its entire output.

Announces Prices On Shell Steel

■ Carnegie-Illinois Steel Corp., Pittsburgh, last week announced prices on a special commodity known as basic open-hearth shell steel, made in accordance with certain United States government specifications. This is a hot-rolled carbon steel which is suitable for hot forging and subsequent machining.

This price announcement covers shipment to and including Sept. 30, 1940, and applies on hot-rolled sections used for shells, such as rounds, cornered squares, and such special squares as Gothic and Mosaic sections.

The delivered base prices per gross ton in lots of 1000 tons of a size and section to which will be added any applicable extra for chemical requirements, cutting to lengths or quantity are as follows:

*Size	Base Prices Per Gross Ton (Delivered Pittsburgh)	Base Prices Per Gross Ton (Delivered Chicago and Gary)
3" to 8", exc.....	$54.50	$54.60
8" to 18", exc.....	52.50	52.60
12" to 18", exc.....	54.50	54.60
18" and over.....	56.50	56.60

*In order to determine group in which a given size applies use diameter of round of diagonal or round corner square, Gothic or Mosaic.

Warner & Swasey To Expand Plant Further

■ The Warner & Swasey Co., Cleveland machine tool manufacturers, has announced a second addition to its plant. The 30,000 square foot extension started a month ago and scheduled to be completed early in July will be increased another 20,000 square feet.

In addition, the basement of the main building will be extended 12,000 square feet to provide more space for the storage of finished parts.

Machine Tool Builders Propose

Committee To Co-ordinate Production

■ BREAKING a precedent of several years because of the astounding course of world events during the past few weeks, the National Machine Tool builders' association held a one-day spring meeting at Cleveland, May 28, instead of the customary two-day meeting in Chicago.

Despite the acute pressure under which the industry is now operating, attendance of nearly 180 key executives representing nearly 100 member companies probably sets a record. This heavy attendance was due primarily to anxiety of machine tool executives to get authoritative information at the earliest possible moment as to the industrial significance of the national defense program which, according to reports released to the press by the treasury department in Washington, will involve the purchase of at least $200,000,000 worth of machine tools for munitions, aircraft and ship builders.

As spokesman for the committee on co-operation with government departments, Clayton R. Burt, chairman of this committee and president and general manager of Pratt & Whitney, division, Niles-Bement Pond Co., Hartford, Conn., gave a confidential report of his committee's conference on the previous day with Henry Morgenthau Jr., secretary of the treasury, and high ranking officers of the army and navy.

Prepare for the Incredible

The nature of the report was such that it was deemed advisable, following a suggestion by Mr. Burt, to increase the membership of this committee from five to 15 members, in order that in the busy days ahead it will always be possible to have in Washington on short notice a larger group of representative machine tool executives than might be possible out of a committee of five. The enlarged body henceforth will function under the title of the defense committee.

In his presidential address, John E. Lovely, vice president and chief engineer, Jones & Lamson Machine Co., Springfield, Vt., dealt with the subject, "Machine Tools and National Defense." Mr. Lovely, who also had attended the Morgenthau conference, said: "At the present moment national defense is the supreme concern of the people of the United States. When we met here last October, the very idea that the United States or any other country in this hemisphere, might be attacked by any European power seemed preposterous. But so did the invasion of Norway, Holland and Belgium seem preposterous. Today, we literally must be prepared for the incredible.

Can Meet Emergency

"The machine tool industry occupies a key position with respect to national defense. Practically every type of equipment by the army, navy and air forces requires machine tools—directly or indirectly—for its manufacture."

Mr. Lovely went on to say that the sudden public concern over the ability of the machine tool industry to meet a national emergency has given rise to many sensational and badly garbled statements and articles in the public prints which picture the industry as a possible "bottleneck" in the defense program.

As a matter of fact, this industry today is in a better position to cope with the situation than is any other one of comparable importance. The past eight months have been in effect a "full dress rehearsal," during which time heavy orders from the Allies, followed by still heavier and even more immediate demands —especially on the part of the United States government—for equipment for aircraft and engine manufacture, have been and are being successfully met.

While there has been some increase in manufacturing space, the situation has for the most part been handled through re-arrangement and re-equipment for increased efficiency, through multiple shifts, and by "farming out" parts to outside concerns.

Incidentally, increases in price have been only to meet the increased cost of production, and since the outbreak of the war have averaged only 10 or 12 per cent.

Mr. Lovely said the industry as a whole has endeavored to keep urgent demands of foreign buyers from interfering with the vital requirements of American customers. There has been in the past few months a substantial decline in the percentage of American machine tools shipped abroad—a decline from two-thirds of the production as of the first of the year to less than one-half at the present time.

In this connection special consideration has been given to the aircraft engine builders in the United States whose current requirements are now for the most part being taken care of. "However," added Mr. Lovely, "I do not mean to imply that the machine tool industry has met tomorrow's demand for tomorrow's aircraft engines or airplanes. That whole problem still lies before both the aircraft and the machine tool industry."

To Work with Government

Regardless of the demands which may be made upon it, it is Mr. Lovely's opinion that the American machine tool industry is fully prepared to turn out machines just as rapidly as operators can be trained to man them.

Having in mind that by far the greatest obligation of his industry is the furtherance of the President's program for national defense, especially as regards the needs of the army, navy and aircraft industry, Mr. Lovely expressed the hope that the association's Defense committee will be able to work closely with a planning committee set up by the

government as a central authority to determine priority of machine tool orders emanating from the three sources just mentioned.

"With the help of our committee," the speaker added, "we can then regulate our own industry ourselves, provided these priorities are previously established. If we can do this in our industry, it likewise can be expected that other industries will be able to do it for themselves."

Mr. Lovely made the following specific recommendation: "To lighten the demand for new machines and to spread the load over a longer period, the government might well buy up usable machine tools in private industry, when such equipment is not now vitally needed therein. This equipment can then be switched to plants in which the immediate need for it is vital to the defense program, instead of demanding that all equipment for such plants must be brand new and made immediately by the machine tool builders.

"I urge that all large corporations and all industries co-operate with the government in this manner—should the need for equipment for national defense become great enough. Our own industry will be able to replace this transferred used equipment with new equipment at a later date."

Describes Shell Lathes

During this meeting details were revealed of the association-sponsored designs for emergency shell lathes. These designs were explained with the help of stereopticon slides by Myron S. Curtis, under whom the work has been carried out. Mr. Curtis, whose years of engineering experience with Potter & Johnston Machine Co., Pawtucket, R. I., have made him thoroughly familiar with the basic requirements in shell production, explained that these machines have been designed for emergency use only and are no way intended to compete with the products of any member of the association. Being single purpose machines for shell production only, they would have only scrap value in normal times.

As far as possible, the same basic parts are used for the lathes for various sizes of shells. Spindle speeds are fixed but pick-off gears allow limited feed changes to suit materials of varying hardness. The simplicity of operation and provisions for quick and easy loading and unloading of the work favor the use of women operators, which would be inevitable under any conditions when use of these emergency machines would be necessary.

They are designed to be built in plants other than those of machine tool builders, boring and planing being eliminated by round bar ways anchored in cored holes by the use of low melting point "expanding metal." The bed bars and other similarly anchored members are held in exact location by fixtures while the expanding metal is poured around them. This expedient was used successfully in building emergency machine tools during the last war.

Another engineering phase of the meeting was presentation of the report of the committee on electrical problems. In the absence of B. P. Graves, director of design, Brown & Sharpe Mfg. Co., Providence, R. I., who is chairman of this committee, this report was presented by Tell Berna, general manager of the association. In this report it was announced that standardization of flange-type motors (other than those of fractional horsepower) finally has been accomplished, this to the decided benefit of the machine tool industry.

There remains, however, a crying need for a set of standards for the wiring of machine tools acceptable not only from the engineering point of view but satisfying also to local authorities all over the country. Recommended standards along this line are now being drawn up by the committee for criticism and eventual acceptance by association members.

It will then be necessary, however, to bring about certain modifications in the national electrical code in line with these proposed standards before the situation can be ironed out on a nation-wide scale and the present confusion done away with. It is hoped that these modifications can be brought about through co-operation with the National Electrical Manufacturers' association.

Other program speakers were Frederick V. Geier, president, Cincinnati Milling Machine Co., Cincinnati; David Ayr, president, Hendey Machine Co., Torrington, Conn.; Mrs. Frida F. Selbert, secretary of the association; and Wendell E. Whipp, president, Monarch Machine Tool Co., Sidney, O.

Canadian Plants Go To 24-Hour Day, 7-Day Week

TORONTO, ONT.

■ CANADIAN government is calling upon industry to speed up production to meet the increasing demand for war materials of all types. Minister of Finance J. L. Ralston announced the government will spend $1,148,055,805, of which $700,000,000 will be for war purposes and the remainder for ordinary account. It is proposed to step up operations to a 24-hour-day and seven-day-week basis and manufacturers in all parts of the dominion have promised to make every effort to comply.

One serious drawback is the lack of skilled labor. Employers say they are unable to obtain sufficient skilled workmen to go on the production basis planned and that it will be necessary to proceed with wide-scale plans for training new men.

Production of pig iron is holding at 85 per cent capacity with eight of ten furnaces in operation. Comparison of iron and steel production follows:

	Gross Tons		
	April	March	April, 1939
Pig iron	84,210	91,772	46,254
Ferroalloys	13,989	8,298	4,284
Steel ingots, castings	153,451	157,326	99,752

Following table shows comparisons of cumulative production of iron and steel for first four months this year and last year:

	Gross Tons	
	1940	1939
Pig iron	367,717	185,970
Ferroalloys	38,063	15,964
Steel ingots	591,265	335,979
Steel castings	26,351	14,847

Cite Social Security Tax As Unemployment Factor

■ Unemployment insurance tax, in preventing small businesses from expanding, is given as an important cause of present unemployment in the third and final report of the American Society of Tool Engineers' fact finding committee. This committee, headed by John M. Younger, professor of industrial engineering, Ohio State university, Columbus, O., undertook a year and a half ago a study of causes of unemployment, particularly insofar as employment was affected by use of machinery.

Present report, recently released, traces various factors contributing toward unemployment, pointing out that industrial employment today is identical with 1929 totals when practically no unemployment existed. It is thus indicated that industrial unemployment is due largely to failure of employment growth to keep up with increases in population.

In endeavoring to locate reasons

for the failure of industry and business to expand its employment, the committee uncovered the fact that a vast number of small businesses purposely are being kept small to avoid necessity of paying unemployment insurance taxes.

Supporting the premise that lack of expansion in business is a major unemployment factor, the committee quotes not only from reports of business enterprises but also from statements by labor organizations.

A further cause of unemployment is traced to the increased cost of consumer goods occasioned by increases in taxation. A study covering 163 business corporations employing 3,000,000 people showed an average of $576 in taxes, direct and concealed, paid per employe, added on to the cost of products without benefit of increased purchasing power to the employe.

Steel Industry Payrolls Slightly Lower in April

■ Steel industry payrolls totaled $67,724,000 during April, slightly below the March total of $68,768,000, but considerably ahead of the total for April 1939 when steel payrolls totaled $58,517,000, according to the American Iron and Steel institute.

Number employed averaged 503,000 during April, which compares with 514,000 during March and with only 452,000 in April 1939.

Wage-earning employes earned an average of 83.6 cents an hour in April, the same as hourly earnings in March, but slightly more than their average of 82.9 cents an hour in April 1939.

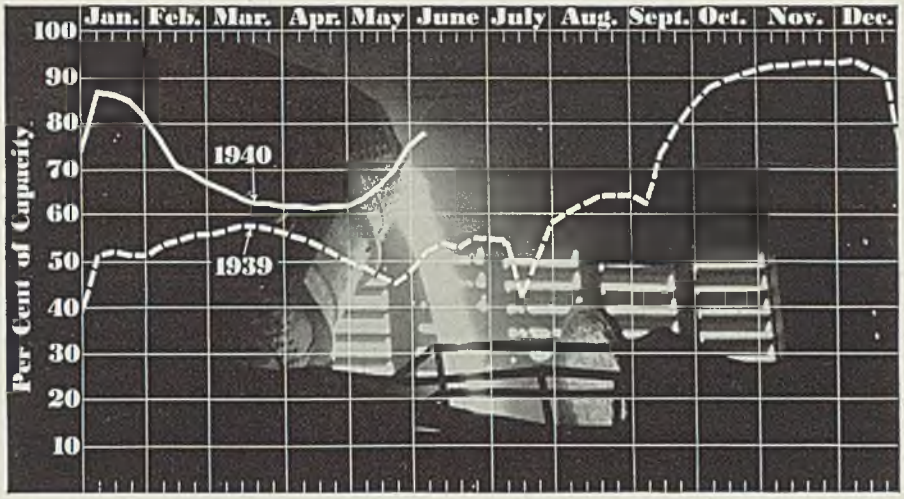
An average of 33.4 hours was worked per week by wage earners in April. This was slightly more than the average of 32.3 hours worked per week in March, and the average of 32.1 hours per week in April 1939.

Union Drawn Steel To Expand Stainless Plant

■ Union Drawn Steel division, Republic Steel Corp., Massillon, O., will expand its stainless bar and wire department, according to E. M. Richards, corporation assistant vice president in charge of operations.

Portion of an existing building 150 x 700 feet will be remodeled and new equipment will be added to substantially increase capacity. Work on building will begin by the middle of June and should be completed within two or three months.

■ Approximately 2295 pounds of finished steel were used for each American family in 1939, according to the American Iron and Steel institute, New York.



PRODUCTION... Up

■ STEELWORKS operations last week continued their steady rise, moving up 3½ points to 78½ per cent. Nine districts made gains, two dropped slightly and one was unchanged. A year ago the rate was 52 per cent; two years ago it was 25½ per cent.

Youngstown, O. — Increased 1 point to 58 per cent with indications for a similar rise this week. Two bessemers and 55 open hearths are in production. Two open hearths were added and one dropped.

Detroit — Down 5 points to 74 per cent, one open hearth being taken off for about ten days for repairs.

Chicago — Gained 8 points to 83 per cent, the fifth consecutive weekly increase. Two mills are above theoretical capacity and three others have enlarged production.

Cincinnati — Up 3 points to 64 per cent, sheet and strip production being at an even higher rate.

Birmingham, Ala. — Rose 2 points to 85 per cent by addition of one open hearth by Republic Steel Corp. at Gadsden, Ala., to a total of 12 in this district.

New England — Unchanged at 56 per cent with the same schedule expected this week.

Pittsburgh — Increases at several plants advanced the rate 5½ points to 79 per cent.

Wheeling — One producer reduced operations temporarily, dropping the rate 6 points to 79.

Central eastern seaboard — Addition of open hearths by several interests increased the rate 4 points to 71 per cent. Individual plants range from 50 to nearly 100 per cent.

Buffalo — Increased 5 points to 70 per cent, probably will be followed by a further rise this week. Addition of three furnaces at end of week raised production rate to 76½.

St. Louis — Regained 2 points to 57 per cent as slight shifts in active capacity were made.

Cleveland — Further additions to production resulted in a rise of 4 points to 82 per cent. Schedules for this week indicate a higher rate.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended June 1	Change	Same week 1939	Same week 1938
Pittsburgh	79	+ 5.5	42	18
Chicago	83	+ 8	53.5	22.5
Eastern Pa.	71	+ 4	37	26
Youngstown	58	+ 1	48	21
Wheeling	79	— 6	70	38
Cleveland	82	+ 4	53	31
Buffalo	70	+ 5	44	21
Birmingham	85	+ 2	60	69
New England	56	None	35	27
Cincinnati	64	+ 3	60	22
St. Louis	57	+ 2	37.5	39.3
Detroit	74	— 5	57	18
Average	78.5	+ 3.5	52	25.5

Former Central Tube Plant Offered for Sale

■ Hetz Construction Co., Warren, O., has purchased from National Supply Co. the Ambridge, Pa., plant formerly occupied by Central Tube Co. Central properties were recently acquired by the National Supply Co., and former Central Tube customers are being served by Spang-Chalfant division of the National company.

The Hetz company is offering for resale this plant, containing 400,000 square feet of space. Buildings were constructed in 1924 and are equipped with late model Alliance cranes.

Pig Iron Rate Rises to 74.1 Per Cent in May; 16 Stacks Blown In

■ ACCELERATING steel operating rate during recent weeks has sharply checked the five months' consecutive decline in daily rate of pig iron production, with May coke pig iron output in United States averaging 112,613 net tons per day. This was an increase of 7.6 per cent over April's average daily rate, 104,635 tons, and raised the operating rate 5.2 points to 74.1 per cent of capacity for May.

Total production during May, according to reports from operators of the nation's 233 potential blast furnaces, and involving their estimates for the last day or two of the month, was 3,491,009 net tons. Highest monthly total since January, 1940, when 4,024,556 tons were produced, May tonnage exceeded April's by 351,966, was 11.2 per cent greater than in the latter month. While output last month was 81.4 per cent greater than 1,923,625 tons in May, 1939, it was 12.1 per cent smaller than 3,970,602 tons produced in May, 1937. For the same month in 1938, total tonnage was 1,412,249.

MONTHLY IRON PRODUCTION

Net Tons

	1940	1939	1938
Jan.	4,024,556	2,436,474	1,618,245
Feb.	3,304,368	2,307,405	1,463,093
March	3,270,575	2,680,446	1,646,636
April	3,139,043	2,301,965	1,554,569
May	3,491,009	1,923,625	1,412,249
Tot. 5 mo.	17,229,551	11,649,915	7,694,792
June		2,373,753	1,188,037
July		2,638,760	1,358,645
Aug.		2,979,774	1,674,976
Sept.		3,218,940	1,885,069
Oct.		4,062,670	2,315,599
Nov.		4,166,512	2,561,060
Dec.		4,219,718	2,478,244
Total		35,310,042	21,156,422

Aggregate production to June 1 this year was 17,229,551 net tons, an increase of nearly 50 per cent over 11,649,915 in corresponding 1939 period. Total for first five months in 1938 was 7,694,792; in 1937 it was 18,654,757 tons.

Daily average for the five months this year was 113,352 net tons, again nearly 50 per cent greater than 77,151 tons in previous year, but smaller than 123,541 tons daily average for first five months in 1937.

Relating production to capacity, May pig iron output averaged 74.1 per cent, compared with 40.2 per cent in same month last year, 29.4 per cent in May, 1938, and 84.3 per cent in same 1937 month. Operating rate last month was highest since February's 75 per cent. April rate was 68.9 per cent, in March, 69.5 per cent.

AVERAGE DAILY PRODUCTION

Net Tons

	1940	1939	1938	1937
Jan.	129,825	78,596	52,201	116,327
Feb.	113,943	82,407	52,254	120,800
March	105,502	86,465	53,117	125,385
April	104,635	76,732	51,819	126,956
May	112,613	62,052	45,556	128,083
June		79,125	39,601	116,304
July		85,121	43,827	126,501
Aug.		96,122	54,031	130,677
Sept.		107,298	62,835	127,604
Oct.		131,053	74,697	104,450
Nov.		138,883	85,369	74,929
Dec.		136,119	79,943	54,319
Ave.	113,352	96,740	57,962	112,642

Stacks in blast May 31 totaled 171, representing an increase of 16 over April's 155, and highest since January, when 177 were active. This compares with 106 in May, 1939; 73 in May, 1938; and 170 for the same month in 1937. Active furnaces Dec. 31, 1939, totaled 191.

Twenty-one blast furnaces resumed or were blown in during May, and five were blown out or banked. One merchant stack resumed and two were blown out; three stacks in the steelworks or nonmerchant classification were banked or blown out and 20 resumed.

Furnaces resuming operation in May were: In Alabama: One Pioneer, Republic Steel Corp. In Illinois: South Chicago Old No. 2, South Chicago New Nos. 9 and 10, Carnegie-Illinois Steel Corp. In Indiana: Gary Nos. 1, 3, 6 and 10, Carnegie-Illinois Steel Corp.; Madeline No. 3, Inland Steel Co. In Kentucky: One Norton, American Rolling Mill Co. In Ohio: Ohio Nos. 4 and 6, Carnegie-Illinois Steel Corp. In Pennsylvania: Eliza Nos. 3, 4 and 6, Jones & Laughlin Steel Corp.; Farrell No. 3, Carrie No. 1, Clairton No. 2 and Duquesne Nos. 1 and 5, Carnegie-Illinois Steel Corp.; One Shenango, Shenango Furnace Co.

Stacks blown out or banked were: In Alabama: One furnace, Sloss-Sheffield Steel & Iron Co. In Indiana: Madeline No. 2, Inland Steel Co. In Ohio: One Anna, Struthers Iron & Steel Co.; One Cleveland, Otis Steel Co. In Pennsylvania: Edgar Thompson C, Carnegie-Illinois Steel Corp.

Jones & Laughlin Steel Corp.'s Aliquippa No. 2 furnace was shifted from ferromanganese production to metal output early in the month.

MAY IRON PRODUCTION

Net Tons

	No. in blast last day of May	No. in blast last day of April	—Total Tonnages— Merchant	—Total Tonnages— Non-Merchant
Alabama	17	17	120,555*	164,239*
Illinois	12	9	56,799	225,862
Indiana	16	12	125	384,621
New York	9	9	53,775	159,785
Ohio	36	36	90,447	680,261*
Penna.	58	50	76,284*	985,898*
Colorado	3	3		
Michigan	5	5		
Minnesota	1	1	2,380*	186,750
Missouri	0	0		
Tennessee	1	1		
Utah	1	1		
Kentucky	2	1		
Maryland	6	6		
Mass.	0	0	3,200*	300,028
Virginia	1	1		
West Va.	3	3		
Total	171	155	403,565*	3,087,444*

*Includes ferromanganese and spiegeleisen.

RATE OF FURNACE OPERATION

(Relation of Production to Capacity)

	1940[1]	1939[2]	1938[3]	1937[4]
Jan.	85.4	51.0	33.6	76.6
Feb.	75.0	53.5	33.6	79.5
March	69.5	56.1	34.2	82.5
April	68.9	49.8	33.4	83.7
May	74.1	40.2	29.4	84.3
June	....	51.4	25.5	76.6
July	....	55.0	28.2	82.9
Aug.	....	62.4	34.8	85.7
Sept.	....	69.7	40.5	83.7
Oct.	....	85.2	48.0	68.4
Nov.	....	90.3	55.0	49.3
Dec.	....	88.5	51.4	35.6

[1] Based on capacity of 55,628,060 net tons, Dec. 31, 1939; [2] capacity of 56,222,790 net tons, Dec. 31, 1938; [3] capacity of 56,679,168 net tons, Dec. 31, 1937; [4] first six months on capacity of 55,454,265 net tons, Dec. 31, 1936—last six months on capacity of 55,695,065 net tons, June 30, 1937. Capacities by American Iron and Steel Institute.

April Scrap Exports Show Slight Increase

■ Exports of iron and steel scrap in April increased slightly compared with March but were considerably below the average for last year, apparently due to smaller shipments to Japan.

The April total of 218,778 tons compares with 206,928 tons for March and 240,124 tons for April, 1939. England was the leading taker in April with 77,160 tons, Italy second with 74,459, Japan third with 37,469. Movement to other countries was insignificant, an exception being 4841 tons to Mexico.

■ Cyclone Fence Co., Cleveland, a subsidiary of United States Steel Corp. has purchased Savannah Wire Cloth Mills, Savannah, Ga., from Port Wentworth Corp., Savannah, Ga., according to C. F. Hood, president, Cyclone Fence Co.

MEN of INDUSTRY

■ D. J. HENECKER has been named assistant manager of wire rope sales, and C. E. Kendall assistant manager of sales of wire and galvanized sheets, Jones & Laughlin Steel Corp., Pittsburgh. Mr. Henecker has been identified with the wire rope industry since 1922, when he was employed in the New York warehouse of American Steel & Wire Co. He advanced through various positions and in 1931 became assistant sales manager, eastern division. In 1932 Mr. Henecker joined the sales force of Wickwire Spencer Steel Co. as assistant manager, later becoming sales manager, Buffalo district. In 1937 he was named general manager of wire rope sales in the United States and in addition in 1939 became sales manager for all products in the eastern district, which position he held until joining Jones & Laughlin.

Mr. Kendall has been with Jones & Laughlin in the wire sales department since February, 1939, having been prior to that, manager of merchant product sales for Pittsburgh Steel Co. Practically his entire business experience was with Pittsburgh Steel, having started with the company in 1919. He served successively as assistant manager, Chicago office; assistant manager and manager, fence department, Pittsburgh, and in 1935 was made manager, merchant products sales department.

The wire rope sales division of Jones & Laughlin has been consolidated into its wire products division, under J. E. Timberlake, present manager of wire products sales.

♦

Marshall Williams, assistant to the president, American Bridge Co., Pittsburgh, retired June 1 with a service record of over 42 years. He has been associated with the subsidiary of United States Steel Corp. and predecessor companies since April 1, 1898. He went to Pittsburgh as operating manager of the Pittsburgh division of the Bridge company in 1902. He performed special duties from April 1, 1904, to Aug. 1, 1911, when he resumed the post of operating manager at Pittsburgh. He was named assistant to president six years later; in 1927 became assistant general operating manager, and resumed the position of assistant to president in August, 1931. Mr. Williams is a member, American Society of Civil Engineers, Engineers Society of Western Pennsylvania and American Welding society.

Marshall Williams

D. J. Henecker

C. E. Kendall

♦

Jack L. Wilson, formerly assistant metallographist in charge of alloy and tool steel laboratory, Bethlehem Steel Co., Bethlehem, Pa., has joined Peninsular Steel Co., Cleveland, as metallurgist. Mr. Wilson is a member, American Society for Metals.

♦

W. L. Martwick, general sales manager, Foster Wheeler Corp., New York, has been elected vice president in charge of sales. Mr. Martwick has been with Foster Wheeler since its formation in 1927, progressing through various administrative sales positions of the petroleum refining and power plant departments to that of general sales manager.

♦

Thorvald L. Haines, formerly associated with Columbia Tool Steel Co., Chicago, has been appointed district manager at Chicago for William Jessop & Sons Inc., New York.

♦

Charles W. Simpson, formerly vice president and works manager, National Acme Co., Cleveland, has been made executive vice president. R. C. Kinley, superintendent, has been made vice president and works manager, and B. H. Ayers, assistant superintendent, has been advanced to superintendent.

♦

Louis F. Lippert has been appointed manager of Pluramelt sales, Allegheny Ludlum Steel Corp., Pittsburgh. He joined Allegheny Steel Co., a predecessor of Allegheny Ludlum, in 1913 as a typist in the sheet department. Ten years later he was transferred to the stainless division, and in 1927 to the sales division.

Truman B. Brown has been named manager of Ludlite sales of Allegheny Ludlum, with headquarters at Watervliet, N. Y. He joined the former Ludlum Steel Co. in March, 1934, working in the mills at Watervliet, and Dunkirk, N. Y. A year later he was transferred to the Chi-

Jack L. Wilson

cago sales department, returning to Watervliet in 1937. Since that time his entire effort has been devoted to the development and the sales promotional activities of Ludlite.

♦

Dr. Howard A. Smith, until recently research metallurgist, Rustless Iron & Steel Co., Baltimore, and previously in charge of stainless steel development in the laboratories of Republic Steel Corp., Canton, O., has been made chief metallurgist, Duraloy Co., Scottdale, Pa.

♦

David L. Mekeel, associated with engineering and development for many years in the steel industry, has retired from active duty with Jones & Laughlin Steel Corp., to enter the field of general steel mill consultant. He will be located in Pittsburgh, with temporary offices at his residence in Coraopolis

D. L. Mekeel

Heights, Coraopolis, Pa. He first joined Cambria Iron Co., predecessor of the Cambria plant of Bethlehem Steel Co. This was followed by several years with Johnson Co., predecessor of National Tube Co. plant at Lorain, O., after which he went with American Steel & Wire Co., as works engineer. He then joined Jones & Laughlin as chief engineer, South Side works, and successively was made chief engineer and consulting engineer of Jones & Laughlin and its subsidiaries.

♦

Oscar E. Harder, assistant director, Battelle Memorial institute, Columbus, O., has been nominated for president, American Society for Metals. Bradley Stoughton, consulting engineer, Lehigh university, Bethlehem, Pa., is the nominee for vice president. William H. Eisenman, 7301 Euclid avenue, Cleveland, was named to succeed himself as secretary for two years.

Nominees for trustee for two years are: Charles Y. Clayton, pro-

Oscar E. Harder

fessor of metallurgical engineering, Missouri School of Mines, Rolla, Mo.; and E. L. Bartholomew, metallurgist, United Shoe Machinery Corp., Beverly, Mass.

These selections were made at a meeting of the nominating committee in New York, May 22. Nominations to the offices virtually assures election at the National Metal congress in Cleveland, Oct. 21-25.

♦

Fred L. Lawrence has been appointed Detroit district manager for Copperweld Steel Co., with headquarters at 7-251 General Motors building. A graduate of the University of Michigan, Mr. Lawrence served as chief metallurgist for Frost Gear & Forge Co., Jackson, Mich., and later as senior metallurgist for Pittsburgh Crucible Steel Co., Midland, Pa. He then was transferred to the Detroit office of the latter company as sales engineer. He is a member, American Society for Metals.

♦

C. M. White, vice president in charge of operations, Republic Steel

Richmond Lewis

Who has been elected president, American Steel Warehouse association, as reported in STEEL, May 27, page 26. Mr. Lewis is vice president, Charles C. Lewis Co., Springfield, Mass.

Corp., was presented with a life membership in the National Association of Foremen at a dinner given in his honor at the Hotel Cleveland, Cleveland, May 27. Mr. White's life membership is the second which the association has given since its board two years ago authorized presentation of such life memberships to individuals or corporations for unusual services in the interest of foremen and the association as a whole.

♦

Tom E. Barlow, metallurgical engineer, Copper Iron and Steel Development association, Cleveland, has resigned to become associated with the newly created foundry division, Vanadium Corp. of America, Detroit, as foundry engineer. Following graduation from the University of Michigan, Mr. Barlow served as chief metallurgist, Ecorse Foundry, Detroit, and then was research metallurgist with Battelle Memorial institute, Columbus, O., for three years. The past year he has directed the research, development and service activities of the Copper Iron and Steel Development association.

♦

Charles R. Morrison has retired as vice president, International Harvester Co., Chicago, in charge of domestic and Canadian sales, after 42 years' service with the company and one of its predecessors. He is succeeded by J. L. McCaffrey, director of domestic and Canadian sales the past several years.

Mr. McCaffrey has spent his entire business career in the sales department of Harvester, advancing from warehouse clerk to branch advertising man, salesman, assistant branch manager at Cincinnati, and assistant manager of the central sales district.

♦

C. L. Dunbar, A. Macfadyen and R. C. Poskanzer were elected president, vice president and secretary-treasurer, respectively, Cohoes Rolling Mill Co., Cohoes, N. Y., at the regular annual meeting of stockholders May 28.

A. M. Mosley, associated with the company the past 43 years, recently as vice president and general manager, has retired from active duty. He assumes his new duties as consulting engineer.

M. L. Jacob, heretofore assistant general manager, has been named general manager. C. F. Anderson, formerly associated with Clayton Mark & Co. and Youngstown Sheet & Tube Co., has been made works manager. J. W. Cooper continues as manager of sales, and C. D. Mauchan was reappointed assistant treasurer.

Activities of Steel Users, Makers

■ JONES & LAMSON MACHINE CO., Springfield, Vt., has begun work on a new addition to its plant which will increase floor space 21,000 square feet and comprise an extension to its assembly lines, a new shipping room and a new paint room. Upon completion of this project, 60,000 square feet will have been added to the company's plant the past 12 months.

♦

William Jessop & Sons Inc., New York, has appointed Bissett Steel Co., Cleveland, agent for the sale of its tool steels in northern Ohio, western New York and Pennsylvania.

♦

Cutler-Hammer Inc., Milwaukee, has moved its offices and warehouse in Atlanta, Ga., to a new location at 134 Marietta street, Northwest. A. C. Gibson is in charge of that office.

♦

Amsler-Morton Co., Pittsburgh, has booked orders from Dominion Steel & Foundries Co., Hamilton, Ont., for four gun forging furnaces, two car-type annealing furnaces and one continuous slab heating furnace.

♦

Tutein Corp., exporter and importer of pig iron, ores, alloys, steel, coal, coke and chemicals, has opened an office in the New York Central building, 230 Park avenue, New York.

♦

All-Steel-Equip Co., Aurora, Ill., has begun work on a new 40,000 square foot addition to its main plant and office. Larger shipping facilities will be provided by the addition which the Austin Co. is building.

♦

General Electric Co. has been awarded contract for the propelling machinery for a 19,405-ton all-welded, turbo-electric tanker to be built for the Atlantic Refining Co. by the Sun Shipbuilding & Dry Dock Co. at its Chester, Pa., yards. The contract includes the turbines and the electric drive.

♦

Allis Chalmers Mfg. Co. district sales office and warehouse, Oakland, Calif., recently moved into new quarters having a total of 60,000 square feet of floor space. Building is structural steel with high low bay construction giving monitor light and ventilation and cost $100,000. It was built by Austin Co., Cleveland, in 45 working days.

♦

Julian d'Este Co., Boston, has been merged with American Chain & Cable Co. Inc., Bridgeport, Conn., and its products will be manufactured in American Chain & Cable's plant at Reading, Pa. The Julian company manufactures Curtis steam specialties, pressure reducing, tank and float, and relief valves, liquid temperature, hot water tank and pump regulators.

♦

Birtman Electric Co. has awarded contracts to the Austin Co., Cleveland, for the design and construction of additions amounting to approximately 35,000 square feet to its plant at Rock Island, Ill. The expansion program, calling for investment of more than $100,000, will include a new plating room, punch press department, addition to the machine shop, and additional foundry and warehouse space.

Died:

■ WARREN ELSEY JR., 52, general superintendent, Central Iron & Steel Co., Harrisburg, Pa., in

Warren Elsey Jr.

Harrisburg, May 28. Mr. Elsey joined Central Iron & Steel Jan. 3, 1927, as assistant general superintendent, prior to which he was associated with the Penn-Seaboard Steel Co., Wilmington, Del., in an executive capacity. He became general superintendent in January, 1939, succeeding H. S. Evans, who became executive vice president.

♦

John H. Cavender, 55, vice president and director, North American Refractories Co., Cleveland, at his home in Cleveland Heights, May 29. Mr. Cavender had been vice president of the refractories company since its formation in 1929, and before that was vice president, Dover Fire Brick Co., one of the firms merged to form North American. He was the first treasurer and a former president, Refractories Manufacturers association, now known as the American Refractories institute.

♦

Edward N. Shepard, 72, president and treasurer, Cleveland Pressed Steel Co., Cleveland, May 23 in Coden, Ala.

♦

William D. McCullough, 54, president, Premier Products Co., Detroit, in that city, May 30. In 1912 he was purchasing agent for Cadillac Motor Car division, and three years later organized Premier Cushion Spring Co., later absorbed by Reynolds Spring Co., Jackson, Mich. Mr. McCullough retained his interests in Premier Products Co., an affiliate manufacturer of accessories.

♦

William H. Quinn, New York district manager, Chain Belt Co., Milwaukee, May 5 in New York. Mr. Quinn had been with the company since 1923, and manager at New York since 1928.

♦

Edward A. Wetzel, 43, assistant chief engineer, Briggs Mfg. Co., Detroit, recently at his home in Grosse Pointe, Mich. Before joining Briggs 11 years ago he was assistant chief engineer, Stutz Motor Car Co., Indianapolis.

♦

Stephen W. Tener, 75, one of the pioneers in the industrial safety movement in this country and a veteran employe of American Steel & Wire Co., Cleveland, which he served for many years as manager of the accident, safety and pension department, at his home in East Cleveland, May 24. He retired in July, 1932.

♦

Edward P. Hammond, 55, president, Gemmer Mfg. Co., Detroit, in that city, May 28. He joined the Gemmer organization, manufacturing steering gears, after graduation from the University of Michigan, and in 1912 became president. He was also connected with the Federal Motor Truck Co., Detroit, in 1910, and was treasurer in 1912.

♦

George L. Bourne, 66, chairman of the board, Combustion Engineering Co. and of Superheater Co., New York, at his home in Larchmont, N. Y., May 24. From 1904 to 1910 he was vice president, Railway Material Co., Chicago, and in the latter year helped organize Superheater Co., becoming its vice president. In 1915 he became president and in 1932 chairman. When Superheater purchased controlling interest in the Combustion Engineering Co., Mr. Bourne also became chairman of that company.

No. 11 BLANCHARD GRINDER

This new small Blanchard has the power, the rigidity, and the ease of control that have made the No. 18 Blanchard so successful. Smaller in overall size than the No. 10 Blanchard which it supersedes, it not only has 50% more power on its spindle but has larger work capacity, 20 inches diameter by 8 inches high under new wheel. Fast, accurate, easy to operate, it has proved profitable for both tool work or small lot production.

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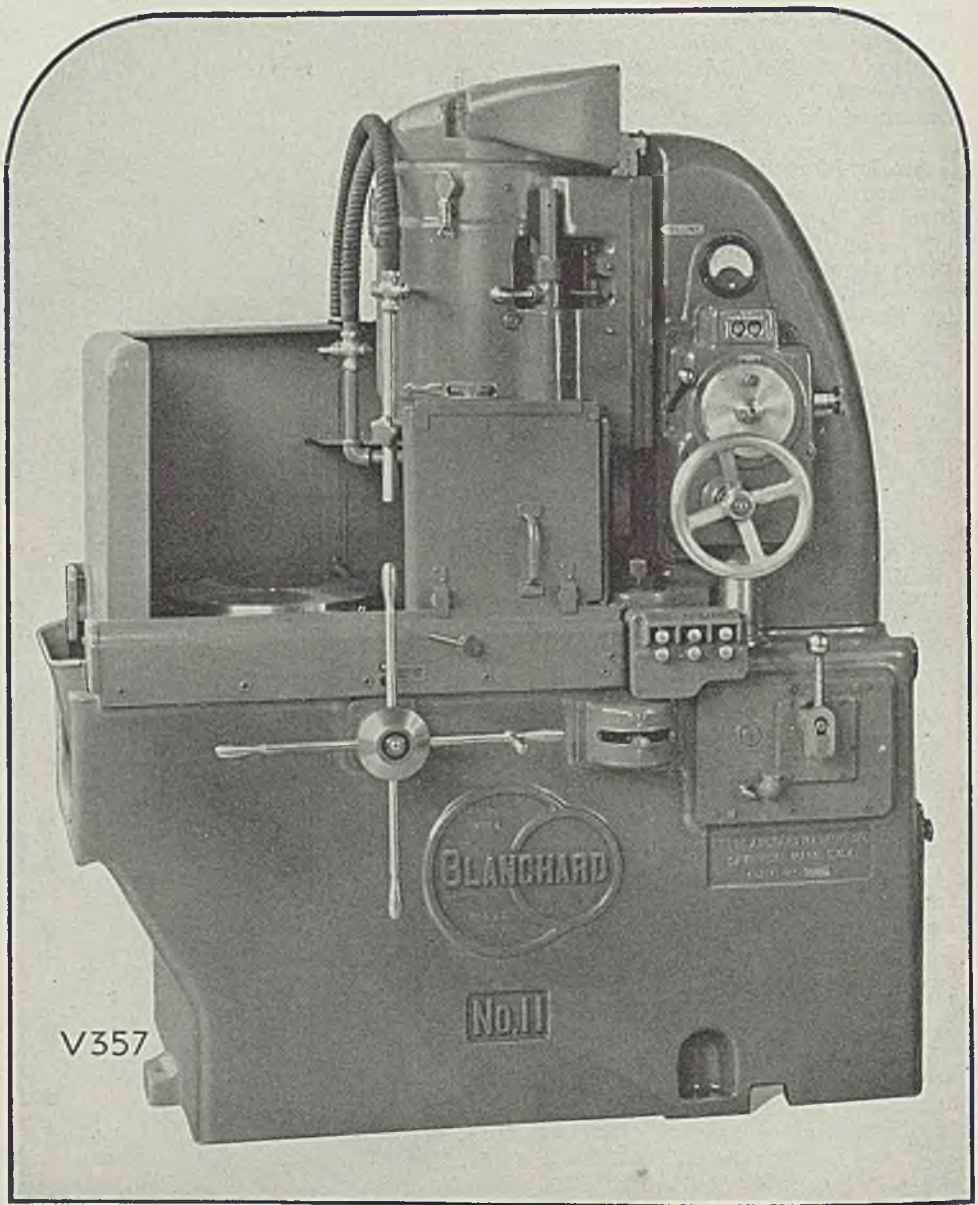

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Windows of WASHINGTON

By L. M. LAMM
Washington Editor, STEEL

WASHINGTON

■ AUTHORITY to prohibit exports of all war materials and machinery and tools necessary for their manufacture is given the President under a new section in the May emergency war legislation. The amendment was proposed by Representative Smith, Connecticut, who already had offered a bill to prohibit exports, except under license, of scrap, pig iron and other commodities. The Smith bill is supplanted by the amendment to the May bill.

The May emergency bill already has passed the house; and a similar bill is pending in the senate.

The new section of the May bill prohibits the export of all kinds of munitions, machinery, tools, and other commodities, if the President wishes to invoke these powers. The section was written by the planning division of the war department. Officials of both the house and senate military affairs committees believe this section will take care of the prohibition of any exports if this seems necessary to the administration.

Punishment Provided

Representative May, chairman of the house military affairs committee, when Representative Smith introduced the amendment made the following statement: "As I understand the amendment . . . it complies with the main conditions set out in a bill that has been reported by the house military affairs committee on the subject of conservation of our war materials in this country. So far as I am concerned, as chairman of the committee I will be glad to accept the amendment because it will save time in the consideration of the other bill."

Representative Smith explained the new section as follows: "The amendment goes a little further than the bill licensing the export of scrap iron and strategic materials which has been reported by the committee.

"This section was prepared in the planning branch of the war department and applies also to munitions, machinery, and tools necessary for the production of munitions for our own use. I understand there have been some recent instances of the exportation of equipment to go into planes, for example, of which we are not able to produce enough for our own military needs."

There was practically no discussion of the amendment on the floor of the house and as it finally passed the house read as follows:

"Whenever the President determines that it is necessary in the interest of national defense to prohibit or curtail the exportation of any military equipment or munitions, or component parts thereof, or machinery, tools, or material necessary for the manufacture or servicing thereof, he may by proclamation prohibit or curtail such exportation, except under such rules and regulations as he shall prescribe. Any such proclamation shall describe the articles or materials included in the prohibition or curtailment contained therein. In case of the violation of any provision of any proclamation, or of any rule or regulation, issued hereunder, such violator or violators, upon conviction, shall be punished by a fine of not more than $10,000, or by imprisonment for not more than two years, or by both such fine and imprisonment. The authority granted in this section shall terminate June 30, 1942, unless the congress shall otherwise provide."

HOUSE PASSES NAVY AIR FORCE EXPANSION BILL

House last week passed the $2,200,000,000 bill for the expansion of the navy air force and to speed up plan for warship construction. In the meantime the senate passed a resolution permitting South American countries to buy arms from the United States at cost.

Naval aviation measure authorizes a force of 10,000 planes for that branch of the service, with 16,000 aviators. This bill passed by a 400 to 1 vote with Representative Marcantonio, New York, being the sole objector.

The speed-up resolution permits the navy to negotiate contracts instead of calling for competitive bids on ships, planes or materials; to advance up to 30 per cent of the contract price to help new companies; permits the navy instead of the treasury department to determine what part of additional facilities can be charged against orders; to extend the work week from 40 to 48 hours; to grant overtime pay and double time pay and to call back retired employes. Efforts were made on the floor of the house during debate to apply the Walsh-Healey act to contracts negotiated under the bill but this was shouted down.

WALSH-HEALEY STEEL WAGES EFFECTIVE MAY 27

After a year of court action, minimum steel wages under the Walsh-Healey act became effective May 27 on government contracts of $10,000 or more.

Public contracts board, having charge of the enforcement of this act, on May 27 notified all government purchasing officers that court injunction against enforcement of these wages had been vacated as of that date. All steel bids are to contain minimum steel wage stipulations and that steel wage order by department of labor, January, 1939, is declared to be effective.

Notification issued by board stated: "All invitations to bid covering products of the iron and steel

industry as decreed by the secretary of labor in her decision of January 16, 1939, should contain a proviso indicating that they are solicited subject to the secretary's minimum wage determination of that industry."

The minimum steel wage rates range from 62½ cents an hour in the Pittsburgh area to 45 cents in the south but will not apply to bids already solicited by federal agencies. Other rates call for 60 cents in far western steel mills and 58½ cents in mid-continent states west of East St. Louis, Ill.

In addition to the iron and steel commodities listed in the secretary's order, the following also are included: Armor plate, galvanized strips, sheets, plates and structural shapes. Insulated telephone wire and coated welding rods are excluded from the order.

FORGED STEEL BALLS HELD DUTIABLE AT 27½ PER CENT

Forged steel balls have been declared to be dutiable at 27½ per cent ad valorem by United States court of customs and patent appeals in a decision by Associate Judge Hatfield in case of Steel Inc. against United States.

Customs collectors assessed these forged steel balls at 27½ per cent ad valorem as machine parts. Importer protested they were dutiable at 25 per cent as forgings of steel. United States customs court overruled protest of importer and last week court of appeals upheld the decision.

MARCH MANGANESE ORE PRODUCTION UP 2 PER CENT

Domestic production in March of manganese ore containing 35 per cent or more manganese was 5200 gross tons, shipments were 5400 tons, and producers' stocks at end of month were 1300 tons, according to bureau of mines, department of the interior. Figures are predicated on reports received from producers accounting for 90 per cent of 1939 total. February production was 5100 tons, shipments 5600 tons and producers' stocks at end of month 1500 tons. Shipments averaged about 2300 tons monthly in 1939, when total amounted to about 28,000 tons.

March imports, for consumption, of manganese ore containing 35 per cent or more manganese were 80,297 gross tons containing 38,765 tons of manganese according to bureau of foreign and domestic commerce. Russia supplied 45 per cent, Gold Coast 18, Cuba 17, Brazil 11, Philippine Islands 4, British India 3, Netherlands Indies and Union of South Africa 1 per cent each. In addition, 9740 tons containing 2876 tons of 30 per cent manganese entered from Egypt and Chile.

General imports in March were 111,666 long tons, containing 55,886 tons of manganese. Russia supplied 30 per cent, Gold Coast 25, British India 23, Cuba 12, Union of South Africa 4, Philippine Islands 3, Brazil 2, and Netherlands Indies 1 per cent. In addition, 9740 tons containing 2876 tons of 30 per cent manganese entered from Egypt and Chile.

APRIL AIRCRAFT EXPORTS 5 PER CENT ABOVE MARCH

United States exports of aeronautic products in April were valued at $21,795,643, according to department of commerce. April exports exceeded March exports by 5 per cent and were 192 per cent greater than April, 1939. Shipments consisted of 233 aircraft complete with engines valued at $12,862,198, and $8,933,445 worth of engines, parts and accessories, and parachutes.

France and United Kingdom were largest individual purchasers of American airplanes and parts in April, accounting for $14,443,071 and $2,908,621, respectively. Canada received $728,929 worth of shipments, China $556,473, Netherlands Indies $541,049, and Rumania $360,501. Remaining 10 per cent of exports was among 46 other markets.

Aeronautic exports in first four months of 1940 were valued at $88,209,488, a gain of 215 per cent over the corresponding period of 1939. Shipments went to 73 markets, with ten countries taking 94 per cent of the total value.

Ten leading markets in the first four months this year and value of their purchases are as follows:

France	$47,184,988
United Kingdom	10,517,887
Australia	8,001,153
Canada	5,129,569
Finland	3,140,597
Sweden	2,330,265
Turkey	1,831,524
China	1,683,033
Norway	1,441,771
Netherlands Indies	1,286,282

SUPREME COURT RULES LABOR SUBJECT TO TRUST LAWS

Last week United States Supreme Court decided unanimously that labor unions are subject to federal antitrust laws in handing down a decision on the Apex Hosiery Co., Philadelphia, versus CIO hosiery union case. By a 6 to 3 vote, however, the court ruled the CIO hosiery union was not responsible to Apex for alleged damages to the company's property and orders in the sitdown strike in May, 1937.

The majority opinion held labor unions subject to federal antitrust laws when their activities cease to be wage-and-working-condition activities and become attempts to control competition or prices in an industry. The minority opinion held that the particular acts of the union in the Apex case were not of the type covered by the antitrust laws and would not have been subject to Sherman act prosecution by whomever performed.

GOVERNMENT WALSH-HEALEY PURCHASES TOTAL $640,076

During week ended May 18, government purchased $640,076.04 worth of iron and steel products under Walsh-Healey act as follows: Blaw-Knox Co., Pittsburgh, $56,000; C. T. Patterson Co. Inc., New Orleans, $20,076; Collins Concrete & Steel Pipe Co., Portland, Oreg., $11,468.40; Judson Steel Corp., Oakland, Calif., $10,882.33; National Tube Co., Pittsburgh, $46,923.03; Bethlehem Steel Export Corp., New York, $92,316; Columbia Steel Co., Seattle, $13,155.04; United States Steel Export Co., Washington, $200,027.54 (estimated); Walter Kidde & Co. Inc., New York, $16,173.60; Pollak Mfg. Co., Arlington, N. J., $16,500; American Chain division of American Chain & Cable Co. Inc., York, Pa., $31,945; Crucible Steel Co. of America, New York, $16,953.50; Widin Metal Goods Co., Garwood, N. J., $50,197.60; Carnegie-Illinois Steel Corp., Washington, $46,358; Bethlehem Steel Co., San Francisco, $11,100.

Tool Engineers' Society Adds Two New Chapters

■ American Society of Tool Engineers recently chartered two more chapters bringing its total to 35. During the past year, 11 new chapters have been established and their combined membership of over 1000 increased total membership by 50 per cent.

Of the two new chapters, one is Greater New York, covering Brooklyn and Long Island; the other Binghamton, N. Y.

Officers of the Greater New York chapter are: Chairman, A. J. Duncan, chief tool designer, E. W. Bliss Co., Brooklyn; vice chairman, Tom Orchard, sales engineer, Herbert Hall Co., New York; secretary, Holbrook Horton; and treasurer, A. J. Schwister, field manager, Greenfield Tap & Die Corp., New York.

Binghamton chapter officers are: Chairman, W. T. Forde, production engineer, International Business Machines Corp., Endicott, N. Y.; vice chairman, Warren Kishbaugh, efficiency engineer, Scintilla Magneto Co., Sidney, N. Y.; secretary, Donald G. Goetcheus, Universal Instruments & Metals Co., Binghamton; and treasurer, Walter Hediger, Scintilla Magneto Co.

Planemakers Face Vast Orders With Billion-Dollar Backlog

■ PLANEMAKERS are facing this country's 50,000-plane building program with backlogs swelling at the rate of nearly $50,000,000 a month. Total backlog now is $865,000,000, compared to $720,000,000 on March 1, and includes only $200,000,000 of the $350,000,000 program of the Allies. The remaining $150,000,000 of the Allied program, expected to be placed soon, may raise the planemakers' backlog to more than a billion dollars.

Testifying before the House military committee, Maj. Gen. H. H. Arnold, chief of the army air corps, said it would take $3,500,000,000 to build a 50,000-plane air force and another $3,500,000,000 annually for maintenance and facilities. Legislation now actually before congress, exclusive of any new plans incident to the 50,000-plane program, calls for purchase of 5769 planes during the fiscal year beginning July 1. Planes ordered but not delivered number 3100 and soon to be ordered for the navy on money already appropriated, 1079. Army air corps now has about 2300 planes on hand; the navy, about 1800. If all planes in current bills are delivered during the 1941 fiscal year, the combined army and navy strength by July 1, 1941, would be slightly over 14,000 planes of all types.

Industry Handicapped

Laboring at a 3-shifts-a-day pace, handicapped by a lack of skilled labor and cramped, sometimes makeshift quarters, the aircraft industry is faced with a staggering volume of business which will necessitate tripling or quadrupling existing facilities. From the present 450 planes per month, the industry will be called upon to produce almost ten times that number a month.

Consolidated Aircraft Corp., San Diego, Calif., which now has a backlog of about $70,000,000, more than its total sales in its previous 16 years of existence, is assured of capacity operations for the next two and one-half to three years and is now doubling its capacity. About 47 per cent of the backlog is said to be foreign orders, with the remaining 53 per cent accounted for largely by United States army and navy orders.

Allowable profits on domestic military business under the Vinson act should average 12 per cent of sales. On foreign deliveries, a net income of about 20 per cent of sales is said to be a reasonable expectation.

Boeing Airplane Co., Seattle, with a backlog of $47,000,000 is expanding its floor area by 77 per cent in a program which including equipment, will cost $2,000,000. Present plant of 775,000 square feet will be increased by 600,000 square feet. Announcement of the expansion was coincident with a $23,000,000 order from the Allies through Douglas Aircraft to build the Douglas twin-engine attack bomber.

Pratt & Whitney Aircraft division, United Aircraft Corp., East Hartford, Conn., has started work on an $8,000,000 addition which is expected to be completed in three months. Addition will raise monthly capacity to a number of engines totaling 1,200,000 horsepower. Backlog on March 31 was $136,338,000. New Allied orders since undoubtedly have raised this figure substantially.

Glenn L. Martin Co., Baltimore, last week announced a backlog of $92,016,000 and indicated it was interested in building a plant near Wright Field, Dayton, O. At beginning of the year backlog was $49,242,000.

Douglas Aircraft Co., Santa Monica, Calif., reported a backlog of $113,744,000 on May 1, to which has been added the $27,000,000 it recently received from the Allies.

The machine tool industry which has been operating at around 94 per cent of capacity since December was told last week that about $200,000,000 worth of machine tools will be needed for the new defense program.

Craig Heads British Iron and Steel Institute

■ John Craig, chairman and managing director, Messrs. Colvilles Ltd., Glasgow, Scotland, was installed as president, British Iron and Steel institute, for two years, at the organization's annual general meeting in London, May 2-3. Fred Clements, managing director, Park Gate Iron & Steel Co., Rotherham, England, became vice president.

The institute's bessemer gold medal for 1940 was awarded to Dr. Andrew McCance, a director and general manager, Messrs. Colvilles Ltd., Glasgow, Scotland, for "eminent services in connection with the application of science to the iron and steel industry."

Bo W. L. Ljunggren was given the Andrew Carnegie silver medal for 1939 for his paper "Method of Sclero-grating Employed for the Study of Grain Boundaries and of Nitrided Cases; Grain Structure Revealed by Cutting."

Two awards of the Williams prize for 1939 were made as follows: W. B. Lawrie, for the paper "Refining of Metal in the Basic Open-Hearth Furnace. Influence of Fluorspar on the Process;" and W. T. Wilson, for paper "Rolling of Sections at the Appleby-Frodingham Steel Co. Ltd."

Honorary membership in the institute was conferred upon Eugene Schneider, chairman, Schneider & Co., Creusot, France, to celebrate his fiftieth anniversary of membership. He was president of the institute in 1918-20.

Farm Equipment Exports 42% Over April, 1939

■ Farm equipment exports from the United States in April totaled $10,013,391, a gain of 42 per cent from April, 1939, the value then being $7,067,114, according to the machinery division, department of commerce.

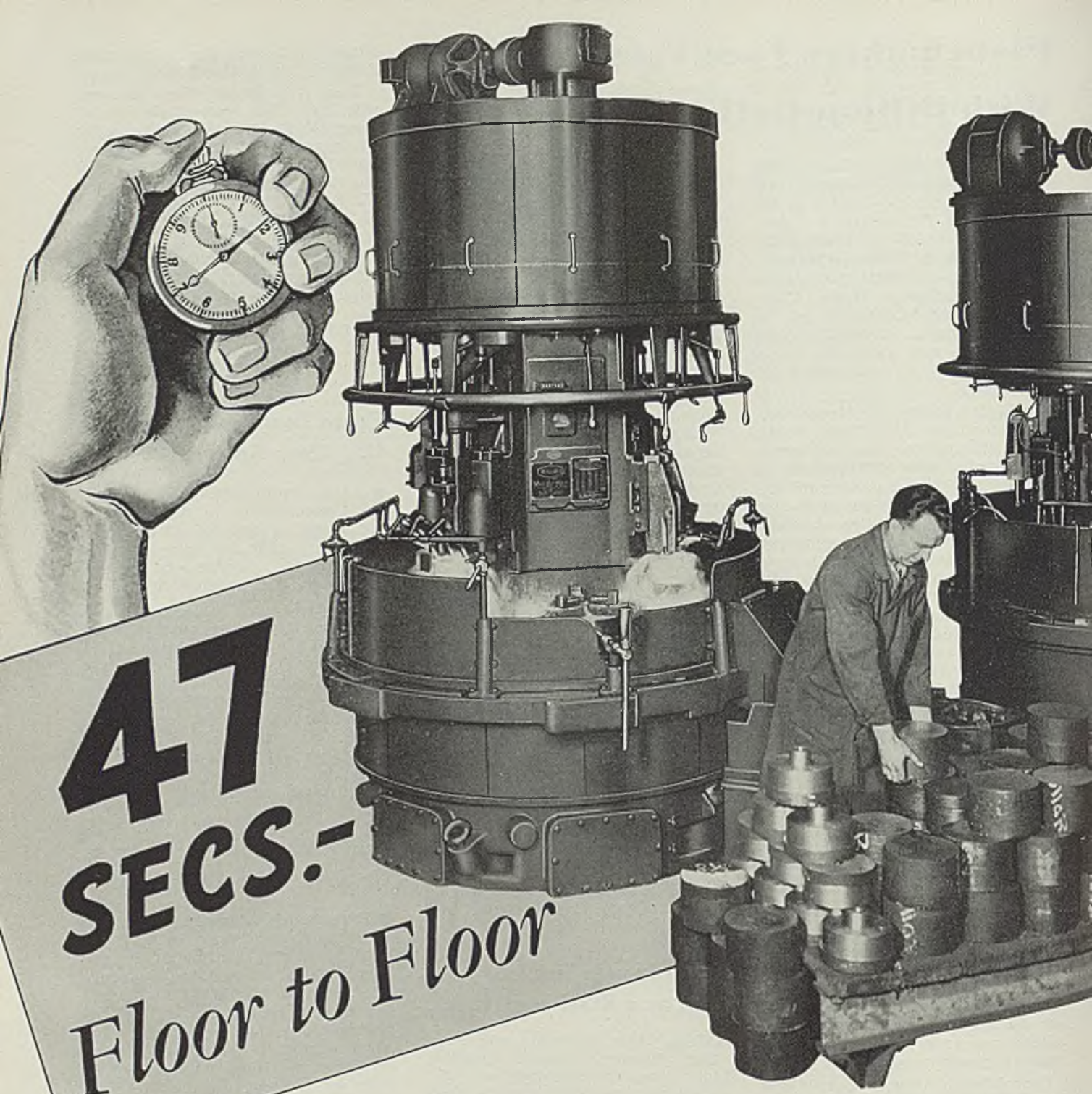
Tillage implement exports were valued at $987,516, an increase of 74 per cent over $563,516 in April, last year. Tractors, parts and accessories exports totaled $7,861,117, more than 40 per cent larger than $5,512,495 in April, 1939. Harvesting machinery exports totaled $500,438, a decline of 5 per cent from $524,800 in April, last year.

April Machinery Exports Up 65% Over Last Year

■ Exports of industrial machinery from the United States in April totaled $40,613,284, continuing the advance which reached the near-record figure of $37,559,841 in March, the machinery division of the department of commerce reports. The April shipments represented a gain of 65 per cent over those of April, 1939, which were valued at $24,592,486. All classes of machinery shared in the increase except petroleum and pumping equipment.

Power-driven metalworking machinery exports reached a new record monthly value of $21,281,332, a gain of 140 per cent over April, 1939, shipments of $8,854,755. Expansion was distributed over all classes, with several unusual increases, some types being six times as great as a year ago.

April exports of power generating equipment, except electric and automotive, totaled $3,231,576, almost four times those of April, 1939. Construction and conveying machinery gained 55 per cent and textile, sewing and shoe machinery 60 per cent.



47 SECS.- Floor to Floor

BAR STOCK—ROUGH AND FINISH TURNING, TAPER TURNING AND THREADING—TWO CHUCKINGS

Two 6-spindle Mult-Au-Matics working in tandem showed the shortest time and far and away the lowest cost for this job, even after including amortization of the entire machine cost over a relatively short period of time.

Bullard manufactures 6- and 8-spindle Mult-Au-Matics, each available in several sizes. The Mult-Au-Matic method of individual feeds, individual speeds and simultaneous operation is thus applicable to an amazingly wide range of production work. Moreover, the machines themselves are backed by over 25 years of engineering experience in tooling and setting up for all sorts of jobs. Ask us to prepare time and cost estimates on some job where you must cut costs.

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Mirrors of MOTORDOM

By A. H. ALLEN
Detroit Editor, STEEL

DETROIT

■ TANGLED in a maze of meetings, conferences and midnight round-table sessions at the nation's capitol is the key to both the immediate and distant future of automobile and allied industries. How soon any unraveling of this knotted skein can be effected is problematical. Right now, conservative opinion is that the situation is a mess.

At least there is no lack for rumors, leading to the belief that Washington once more has usurped Detroit's thunder as rumor headquarters. "The government will permit the automobile industry to proceed with 1941 models"—"There will be no 1942 models"—"A large manufacturer has suspended most of current work on 1941 models"—take your choice according to which paper you read; but if you want the advice of this department, forget them all.

No Cancellations Yet

Comment in official and semiofficial quarters on the general automotive situation as it bears on the defense program sums up about like this:

Development work on 1941 models is better than 75 per cent completed. There have been no important hold-ups or cancellations. Another five weeks will see many plants down for inventory and changeover to new tools and dies, excepting Ford and Chevrolet which apparently are anticipating continuation of 1940 model production until about Aug. 1.

Tool and die shops thus will be freed of most of their automotive work by the middle of August and will be sitting around waiting for something to fill in the usual six month void in their production schedules. If armament plans are anywhere near the release stage by that time, so much the better. The tool shops will be ready to go.

Serious doubt exists as to whether the actual placing of heavy armament business can be effected before midsummer. Local ordnance offices do not have the faintest conception of what is forthcoming. They are waiting to study details of the three-billion dollar defense appropriation bill, and meanwhile are deploring the flood of inaccurate statements and guesses emanating from Washington.

Government Sadly in the Dark

For example, they ask, is equipment buying to proceed on the normal basis of advertising for competitive bids and awarding to the lowest bidder with the usual performance bond; or is this law to be abrogated under the guise of an emergency, and procurement agencies permitted to negotiate contracts? Is the emergency serious enough to decentralize procurement into more regional districts? Now, for example, aircraft procurement is concentrated at Dayton, O., Buffalo and on the Pacific coast. Ordnance procurement proceeds through the various arsenals—Rockford, Frankford, Picatinny, etc.—ordnance including guns, munitions, tanks and mechanized transport equipment with facilities for attack.

A hundred other questions come up as to the mechanics of placing defense business, none of which can be answered until the bill in congress is enacted, studied in detail and instructions issued to the various procurement offices. Furthermore, complete knowledge must be had of just how much money is to be available for each branch of the service before any buying can start. And on top of that there must be approved specifications on all purchases.

There is a real job cut out for the powers that be in Washington who supposedly are drawing heavily upon the experience of industrial experts for counsel on the speediest way to proceed. Saddest aspect of the whole situation is the lack of any clear concept by high government officials of how industry is constituted and how it operates. It is too late to do anything about this now, however, so the country will be forced to do the best it can with the leadership now in power.

Establishment of priority systems in purchases of machine tools for use in the defense program is considered highly probable by some machinery people here. Actually, priority systems have been in effect for many months among machine tool builders on their own instigation, domestic needs being scheduled ahead of foreign inquiries. A logical step would seem to be to permit machine tool builders to continue to supervise the allocation of orders, since they know best how badly certain types of equipment are needed and how quickly they can be built. All the government need do is supply the money.

Might Suspend 1942 Models

Secretary Morgenthau has indicated $200,000,000 as the figure encompassing machine tool requirements for the defense program, and tool builders are slated to report this week on how soon the equipment can be produced.

Mr. Morgenthau suggested to reporters the auto industry might be asked to suspend 1942 models to permit these machine tools to have the right of way. To observers here, the possible shortage of machine tools

would be no insurmountable barrier to the creation of new models, but what might hold back the 1942 jobs would be the inability of motor plants to reserve sufficient time in the die shops next spring, should the latter become clogged with armament work.

Here, again, the conclusions are largely conjecture. The nation's tool and die supply sources may well be able to handle both armament and automobiles. Suspension of new models, in the minds of many, would put a bad kink in the national economic machine, and might cause unnecessary paralysis in hundreds of other industries.

Representatives of this city were plugging hard at Washington last week to get approval of a proposal to locate a new $8,400,000 aircraft engine test laboratory at Detroit—Wayne county airport being the specific location suggested. Large hangar, research plant and wind tunnel on a site of 80-100 acres are covered in the project, funds for which have been provided in the pending deficiency bill.

William B. Stout, free-thinking and able designer of autos and aircraft, threw out a few choice morsels for contemplation at the meeting of the National Aviation forum in Washington last week, forecasting that "production of air flivvers some day will exceed that of automobiles." He further noted that new concepts of aircraft design were needed if mass production is to be achieved, adding that "construction today is too expensive because it involves too much hand labor."

■ CONSENSUS here still seems to be that the bulge in steelmaking operations can be explained by accelerated foreign buying and building up of inventories in mills, rather than by volume purchases for automobiles. Impetus of automotive buying is not likely to be felt until about the first week in July. Chevrolet, in fact, is scheduled to continue taking steel for 1940 models until the middle of July, so its new buys will not come until August.

Numerous inquiries have been received here for export steel. A recent purchase was for 10,000 gun barrel forging bars, weighing about 8 pounds each, of high-quality chrome-vanadium steel, placed by the Chinese buying commission in New York, Universal Trading Corp., to be shipped to the Orient after forging outside this territory. Other inquiries have been received in recent weeks from South American and Central American countries, as well as from what was once Holland.

Thursday and Friday of this week Chrysler will stage a celebration officially to mark the opening of its new engineering and research laboratories at the Highland Park plant. Invitations have been issued by Chrysler's famed engineering triumvirate—Zeder, Skelton and Breer—to inspect the buildings and equipment which Chrysler believes will comprise the largest and most modern automotive engineering and research facilities in the world.

Retail sales of new passenger cars and trucks in the United States totaled 410,921 units in April, a gain of 3 per cent over the previous month and 31.9 per cent higher than April, 1939, according to analysis by the Automobile Manufacturers association. This figure compares with total plant output of 452,433, the latter of course including export and Canadian assemblies. How factory shipments have been held on even keel this year and how retail sales have increased in spring months to pare down backlogs built up earlier are shown in a comparison of retail sales with actual production as follows:

	Retail sales	Production
January	285,438	449,314
February	284,013	421,820
March	398,658	439,911
April	410,921	452,433

Shipments of Dodge trucks for the first quarter of this year were the largest for any similar period in the history of the company, exceeding the first three months of 1939 by 34.3 per cent and the next highest year, 1936, by 12 per cent.

Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

	1938	1939	1940
Jan.	226,952	356,962	449,492*
Feb.	202,597	317,520	422,225*
March	238,447	389,495	440,232*
April	237,929	354,266	452,433
May	210,174	313,248	.....
June	189,402	324,253	.....
July	150,450	218,494	.....
Aug.	96,946	103,343	.....
Sept.	89,623	192,678	.....
Oct.	215,286	324,688	.....
Nov.	390,405	368,541	.....
Dec.	406,960	469,120	.....
Year	2,655,171	3,732,608	.....

*Revised.

Estimated by Ward's Reports

Week ended:	1940	1939†
May 4	99,305	71,420
May 11	98,480	72,375
May 18	99,030	80,145
May 25	96,810	67,740
June 1	61,255	32,445

†Comparable week.

Domestic retail sales of Hudson for the three weeks ended May 18 gained 63 per cent over the corresponding period a year ago. Total was 6302.

In the first eight months of 1940 model output, Buick last Tuesday rang up a new all-time production record for any model year with the assembly of its 250,117th car. H. H. Curtice, Buick general manager, predicts that assemblies for the full 1940 model run will approximate 280,000, far ahead of earlier estimates. The record for 1940 "culminates many years of efforts," he notes. "During this time our constant goal has been to stabilize employment, now about 16,000, and eliminate the peaks and valleys of the production season. We are nearer that goal this year than at any time in our experience."

Financing Helped To Build New Steel Mills

■ Sale of security issues was an important factor in financing the extensive plant modernization programs of steel companies in recent years, according to a study by the American Iron and Steel institute. Use of accumulated surplus after dividends during the period, plus allowances for depreciation and depletion, would have failed to cover the costs of modernization.

In the four years 1935-1938, a group of steel companies accounting for nearly 90 per cent of the industry's output spent a total of $794,000,000 for new equipment and construction.

During the same period the companies charged off for depreciation and depletion a total of $489,000,000.

The total amount of net earnings carried to surplus, after dividend payments, in the four years was $83,000,000.

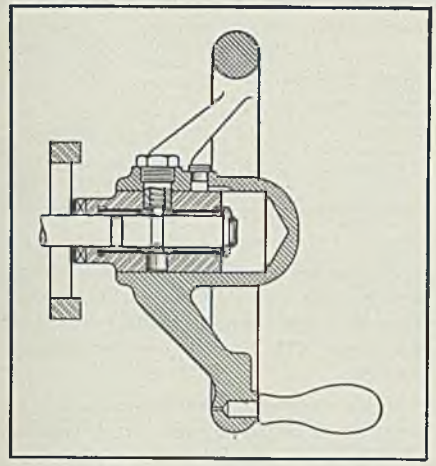
The combined total of depreciation reserves and additions to surplus in the period was $222,000,000 less than the amount actually spent by the companies for modernization.

In the four years the same group of companies sold security issues totaling $838,000,000. Of that amount, over $350,000,000 represented the replacement of outstanding securities either by stock or by bonds bearing lower interest. Somewhat less than $488,000,000 was available for new construction, for general corporate purposes, and also for replenishing the companies' working capital, which had been reduced about $420,000,000 between 1929 and 1932.

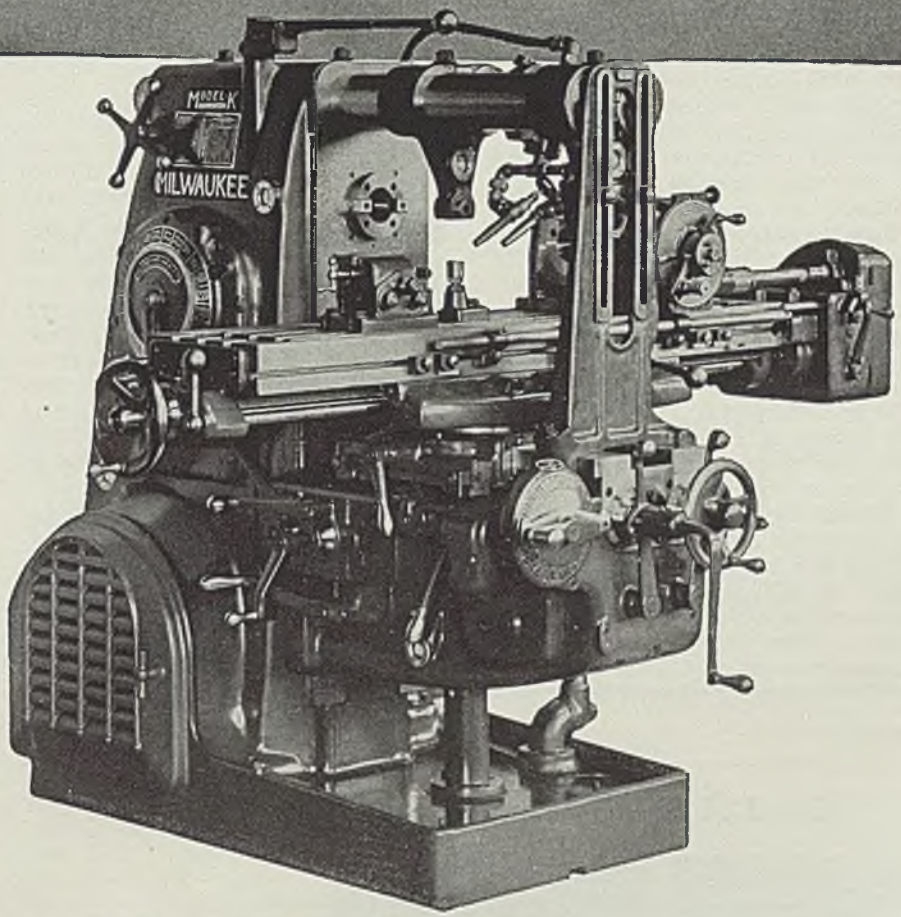
■ April household vacuum cleaner sales totaled 170,209 units, an increase of 36.08 per cent above the 125,026 of April 1939, according to Vacuum Cleaners Manufacturers' association, Cleveland.

GREATER SPEED AND EASIER OPERATION

FROM TORRINGTON NEEDLE BEARINGS



(*Above*) Cross-section showing how a Torrington Needle Bearing is used in Hand Control Lever. The Torrington Bearing requires no more space than the conventional bushing it replaced.



(*Above*) The Kearney & Trecker Milling Machine in which Torrington Needle Bearings are used extensively to facilitate accuracy and ease of operation.

EASE in handling and speed of operation are important considerations when it comes to the purchase of milling machines. That's why engineers of Kearney & Trecker Corporation, manufacturers of the well known "Milwaukee" precision milling machines, were quick to appreciate the advantages of Torrington Needle Bearings.

Said the engineering department: "We replaced bronze bushings in the hand control levers with Torrington Needle Bearings. Our purpose was to minimize friction so that hand cranks will quickly assume a disengaged position when not operated. The Torrington Bearing was selected because of its small O.D. which required no more space than the bronze bearing it replaced. And," they add, "Torrington Bearings are also used extensively on various hand and power operated trip levers where *accuracy* and *ease of tripping under all load conditions* are essential."

Perhaps you, too, can profitably employ the many advantages of this unique Needle Bearing in *your* product. The Torrington Needle Bearing gives you the advantages of complete anti-friction operation, high-load capacity, efficient lubrication. It is a low-cost, compact unit that is easily installed, and is readily adaptable to modern product design.

For further information, write for Catalog No. 10. For data on Needle Bearings for use in heavier service, request Booklet 103X from our associate, Bantam Bearings Corporation, South Bend, Ind.

The Torrington Company
ESTABLISHED 1866
Torrington, Conn., U.S.A.

Makers of Needle and Ball Bearings

New York Boston Philadelphia Detroit
Cleveland Chicago London, England

TORRINGTON
NEEDLE BEARING

Payrolls, Taxes Take Larger Share of Steel Sales Dollar

■ SHARE of the steel sales dollar going for payrolls, taxes, raw materials and other operating costs has increased substantially over the past decade at the expense of the amounts going to stockholders and left in the business, according to the American Iron and Steel institute.

In 1939, payrolls, taxes, materials and other costs consumed 93 cents of each dollar received by the steel industry from the sale of its products. By comparison, those costs in 1929 took only 83 cents of each dollar.

Labor's share of each steel dollar received last year amounted to 37 cents, or nearly 5 per cent more than in 1929 when 35½ cents of each dollar went into payrolls.

Almost 40 per cent more of the steel dollar was needed to meet tax bills in 1939 than in 1929. Last year 5½ cents of each dollar received went for taxes, compared with only 4 cents ten years earlier.

In 1939 the industry paid 2½ cents in dividends out of each dollar received and left 3 cents in the business. In 1929, stockholders received 6½ cents in dividends per dollar received, while 9 cents was added to surplus.

About 5½ cents of each dollar was received for depreciation and depletion in 1939, as against 5 cents in the year 1929. Interest charges on outstanding bonds amounted to 1½ cents per dollar received in both years.

The cost of raw materials, freight charges and miscellaneous expenses consumed 45 cents of each 1939 steel dollar, compared with 38½ cents a decade before.

April Steel Imports In 22 Per Cent Gain

■ Iron and steel imports in April, scrap excluded, 6192 gross tons, valued at $1,026,425, were 22 per cent greater in quantity and 26 per cent in value, compared with 5067 tons, valued at $813,303 imported in March, according to the metals and minerals division, department of commerce. In April, 1939, this trade totaled 41,314 tons, valued at $2,703,092.

During four months this year total imports were 25,558 gross tons, valued at $3,424,626. This was only 23.7 per cent in quantity and 48 per cent in value of the 1939 trade for corresponding months, 107,790 tons, valued at $7,132,919.

Sweden furnished 60 per cent of April imports, 3840 tons, and Norway nearly 25 per cent, 1442 tons. Canada with a total of 483 tons, was the only other supplier of consequence.

Scrap imports, though small, increased in April to 482 tons, valued at $28,318 from 29 tons, valued at $160 in March.

ORIGIN OF APRIL IMPORTS

Gross Tons

	Iron ore	Pig iron	Manganese ore	Ferromanganese
Sweden	50,076	.....	.....	.....
United Kingdom	19	.....	.....	.....
Canada	148	286	.....	.....
Mexico	202	.....	60	.....
Cuba	21,004	.....	2,178	.....
Chile	178,600	.....	1,293	.....
British West Africa	7,190	.....	.....	.....
Brazil	.....	.....	5,466	.....
Netherlands Indies	.....	.....	264	.....
British India	.....	.....	1,576	.....
Soviet Russia	.....	.....	11,210	.....
Nigeria	.....	.....	3,952	.....
Egypt	.....	.....	13	.....
Norway	.....	.....	.....	1,408
Total	257,239	286	26,012	1,408

	Sheets, skelp and sawplate	Structural steel	Steel bars	Hoops and bands
United Kingdom	4	...	10	1
Canada	1	...	...	...
Sweden	3	...	511	564
Belgium	...	3	15	...
France	...	32	...	...
Total	8	35	536	565

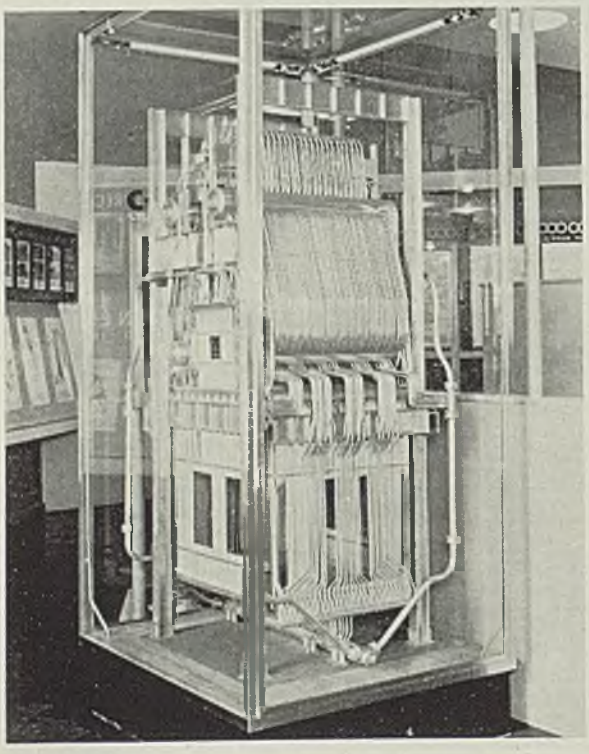
UNITED STATES IMPORTS FOR CONSUMPTION OF IRON AND STEEL PRODUCTS

(Gross Tons)

	Apr. 1940	Mar. 1940	Jan. through Apr. 1940
Pig iron	286	583	4,815
Sponge iron	368	69	609
Ferromanganese (1)	1,408	835	5,783
Spiegeleisen	99	18	364
Ferrochrome (2)	1	...	1
Ferrosilicon (3)	63	63	435
Other ferroalloys (4)	26	14	190
Steel ingots, blooms	...	...	...
Billets, solid or hollow	45	135	406
Concrete reinforce. bars	...	7	7
Hollow bar, drill steel	183	186	754
Bars, solid or hollow	536	472	1,556
Iron slabs	...	...	...
Bar iron	31	34	189
Wire rods	1,382	930	3,848
Boiler and other plate (including skelp)	...	2	4
Sheets, skelp, sawplate	8	29	65
Die blocks, blanks, etc.	3	2	11
Tin plate, taggers' tin and terne plate	11	12	37
Structural shapes	46	235	580
Sashes and frames	...	...	...
Sheet piling	...	...	...
Rails, track material	13	2	310
Cast-iron pipe, fittings	...	...	419
Mall. iron pipe fittings	2	...	2
Welded pipe	...	...	...
Other pipe	565	612	1,782
Cotton ties	...	2	2
Other hoops and bands	112	100	569
Barbed wire	44	...	44
Round iron, steel wire	277	170	767
Teleg., telephone wire	...	...	...
Flat wire, steel strips	392	336	1,195
Wire rope and strand	60	97	320
Other wire	...	...	...
Nails, tacks, staples	17	21	83
Bolts, nuts, and rivets	24	53	101
Horse and mule shoes	...	...	3
Castings and forgings	190	48	307
Total	6,192	5,067	25,558
Iron and steel scrap	482	29	1,226
GRAND TOTAL	6,674	5,096	26,784

(1) Manganese content; (2) chrome content; (3) silicon content; (4) alloy content.

Model of Ford's Rouge Power Plant Displayed



■ Scale model of the huge industrial power unit at Ford Motor Co.'s Rouge plant, Dearborn, Mich., on display in New York World's Fair exhibit of Combustion Engineering Co. Inc., New York. Aluminum model is six feet high, reproduces every detail of the actual unit on a ¾-inch-to-the-foot scale, contains ¾ mile of boiler and furnace tubes and 2800 feet of superheater tubes rolled into drums and headers. More than 3000 man-hours were required to build it. Actual boiler is steel, weighs 822 tons; complete power unit weighs 1392 tons

MEETINGS

AUTOMOTIVE ENGINEERS TO CONSIDER DEFENSE PROGRAM

■ LIEUT. Col. Edward E. MacMorland, secretary, clearance committee, army and navy munitions board, Washington, tops a group of army officers representing the ordnance, quartermaster, air and transportation corps, to participate in the summer meeting of the Society of Automotive Engineers, at the Greenbrier, White Sulphur Springs, W. Va., June 9-14.

Col. MacMorland will speak on "The Role of the S.A.E. in National Defense" at a session on the evening of June 10. Numerous items of ordnance equipment will be on display during the week.

The meeting, which marks the thirty-fifth anniversary of the society, will open with a banquet, June 9. David Beecroft, Bendix Aviation Corp., South Bend, Ind., will discuss "The Next 35 Years." Twelve technical sessions schedule 23 papers on automotive and aircraft engineering.

A diesel engine session on the morning of June 13 lists the following papers: "New Applications of Aluminum in High-Speed Diesel Engines," by Frank Jardine, Aluminum Co. of America, New Kensington, Pa.; "Wear Resistant Coatings," by J. E. Jackson, Caterpillar Tractor Co., Peoria, Ill.; and "Load Carrying Capacity Phenomena of Bearing Surfaces," by Macy O. Teetor, Perfect Circle Co., Hagerstown, Ind.

A. S. M. E. LISTS PAPERS FOR ITS MILWAUKEE MEETING

Several papers dealing with metals, machine shop practice, and education and training, will be presented at the semiannual meeting of the American Society of Mechanical Engineers at Hotel Pfister, Milwaukee, June 17-20.

Papers scheduled for the two machine shop practice sessions on the mornings of June 19 and June 20 are: "Use of Electric Welded Construction for Columns and Bases in the Machine Tool Industry," by F. O. Volz, Lakeside Bridge Steel Co., Milwaukee; "Making Better Machine Tool Castings," by F. J. Dost, Sterling Foundry Co., Wellington, O.; "Hard Facing—A Process for the Mechanical Engineer," by E. E. LeVan, vice president, Haynes Stellite Co., Kokomo, Ind.; and "A New Method of Tool and Die Milling," by Francis J. Trecker, Kearney & Trecker Corp., Milwaukee.

"Experience with Metals at High Temperatures," is the title of a paper which A. E. White, director, department of engineering research, University of Michigan, Ann Arbor, Mich., will present at a power session on the morning of June 18.

An education and training session on the morning of June 17 features two papers as follows: "Encouragement of Creative Ability," by John E. Ryan and A. R. Stevenson Jr., General Electric Co., Schenectady, N. Y.; and "The Employer Suggests Needed Improvements in Our System of Technical Education," by W. H. Carrier, chairman of board, Carrier Corp., Syracuse, N. Y.

ELECTROPLATERS' ANNUAL CONVENTION IN DAYTON, O.

An extensive program of technical activities and entertainment has been arranged for the twenty-eighth annual convention of the American Electroplaters' society at the Biltmore hotel, Dayton, O., June 10-13.

A total of 24 technical papers will be presented at six education sessions, these covering a wide range of problems in metal cleaning and plating. Afternoon of June 11 will be spent visiting plants of the National Cash Register Co. and Frigidaire division of General Motors Corp. The business session with election of officers will take place on the afternoon of June 13.

Social activities will include an entertainment on the evening of June 10; an outing following inspection of the Mitchell Engineering Co. branch of Frederic B. Stevens Co. on the afternoon of June 12; and the banquet on June 13.

An exhibit of plated ware, composed of articles supplied by branches of the society, will be held during the four days of the meeting.

Convention Calendar

June 4-7—American Association of Industrial Physicians and Surgeons. Twenty-fifth annual meeting at Hotel Pennsylvania, New York. Armour G. Park, 540 North Michigan avenue, Chicago, is executive secretary.

June 4-7—American Industrial Hygiene association. First annual meeting at Hotel Pennsylvania, New York. Gordon C. Harrold, Chrysler Corp., Detroit, is secretary.

June 9-11—American Society for Refrigerating Engineers. Twenty-seventh spring meeting at Skytop Lodge, Skytop, Pa. David L. Fiske, 37 West Thirty-ninth street, New York, is secretary.

June 9-14—Society of Automotive Engineers. Summer meeting at the Greenbrier, White Sulphur Springs, W. Va. John A. C. Warner, 29 West Thirty-ninth street, New York, is secretary and general manager.

June 10-13—American Electroplaters' society. Twenty-eighth annual convention at Biltmore hotel, Dayton, O. W. J. R. Kennedy, 93 Oak Grove avenue, Springfield, Mass., is executive secretary.

June 17-21—American Society of Mechanical Engineers. Semiannual meeting at Hotel Pfister, Milwaukee. C. E. Davies, 29 West Thirty-ninth street, New York, is secretary.

July 22-23—Institute of Scrap Iron and Steel. Midyear meeting at Hotel Statler, Buffalo. Edwin C. Barringer, 11 West Forty-second street, New York, is executive secretary.

June 24-27—National Association of Cost Accountants. Twenty-first annual convention at Jefferson hotel, St. Louis. Stuart C. McLeod, 385 Madison avenue, New York, is secretary.

June 24-28—American Society for Testing Materials. Forty-third annual convention at Chalfonte-Haddon hall, Atlantic City, N. J. C. L. Warwick, 260 South Broad street, Philadelphia, is secretary.

June 25-29—Production and Machine Tool show. Public Auditorium, Cleveland. Executive headquarters, Grafton, Wis.

Large Home Is All-Welded Steel

■ No wood, no lath, no plaster, no masonry was used in the construction of this all welded steel house just completed by E. A. Hobart, president, Hobart Welders Inc., Troy, O. Including ten rooms and four baths, the structure is attractive in design and refutes the objection that steel houses lack beauty

Why Ask for It?

■ FOR many years after the first World war—as has been the case after every war—one of the questions that aroused much debate was: "Who and what caused the war?" There was widespread accusation that wars are incited by bankers, manufacturers and others who seek to gratify their lust for profits through mass murder, through the spilling of human blood and the creation of untold human misery. They were labeled "merchants of death."

Here is a strange contradiction. During war a nation mobilizes its human and material resources to the fullest extent in order to annihilate the enemy. Industry is encouraged to do its patriotic duty of producing at top speed the equipment and materials of war. After the war comes revulsion. Never again, the people say, shall there be war. Patriotic manufacturers—many of whom have severe economic headaches due to dislocations resulting from their contributions to the country's war effort—now loom as "warmongers" swollen with "blood money."

Munitions Makers Must Protect Themselves Against Postwar Blame

Today this process may be about to repeat itself. Under the policy of the government, approved by the will of the great majority of American citizens who abhor the tactics of the totalitarian governments and favor opposing them with measures short of war, many of our industries are executing large orders for goods for military use. If history repeats itself there will come the time when the "merchants of death" again will be haled before the bar of public opinion. The fact that they utilized their productive capacity to execute the country's will will be forgotten—it will be forgotten, that is, unless the manufacturers involved begin now to take this factor into account in their present public relations and publicity efforts.

Few now are doing much along this line. Many who are contributing to American objectives and who must protect military secrets have gone so far, in fact, as to think it good policy to conceal their activities from the public. They overlook the fact that these things cannot be kept hidden and that the secrets of today become the sensations of tomorrow.

For example, the aircraft production industry—aside from a very few exceptions—today is following a policy which amounts virtually to "nonpublicity." It is doing this at a time when the American public, through radio broadcasts, newsphotos and newsreels is building up a realization of the stark horror that results when cities and towns are subjected to attacks by air. If this impression is not offset by the publication of facts in the case it is not at all a far-fetched conclusion that all those having to do with the manufacture of the air arm may encounter violent resentment later.

Publicity Policies Should Avoid Unnecessary Concealment of Facts

It may be argued that the facts speak for themselves and that the intelligent, well-read individual will reach a fair conclusion. Mass sentiment, however, is not based on intelligence but on emotions—a fact which the manufacturer has to face in connection with his status with the public.

This is a time when manufacturers—particularly those making munitions of war—should shape their publicity policies wisely. First of all, they should determine what information they can make public, and what information they cannot disclose. Study undoubtedly will reveal that much information now kept under a blanket can be released, without disclosing any military secrets. This is a time when manufacturers should go as far as they can in informing the public as to the nature of their activities, as well as their aims and methods. "Hush-hush" policies can be expected to prove harmful to industry in general in the long run.

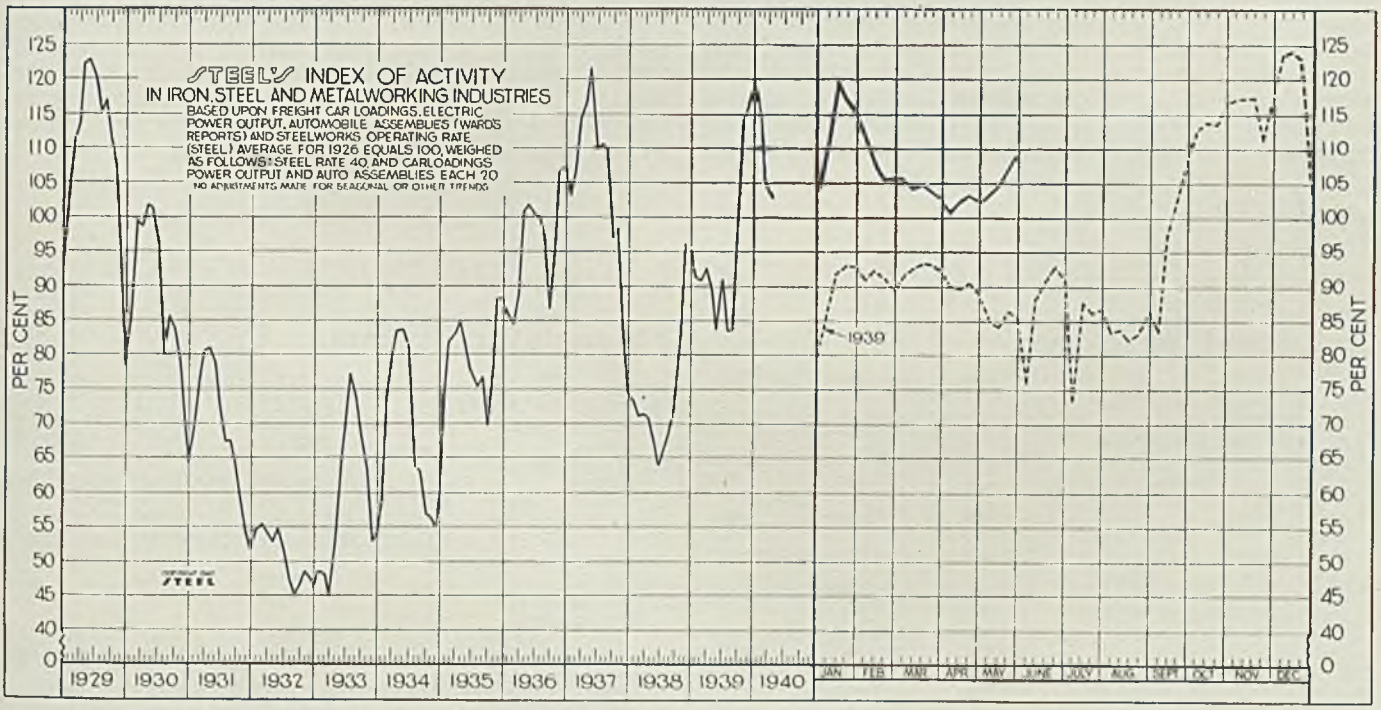
The BUSINESS TREND

Further Gains Recorded By Most Business Indexes

■ INDUSTRIAL activity in the iron, steel and metalworking industries recorded further improvement during the latest period. STEEL'S index in the week ended May 18 advanced to highest level since the period ended Feb. 3. The index now stands at 109.1, a gain of 2.3 points over the previous week's level and remained well above the 85.4 figure reported for the corresponding 1939 week. In the same weeks of 1938 and 1937, the index stood at 66.5 and 115.6 respectively. The latest gain recorded by the index represents the fourth consecutive weekly increase, and further advance is probable in the weeks immediately ahead.

Current indications point to an increase in the Federal Reserve board's seasonally adjusted index of industrial production to 106 for May. This would represent a gain of four points over the April index figure of 102 and is the first time this year that an advance has been recorded by the index.

Outstanding in the improvement of business activity in recent weeks has been the sharp gains recorded in steelmaking operations. During the period from the week ended April 27 to the first of June, the steel rate recorded an increase of about 15 points and still further



STEEL'S index of activity gained 2.3 points to 109.1 in the week ended May 25:

Week Ended	1940	1939
Mar. 16	104.9	93.3
Mar. 23	103.7	93.2
Mar. 30	103.2	92.2
Apr. 6	101.8	90.0
Apr. 13	102.7	89.7
Apr. 20	103.4	90.4
Apr. 27	102.8	89.2
May 4	103.3	85.1
May 11	104.8	84.2
May 18	106.8	86.6
May 25	109.1†	85.4

†Preliminary.

Mo. Data	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Jan.	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6	104.1
Feb.	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2	111.2
March	104.1	92.6	71.2	114.4	88.7	83.1	78.9	44.5	54.2	80.4	98.6	114.0
April	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0	101.7	122.5
May	.....	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6	101.2	122.9
June	.....	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1	95.8	120.3
July	.....	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3	79.9	115.2
Aug.	.....	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4	85.4	116.9
Sept.	.....	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3	83.7	110.8
Oct.	.....	114.0	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2	78.8	107.1
Nov.	.....	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4	71.0	92.2
Dec.	.....	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3	64.3	78.3

gains are expected. For the week ended May 25, the national steel rate stood at 75 per cent, a gain of five points over the preceding period and compares with 48 per cent reported in 1939. Improved domestic and foreign demand are the chief factors in the recent upturn. Deliveries abroad now represent a substantially higher percentage of the total finished steel shipments than was the case a year ago.

Influenced by the sharp increase in steelmaking operations, steel scrap prices have advanced in most districts throughout the country. Improved demand has also developed in the pig iron trade now that the large stocks accumulated last September are being exhausted.

Order backlogs continue to expand in the machine tool, aircraft and shipbuilding industries. The proposed rearmament program will necessitate considerable expansion in these three fields. It is estimated that the program will involve about $200,000,000 worth of machine tools alone. Proposed speed-up of the naval shipbuilding program will be accomplished through plans now being worked out, whereby the government will absorb most or all of the cost of additional facilities and special equipment required by private yards. An indication of the expansion program being planned and underway in the aviation field is a recent announcement by the directors of the United Aircraft Corp. of the approval of a plan for the construction of an $8,000,000 addition to the Pratt & Whitney division. Construction on the new addition will begin immediately and should be completed in three months.

In some industrial lines, payrolls and employment have been mounting steadily. Shortage of skilled workers has developed in some instances.

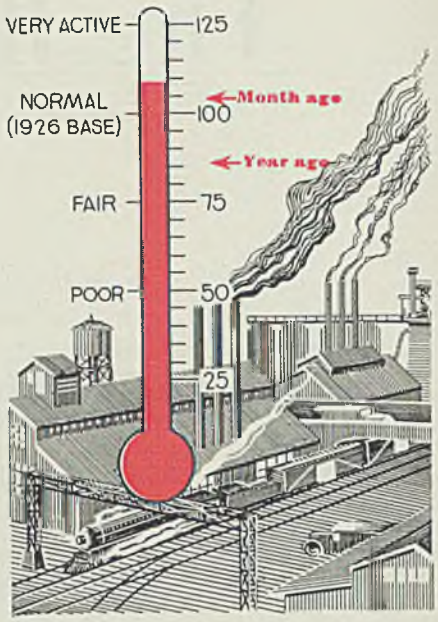
Industrial and residential construction have been important factors in bolstering business activity throughout the past month. Private engineering awards during the latest period recorded further gains and remained well above the total for same 1939 week. Public construction has lagged in recent weeks.

Where Business Stands

Monthly Averages, 1939 = 100

	Apr., 1940	Mar., 1940	Apr., 1939
Steel Ingot Output	94.2	97.3	79.5
Pig Iron Output	108.2	109.1	79.3
Freight Movement	95.2	95.0	85.0
Automobile Production	145.5	141.5	113.9
Building Construction	101.6	91.9	111.5
Wholesale Prices	101.9	101.3	98.8

Industrial Weather



TREND:

Upward

The Barometer of Business

Industrial Indicators

	Apr., 1940	Mar., 1940	Apr., 1939
Pig iron output (daily average, tons)	104,635	105,502	76,732
Iron and steel scrap consumption (tons)	2,753,000	2,932,000	2,317,000
Gear Sales Index	128	114	88.0
Foundry equipment new order index	192.9	243.4	146.0
Finished steel shipments (Net tons)	907,904	931,905	771,752
Ingot output (average weekly; net tons)	926,505	962,699	781,532
Dodge bldg. awards in 37 states ($ Valuation)	$300,504,000	$272,178,000	$330,030,000
Automobile output	452,433	440,232	354,263
Coal output, tons	32,962,000	35,210,000	9,627,000
Business failures; number	1,291	1,197	1,331
Business failures; liabilities	$16,247,000	$11,681,000	$18,579,000
Nat'l. Ind. Conf. board (25 industries, factory):			
†Av. wkly. hrs. per worker	37.7	38.0	36.9
†Av. weekly earnings	$27.61	$27.61	$26.25
Cement production,† bbls.	7,917,000	5,040,000	8,171,000
Cotton consumption bales	623,893	626,331	543,187
Car loadings (weekly av.)	623,592	622,037	557,002

†March, February and March respectively.

Foreign Trade

	Apr., 1940	Mar., 1940	Apr., 1939
Exports	$324,008,000	$352,272,000	$274,472,000
Imports	$212,240,000	$216,732,000	$159,827,000
Gold exports†	$459,845,000	$201,475,000	$365,436,000
Gold imports†	$18.000	$53,000	$53,000

†March, February and March respectively.

Financial Indicators

	Apr., 1940	Mar., 1940	Apr., 1939
25 Industrial Stocks	$195.13	$192.71	$161.51
25 Rail stocks	$23.22	$22.61	$19.41
40 Bonds	$73.60	$73.14	$70.16
Bank clear'gs† (000 omitted)	$23,615,000	$20,446,000	$24,995,000
Commercial paper rate (N. Y., per cent)	½–⅝	½–⅝	½–⅝
*Com'l loans (000 omitted)	$8,661,000	$8,596,000	$8,071,000
Federal Reserve ratio (per cent)	88.0	87.8	85.1
Capital flotations (000 omitted)			
New Capital	$117,609	$69,806	$144,258
Refunding	$227,287	$171,377	$213,860
Federal Gross debt. (mil. of dol.)	$42,658	$42,540	$40,068
Railroad earnings†	$36,734,348	$32,617,743	$34,375,047
Stock sales, New York stock exchange	26,696,490	16,268,868	20,247,438
Bond sales, par value	$165,386,700	$135,488,700	$122,651,425

†March, February and March respectively.
*Leading member banks Federal Reserve System.

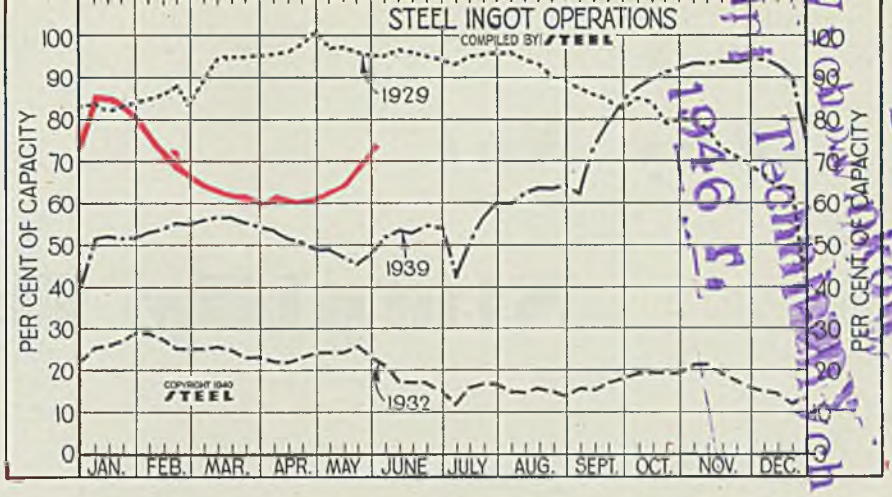
Commodity Prices

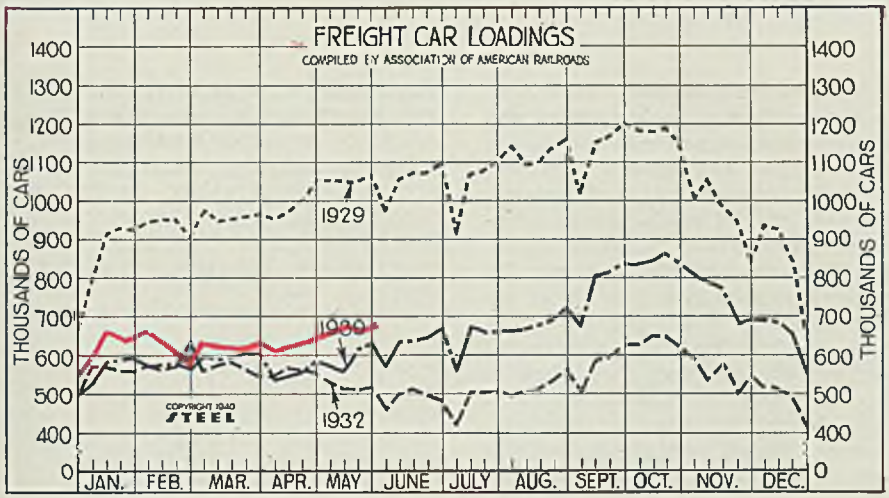
	Apr., 1940	Mar., 1940	Apr., 1939
STEEL's composite average of 25 iron & steel prices	$36.69	$36.83	$36.34
U. S. Bureau of Labor's index	78.6	78.4	76.2
Wheat, cash (bushel)	$1.28	$1.24	$0.90
Corn, cash (bushel)	$0.78	$0.72	$0.64

Steel Ingot Operations

(Per Cent)

Week ended	1940	1939	1938	1937
Feb. 24....	67.0	55.0	30.5	84.0
Mar. 2....	65.5	56.0	29.5	86.0
Mar. 9....	63.5	56.5	30.0	87.0
Mar. 16....	62.5	56.5	32.0	89.0
Mar. 23....	62.5	55.5	35.0	90.0
Mar. 30....	61.0	54.5	36.0	91.5
Apr. 6....	61.5	53.5	32.0	91.5
Apr. 13....	61.0	51.5	32.0	91.5
Apr. 20....	61.5	50.5	32.5	91.5
Apr. 27....	61.5	49.0	32.0	91.0
May 4....	63.5	49.0	31.0	91.0
May 11....	66.5	47.0	30.0	89.0
May 18....	70.0	45.5	30.0	91.5
May 25....	75.0	48.0	28.5	75.0





Freight Car Loadings

(1000 Cars)

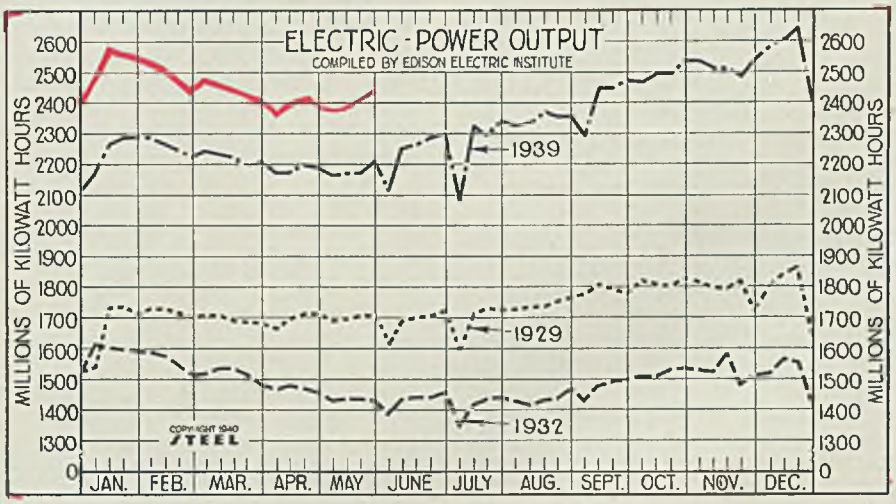
Week ended	1940	1939	1938	1937
Mar. 2.....	634	599	553	734
Mar. 9.....	621	592	557	749
Mar. 16.....	619	595	540	759
Mar. 23.....	620	605	573	761
Mar. 30.....	628	604	523	727
Apr. 6.....	603	535	522	716
Apr. 13.....	619	548	538	751
Apr. 20.....	628	559	524	761
Apr. 27.....	645	586	543	782
May 4.....	666	573	536	767
May 11.....	681	555	542	774
May 18.....	679	616	546	779
May 25.....	685†	628	562	795

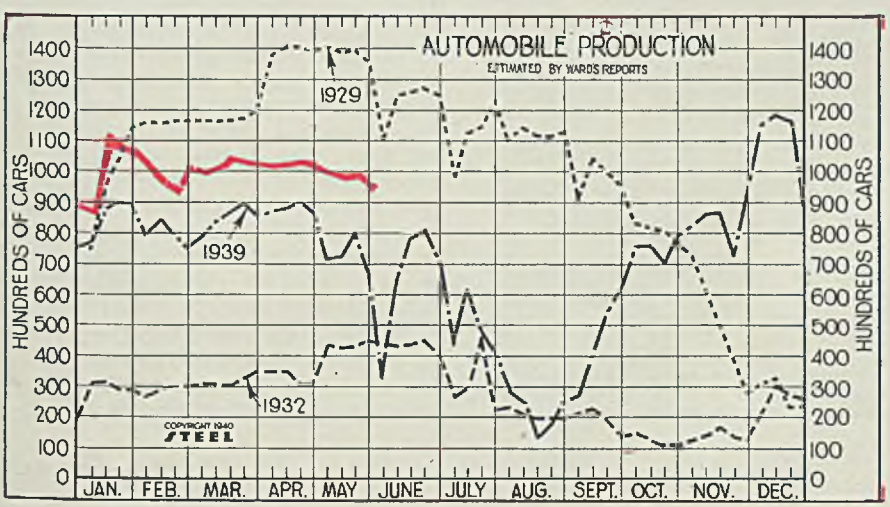
†Preliminary.

Electric Power Output

(Million KWH)

Week ended	1940	1939	1938	1937
Feb. 24...	2,455	2,226	2,031	2,207
Mar. 2....	2,479	2,244	2,036	2,200
Mar. 9....	2,464	2,238	2,015	2,213
Mar. 16...	2,460	2,225	2,018	2,211
Mar. 23...	2,424	2,199	1,975	2,200
Mar. 30...	2,422	2,210	1,979	2,147
Apr. 6....	2,381	2,173	1,990	2,176
Apr. 13...	2,418	2,171	1,958	2,173
Apr. 20...	2,422	2,199	1,951	2,188
Apr. 27...	2,398	2,183	1,939	2,194
May 4....	2,386	2,164	1,939	2,176
May 11...	2,388	2,171	1,968	2,195
May 18...	2,422	2,170	1,968	2,199
May 25...	2,449	2,205	1,973	2,207





Auto Production

(1000 Units)

Week ended	1940	1939	1938	1937
Feb. 24....	102.6	75.7	57.0	111.9
Mar. 2....	100.9	78.7	54.4	127.0
Mar. 9....	103.6	84.1	57.4	101.7
Mar. 16....	105.7	86.7	57.5	99.0
Mar. 23....	103.4	89.4	56.8	101.0
Mar. 30....	103.4	86.0	57.5	97.0
Apr. 6....	101.7	87.0	70.0	99.2
Apr. 13....	101.9	88.0	62.0	125.5
Apr. 20....	103.7	90.3	60.6	133.2
Apr. 27....	101.4	86.6	50.7	139.5
May 4....	99.3	71.4	53.4	140.2
May 11....	98.4	72.4	47.4	140.4
May 18....	99.0	80.1	46.8	131.3
May 25....	96.8	67.7	45.1	131.4

Why Not . . .

Simplify the Problem

The steel industry seriously needs product standardization to encourage the use of those steels now made in significant quantities and capable of replacing many hundreds of small volume high cost, special steels. Better specification methods are necessary for an even flow of production. About 200 chemical combinations instead of the many hundreds now furnished should be selected, codified and their suitability as well as availability publicized. After establishment of standard products of known qualities for major uses, deviations should carry a price penalty to the user. When developing new designs, the steel user should not force the steel producer to alter his product to meet a particular set of design requirements

Only by doing these things effectively will the steel industry be able to stop NOW the waste of energy and materials involved in present methods

By EARLE C. SMITH

Chief Metallurgist
Republic Steel Corp.
Cleveland

■ ALTHOUGH steel has been available in large quantities within the past century, steel products have not yet arrived at proper economic stability largely because for purposes of description, manufacture and sale they have been difficult to classify into a simple and orderly arrangement.

It becomes more and more evident that standards must be set up and defined so these products can be properly distinguished. Likewise, the selling price of the product must be sensibly related to its cost of manufacture and to no other factors.

Little chemistry is required to produce the great bulk of steel. Even today the maker knows only part of the possible elements that may be present. Excellent results were obtained from steel before the chemist became a serious factor, so to what degree his part in steel making is essential is something to be considered.

Excluding specials such as tool steels and stainless steels, this discussion will cover the control of the chemical composition of those steels made in significant volume and the problems such control presents.

Much steel is heat treated to produce a variety of physical characteristics. Chemical limitation is an aid in producing definitely desirable physical characteristics, and it is usual to attempt chemical specifications where heat treatment is involved. A simple problem yet difficult to answer in economic results thus arises, "Must we design the part to use existing steels or must we design the steel to fit a method of manufacture?"

Specification Problems

Modern specification - writing bodies have grown up within the lifetime of many people now active in our industry. Our patent procedure is not very old, and the flood of steel patents involving chemical composition is so new that the last five years has produced a more complicated setup of analyses than in previous history back to the starting of the system of patented compositions. There are thousands of patents, many involving specifications of as many as seven elements over ranges so wide that subdivision may be required, in one case with which the writer is familiar, to nine variations. The end is not near for 33 elements have been listed as soluble in iron. Thus many combinations are possible before the variations are all recorded.

Another difficulty is the growing custom of using the so-called specification-writing groups as selling mediums. Carefully handled campaigns extending over years have resulted in promulgation of so-called standard specifications which are actually carefully worded descriptions of proprietary materials. Steel plants thus must produce not commodities but specific products useful in but a very narrow field.

It is no longer possible in many branches of the steel industry to produce for stock in advance, nor is it possible for the buyer to allocate his purchases in advance. There exists, therefore, a definite need for the user to aid in any program of simplification. The present method can only lead to more violent disturbances in business as the producer cannot risk storing but must produce always for a single specific product. Any mishap during manufacture is promptly reflected in a shutdown in the user's plant since the buyer cannot order until he is certain which producer has the approved material. There exists then a mutual problem in which the user is more concerned than he may realize.

Any sudden sustained demand for steel in this country will require some simplification for it is not uncommon to find a plant, making high-grade carbon and automotive alloy steels, working regularly to more than a thousand variations of quantitative chemistry. With each variation of chemistry there is an average of four requirements of physical condition peculiar to an individual user's problem. This means the producing department must carry a plant that will control many thousands of variables. This leads to the fact that where manufacture or partial manufacture is involved, the complications increase. One important steel producer offers for sale 70,000 different materials and products.

Chemical Composition: Over 1000 common steels are produced according to chemical contents. With certain physical attributes as impor-

Abstract from a paper read at meeting of American Iron & Steel Institute, New York, May 25, 1940.

# of Steel Selection?

tant as chemistry, the working group of steels must approach 5000 combinations.

How then should steels be specified?

The simple answer is—to make the part, to meet physicals, or to meet chemical limits.

An additional question is—How many steels should be specified? To answer this question requires a statement of principle. Either we should continue to make several thousand steels as needed or make a few well defined general purpose steels which could be used instead.

In making 50,000,000 tons per year, less than two dozen steels cover those compositions produced in excess of 500,000 tons each per year. This is satisfactory evidence that users of steel consume a large volume of significant compositions. Dropping the requirements for being classed as a significant steel to one-quarter of one per cent of the volume will not increase the number of steels involved above the 200 mark.

This number is ample because: The bulk of our business is done with 20 compositions. Published specifications of certain important consumers list less than 50 steels to cover all their manufacturing operations. There are about 300 widely published chemical compositions to cover the steels used in the automotive industry. About two-thirds of the steel purchased by that industry is strip and sheets specified to make the part, usually with no chemistry required. About one-eighth of the purchases are alloy steels and about an equal amount of carbon steels are involved. Thus, one-fourth of the purchase carries the problem of chemical analysis to desired ranges.

Simplification: It is difficult to reconcile the limited general knowledge of any given steel with any need for 5000 different steels. The conclusion that many of these exist for uneconomic reasons may be open to argument, but the fact remains that simplification of the amazing array is long overdue. What steels should be considered significant in today's business? Should such steels be advertised as such with the general idea that more of them would be selected by our designers and users? What pressure will force simplification of the methods now used?

It has been fairly well demonstrated in recent years that the profit motive has not been sufficient to make the steel industry undertake this simplification. Ultimately, however, the industry may be forced to simplify to achieve a more uniform operation of its plants. Steel has always been a prince or pauper industry and largely because few of its products permitted of manufacture in advance. Thus, the boom and slump method of production governed. Plant capacity far in excess of average consumption has had to be maintained to handle business on short notice. *Simplification is a big job, but it will be done sooner or later.*

There are three commonly used methods of placing orders for steel and any method of simplification must conform to the buying habits now existing. By far the largest amount of steel used is ordered to size or weight and approximate dimensions—with the stipulation that it be satisfactory for making some product or some general line of products. Where more accurate knowledge of the manufacture of some product makes it essential that definite physical strength be available it is customary to require that the steel have certain physical characteristics, usually judged from one or more tensile strength tests. The producer may use any steel that is available so long as it complies with the conditions specified. Rarely such specifications limit certain elements regarded as impurities.

In recent years there has been a growth of specifications that combine all three methods: The user (1) specifies that the steel must be satisfactory in his plant for use, (2) further limits the physical characteristics, and (3) insists that only certain narrow ranges of chemical composition will be accepted. In most cases too little information is available to fill properly any one of the three requirements, and it is seldom that any piece of steel will completely meet such a three-way specification.

If simplification is to be achieved, more users should be encouraged to specify the products now manufactured. Obviously it should be made economically worthwhile for users to consume more of what is made in bulk. Further, an economic penalty should be imposed on the user who insists on a specific consideration of his problems. The steel industry can produce tailor-made steels for specific purposes, but should be expected to do so only when an adequate price for such products can be obtained.

Where possible the unusual should be eliminated. To do this will require some compromise on the part of both producer and user and will be sound only in proportion to the success obtained in making the value of the product bear a definite relation to the cost of production and distribution. This is to the user's advantage for business should then be able to move with less violent fluctuations; likewise, a better utilization of facilities would be possible.

We produce steels to be used in about 100 important fields of consumption. Usually the product has been developed to cover a particular field and broadened beyond its early limitation. Thus, we find barbed wire for cattle fence a material important in warfare. Obviously, the same specification is not ideal for both uses, but sensible compromise is possible and at times may become imperative.

Where steel is specified to make

a given article, some consideration should be given to the law of probability and the specification designed so it covers material that can be expected from the process used regularly in manufacture. During recent years of excess capacity the tendency to tighten standards has in many cases involved real economic waste.

Where steel is specified to chemical composition, it is customary to include a certain range of composition involving definite amounts of the more important elements. These ranges have never been definite, in spite of the printed figures, since in many cases they were so narrow that good analytical methods produced results varying more than the so-called chemical spread. Thus, when two chemists checked and found the material to be inside the specified range it was partly a matter of probability since repeated analyses of a given sample will produce results which vary as much as the range provided by the formal specification.

Steel Making Methods

The bulk of American production comes from the basic-lined open-hearth furnace. The acid-lined open-hearth furnace is used in certain special products, but the tonnage is small. The Bessemer converter is an important source of our steels, and scrap and market conditions should cause increase in its use. The electric furnaces, basic and acid, arc or induction, are now very important in the value of their output and increasingly so in actual tons delivered for aviation and munitions. Powdered iron, too, involves a certain growing output.

A discussion of the relationship of the methods of making steel to the chemical specifications that can be expected should assist in understanding more clearly the problems of producer and user.

The basic open hearth, our largest source of production, is essentially a broad shallow hearth lined usually with magnesite and holding about 165 tons of steel. It can produce usable steel under more widely varying conditions than any competing unit. It dominates the steel production of all the world today, our country using this furnace for about 90 per cent of the steel made. It is a continuously oxidizing operation. Temporary reversal of the oxidation reactions is possible in a limited way, but in practice the operation does not permit of any reducing process similar to the blast furnace or the electric furnace.

Open-Hearth Steel: Four important groups of commercial materials originate in the basic open-hearth furnace. Each is associated with furnace conditions that are different, but the shading from group to group is uncertain. The products shade one to the next, but while the boundaries are indistinct the fields are very different. Chemical specification does not clearly define the groups and for this reason any blanket scheme of tying all steels to chemical specifications fails to cope with this, the most important steel-producing unit of our times.

Open-Hearth Iron: The lowest carbon content materials are the so-called open-hearth irons, a series of commercially significant products which have as their outstanding characteristic the segregation of iron oxide during freezing to an extent that overshadows the usual freezing relation of iron and carbon. An open-hearth iron may be defined as an alloy of iron and iron oxide of such composition that the last freezing portion is the iron iron-oxide eutectic as distinct from the usual last freezing product which is the iron iron-carbide eutectic. The equilibrium diagram indicates composition of 0.05 per cent carbon with no manganese and slightly less carbon with manganese up to 0.20 per cent as the limiting compositions which freeze with iron oxide segregation as the governing phenomenon, the last freezing metal having a composition exceeding 0.20 per cent oxygen. This material is characterized by having definitely lower carbon in the center of the ingot, a very fusible intergranular oxide which makes the products difficult to roll in conventional steel-handling equipment.

Rimming Steels: When the carbon content is not below 0.05 per cent and the manganese content not below 0.20 per cent, the freezing proceeds with an increasing carbon content in the unfrozen portion. The last freezing portion of the ingot is definitely higher in carbon. An automatic deoxidation takes place during freezing and the ingot does not present the problem of intergranular oxide with its attendant rolling difficulties. The product is normal, soft steel of the so-called rimmed variety. Since gas evolution is a necessary part of this method of steel making, it is obvious that only such compositions may be rimmed as permit the solution of enough oxygen to provide the necessary gas. Commercially, with existing ferro manganese, the limits are about 0.35 per cent carbon with manganese around 0.30 per cent and about 0.60 per cent manganese with the carbon as low as possible, or approximately 0.07 per cent carbon.

Semi-Killed and Killed Steels: Above the range of rimming steels are groups of steels which extend nearly the full range of carbon and manganese, which have been subjected distinctly to the refining action of the open-hearth slags. They constitute the largest proportion of steels made in the basic open hearth. They are either partially deoxidized and termed semikilled, or they are fully deoxidized and termed full-killed steels.

Acid Open-Hearth Steels: The acid open hearth has a narrower field for its activity. The material used must be selected since neither phosphorus nor sulfur is removed. With the highest skill it is possible to make a steel with 0.10 per cent carbon and with manganese as low as 0.30 per cent, but usually only small furnaces and extreme skill make this possible since the silica sand bottoms must be retained in the melting hearth.

Bessemer Steels: The Bessemer steel converter is essentially a lined steel bottle with a perforated false bottom through which air is blown. A portion of the charge is burned to slag and gas. The siliceous lining has given to the American variation the name of acid Bessemer.

The acid Bessemer has distinct limitations as to compositions possible, and illustrates another of our peculiarities as to quantitative chemistry. The nitrogen content of acid Bessemer steels is an extremely serious part of their chemical composition, but it is exceptional to analyze either for the nitrogen present or to regulate the metal temperature to the vary narrow ranges essential for control of the content of this important element.

Electric Furnace Steels: The electric furnace has many shapes and does not depend upon oxidation reactions for the heat required to make the process commercially useful. This permits either oxidizing or reducing reactions to take place. In fact, either type of reaction may be stopped or reversed. The whole operation may be stopped and new slags substituted. The only limitation which is serious is cost. To date the cost of operation of the best electric furnace is about twice that of its competitor, the basic open hearth. The electric furnace is the unit which has made possible the great flood of patented compositions now in existence. The electric furnace can melt a heat of steel which in total is a few grams or it can, and does, turn out lots of 100 tons. The patent office does not put a limitation on the amount which must be commercially available.

Powder Metallurgy: Powdered iron pressed into shape and sintered to provide cohesion is no longer an academic affair. Some hundreds of tons of product are in service. When one considers that the variation of chemical composition is as nearly infinite as the ability to mix particles of material whose size is about one hundred mesh per inch, we realize

(*Please turn to Page* 80)

Steel INTERIORS

■ THE TREMENDOUS possibilities of steel surfaces, porcelain enameled, for beautiful decorative effects are demonstrated excellently in the recently modernized offices of Chicago Vitreous Enamel Products Co., Cicero, Ill., shown in accompanying illustrations.

Reception room, Fig. 1, features an interesting wall mural fired into the panels. Lighting is fluorescent tubes recessed in ceiling cove. Doors and venetian blinds are bronze. Receptionist's desk, Fig. 2 is black porcelain enamel. Back wall is calfskin brown with ivory panels. Terrazo floor has bronze detail insets,

Women's room, Fig. 3, is predominately grey. Area under mirrors is a delicate peach tone. It contrasts well with horizontal burgundy stripes and lavatories. Men's room, Fig. 4, has ivory lavatories to match wall panels, blue hand driers to match base wall panels. Ceiling is mulberry red with recessed circular skylight. Washroom, Fig. 5, is prussian tan with black panels.

All these interiors are 100 per cent porcelain enameled, work being done by Porcelain Products Co., Cicero, Ill., with Roy Blass, Chicago, architect.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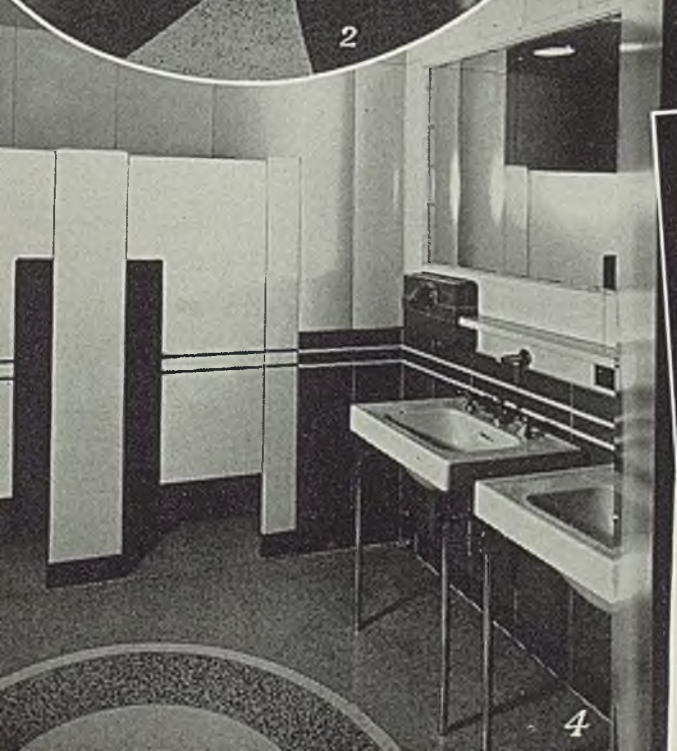
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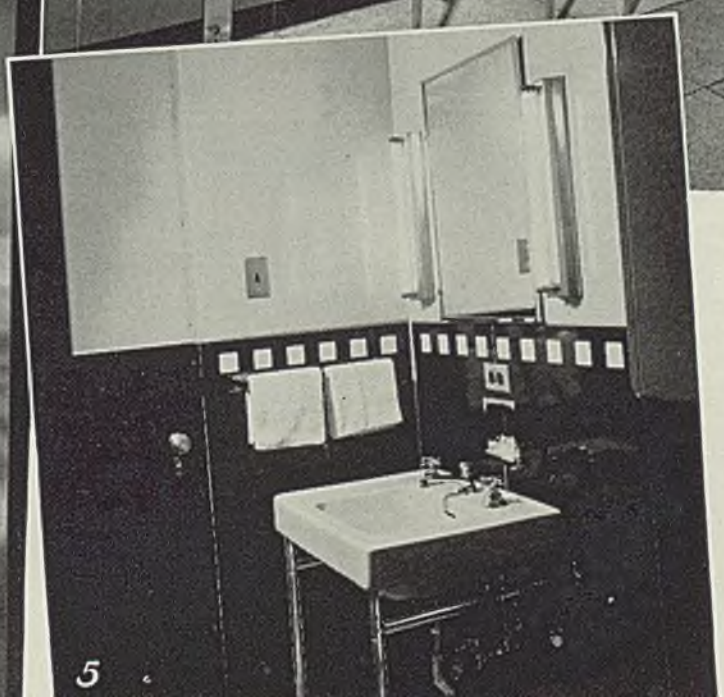
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Iron Powders in Europe

New pilot plant produces pure powders of metals by spraying. Method makes powder from any metal or alloy which melts under 1600 or 1700 degrees Cent. Powder applications are expanding

(Passed by British press and censorship bureau)

By W. D. JONES, M. Eng., Ph. D.
London, England

■ PROGRESS of powder metallurgy in the United States has been watched closely in Europe, and some attempts are being made to parallel the more interesting achievements. To a certain extent the manufacture of parts from metal powders in the United States is centered in the automobile industry. This is a little unfortunate for powder metallurgy in Europe because the automobile industry there is of small magnitude compared to American standards. Since, in many cases, large numbers of parts have to be produced before reasonable profits are assured, it follows that European concerns have to consider carefully whether to embark on the manufacturing of any article which perhaps may be a standardized outcome of powder metallurgy in the States.

However, during the last two years there have been encouraging indications of a gradual breakdown in the barrier of reserve which the British tend to erect before new processes and products. In fact, a number of concerns have been giving consideration to the manufacture by this method of such articles as small gears, tappets and various automobile parts.

Hand in hand with the manufacture of articles from powders there has been a close watch on the processes by which powders are being manufactured in the States. In particular, the article by A. H. Allen in STEEL, April 10, 1939, was read with great interest. Some of the market conditions cited in this article also apply to Europe and there exists a respectable market in numerous directions for pure iron powders at low price; the finer the powder and the lower the price, the better the market. Other than the well known Swedish sponge iron powder, there has been no supply of any kind of iron powder at a sufficiently low price to meet the circumstances.

The cost of the popularly appreciated "carbonyl," iron powder has only served to put it in the class of a luxury chemical, the only market for it being in the telephone and radio industry.

Following publication of STEEL'S extensive article on iron powder development work in the United States (STEEL, April 10, 1939, p. 43), emissaries of British metalworking companies visited this country to investigate the various processes discussed. Meanwhile, keen interest appears to have developed in Europe. With supplies of Swedish iron now menaced by Nazi aggression, the subject becomes still more newsworthy. Dr. Jones here reviews present trends in Europe with respect to iron powder. Unfortunately he is prevented from examining technical details more specifically

Carbonyl iron is made by passing pure carbon monoxide gas over ferrous material to form under proper conditions iron carbonyl, $Fe(CO)_5$, a liquid which is later volatilized to release the CO and pure iron powder. To some extent there has been commercial use of the liquid iron carbonyl as an antiknock fluid for gasoline and as a desulfurizing agent in the refining of crude petroleum.

The curtailment of supplies of this powder since September now is being met by the British firm of Bradley & Foster Ltd. through its sales agents Powder Metallurgy Ltd. This company now is taking steps to meet the demand for a reasonably pure and low-cost iron powder. Experiments with a pilot plant during the last six months having proved satisfactory, and a continuous tubular reduction unit of several tons capacity is undergoing test trials. Although it is known that experimental work is in progress in various quarters, nevertheless the writer believes that this plant is the only one in western Europe where a serious attempt is being made to satisfy the current market demands.

However, what may be of interest and news to American readers is the incidence of a new process for the manufacture of powders which may possibly be much in advance of anything so far attempted. The work is being undertaken by the organization referred to above. It involves a modified type of spraying equipment arranged in such a manner as to make it capable of handling metals and alloys with melting points up to 1600 or 1700 degrees Cent. In this plant are easily and quickly produced pure powders of any metal or alloy which is capable of being melted within this temperature limit.

Such a development of course opens up a completely new market for powdered alloys. Probably it will have extended and unexpected results in the development of new processes for the utilization of powdered alloys. Preliminary trials have been concluded using mild steels and low-carbon steels of the Armco type

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EVERY production man knows the secret of lower costs is more *running* time and less shutdown time. When a press must be shut down to regrind or replace tools that have fallen short of the job—valuable running time is lost—and idle time of press and operator eats into profits.

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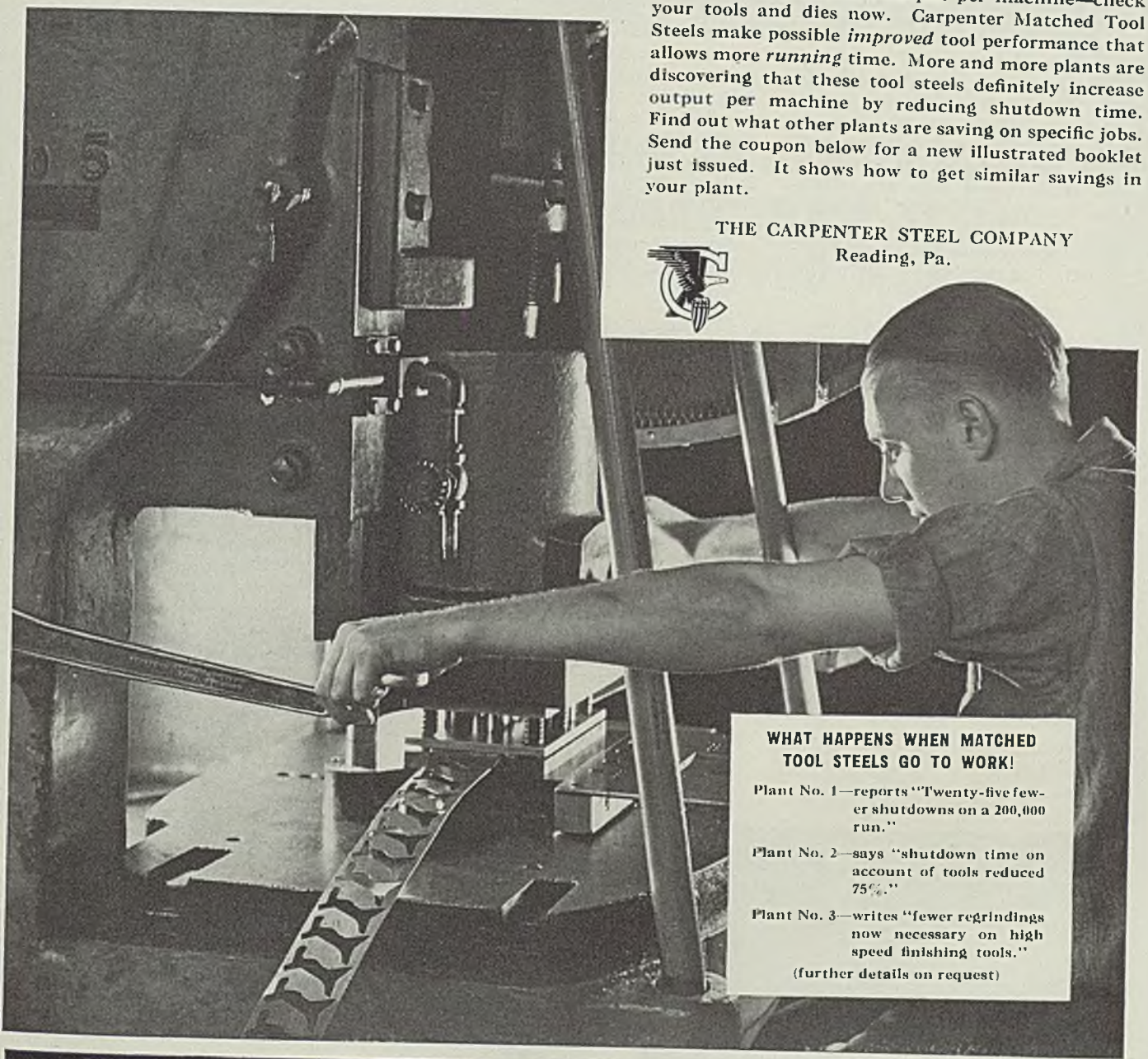

WHAT HAPPENS WHEN MATCHED TOOL STEELS GO TO WORK!

Plant No. 1—reports "Twenty-five fewer shutdowns on a 200,000 run."

Plant No. 2—says "shutdown time on account of tools reduced 75%."

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(further details on request)

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as basis metals. Such powdered steels made on a pilot plant are being marketed in England.

A wide range of alloy steel powders now has been produced and a small but growing market for them has been discovered. Naturally, completely new products of this type require a certain incubation period while their potentialities are being discovered and appreciated. Much labor is involved in supplying interested consumers with test samples for development and research.

Certain markets, however, already exist. The welding industry is taking appreciatively to powders of nickel steels, manganese steel and stellite, for example. Materials of the stainless steel type are of obvious interest to paint manufacturers.

Metal spraying by the powder pistol method is capable of making effective use of a number of the harder steels and also of the stainless types. These various demands, together with obvious applications such as nickel-iron magnetic alloys and permanent magnet alloys, are maintaining the plant in full production. It is hoped, however, that the time will arrive shortly when capacity will be provided for the examination of the more out-of-the-way alloys which may be of great interest.

This process of manufacturing and marketing every conceivable type of alloy steel in the form of a powder is a totally new development which apparently has not yet appeared in the States. As such, it is of great interest to the steel industry and should be observed closely. It may well lead to applications of alloy steels at present unexplored.

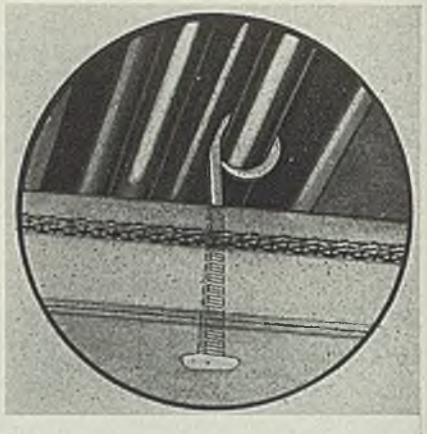


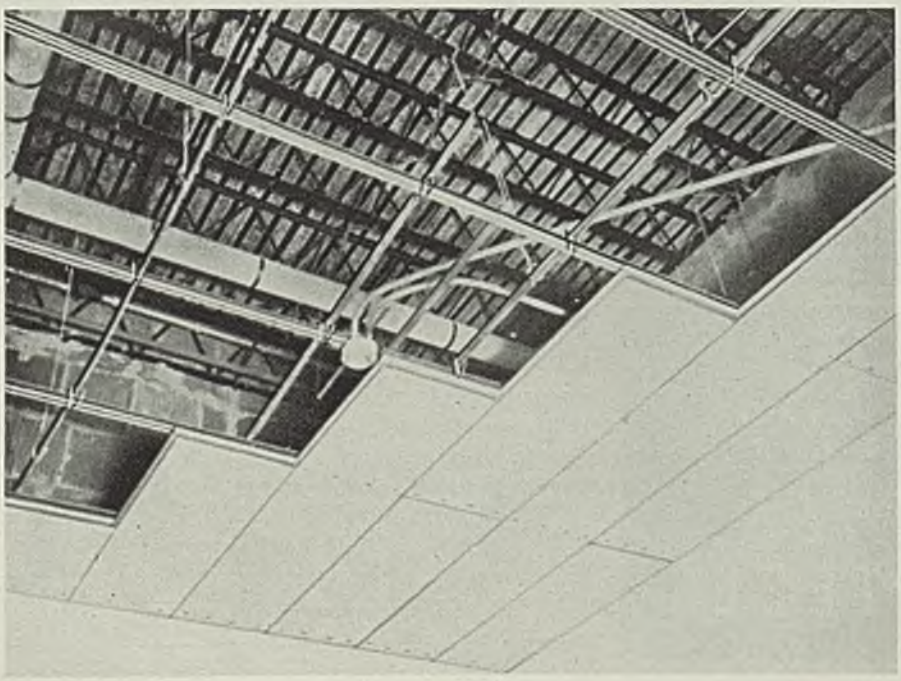
Fig. 1—Close-up view of rectangular cross-section nail acting as hanger to hold the gypsum board ceiling tightly against steel nailing channel. Oval-shaped spot in the lower portion of the illustration is the nail head

Nailing Channel Permits Ceiling To Be Attached Mechanically

■ BY MEANS of a new structural member developed by M. R. Price, president Union Acoustical Co., Leader building, Cleveland, fireproof and acoustic ceilings can be attached mechanically to steel joist and masonry. Method is based on a light-weight steel nailing channel which is secured to a drop frame where the ceiling is to be suspended.

Made of 16-gage cold-rolled strip steel, the channel is shaped in the form of an M, except that the twin channels have rounded bottoms. Running the length of each channel is a ¼-inch diameter steel rod, spot welded to bosses or cradles pressed into the bottoms of the channels at 6-inch intervals. The nailing channel, as shown in Fig. 2, is fastened open face down by wires

Fig. 2—The formed steel nailing channels are fastened to ceiling joists, open face down, by wires



to the steel joists of members to which the ceiling is to be suspended.

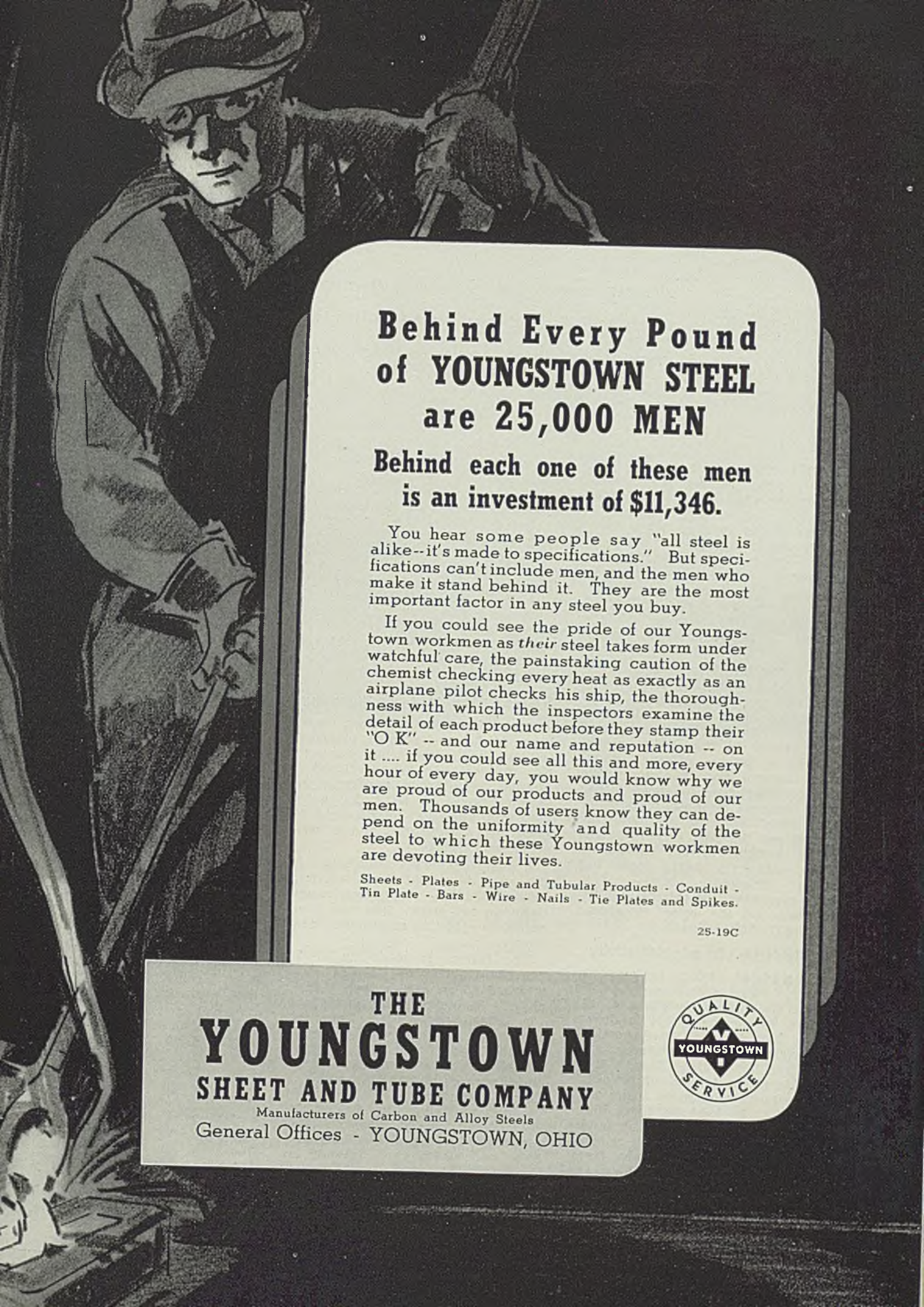
Specially-designed long rectangular cross-section nails are used to fasten ceiling material to the channels. These nails are driven through the ceiling material and, because of their shape, are guided by the contour of the channels and rods so that they wrap around the bar tightly, thus becoming hangers. The nails drive easily and furnish a tight permanent attachment, as shown by the close-up view in Fig. 1.

Ceiling Material Holds Tile

An important part of the development is the ceiling material used in conjunction with this channel. It consists of a 2-ply gypsum board, ¾-inch thick, with a core of 14-gage wire cloth. When this is nailed to the channels it serves as a base against which acoustic tile can be attached by means of screws. The wire core or screen in the gypsum board acts as a nut or thread to hold the screws, allowing them to be backed out if necessary. A small tool, of either manual or electric type, which works on the principle of a push drill and has a jig to hold and start the screws, is used to set the screws.

In side wall construction, the nailing channels can either take the place of studs or be affixed to masonry, and the gypsum board nailed on as outlined. The board, besides offering a base upon which plywood, paneling or molding can be attached, is suited to serve as a wall upon which most kinds of interior decorating can be applied directly.

The development, which is being handled exclusively by Atlas Supply Co., 4500 High street, Philadelphia, so far has been used in a number of current building projects in several states.



Behind Every Pound of YOUNGSTOWN STEEL are 25,000 MEN

Behind each one of these men is an investment of $11,346.

You hear some people say "all steel is alike--it's made to specifications." But specifications can't include men, and the men who make it stand behind it. They are the most important factor in any steel you buy.

If you could see the pride of our Youngstown workmen as *their* steel takes form under watchful care, the painstaking caution of the chemist checking every heat as exactly as an airplane pilot checks his ship, the thoroughness with which the inspectors examine the detail of each product before they stamp their "O K" -- and our name and reputation -- on it .... if you could see all this and more, every hour of every day, you would know why we are proud of our products and proud of our men. Thousands of users know they can depend on the uniformity and quality of the steel to which these Youngstown workmen are devoting their lives.

Sheets - Plates - Pipe and Tubular Products - Conduit - Tin Plate - Bars - Wire - Nails - Tie Plates and Spikes.

25-19C

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon and Alloy Steels

General Offices - YOUNGSTOWN, OHIO

QUALITY YOUNGSTOWN SERVICE

Applying Colors to Metal

Arrangement of steel masks, electromagnetic holding fixtures and infra-red drying equipment automatically coats 2400 hub caps each hour. Can apply as high as seven colors simultaneously

■ APPLICATION of decorative color to metal products is receiving increasing attention. Automobile hubcaps, bumpers, nameplates, louvers, radio grilles, instrument panels and many other parts are greatly enhanced in appearance by the addition of a few deft touches of color. However, proper masking of the part and preparation of stencils to isolate the color to spots desired is not always so easily done.

On production jobs, such as automotive hubcaps where the name is embossed on the cap and it is desired to apply color to the embossed portions only, it has been the practice to mount the plated cap on a fixture, adjust a metal mask over it and then spray the desired color over the mask. The paint adheres to those portions of the metal exposed through the stencil and the part then is passed on to suitable drying equipment. This method is fairly rapid but suffers frequently because of a high percentage of rejects and the tendency of the color to spread beyond limits desired.

"Highlights" Impair Reflectivity

On a plated surface, for example, where a name is embossed into the metal, the curved shoulders of the letters where the metal is drawn down into the depressed portions will reflect light in a different way than the flat surface does. These shoulders are termed "highlights" by designers who often insist that color shall be kept off these highlights so reflectivity will be unimpaired. The ordinary mask or stencil cannot prevent color paint from adhering to these highlights since it is a flat material and does not extend down into embossed portions of the metal.

One answer is to prepare a stencil of sheet metal in which the edges of the letters or insignia are curved or rolled over sufficiently to extend down over the shoulders of the embossing. When such a stencil, which incidentally calls for precision workmanship in its fabrication, is placed over the part, the color is confined properly and the highlights are retained. Furthermore the use of such stencils permits greatly increased speed of painting by virtue of the fact the operation can be made nearly automatic.

Great Strides Made in Stenciling

Stencil Engineering Corp., Dearborn, Mich., has devoted extended thought and engineering study to this problem and has developed a number of stencils applicable to various types of work for automatically applying color to plated materials, die castings and a variety of other parts.

A most interesting installation is the one developed for stenciling hubcaps. This comprises essentially an art stencil conveyor connected to a baking and cooling conveyor.

The former is made up of 24 conveyor plates of 14-gage steel attached to an endless belt. Each plate is 31 inches across and about 12 inches wide. Plates are cut out at one side to clear the electric chucks over which the hubcaps are placed in the operation. These chucks are curved to the exact contour of the cap and, as shown in the accompanying illustrations, include three curved steel sections, connected to suitable contacts and coils underneath the conveyor so they are electrified to hold the stencil down rigidly on the cap for a certain distance of their travel along the top of the conveyor. Contacts on the individual plates wipe against electric bus bars to establish this action.

Moving with the conveyor and carried by steel straps attached to the conveyor plates are 24 sheet steel stencils. As the caps are being placed on the chucks, these stencils are in the raised position, as shown. A roller at the end of the stencil arm rides on a cam rail and lowers the cap onto the chuck at a point about one-third the length of the conveyor. At this point, the magnetic force is applied, pulling the stencil down firmly on the cap, preventing slippage and insuring proper register.

Spray guns, either mounted on the machine or in the hands of an operator, direct the color paint over the center of the stencil in which the name is cut. The electric field then is released, cams raise the stencils and the caps slide down a chute onto the mesh belt baking conveyor as the conveyor plates turn over the shaft at the exit side of the conveyor.

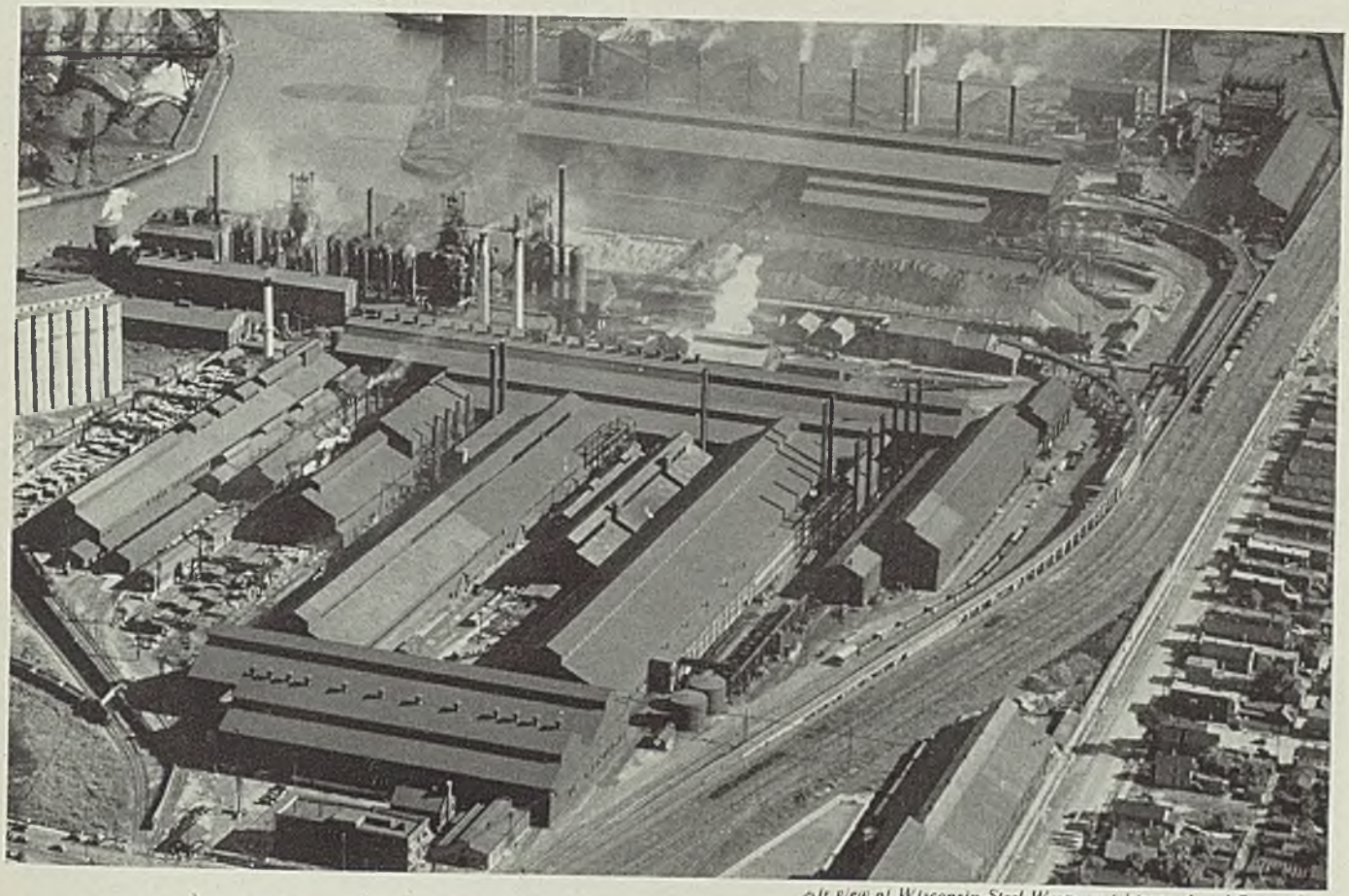
Excess Paint Dissolved

The stencil arms travel around the under side of the machine and pass through a degreasing chamber where a vapor dissolves excess paint from the outside, leaving them clean for the next application.

Stencil conveyor is 16 feet 7 inches long, 50 inches high and weighs 2000 pounds. Production is gaged at 1500 to 2400 caps per hour. Power for driving is supplied by a ¾-horsepower motor through a variable-speed control and a speed reducer. A small rod runs the length of the conveyor at one side. By moving it, an operator can start or stop the conveyor from any spot along the side.

The baking arrangement also is interesting, comprising a single-piece wire mesh belt 72 inches wide

The Right "FOLLOW THROUGH" Counts in Making Quality Steel



Air view of Wisconsin Steel Works by Chicago Aerial Survey Co.

Users of alloy and carbon steels recognize the value of dealing with a firm that "follows through."

Wisconsin Steel maintains a rigid "follow through" policy. It begins when the salesman writes the order. It continues through every operation at Wisconsin Steel's modern, up-to-date plant. A competent staff sees that the finished product measures up to the most exacting specifications.

Wisconsin Alloy and Carbon Steels are being used successfully by manufacturers in many lines of business. Ask us to point out how your business can benefit from Wisconsin Steel's "follow through" policy. We are well equipped to supply a full range of alloy and carbon steels, as well as high quality pig iron that is "better controlled from mine to mold." Write or phone us. Inquiries will receive prompt attention.

WISCONSIN STEEL COMPANY

General Offices:

180 North Michigan Avenue, Chicago, Illinois

Affiliate of International Harvester Company

WISCONSIN STEEL

and 124 feet in length. The conveyor thus is about 60 feet long and is wide enough to handle the output of at least three stenciling machines. Four banks of 66 infra-red ray lamps are arranged at the entrance end of the conveyor, forming a dome-shaped oven over the belt.

The lamps are packed closely together with gold-plated reflectors touching one another. Each bank of lamps is controlled through 12 sets of switches, permitting use of a part of the bank or all at will.

Thus, there are 264 infra-red ray lamps nested together and controlled through 48 switches placed at one side and above the lamp bank. The lamp bank occupies about one-half the length of the conveyor, the remainder being used for cooling. The colored caps can be packed for shipment as they reach the discharge end of this conveyor.

Baking conveyor can be run at somewhat slower speed than the stencil conveyor and still maintain the production of 1500 to 2400 caps per hour since six caps can be placed in a row across the conveyor. Drive arrangement is similar to that on the stencil conveyor with ¾-horsepower motor, reducer and variable-speed control unit.

Similar installations can be designed for automatic coloring of a wide variety of parts, both large and small. It is even possible to prepare suitable stencils for multi-coloring with as many as seven colors being applied simultaneously.

Future possibilities of the system are seen as particularly important in the field of electrical appliances where the use of color is coming into greater demand. Equipment has been designed as well for stenciling steel wire mesh cloth (wire mesh over which flocking has been sprayed to give a cloth effect) for various types of radio grilles.

Other possibilities of the system are in the masking of plastic radio cabinets. These plastic radio cabinets can be molded in an inexpensive black plastic and can be masked in various colors. Stencil Engineering Corp. has gone into the masking of plastics and has an application to apply a color material that freezes directly to the plastic mold.

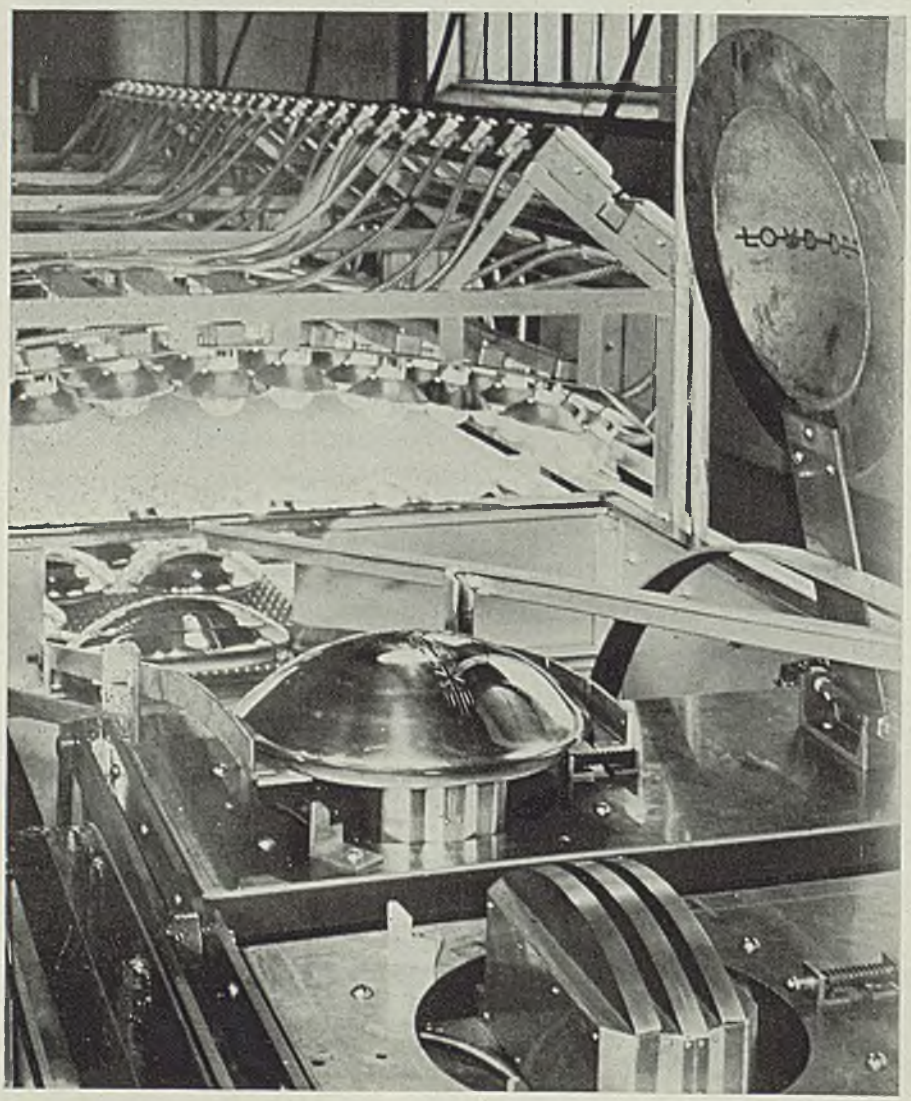
The horn button illustrated is an interesting piece of masking with this particular system because after the horn buttons are stamped, a steel fastener plate is inserted in the reverse side of the button. Placing this inset in has a tendency to distort the original stamping, making it almost impossible to protect the highlights of chromium which the designers want shown. The ordinary hand mask on this operation is most difficult to use because no one mask will fit the thousands of buttons manufactured due to the distortion in placing in the inset.

Use of specially prepared sheet steel stencils permits much greater accuracy in spotting contrasting colors on parts, as has been pointed out.

While fabrication of the stencils is a tedious operation, requiring painstaking skill on the part of operators, this cost appears more than justified when the results in the form of improved appearance and greater production speed are weighed.

Moreover stencils, too, have considerably longer life than ordinary types. The steel stencil usually is protected further after fabrication by giving it a flash coating of hard chromium which also prevents rusting.

Hubcaps descend chute from stenciling conveyor onto wire mesh belt which carries them under banks of infra-red ray lamps to bake color paint. At right in raised position is steel stencil which is lowered over caps riding on magnetic chucks to permit spraying paint into embossed lettering

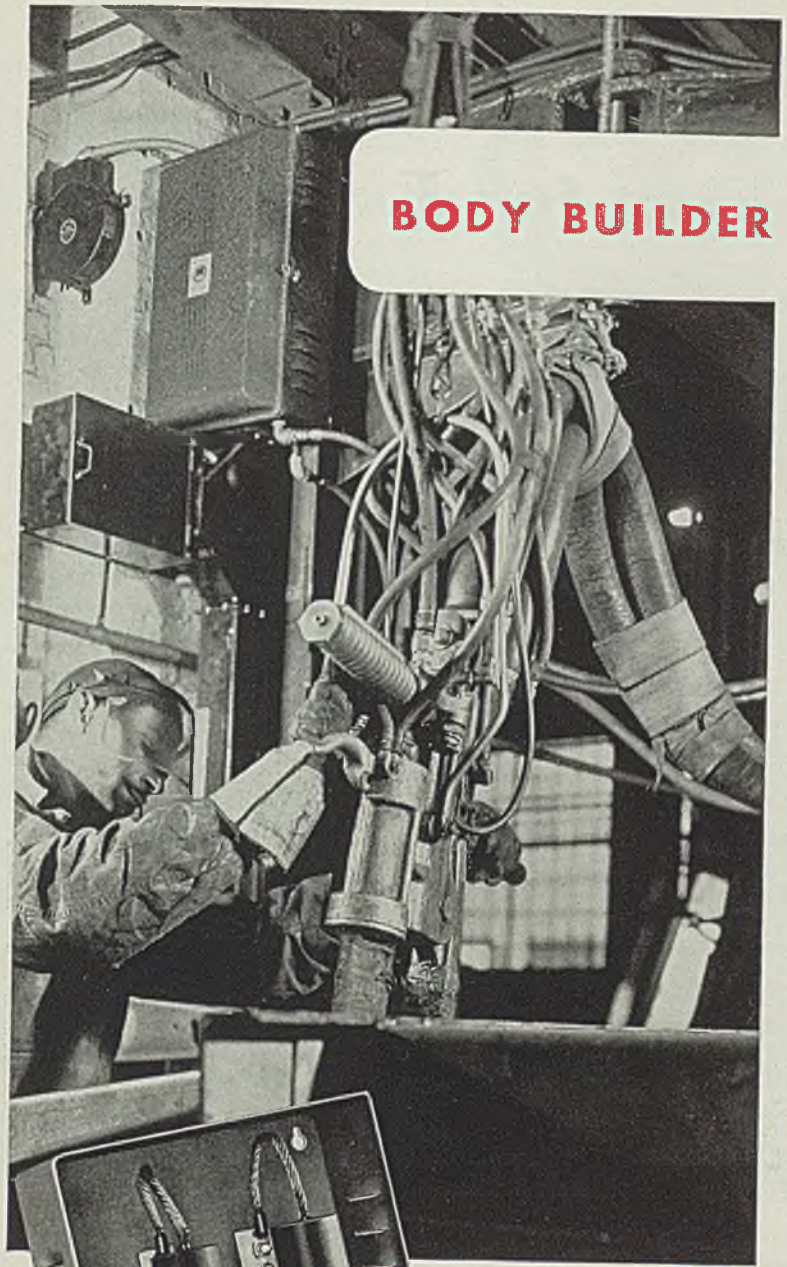


♦

Packing Material Has Unified Construction

■ A new packing material for shafts, etc., known as Lattice-Braid, is announced by Garlock Packing Co., Palmyra, N. Y. It features unified construction in which every braiding strand is passed diagonally through the body of the packing at a 45 degree angle, providing an internal as well as external braided construction.

Construction prevents disintegration, no matter how badly the packing is worn, and offers a flexibility which makes it possible to be used around small diameters. The packing also provides controlled porosity and semiautomatic action. The former is predetermined and remains in the packing, while the latter is the result of a combination of the mechanical pressure which the gland brings to bear upon the packing and the fluid pressure confined in the packing itself. It is made of long asbestos yarn and is readily available in sizes of ⅜ to 1-inch.



BODY BUILDER BOOSTS PRODUCTION

100%

WITH *NEW* RESISTANCE WELDING EQUIPMENT

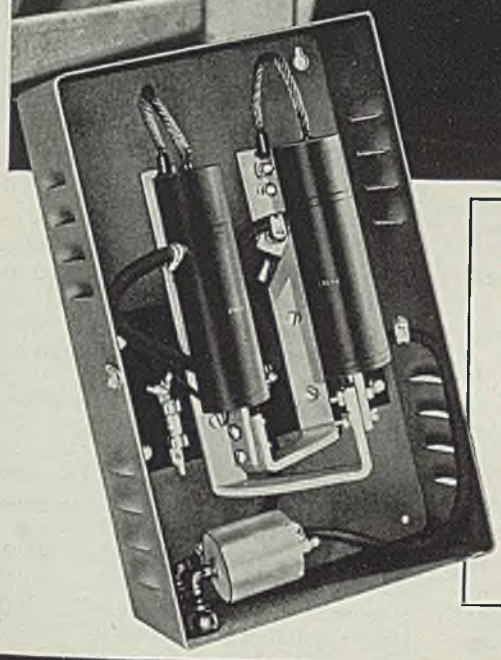
WELD-O-TROL—the new resistance welding switch WITHOUT A SINGLE MOVING PART was an important factor in an installation of five Weld-O-Trol equipped gun-welders at Gar Wood Industries, Inc.

Bodies are now stronger—more rigid—warping is eliminated. Operators can now change the weld-cycle as they move along the body to accommodate the different thicknesses of metal.

But Gar Wood Industries haven't stopped with these improvements. They've added a Weld-O-Trol equipped, sixth gun resistance welder, and stepped up production an additional 40%! And when this picture was taken, more Weld-O-Trols were on order for more gun-welders at the Gar Wood plant.

This "success story" at Gar Wood Industries is an indication of what Weld-O-Trol might do in your plant . . . if you'd like to know more about its moneysaving features, drop us a line. Ask for Bulletin F-8451-A.

WESTINGHOUSE ELECTRIC & MFG. CO.
EAST PITTSBURGH, PENNSYLVANIA



WELD-O-TROL THE *NEWEST* DEVELOPMENT IN RESISTANCE WELDING GIVES YOU THESE ADVANTAGES:

- **REDUCED OUTAGE CHARGES** — current turned "on" and "off" 600 or more times per minute.
- **BETTER WELDS** — no mechanical delay — no stopping and starting.
- **REDUCED MAINTENANCE** — no moving parts to wear out.

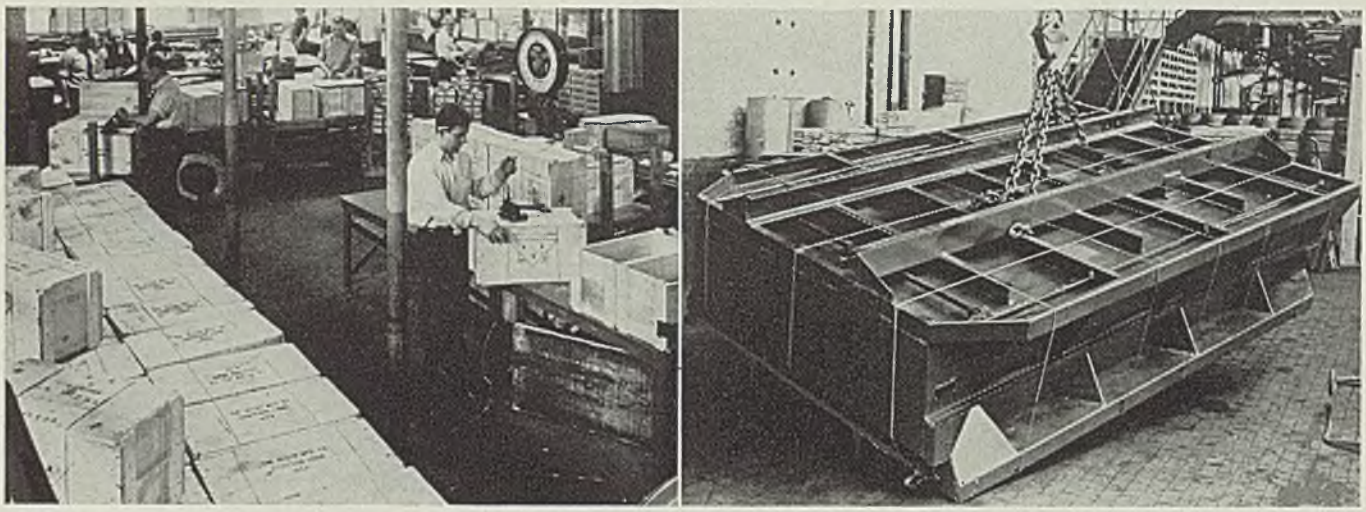
Tune in "Musical Americana", N. B. C. Blue Network, every Thursday evening.

J-21065

Westinghouse Weld-O-Trol

Packing for Export

Steel ties afford valuable strengthening to shipping cases and also obviate need for crates in some instances. New method of cross bracing uses diagonal ties to absorb the torsional stresses



Right, $16 worth of lumber per package of two truck bodies is saved by this method of shipping as all crates and skids are eliminated. Two bottom rails serve as skids. Left, two wire straps around packing box permit thickness of sides, top and bottom to be reduced approximately 36 per cent, another important saving

Part I

By W. J. AUBURN
Gerrard Co. Inc.
Chicago

■ WITH the growth of inquiries and orders from Central and South America and the rest of the world not immediately involved in war, more attention is being given to export shipments. Proper packing for handling is of utmost importance.

Ordinarily but ten per cent of United States production has been allocated to export trade but American sources are now absorbing the requirements of customers of many of our former foreign competitors.

American shippers must offer the highest possible degree of quality and service to keep our new-found Latin trade for the future. Shippers of steel products, fabricated metal objects, machines and products of every variety are beginning to see the light that may aid our future economy and our future national welfare in foreign trade.

It is a necessity that shipments reach their destination safely even on longest journeys. Damage claims are costly not only in dollars, but in time lost. Hence proper protection and re-enforcement are essential. Wire strapping for export packages, crates, boxes and cartons has been found helpful.

From the shipping point via railroad freight car, truck or express to the hand truck, shipboard sling and with all the bumps, jars, crashes and nicks pertaining to these journey waystations, export shipments receive a consistent schooling of hard knocks.

On shipboard heavier cargo may be piled on top, or improper stowage in the hold as well as storms at sea may cause cargo slippage. Often delivery is by mule, llama or camelback, ox-cart or in old cars jolting across rivers and arroyos. Packages thus require careful preparation.

Cases may be twisted out of shape unless they have sufficiently strong re-enforcement to withstand abrupt torsional strains. Similarly, sudden jars and drops often break open cases, crates and cartons. Cases thus must be rigid. All export shipping regulations demand it.

Airplane shipments require light but strong packing on account of high transportation rates. Here rigid wire strapping may eliminate much lumber and other crate protection.

Galvanized round wire strapping for export usually requires but two

(*Please turn to Page* 74)

NEW RECORDS are in the Headlines

"They call me, 'Decathalon Fleetweld' because I excel in so many events. I *run* fast and smooth. I *hurdle* production obstacles. I *heave* more metal into the joint—less into spatter. I *jump* into new fields to conquer. I *throw* light on tough welding problems. I *vault* to new highs in weld quality and economy.

"Where do I get such versatility? From the inherent ability given me by my maker to win over others of my type. And I'm aided a lot by a versatile welding control—that of the New *'Shield-Arc'* and *'Shield-Arc Jr.'* They're equipped with 'Job Selector' which can be set for any TYPE of arc and with Current Control which can be set for any arc INTENSITY. Each is *continuous* in selection and self-indicating. I'm *sure* to get the *exact* arc I need to get first place in every welding event.

"Put us on your team and watch us win profitable points and help you set new records in design, manufacturing and construction. Yours for Progress.

"FLEETWELD ROD"

World's Fastest, Most Versatile Welding Performer—For Sale by

THE LINCOLN ELECTRIC COMPANY, Cleveland, Ohio.

Largest Manufacturers of Arc Welding Equipment in the World.

In line with Lincoln's policy of ever reducing the cost of welding, this Company has announced new low prices for electrodes, welders and supplies. For example, the 75-amp. *"Shield-Arc Jr."* Welder is now only $148 for portable model shown. Complete with "Job Selector" and Current Control to cover the entire welding front—weld all types of work and kinds of metals. This is lowest price ever set for a high-quality motor-generator type d.c. welder. Get details today.

Call the nearest Lincoln office or mail the coupon for details.

LINCOLN "SHIELD-ARC" WELDERS

The *head line* for profits on the welding front

THE LINCOLN ELECTRIC CO., Dept. Y -26, Cleveland, O.

Send free bulletin on New motor-driven *"Shield-Arc Jr."*

Name _____ Position _____

Company _____

Address _____

City _____ State _____

Transformer Steel Takes a New TURN

By W. E. RUDER
Research Laboratory
General Electric Co.
Schenectady, N. Y.

Electric industry is enabled to use silicon steel as core material most effectively by new core assembly method which utilizes directional effect produced by rolling the steel

■ SILICON steel, since its discovery by Sir Robert Hadfield at the beginning of the century, has become indispensable to the electrical industry. Valiant and persistent effort has been made to find a satisfactory substitute, but its position as a magnetic core material for all types of electrical apparatus remains unchallenged. It is used in transformers ranging in size from the small radio type using less than a pound of sheet to large power transformers like those at Boulder Dam, each unit of which may contain over 50 net tons of silicon alloy.

History of Development

By the time the results of Hadfield's experiments were published, the possibilities of alternating-current systems were being realized so the announcement of an improved transformer core material caused an immediate response. Gumlich in Germany called attention to the advantages of high resistivity in reducing eddy current losses and inspired the German mills to produce a new alloy in sheet form. In the United States, W. S. Moody, following the lead J. F. Kelly's work on silicon alloys had given him, eagerly accepted Hadfield's suggestion and with the capable assistance of H. E. Sheldon and his staff of experienced sheet steel makers took up the task of making sheet from this new alloy steel.

It was heartbreaking. Hadfield reports that it was not until 1906 that his own firm was able to "sell a single ton of the new alloy, and still later before its production became possible on a manufacturing scale." Progress was more rapid in Germany, however, where heats were cast in 1903 and early in 1904. By 1905 a considerable amount of the new alloy was being used in transformers.

Progress in quality since that time has been steady if not spectacular. Watt losses have been reduced from about 1.20 watts per pound at 60 cycles and at 10,000 gausses to the present day value of "under 0.52" for the best selected grades. Once the problem of making satisfactory sheets was understood, the metallurgists, chemists and physicists contributed to improvement of the product. Today this important alloy is made and treated throughout its course from steel mill to finished transformer with a watchful care given few "tonnage" products.

Determining the contribution that silicon steel has made is difficult. The great Boulder Dam transformers, each containing over 50 net tons of 0.014-inch silicon steel sheet would be impossible without silicon steel. Thus a comparison of losses on the basis of three to one for the best unalloyed steel as compared with silicon sheet gives only a part of the story. But in a single one of these great transformers, the alloy effects a saving of well over a million kilowatt hours per year.

Greatest savings accrue from use of silicon steel in distribution transformers where core losses now are only slightly over 30 per cent and the exciting current 38 per cent of what they would be if the best grade of unalloyed iron were used, an increase in efficiency of 1½ per cent. On a 15 kilovolt-ampere transformer this means about 1300 kilowatt hours per year.

Grades and Specifications

Silicon alloy sheets are graded by silicon content into "armature", "electrical", "motor", "dynamo", and "transformer" grades and sold under guaranteed maximum watt

TABLE I—Core Loss Standards

(Most commonly used thicknesses in each grade in bold-faced type.)

U. S. Sheet Gage No.		29	28	27	26	25	24	22
Thickness in inches		.014	.0156	.0171	.0187	.0218	.025	.0312
Weight per sq. ft. in pounds		.562	.625	.688	.75	.88	1.0	1.25
Grade Name*	Approx. Si. %							
Armature	0.5	1.30	1.38	1.46	1.55	1.75	1.98	2.50
Electrical	1.0	1.17	1.23	1.29	1.35	1.50	1.70	2.17
Motor	2.5	1.01	1.05	1.09	1.14	1.22	1.30	....
Dynamo	3.5	.82	.86	.90	.94	1.02	1.10	....
Transformer I	4-5	.72	.76	.80	.83	.90	.97	....
Transformer II	4-5	.65	....	....	....	....	....	....
Transformer III	4.5-5	.58	....	....	....	....	....	....
Transformer IV	4.5-5	.52	....	....	....	....	....	....

*These are generally accepted designations of grades. They may be modified somewhat by the addition of commercial trade names.

losses for each grade. Table I shows latest guaranteed values of core losses for electrical sheets. They are the same for all manufacturers. These values are based on standard epstein tests made at 60 cycles and a density of 10,000 gausses in accordance with the method prescribed in A.S.T.M. Designation A:34.

In addition to meeting the magnetic quality requirements, sheets must be flat, accurately sheared, of good surface, minimum gage variation and free from brittleness. Also they either must be free from scale or have a tightly adherent scale as the application may demand.

Cold Rolled Silicon Strip

Silicon alloy in strip form has long been the dream of the electrical manufacturer. Smooth surface, accurate gage and width, and extremely long lengths characteristic of strip are all very desirable attributes.

Until quite recently, it was not possible to produce strip with satisfactory watt losses at a cost which would compete with hot-rolled sheet. This situation has changed in recent years, however, and now several electrical sheet manufacturers are offering a satisfactory product in strip form that meets the same watt loss guaraantees as sheet.

Directional Effect

Scientists have known for almost 20 years that the crystalline grain in silicon steel has a pronounced directional effect; that is, it carries magnetic flux much more readily in one direction of its cubic axis than in others. This they call "anisotropy." Its effect has been known to engineers for many years as a quality associated with the rolling direction of the sheet.

As a result of this, designs are always made to have the magnetic flux travel as nearly as possible *with* the direction of rolling. Smith (U. S. patent 1,915,766) discovered that this directional effect could be enhanced greatly by cold rolling and heat treatment. Later Goss and Freeland followed this idea further and developed a silicon alloy strip that could be produced in cold-rolled strip form and that had magnetic qualities in the direction of rolling approaching those of single crystals.

This directional quality strip was of little use to the art at the time as most transformer cores were made from punchings in which the magnetic flux traveled at various directions with respect to the rolling direction. Even in cores assembled from straight strips, the flux had to travel across grain at the corners.

Another dream of the transformer designer had been to make up his core from a continuous wound band of steel and so simplify his construction. What stood between the dream and its realization was the apparent impossibility of applying the strip to any kind of a conductive winding without straining the metal, for strain is fatal to magnetic quality.

J. C. Granfield, a General Electric transformer engineer, solved this problem by a simple, ingenious and practical method whereby a thoroughly annealed coil of strip can be applied to an insulated conductive coil without introducing the least strain in the magnetic material.

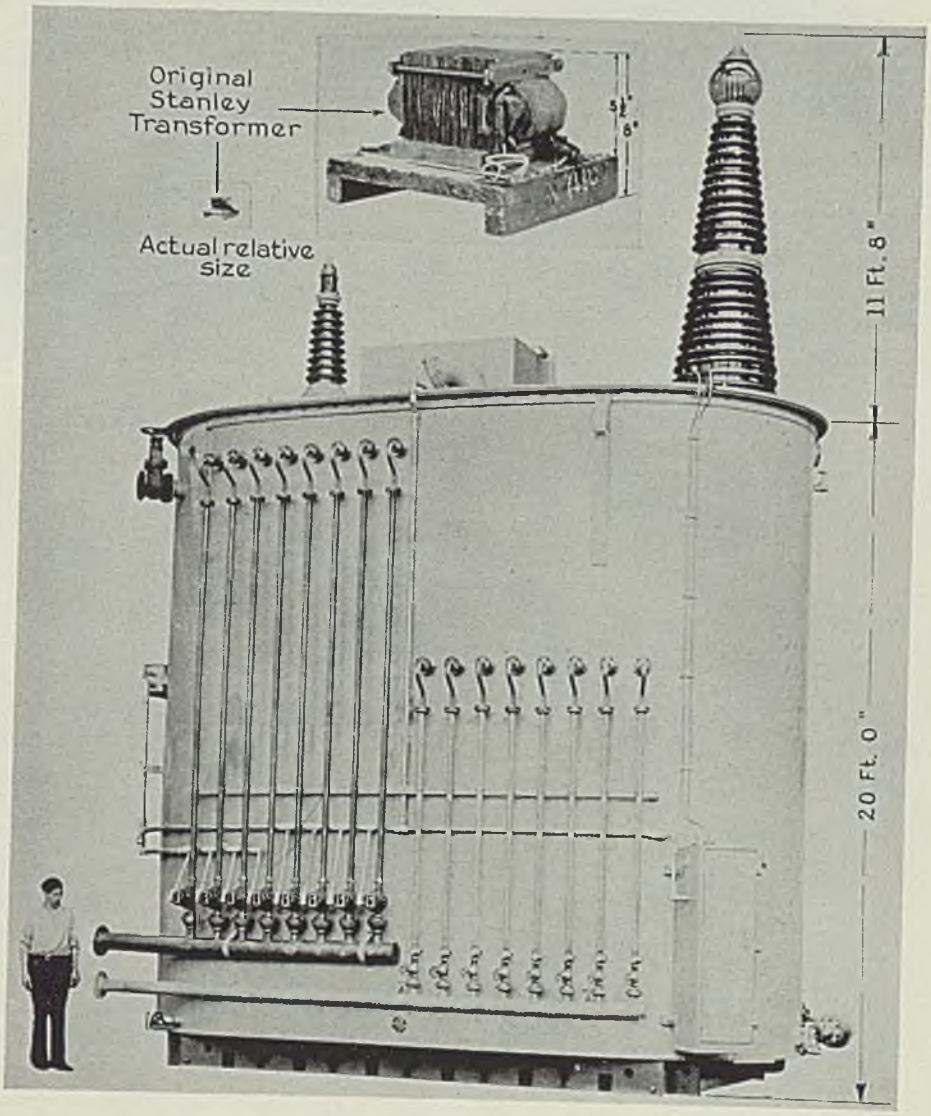
A transformer construction was devised using the newly developed high quality strip in such a way that its outstanding properties could be utilized to the fullest extent. The magnetic flux induced in the silicon strip is all in the direction of the length or rolling direction of the strip, which is the direction in which it has lowest losses and highest permeability.

The combined use of a new core material of exceptional quality with an ingenious transformer construction and with an ingenious method of application of the core has resulted in a radically improved transformer, lower in cost, sturdy, compact, and symmetrical in construction with an ideal magnetic circuit having minimum air gap reluctance and core loss. A quick, simple, and efficient machine operation is substituted for the slow and expensive manual operations formerly necessary in assembling a core of individual punchings with a conductive coil.

Construction Is Unique

Fig. 1 shows a section of a transformer coil. The core C is placed over a suitable post or roller E. The tack welds are broken, and end of strip is carried in a clockwise direction through window A and brought around to form a fairly large loop F, end of strip being fastened to next underlying turn as at G.

Core C then is rotated together



This illustrates graphically the development of electric transformers in 50 years from the original Stanley transformer, built in 1886, to the huge Boulder Dam unit of 1936

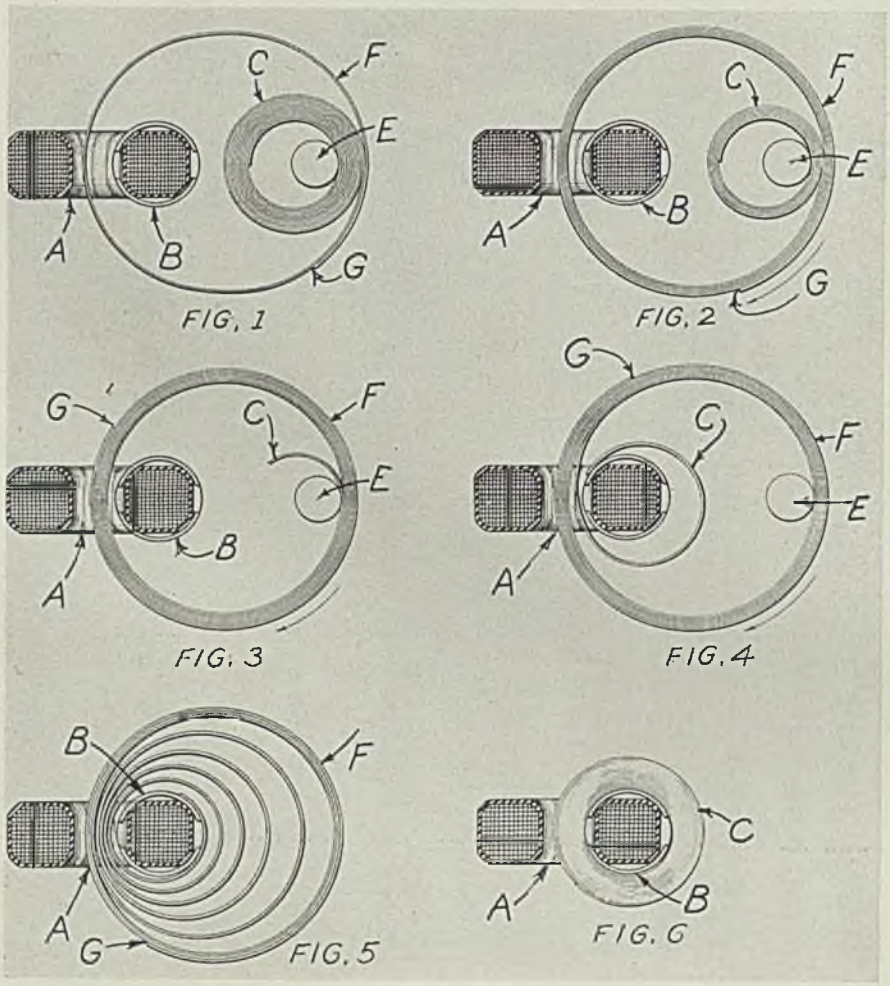
with the large loop F which permits the strip to be unwound from the core C and simultaneously rewound into the loop F.

At Fig. 2, half the material of the core C has been wound into the larger loop F. Because the loop F has a larger diameter than outside diameter of core C, number of layers in large loop is so much less than number in core C that large loop may be rotated freely through window A in the winding structure without scraping or in any way damaging the insulation B.

Further rotation of loop F beyond the position shown in Fig. 3 permits the inside turn of strip C to wrap itself about the leg of the winding B which it does (Fig. 4) by reason of the permanent set imparted to the strip during heat treatment. The post or roller E then is lifted out of the way and the fastening G broken, whereupon the coil of strip collapses to the general shape shown in Fig. 5.

Because of the permanent set imparted by the heat treatment, the coil of strip tends to collapse to the exact physical condition it was in when heat treated, but friction of edge of strip on work table causes strip to assume shape in Fig. 5. The operator then temporarily clamps the inside turn of the strip down into the completed form C shown in Fig. 6. Spot welding end of strip to the underlying turn completes the operation.

Here Figs. 1 to 6 show how continuous core is assembled or "wound" into the coil structure to form the transformer. Steps are detailed in text



Directory of Canadian Industry and Trade

■ *Canadian Trade Index*, 1940; cloth, 842 pages, 6½ x 10 inches; published by Canadian Manufacturers' association, Toronto; supplied by STEEL, Cleveland, for $6.

This is an authoritative source of reference on what is made in Canada and who makes it. The current issue has been revised thoroughly as to names, addresses and classifications. The export section also has been completely revised and includes information on the effect of the war on export trade and Canadian foreign exchange control board regulations affecting exporters.

The editors believe in war time the information made available in this volume is of more than ordinary value as world disturbance causes effort to obtain new sources of supply.

Five sections cover a broad field. The first is a special export presentation; Part II is an alphabetical list of manufacturers with addresses, branches, export representatives, trademarks, brands and milar information; Part III is a directory of Canadian manufacturers, classified according to their products; Part IV is a similar directory of producers, shippers and exporters of agricultural machinery and similar lines. The fifth section is an alphabetical list of headings in Part III. in French, with parallel English. The various sections are on contrasting colors of paper to assist ready reference.

Wetting Agent Speeds Up Core Making

■ Nonferrous metals can be cast over smooth, fine cores by treating the cores with a small percentage of Sulfatate, a new wetting agent, manufactured by the Glyco Products Co. Inc., 148 Lafayette street, New York.

After baking the core the first time, it is dipped into a solution of 1 pint molasses, 10 pounds graphite, 1 pound Sulfatate and water sufficient to make 5 gallons, and then re-baked.

Addition of Sulfatate eliminates necessity of hanging the core to allow excess graphite-molasses mixture to drip off. When the core is withdrawn from the solution it breaks away cleanly. Resulting castings are said to require less machining.

New Process Protects Aluminum Surfaces

■ Pylumin, a process which provides an inexpensive and rapid method of producing paint base coatings on aluminum and aluminum alloys has been introduced by Pyrene Mfg. Co., Newark, N. J. It not only provides a base for finishes but is equally efficient for the protection of the metal itself. The surface of aluminum when treated with this process is converted into millions of minute molecular groups providing interstices into which the finish flows.

The combination of a Pyluminized surface and paint seals the surface of the metal so that it is impervious to severe atmospheric conditions. Because of the cohesive quality provided, the final finishes will not flake or peel off under shock or vibration. An important feature of this development is its characteristic of arresting the spread of corrosion in event any portion of the finish is seriously damaged.

THOUGHTS ON POPULAR COATS NO. 1 *By Hanlon-Gregory Galvanizing Co.*

The CLAW-HAMMER COAT

Even before Darwin suggested the association of men and monkeys, men attained to dignity by the paradox of wearing tails. Just why a tail, or a pair of tails should dignify a man is as deep a mystery as a woman's interest in what passes for hats. Still, a claw-hammer coat vested a man with pride and dignity; it gave him an air, a dash, a sense of importance. As a utility garment it had many drawbacks, but many gentlemen with views toward protection, inner and outer, looked with favor upon pockets in the tails wherein they might conceal flasks or firearms. Gentlemen with views toward protecting outdoor steel construction look with favor upon another type of coat—HOT DIP GALVANIZING. Here is a protective coat that resists rust and corrosion for years. HANLON-GREGORY HOT DIP GALVANIZING process guarantees a coating of zinc that becomes an *inseparable* part of the base metal. Where rust is a factor, nothing serves so long for so little as Hot Dip Galvanizing.

HANLON-GREGORY GALVANIZING CO.
PITTSBURGH **PENNA.**

BETWEEN HEATS WITH Shorty

■ Say fellers:

Goin' through the cast house of "B" furnace last week I stopped to watch Nick Racco, one of the runnermen, and John Stanko, the keeper, loadin' up the clay gun. They had a barrow load of clay in the hopper and barrel of the gun and Nick had gone after another load.

Shortly he came out of the clay shanty pushin' the clay in a barrow 'quipped with a rubber tire. Had about 20 pounds pressure in 'er and was ridin' the gouged-out brick floor like a dandy.

Nick seein' me eyein' his new barrow drops the handles and hollers, "Hey boss, how you like 'em? Ain't she son of a gun?"

"Sure is, Nick," I sez. "How many miles you get on a gallon?"

"Jeemanie whiz, Shorty, no can figure 'em up. I knowa dis, though. She wasa got by every red light and Nick he no getta traffic ticket, you bet."

Storekeeper Passes One Out

"When you get 'er?", I asked.

"Yesterday. Boss he was give me order for new barrow and I wassa dive over to storeroom and say to storekeeper, 'Hey you, queek, give me for one handout. Ticket say new push buggy with plenty of rubber tire.'

"Pretty soon I walka 'cross yard pushin' new wheel buggy and engineer on hot metal train he blow 'em whistle, toot-toot, jus'a like dat, and then he yell, 'Hey Nick, how you trade?'

"I say, 'Son of a gun, no. Yoursa too mucha cost.'

"You knowa somet'ing, Shorty? Dis buggy she be alright, I betcha my life. Come over brick nice. Plenty of cushin'. No bad on back. No catch-em bounce on shoulders. Old one she go booma de boom over floor and right away shoulders she be goin' crazy."

And all the time Nick was pourin' out his O.K's. he was shovelin' the clay into the hopper of the gun. When he finished he wheels the barrow over near the side of the cast house, washes off the clay still clingin' to 'er sides, picks 'er up by the handles and parks 'er in the clay shanty.

You know, fellers, plenty o' boys workin' for my company are like Nick's barrow: they don't seem to get any further than they're pushed. You move 'em on a certain job and there they stay until you pick 'em up and move 'em on to some other job.

Say, you got any like that in your plant? . . . You don't, heh . . . What's that you're sayin'? Yard engine's makin' so much noise can't hear you . . . Oh, you do, huh? Sorta thought so for the boys up in the sales office tells me you ain't givin' way any extras on wide coils these days.

Reminds me of a little blast furnace I saw the other day standin' out all by 'erself, defyin' the weather. But I'm 'fraid she has lost the battle.

Four old McClure stoves that at one time were the berries for heat, but fell by the wayside when progress swept through the valley like a cyclone, were sittin' there cold as a corpse. There they were—rustin' away not far from the old brick blowin' engine house where a couple of old Tod engines used to put 52,000 cubic feet of air through the cold blast main every minute. They used to wheeze a little when the gage at the furnace got up 'round 20 or 25 pounds but they did the trick jus' the same. Bet them old walls could tell you and me some interestin' tales and I don't mean Dicken's, either.

Lots of ore 'neath the old wooden trestle but the little skip wasn't takin' the stuff to the top. Sorta like the little nations today: can't hold 'er own in the face of the big boys, I guess.

No. 2's about ready to cast and I got to head that way. I'll be seein' you.

"Shorty" Long

Powder Metallurgy Makes Satisfactory Progress

■ Despite certain definite limitations, such as size of parts feasible and strengths obtainable, progress of powder metallurgy appears to be proceeding uninterruptedly toward new goals. R. P. Koehring, metallurgist, Moraine Products division, General Motors Corp., Dayton, O., made this observation in addressing the Toledo, O., group of the American Society for Metals, May 27.

He reviewed the development of powder metallurgy, particularly in the past two decades, and described various types of parts of copper and tin powders, and iron powders, now in current production. A significant new application of the copper and tin powders is in fabrication of small filters used in diesel engine injection units. These are molded of 50-mesh powder and then sintered. They have proved much more effective than the stacked-plate type of filter, he stated.

Moraine Products currently has in production a variety of small pieces of iron powder, including oil pump gears, radio parts, washing machine parts, spherical self-aligning bearings, etc.

Mr. Koehring described several types of presses used in compressing powdered metals. The setup for molding a bushing, for example, comprises a lower punch, an upper punch, a pilot bar, a stripper punch, all contained in a die barrel. Both mechanical and hydraulic presses are used, one rotary press of the mechanical type being operated with 16 sets of tools, capable of molding 128 pieces per minute.

Important consideration in molding pieces of powder is the ratio of length to wall thickness, if a tube, or length to diameter, if a solid piece. Too high a ratio results in excessive variations in density throughout the length.

He showed an example of an oil pump gear of powdered iron, currently used in two car models, which has a density of 70 per cent, and permits important savings in manufacturing by virtue of the fact no machining is necessary on the pressed gear. Further, the casting formerly required for a machined gear weighed 3.875 times as much as the new pressed gear.

Announces Solution for Surfacing Aluminum

■ Colonial Alloys Co., Chemicals division, Colonial Philadelphia building, Philadelphia, announces a Chemodizing solution and process which produce a hard, smooth, tenacious, corrosion-resistant, colorless and integrally fused surface on Colalloy, aluminum and their alloys. Solution is furnished ready for mixing and its application is simply an immersion process.

It also is nontoxic, has no objectionable odor and remains stable when not in use. It is applied directly upon the metal, dispensing with any degreasing or cleaning.

THROUGHOUT the welding world, General Electric's a-c welders are taking over the problem of making good welds in the high current ranges. Management and operators alike are turning to a-c welders, because alternating current avoids magnetic blow, permits higher welding currents, and increases production speeds through the use of larger electrodes.

Power costs are being cut down as much as 50 per cent. The G-E transformer-type of a-c welder eliminates power loss due to windage and friction, usually associated with all rotating machines. Maintenance time and expense are reduced to the absolute minimum, since there are no constantly moving parts to keep in working order.

AND PAYS OFF

INCREASES PRODUCTION RATES

IN decreasing practically every cost factor in a welding job, resulting in increased profits, *a-c gives you welding at its best!*

Operators, on their part, like a-c welders because they can make cleaner welds of a more uniform, high-quality finish. Built-in heavy-duty design allows operators to weld all day long without fear of burnout or overheating of the welder. Simple, stepless current adjustment is available without interrupting the arc—a feature of especial value to automatic welding. G-E design allows "straight-through production" that operators readily approve for both results and ease of handling when it comes to welding that requires complete adaptability and speed.

IN CASH

DECREASES OVER-ALL COSTS

SAVINGS to hundreds of users, in many different applications, prove that a-c welders can pay for themselves within the first year's operation.

You can have maximum welding speeds with *absolute minimum* costs *only* when you are using the highest current practicable to your work, together with the largest and most suitable electrodes.

With that in mind . . . if your welding operations call for work above 200 amperes . . . if you want increased production and decreased costs . . . in short, if you want high-current welding at its best, call your nearest G-E arc welding distributor or G-E Office. A complete survey of a-c possibilities in your shop will gladly be made at no obligation.

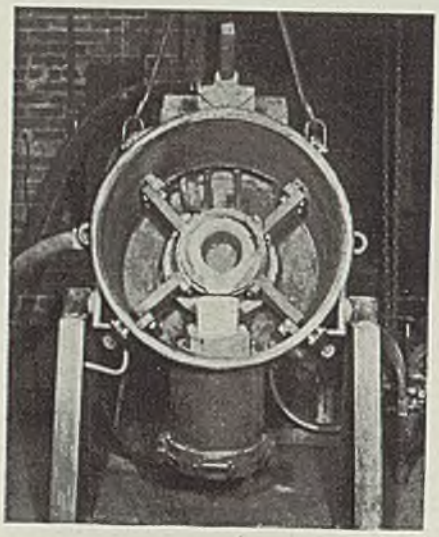
Why not get in touch with them today?

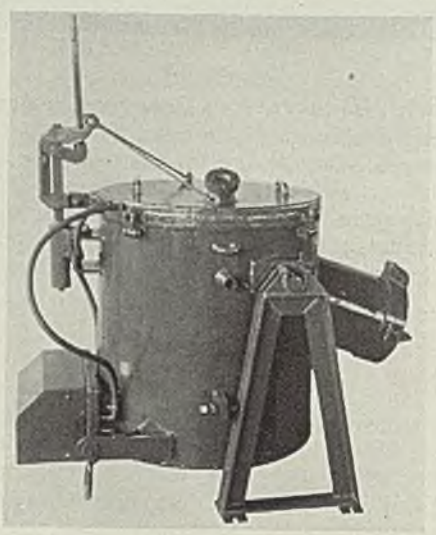
GENERAL ELECTRIC

672-5

Controlled Melting. Pouring

New vacuum melting and pouring furnace greatly facilitates study of pure metals. Pressure melting and pouring unit is designed to investigate effects of gas inclusions in metal





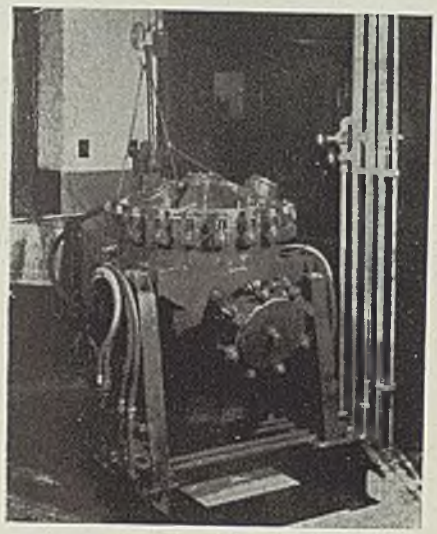


Fig. 1. (Left)—Vacuum furnace tilted and with lid removed to show hot top on mold. Fig. 2. (Center)—This vacuum induction melting furnace has 50-pound capacity. Fig. 3. (Right)—Pressure melting furnace is much heavier construction, has 50-pound capacity

■ LONG a dream of the metallurgist, the melting and pouring of metals under vacuum recently has passed well beyond the experimental laboratory stage. With recently developed equipment the study of pure metals becomes a relatively simple matter. The vacuum melting and pouring furnace now is standard apparatus—even though not more than half a dozen such units exist in this country today.

Melting in a vacuum dates back to around 1917. Melting and pouring in a vacuum goes back to about 1932 when ingots weighing from 3 to 6 pounds were produced in that manner. The present development —melting and pouring 50 pounds in high vacuum—dates back to the early months of 1939. All of these furnaces are of the induction type. They were built by Ajax Electrothermic Corp., Trenton, N. J., or incorporate equipment developed and furnished by that company.

Figs. 1 and 2 show a vacuum melting and pouring furnace recently built for a large research laboratory—for use especially in studying pure iron.

This unit has capacity for producing a 50-pound iron ingot. It consists of a manganese steel cylinder about 30 inches in diameter and 35 inches long. The induction heating coil is set centrally, both radially and axially, with about 10.5 inches between outside surface of coil and the case. The manganese steel used for the case is nonmagnetic so that electromagnetic energy loss is low.

The furnace lid is water-cooled to absorb radiation from the bath. A window is provided in a projection at the top of the furnace so that the operator may observe the melting and pouring operations. Electric leads to the coil, and connections to the water supply, are brought in through an insulating plate bolted to a heavy flange near the bottom of the case.

The ingot mold was designed so as not to require the usual large rings and wedges. It is clamped with small wedges in a simple and effective manner and is located in a steel cylinder projecting at a downward angle of about 70 degrees from the side of the main cylinder and about one-third of the way from the top of the furnace. A plate is bolted to a flange on the end or bottom of the mold container. Only a few small bolts are required as the vacuum serves to hold the furnace lid and mold plate firmly against rubber gaskets.

By means of a 26-cubic-foot pump, vacuum pressure is held

(*Please turn to Page* 82)

Advertisement

JUNE, 1940

COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by the Bridgeport Brass Co. "Bridgeport" *Headquarters for BRASS, BRONZE and COPPER*

Percussive Welds Join Two Conductive Metals

The percussive welding process, for which new equipment is now commercially available, is reported to have advantages for the joining of metals of high thermal conductivity. A typical application is said to be the welding of silver contact tips to copper.

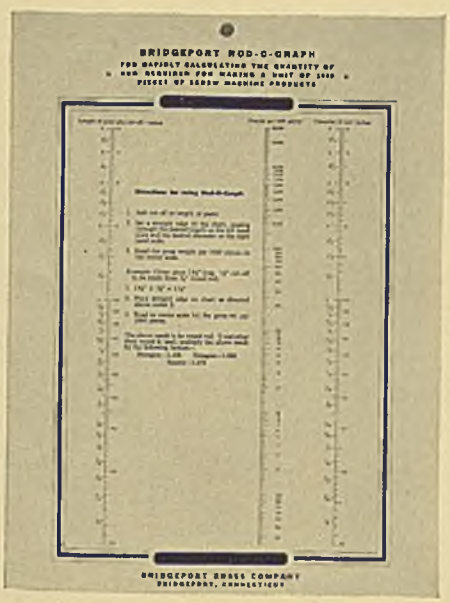
In percussive welding, electrical energy is discharged across the areas to be welded and a hammer-like blow is applied. In the equipment now on the market, the metals to be joined are connected to a source of high voltage, and are moved toward each other until an arc forms across the gap.

Other applications of the process are said to include the welding of metals that differ sharply in thermal and electrical conductivity.

Handy Chart Estimates Rod Weights and Costs

A convenient chart for estimating the quantity of Ledrite* Rod needed to make 1,000 screw machine parts has been prepared by Bridgeport Brass Company. The chart, which is in the form of an 8½ by 11 inch card, gives direct reading of weights for round rods, and includes conversion factors for square, hexagon, and octagon rod.

On the reverse side of the chart are given



data for the net extras to be added to or deducted from the base price for brass and Commercial Bronze rod. This information is helpful in computing the price of rod.

Copies of this handy chart may be obtained free of charge by writing Bridgeport on your letterhead.

Ease of Fabrication Broadens Usefulness of Silicon Bronzes

Bridgeport's Duronze Alloys Find Many Applications Where Strength and Corrosion Resistance are Needed

The readiness with which the silicon bronzes of the Duronze* family can be adapted to most of the commonly used fabricating processes is opening new applications in the manufacture of parts requiring high tensile strength and corrosion resistance.

The silicon bronzes manufactured by Bridgeport include four alloys—Duronze I, II, III, and V—that offer unusual opportunities for the fabrication of shapes ranging from bolts to tanks. The forms in which these four alloys are available and the fabricating processes for which they are most suitable are summarized in the table below.

(Duronze IV, the remaining member of the family, is not ordinarily employed for fabricating purposes. It is supplied only in tube form, for condenser and heat exchanger service and for process industries.)

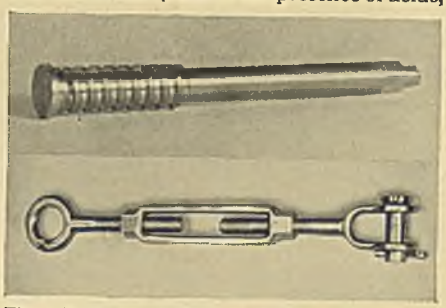
Wide Range of Usefulness

While each of the Duronze alloys has its own individual properties, all are characterized by great strength and fatigue resistance, and are superior to copper in resistance to corrosive attack. For these reasons, it is often possible for the fabricator to select a specific Duronze alloy on the basis of the manufacturing equipment he has available. Typical examples are electrical connectors, marine hardware, bolts and nuts. All of the Duronze alloys have the necessary strength and corrosion resistance for these applications. The fabricator may cold head and roll thread bolts from Duronze I or V; hot forge them from Duronze II; hot forge them or form them on automatic screw machines from Duronze III. Parts for electrical connectors may be cold forged from Duronze I or V; hot forged or sand cast from Duronze II or III. Most sizes of Duronze bolts made by cold heading average over 100,000 pounds per square inch in tensile strength. Hot forgings made from Duronze III have the remarkably high tensile strength of about 85,000 pounds per square inch, while rod for screw machine items averages about 95,000 pounds per square inch.

For other types of fabrication, one of the Duronze alloys is often more suitable or more economical than the others. In the manufacture of range boilers, storage tanks, or ducts for air conditioning, Duronze II in the form of hot rolled sheets is ideal. Its great strength eliminates the need for reinforcement, while the ease with which it is welded permits production economies. Cold rolled Duronze II strip has fine spring qualities.

For automatic screw machine products, Duronze III has outstanding advantages. It is free machining, and can be cut about 70% as fast as free cutting brass rod, using the same tools that are suitable for brass. It is almost twice as strong as brass and presents a harder surface.

Where the service to which Duronze is to be subjected involves very severely corrosive conditions (such as the presence of acids, alkalis, and solvents), it is frequently desirable to determine by test under actual service conditions which of the alloys is most suitable.



These items are typical of the fabricating possibilities of the Duronze alloys.

Duronze I, II, and III are discussed in detail in the "Duronze Manual", and additional data on Duronze III are contained in

(Continued on following page, column 2)

Duronze Alloy Number	FORMS AVAILABLE						FABRICATION PROCESSES				
	Hot Rolled Sheet	Cold Rolled Strip	Rod	Wire	Tube	Ingot	Cold Working	Hot Forging	Sand Casting	Automatic Screw Machine	Welding
I		√	√	√			√				
II	√	√	√	√	√	√		√	√		√
III			√			√		√	√	√	
V			√	√	√		√				

ALLOYS OF COPPER

This is the twelfth of a series of articles on the properties and applications of the copper alloys, and begins the subject of Common High Brass.

COMMON HIGH BRASS

Of all the alloys of copper and zinc, the one most widely used for fabricating purposes is the one having a nominal composition of 66% copper and 34% zinc.

The reason for this lies in the nature of the solid solutions formed in the alloys of copper and zinc. These alloys form solid ductile solutions with zinc contents up to 36%: that is, with copper contents from 100 to 64%. With a zinc content of over 36%, a second solid solution is formed which is appreciably less ductile in cold working. The nominal 66-34 alloy is made commercially with a copper content between 64.5 and 67.5%, and therefore represents about the lowest copper content in those alloys which contain simply the ductile alpha solid solution. Because of this fact, the alloy has been well known as "Common High Brass", and is the cheapest alloy which is suitable for the more severe cold working, heading, cupping, forming, and spinning operations.

PHYSICAL PROPERTIES

The commercial mixture limits of Common High Brass are: copper, 64.5-67.5%; lead, 0.30% max.; iron, 0.05% max.; zinc, remainder. The general physical propreties are as follows:

Specific Gravity	8.47
Density, lbs./cu. in.	0.306
Electrical Resistance ohms/circ. mil ft. at 20° C.	40.12
Electrical Conductivity % copper at 20° C.	25.85
Thermal Conductivity cal./sq. cm./cm./sec./° C at 20° C	0.286
Temperature Coefficient of Linear Expansion/° C	0.0000201
Specific Heat, cal., at 18° C.	0.0909
Melting range, ° F	1,660-1,715
° C	905-935
Modulus of Elasticity	15,000,000
Tensile Strength, lbs./sq. in.	
Annealed	40,000- 50,000
Cold worked	50,000-140,000
Endurance Limit, lbs. sq. in.	
Annealed	10,000- 15,000
Cold worked	13,000- 20,000

The subject of Common High Brass will be continued in next month's issue, with particular reference to some of its more important applications.

Brass Plated With Gold In Pen and Pencil Sets

Illustration of the versatility of brass is its use as a base metal for gold plating in the pen and pencil sets made by David Kahn, Inc., manufacturers of the well-known Pioneer and Wearever brands.

Lever, clip, band, and pencil mechanism are all made of gold-plated brass in the set illustrated.

Memos on Brass—No. 10

The temper of brass can be varied to give greatest manufacturing economy. If severe forming operations are necessary, a soft temper is desirable. If the finished article is to be polished, a smaller grain size (lower degree of softness) gives most economical results.

Fox Company is producing this new push button box from brass supplied by Bridgeport. The box, which is used on 1940 Delco sets, requires the finest grade of deep drawing brass.

Fabricating Duronze

(*Continued from preceding page, column 3*)

"Technical Bulletin—Duronze III." Copies of both of these publications will be furnished free of charge by Bridgeport if requested on your letterhead. Data on Duronze V will be supplied on request.

NEW DEVELOPMENTS

A soldering tool is reported to release a drop of solder when a trigger is depressed, thus allowing the operator to hold the tool in one hand and the work in the other. **(No. 40)**

A brush plating outfit is said to be especially suitable for the plating of electrical contacts with silver, and may also be used in touching up worn spots on platings that have been in service. **(No. 41)**

Drying of lacquered parts can be speeded up, it is claimed, by new banks of lights for the production of infra-red rays. Units are said to be completely assembled, and to include from three to eight lights per unit. **(No. 42)**

Straightening, polishing, and sizing can be accomplished by new automatic machinery, according to the manufacturer. It is said that the equipment will accommodate round rod up to 1 inch in diameter, and that polishing may be simultaneous with straightening and sizing. **(No. 43)**

A thickness tester of the magnetic type is said to be adaptable to measuring the thickness of nickel platings on non-magnetic base metals. By changing magnets, it can also be used for measuring thickness of non-magnetic metallic or inorganic coatings or of nickel platings on iron and steel. **(No. 44)**

A reaming tool can be used for burring and reaming the inside and outside edges of brass and copper tubing, it is reported. It is made in the form of a cylinder containing a three-pronged pointed cutter. Cylinder is knurled. **(No. 45)**

Polishing wheels are said to be permanently fastened together with a cement that improves operation at high temperatures and decreases the danger of wheel burning. **(No. 46)**

Nickel stripping can be accelerated by a new addition agent, it is claimed. It is said that the agent can be added to sulphuric acid strips of any concentration, that it saves acid, and that pitting and roughening of the base metal are avoided. **(No. 47)**

A light-duty machine for polishing and buffing can be operated at a power cost of about one cent an hour, according to maker. It is said to be highly efficient for light work. **(No. 48)**

Improved connectors for brass and copper tubing are said to use a compression joint with a long flare that gives a tight seal. **(No. 49)**

Perforated containers for handling work in process can be supplied to specification as to shape, dimensions, and size and number of perforations, it is said. Containers can be supplied in brass, copper, or other materials to order. **(No. 50)**

This column lists items manufactured or developed by many different sources. Further information on any of them may be obtained by writing Bridgeport Brass Company, which will gladly refer readers to the manufacturer or other source.

By HAROLD LAWRENCE
Welding Engineer

The Silicon Bronzes

To prevent steel pickup during welding of silicon bronzes to steel, the steel surfaces are first tinned with bronze, using oxyacetylene flame. Weld is then completed by carbon arc

■ SILICON bronzes with high strength and corrosion resistance are well known by such trade names as Everdur, Olympic Bronze or Herculoy. Fundamentally they are all alike, containing 96 per cent copper, 3 per cent silicon and the remainder manganese, zinc or tin. Most important part of the combination is the copper and silicon, the portion that furnishes the name, silicon bronze.

Silicon bronzes do not have quite the strength of steel nor do they have a definite yield point as high as that found in the usual boiler and tank steel. They have been, however, accepted by the A. S. M. E. Code for the fabrication of pressure vessels. Following this acceptance, silicon bronzes have been applied to all classes of pressure vessels engaged in a service where corrosion is a prime factor. Since these alloys partake of the high strength characteristics of steel and the excellent corrosion resistance of copper, the physical properties of all three materials are reported in Table I. Here may be noted the great effect of the alloying elements on a material that remains high in copper content.

In almost universal use is the carbon arc method of welding the silicon bronzes. In addition, both bare and coated metallic arc welding is used in some instances although the electrodes available at this time make metallic arc welding unsuited to the entire range of gages and structures to be welded. Then, too, the oxyacetylene process is employed to make some joints. The temperamental properties of the silicon bronzes in rigid structures, however, rule out the oxyacetylene process as cracks occasioned by the hot shortness of the silicon bronzes at elevated temperatures, where strength and ductility are low, work to the disadvantage of the flame welding process. So metallurgical attributes of the silicon bronzes and the dictates of economy combine to favor the carbon arc process.

Hot shortness has been mentioned. Add to this the extreme hardness and brittleness of a complex formed when this copper alloy and steel mix during the welding of these bronzes to steel and you are confronted by a real problem. Making joints between steel and a silicon bronze calls for meticulous care.

To make such a weld, the plates must be CLEAN. The copper alloy may have been pickled at the mill to remove oxide but an additional cleaning before welding is recommended. The steel must be clean, too. This cleaning may be done by sand blasting, grinding or machining. Application of flux is next.

This flux is either 90 per cent borax, 10 per cent sodium fluoride or a mixture of one part by each weight of sodium fluoride, barium carbonate, fused borax and manganese boride. If you mix your own flux, be sure to use fused borax as the kind available at the grocery store has water of crystallization

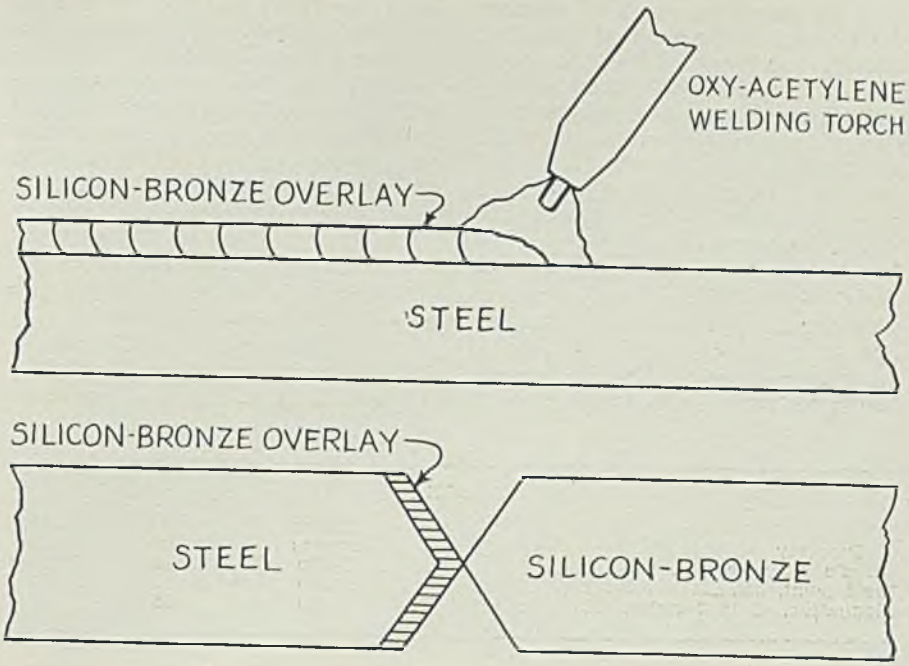


Fig. 1—Method of applying overlay of bronze to steel before welding

Fig. 2—Showing joint set up for welding silicon bronze to steel

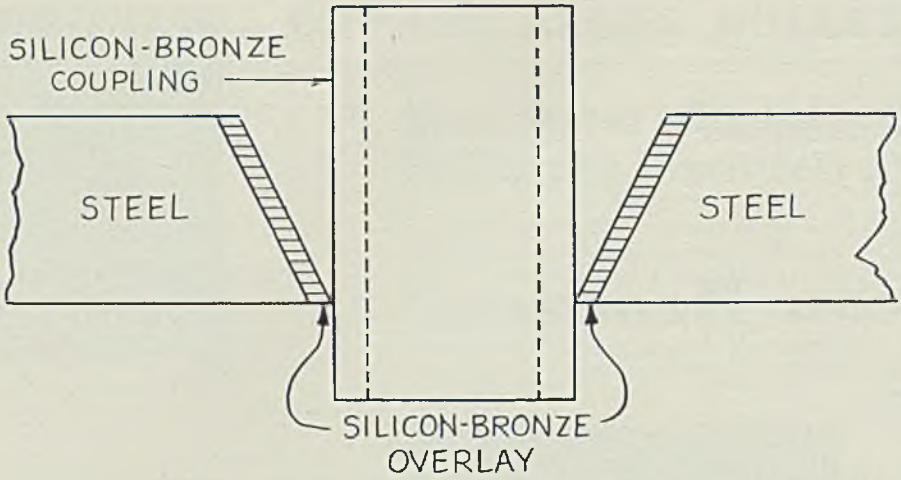


Fig. 3—Method of welding a bronze coupling, collar or outlet to a steel tank or other fabrication

in it and will cause excessive porosity. Mix with dry methyl alcohol to make a smooth paste for application to the parts to be welded. Use the flux sparingly as an excessive amount is almost as bad as none at all. When the joint has become quite hot, powdered flux may be sprinkled in place as the alcohol evaporates as soon as it touches the hot metal.

Since the purpose of the procedure recommended here is to prevent admixture of silicon bronze and steel to form the hard brittle complex, much care is required to properly prepare the steel surface for subsequent welding. It is most important that a proper overlay of silicon bronze be placed on the steel surface before attempting to weld the two dissimiliar metals together. This overlay may be applied with either the carbon arc or the oxyacetylene torch. If the carbon arc is used, a soft arc must be played on the filler rod, watching the deposit to make sure that tinning is taking place. Better control is possible with the oxyacetylene torch where the flame may be played on the steel, adding filler metal as the steel becomes hot enough for tinning. Heat is much less concentrated with the torch so will permit successful application even though the operator may be inexperienced in this work. This step is illustrated in Fig. 1. The steel must be wetted thoroughly during application of the overlay but take care not to melt the steel and pick up iron.

Either stringer beads or a lacing operation will be found satisfactory for this overlaying. Should stringer beads be tried, much attention must be paid to the slag along the edges of the adjoining beads. Less trouble is found with the lacing operation as the trapping of slag is not so easy. Both methods have been used successfully. Choice is a matter of preference.

The two parts next are brought together as shown in Fig. 2. Next flux is applied and the parts are tack welded together. More flux is put over the tacks and the welding operation follows. The carbon arc will be played on the silicon bronze side of the joint as much as possible. A medium length arc should be held so magnetic interference does not cause the arc to wander to the overlayed steel. Unless the arc is controlled carefully, steel pickup will occur to cause a disastrous crack. The weld is completed the same as any other weld joining silicon bronze to silicon bronze.

Often designs call for the use of silicon bronze couplings through a steel shell as in Fig. 3. Once more an overlay of silicon bronze weld metal is essential before attempting to complete the weld. The opening around the coupling should be kept as small as possible to avoid excessive shrinkage. Cracks due to rigidity of design and the hot shortness of the deposited metal may be avoided in that way.

TABLE I

Property	Silicon Bronze	Copper	Tank Steel
Tensile strength, psi.	55,000	30,000	55,000
Yield point, psi.	20,000	.....	32,000
Elongation, % in 2 inches	50	45	28

Use of Bronzes Increasing

Silicon bronzes are being used more and more. This increased use has resulted mainly from the fact that the alloys may be welded with little trouble after some experience has been gained. Rigid structures call for much forethought in preparing the material for welding. Sometimes preheating followed by slow cooling proves beneficial. Peening helps eliminate some of the cooling stresses by stretching the metal.

Heavy sections of copper are almost impossible to weld. Since the silicon bronzes have the corrosion resistance of copper along with good weldability at heavy gages, these materials are now requisitioned as copper substitutes. The addition of good physical properties makes the substitution all the more sound.

As long as steel remains our least expensive abundant engineering metal, the silicon bronzes will be used in combination with steel wherever possible. Strength parts of steel with liners of the silicon bronzes are used at times with steel as reinforcement. Steel is designated wherever portions of the equipment are not being subjected to corrosive action. As long as designers combine the best properties of the two materials for the most economical unit, fabricators will weld steel and silicon bronze together. Procedures outlined here will save both time and money.

♦

Rustproof Nail Has Greater Holding Power

■ A new rust proof nail of unique design called Anchorfast, produced by Independent Nail & Packing Co., Bridgewater, Mass., for the boat building industry, has revealed in a series of tests properties which indicate its value for a wide range of industries where corrosion is encountered.

Made of Monel, the nail's holding power is derived from a series of sharp annular rings rolled-on in manufacturing operations. These are sharp and set at such an angle that in driving they will not disrupt the fibers of the wood. The nail can be driven quickly without drilling a pilot hole—even into hard wood.

It also has an exceptionally heavy head which is 2 gages heavier than wire nail of corresponding length.

Steel Chips, Cutting Oil Reclaimed 100 Per Cent in Efficient System

■ OUT of every 100 pounds of steel used at Timken Roller Bearing Co. plants at Canton and Columbus, O., only 18 pounds finally reaches the trade as finished bearings. It is of vital importance that the other 82 pounds be reclaimed efficiently and returned to the furnaces for remelting.

Of the 82 pounds, a large percentage comes from the automatic screw machines with a heavy coating of cutting oil which must be removed economically before the chips are returned to the furnaces.

By O. L. MAAG
Lubrication Engineer
Timken Roller Bearing Co.
Canton, Ohio

Chips Carried Through Spray

Removal of oil is accomplished by a unique screen conveyor system which was developed by Timken. It carries the oily chips or turnings through a high-pressure spray of hot water and up a slight incline. When the chips have progressed half way through, they are dropped to a second conveyor. In dropping, they turn over and are washed from the other side. Operating temperature of the water is maintained at approximately 190 degrees Fahr. The main sump pumps circulate water at a rate of 800 gallons per minute.

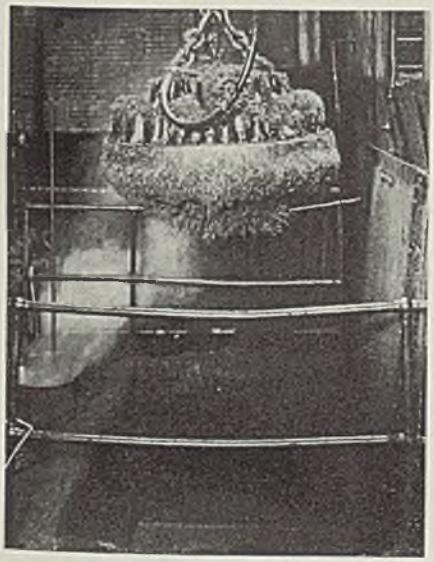
Coolant is reclaimed from the mixture of oil and water by allowing the mixture to flow to a large compartment sump where the oil is constantly removed by means of floating skimmers. This oil in turn is pumped to settling tanks from which it is drawn and sent through centrifugal separators to remove fine dirt and traces of moisture. The coolant then is returned to the automatic screw machines for further service. The extremely fine chips which fall through the screen conveyor are removed from the large 20,000-gallon water sump by submerging periodically a specially constructed electric magnet shown in an accompanying illustration. Some 100 tons of chips are reclaimed daily.

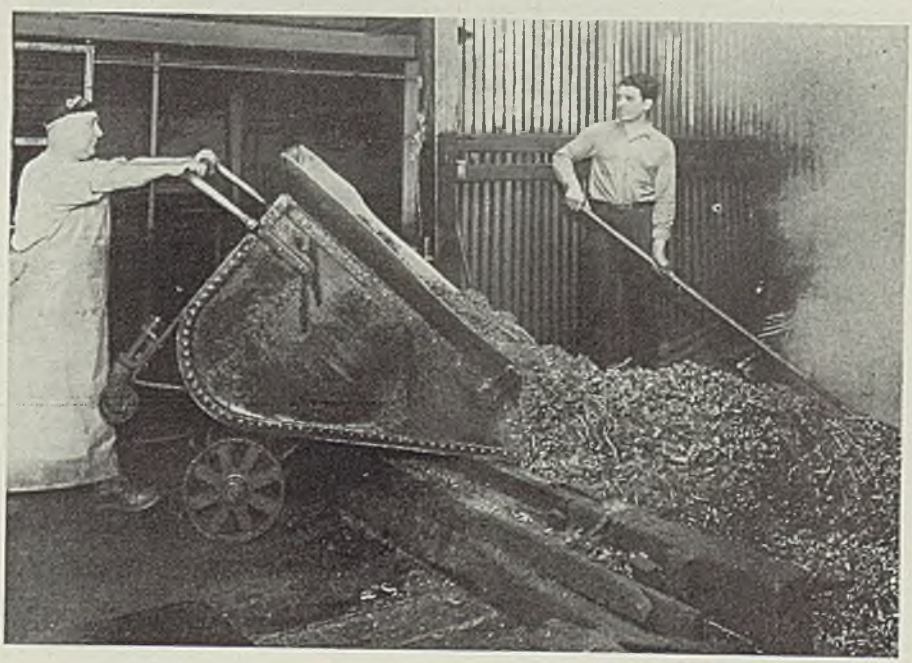
This recovery system has another excellent feature. In heating the oil to 190 degrees Fahr. for efficient centrifuging, the oil is completely sterilized so there is no chance of infecting the screw-machine operators.

Approximately 10,000 gallons of oil are reclaimed per day by this method.

Washed chips go directly from the washing machine to the briquetters where they are compressed into bricks of suitable size—approximately 22 pounds each for ease of handling. These briquettes subsequently are used as charging stock for the electric furnaces after the small amount of remaining oil is removed by burning in a conveyor-type furnace.

Right, oil covered chips from automatic screw machines being dumped into washer pit. Left, magnet crane rides over sump and picks up chip particles to reclaim about 100 tons of chips daily





A.S.T.M. Proceedings Issued in One Volume

■ *A. S. T. M. Proceedings*, 1939, 1350 pages, 6 x 9 inches; published by American Society for Testing Materials, Philadelphia; supplied by STEEL, Cleveland, at $8.50 for heavy paper binding, $9 in cloth and $10 in half-leather.

This is the first time the *Proceedings* have been issued in a single volume, the society's new publication plan by which all tentative standards are included in the book of standards and the present volume contains only committee reports and technical papers. Committee reports include full details of important recommendations on specifications and standardized test methods, with appended section reports or papers. Eleven reports in the 1939 volume pertain to ferrous metals, including extensive reports on field tests of metallic coatings on wire and wire products. Reports also are given on inspection of stainless steel, metallographic examination of 18 per cent chromium and 8 per cent nickel alloy stainless.

Seven reports are on nonferrous metals and alloys, including extensive technical data on galvanic and electrolytic corrosion tests, proposed classification of cast copper and copper-base alloys and discussion of magnesium alloy die castings.

Reports also are included on cementitious, ceramic, concrete and masonry materials and miscellaneous materials.

The technical papers include the fourteenth Edgar Marburg lecture and 20 papers dealing with metals, 16 on cement, concrete and masonry materials, eight comprising the symposium on shear testing of soils and 15 on miscellaneous materials.

Threading Machine

■ Landis Machine Co., Waynesboro, Pa., announces a threading machine for threading rock bit steel or rods. It employs a 3-jawed universal chuck on the machine spindle instead of the revolving head. The die head is mounted on a special carriage. Carriage is equipped with tail stock into which is fitted the shank of a Landmatic head. Shank is long and has a sliding fit within the bore of the tail stock permitting linear travel of the head. A lever extends the die head to its most advanced position

in the tail stock where it is clamped rigidly into position for thread cutting operations. The machine is of the leadscrew type. Directly in front of die head on the carriage is a cross slide which supports a square turret and which in turn can be fitted with turning, facing, forming and cutting off tools. A quick acting clamp on the side of the carriage locks entire assembly into position during cutting off operations. Provision also is made for stopping forward movement of the carriage. Stop is adjustable so it can be synchronized with the leadscrew tripping mechanism.

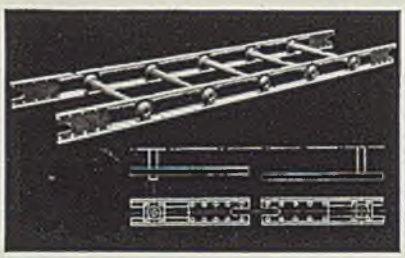
Synchronous Control

■ General Electric Co., Schenectady, N. Y., announces a synchronous motor control featuring slip-cycle impedance SCI relay. Control waits until motor reaches correct speed and then selects an instant of favorable angular relation of stator and rotor poles to apply field in order to take advantage of the inherent synchronizing ability of the motor. SCI relay prevents pulsations in case of motor pull-out by disconnecting power. Protection of squirrel-cage winding during starting and the stator winding during running is provided by separate relays which match different characteristics of the two windings. System of field application is available for control of all ratings of synchro-

nous motors. Magnetic or semimagnetic forms are available for full voltage, reduced-voltage or part-winding starting.

Telescoping Ladder

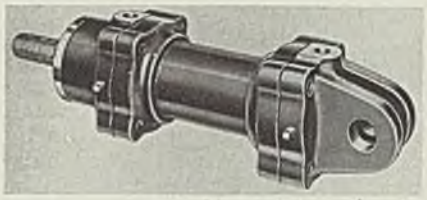
■ Aluminum Ladder Co., Tarentum, Pa., announces a portable aluminum sectional telescoping ladder for general maintenance work around plants and office buildings. It is light in weight and has great strength. Ladder is constructed in five sections each 6 feet long. Total



working length is 26 feet, weighing 48 pounds. Sections are interchangeable. The ladder is rust-proof, nonsparking and easily cleaned. Either steel spikes or rubber boots can be supplied for fitting over bottom ends.

Swivel Mounted Hydraulic Cylinder

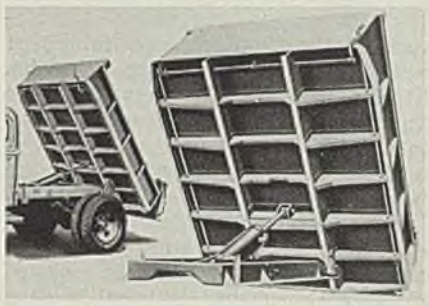
■ Hannifin Mfg. Co., 621 South Kolmar avenue, Chicago, has added to its line of high pressure hydraulic cylinders a standard swivel mounting type, models BN and B2N. Model BN is a cylinder with a small diameter piston rod, while the latter is a cylinder with a two to one



differential piston rod. Either model is available with an adjustable cushion on either or both ends. Universal end caps may be positioned independently to bring inlet port at top, bottom or either side. Either cap may be moved without disturbing cylinder mounting or any other parts.

Dump-Truck Body

■ Gar Wood Industries Inc., 7924 Riopelle avenue, Detroit, has introduced a new type of dump-truck body which has a trussed under-



structure. It is said to provide direct full-length support to the floor by integral longitudinals in combination with trussed crossmembers. Sides and floor sections which form the body longitudinals are welded integrally giving maximum strength in resisting shocks and sudden load impacts.

Exhaust Attachment

■ Brown & Sharpe Mfg. Co., Providence, R. I., announces an exhaust attachment for cylindrical grinding to be used on its No. 13 grinding machine. It is motor driven and removes grit and dust-laden air from the region of the grinding operation by suction and separates foreign matter. It is intended for use with straight and dish wheels and may be applied at either end of the wheel spindle. The attachment includes an exhaust nozzle, flexible suction hose and a dust collector unit consisting of a motor-driven fan mounted on a separator tank. Dust-laden air is

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CHRONOLOGY OF IRON AND STEEL..... was $4.00

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332 pages, 4¼ x 7 inches, Second Edition, Fully indexed.—This book is in reality a condensed encyclopedia of the iron and steel industry from biblical times to the 20th century. The book is arranged chronologically. Developments, discoveries, and in more recent years, production, price range, new plants, etc., are given.

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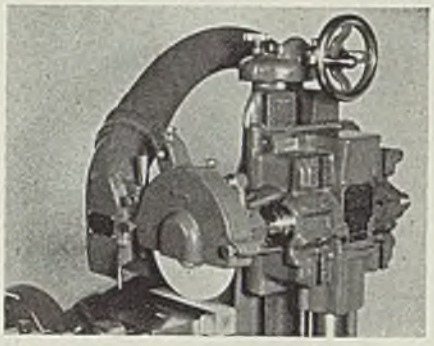
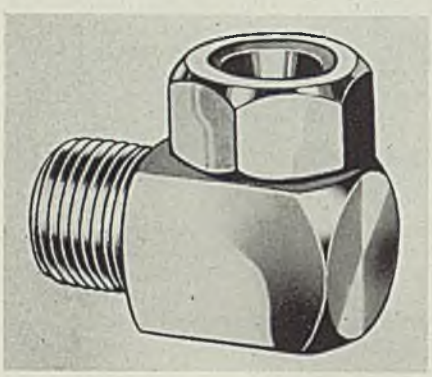
blown into a spiral separator where the heavier particles are removed by centrifugal force, and slowly dispersed over the whole area of the



outlet filter, where the remaining finer particles are trapped by two fire-resistant, viscous-coated filter pads enclosed by metal grilles. Fan is driven by a ¼-horsepower flange-type motor. The capacity of the attachment with a 3600 revolutions-per-minute-motor is 300 cubic feet per minute.

Spray Nozzle

■ Spraying Systems Co., 4021 West Lake street, Chicago, announces a nonclogging centrifugal spray nozzle with unusually large orifice. It is of the Whirljet type with ⅜-



inch male pipe connection. Capacity is 2.3 gallons per minute with 45 degree included spray angle at ten pounds pressure. Construction is sturdy with smoothly rounded, large passages. Standard stock construction is 18-8 stainless steel.

Industrial Contactors

■ Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., announces a line of improved heavy duty direct current magnetic contactors, designated as series 200 type SM. Armature overtravel of the contactors are increased and contact tips are larger. The wearing depth of the contacts on all magnet closed contactors is increased approximately one-third. Bearing pin hole of armature bracket are reamed so play is reduced and centering assured. Blowout coil is brazed to contact support, and heating is reduced.

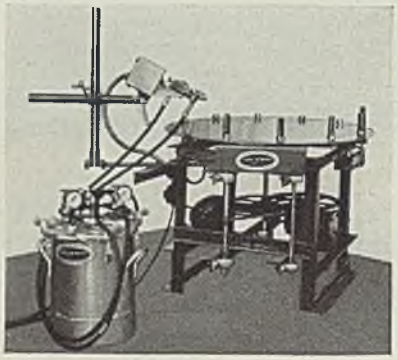
Electric Sander

■ Detroit Surfacing Machine Co., 7433 West Davison avenue, Detroit, has introduced a portable all-electric Easy sander adaptable to new or maintenance abrasive application. It features a perfected drive mechanism, increased power and im-

proved positive lubrication. The tool may be operated from any alternating or direct-current light socket. A large fan provides ventilation for cooling. Injurious dust and grit is removed by a filter before entering motor. The sander takes one-third of a standard size sheet of abrasive and the abrasive holder holds it tightly on the sanding pad.

Automatic Tube Sprayer

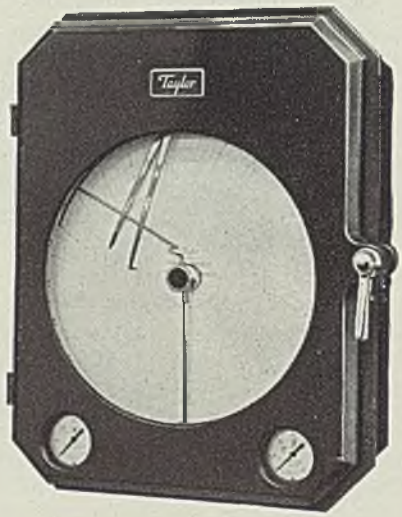
■ Eclipse Air Brush Co., Newark, N. J., has introduced an automatic sprayer to coat the inside and outside of steel tubes, 4 inches long,



with an inside diameter of 1 inch. Tubes are placed in an upright position on an automatic turntable which rotates them as they pass in front of a solenoid operated spray gun, synchronized with the turntable action. Treadle operated spray gun coats the insides of the tubes as they are set into a holder on a stationary table. The setting and removing of the tubes for both inside and outside coatings are manual operations. Production is 1200 tubes per hour for the outside and the same for the inside.

Indicating Controllers

■ Taylor Instrument Co., Rochester, N. Y., has introduced a redesigned line of Fulscope air-operated recording and indicating controllers for temperature, pressure, rate of flow and liquid level. In addition to combining in one instrument conventional proportional response and automatic reset forms of control, the new instrument introduces a third process-control effect, Pre-Act. Pre-Act is a control feature which makes control-valve corrections according to rate of control-point deviation. Automatic reset which compensates for changes in load is located in instrument case and is adjustable over a much wider range than previously. Air system includes relay air valve with drilled sapphire orifice, removable stainless steel nozzle and air gages inside case. Unit



is available in five standard types, fixed high sensitivity, adjustable sensitivity, adjustable sensitivity with automatic reset, adjustable sensitivity with Pre-Act and adjustable sensitivity with automatic reset and Pre-Act.

Emergency Fire Suit

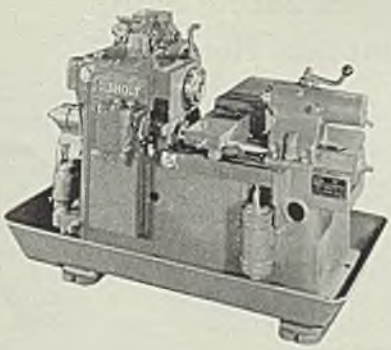
■ Industrial Products Co., 800 West Somerset street, Philadelphia, has introduced an emergency fire suit for combating emergency fires. Jumper suit with overshoes attached is made from asbestos cloth. It is adjustable at waist automatically for any normal size. Extra long

asbestos tab on protected zipper is incorporated to insure quick closing. Overshoes are lined and have steel studded chrome leather soles with

asbestos innersoles. Helmet is of the same grade asbestos cloth and fully lined. Glare-proof brass screen covering mica lens affords safe and full vision. Outfit is completed by leather reinforced asbestos gloves. Suit is housed in a metal case having fasteners that open easily. Outfit is arranged in compartments within the case in proper order for donning quickly.

Automatic Lathe

■ Gisholt Machine Co., Madison, Wis., has introduced a hydraulic automatic lathe for between centers and chucking work. It provides for a swing of 16¾ inches over the bed



or 12 inches over the front carriage, with a length between centers of 22 inches. Features of machine include a simplified hydraulic control system which permits handling of all functions by means of a single lever. The front carriage, as well as the rear slide, has independent hy-

(*Please turn to Page* 75)

Packing for export

(*Continued from Page* 56)

wire binders per case, usually across the width or girth of the case and within a few inches of either end. For large cases, often a diagonal wire tie overall the case or crate is needed to prevent torsional strains. In addition wire binding on smaller boxes can be interlocked, distributing strains and making reenforcement double and triple what one or two wires would give.

Tests made by the United States forest products laboratory at Madison, Wis., show that when one wire strap is applied around the sides, top and bottom of a wooden box, those parts may be 20 per cent thinner than for the same box unre-enforced. If two straps (export requirements) are applied about one-sixth of the length from the end of a box, then the thickness reduction can be 36 per cent.

According to the Exporters' encyclopedia, all packing should be as light in weight as possible as duty often is charged on the gross weight of the package. Other recommendations from this same source include:

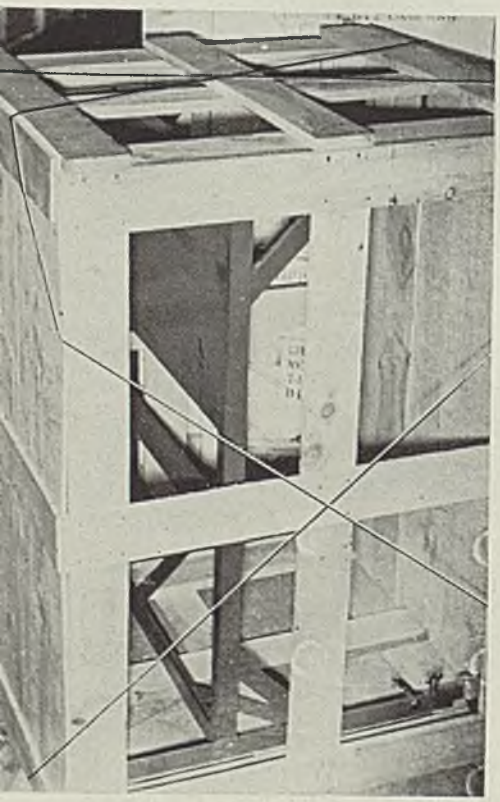
Another considerable reason for strong packing is the pilfering in transit. It is probable that no amount of care in packing can entirely prevent this, yet strong well-nailed wire-bound or strapped boxes are more immune than those which burst when merely dropped on the floor at a certain angle.

Under the new method of diagonally bracing a crate with metal binders, two continuous binders are placed around the crate, each of two wires being placed over four corners diagonally—that is from one side to the other and from a bottom to a top corner. See accompanying illustration. The wires should cross each other in the center of the ends and sides of the crate. After placing the wires, the ends are tensioned with a wire-tying machine until the proper braced effect has been accomplished. The machine then seals the ends of the wire. Bracing in this way imparts great rigidity to the crate and has the effect of binding it as if in a vise.

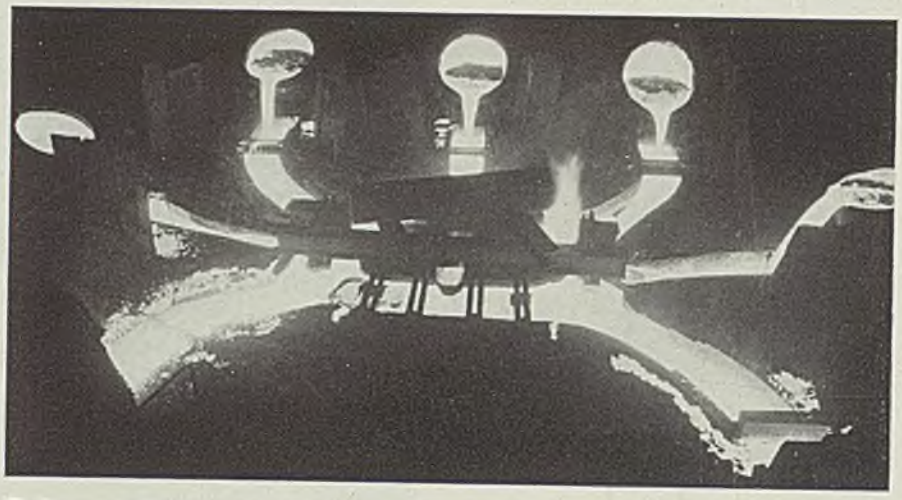
Diagonal metal bracing has several advantages over wood diagonal bracing. It may be applied more quickly since the sawing and nailing operations are eliminated and it is cheaper, the metal binders costing less than the wood braces. Other savings, such as in shipping weight and space, also are effected. Metal binders weigh only a fraction as much as wood braces and occupy practically no space. Since export

(*Please turn to Page* 82)

Here a single wire tie is employed in a multiple diagonal wrap to absorb torsional or twisting strains, making a much stronger package. Photo is retouched to show up wire clearly



"Swift Rivers" of Hot Metal



■ Seven ladles were employed recently in casting a large ingot mold at the Bethlehem, Pa., plant of Bethlehem Steel Co. The casting weighed 350,000 pounds and was poured in one minute and forty seconds

Metal-Mining Practice Summarized in Bulletin

■ Mining practices of more than 200 representative metal mines in the United States and foreign countries are summarized in bulletin 419 published by Bureau of Mines, United States department of interior, Washington. The bulletin is based upon study of mining and milling methods and costs. It combines in permanent form the salient general information and analytical discussions contained in earlier publications.

Beginning with prospecting and exploration, the bulletin contains discussions on such subjects as sampling of ore deposits, estimation of ore reserves, mine development, transportation of ore and waste, stoping, direct cost of underground mining, surface mining, ore dressing, total cost of producing ore and concentrates and engineering valuation of mining properties. Copies of the bulletin may be obtained from the superintendent of documents, government printing office, for 60 cents.

Metal Fabric Shuts Out Sun Heat

■ A new metal fabric that shuts out sun heat and makes rooms many degrees cooler, called Koolshade sun screen, is announced by Borg-Warner Corp., 310 South Michigan avenue, Chicago. It consists of vertical wires spaced ½-inch apart holding flat horizontal wires at a fixed angle. These are arranged to shut out direct sun radiation completely.

The mesh of the fabric is so fine that it does not shut off light, view or breeze. The wires are of bronze, and installation is the same as for ordinary fly screens. The mesh is said to arrest the sun's rays before they strike the window, reducing the solar load as much as 80 to 85 per cent. The screen also is effective in keeping out insects.

New Equipment

(*Continued from Page 73*)

draulic feed. Machine is equipped with a hydraulically operated main clutch and an automatic spindle brake.

Wick Feed Oiler

■ Trico Fuse Mfg. Co., 2948 North Fifth street, Milwaukee, has introduced an unbreakable wick feed oiler for use on machinery which operates intermittently.

Operation of the oiler is controlled by a lever at the top. Oil

supply is always visible. When oiler is filled above the point where the wick enters the center tube, the surplus oil drains into the bearings, flushing them. When the oil recedes to the opening in the tube, the wick feeds oil to the bearing automatically by capillary action. All metal parts of unit are bright cadmium-plated. Shut-off lever is hidden entirely by the dome.

Oiler is made in three styles, in 1, 2 and 4-ounce capacities.

Electric Stop-Watch

■ Precision Scientific Co., 1751 North Springfield avenue, Chicago, has introduced a new electric stop-watch called Time-It. It is run by a synchronous electric motor whose

speed is controlled by the power house master clock which governs the cycle constancy of alternating current. Instead of the ordinary watch dial, the new electric stop-watch has a direct reading counter reading to 1/10-second. The counter can be reset to zero from any reading.

The stop-watch can be used wherever it can be plugged into a 110-volt alternating-current line.

Wire Rope Clip

■ Thomas Laughlin Co., Portland, Me., announces a new wire rope clip, Safety Clip, which has a 20 to 30 per cent increase in holding power. Bolts and identical bearing surfaces on opposite sides of the

clip equalize the pressure on the rope. It is easy to apply. Fewer

accidents and savings in rope are among the advantages claimed for it.

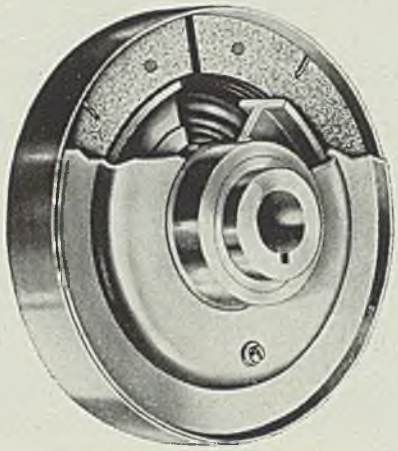
Industrial Truck

■ Elwell-Parker Electric Co., 4205 St. Clair street, Cleveland, announces center control industrial truck, Model F-14. It is designed to operate in cramped areas and can make a complete turn in a 46-inch radius.

It traverses through doors 4½ feet high, turns completely around inside a boxcar and travels under load on plant elevators and up ramps. Truck is equipped with forks and transports 2000-pound loads on pallets or skids.

Mercury Clutch

■ Mercury Clutch Corp., Massillon, O., announces a new mercury clutch which permits a driving motor to gain speed for assuming load. Utilizing mercury to displace friction segments by centrifugal force, the clutch gradually picks up the load at full speed. Its horsepower output per pound weight of the clutch is said to be great. At present, clutches are available in 4 and 4½-inch diameter sizes which will transmit loads up to 5-horsepower. Other sizes are available on specification. Four principal parts comprise the clutch, the driving member or housing, the driven member or inner drum, the clutch segments and the mercury.

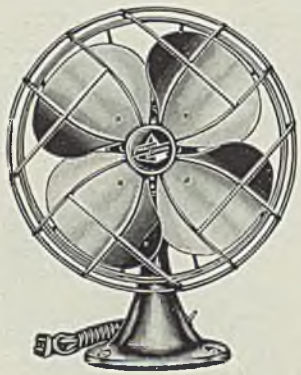


Reflector

■ Holophane Co. Inc., 342 Madison avenue, New York, has introduced Lobay reflectors No. 645 for use with 400-watt mercury vapor lamps. Their 30-degree shielding angle and deep reflector construction which keeps the elongated mercury lamp high in the reflector eliminates glare at all normal angles. Reflectors are equipped with prismatic glass reflecting surfaces. A tripod support holds the reflector in position and it can be easily removed for cleaning.

Electric Fan

■ Emerson Electric Mfg. Co., 2032 St. Charles street, St. Louis, announces Golden Jubilee fans equipped with 10-inch overlapping bronze blades which deliver 640 cubic feet of air per minute. Fan incorporates finger-tip control for adjustment of arc of oscillation from 90 degrees to any lower range or stationary po-



sition. Also provided is a friction hinge for tilting fan up or down or for wall mounting. Felt-covered base prevents marring of polished surfaces.

Numbering Plates

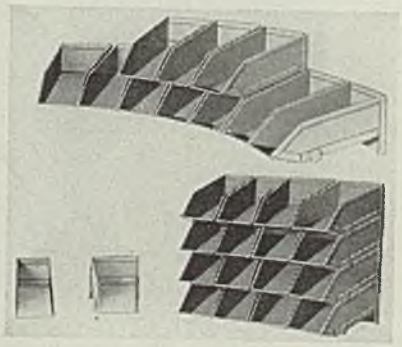
■ Mosebach Electric & Supply Co., 1170 Arlington avenue, Pittsburgh, has developed cast bronze numbering plates for numbering plants,

gates, tanks and stations. Cast in one piece from rustproof, acid-resistant bronze alloy, the new plates are available in any size up to 3 x 2 feet. Minimum thickness is ⅛-inch. The markers can be supplied in any style or any combination of letters and figures.

Letters and figures are raised from the surface of the plate, providing high visibility. Plates may be bolted tightly to flat surfaces if desired.

Assembly Bin

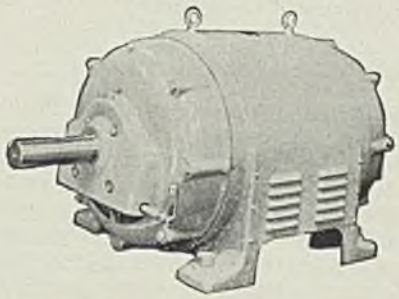
■ Stackbin Corp., Providence, R. I., announces a new larger size assembly bin. It is 12 inches long, 4



inches deep, 5 inches wide in front and 6 inches wide in back. Contents are fed toward front by a sloping floor. The bin can be used on any assembly bench or can be set up in a semicircle and stacked one above the other. They are made of heavy gage welded sheet steel and are readily accessible.

Oil Lubrication System

■ U. S. Electrical Motors Inc., 200 East Slauson avenue, Los Angeles, has developed an oil lubrication system now being supplied on all open type SA and Uniclosed type SC motors larger than 30 horsepower. It incorporates a conveniently located and simply constructed oil gage, marked with maximum and minimum level. Oil level is maintained just slightly over the outer race of



motor bearing so it is never overloaded with oil. Bearing housing

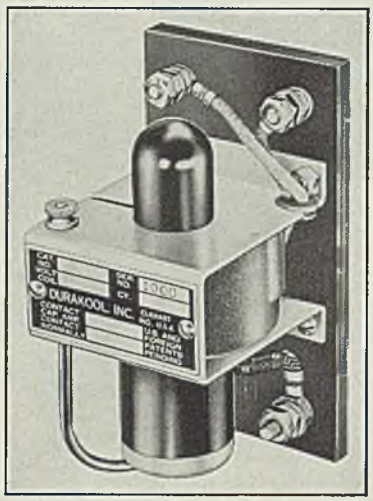
may be flushed frequently and there is no chance of caking resulting in insufficient lubrication.

Surface Grinder

■ Builders Iron Foundry, Providence, R. I., announces a new T surface grinder for grinding tools, dies and small machine parts. Its table rests directly upon the plane ground surface of the bed and is guided longitudinally and laterally by the T-square. Both the screw and nut, as well as the T-square and other bearing surfaces, are protected from dust by the large apron on the table. Bed of box construction assures rigidity and prevents distortion. Upright has three ground ways to which the saddle is clamped when in grinding position. The weight of the driving motor holds the spindle housing against the micrometer adjusting screw, eliminating backlash. Table has a platen with one slot for ⅜-inch bolts. A magnetic chuck 8 x 4 inches, or a mechanical fixture with a suitable opening for work within capacity of the machine can be furnished. Either bench or floor mountings are offered with the machines. A ¼-horsepower, 110-volt, 60-cycle, single phase motor is standard equipment.

Mercury Relay

■ Durakool Inc., Elkhart, Ind., announces an unbreakable mercury relay which utilizes the unbreakable



metal body of the company's mercury switch and the displacement principle with solenoid actuation. Its contact structure is hermetically sealed. The relay may be operated up to 300 times per minute with little friction during operation. The metal body is treated to hold a gas at a pressure of 4 atmospheres. Relay's contact resistance is as low as 0.002 ohms. On alternating current 1 watt is required for normal closing operation, and only 1.5 watts for normal opening operation. On direct current the operating energy required is but 0.25-watt. It is available for special requirements up to 200 amperes.

All Purpose Gas Mask

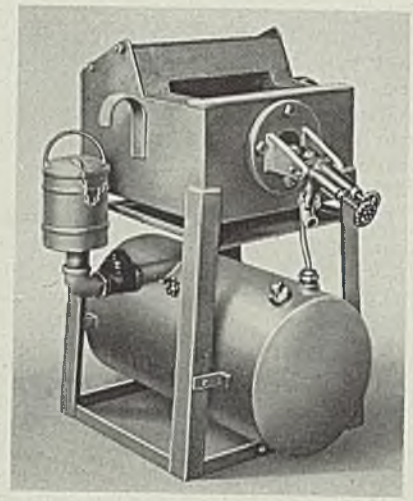
■ Acme Protection Equipment Co., 3647 Liberty avenue, Pittsburgh,

has developed an all purpose gas mask for the protection of indus-

trial workers against smoke, fumes and mist. It provides full vision for user and incorporates a harmless chemical reaction which gives warning by odor as soon as protection against carbon monoxide commences to weaken.

Rivet Forge

■ Hauck Mfg. Co., Brooklyn, N. Y., announces a light weight, portable oil burning rivet forge which pro-

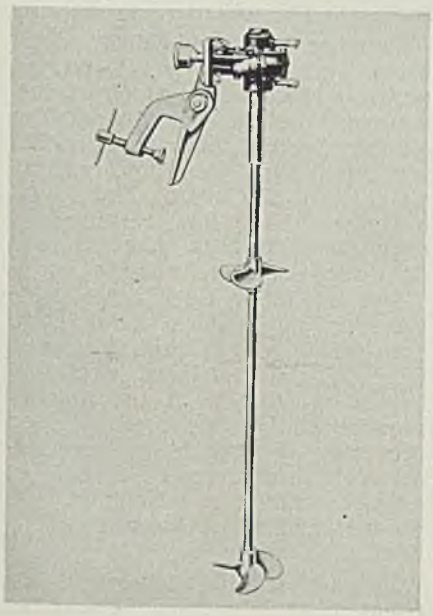


duces white hot rivets in 3 minutes from cold start and heats 200 rivets per hour.

The forge dimensions are 27 x 20 x 25 inches and take up 14 x 15½ inches of floor space. Its heating chamber is 8½ inches wide 9 inches long and 5 inches deep. Unit weighs 126 pounds and is easy to carry.

Propeller Agitators

■ Binks Mfg. Co., 3114 Carroll avenue, Chicago, has placed on the market a complete line of propeller air motor drive agitators for both open and closed containers. The No. 939 series for open containers consists of two airplane type propellers, one pitched right and the other pitched left, so that they throw towards each other. Being driven by an air motor, these agitators are suitable for explosive liquids. Shafts can be furnished from 12 to 27 inches long.



The readily moved adjustable clamps enable operator to fasten agitator to outside of a barrel in any desired position.

All units in the No. 636 series for closed type barrels have their own agitating mechanism.

Segment Saw

■ Pittsburgh Saw & Tool Co., 75 Sycamore street, Pittsburgh, has developed a Segment Saw in which segments are held in place with wedges.

The segments are driven by the full width of saw body. Should saw meet with an accident by moving of the work or other cause, and a segment broken, plate will not be damaged.

Any broken segment can be replaced easily by removing key and wedge.

Why Not Simplify?

(*Continued from Page* 46)

that here, at least, chemical ranges of composition are going to give way to physical mixing and handling of given materials.

Ingots: With a few exceptions, the conventional method is to cast an ingot. There are several kinds of steel to cast, and ingots can have an infinite number of sizes and shapes.

The manner in which the cast ingot freezes may be the vital difference between steels. This is more closely the limiting control than chemical analysis. We thus find our commercial production involved in a compromise between an ingot small enough to provide for precise freezing, yet large enough to give an economical weight to work.

The cross section of an ingot has a relation to the product for which it is intended. In general they are approximately square and have a length about four times the thickness.

A better limitation in recent years has been the intended weight and the time required to freeze solid. Thus, we may specify an ingot weighing between 4000 and 5000 pounds and which will freeze in 100 minutes.

Freezing of Ingots and Chemical Composition: The speed of freezing, ingot design and chemical composition are important related variables. The various constituents of the molten steel freeze at different temperatures, and the solubilities of the various components likewise change. The result is that each particle of metal in an ingot varies in some manner from the other particles of the same ingot. Due to the effect, called "cored" structure, the successive layers of a single crystal vary in composition. This variation is called "segregation". It is widely known in terms of carbon segregation both above and below the average analysis of the ingot or the heat of steel.

Every range of chemical composition commercially useful must balance the desire for uniform composition with the impossible problem of getting even an approximation of this ideal.

Freezing of Rimmed Steel and Distribution of Elements: In rimmed steels, free evolution of gas proceeds during freezing and, since this gas is largely carbon gases, we expect a lowering of carbon during freezing. The boiling action also causes the lower freezing point materials to concentrate in the last freezing portion of the ingot. Rimmed steels are so nearly impossible of sampling in any uniform manner that quantitative chemistry of the entire line of materials is doubtful as to results and questionable as to utility. As a class these steels should be specified to make a part and their chemistry left to the supplier's discretion.

When for any reason it is deemed essential to specify chemistry, it should be recognized that only when reduced to very small cross sections can a sample be reasonably sure to represent the material.

Freezing of Semi-Killed Steel: When deoxidizers in limited amounts are added to steel, the major gas evolution is eliminated. The quieter freezing tends to distribute the impurities more uniformly to all parts of the ingot. The resulting steels have less variation of chemistry and thus chemical tests of these are more reliable.

Size of ingot may cause wide variation in chemical composition even when poured from the same ladle. The size of ingot in general has some relation to the finished product and it has recently been necessary to include in specifications maximum cross sections of finished product to which not only chemical but also physical specifications are applicable.

Freezing of Killed Steels and Distribution of Elements: Where the

steel is deoxidized to the extent of pouring quietly and remaining quiet during freezing, we speak of it as full killed or dead steel. Originally it designated the quality of steel produced in crucibles when the process was properly carried to a stage in which enough silicon was reduced from the crucible wall to insure quiet teeming and freezing.

The fully killed steels are a proper material for a specification by chemistry inasmuch as they are usually uniform enough in composition to permit a proper relation between the ladle sample and a sample of the finished product selected for check analysis. Like the semi-killed steels, ingot size and freezing time play an important part in composition. Very large sections such as squares over 7 inches or equivalent thickness may be expected to show much larger variation in chemistry than the average bar, which is about 1 inch in diameter.

Diffusion of Elements: Equalization of the chemical composition by diffusion is useful in a limited way on some of the very costly materials. The time and expense involved are commercially impossible in any wide application. As an example, ten hours at rolling temperature will equalize commercially only a quarter of an inch of product.

Size of Ingot: Where very large ingots, such as forging ingots, must be supplied, it is a part of the practice to mix heats of steel of very different compositions so that the whole may approximate the desired. The carbon content of the last third of the ingot may be only half of the previous heats in extreme cases. The other extreme is where individual small ingots are used as in antiaircraft gun barrels where only the middle portion of an ingot weighing less than 1000 pounds can be uniform enough to meet the requirements of the heat treater.

When cross section of an ingot is cut down to achieve uniformity of chemistry, consider the fact that soundness of the ingot is promoted by increase of the section in comparison to its length.

Rolled Size: The bulk of steel is rolled so we are forced to adapt our ingot to the blooming mill. Cost of handling a small ingot is a serious disadvantage. Cutting the weight to less than 4000 pounds about doubles the cost per ton of rolling compared to a 10,000-pound ingot. The 4000-pound ingot is actually small compared to the modern strip slab ingot of 30,000 pounds.

When we separate the billets or slabs from individual ingots and collect groups of semifinished products of restricted chemistry, we have an additional tool for narrow ranges of analysis, but this entails added cost in handling and often involves decreased yield. Where the material is a standard commodity, such as certain wire products, this can be accomplished with little added cost.

Wire: Wire is usually rolled from standard weights of billets of uniform cross section. Thus, any ingot can be rolled to the semifinished stage, checked for analysis, grouped properly and finally rolled to the rod. The rod can be checked further prior to drawing. Final cross section is small enough to permit analysis of the full cross section.

The chemical analysis of wire is that of the finished product, and the ranges are as narrow as laboratory methods of analysis permit. It would be practically impossible to get a dozen analysts' results on a 7-inch square medium carbon steel to check within the full analysis range for carbon that is customary for wire. Probably the most accurately reproduced article of the steel industry today is the heat-treated cap screw of the American automotive trade. It represents the sum of accurate making, complete checking, and is small enough mass to make segregation only a minor problem. However, it cannot set a standard for other products which either because of the way they are manufactured or their different mass cannot approximate their selection.

Packing for Export

(*Continued from Page 74*)

shipments are rated by their cubic space measurements as well as total weight, a material saving is effected in this way.

All goods affected by mold or rust should be especially protected by oiled coverings, while metallic surfaces ordinarily should be well covered with waterproof material.

To facilitate easy handling and minimize chances of breakage, cases containing machines should be as small as possible. All parts should be snug and tight in the case or crate. The least bit of movement may result in serious damage. Pieces of irregular form should be braced at every curve and angle, the box itself being re-enforced inside and out to prevent its gonig to pieces if dropped.

Because of its weight, hardware should be packed in as small compass as practicable and in cases that will stand rough and frequent handling.

(*Concluded next week*)

♦

Treatment Allows Wood To Be Electroplated

■ A surface treatment for permitting such materials as phenolic products, wood, ebonite, etc., to be electroplated has been developed by Acheson Colloids Corp., Port Huron, Mich. It consists of applying a coating containing a hardenable organic colloid, a hardening agent and colloidal graphite, suspended in water, to the part by dipping, brushing or spraying.

The coating hardens on exposure to light and renders the surface conductive. It is not affected by copper sulphate or cyanide solutions, and may be applied at normal or elevated temperatures.

The treatment also may be used directly in the preparation of electrical resistance elements.

♦

Controlled Melting

(*Concluded from Page 64*)

down to within 1½ millimeters of mercury from a perfect vacuum throughout the 50-pound melting and pouring operation. It is more difficult to keep the pressure down just as the metal melts than at any other time during a heat. Much of the difference in vacuum pressure is thought to result from evolution of gases from the refractory linings, a phenomenon which takes place even in a furnace of the induction type. There is a tendency for the metal to boil under each greatly reduced pressures. Any difficulty from this cause, however, can be overcome by cutting down the high frequency voltage, thus reducing the melting speed.

Enables Particles to Rise

Power for the vacuum furnace is furnished by a 100-kilowatt, 2000-cycle generator. The 50-pound charge, from a cold start, can be melted and poured in 15 minutes. This includes the time during which the furnace is held at low power while the charge is heated through the melting point. At atmospheric pressure the charge can be melted and poured in about 11 minutes.

Because the metal is melted in a vacuum it is possible to keep the heat liquid over a period of time without oxidation. This feature makes it possible to hold heats so as to permit suspended particles of slag and oxides to rise to the surface.

Another recent Ajax development is an induction furnace for melting and pouring metals under pressure in the presence of various gases in order to determine their effects. Shown in Fig. 3, this unit is of much heavier construction. The furnace was built carefully and joints are so tight that a water column exerting about 15 pounds per square inch against pressure in the furnace container fell only an inch in 10 minutes. Numerous heavy bolts engaging projections hold the lids tightly against lead gaskets set in grooved flanges at top of the furnace and the bottom of mold.

The 25-pound pressure melting and pouring furnace is operated from a 35-kilovolt-ampere spark-gap converter. With this small power supply a melt requires about 1¼ hours.

The furnace in addition can be operated from a rotary generator. With 100 kilowatts of 2000-cycle power melts can be made ion 6 to 8 minutes.

New Wall Construction Has Low Heat Loss

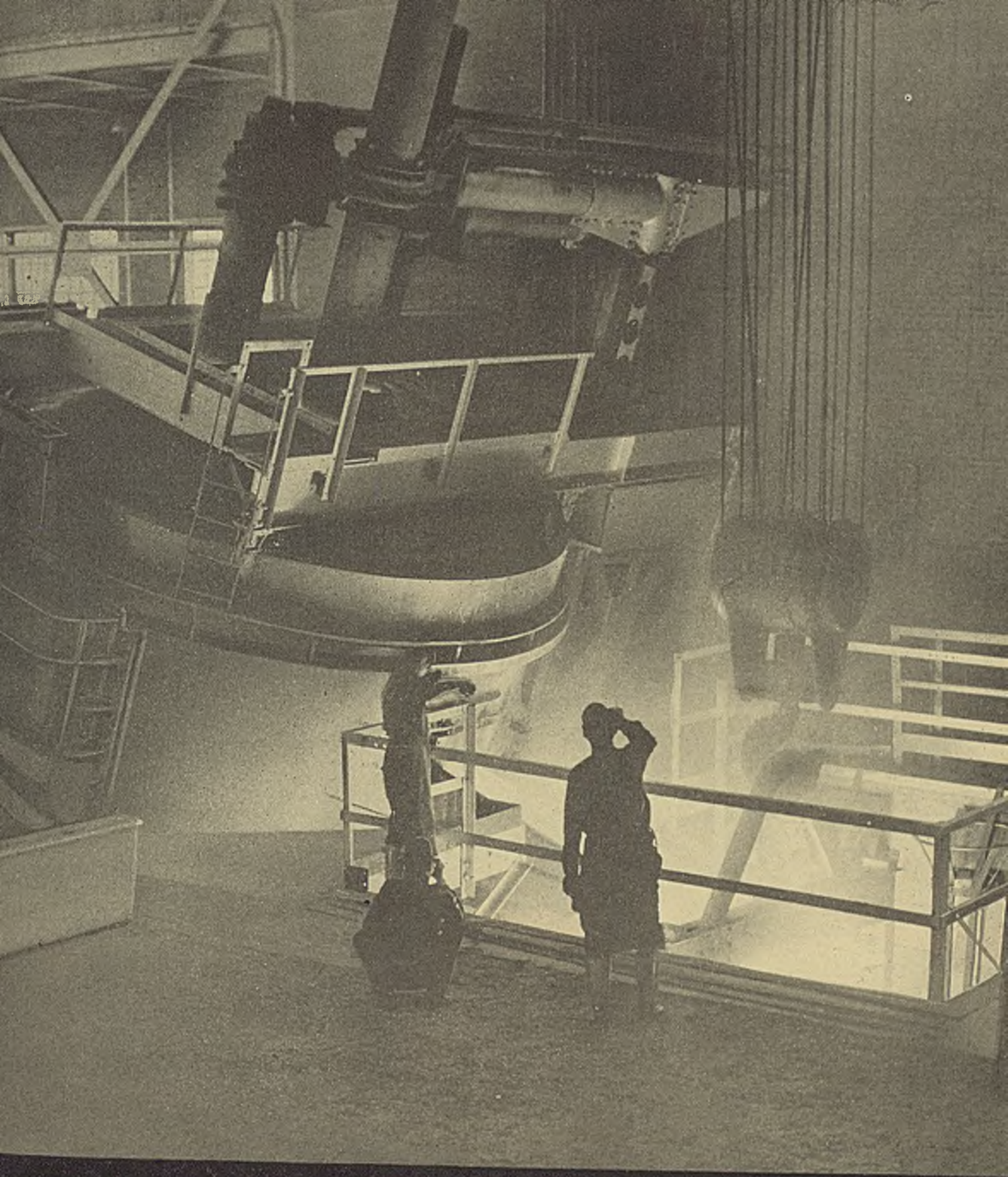
■ A new type of construction for furnace walls and arches, called Thinsulite, is announced by M. H. Detrick Co., 140 South Dearborn street, Chicago. It is suitable for boiler walls, water wall backing, oil still heaters, stress relieving furnaces and all areas not exposed to actual abrasion.

The construction includes a refractory which is backed up by insulation and supported on a light steel structure. Besides being economical to install, it permits a completely suspended wall having a low heat loss.

Improves Steel for Cold Heading Dies

■ Steel for cold heading dies, made by an improved process which eliminates the porous center of the cast ingots has been developed by the Jessop Steel Co., Washington, Pa. It can be used in either solid or open die cold-heading work and requires no change in regular shop practice.

The steel is made from electric furnace steel, grain size of which is controlled so as to permit wide variation in hardening temperature without coarsening.



Copperweld Steel Company

COMPLETES NEW ALLOY STEEL PLANT

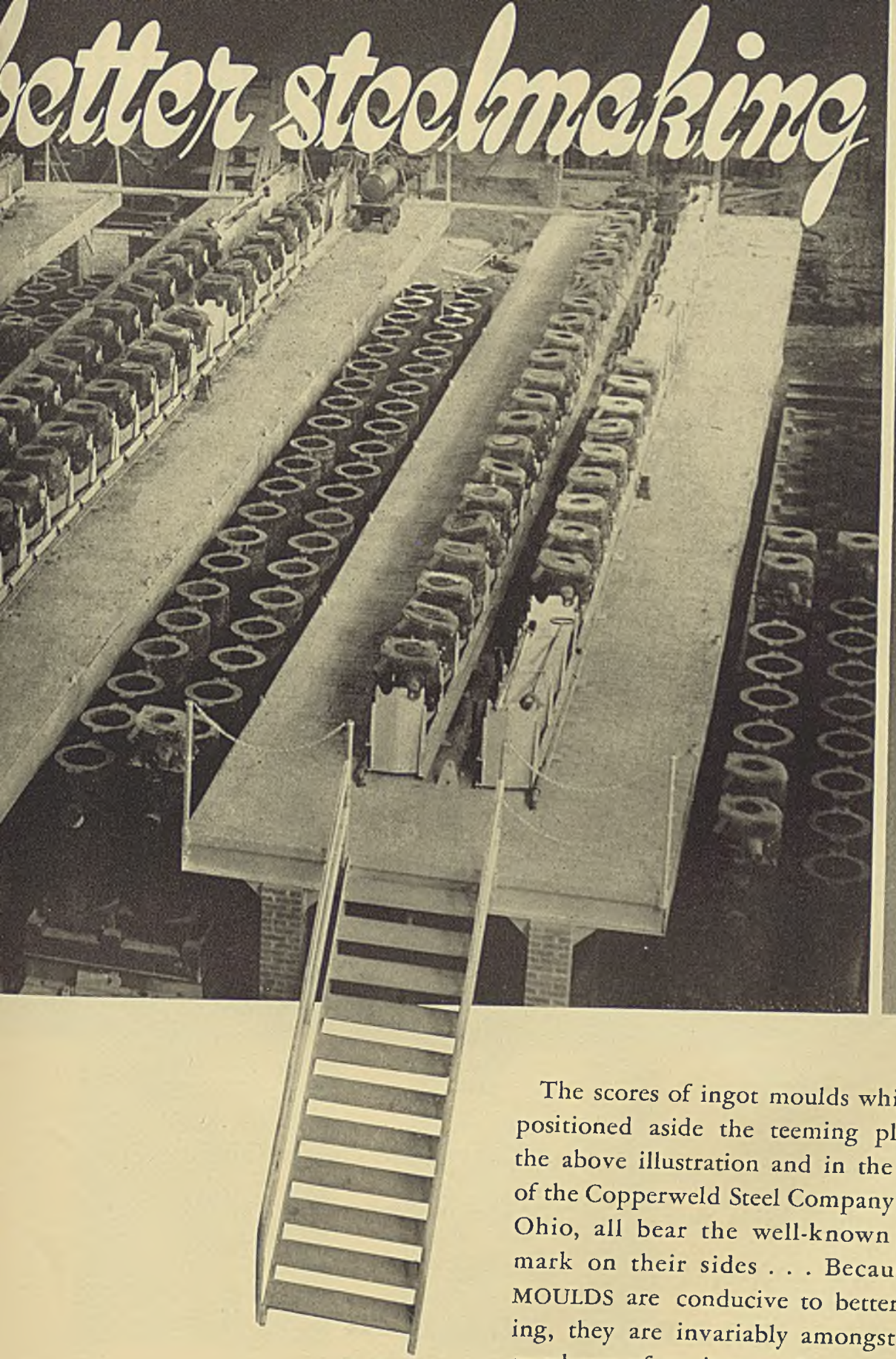
at Warren, Ohio

V

Steps toward

VALLEY MO

GENERAL OFFICE: HUBBARD, OHIO

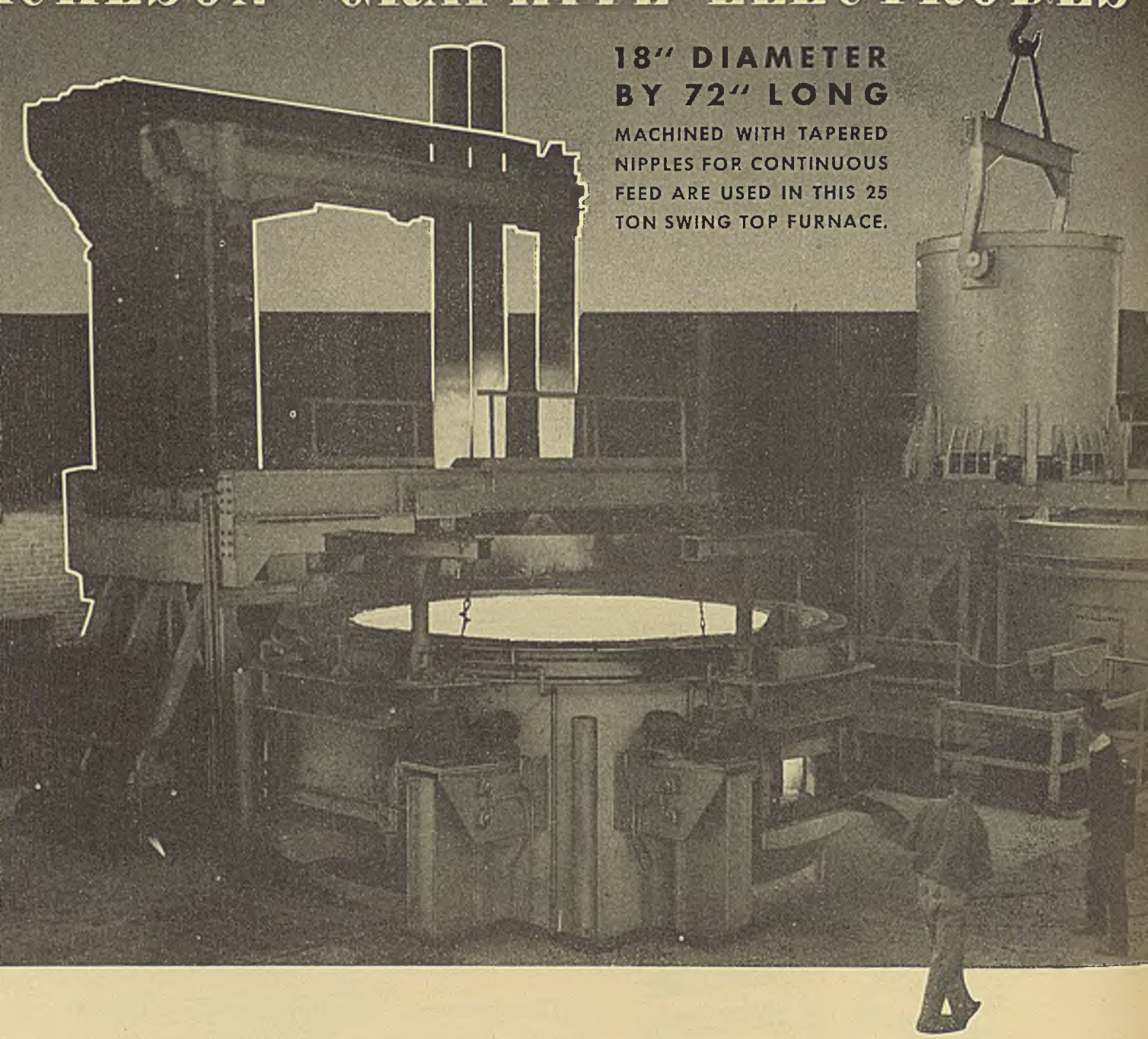


The scores of ingot moulds which you see positioned aside the teeming platforms in the above illustration and in the new plant of the Copperweld Steel Company at Warren, Ohio, all bear the well-known "V" trade mark on their sides . . . Because VALLEY MOULDS are conducive to better steelmaking, they are invariably amongst the initial purchases of equipment for new steel mills.

D & IRON CORPORATION

WESTERN OFFICE: CHICAGO, ILL.

ACHESON" GRAPHITE ELECTRODES



18" DIAMETER BY 72" LONG

MACHINED WITH TAPERED NIPPLES FOR CONTINUOUS FEED ARE USED IN THIS 25 TON SWING TOP FURNACE.

"ACHESON" Graphite and "NATIONAL" Carbon Electrodes are available in proper sizes for the efficient operation of all types of Electric Arc Furnaces for the production of Alloy Steels and other Electric Furnace Products.

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation

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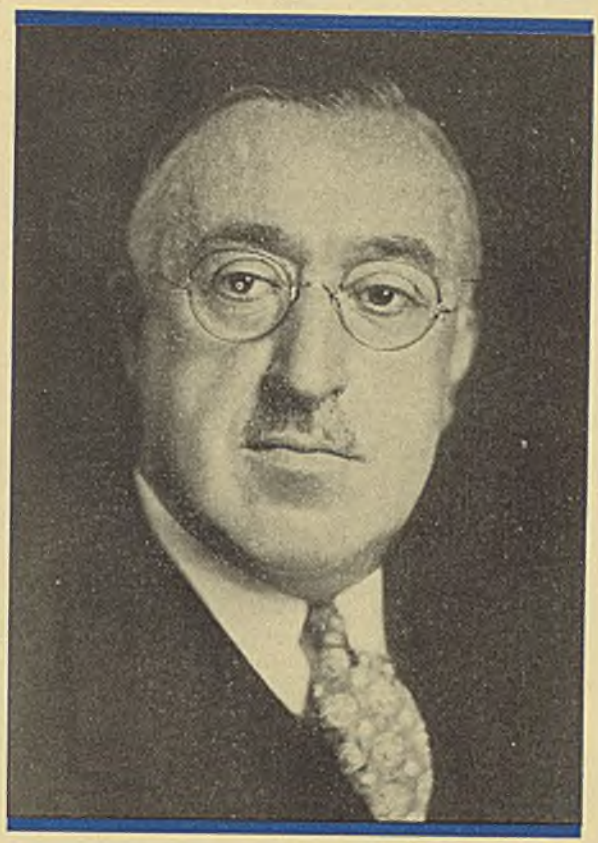
ELECTRODE SALES DIVISION

General Offices: 30 East 42nd St., New York

Branches: Niagara Falls, N. Y., Cleveland, Detroit, Chicago, Birmingham and San Francisco

■ Frederick J. Griffiths, executive vice president. From 1913 to 1926 associated with Central Steel Co. from general superintendent to president and general manager. From 1926 to 1929, chairman of board, Central Alloy Steel Corp. From 1929 to 1931, president Republic Research Corp. and a member of board of Republic Steel Corp. Subsequently, he was president, Timken Steel & Tube Co. and a member of board of Timken Roller Bearing Co. Since 1937, president, the Griffiths-Bowman Engineering Co.

Mr. Griffiths at present holds directorships in Eaton Mfg. Co., Cleveland Graphite Bronze Co., Inland Investors, Inc. and the Aetna-Standard Engineering Co. He is one of the nation's outstanding pioneers in the development of alloy steels, an accomplished metallurgist, and an executive of proved ability.



Frederick J. Griffiths

■ Sidney D. Williams, vice president in charge of alloy steel sales. Graduate of Lehigh university, 1913, with degree of metallurgical engineer. Previously associated with Carnegie-Illinois Steel Corp., U. S. Navy flying corps, open-hearth superintendent of Central Iron & Steel Co. as well as open-hearth superintendent and chief metallurgist, Pittsburgh Crucible Steel Co. From 1926 to 1940, he was respectively, metallurgical sales engineer, assistant director of sales, manager of tube sales and director of sales for Timken Steel & Tube division, Timken Roller Bearing Co.

■ Norman L. Deuble, assistant to vice president Graduate of Case School of Applied Science with degrees of B.S. and metallurgical engineer. Member of A.S.M. and S.A.E. (member of iron and steel committee, S.A.E.). Previously associated with Republic Steel Corp., Central Alloy Steel Corp. and United Alloy Steel Corp.

■ C. W. Holmquist, general works manager. For past eight years, general manager of the Glassport, Pa., works of the Copperweld Steel Co.

Sidney D. Williams

C. W. Holmquist

Norman L. Deuble

Paul Lindberg

■ Paul Lindberg, rolling mill superintendent. Formerly rolling mill superintendent, Timken Roller Bearing Co. Started in Swedish steel mills, his experience including over 42 years in capacity of roller to superintendent of rolling mills. Formerly associated with Carnegie-Illinois Steel Corp. and subsequently roller, foreman and assistant in charge of rolling for former United Alloy Steel Corp.

Roy F. Lab

■ Roy F. Lab, chief chemist. Previously associated with United Alloy Steel Corp. Republic Steel Corp. and Barium Stainless Steel Corp.

John P. Smith

■ John P. Smith, chief engineer. Graduate of Carnegie Institute of Technology, 1912, with degree of B.S. in mechanical engineering. Previously associated with Mesta Machine Co., and United Engineering & Foundry Co.

Floyd Stroup

■ Floyd Stroup, superintendent of melt department. Previously associated with American Steel Foundries, Central Alloy Steel Corp., Republic Steel Corp., Republic Research Co., Timken Steel & Tube Co., United Engineering & Foundry Co. and Aetna-Standard Engineering Co.

J. Russell Penman

■ J. Russell Penman, production manager. Previously associated with Central Steel Co., Timken Roller Bearing Co. and United States Steel Corp.

■ W. J. Buechling, chief metallurgist. Graduate of Carnegie Institute of Technology, 1926, with a degree of B.S. in metallurgical engineering. Previously associated with Central Alloy Steel Corp. and Republic Steel Corp.

■ W. C. Morgenstern, assistant chief engineer. Graduate of Cornell University, 1909. Previously associated with American Steel & Wire Co., Carbon Steel Co., Blaw-Knox Corp., Barium Stainless Steel Corp. and Thomas Hilliard, special consulting engineer.

■ Donald Schaffert, assistant chief chemist. Previously associated with Republic Steel Corp., Diebold Safe & Lock Co., Central Forging & Axle Co. and Timken Roller Bearing Co.

■ John B. Formet, assistant superintendent of rolling mills. Previously associated with United Alloy Steel Corp. and Timken Roller Bearing Co.

■ H. F. Peschel, chief roll designer. Affiliated for past 30 years with United Engineering & Foundry Co., United Steel Co., Corrigan-McKinney Steel Co., Central Steel Co., Algoma Steel Corp. Ltd., and Great Lakes Steel Corp.

W. J. Buechling

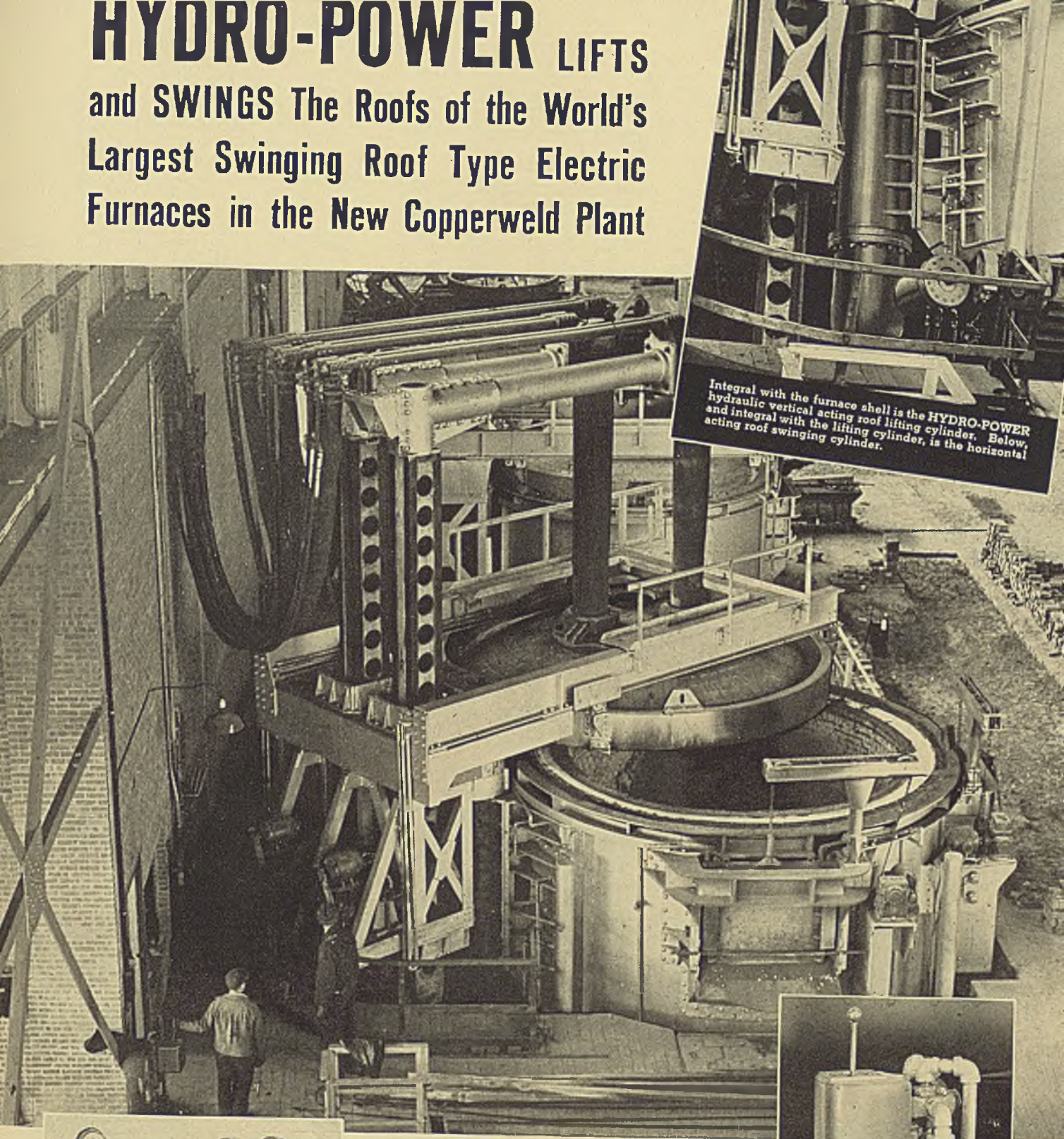
W. C. Morgenstern

Donald Schaffert

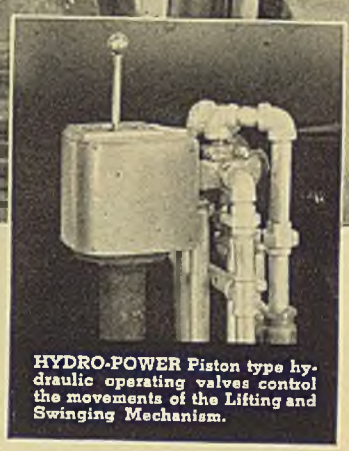
John B. Formet

H. F. Peschel

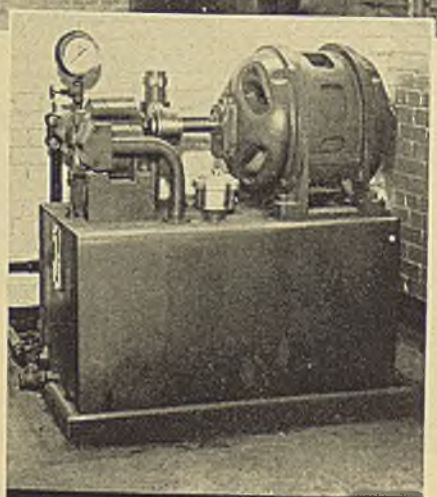
HYDRO-POWER LIFTS and SWINGS The Roofs of the World's Largest Swinging Roof Type Electric Furnaces in the New Copperweld Plant



Integral with the furnace shell is the HYDRO-POWER hydraulic vertical acting roof lifting cylinder. Below, and integral with the lifting cylinder, is the horizontal acting roof swinging cylinder.



HYDRO-POWER Piston type hydraulic operating valves control the movements of the Lifting and Swinging Mechanism.



A standard HYDRO-POWER heavy duty Gear Pump power unit supplies moderate hydraulic pressure to actuate the roof lift-

➡ Swindell-Dressler Corporation, builders of a complete line of electric steel furnaces, chose HYDRO-POWER for their hydraulic movements. Besides lifting and swinging the furnace roof, a patented cushioning device permits the roof to slowly come to a stop at both ends of the swinging arc, thus eliminating shock. The Swindell-Dressler electric furnace is one of many HYDRO-POWER installations where uninterrupted hydraulic pressure service must be assured.

HYDRO-POWER SYSTEMS, INC. ★ *Sales Headquarters*
604 Grant Bldg., Pittsburgh, Pa.
Factory: Mount Gilead, Ohio

By Appointment

TO

COPPERWELD STEEL COMPANY

● It was an honor to be selected to procure equipment for the new alloy steel plant of Copperweld Steel Company at Warren, Ohio. This repeats the service rendered in 1927 when their Glassport works were built.

The exclusive contract included 29", 24", 18" and 12" rolling mills — buildings and cranes — shears, cooling beds and tables — motors and generators — etc. To be of service to this new plant is a source of satisfaction and pride.

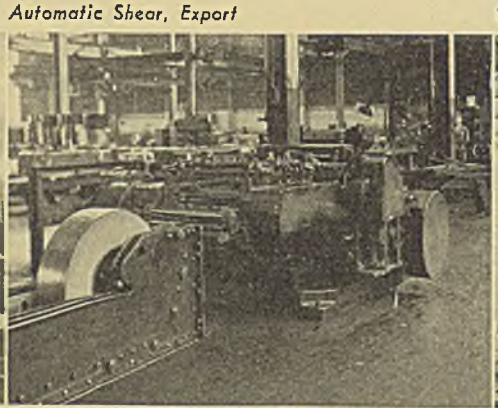
This specialized service has now been functioning for 25 years in the purchase and sale of high-grade existing rolling mills and steel works equipment. It has been extended to complete plants as well. Sales in this field have probably exceeded those of any other organization in it. Largest order, over 250 rail carloads—smallest order, a single unit.

CUSTOMERS LOCATED IN ALL PARTS OF THE WORLD

This service can aid you, too.
An inquiry will bring current existing equipment list.

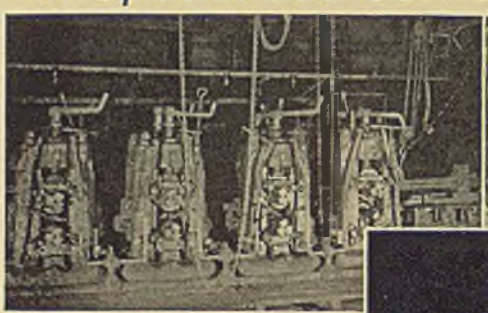
Automatic Cooling Bed, U. S.

Automatic Shear, Export



1000-Ton Forging Press, U. S.

A Specialized Service to Industry in All Parts of the World



12" Continuous Roughing Rod Mill, U. S.

Center: Cold Sheet Mill and Drive, Export

Reversing Blooming Mill and Motor, Export

ROLLING MILLS *and* EQUIPMENT

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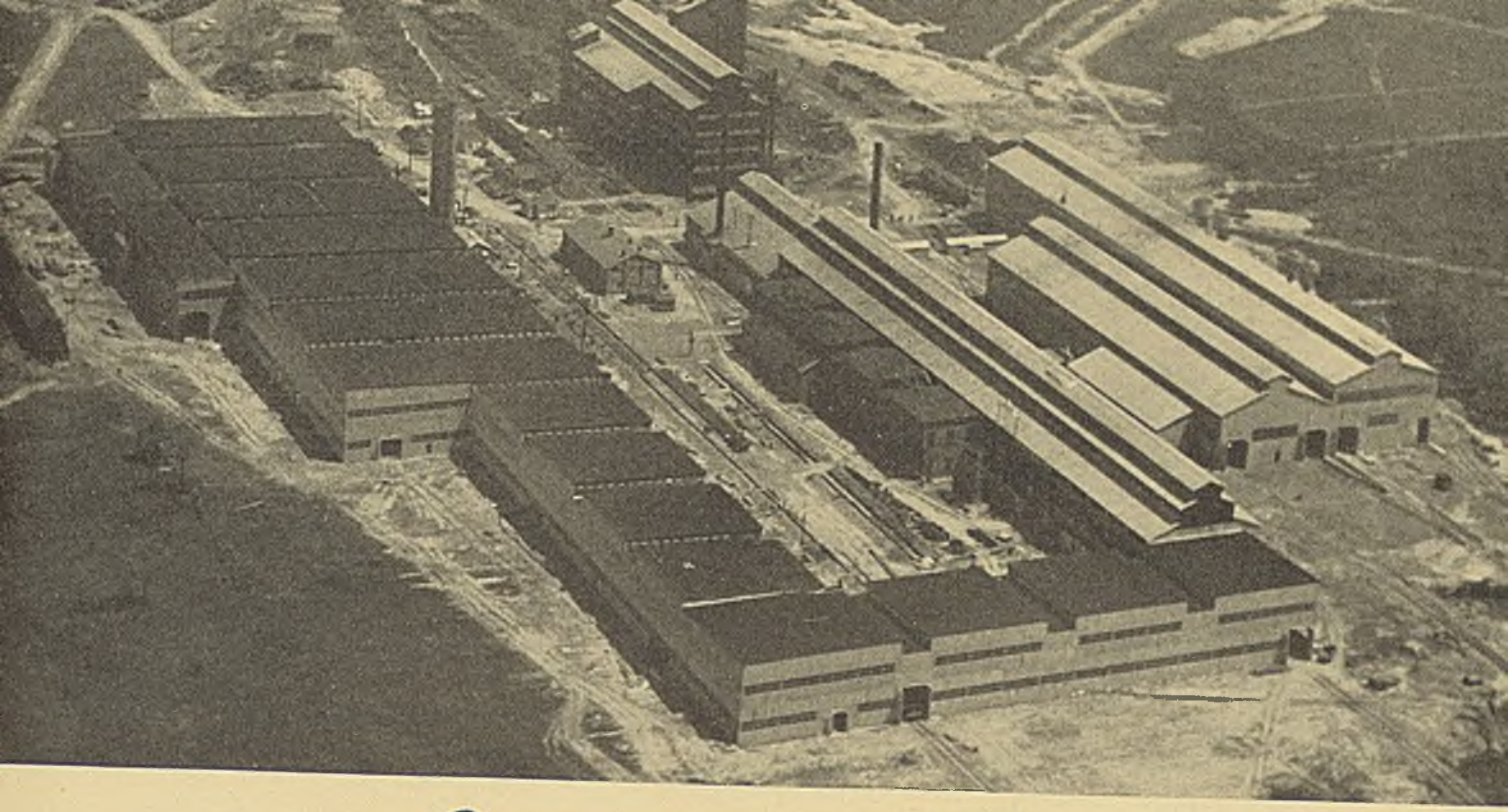


Copperweld's NEW ALLOY STEEL PLANT

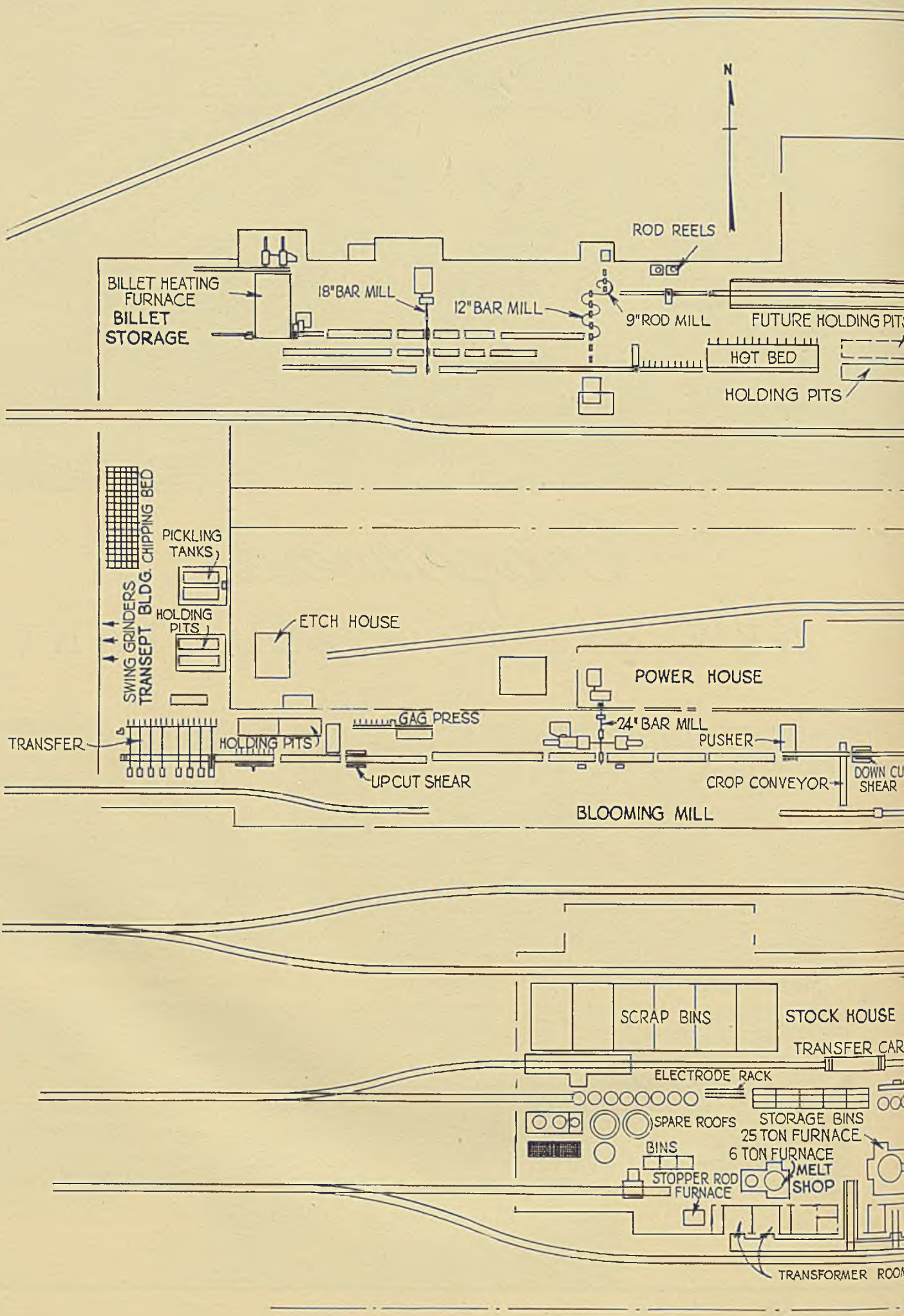
By John D. Knox
Associate Editor, STEEL

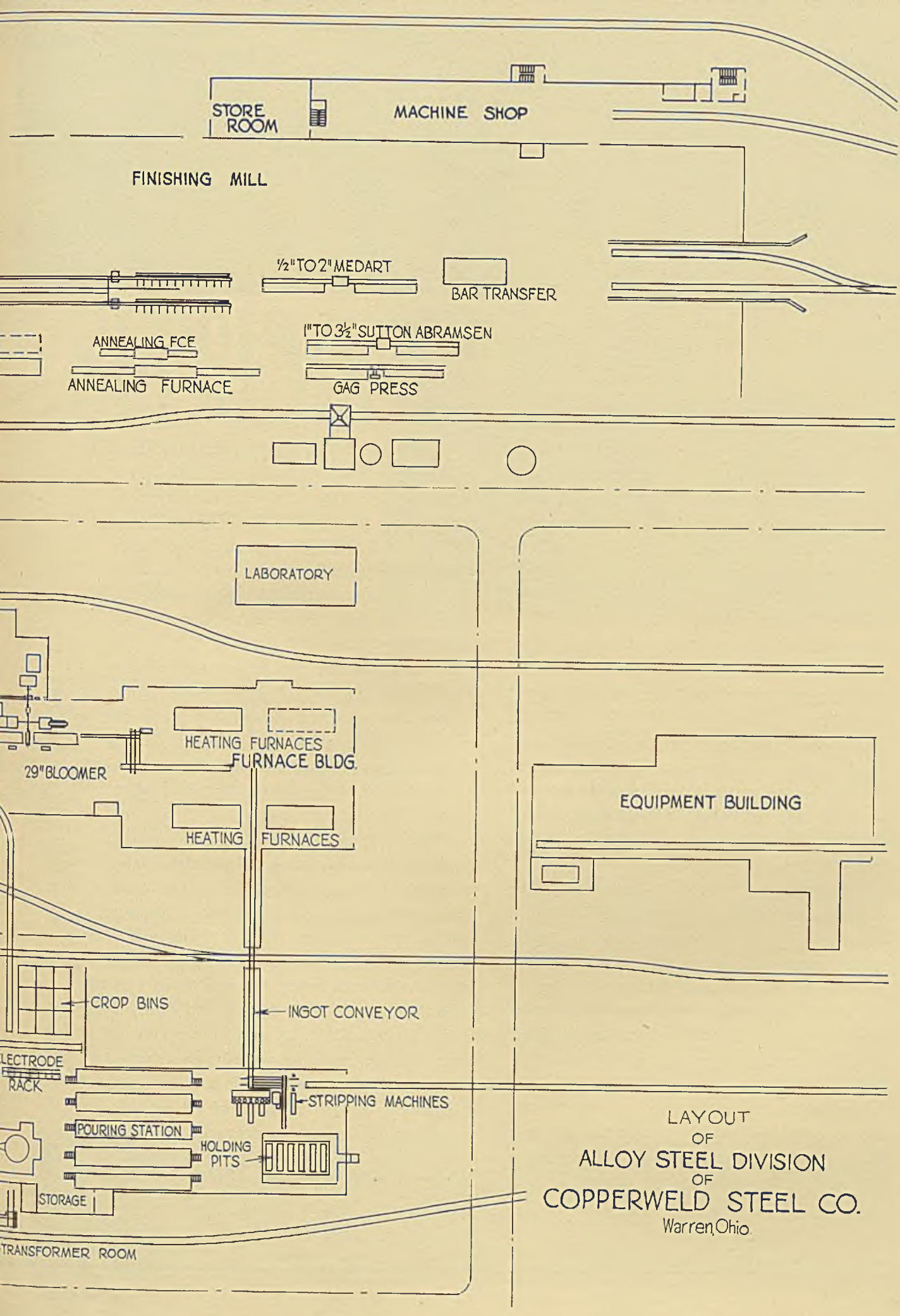
■ ALLOY STEEL now is being manufactured at the new plant of the Copperweld Steel Co., 2¼ miles north of Warren, O. on State highway, Route 45. The plant site includes 423 acres on the Mahoning river, and is served by the Baltimore and Ohio, Pennsylvania and Erie railroads. Standard S. A. E. types of alloy steels in automotive and electric furnace quality will be marketed. In addition, aircraft quality and tool steels will be melted. Later, higher alloy steels will be produced.

Present melting capacity is about 12,000 tons of electric alloy ingots per month and finishing capacity approximately 20,000 tons per month in billets, bars and rods ranging from ½ to 8 inches.

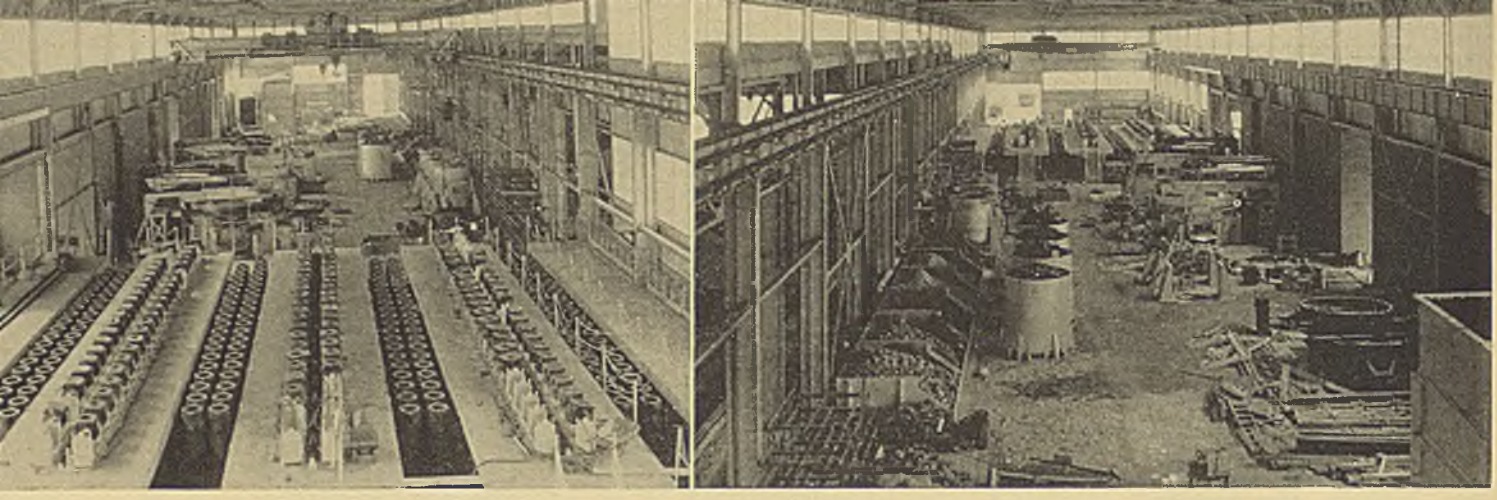
Approximately 7½ acres of floor space are under roof in modern day-light buildings—all served by cranes. The melt shop is housed in a building 78 x 500 feet, on the south side of the property with offsets provided for material storage, transformers, offices, test room and ladle stopper repair. The melt shop opens into the stockhouse, 80 x 330 feet, where one system of bins is provided for storing different grades of electric furnace scrap, and another for storing various grades of steel crops which accumulate at the blooming mill shear.

North of the melt shop and stockhouse buildings and parallel thereto is the blooming mill building, 71 x 683 feet, which houses the 29-inch 3-high blooming mill and the 24-inch bar mill. Motors for driving these mills are located in the power house. The latter is housed in an extension on the northern side of the building, 40 feet wide and 264 feet long.


N
ROD REELS
BILLET HEATING FURNACE
BILLET STORAGE
18"BAR MILL
12"BAR MILL
9"ROD MILL
FUTURE HOLDING PITS
HOT BED
HOLDING PITS
SWING GRINDERS
TRANSEPT BLDG. CHIPPING BED
PICKLING TANKS
HOLDING PITS
ETCH HOUSE
POWER HOUSE
TRANSFER
HOLDING PITS
GAG PRESS
24" BAR MILL
PUSHER
UPCUT SHEAR
CROP CONVEYOR
DOWN CU
SHEAR
BLOOMING MILL
SCRAP BINS
STOCK HOUSE
TRANSFER CAR
ELECTRODE RACK
SPARE ROODS
STORAGE BINS
25 TON FURNACE
BINS
6 TON FURNACE
MELT SHOP
STOPPER ROD FURNACE
TRANSFORMER ROOM



LAYOUT
OF
ALLOY STEEL DIVISION
OF
COPPERWELD STEEL CO.
Warren, Ohio



Left—Melt shop looking toward entrance. Teeming station in foreground provides four aisles for mold. Right—Mold shop looking towards exit end. Charging buckets of light scrap shown near bins

A third building which parallels the other two main structures is built in three sections. One, 80 x 924½ feet, houses an 18, 12 and 9-inch bar mill and rod mill, holding pits, annealing furnaces, straightening machines and other finishing equipment; the second, 80 x 580½ feet, which will house additional finishing capacity. The third section on the north, is a 2-story building, 344 x 40 feet. The ground floor provides for the storeroom, machine shop, lockers and clockhouse. The second floor will house drafting rooms and general offices.

The western end of both the blooming mill building and bar and rod mill building opens into the bloom yard building, 80 x 344 feet, in which are located holding pits, pickling tanks, chipping bed, cold saws and ample storage space for semifinished material.

Seven miles of trackage is laid within the plant enclosure and over this the company operates a diesel yard locomotive, a diesel narrow-gage locomotive for moving crops from the blooming mill to the storage bins in the stockhouse, and a 4-wheel drive electric transfer car for handling charging buckets from the loading station in the stockhouse to the melt shop.

Installed in the melt shop are two 25-ton top charged and one 6-ton electric furnaces. Furnaces of small capacity were selected to afford accurate and uniform control of all phases of melting. Each 25-ton furnace is 16 feet diameter, taps average heats of 35 tons, and has electrical capacity of 12,000 kilovolt amperes. By virtue of the high electrical input, melting down of the complete charge is accomplished within a period of two hours. The refining period then is carried out under the flexible inputs available. Under-the-slag pouring is used to maintain metallurgical cleanliness.

The furnaces are the largest top-charging electric steel melting furnaces in the United States. The combination of a swinging roof with a 4-point suspension is a unique feature of the design inasmuch as the heavy stresses on the roof refractories are completely eliminated. The 4-point suspension of the roof makes the changing of a roof a simple and rapid process. Moreover, all roofs are interchangeable and are relined on well-built, accurate and matching forms located at the west end of the melt shop. Two of these relining pits are provided which also serve as a storage for the roofs until ready for installation.

Smooth operation of the lift and swinging roof is attributed to the use of a heavy oil hydraulic lifting ram into which is incorporated a transverse oil hydraulic cylinder for swinging in both directions. Each oil system is of low pressure and interconnected. The rams made of forged alloy steel are interlocked. Jarring at each end of the swing is eliminated

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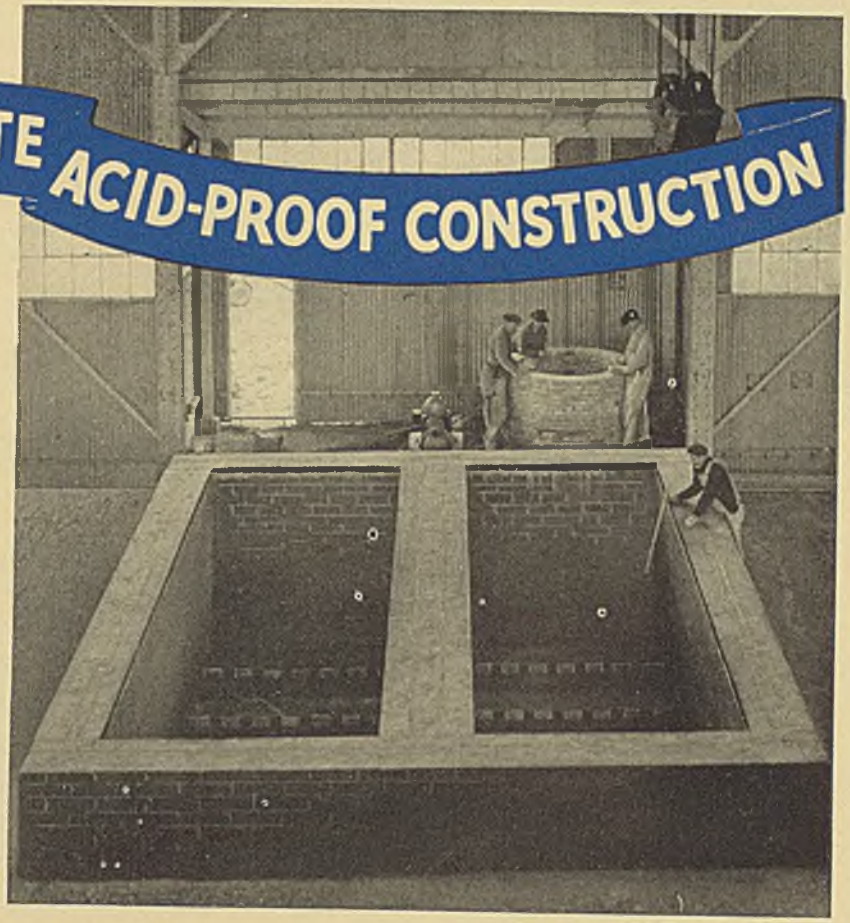
UP-TO-THE-MINUTE ACID-PROOF CONSTRUCTION

AFFORDING SUPREME

ACID-RESISTING QUALITIES, IMPERVIOUSNESS TO HIGH TEMPERATURES . . . ABRASION AND TURBULENT LIQUIDS



Modern acid tanks of ATLAS DUAL CONSTRUCTION, in the Copperweld Steel plant at Warren, Ohio

THE lining, next to the corrosive bath, is a combination of Atlas acid-proof brick and KOREZ, a chemically setting resin cement. Into the back course of the brick is poured molten Tegul-VITROBOND, an improved sulfur cement. The heat given off during solidification of the Tegul-VITROBOND converts the KOREZ resin cement to its final set in a short time. Tank is then ready for immediate service.

This type construction withstands temperature changes and does not deteriorate under high temperatures nor contaminate the acid bath. Atlas Dual Construction is:

- Inert to hot acid and hot lime solutions
- Able to withstand operating temperatures to 250° Fahr.
- Unaffected by local overheating, whether from faulty steam jets, or from heat generated by the addition of concentrated acid.
- Resistant to Oils . . . and its construction requires less labor.

Atlas has pioneered notable improvements in pickling tank design and construction materials. These improvements include Atlas Dual Construction, Rubber Expansion Joints in acid-proof brick sheathings, Tegul-VITROBOND plasticized sulfur base acid-proof cement, Carbon Brick—Carbo-VITROBOND tank linings for nitric and hydrofluoric acid mixtures, used in pickling stainless steel, acid-proof Brick with scored surfaces, insuring maximum bond, triple acid-proof membranes.

Atlas Construction is used in more than thirty continuous pickling lines for pickling wide strip steel, each line over 300′ long, also in numerous batch pickling tanks, neutralization and acid-disposal equipment, acid-proof sewers, floors, etc. Atlas Dual Acid- Alkali- Water- and Oilproof linings serve in large steel mills, chemical and metal refinery plants. Technical booklets on modern acid-proof construction will be sent on request.

Tegul-VITROBOND

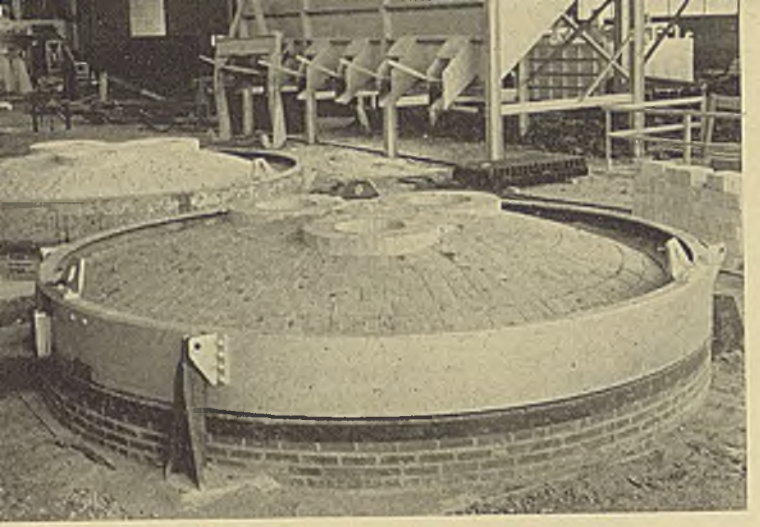
THE ATLAS MINERAL PRODUCTS CO. OF PA. — THE House Jointing Materials — MERTZTOWN, PA. EST. 1892

The ATLAS MINERAL PRODUCTS COMPANY

OF PENNA. — MERTZTOWN, PA.

★CHICAGO 1442 Cullom Ave.
★DALLAS 3921 Purdue St.
NEW YORK 280 Madison Ave.
PITTSBURGH (10) Old Boston Road
★SAN FRANCISCO 721 Bryant Street
★ATLANTA 175 Spring St., S.W.
★KANSAS CITY, Kan. 647 Ann Avenue
★DETROIT 2970 West Grand Blvd.
★LOS ANGELES 817 Yale Street
★SEATTLE P. O. Box 3084

★ Stocks carried at these points



Matching forms where the furnace tops are relined and stored until ready for installation. Bins for dolomite and limestone in background

by an automatic decelerating device. A single lever operates the entire system, its motion being identical to the gear shift movement of an automobile. The structure housing the swinging apparatus is of massive steel castings.

Furnace electrodes are of graphite 18 inches diameter and 72 inches long. Threaded sockets are machined on each end to allow for end-joining by a tapered graphite connecting pin. Three electrodes are joined together to form an 18-foot column, three of which are used in each of the 25-ton furnaces. These are mounted in water-cooled holders. Pyramid shaped racks built of structural steel members are provided opposite the 6-ton and two 25-ton furnaces for storing the respective size electrodes until ready for use. The rack serving the large furnaces has a storage capacity of 120 electrodes.

When a roof is to be changed the electrodes in use are removed and stored in a vertical position in steel vases anchored parallel to each other on a sidewall in the casting pit between the 25-ton furnaces. Three holders are provided for this purpose.

Electrode travel is nearly twice the distance as in previous practice. This feature reduces shutdowns attributable to electrode slippage 50 per cent.

Flexible cables supplying power to the electrodes are water cooled. A desirable safety feature is that they are insulated from one another by rubber hose containers. This arrangement is becoming more and more important with the use of modern high-melting voltage.

In such large electric melting furnaces the matter of mass inertia and long electrode mast cables has been a problem to designers. Nevertheless this has been overcome to a remarkable degree by accurately machining the large cast-steel masts, by installing high-grade roller bearings at all points, by placing the electrode winch directly on the roof structure and by a complete system of lubrication.

The balance of this whole structure is so accurate that an immediate response from the regulator to the electric arc is had in both directions. This, more than any other feature, insures accuracy of temperatures.

Transformers have a range of 10 secondary voltages thus affording full flexibility from the rapid melting of light scrap to the voltages used for the holding and refining periods.

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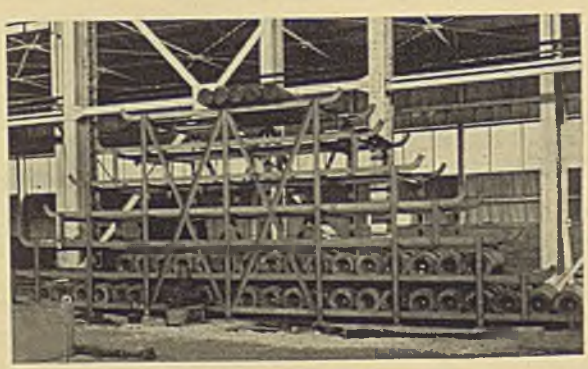


Storage racks for 18 x 72-inch electrodes used in 25-ton furnaces. The electrodes are machined on each end with threaded sockets for end-joining

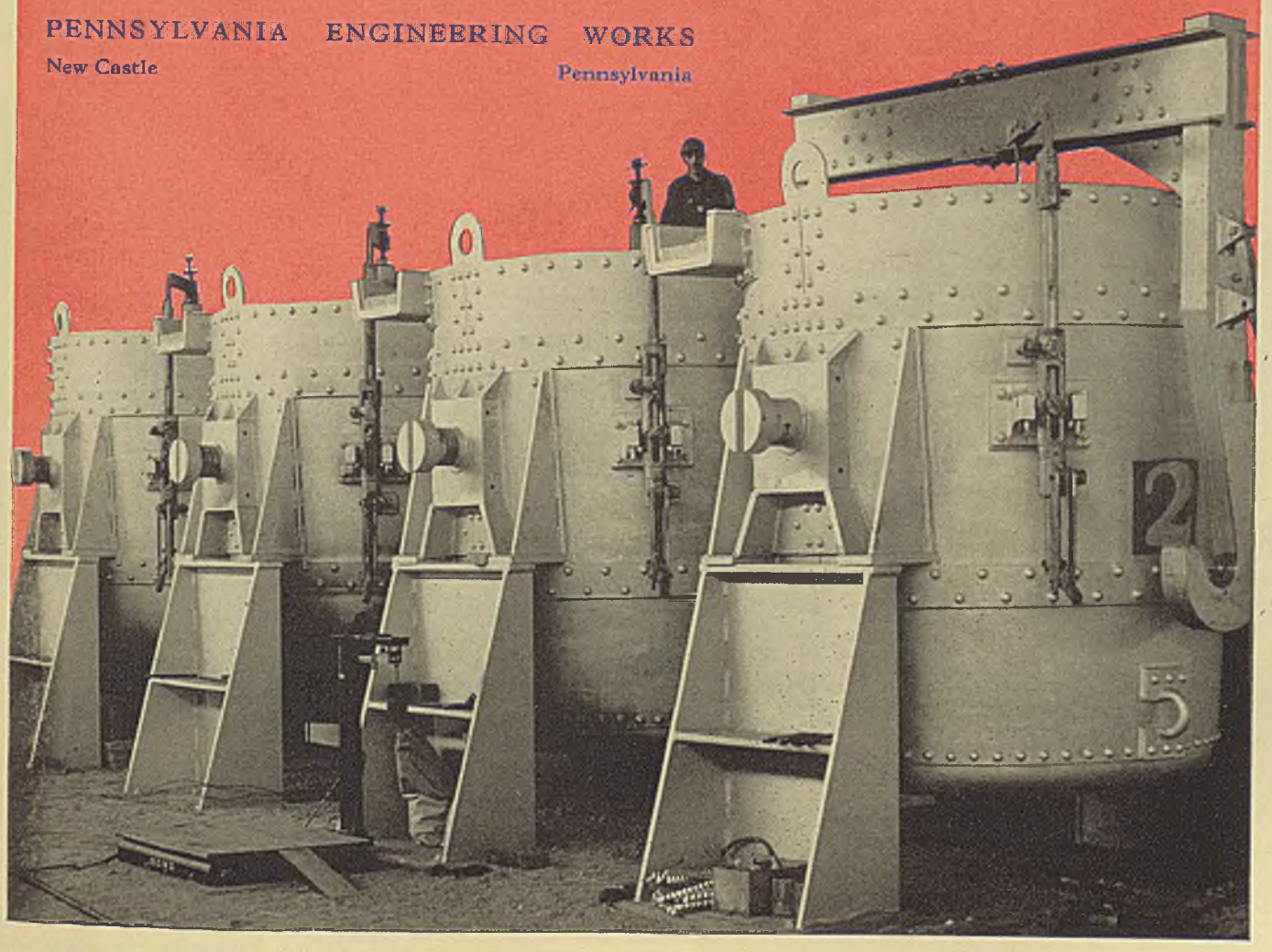
LADLES

for Copperweld Steel Co.

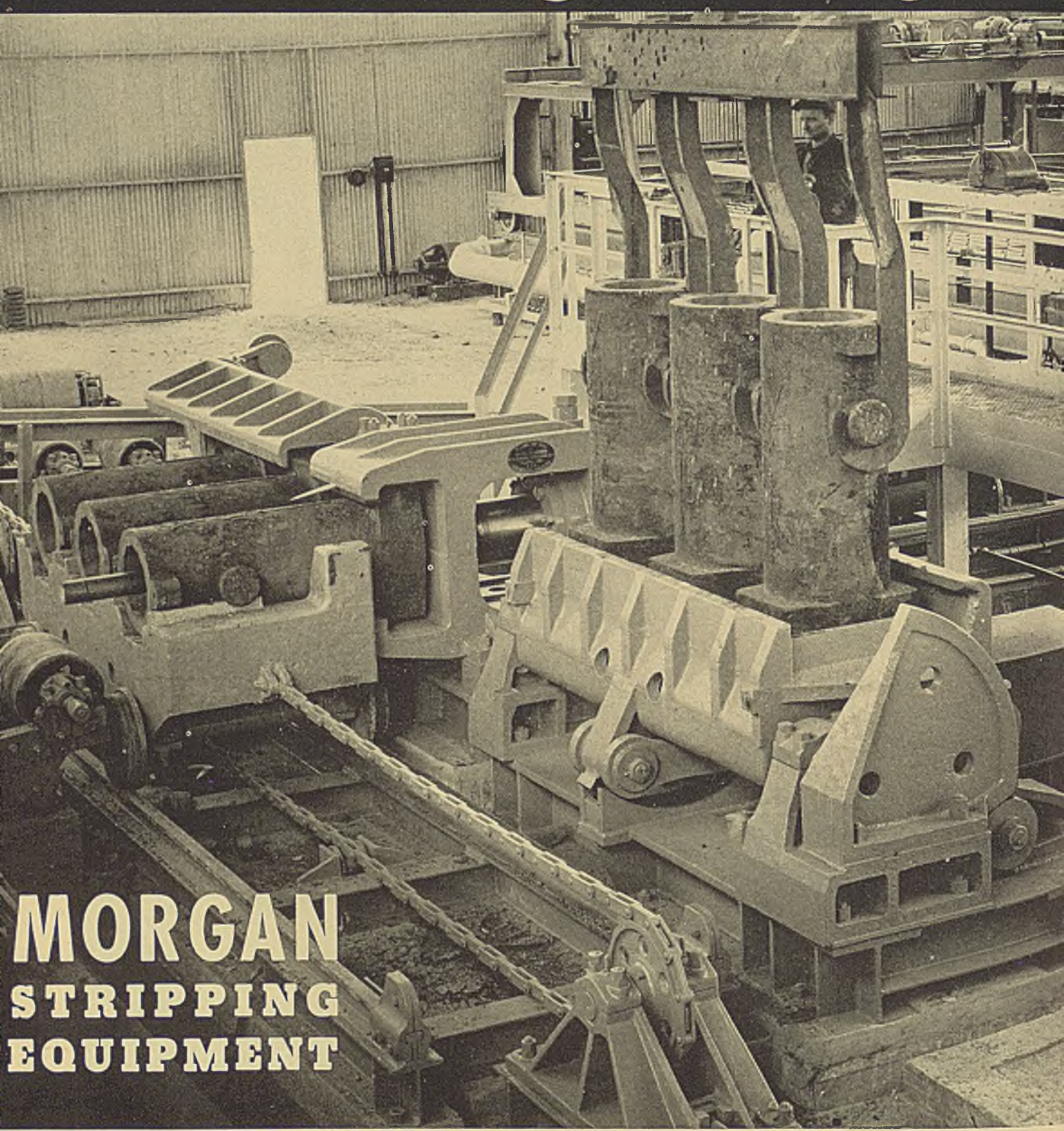
This row of sturdy, riveted, bottom pouring ladles—furnished for Copperweld Steel Company's new plant at Warren, Ohio, is but small evidence of PENNSYLVANIA ENGINEERING's contribution to the steel industry . . . Designers and builders of Blast Furnaces, Duplex Steel Plants, Hot Metal Mixers, Converters, Ladles, Open Hearth Furnaces—stationary and tilting, Cupolas, Hot Metal Cars, Charging Cars and Rolling Mill Tables, which qualifies this organization to solicit your individual requirements in the industry.

PENNSYLVANIA ENGINEERING WORKS

New Castle Pennsylvania



BUILT BY MORGAN *Engineering*

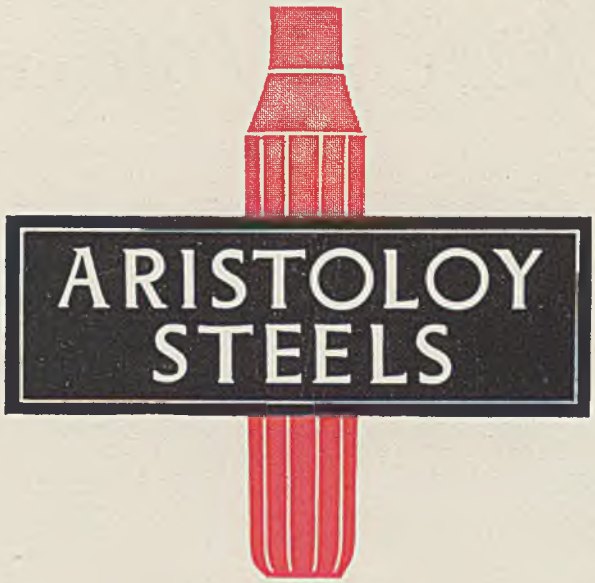


MORGAN STRIPPING EQUIPMENT

Above is shown equipment installed in the new Copperweld Steel Company plant at Warren, Ohio, for stripping alloy hot top ingots, consisting of two hydraulically operated ingot mold tilting machines, one 100-ton hydraulic stripper, and one mold car, all controlled by one operator. • Molds with ingots are transferred by multiple hook crane bale to mold tilter, are locked in position and tilted onto transfer car. • The ingot car conveys molds to stripper where they automatically engage with stripper head and are stripped, one at a time, to conveyor table. • After stripping, the molds are moved to second tilter to be returned to original upright posi-

★ DESIGNERS • MANUFACTURERS • CONTRACTORS
BLOOMING MILLS • PLATE MILLS • STRUCTURAL MILLS
★ ELECTRIC TRAVELING CRANES • CHARGING MACHINES
INGOT STRIPPING MACHINES • SOAKING PIT CRANES
★ ELECTRIC WELDED FABRICATION • LADLE CRANES
STEAM HAMMERS • STEAM HYDRAULIC FORGING
★ PRESSES • SPECIAL MACHINERY FOR STEEL MILLS

THE MORGAN ENGINEERING CO., Alliance, Ohio



A STATEMENT OF POLICY

The Copperweld Steel Company offers and is now shipping, under the trade name "ARISTOLOY," the finest alloy steels that can be produced in a modern steel plant under the guidance of men who helped build the alloy steel industry. The plant has ample capacity; but quality, not quantity, will be our constant aim. This aim is consistent with our 25 year record in the manufacture of other high-grade Copperweld Steel products at our Glassport, Pennsylvania mills. The name "ARISTOLOY," derived from "ARISTOS" (Greek root word of "Aristocrat") is significant of this policy.

President

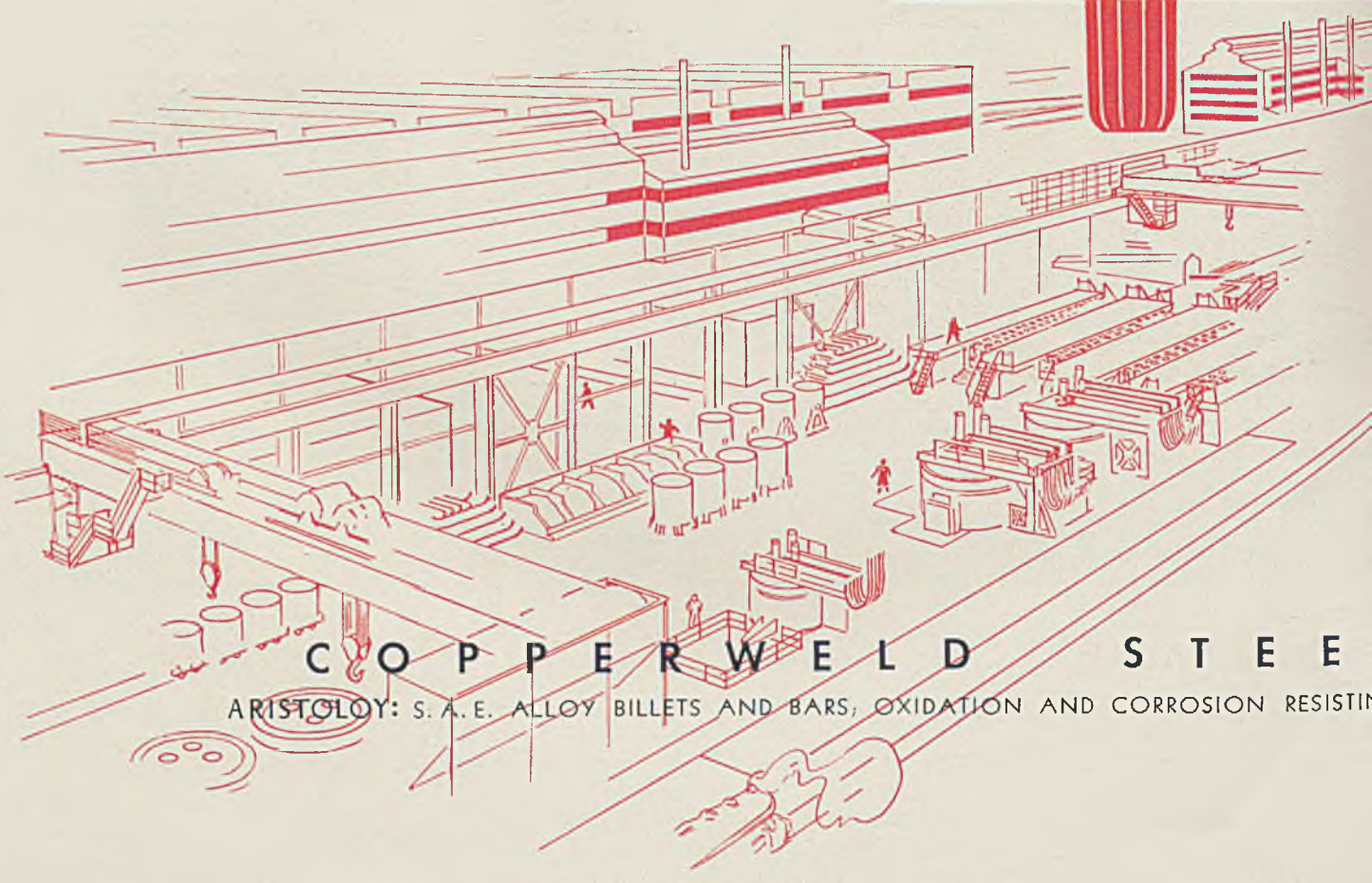
COPPERWELD STEEL COMPANY · Warren, Ohio

These Men HAVE BEEN MAKIN

Men, plant and capital are requirements for the manufacture of any product—and *men* come first. These "Aristoloy" steel makers, who have been making steel for you for a quarter of a century, now have a new plant, designed as they have always wished a plant to be—and operating under the policy of quality and customer-satisfaction first. The experience and character of these men is your assurance that "Aristoloy" consistently will be the kind of steel you need — delivered when you want it.

35 Years
FREDERICK J. GRIFFITHS
Executive Vice President

ARISTOLOY STEELS



COPPERWELD STEE

ARISTOLOY: S. A. E. ALLOY BILLETS AND BARS; OXIDATION AND CORROSION RESISTIN

ALLOY STEELS FOR YOU FOR 25 YEARS

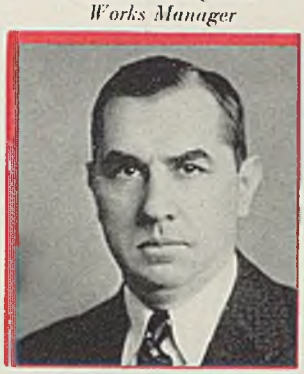
27 Years
SIDNEY D. WILLIAMS
Vice President & in Charge of Sales

31 Years
C. W. HOLMQUIST
Works Manager

20 Years
NORMAN L. DEUBLE
Assistant to Vice President

42 Years
PAUL LINDBERG
Superintendent of Rolling Mills

14 Years
W. J. BUECHLING
Chief Metallurgist

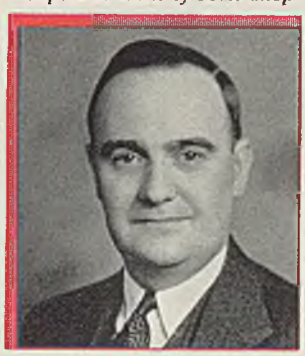


19 Years
FLOYD STROUP
Superintendent of Melt Shop

16 Years
ROY F. LAB
Chief Chemist

18 Years
JOHN B. FORMET
Asst. Supt. of Rolling Mills

31 Years
W. C. MORGENSTERN
Assistant Chief Engineer



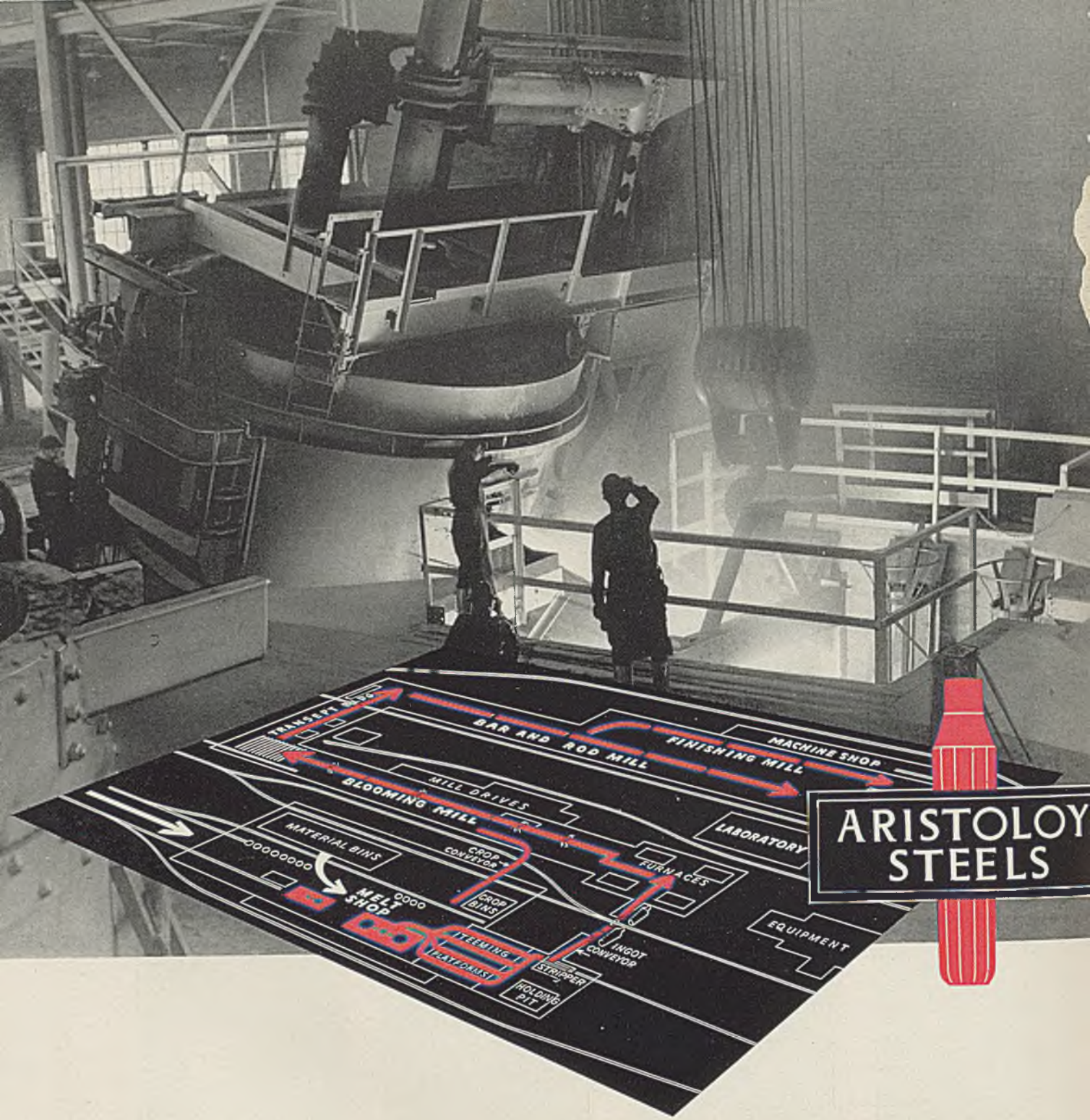
28 Years
JOHN P. SMITH
Chief Engineer

18 Years
J. RUSSELL PENMAN
Production Manager

30 Years
H. F. PESCHEL
Chief Roll Designer

COMPANY *Warren, Ohio*

STEELS; TOOL AND SPECIAL STEELS; AIRCRAFT QUALITY STEELS; STAINLESS STEELS



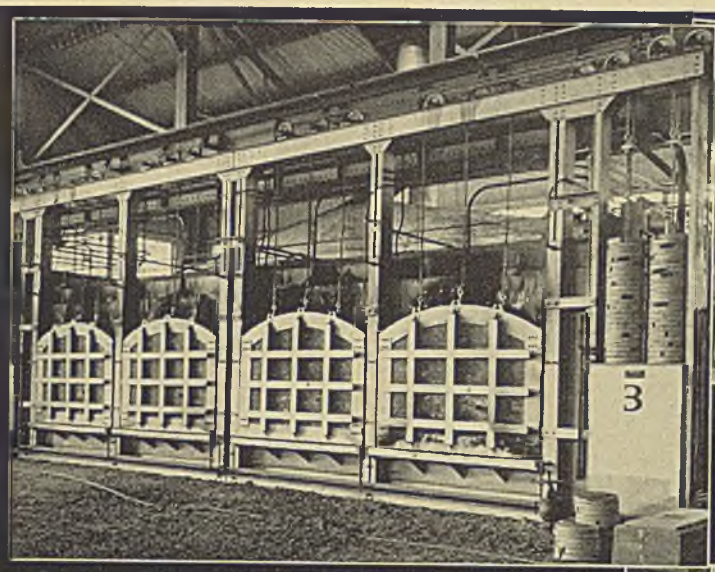
Direct production "flow" features this new plant layout. Material moves from bins to charge 25 ton melting furnaces in 15 minutes. Oversize transformers contribute to a rapid melting down of the furnace charge, resulting in more time for the all important refining period. Hot-top molds are teemed at stationary stands immediately adjacent to the melting furnaces. A hydraulic stripper places stripped ingots on a direct conveyor to the blooming mill furnaces. Blooming mills and rod mills are all in direct-line arrangement with the finishing and shipping departments. Pneumatic tubes speed test samples from mill and furnace stations to the modern new laboratories, and written test results are flashed back by telautograph.

There is cleanliness and order and plentiful air, space, and daylight in all of the 320,000 square feet of floor space — and all production floor space is completely served by overhead cranes.

Ideal operating conditions, and "direct-flow" plant layout, enable the makers of Aristoloy Steels to make every bit of their long experience count in their real job of making the kind of steel you need—and to deliver it when you want it.

COPPERWELD STEEL COMPANY, Warren, Ohio

S.A.E. ALLOY BILLETS AND BARS; OXIDATION AND CORROSION RESISTING STEELS;
TOOL AND SPECIAL STEELS; AIRCRAFT QUALITY STEELS; STAINLESS STEELS.



Double chamber ingot heating furnace.

Pipe galvanizing installation.

Walking beam billet heating furnace.

MODERN HEATING

. . . quite naturally called for P. I. E. furnaces in the Copperweld Steel Company's new alloy steel plant at Warren, Ohio, where 3 double chamber ingot heating furnaces and 1 pusher type mill furnace, together with miscellaneous burner equipment, have been installed throughout the plant.

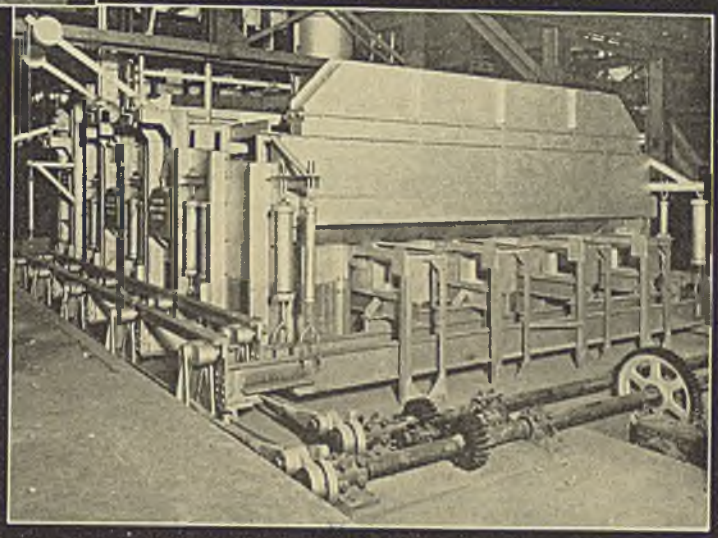
It has also been our privilege to furnish furnaces at the Glassport plant of the Copperweld Steel Company.

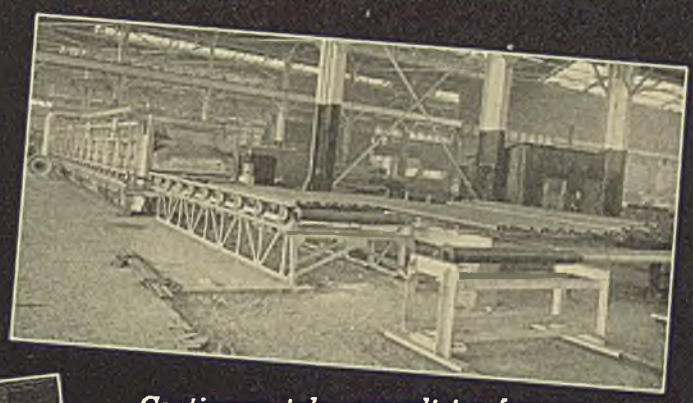
Another of our recent developments are P. I. E. cover furnaces *(illustrated below) for manufacturers of sheets, strip coil and wire.

Pennsylvania Industrial Engineers will continue to serve the steel industry with new developments to meet the needs of a rapidly progressing industry.

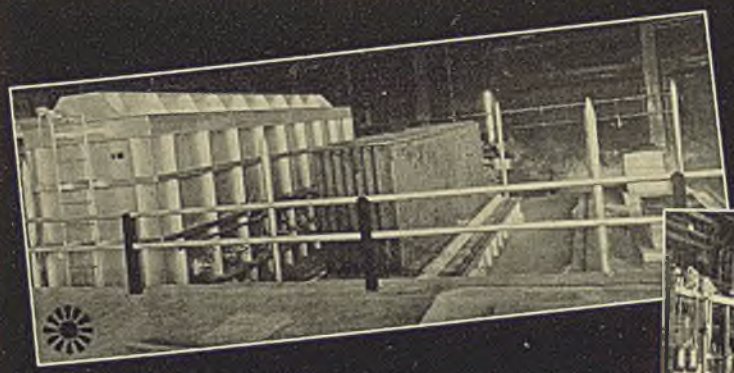
May we have the opportunity to help solve your furnace problems?

PENNSYLVANIA INDUSTRIAL ENGINEERS
2413 W. Magnolia St. Pittsburgh, Pa.





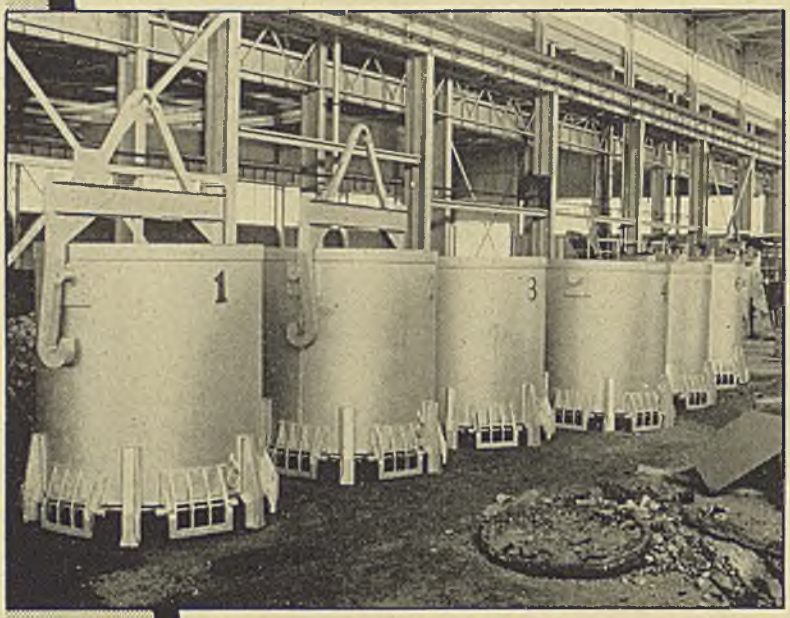
Continuous tube normalizing furnace.



New type P.I.E. annealing cover.

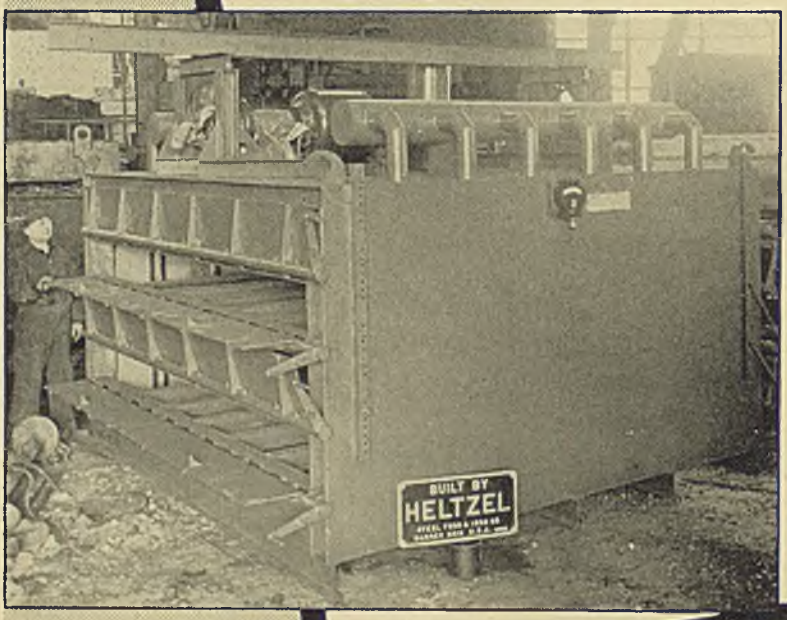
Group of hammer furnaces for alloy steel.

Specializing in "Custom Built"



ABOVE: — Charging Buckets and Bails of welded and riveted construction for charging electric furnace . . . per customer's specifications.

BELOW: — Stopper Rod Furnace completely fabricated to customer's specifications including motor and pyrometer, ready for operation.



Fabricated Steel Products for more than 20 years made HELTZEL the leader in Flame-cut, Welded Structures . . . proved beyond contention the superiority of HELCO-WELD.

Modern machines for working all steel from 1/16" to 12" plate and over . . . up-to-date equipment for pressed steel jobs combined with excellent shipping facilities from the heart of the "Steel Country" has enabled HELTZEL to supply an endless number of so-called "special jobs" for manufacturing concerns.

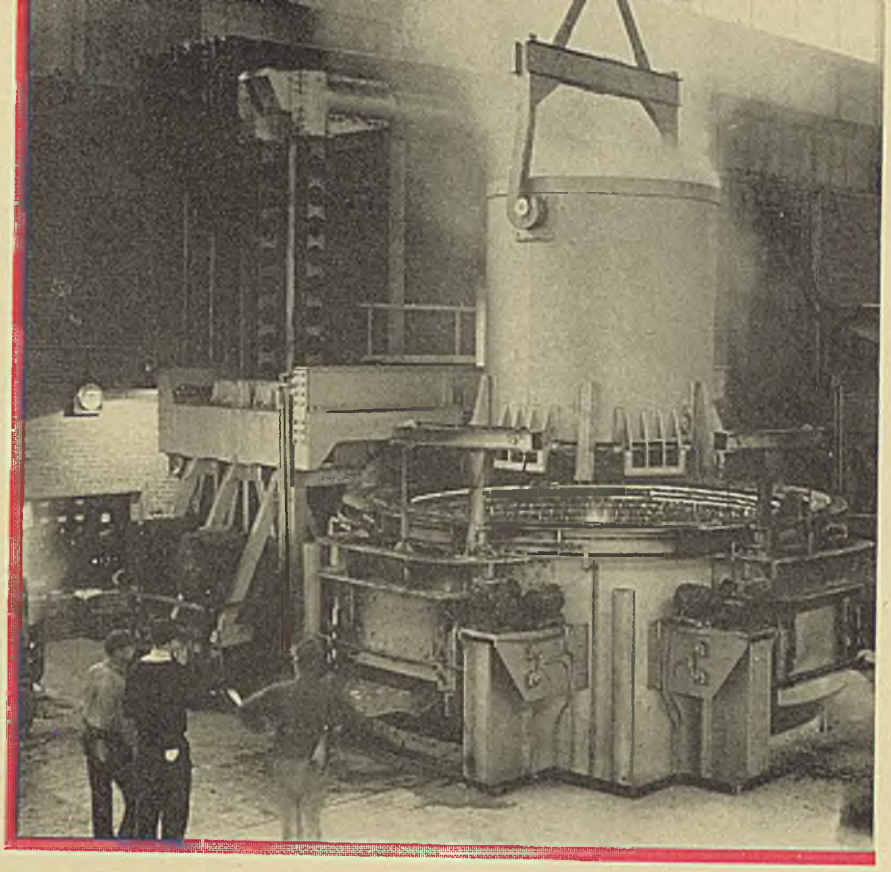
Flame-cut, welded machine bases . . . gear drive and oil-tight transmission cases from 6" — 8" — 10" — 12" material . . . welded steel blast furnace pipes . . . gas burners . . . annealing furnaces . . . special dust collecting systems . . . neutralizing plants . . . elevator housings . . . stacks . . . brine pans . . . tinning pots . . . in fact all basic equipment for any manufacturing plant can be built by HELTZEL . . . to your specifications.

Send your drawings or specifications for quotations . . . Remember — We Specialize in the Most Intricate Kind of Steel Fabricating.

H E L T Z E L

STEEL FORM & IRON CO.

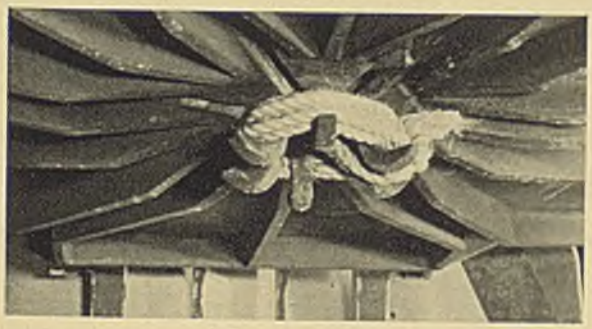
Warren Ohio



Furnace with its cover swung aside and charging bucket being lowered to deposit its load of selected scrap on the hearth

Each transformer is built with a range of reactance values designed to give either the minimum impedance of the circuit or equal increments of additional reactance if and when desired to suit the power system.

For many years the so-called backwall problem of large 3-phase arc melting furnaces has been a source of worry. Consequently considerable time was devoted to the study of three different systems employed on three furnaces similar to those of the Copperweld installation, and built side-by-side.



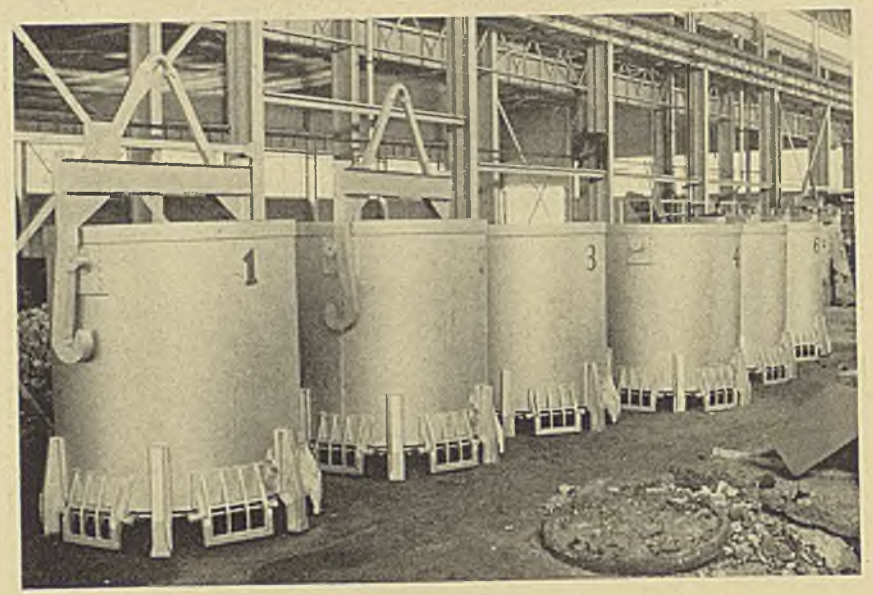
Bottom of charging bucket showing rope tie for holding segments in closed position

As a result of this investigation the furnaces in the melt shop of the Copperweld plant at Warren, O., are designed for an excellent balance with respect to the life of the refractories used.

Door sills are wide and deep. All jambs and lintels are protected by easily removable water-cooled members of liberal open-hearth design. The doors are motor operated through a speed reducer and will remain in opened position.

The mechanism for tilting the furnace is of the balanced rocker type. Machined tracks and rocker faces with high-efficiency reduction gears are used requiring only a low turning effect.

Electric furnace scrap is brought into the plant in standard railroad cars and transferred by a magnet suspended from an overhead crane to a system of concrete bins comprising six compartments each 25 x 42½ feet. The stockhouse adjoins the melt shop. Parallel to the unloading track but on the opposite side of the bin system is another track over



Six of the buckets used for charging scrap into the electric furnaces. Each is built with a 6-segment drop bottom

which an electric transfer car operates with its load of two charging buckets.

The charging buckets are cylindrical-shaped containers with the bottom comprising six segments which are held in a closed position by heavy rope. After the loaded buckets are weighed on the stockhouse track scale the electrically-operated transfer car moves them inside the west end of the melt shop where an overhead crane takes them, one at a time, to the electric furnace to be charged. With the roof swung aside and the bucket suspended above the furnace, the rope burns away thus permitting the charge of scrap to drop onto the hearth. The charging time is short since the raising and swinging of the furnace roof involves only 30 seconds in each direction.

Six steel bins built opposite the 6-ton electric furnace afford storage for other raw materials such as silicon pig, spiegel, ferrochrome, ferromanganese, etc. Limestone and dolomite are stored in six steel plate bins elevated above floor level so that the material can be chuted into steel trays and delivered by crane to the respective furnaces. These refractories are brought into the melt shop by hopper car which is spotted over a screen and unloaded into a concrete bin. Material from this bin is fed by chute into a bucket positioned in a pit beneath the spout, hoisted by crane and dumped into the elevated storage bins nearby.

Heats are tapped into ladles which are built with dual nozzles so that two ingots can be poured simultaneously. When not in use, the ladles are kept along one side of the melt shop opposite the electric furnaces and are maintained at the proper temperature by the use of natural gas. Here the nozzles are set and the stopper rods installed. Provision is had at this warming station for four ladles.

Ladles are relined in a pit located at the west end of the melt shop adjacent to the furnace roof relining station. Nearby is a natural gas fired oven for drying the ladle stopper rods. In fact, all heating throughout the plant is done with natural gas.

After a heat of steel is tapped into the ladle it is transferred by crane to the teeming station within close proximity to the furnace. Here are located five parallel platforms, 75 feet long with four aisles between. Each aisle is wide enough to accommodate two rows of 26 molds each, which are mounted six on a stool. The stools are positioned on heavy I-beams resting on concrete piers. All molds are of the 14-inch corrugated type for pouring 1-ton ingots. Hot tops for the molds are stored on racks mounted on the teeming platform. The tops are dried out and main-

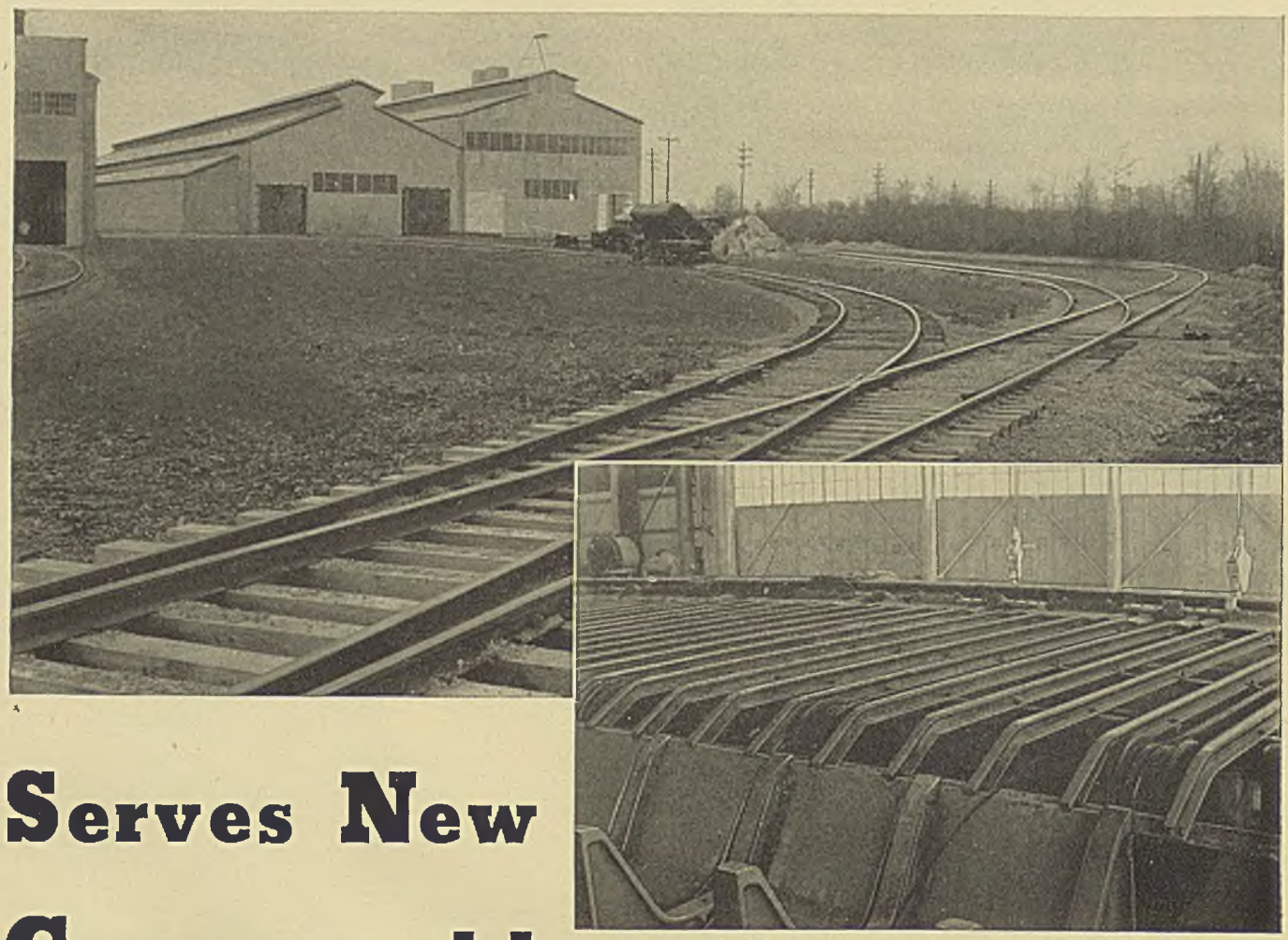
Please turn to Page 109

With nothing short of modern entering into the equipment for Copperweld Steel Company's new plant at Warren, Ohio, the ladle handling job quite naturally went to ALLIANCE... a 50-ton ladle crane with a 15-ton auxiliary hoist, span of 75'0".

In addition to Ladle Cranes, ALLIANCE designs and builds Ingot Strippers, Soaking Pit Cranes, Standard Cranes, Gantry Cranes, Ore and Coal Bridges, Open Hearth Charging Machines, Slab and Billet Charging and Drawing Machines, Car Dumpers, Forging Manipulators, Board and Steam Drop Hammers, Coal Pier Equipment, Rolling Mill Machinery and Special Machinery to your individual requirements.

THE ALLIANCE MACHINE COMPANY
ALLIANCE OHIO

FOSTER TRACK EQUIPMENT



The cooling beds at Copperweld illustrate one of the many non-trackage uses of Foster Rails in industrial plants.

Serves New Copperweld Steel Plant

FOR EVERY TRACK NEED
MAKE **Foster**
YOUR SOURCE OF SUPPLY

TRADE MARK
1 ton or 1000

MODERN manufacturing technique demands the continuous flow of materials, and to maintain this flow, sound and adequate trackage is a major requirement.

Copperweld, like many other skillfully-engineered industrial concerns, turned to Foster for their haulage system. From long experience with this organization they knew that Foster not only could supply all the quality materials essential to their complete track installation but also that these materials would arrive on scheduled time—matched for the job.

Foster assures you the same quality materials and dependable service whether you are installing a complete haulage system or making extensions or replacements to your present track.

L. B. FOSTER COMPANY
PITTSBURGH · NEW YORK · CHICAGO

RAILS · TRACK ACCESSORIES · SHEET STEEL PILING · PIPE

tained at the proper temperature by natural gas, fired through individual burners, each burner being an integral part of the hot top rack.

Close control of the speed and temperature at which the ingot is poured is essential if segregation is to be held at a minimum. The company chose small ingots, 2100 pounds or less, to secure quick freezing and thereby obtain fine crystallization and low segregation.

Upon completion of the pouring operation the molds are allowed to remain undisturbed until the steel is completely solidified. Then they are transferred three at a time by a multiple hook bale suspended from an overhead crane to the mold stripping machines situated adjacent to the teeming platforms.

Stripping equipment includes two ingot tilting machines, a 100-ton stripper, and an ingot mold car. The tilting machines and stripper are operated hydraulically through a motor-driven oil hydraulic unit. The ingot mold car is operated on a track through a chain drive and electric motor. The entire equipment is controlled by one man from the operating pulpit. The operating cycle follows:

Three molds are brought to rest in an upright position on the first tilting table. This unit is built with an automatic clamping device which locks the molds securely to the tilting frame. With the molds locked in position the cradle tilts through a 90-degree angle and deposits the three loaded molds in a horizontal position on the ingot car. The tilting table is immediately released and returns to its horizontal position simultaneously.

The ingot car conveys the molds to the stationary stripper located at the center of the unit immediately in front of the operator. Here the molds in turn automatically engage with the stripper head, each ingot being ejected from its mold by the stripper plunger which is actuated at 200,000 pounds pressure per square inch. The stripper is built with two cylinders in which telescoping plungers operate through a stroke of 6 feet. This arrangement provides rapid push out and return motions after the ingot has been loosened from its mold.

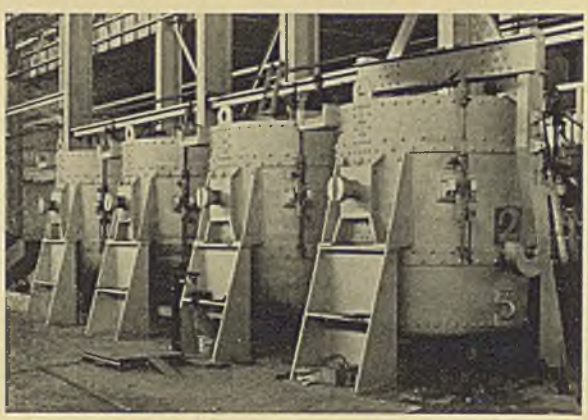
Steel ladles are relined in a concrete pit built near the entrance of the melt shop. Capacity is had for two ladles

While the ingots are being removed from their molds the first tilting machine is returned to its original position and receives a second batch of freshly poured ingots.

Upon completion of the stripping operation the ingot car conveys the empty molds forward to the second tilting machine. Here the molds automatically engage the clamping device and the tilting cradle upends them. The crane lowers the carrier, engages the hooks with the trunnions and returns the empty molds to the pouring station, thus completing the cycle of operation.

Ingots are received from the molds by a conveyor table having two outlets. One delivers the ingots to the holding pits directly

Please turn to Page 111



Ladle station opposite the 25-ton electric furnaces. Here stopper rods are set and the ladles kept warm ready for use

The ROUGHEST, TOUGHEST WINTER *in 80 Years*

●This plant was started on October 16, 1939. During the winter, excavation went down through ice, and at three feet was *still* in frozen ground.

The completion of this schedule under such adverse conditions represents a triumph in initiative and enterprise. In addition to erecting fifteen structures containing seven and one-half acres, the work included excavation and installation of foundations, sewers, and thirteen overhead electric cranes, ranging from 5 to 50-ton capacity.

For twenty years Uhl Construction Company has been erecting plants, re-erecting steel frame buildings and doing general contracting work efficiently and quickly for such firms as:

UNITED ENGINEERING & FOUNDRY CO., VANDERGRIFT, PA.
PITTSBURGH PIPE & COUPLING CO., ALLISON PARK, PA.
ETNA FORGE & RIVET CO., ETNA, PA.
HEMPFIELD FOUNDRY CO., GREENSBURG, PA.

and many others.

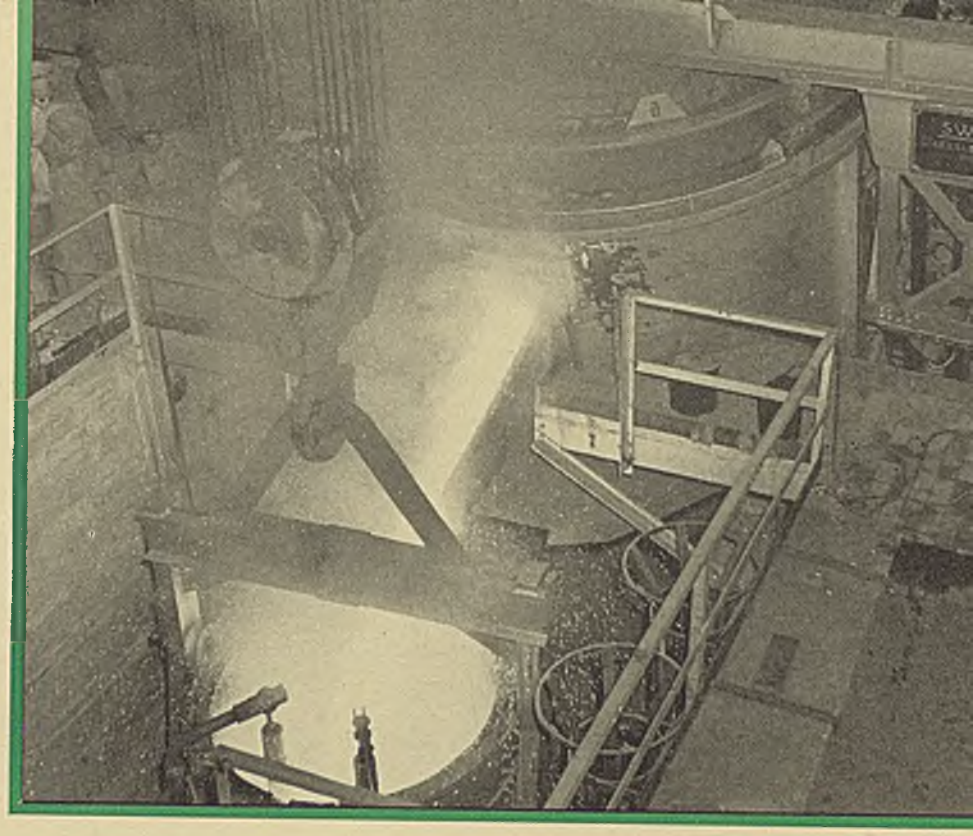
UHL CONSTRUCTION COMPANY
6001 BUTLER ST. PITTSBURGH, PA.
Phone STerling 4422

Yet the New COPPERWELD Plant at Warren, Ohio WAS FINISHED ON TIME!

Our construction for Copperweld included:

- MELT SHOP
- STOCK HOUSE
- BAR MILL
- FINISHING MILL
- SHIPPING BUILDING
- MACHINE SHOP
- LABORATORY
- SEWAGE DISPOSAL PLANT
- REBUILDING BLOOMING MILL

Illustrated across the top of the page is a general view of the new Copperweld plant, recently completed at Warren. It suggests the immensity of 7½ acres of construction. To the left are views of other buildings including the melt shop, stock house and blooming mill.



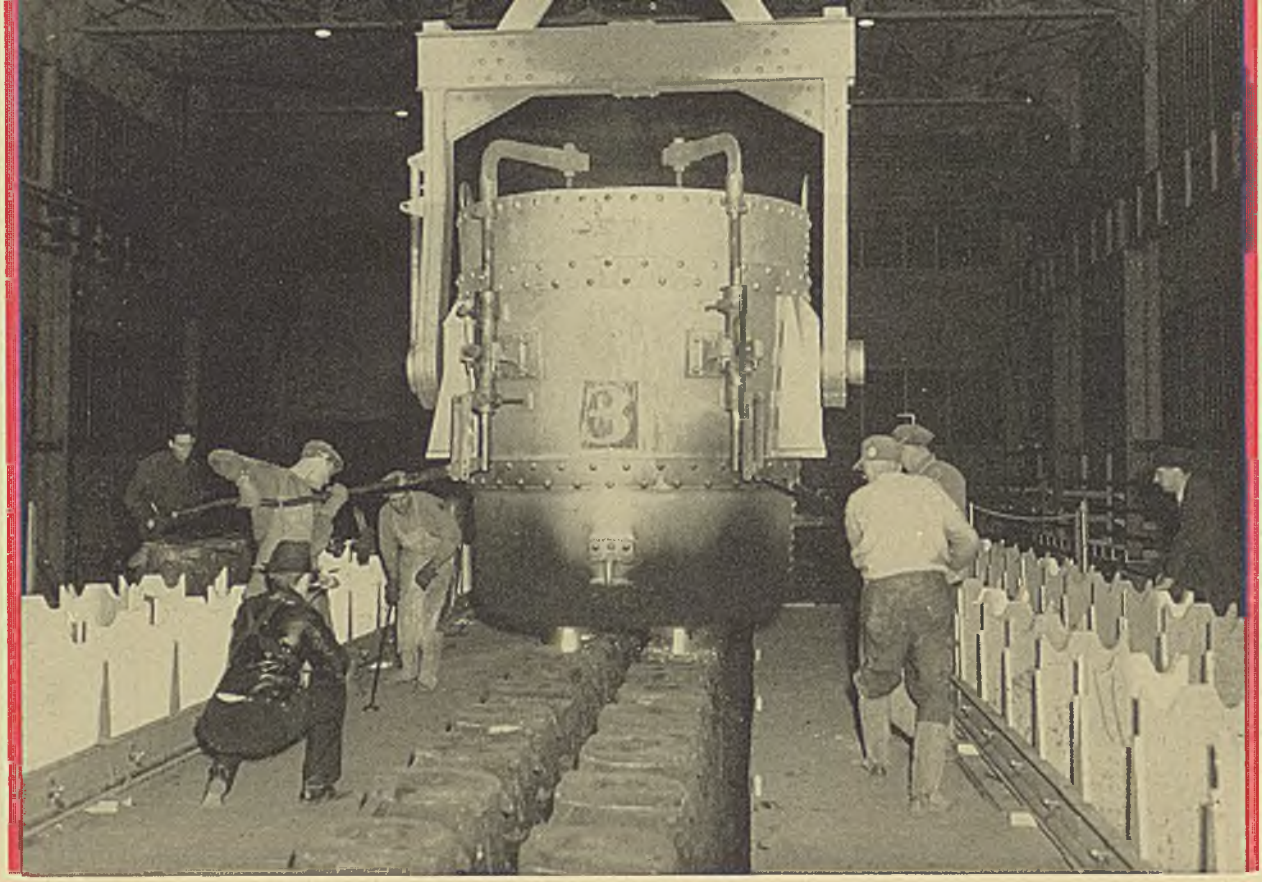
Heat of steel being poured from one of the 25-ton electric furnaces. Casting pit serves both furnaces

behind the stripper, in approximately 10 seconds. This table contains two 90-degree turns. The second outlet is 180 feet directly north, at the preheating furnaces in the blooming mill building. This conveyor operates underground, with 6 feet headroom and a monorail above to provide means for immediate and safe repairs. Ingots reach the blooming mill furnaces in less than 60 seconds after being stripped.

The six holding pits behind the stripper are fired with natural gas and have a capacity for 36 ingots per pit, or a complete heat in each pit. The pit covers are removed by a special overhead crane which operates lengthwise of the furnace. The purpose of this furnace is to maintain the temperature of certain grade ingots to avoid overcrowding of steel in process through the rolling mills.

As the ingots arrive in the furnace building serving the blooming mill they are picked up by an overhead charging machine and placed in a heating furnace in an upright position against the side and backwalls. The furnace building houses three modern heating furnaces and has sufficient room for the installation of a fourth furnace. Each furnace is built with four chambers, having a holding capacity of nine ingots per chamber. All doors are operated hydraulically. The furnaces are fired by a unique method. A battery of ten burners built in the backwall throw a luminous flame under the arch toward the charging door. Here by means of a series of flues the incandescent gases in front of the doors are led back through the rows of ingots. By this arrangement the ingots are heated uniformly. Automatic furnace temperature control holds scale formation and decarburization to a minimum.

Heated ingots from any one of these three modern furnaces are transferred by the crane-type charging machine to the approach table serving the blooming mill. This table is located between the furnaces, requiring a maximum crane travel of only 50 feet. The blooming mill is a 29-inch 3-high unit driven by a 1200-horsepower motor and equipped with front and rear tilting tables and manipulators. The front and back tilting tables are operated



Heat of steel being poured into ingot molds. Double-pour ladles are employed. Racks at right and left are for the storage of hot tops

hydraulically and independently. Each pulpit, however, is equipped to operate both tables should this be necessary. The mill is of heavy construction and will handle high-carbon as well as high-alloy steel.

Seventy feet beyond the mill is a downcut shear for cropping the ends of the blooms coming off the 29-inch mill, as well as for cutting the blooms to specified lengths. Crops fall into a bucket positioned beneath the table. When a sufficient load has accumulated the bucket is hoisted on an inclined track to one side of the building and discharges its load of cropends into another bucket on a transfer car. After being weighed on a track scale, the buckets of crops are taken to the stockhouse and unloaded into bins. Nine bins are provided so that each type of steel may be kept separate.

Certain grades of steel put through the blooming mill have to be reprocessed and when this is the case the blooms are conveyed approximately 109 feet away from the mill where they are brought to rest on the conveyor table. Here an electrically-operated kickoff pushes the blooms into a piling cradle and from here they are transferred to the blooming mill cooling pits. After cleaning they are returned to the heating furnaces to be heated for rerolling.

Approximately 274 feet from the blooming mill is a 24-inch, 3-high bar mill of heavy construction, served by tilting tables front and rear. Minimum sizes rolled by this unit are 3-inch squares and 4-inch rounds. Beyond the mill is an upcut shear as well as a hot saw for cutting rolled commodities to specified lengths. A back-table gage with a range of 25 feet serves the shearing and sawing units.

When the bars are free of the back shear table an electrically-driven kickoff pushes them into a cradle at floor level whence they are transferred by crane into two holding pits located near the sidewall. Or the bars may

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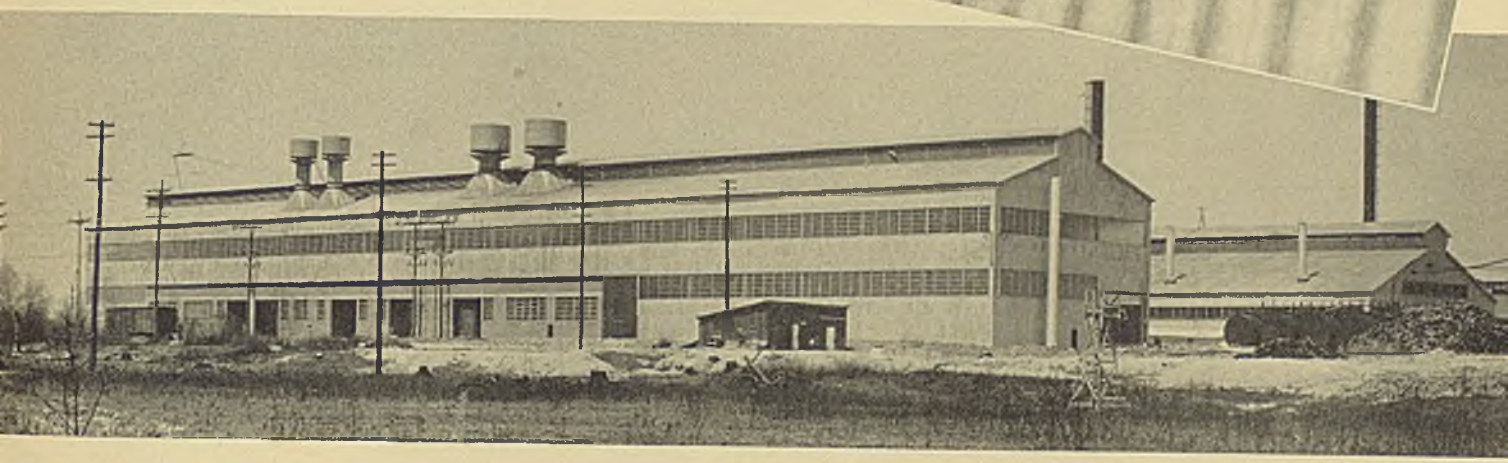
7½ Acres

OF BUILDINGS PROTECTED
WITH SHEET STEEL
MADE BY AND COATED BY

MEN WHO KNOW HOW



When Copperweld Steel Company required roofing and siding for their magnificent new steel plant at Warren, Ohio, they called upon . . . .

APOLLO
STEEL COMPANY
APOLLO, PENNA.

● This great modern plant (described in this number of "STEEL") is now protected and equipped to stand the wear and tear of the elements for many years to come.

Galvanized sheets made at Apollo wear longer and last longer because they are made right from start to finish. Get the best—in galvanized sheets, hot rolled sheets and cold rolled sheets from Apollo Steel Company at Apollo, Pa., the cradle of the sheet steel industry.

APOLLO STEEL COMPANY SPECIALTIES HAVE A WORLD-WIDE RENOWN

√ **APOLLOY METAL**
(Copper Content)

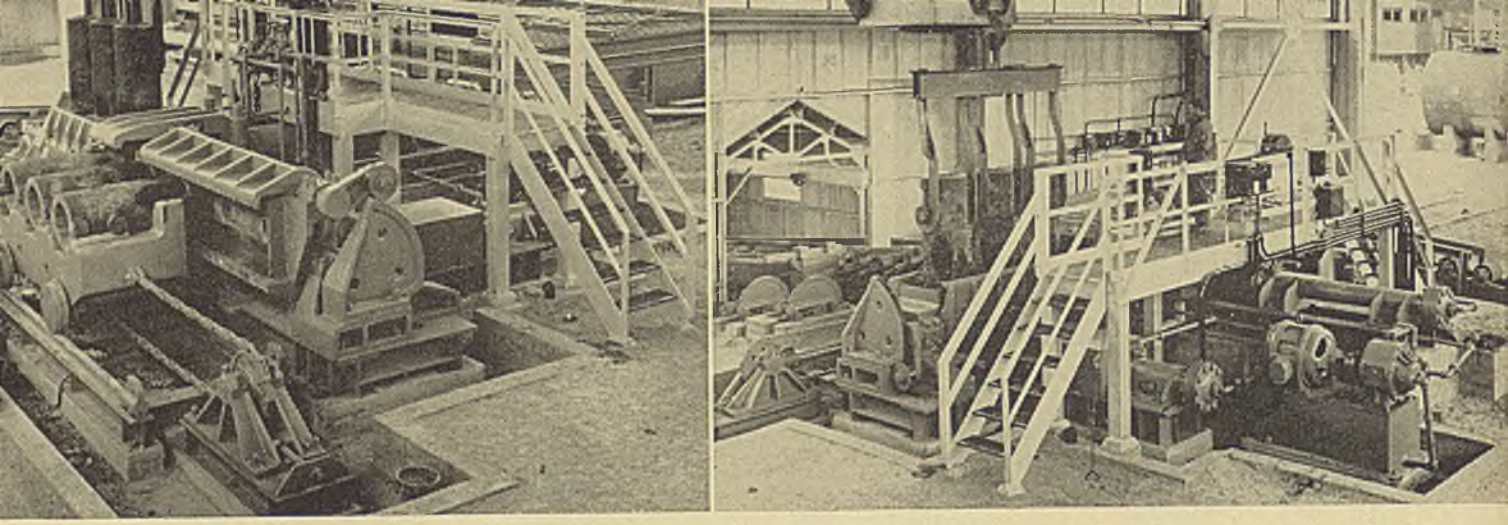
√ **HIGHWAY METAL**
(Pure Iron)

√ **ZINC ENAMEL**
(Dull Coat)

√ **SEAL OF QUALITY**
(2 oz. coating)

√ **RIDGE DRAIN AND DRY DRAIN**
(The standard roofings for modern farm buildings)

Pittsburgh Office: Oliver Building



Left—Stripping machines. Molds on ingot car are in stripping position; upended molds ready to be returned to pouring station for further service. Right—rear of stripper showing hydraulic system

continue to the end of the mill where they are brought to rest, then conveyed across a rail-type transfer bed, about 22 feet, into a piling cradle 56 feet long. The batch is transferred by crane to either of two holding pits immediately adjacent, where the steel is permitted to cool slowly. The pits are located in the billet storage building which runs at right angles to the blooming mill building.

Steel in transit through the billet storage building may have the surface conditioned by pickling and chipping, or grinding. Two 7 x 22-foot brick pickling tanks are built along one sidewall and a chipping bed, 21 x 65 feet, on the opposite side and within close proximity.

Billets to be converted into bars and rods are charged in one end of a 40 x 21-foot heating furnace, pushed out of the furnace at the other end and conveyed to the 18-inch mill, comprising two 3-high stands and one 2-high stand. After the billet is given the desired reduction on the first 3-high stand of rolls it is brought to rest on the roller table in front of the mill and then transferred 11½ feet to a parallel table which serves as the approach to the other 3-high stand of rolls. After being reduced on this mill, the rolled section is transferred to the approach table of the 2-high stand where it receives the finishing pass. This stand of rolls delivers the piece to a roller table which conveys it to a hot saw located 127 feet from the center line of the mill. This saw is served by a gage table and cradles so that when the forward end of the bar is cropped and the gage set at a predetermined distance from the saw, the oncoming bar is cut to specified lengths and then piled in the cradle at one side of the gage table. This takes care of 40-foot bars, but when larger sections are going through the mill, they are cut to length by the saw and delivered to a hot bed 70-feet long and transferred broadside into a loading cradle.

Certain specifications call for slow cooling of the bars in which event they are charged into a holding pit located at the end of the 18-inch mill hotbed. Space is provided at the side of this pit for a spare unit. When rolling smaller diameter bars, the first 3-high stand of the 18-inch mill is used to break down the billet to the proper entering size for the 12-inch mill, 102 feet 4 inches away. This is a 5-stand 2-high mill built in train, the steel in transit being looped from one stand to another. Upon being delivered from the last stand, the bar continues toward the rear of the mill where it is received by a double cooling bed 205 feet long. The bars are moved across this bed alternately from left to right and are received by a conveyor table which moves them to a shear at the rear of the bed. Here they are cut to specified lengths and piled in a cradle. An annealing furnace is provided

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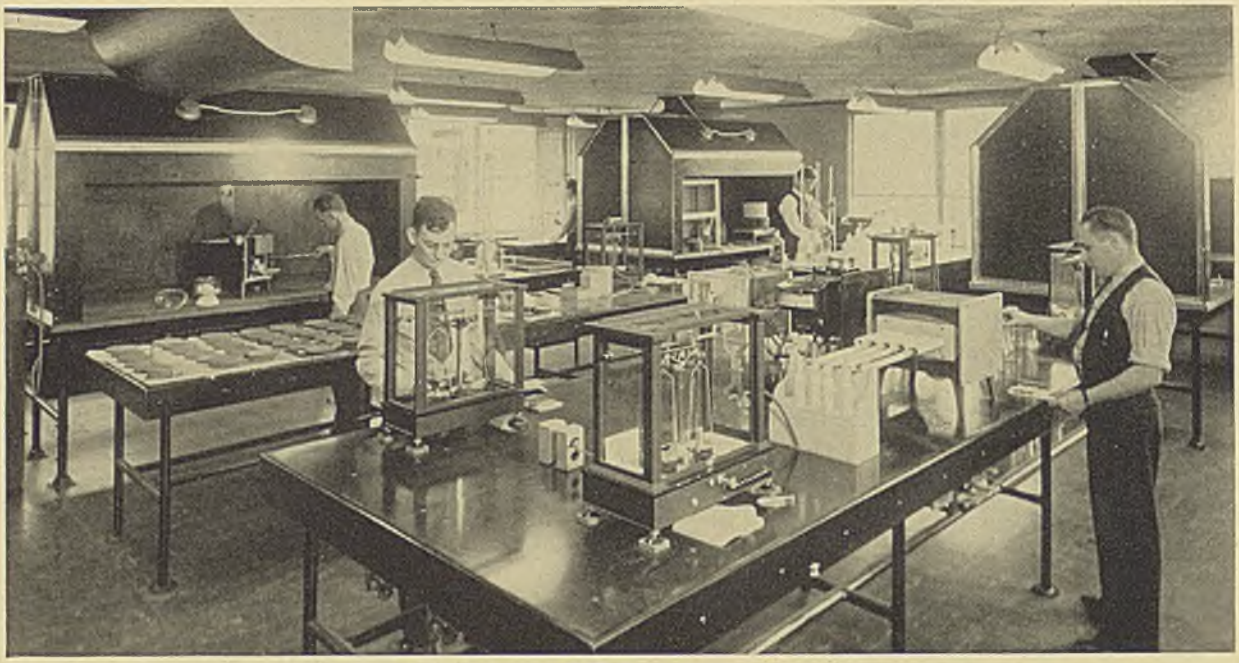


General view of chemical laboratory which is built with soundproof ceiling and lighted with fluorescent lamps

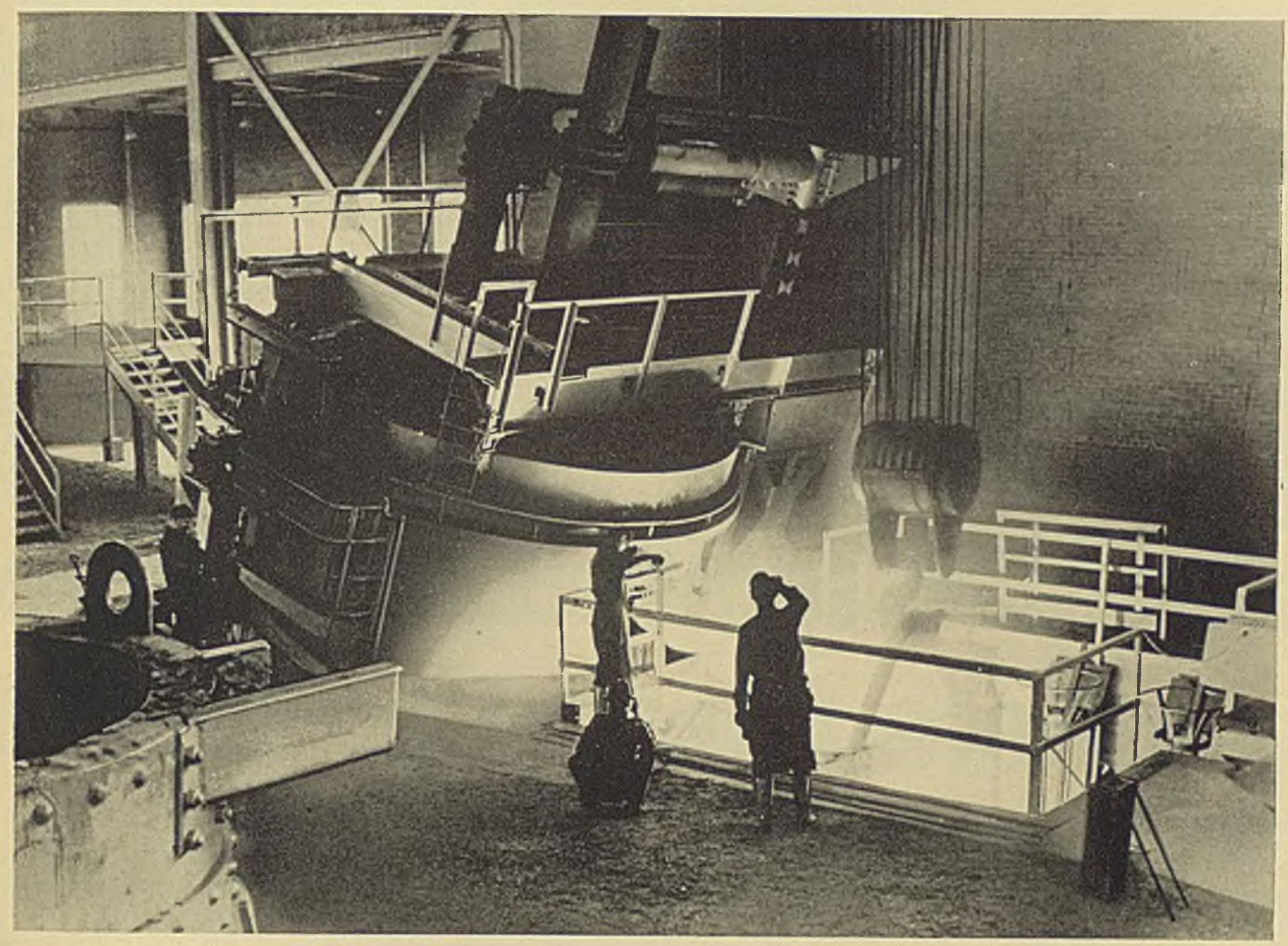
for annealing the bars before shipment as well as a gag press and two straightening machines which handle bars from ½ to 5 inches diameter.

In case orders call for stock in coil form, the heated billets are reduced on the 3-high roughing stand of the 18-inch mill and then looped through the five stands of 2-high rolls of the 12-inch mill. Built parallel to this mill but to one side is the 9-inch train comprising two stands of rolls. Upon completion of the finishing pass in the 12-inch mill, the bars are looped in and out of the 9-inch mill and then sent to the coiling machines.

Samples of steel are delivered from melt shop to laboratory by compressed air and analyses reported to furnace department by telautograph system

Centrally located is the most modern and completely equipped metallurgical and chemical laboratory that money can provide. The building is two stories with the metallurgical laboratory occupying one end of the first floor and the chemical laboratory occupying one end of the second floor. Other space is devoted to offices.

The chemical laboratory is well ventilated. The three hoods are connected with fans which exhaust 3000 cubic feet of air per minute each while a large fan brings in 12,000 cubic feet of air per minute. In the winter months the laboratory is steam heated. Interior walls are of glazed tile and the ceiling of material which is 50 per cent sound absorbent. An elevator operating from the basement direct to the laboratory facilitates the handling of oxygen tanks, acid cases, etc. Samples of steel for chemical analysis are delivered direct from the electric furnace melt shop to the chemical laboratory in 40 seconds through a compressed air tube system. Analyses are returned to the melt shop by a telautograph system.



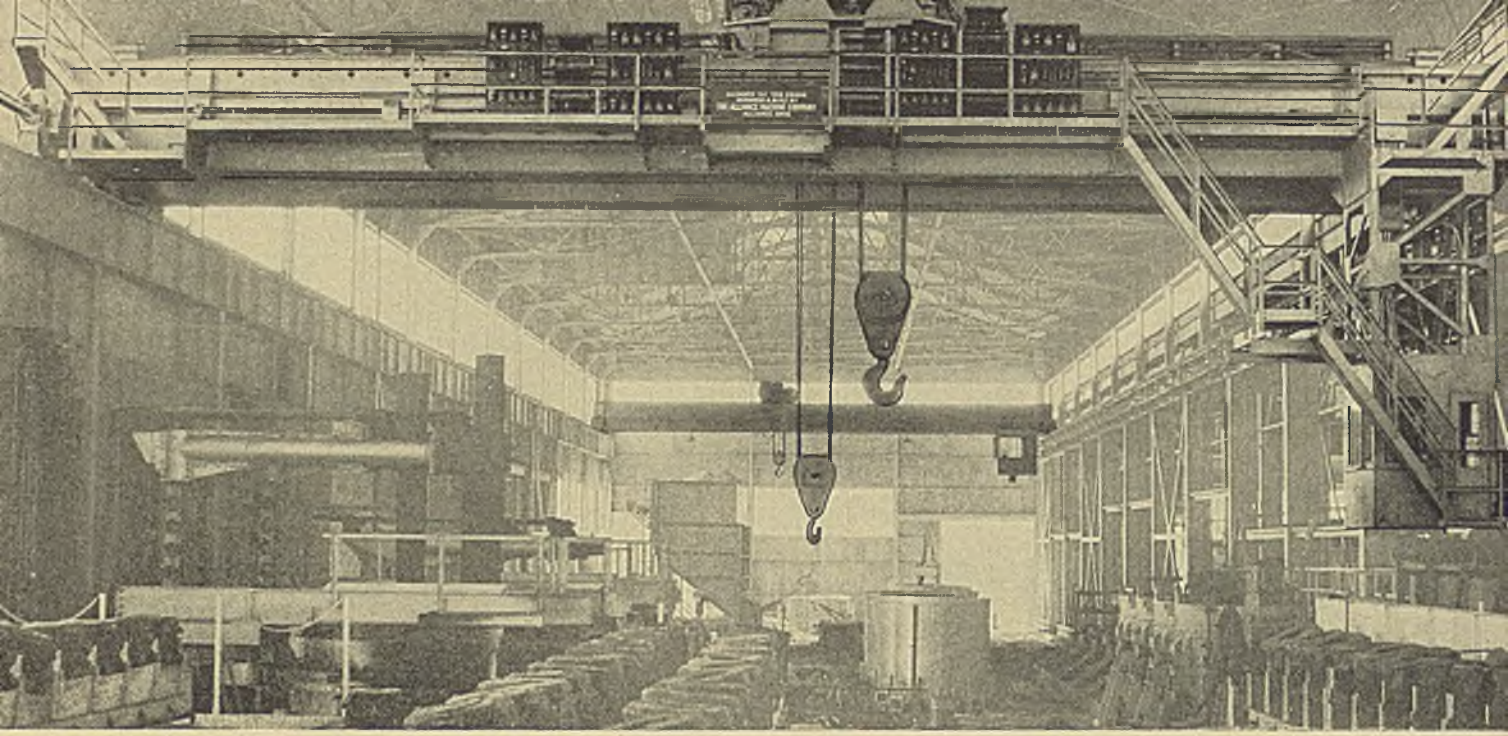
16′-0″ Swindell Swinging-Roof Electric Arc Melting Furnace
at the Copperweld Steel Co., Warren, Ohio.

SWINDELL

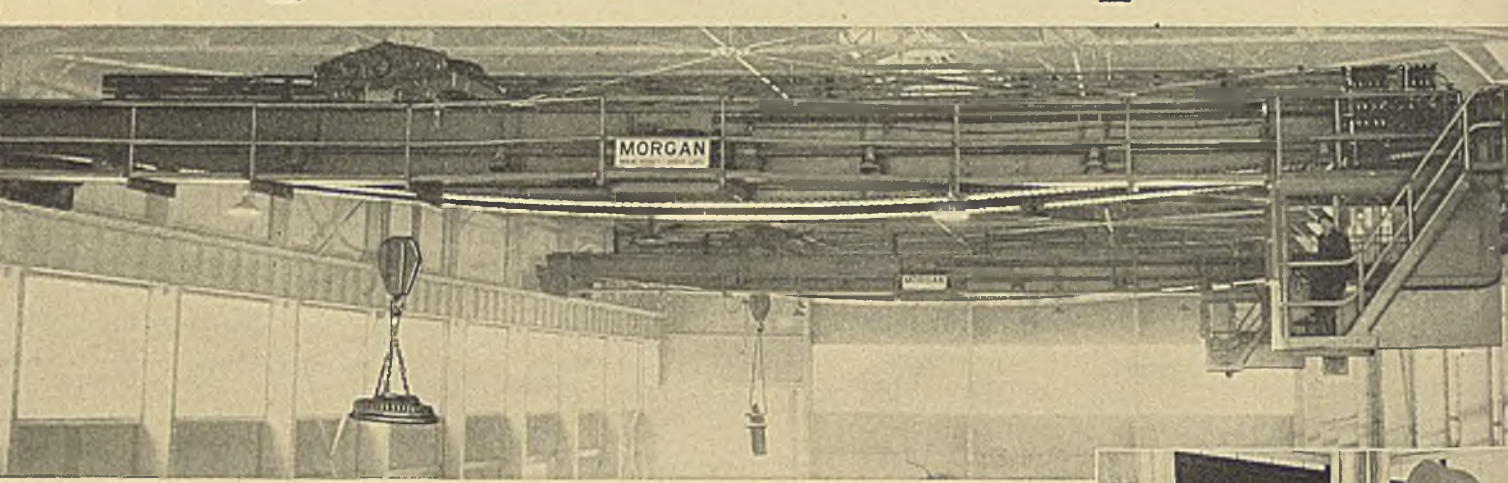
ELECTRIC ARC MELTING FURNACES

Full Range of Sizes in Closed and Swinging Roof Types.

SWINDELL-DRESSLER CORPORATION
PITTSBURGH, PA.



Complete Control by EC&M



on all Cranes in this new plant

Again, EC&M Control, complete with Brakes, Limit Stops, etc., is selected for all the new cranes in this plant. Ask any user what he thinks of EC&M Crane Control. Proudly, he boasts of accurate inching in spotting loads—brakes with thick, tough block-linings—simplicity of circuits and apparatus—smoothness of operation—and low operating costs, because contractors are of Line-Arc design. He knows a Youngstown Safety Limit Stop is a double asset—it not only prevents overhoisting accidents but an operator can do better work when his crane is so equipped. Look how conveniently the Master Switches may be grouped in the cab. Get the facts on EC&M Control for your next crane.

When buying Cranes, Specify EC&M Contro

Steel's Upward Swing Holds Steady Pace

Export demand and preparedness program forecast heavy future needs. Scrap moves to new high level. Output rises steadily

MARKET IN TABLOID ★

Demand
Strong in all lines; exports heavier.

Prices
Steady and firmer; scrap continues advance.

Production
Gains 3½ points to 78½ per cent.

■ DOMESTIC steel consumption and increasing demand for export combine to bring American steel mills heavy bookings, most of which carry request for immediate delivery. Steelmaking operations continue their upward movement, advancing 3½ points last week to 78½ per cent.

Not only are the Allies placing more tonnage in this country but neutral countries cut off from former European sources are turning here for their steel requirements. Canada, working at top speed on armament for Great Britain, finds its mills booked far ahead and is placing considerable steel with American mills to supplement the home supply. This is largely plates and bars, with some sheet tonnage, as well. Great Britain, operating its plants day and night, seven days a week, requires much iron and steel beyond its own capacity and with semifinished supplies from the Continent reduced by war conditions increasing orders are being placed here.

Although steelmakers are expediting deliveries on flat-rolled steel booked during the recent low-priced period, to meet the June 30 deadline, backlogs of this class of steel are being accumulated in many cases.

Consumers are looking to the future in view of expected expansion of requirements for preparedness and there is considerable advanced buying to replenish inventory. Steelmakers believe armament requirements and export steel will take precedence over domestic industrial needs and steelmakers seek to protect consumers now rather than have their requirements come out when capacity is fully engaged on preferred tonnage.

General buying is in the best volume since last fall, in the experience of leading producers. Much of it is for government work, directly or indirectly especially in bars and plates, with some sheets, but few structurals. Semifinished steel is in heavy demand, lots of 8000 to 11,000 tons being booked recently.

May production of pig iron totaled 3,491,009 net tons, with some estimates. This compares with 3,139,-143 tons in April and 1,923,625 tons in May, 1939. The daily rate of production in May was 112,613 tons, in April 104,635 tons. At the end of May 171 blast furnace stacks were in operation, a gain of 16 over the 155 at the close of April.

Pig iron is moving well, covering for third quarter being active and in good volume. Apparently current buying does not extend beyond third quarter as producers have not opened books for the final period.

From all indications practically all low-priced sheets have been specified and little will remain undelivered after the June 30 deadline. Coverage at the cut price has caused current buying to lag until the slack has been taken up.

Prices in general are firm and wherever soft spots have developed in recent weeks there is a hardening toward quoted figures. Fewer concessions are being met and the market is much firmer than for some time.

Scrap continues its upward course although there has been little tonnage buying. Suppliers are holding their stocks closely in expectation of an intensified demand and bidding on current railroad lists lends color to this attitude. Rise of more than $2 per ton since the middle of April shows the strength of the situation. The composite price last week advanced 17 cents, to $18.38, on higher prices on the Atlantic seaboard. At Chicago and Pittsburgh quotations held steady.

Steel and iron imports in April totaled 6674 gross tons, a gain of 30 per cent over March. With scrap imports excluded the gain was 22 per cent. Practically all the tonnage came from Norway and Sweden, the war situation in the Scandinavian countries not being apparent. During four months cumulative import tonnage, 25,558 tons, was only 23.7 per cent of steel and iron products imported in the corresponding period last year.

Rise of the operating rate 3½ points to 78½ per cent resulted from substantial increases in a number of centers and only slight decreases in two. Chicago advanced 8 points to 83 per cent, Pittsburgh 5½ points to 79 per cent and eastern Pennsylvania 4 points to 71 per cent. Other gains were: Birmingham 2 points to 85 per cent, Cincinnati 3 points to 64 per cent, Cleveland 4 points to 82, Buffalo 5 points to 70, St. Louis 2 points to 57 and Youngstown 1 point to 58. Detroit lost 5 points to 74 and Wheeling 6 points to 79. In New England the rate remained 56 per cent.

COMPOSITE MARKET AVERAGES

	June 1	May 25	May 18	One Month Ago May, 1940	Three Months Ago March, 1940	One Year Ago June, 1939	Five Years Ago June, 1935
Iron and Steel	$37.55	$37.51	$37.40	$37.33	$37.07	$35.69	$32.42
Finished Steel	56.60	56.60	56.60	56.60	56.50	55.70	54.00
Steelworks Scrap..	18.38	18.21	17.62	17.18	16.47	14.49	10.45

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel, hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	June 1, 1940	May 1940	Mar. 1940	June 1939
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.47
Iron bars, Chicago	2.25	2.25	2.25	2.05
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.00
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.00
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.60
Tin plate, per base box, Pitts.	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.45

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to ⅜-inch, Pitts.	2.00	2.00	2.00	1.92

Pig Iron

	June 1 1940	May 1940	Mar. 1940	June 1939
Bessemer, del. Pittsburgh	$24.34	$24.34	$24.34	$22.34
Basic, Valley	22.50	22.50	22.50	20.50
Basic, eastern, del. Philadelphia	24.34	24.34	24.34	22.34
No. 2 foundry, Pittsburgh	24.21	24.21	24.21	22.21
No. 2 foundry, Chicago	23.00	23.00	23.00	21.00
Southern No. 2, Birmingham	19.38	19.38	19.38	17.38
Southern No. 2, del. Cincinnati	22.89	22.89	22.89	20.89
No. 2X, del. Phila. (differ av.)	25.215	25.215	25.215	23.215
Malleable, Valley	23.00	23.00	23.00	21.00
Malleable, Chicago	23.00	23.00	23.00	21.00
Lake Sup., charcoal, del. Chicago	30.34	30.34	30.34	28.34
Gray forge, del. Pittsburgh	23.17	23.17	23.17	21.17
Ferromanganese, del. Pittsburgh	105.33	105.33	105.33	85.33

Scrap

Heavy melt. steel, Pitts.	19.25	$18.00	$17.05	$15.00
Heavy melt. steel No. 2, E. Pa.	17.50	16.00	15.90	13.10
Heavy melting steel, Chicago	17.25	16.65	15.50	13.40
Rails for rolling, Chicago	21.25	20.45	18.25	17.65
Railroad steel specialties, Chicago	20.25	19.75	18.40	15.30

Coke

Connellsville, furnace, ovens	$4.75	$4.75	$4.75	$3.75
Connellsville, foundry, ovens	5.75	5.75	5.75	5.00
Chicago, by-product fdry., del.	11.25	11.25	11.25	10.50

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Except when otherwise designated, prices are base, f.o.b. cars.

Sheet Steel

Hot Rolled

Pittsburgh	2.10c
Chicago, Gary	2.10c
Cleveland	2.10c
Detroit, del.	2.20c
Buffalo	2.10c
Sparrows Point, Md.	2.10c
New York, del.	2.34c
Philadelphia, del.	2.27c
Granite City, Ill.	2.20c
Middletown, O.	2.10c
Youngstown, O.	2.10c
Birmingham	2.10c
Pacific Coast ports	2.65c

Cold Rolled

Pittsburgh	3.05c
Chicago, Gary	3.05c
Buffalo	3.05c
Cleveland	3.05c
Detroit, delivered	3.15c
Philadelphia, del.	3.37c
New York, del.	3.39c
Granite City, Ill.	3.15c
Middletown, O.	3.05c
Youngstown, O.	3.05c
Pacific Coast ports	3.70c

Galvanized No. 24

Pittsburgh	3.50c
Chicago, Gary	3.50c
Buffalo	3.50c
Sparrows Point, Md.	3.50c
Philadelphia, del.	3.67c
New York, delivered	3.74c
Birmingham	3.50c
Granite City, Ill.	3.60c
Middletown, O.	3.50c
Youngstown, O.	3.50c
Pacific Coast ports	4.05c

Black Plate, No. 29 and Lighter

Pittsburgh	3.05c
Chicago, Gary	3.05c
Granite City, Ill.	3.15c

Long Ternes No. 24 Unassorted

Pittsburgh, Gary	3.80c
Pacific Coast	4.55c

Enameling Sheets

	No. 10	No. 20
Pittsburgh	2.75c	3.35c
Chicago, Gary	2.75c	3.35c
Granite City, Ill.	2.85c	3.45c
Youngstown, O.	2.75c	3.35c
Cleveland	2.75c	3.35c
Middletown, O.	2.75c	3.35c
Pacific Coast	3.40c	4.00c

Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.

Chrome-Nickel

	No. 302	No. 304
Bars	24.00	25.00
Plates	27.00	29.00
Sheets	34.00	36.00
Hot strip	21.50	23.50
Cold strip	28.00	30.00

Straight Chromes

	No. 410	No. 430	No. 442	No. 446
Bars	18.50	19.00	22.50	27.50
Plates	21.50	22.00	25.50	30.50
Sheets	26.50	29.00	32.50	36.50
Hot strip	17.00	17.50	24.00	35.00
Cold stp.	22.00	22.50	32.00	52.00

Steel Plate

Pittsburgh	2.10c
New York, del.	2.29c
Philadelphia, del.	2.15c
Boston, delivered	2.46c
Buffalo, delivered	2.33c
Chicago or Gary	2.10c
Cleveland	2.10c
Birmingham	2.10c
Coatesville, Pa.	2.10c
Sparrows Point, Md.	2.10c
Claymont, Del.	2.10c
Youngstown	2.10c
Gulf ports	2.45c
Pacific Coast ports	2.65c

Steel Floor Plates

Pittsburgh	3.35c
Chicago	3.35c
Gulf ports	3.70c
Pacific Coast ports	4.00c

Structural Shapes

Pittsburgh	2.10c
Philadelphia, del.	2.21½c
New York, del.	2.27c
Boston, delivered	2.41c
Bethlehem	2.10c
Chicago	2.10c
Cleveland, del.	2.30c
Buffalo	2.10c
Gulf ports	2.45c
Birmingham	2.10c
St. Louis, del.	2.34c
Pacific Coast ports	2.70c

Tin and Terne Plate

Tin Plate, Coke (base box)

Pittsburgh, Gary, Chicago	$5.00
Granite City, Ill.	5.10

Mfg. Terne Plate (base box)

Pittsburgh, Gary, Chicago	$4.30
Granite City, Ill.	4.40

Bars

Soft Steel

(Base, 20 tons or over)

Pittsburgh	2.15c
Chicago or Gary	2.15c
Duluth	2.25c
Birmingham	2.15c
Cleveland	2.15c
Buffalo	2.15c
Detroit, delivered	2.25c
Philadelphia, del.	2.47c
Boston, delivered	2.52c
New York, del.	2.49c
Gulf ports	2.50c
Pacific Coast ports	2.80c

Rail Steel

(Base, 5 tons or over)

Pittsburgh	2.05c
Chicago or Gary	2.05c
Detroit, delivered	2.15c
Cleveland	2.05c

Buffalo	2.05c
Birmingham	2.05c
Gulf ports	2.40c
Pacific Coast ports	2.70c

Iron

Chicago	2.25c
Philadelphia, del.	2.37c
Pittsburgh, refined	3.50-8.00c
Terre Haute, Ind.	2.15c

Reinforcing

New Billet Bars, Base

Chicago, Gary, Buffalo, Cleve., Birm., Young., Sparrows Pt., Pitts.	1.60-1.90c
Gulf ports	1.95-2.25c
Pacific Coast ports	2.00-2.30c

Rail Steel Bars, Base

Pittsburgh, Gary Chicago, Buffalo, Cleveland, Birm.	1.60-1.90c
Gulf ports	1.95-2.25c
Pacific Coast ports	2.00-2.30c

The above represent average going prices. Last quotations announced by producers were 2.15c, mill base, for billet bars and 2.00c for rail steel.

Wire Products

Pitts-Cleve.-Chicago-Birm. base per 100 lb. keg in carloads

Standard and cement coated wire nails	$2.55
(Per pound)	
Polished fence staples	2.55c
Annealed fence wire	3.05c
Galv. fence wire	3.40c
Woven wire fencing (base C. L. column)	67
Single loop bale tie, (base C.L. column)	56
Galv. barbed wire, 80-rod spools, base column	70
Twisted barbless wire, column	70

To Manufacturing Trade

Base, Pitts. - Cleve. - Chicago-Birmingham (except spring wire)

Bright bess., basic wire	2.60c
Galvanized wire	2.60c
Spring wire	3.20c

Worcester, Mass., $2 higher on bright basic and spring wire.

Cut Nails

Carload, Pittsburgh, keg..$3.85

Cold-Finished Bars

	Carbon	Alloy
Pittsburgh	2.65c	3.35c
Chicago	2.65c	3.35c
Gary, Ind.	2.65c	3.35c
Detroit	2.70c	*3.45c
Cleveland	2.65c	3.35c
Buffalo	2.65c	3.35c

* Delivered.

Alloy Bars (Hot)

(Base, 20 tons or over)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem	2.70c
Detroit, delivered	2.80c

Alloy S.A.E.	Diff.	Alloy S.A.E.	Diff.
2000	0.35	3100	0.70
2100	0.75	3200	1.35
2300	1.55	3300	3.80
2500	2.25	3400	3.20

4100 0.15 to 0.25 Mo.	0.55
4600 0.20 to 0.30 Mo. 1.50-2.00 Ni.	1.10
5100 0.80-1.10 Cr.	0.45
5100 Cr. spring flats	0.15
6100 bars	1.20
6100 spring flats	0.85
Cr. N., Van.	1.50
Carbon Van.	0.85
9200 spring flats	0.15
9200 spring rounds, squares	0.40

Electric furnace up 50 cents.

Strip and Hoops

(Base, hot strip, 1 ton or over; cold, 3 tons or over)

Hot Strip, 12-inch and less

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, Birmingham	2.10c
Detroit, del.	2.20c
Philadelphia, del.	2.42c
New York, del.	2.46c
Pacific Coast ports	2.75c
Cooperage hoop, Young., Pitts.; Chicago, Birm.	2.20c
Cold strip, 0.25 carbon and under, Pittsburgh, Cleveland, Youngstown	2.80c
Chicago	2.90c
Detroit, del.	2.90c
Worcester, Mass.	3.00c

Carbon	Cleve., Pitts.
0.26—0.50	2.80c
0.51—0.75	4.30c
0.76—1.00	6.15c
Over 1.00	8.35c

Worcester, Mass. $4 higher.

Commodity Cold-Rolled Strip

Pitts.-Cleve.-Youngstown	2.95c
Chicago	3.05c
Detroit, del.	3.05c
Worcester, Mass.	3.35c

Lamp stock up 10 cents.

Rails, Fastenings

(Gross Tons)

Standard rails, mill	$40.00
Relay rails, Pittsburgh 20—100 lbs.	32.50-35.50
Light rails, billet qual., Pitts., Chicago, B'ham.	$40.00
Do., rerolling quality	39.00

Cents per pound

Angle bars, billet, mills	2.70c
Do., axle steel	2.35c
Spikes, R. R. base	3.00c
Track bolts, base	4.15c
Car axles forged, Pitts., Chicago, Birmingham	3.15c
Tie plates, base	2.15c

Base, light rails 25 to 60 lbs., 20 lbs., up $2; 16 lbs. up $4; 12 lbs. up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base plates 20 tons.

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller	68.5 off
Do. larger, to 1-in.	66 off
Do. 1⅛ and larger	64 off
Tire bolts	52.5 off

Stove Bolts

In packages with nuts separate 72.5 off; with nuts attached add 15%; bulk 83.5 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts	60 off
Plow bolts	68.5 off

Nuts

	U.S.S.	S.A.E.
Semifinished hex.		
⅛-inch and less	67	70
¼-1-inch	64	65
1⅛-1⅛-inch	62	62
1⅛ and larger	60	..

Hexagon Cap Screws

Upset, 1-in., smaller	70.0 off

Square Head Set Screws

Upset. 1-in., smaller	75.0 off
Headless set screws	64.0 off

Piling

Pitts., Chgo., Buffalo	2.40c
Gulf ports	2.85c
Pacific Coast ports	2.95c

Rivets, Washers

F.o.b. Pitts., Cleve., Chgo., Bham.

Structural	3.40c
⅛-inch and under	65-10 off
Wrought washers, Pitts., Chi., Phila., to jobbers and large nut, bolt mfrs. l.c.l. $5.40; c.l. $5.75	off

Welded Iron, Steel Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less on butt weld. Chicago delivery 2½ and 1½ less, respectively. Wrought pipe, Pittsburgh base.

Butt Weld

Steel

In.	Blk.	Galv.
⅛	63½	54
¼	66½	58
⅜—⅜	68½	60½

Iron

¼	30	13
⅜—1¼	34	19
1½	38	21½
2	37½	21

Lap Weld

Steel

2	61	52½
2½—3	64	55½
3½—6	66	57½
7 and 8	65	55½
9 and 10	64½	55
11 and 12	63½	54

Iron

2	30½	15
2½—3½	31½	17½
4	33½	21
4½—8	32½	20
9—12	28½	15

Line Pipe

Steel

1 to 3, butt weld	67½
2, lap weld	60
2½ to 3, lap weld	63
3½ to 6, lap weld	65
7 and 8, lap weld	64
10-inch lap weld	63½
12-inch, lap weld	62½

Iron

	Blk.	Galv.
¾ butt weld	25	7
1 and 1¼ butt weld	29	13
1½ butt weld	33	15½
2 butt weld	32½	15
1½ lap weld	23½	7
2 lap weld	25½	9
2½ to 3½ lap weld	26½	11½
4 lap weld	28½	15
4½ to 8 lap weld	27½	14
9 to 12 lap weld	23½	9

Boiler Tubes

Carloads minimum wall seamless steel boiler tubes, cut lengths 4 to 24 feet; f.o.b. Pittsburgh, base price per 100 feet subject to usual extras.

Lap Welded

Sizes	Gage	Steel	Charcoal Iron
1½" O.D.	13	$ 9.72	$23.71
1¾" O.D.	13	11.06	22.93
2" O.D.	13	12.38	19.35
2¼" O.D.	13	13.79	21.68
2¼" O.D.	12	15.16	.....
2½" O.D.	12	16.58	26.57
2¾" O.D.	12	17.54	29.00
3" O.D.	12	18.35	31.36
3½" O.D.	11	23.15	39.81
4" O.D.	10	28.66	49.90
5" O.D.	9	44.25	73.93
6" O.D.	7	68.14	.....

Seamless

Sizes	Gage	Hot Rolled	Cold Drawn
1 "O.D.	13	$ 7.82	$ 9.01
1¼"O.D.	13	9.26	10.67
1½"O.D.	13	10.23	11.79
1¾"O.D.	13	11.64	13.42
2" O.D.	13	13.04	15.03
2¼"O.D.	13	14.54	16.76
2¼"O.D.	12	16.01	18.45
2½"O.D.	12	17.54	20.21
2¾"O.D.	12	18.59	21.42
3" O.D.	12	19.50	22.48
3½"O.D.	11	24.62	28.37
4" O.D.	10	30.54	35.20
4½"O.D.	10	37.35	43.04
5" O.D.	9	46.87	54.01
6" O.D.	7	71.96	82.93

Cast Iron Pipe

Class B Pipe—Per Net Ton

6-in., & over, Birm.	$45.00-46.00
4-in., Birmingham	48.00-49.00
4-in., Chicago	56.80-57.80
6-in. & over, Chicago	53.80-54.80
6-in. & over, east fdy.	49.00
Do., 4-in.	52.00

Class A Pipe $3 over Class B Stnd. fitgs., Birm., base $100.00

Semifinished Steel

Rerolling Billets, Slabs

(Gross Tons)

Pittsburgh, Chicago, Gary, Cleve., Buffalo, Young., Birm., Sparrows Point	$34.00
Duluth (billets)	36.00
Detroit, delivered	36.00

Forging Quality Billets

Pitts., Chi., Gary, Cleve., Young., Buffalo, Birm.	40.00
Duluth	42.00

Sheet Bars

Pitts., Cleveland, Young., Sparrows Point, Buffalo, Canton, Chicago	34.00
Detroit, delivered	36.00

Wire Rods

Pitts., Cleveland, Chicago, Birmingham No. 5 to ⅝-inch incl. (per 100 lbs.) $2.00
Do., over ⅝ to ⅞-in. incl. 2.15
Worcester up $0.10; Galveston up $0.25; Pacific Coast up $0.50.

Skelp

Pitts., Chi., Youngstown, Coatesville, Sparrows Pt. 1.90c

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur.	$4.35- 4.60
Connellsville, fdry.	5.00- 5.75
Connell. prem. fdry.	5.75- 6.25
New River fdry.	6.25- 6.50
Wise county fdry.	5.50- 6.50
Wise county fur.	5.00- 5.25

By-Product Foundry

Newark, N. J., del.	11.38-11.85
Chicago, outside del.	10.50
Chicago, delivered	11.25
Terre Haute, del.	10.75
Milwaukee, ovens	11.25
New England, del.	12.50
St. Louis, del.	11.75
Birmingham, ovens	7.50
Indianapolis, del.	10.75
Cincinnati, del.	10.50
Cleveland, del.	11.05
Buffalo, del.	11.25
Detroit, del.	11.00
Philadelphia, del.	11.15

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	16.00c
Toluol, two degree	25.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c

Per lb. f.o.b. Frankford and St. Louis

Phenol (less than 1000 lbs.)	14.75c
Do. (1000 lbs. or over)	13.75c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers	7.00c

Per ton, bulk, f.o.b. port

Sulphate of ammonia	$28.00

Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25 sil.; 50c diff. below 1.75 sil. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$24.00	$24.50	$23.50	$25.00
Birdsboro, Pa.	24.00	24.50	23.50	25.00
Birmingham, Ala.‡	19.38	.....	18.38	24.00
Buffalo	23.00	23.50	22.00	24.00
Chicago	23.00	23.00	22.50	23.50
Cleveland	23.00	23.00	22.50	23.50
Detroit	23.00	23.00	22.50	23.50
Duluth	23.50	23.50	.....	24.00
Erie, Pa.	23.00	23.50	22.50	24.00
Everett, Mass.	24.00	24.50	23.50	25.00
Granite City, Ill.	23.00	23.00	22.50	23.50
Hamilton, O.	23.00	23.00	22.50	.....
Neville Island, Pa.	23.00	23.00	22.50	23.50
Provo, Utah	21.00	.....	.....	.....
Sharpsville, Pa.	23.00	23.00	22.50	23.50
Sparrow's Point, Md.	24.00	.....	23.50	.....
Swedeland, Pa.	24.00	24.50	23.50	25.00
Toledo, O.	23.00	23.00	22.50	23.50
Youngstown, O.	23.00	23.00	22.50	23.50

‡Subject to 38 cents deduction for 0.70 per cent phosphorus or higher.

Delivered from Basing Points:				
Akron, O., from Cleveland	24.39	24.39	23.89	24.89
Baltimore from Birmingham	24.78	.....	23.66	.....
Boston from Birmingham	24.12	.....	.....	.....
Boston from Everett, Mass.	24.50	25.00	24.00	25.50
Boston from Buffalo	24.50	25.00	24.00	25.50
Brooklyn, N. Y., from Bethlehem	26.50	27.00	.....	.....
Canton, O., from Cleveland	24.39	24.39	23.89	24.89
Chicago from Birmingham	†23.22	.....	.....	.....
Cincinnati from Hamilton, O.	23.24	24.11	23.61	.....
Cincinnati from Birmingham	23.06	.....	22.06	.....
Cleveland from Birmingham	23.32	.....	22.82	.....
Mansfield, O., from Toledo, O.	24.94	24.94	24.44	24.44
Milwaukee from Chicago	24.10	24.10	23.60	24.60
Muskegon, Mich., from Chicago, Toledo or Detroit	26.19	26.19	25.69	26.69
Newark, N. J., from Birmingham	25.15	.....	.....	.....
Newark, N. J., from Bethlehem	25.53	26.03	.....	.....
Philadelphia from Birmingham	24.46	.....	23.96	.....
Philadelphia from Swedeland, Pa.	24.84	25.34	24.34	.....
Pittsburgh district from Neville Island	‡Neville base, plus 69c, 84c, and $1.24 freight.			
Saginaw, Mich., from Detroit	25.31	25.31	24.81	25.81
St. Louis, northern	23.50	23.50	23.00	....
St. Louis from Birmingham	†23.12	....	22.62	....
St. Paul from Duluth	25.63	25.63	....	26.13

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $28.50, base; $29.74 delivered Philadelphia.

Gray Forge		Charcoal	
Valley furnace	$22.50	Lake Superior fur.	$27.00
Pitts. dist. fur.	22.50	do., del. Chicago	30.34
		Lyles, Tenn.	26.50

†Silvery

Jackson county, O., base: 6-6.50 per cent $28.50; 6.51-7—$29.00; 7-7.50—$29.50; 7.51-8—$30.00; 8-8.50—$30.50; 8.51-9—$31.00; 9-9.50—$31.50; Buffalo, $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base; Prices are the same as for silveries, plus $1 a ton.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Manganese differentials in silvery iron and ferrosilicon, 2 to 3%, $1 per ton add. Each unit over 3%, add $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$60.80

First Quality

Pa., Ill., Md., Mo., Ky.	47.50
Alabama, Georgia	47.50
New Jersey	52.50

Second Quality

Pa., Ill., Ky., Md., Mo.	42.75
Georgia, Alabama	34.20
New Jersey	49.00

Ohio

First quality	39.90
Intermediate	36.10
Second quality	31.35

Malleable Bung Brick

All bases	$56.05

Silica Brick

Pennsylvania	$47.50
Joliet, E. Chicago	55.10
Birmingham, Ala.	47.50

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$28.00
Wire cut	$26.00

Magnesite

Domestic dead - burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$50.00
Chem. bonded chrome	50.00
Magnesite brick	72.00
Chem. bonded magnesite	61.00

Fluorspar

Washed gravel, duty pd., tide, net ton	$25.00-$26.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	20.00
Do. barge	20.00
No. 2 lump	21.00

Ferroalloy Prices

Ferromanganese, 78-82%, lump and bulk, carlots tide., duty pd. $100.00
Ton lots 110.00
Less ton lots 113.50
Less 200 lb. lots 118.00
Do., carlots del. Pitts. 105.33

Spiegeleisen, 19-21% dom. Palmerton, Pa., spot 32.00
Do., 26-28% 39.50

Ferrosilicon, 50% freight allowed, c.l. 69.50
Do., ton lot 82.00
Do., 75 per cent 126.00
Do. ton lots 142.00
Spot, $5 a ton higher.

Silicomanganese, c.l., 2½ per cent carbon, 103.00
2% carbon, 108.00; 1%, 118.00
Contract ton price $12.50 higher; spot $5 over contract.

Ferrotungsten, stand., lb. con. del. cars 1.90-2.00

Ferrovanadium, 35 to 40%, lb., cont. 2.70-2.80-2.90

Ferrophosphorus, gr. ton, c.l., 17-18% Rockdale, Tenn., basis, 18%, $3 unitage, 58.50; electric furn., per ton, c. l., 23-26% f.o.b. Mt. Pleasant, Tenn., 24% $3 unitage 75.00

Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb., contained cr., del. carlots 11.00c
Do., ton lots 11.75c
Do., less-ton lots 12.00c

67-72% low carbon:

	Carloads	Ton lots	Less ton
2% carb.	17.50c	18.25c	18.75c
1% carb.	18.50c	19.25c	19.75c
0.10% carb.	20.50c	21.25c	21.75c
0.20% carb.	19.50c	20.25c	20.75c

Spot ¼c higher

Ferromolybdenum, 55-65% molyb. cont., f.o.b. mill, lb. 0.95

Calcium molybdate, lb. molyb. cont., f.o.b. mill 0.80

Ferrotitanium, 40-45%, lb., con. tl., f.o.b. Niagara Falls, ton lots $1.23
Do., less-ton lots 1.25
20-25% carbon, 0.10 max., ton lots, lb. 1.35
Do. less-ton lots 1.40
Spot 5c higher

Ferrocolumbium, 50-60%, contract, lb. con. col., f.o.b. Niagara Falls $2.25
Do., less-ton lots 2.30
Spot is 10c higher

Technical molybdenum trioxide, 53 to 60% molybdenum, lb. molyb. cont., f.o.b. mill 0.80

Ferro-carbon-titanium, 15-18%, tl., 6-8% carb., carlots, contr., net ton $142.50
Do, spot 145.00
Do, contract, ton lots 145.00
Do, spot, ton lots 150.00

15-18% tl., 3-5% carbon, carlots, contr., net ton 157.50
Do, spot 160.00
Do, contract, ton lots 160.00
Do, spot, ton lots 165.00

Alsifer, contract carlots, f.o.b. Niagara Falls, lb. 7.50c
Do, ton lots 8.00c
Do, less-ton lots 8.50c
Spot ½c lb. higher

Chromium Briquets, contract, freight allowed, lb. spot carlots, bulk 7.00c
Do., ton lots 7.50c
Do., less-ton lots 7.75c
Do., less 200 lbs. 8.00c
Spot, ¼c higher.

Tungsten Metal Powder, according to grade, spot shipment, 200-lb. drum lots, lb. $2.50
Do., smaller lots 2.60

Vanadium Pentoxide, contract, lb. contained $1.10
Do. spot 1.15

Chromium Metal, 98% cr., 0.50 carbon max., contract, lb. con. chrome 84.00c
Do., spot 89.00c
88% chrome, contract 83.00c
Do., spot 88.00c

Silicon Metal, 1% iron, contract, carlots, 2 x ⅛-in., lb. 14.00c
Do., 2% 12.50c
Spot ¼c higher

Silicon Briquets, contract carloads, bulk, freight allowed, ton $69.50
Ton lots 79.50
Less-ton lots, lb. 3.75c
Less 200 lb. lots, lb. 4.00c
Spot ¼-cent higher.

Manganese Briquets, contract carloads, bulk freight allowed, lb. 5.00c
Ton lots 5.50c
Less-ton lots 5.75c
Spot ¼c higher

Zirconium Alloy, 12-15%, contract, carloads, bulk, gross ton $97.50
Do, spot 102.50

34-40%, contract, carloads, lb., alloy 14.00c
Do, ton lots 15.00c
Do, less-ton lots 16.00c
Spot ¼c higher

Molybdenum Powder, 99%, f.o.b. York, Pa. 200-lb. kegs, lb. $2.60
Do, 100-200 lb. lots 2.75
Do, under 100-lb. lots 3.00

Molybdenum Oxide Briquets, 48-52% molybdenum, per pound contained, f.o.b. producers' plant 80.00c

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials

	Soft Bars	Bands	Hoops	Plates ¼-in. & Over	Structural Shapes	Floor Plates	Sheets: Hot Rolled	Sheets: Cold Rolled	Sheets: Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars: Carbon	Cold Drawn Bars: SAE 2300	Cold Drawn Bars: SAE 3100
Boston	3.98	3.86	4.86	3.85	3.85	5.66	3.51	4.48	4.66	3.46	4.13	8.63	7.23
New York Met.)	3.84	3.76	3.76	3.76	3.75	5.56	3.38	4.40	4.05	3.31	4.09	8.59	7.19
Philadelphia	3.85	3.75	4.25	3.55	3.55	5.25	3.35	4.05	4.25	3.31	4.06	8.56	7.16
Baltimore	3.95	4.05	4.45	3.70	3.70	5.25	3.55	....	5.05	....	4.05	....	....
Norfolk, Va.	4.15	4.25	....	3.90	3.90	5.45	3.75	....	5.40	....	4.15	....	....
Buffalo	3.35	3.62	3.62	3.62	3.40	5.25	3.05	4.30	4.45	3.22	3.75	8.15	6.75
Pittsburgh	3.35	3.40	3.40	3.40	3.40	5.00	3.15	....	4.45	....	3.65	8.15	6.75
Cleveland	3.25	3.30	3.30	3.40	3.58	5.18	3.15	4.05	4.42	3.20	3.75	8.15	6.75
Detroit	3.43	3.23	3.48	3.60	3.65	5.27	3.23	4.30	4.84	3.20	3.80	8.45	7.05
Omaha	3.90	3.80	3.80	3.95	3.95	5.55	3.45	....	5.00	....	4.42	....	....
Cincinnati	3.60	3.47	3.47	3.65	3.68	5.28	3.22	4.00	4.67	3.47	4.00	8.50	7.10
Chicago	3.50	3.40	3.40	3.55	3.55	5.15	3.05	4.10	4.60	3.30	3.75	8.15	6.75
Twin Cities	3.75	3.65	3.65	3.80	3.80	5.40	3.30	4.35	4.75	3.63	4.34	8.84	7.44
Milwaukee	3.63	3.53	3.53	3.68	3.68	5.28	3.18	4.23	4.73	3.54	3.88	8.38	6.98
St. Louis	3.62	3.52	3.52	3.47	3.47	5.07	3.18	4.12	4.87	3.41	4.02	8.52	7.12
Kansas City	4.05	4.15	4.15	4.00	4.00	5.60	3.90	....	5.00	....	4.30	....	....
Indianapolis	3.60	3.55	3.55	3.70	3.70	5.30	3.25	....	4.76	....	3.97	....	....
Memphis	3.90	4.10	4.10	3.95	3.95	5.71	3.85	....	5.25	....	4.31	....	....
Chattanooga	3.80	4.00	4.00	3.85	3.85	5.68	3.70	....	4.40	....	4.39	....	....
Tulsa, Okla.	4.44	4.34	4.34	4.33	4.33	5.93	3.99	....	5.71	....	4.69	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.88	3.45	....	4.75	....	4.43	....	....
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	4.80	5.00	4.60	....	....
Houston, Tex.	4.05	6.20	6.20	4.05	4.05	5.75	4.20	....	5.25	....	....	....	....
Seattle	4.00	3.85	5.20	3.40	3.50	5.75	3.70	6.50	4.75	....	5.75	....	....
Portland, Oreg.	4.25	4.50	6.10	4.00	4.00	5.75	3.95	6.50	4.75	....	5.75	....	....
Los Angeles	4.15	4.60	4.45	4.00	4.00	6.40	4.30	6.50	5.25	....	6.60	10.65	9.80
San Francisco	3.50	4.00	6.00	3.35	3.35	5.60	3.40	6.40	5.15	....	6.80	10.65	9.80

	SAE Hot-rolled Bars (Unannealed): 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.18	7.50	6.05	5.80	7.90
New York (Met.)	4.04	7.35	5.90	5.65	....
Philadelphia	4.10	7.31	5.86	5.61	8.56
Baltimore	4.10	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.10	5.65	5.40	7.50
Pittsburgh	3.40	7.20	5.75	5.50	7.60
Cleveland	3.30	7.30	5.85	5.85	7.70
Detroit	3.48	7.42	5.97	5.72	7.19
Cincinnati	3.65	7.44	5.99	5.74	7.84
Chicago	3.70	7.10	5.65	5.40	7.50
Twin Cities	3.95	7.45	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.82	7.47	6.02	5.77	7.87
Seattle	5.85	....	8.00	7.85	8.65
Portland, Oreg.	5.70	8.85	8.00	7.85	8.65
Los Angeles	4.80	9.40	8.55	8.40	9.05
San Francisco	5.00	9.65	8.80	8.65	9.30

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300-4999 pounds in Portland, Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in Birmingham.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Kansas City and St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 300-4999 in San Francisco, Portland; any quantity in Twin Cities; 300-1999 in Los Angeles.

Galvanized Sheets: Base, 1500-3499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 150-1049 in Los Angeles; 300-4999 in Portland, Seattle, San Francisco; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis, Tulsa; 1500 and over in Chattanooga; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; 10 to 24 bundles in Philadelphia.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco, 1000 and over in Portland, Seattle; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

CURRENT IRON AND STEEL PRICES OF EUROPE

Dollars at Rates of Exchange, May 29

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	British gross tons U. K. ports £ s d	Quoted in dollars at current value	Continental Channel or North Sea ports, gross tons‡‡ **Quoted in gold pounds sterling £ s d
Foundry, 2.50-3.00 Si.	$19.08 6 0 0	$33.23	3 18 0
Basic bessemer	....	.....	.....
Hematite, Phos. .03-.05	19.88 6 5 0	.....	.....
Billets	....	$31.95	3 15 0
Wire rods, No. 5 gage	....	60.71	7 2 6
Standard rails	$33.39 10 10 0	$48.99	5 15 0
Merchant bars	1.91c 13 9 0	2.77c	7 6 0
Structural shapes	1.72c 12 2 6	2.83c	7 9 0
Plates, ††¼ in. or 5 mm.	1.83c 12 17 6	3.53c	9 6 0
Sheets, black, 24 gage or 0.5 mm	2.41c 17 0 0	2.98c	7 17 0°
Sheets, gal., 24 ga., corr.	2.88c 20 6 3	3.94c	10 7 6
Bands and strips	....	2.76c	7 5 0
Plain wire, base	....	3.15c	8 6 3
Galvanized wire, base	....	3.75c	9 17 6
Wire nails, base	....	3.56c	9 7 6
Tin plate, box 108 lbs.	$ 5.09 1 12 0	....	.....

British ferromanganese $100.00 delivered Atlantic seaboard duty-paid.

Domestic Prices at Works or Furnace—

Last Reported

	£ s d		French Francs		Belgian §§Francs		Reich §§Mar
Fdy. pig iron, Si. 2.5.	$17.65	5 11 0(a)	$14.18	788	$31.44	950	$25.33	63
Basic bess. pig iron	16.62	5 4 6(a)	.....	...	29.79	900	27.94	(b)69.50
Furnace coke	5.03	1 11 8	4.05	225	10.92	330	7.64	19
Billets	29.81	9 7 6	20.93	1,163	42.20	1,275	38.79	96.
Standard rails	1.59c	11 3 0	1.27c	1,588	2.06c	1,375	2.38c	132
Merchant bars	2.00c	14 0 0††	1.16c	1,454	2.06c	1,375	1.98c	110
Structural shapes	1.77c	12 8 0††	1.13c	1,414	2.06c	1,375	1.93c	107
Plates, ††¼-in. or 5 mm.	1.79c	12 10 6††	1.48c	1,848	2.42c	1,610	2.29c	127
Sheets, black	2.50c	17 10 0§	1.75c	2,193‡	2.85c	1,900‡	2.59c	144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.	2.98c	20 16 3††	2.87c	3,589	4.80c	3,200	6.66c	370
Plain wire	2.79c	19 10 0	1.87c	2,340	3.00c	2,000	3.11c	173
Bands and strips	2.11c	14 15 0††	1.31c	1,632	2.48c	1,650	2.29c	127

†British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continent usually for basic-bessemer steel. (a) del. Middlesbrough. 5s rebate to approved customers. (b) hematite. °Close annealed. ††Rebate of 15s on certain conditions.

**Gold pound sterling not quoted. §§Last prices, no current quotations. ‡‡No quotations

IRON AND STEEL SCRAP PRICES

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated; †indicates brokers prices

HEAVY MELTING STEEL

Birmingham, No. 1.	15.00
Bos. dock No. 1 exp.	15.50
New Eng. del. No. 1	14.50-15.00
Buffalo, No. 1	18.50-19.00
Buffalo, No. 2	16.50-17.00
Chicago, No. 1	17.00-17.50
Chicago, auto, no alloy	16.00-16.50
Cincinnati, dealers.	14.50-15.00
Cleveland, No. 1	17.50-18.00
Cleveland, No. 2	16.50-17.00
Detroit, No. 1	†15.50-16.00
Detroit, No. 2	†14.50-15.00
Eastern Pa., No. 1.	19.00
Eastern Pa., No. 2.	17.50
Federal, Ill., No. 2	14.25-14.75
Granite City, R. R. No. 1	†15.25-15.75
Granite City, No. 2.	14.00-14.50
Los Ang., No. 1, net	11.50-12.00
Los Ang., No. 2, net	10.50-11.00
N. Y. dock No. 1 exp.	14.50
Pitts., No. 1 (R. R.)	20.00-20.50
Pittsburgh, No. 1	19.00-19.50
Pittsburgh, No. 2	17.50-18.00
St. Louis, No. 1	†15.25-15.75
St. Louis, No. 2	†14.25-14.75
San Fran., No. 1, net	12.50-13.00
San Fran., No. 2, net	11.50-12.00
Seattle, No. 1	13.00-14.00
Toronto, dirs., No. 1	11.00
Valleys, No. 1	18.00-18.50

COMPRESSED SHEETS

Buffalo, new	17.00-17.50
Chicago, factory	16.50-17.00
Chicago, dealers	15.00-15.50
Cincinnati, dealers	14.00-14.50
Cleveland	17.50-18.00
Detroit	†16.75-17.25
E. Pa., new mat.	18.50-19.00
E. Pa., old mat.	15.00-15.50
Los Angeles, net	9.00- 9.50
Pittsburgh	19.00-19.50
St. Louis	†13.00-13.50
San Francisco, net	9.00- 9.50
Valleys	17.50-18.00

BUNDLED SHEETS

Buffalo, No. 1	16.50-17.00
Buffalo, No. 2	15.00-15.50
Cleveland	14.00-14.50
Pittsburgh	17.50-18.00
St. Louis	†11.00-11.50
Toronto, dealers	9.75

SHEET CLIPPINGS, LOOSE

Chicago	12.00-12.50
Cincinnati, dealers.	10.00-10.50
Detroit	†13.50-14.00
St. Louis	†9.50-10.00
Toronto, dealers	9.00

BUSHELING

Birmingham, No. 1	13.00
Buffalo, No. 1	16.50-17.00
Chicago, No. 1	16.50-17.00
Cincin., No. 1 deal.	9.75-10.25
Cincin., No. 2 deal.	4.50- 5.00
Cleveland, No. 2	11.00-11.50
Detroit, No. 1, new.	†15.50-16.00
Valleys, new, No. 1	17.50-18.00
Toronto, dealers	5.50- 6.00

MACHINE TURNINGS (Long)

Birmingham	5.00
Buffalo	11.00-11.50
Chicago	11.00-11.50
Cincinnati, dealers.	6.50- 7.00
Cleveland, no alloy.	10.50-11.00
Detroit	†10.00-10.50
Eastern Pa.	11.00-11.50
Los Angeles	4.00- 5.00
New York	†6.50- 7.00
Pittsburgh	12.50-13.00
St. Louis	†7.50- 8.00
San Francisco	5.00
Toronto, dealers	7.00- 7.25
Valleys	11.50-12.00

SHOVELING TURNINGS

Buffalo	13.00-13.50
Cleveland	11.00-11.50
Chicago	11.50-12.00
Chicago, spel, anal.	14.50-15.00
Detroit	†11.00-11.50
Pitts., alloy-free	13.50-14.00

BORINGS AND TURNINGS
For Blast Furnace Use

Boston district	†4.00- 4.25
Buffalo	10.50-11.00
Cincinnati, dealers.	5.50- 6.00
Cleveland	11.00-11.50
Eastern Pa.	10.50-11.00
Detroit	†10.00-10.50
New York	†6.25- 6.50
Pittsburgh	10.00-10.50
Toronto, dealers	6.75

AXLE TURNINGS

Buffalo	16.00-16.50
Boston district	†8.00- 8.50
Chicago, elec. fur.	17.50-18.00
East. Pa. elec. fur.	16.00-16.50
St. Louis	†10.50-11.00
Toronto	6.00- 6.50

CAST IRON BORINGS

Birmingham	7.50
Boston dist. chem.	†8.25- 8.50
Buffalo	10.50-11.00
Chicago	10.50-11.00
Cincinnati, dealers.	5.50- 6.00
Cleveland	11.00-11.50
Detroit	†10.00-10.50
E. Pa., chemical	14.50-15.00
New York	†7.00
St. Louis	†7.00- 7.50
Toronto, dealers	6.75

RAILROAD SPECIALTIES

Chicago	20.00-20.50

ANGLE BARS—STEEL

Chicago	20.50-21.00
St. Louis	†18.00-18.50

SPRINGS

Buffalo	21.00-21.50
Chicago, coil	21.50-22.00
Chicago, leaf	19.50-20.00
Eastern Pa.	22.50-23.00
Pittsburgh	23.50-24.00
St. Louis	†19.00-19.50

STEEL RAILS, SHORT

Birmingham	16.50
Buffalo	22.50-23.00
Chicago (3 ft.)	20.50-21.00
Chicago (2 ft.)	21.00-21.50
Cincinnati, dealers.	20.50-21.00
Detroit	†21.00-21.50
Pitts., 3 ft. and less	23.50-24.00
St. L., 2 ft. & less	†19.00-19.50

STEEL RAILS, SCRAP

Birmingham	16.00
Boston district	†14.50-15.00
Buffalo	19.00-19.50
Chicago	17.50-18.00
Cleveland	20.00-20.50
Pittsburgh	20.50-21.00
St. Louis	†17.50-18.00
Seattle	18.00-18.50

PIPE AND FLUES

Chicago, net	12.50-13.00
Cincinnati, dealers.	11.50-12.00

RAILROAD GRATE BARS

Buffalo	13.00-13.50
Chicago, net	12.50-13.00
Cincinnati, dealers.	9.75-10.25
Eastern Pa.	16.00-16.50
New York	†11.00-11.50
St. Louis	†10.50-11.00

RAILROAD WROUGHT

Birmingham	14.00
Boston district	†9.50-10.00
Eastern Pa., No. 1	19.00
St. Louis, No. 1	†11.50-12.00
St, Louis, No. 2	†14.00-14.50

FORGE FLASHINGS

Boston district	†10.25-10.50
Buffalo	16.50-17.00
Cleveland	15.50-16.00
Detroit	†15.00-15.50
Pittsburgh	16.50-17.00

FORGE SCRAP

Boston district	†7.00
Chicago, heavy	20.00-20.50

LOW PHOSPHORUS

Cleveland, crops	22.50-23.00
Eastern Pa. crops	22.50-23.00
Pitts., billet, bloom, slab crops	23.50-24.00

LOW PHOS. PUNCHINGS

Buffalo	21.00-21.50
Chicago	19.50-20.00
Cleveland	19.50-20.00
Eastern Pa.	22.50-23.00
Pittsburgh	22.50-23.00
Seattle	15.00
Detroit	†17.00-17.50

RAILS FOR ROLLING
3 feet and over

Birmingham	16.50
Boston	†15.75-16.00
Chicago	21.00-21.50
New York	†16.00-16.50
Eastern Pa.	20.00-20.50
St. Louis	†19.00-19.50

STEEL CAR AXLES

Birmingham	18.00
Boston district	†17.00-17.50
Chicago, net	22.50-23.00
Eastern Pa.	23.00-23.50
St. Louis	†19.50-20.00

LOCOMOTIVE TIRES

Chicago (cut)	20.00-20.50
St. Louis, No. 1	†16.00-16.50

SHAFTING

Boston district	†17.75-18.00
New York	†18.00-18.50
Eastern Pa.	23.00-23.50
St. Louis, 1¼-3¾"	17.50-18.00

CAR WHEELS

Birmingham, iron	13.00
Boston dist., iron	†13.00-13.25
Buffalo, steel	23.00-23.50
Chicago, iron	18.50-19.00
Chicago, rolled steel	19.50-20.00
Cincin., iron, deal.	17.25-17.75
Eastern Pa., iron	20.50-21.00
Eastern Pa., steel	21.50-22.50
Pittsburgh, iron	20.00-20.50
Pittsburgh, steel	23.50-24.00
St. Louis, iron	†16.00-16.50
St. Louis, steel	†19.50-20.00

NO. 1 CAST SCRAP

Birmingham	15.50
Boston, No. 1 mach.	†16.00-16.50
N. Eng. del. No. 2	14.75-15.00
N. Eng. del. textile	18.00-18.50
Buffalo, cupola	18.50-19.00
Buffalo, mach.	20.00-20.50
Chicago, agri. net	14.00-14.50
Chicago, auto net	16.50-17.00
Chicago, railroad net	15.00-15.50
Chicago, mach. net.	15.50-16.00
Cincin., mach. deal.	17.50-18.00
Cleveland, mach.	20.50-21.00
Detroit, cupola, net.	†17.00-17.50
Eastern Pa., cupola	21.00-21.50
E. Pa., No. 2 yard	17.50-18.00
E. Pa., yard fdry.	17.50-18.00
Los Angeles	16.50-17.00
Pittsburgh, cupola	19.00-19.50
San Francisco	14.50-15.00
Seattle	12.00-14.00
St. L., agri. mach.	†17.00-17.50
St. L., No. 1 mach.	†17.50-18.00
Toronto, No. 1 mach., net dealers	18.00-18.50

HEAVY CAST

Boston dist. break.	†14.00
New England, del.	15.00-15.25
Buffalo, break	16.50-17.00
Cleveland, break, net	15.50-16.00
Detroit, auto net	†17.00-17.50
Detroit, break	†15.50-16.00
Eastern Pa.	19.50-20.00
Los Ang., auto, net.	13.00-14.00
New York break	†15.00-15.50
Pittsburgh, break	16.50-17.00

STOVE PLATE

Birmingham	10.00
Boston district	†11.00-11.50
Buffalo	14.50-15.00
Chicago, net	10.50-11.00
Cincinnati, dealers.	9.50-10.00
Detroit, net	†10.50-11.00
Eastern Pa.	16.00-16.50
New York fdry.	†11.50
St. Louis	†12.00-12.50
Toronto dealers, net	12.00

MALLEABLE

New England, del.	21.50-22.00
Buffalo	20.00-20.50
Chicago, R. R.	20.50-21.00
Cincin., agri., deal.	14.75-15.25
Cleveland, rail.	22.00-22.50
Eastern Pa., R. R.	22.00-22.50
Los Angeles	12.50
Pittsburgh, rail	23.50-24.00
St. Louis, R. R.	†17.50-18.00

Ores

Lake Superior Iron Ore

Gross ton, 51½ %
Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract.	9.00-10.00

Foreign Ore
(Asking prices only)

Cents per unit. c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mn.	19.00
North African low phos.	19.00-20.00
Spanish, No. African basic, 50 to 60%	19.00-20.00
Chinese wolframite, short ton unit, duty paid	$23.50-24.00
Scheelite, imp.	$25.00
Chrome ore, Indian, 48% gross ton, clf.	$26.00-28.00

Manganese Ore

Including war risk but not duty, cents per unit cargo lots

Caucasian, 50-52%	55.00-57.00
So. African, 50-52%	55.00-57.00
Indian, 49-50%	nom.
Brazilian, 48-52%	53.00-55.00
Cuban, 50-51%, duty free	71.20

Molybdenum

Sulphide conc., per lb., Mo. cont., mines	$0.75

—The Market Week—

Sheets, Strip

Sheet & Strip Prices, Page 120

Pittsburgh—Sheet mill operations continue to increase, estimated this week at close to 65 per cent of capacity. Releases have been heavy and deliveries are now running slightly behind. There has been fair export demand, especially for galvanized sheets. In what is normally a tapering season, galvanized sheet production is now rising and currently is at about 55 per cent. Strip mill operations are still gaining, estimated at between 45 and 50 per cent. Demand for narrower material is picking up from miscellaneous sources.

Chicago — Specifications against blanket commitments made in April continue to increase. Releases are heaviest of year in some quarters. Automotive needs continue substantial, with some releases of material for first 1941 model runs. Makers of farm equipment, refrigerators, electrical equipment, steel furniture, and household appliances are included in a wide range of present heavy users.

Boston—Releases against blanket low-priced cold strip orders are heavier, but to date there is no rush to cover. Re-rolling operations are heavier and June schedules are likely to be the highest since early in the year. It is also evident more consumers than expected failed to cover with blanket contracts during the price decline late in April, reflected in new buying which with some producers almost equals releases against contracts. As a result incoming tonnage, both new and releases against commitments, is from 70 to 75 per cent of capacity.

New York—Indications are that consumers generally will have specifications in on tonnage bought in April at concessions in time for delivery by the end of this quarter. As a matter of fact, most consumers have specifications already set up so that this can be done and as a result specifying recently, even barring the May 30 holiday influence, has been lighter than a week or ten days ago. Manufacturers of household appliance are scaling down operations seasonally and this also is a factor in the somewhat lighter specifications.

Philadelphia—Sheet rolling schedules in some directions are the highest since 1937. Automotive body and frame makers are being urged to take in as much tonnage as possible now to avoid an anticipated further rush next fall. Exports in April included 1400 tons to England.

Buffalo—With consumers building up stocks in preparation for the

national defense program, sheet and strip steel releases are in improved volume. Inquiries continue miscellaneous.

Cincinnati—Sheets and strip are being produced at better than 75 per cent of capacity, heavy specifications against low-priced sheets for delivery before June 30 continue heavy. Current buying is relatively light, a result of heavy commitments several weeks ago but a recent increase has been noted, including larger export demand. The latter is for prompt delivery. Automotive needs are dwindling to fill-in requirements. Household equipment makers are more active.

St. Louis—Shipping instructions for hot-rolled sheets and strip steel were being received this week for orders placed at the recent reduction. New business has been light, however.

Birmingham, Ala.—Relatively substantial releases in sheets are evident. Production is steady at slightly better than 80 per cent, and new bookings are in fairly good volume. Strip has shown a rather steady improvement with approach of a new cotton season.

Toronto, Ont. — Placing of several million dollars worth of motor vehicles for war needs has had a stimulating effect on sheet sales and demand is growing rapidly. Spot demand and orders for near future delivery are increasing in number with most going to United States producers. Other consumers also show more interest and heavy buying is expected for the remainder of the year.

Plates

Plate Prices, Page 120

Pittsburgh—Plate mill schedules are well filled, although operators report deliveries are reasonably close to specifications. The demand from railroad equipment builders has decreased somewhat but shipbuilding tonnage is heavy. There is additional demand from barge builders as buyers of barges press for delivery. Prices are tending toward better levels and are expected to hold.

Chicago — Orders have shown some gain and prospects for further improvement are considered good. Domestic demand has been stimulated somewhat by increased foreign needs. Prices continue to show a firmer tendency. Railroad freight car needs are in better prospect.

Boston—While plate buying is more active, orders continue mostly for less-than-car lots from miscellaneous consumers, with the aggregate tonnage unimpressive. Shipbuilding specifications are steady with indications of an increase from this direction shortly from yards at Bath, Me., and Groton, Conn. Boiler and structural shops, however, have light backlogs and are buying for current needs only.

New York—Plate buying still lags. Considerable tonnage is going into ship work but miscellaneous demand is spotty.

Philadelphia—Plate rolling schedules have been stepped up sharply, not so much as the result of demand from miscellaneous consumers, but from so-called special requirements, including navy releases and merchant ship tonnage. Private yards are speeding up production by going to a six-day week, three shifts. Tank makers and other private consumers are showing more interest in covering ahead.

San Francisco—The metropolitan water district, Los Angeles, on an inquiry for 4200 tons of welded or precast reinforced concrete pipe, purchased a portion, involving 2100 tons, from Southwest Welding & Mfg. Co., the remainder going as

precast pipe. Awards totaled 3660 tons and brought the year's aggregate to 29,323 tons, compared with 16,665 tons for the same period a year ago.

Birmingham, Ala.—Demand continues exceptionally good for plates. Shipbuilding accounts for a substantial volume, and miscellaneous demand from tank manufacturers is an important factor. Production is steady at approximately 80 per cent.

Seattle—Local shops are handicapped by labor difficulties and meanwhile are not bidding. Chicago Bridge & Iron Co. is low to Vancouver, Wash., for fabricating two tower water storage tanks. It is expected that Richfield Oil Co. will soon proceed with construction of additional storage tanks at its Seattle terminal, calling for about 5000 tons of plates.

Toronto, Ont. — Buying is developing in better volume from consumers, other than those handling war business and much is going either to warehouse operators or to United States producers. Shipbuilding demand continues at a high level, and boiler and tank builders recently have been more prominent in the market.

Plate Contracts Placed

2100 tons, welded steel pipe, metropolitan water district, Los Angeles, specification 328, to Southwest Welding & Mfg. Co., Alhambra, Calif.

420 tons, 30-inch intake pipe, Muskegon Heights, Mich., to Chicago Bridge & Iron Co., Chicago.

325 tons, large diameter pipe, Central Park and Fifth avenue, New York, to Alco Products Co., Dunkirk, N. Y., through Atlas Water Works Inc., New York, contractor.

250 tons, 72-in. welded pipe, Deer Creek dam, Provo River project, Utah, to Western Pipe & Steel Co., San Francisco.

235 tons, two deck barges, Nugent Sand Co., Louisville, Ky., to St. Louis Shipbuilding & Steel Co., St. Louis.

175 tons, two steel barges for Pickwick Landing dam, Tennessee Valley authority, Knoxville, Tenn., to Hunter Steel Co., Pittsburgh; bids May 15.

125 tons, two tanks, Humble Oil & Refining Co., Baytown, Tex., to Chicago Bridge & Iron Co., Chicago.

Unstated tonnage, four steel barges, Panama, schedule 4008, to United States Steel Export Co., Washington, $201,156, delivered.

Plate Contracts Pending

100 tons, cast iron pier plates, drum gates, Friant dam, Central Valley project, California, Lynchburg Foundry Co., Lynchburg, Va., low; bids May 16, bureau of reclamation, Denver; Arthur J. O'Leary & Son Co., Chicago, low on anchor bolts and erection trusses.

Bars

Bar Prices, Page 120

Pittsburgh — Bar markets show little change. Mill releases are somewhat larger but there has been little additional placement except in some construction work. Manufacturing specifications on nearly all grades of bars have been light, due largely to the absence of automotive buyers from the market and the decline in activity from agricultural sources. Prices are reported firm in most instances. Some shading has been rumored in cold-finished material but this has not been verified. Discussion and some dissatisfaction still holds regarding quantity extras on the bar card, but there is apparently little hope for an early solution.

Chicago — Both orders and releases are cited as heavier by some mills. Material for the government, both direct and indirect, is made up, for a large part, of bar requirements, both carbon and special analyses. Automotive needs are fairly well sustained, while farm equipment and tractor requirements continue prominent. Bar prices are notably firm.

Boston—With bar consumption, notably alloys, tending upward, demand is well maintained and in scattered instances buying is more active. Machine tool builders, aircraft shops, small tool makers and forgers are leading users and in some cases have increased specifications with mills. The same is true of secondary distributors handling a good part of specialty bar business. While there is some improvement in demand for hot-rolled carbon bars, notably since deliveries are slightly further extended by some mills, the gain has been less evident.

Carnegie-Illinois Steel Corp., Pittsburgh, has been awarded a contract for steel shaft forgings for the Boston navy yard at $46,358, delivered, under navy schedule 1509, bids May 3.

New York—Commercial bar deliveries are becoming more extended. Buying has been broadening steadily, but conservatively so far. Special steels are in relatively better demand than carbon bars, but this has been the case for some time.

Indications of growing concern as to later deliveries some consumers are inquiring for fourth quarter tonnage. Producers are not disposed to offer protection that far ahead, not knowing what their position will be at that time.

Philadelphia — Screw machine product makers are buying more actively following recent lull and government bids for arsenal and other requirements are coming out in larger volume. A number of important private consumers, who stocked up heavily several months ago are studying stocks to determine what replacements are necessary.

Buffalo—Mills are quickening production schedules in bars to fill an expanding demand. While merchant inquiries are becoming more numerous production was also aided by a mild pickup in automotive specifications. The increase in shipments is accomplished by a gain in bookings for future delivery.

Birmingham, Ala.—Some relatively heavy buying, added to backlogs, accounts for satisfactory output of bars. Manufacturers of agricultural implements are an important factor.

Pipe

Pipe Prices, Page 121

Pittsburgh — Pipe tonnage has improved slightly, shipments increasing on mechanical tubing, standard pipe and specialties. There has been little change in oil country goods, although May tonnage was ahead of April. Order backlogs are fairly good in standard pipe, as most consignees are building up stocks. Deliveries are well behind on specialties, particularly aircraft tubing. New specifications are active, and releases against tonnage placed earlier now are being received in volume.

Chicago — Steel pipe demand continues good and in some quarters has shown recent improvement. Large interests state sales to warehouses are heavier. Cast iron pipe volume remains unimpressive. Private jobs are fairly numerous but small.

Boston—Moderate upturn in building construction is stimulating demand for merchant steel pipe and buying is somewhat more active in some districts, notably Connecticut. Cast pipe purchases have slackened, most blanket contracts having been placed with releases fair.

Birmingham, Ala.—Demand for cast iron pipe remains consistent, due mainly to scattered business, largely from municipal sources. Plants are enabled to maintain the four and five day week.

San Francisco—Only one cast iron pipe award of size was reported, United States Pipe & Foundry Co. taking 274 tons of 6 to 14-inch pipe for Alhambra, Wash. Awards for the week aggregated 449 tons, bringing the total to date to 14,547 tons

as compared with 11,254 tons for the corresponding period in 1939.

Seattle — Demand for cast iron pipe is small. Only business pending consists of 200 tons 2 to 6-inch for a water district at Portland, Oreg. Wolf Creek district, Portland, received tenders May 27 for furnishing 12 miles of 2, 3 and 4-inch steel water pipe and accessories, $85,287, WPA funds available. Yoncalla, Oreg. at a special election approved a $30,000 bond issue to finance system improvements including six miles of pipe.

Toronto, Ont. — Demand for merchant bars is gaining steadily and while Canadian mills have not been specially pushed they report better forward contracts with booking now turning into third quarter.

Cast Pipe Placed

500 tons, various sizes, two sections, grade crossing, Long Island railroad, Brooklyn, to United States Pipe & Foundry Co., Burlington, N. J., Poirier & McLane Corp., New York, contractor.

274 tons, 6 to 14-in. pipe, Alhambra, Calif., to United States Pipe & Foundry Co., Burlington, N. J.

150 tons, 8-inch, Yonkers, N. Y., to Donaldson Iron Works, Emaus, Pa.

110 tons, 8-inch cement-lined, Panama, schedule 4022, to Lynchburg Foundry Co., Lynchburg, Va.

Cast Pipe Pending

13,280 tons, 4 to 20-inch, cement lined, yard stocks, New York, low being: United States Pipe & Foundry Co., Burlington, N. J., 4280 tons; Warren Foundry & Pipe Co., Phillipsburg, N. J., 1300 tons; R. D. Wood Co., Florence, N. J., 3600 tons, and Donaldson Iron Works, Emaus, Pa., 1300 tons.

Wire

Wire Prices, Page 121

Pittsburgh—Wire makers have been able to make deliveries on schedule, but export demand is growing and domestic markets look better and there is good possibility that a jam may develop later this year. Merchant items are moving better with prices reportedly firm.

Chicago — Demand is well sustained and has even shown recent expansion, though heavier buying still is awaited by producing interests. Farm implement needs have been well maintained, while automotive tonnage is reasonably satisfactory.

Boston—Demand for wire specialties has broadened and with some producers incoming volume is ahead of current shipments. Finishing mill operations are being advanced, but although more orders for wire rods are appearing, production schedules on semifinished have not advanced materially for the district as a whole. This is due in part to substantial inventories at mills. Some improvement is noted in buying of spring wire and maritime demand for rope is maintained.

New York—Steady improvement in wire buying continues with a broadening demand for specialties. Orders for products normally involving Swedish steel are heavier, consumers fearing a shortage, although domestic material is being satisfactorily utilized. Demand for wire rods is stronger and spring wire is more active than a month ago.

Birmingham, Ala.—Wire products, including virtually all specifications, are reasonably active. Nails and fencing are in consistently good demand, and merchant wire is moving in satisfactory volume.

Semifinished Steel

Semifinished Prices, Page 121

Pittsburgh — Semifinished steel shipments continued to gain, both in the export market and to nonin-

tegrated producers. There is every indication that stocks are being built up at all points since it is certain that heaviest demand will be placed on semifinished divisions both for defense and for aid to the Allies. Releases are much larger now than at any time previously this year.

Rails, Cars

Track Material Prices, Page 121

Railroad buying continues light though additional locomotives are being placed. Missouri Pacific has allocated six diesel-electric to three builders. Denver & Rio Grande Western has closed on its inquiry for 500 box cars, which were awarded to Pressed Steel Car Co., Pittsburgh.

Relatively few cars or locomotives remain on inquiry and no definite programs are under way for any considerable number. No rail inquiries have been formulated but steelmakers believe buying may be started earlier this year because of imminent crowding on mill books by export and domestic rearmament requirements.

Car Orders Placed

Denver & Rio Grande Western, 500 box cars, to Pressed Steel Car Co., Pittsburgh.

Milwaukee Electric Railways, 55 trolley coaches to Pullman-Standard Car Mfg. Co., Worcester, Mass., plant.

Tennseess Coal, Iron & Railroad Co., sixteen 70-ton air dump cars, to Pressed Steel Car Co., Pittsburgh.

United Electric Railway, Providence, R. I., 22 trolley coaches to Pullman-Standard Car Mfg. Co., Worcester, Mass., plant.

Locomotives Placed

Missouri Pacific, six diesel-electric switchers; two each of 660 horsepower to American Locomotive Co., New York and Baldwin Locomotive Works, Philadelphia and one 660-horsepower and 1000-horsepower to Electro-Motive Corp., La Grange, Ill.

Car Orders Pending

Canadian Pacific, 25 passenger coach frames, interior to be built at company's Montreal, Que., shops.

Tin Plate

Tin Plate Prices, Page 120

Pittsburgh — Tin mill operations continue to climb and it now seems probable that additional mills will be required. Demand on current output has been heavy and currently operating mills are being pushed to the limit. Operations at the close of last week were close to 75 per cent, up four points from the preceding week. Markets are good both here and abroad, with export demand growing.

Shapes

Structural Shape Prices, Page 120

New York—Two additional sections of the Long Island railroad grade crossing program in Brooklyn will be bid about June 20, approximately 5500 tons. Awards for private construction continue to mount, including 2250 tons for an insurance building at Hartford, Conn., and a high school in Queens will take 2500 tons. Active bridge tonnage pending in this district approximates 5000 tons.

April fabricated steel bookings totaled 63,506 tons, against 128,321 tons in March and 118,309 tons in April, 1939, according to reports to the American Institute of Steel Construction, New York. April shipments of 110,919 tons compare with 95,915 tons in March and 120,943 tons in April, 1939.

Pittsburgh — Private construction is still actively taking structural steel. Housing, service companies and theaters also are contributing to the best market. Public works tonnages are smaller. Government projects under way for some time are still taking steel and a fair tonnage has gone toward completion of the army and navy expansion program. With defense measures now pending, tremendous new tonnage demands will be made both on plate and shape mills.

Boston—Structural steel contracts are heavier, approximating 3500 tons, including 1750 tons for aircraft shop additions, East Hartford, Conn., placed with a Detroit fabricator, and close to 1500 tons for

Shape Awards Compared

	Tons
Week ended June 1	24,692
Week ended May 25	20,234
Week ended May 18	22,911
This week, 1939	48,113
Weekly average, year, 1940	18,177
Weekly average, 1939	22,411
Weekly average, April	10,851
Total to date, 1939	513,720
Total to date, 1940	399,903

Includes awards of 100 tons or more.

bridges, Vermont and Massachusetts. Relatively little of this tonnage has been booked by New England shops, the latter being engaged mostly on small miscellaneous work with light backlogs. Industrial expansion, taking moderate tonnages as a rule, are being developed more encouragingly.

Buffalo—With large jobs scarce, interest in the structural steel market continues restricted. A few small jobs, however, are helping to expand aggregate tonnage volume.

San Francisco — Movement of structural shapes is active and 7142 tons were placed. This brought the aggregate for the year to 81,389 tons as compared with 59,920 tons for the corresponding period in 1939.

Seattle — Shop operations are practically at a standstill, due to a machinists' strike affecting other crafts. Interest centers in pending award of unstated tonnage, probably 1000 tons, involved in the Boeing Aircraft plant addition, Seattle, with the Austin Co., Cleveland, general contractor. Reclamation bureau, Denver, will receive bids June 5 for structurals, floor plates, gratings and other items, Spec. 1368-D, for Coulee dam. For the same project Carnegie-Illinois Steel Corp. is low at $15,434 for Item I, $11,411 for Item 2 and Bethlehem Steel Co. low at $5250 for Item 3, involving bearing plate, rail bases and clips, tonnages unstated.

Shape Contracts Placed

2500 tons, office building, National Mutual Insurance Co., Hartford, Conn., to Bethlehem Steel Co., Bethlehem, Pa., through George A. Fuller Co., New York, contractor.

2237 tons, two extensions to building No. 16, Aluminum Co. of America, Lafayette, Ind., to Bethlehem Steel Co., Bethlehem, Pa.

1750 tons, two shop additions, Pratt & Whitney division, Niles-Bement-Pond Co., East Hartford, Conn., to R. C. Mahon Co., Detroit.

1630 tons, state highway bridge, Kettle Falls, Wash., to Pacific Car & Foundry Co., Seattle, Wash.

1500 tons, two strip mill buildings, Weirton Steel Co., Weirton, W. Va., to Truscon Steel Co., Youngstown, O.

1500 tons, Cardinal Hayes memorial high school, Bronx, to American Bridge Co., through George A. Fuller Co., contractor.

1350 tons, steel sheet and H-piles, bolts, washers and miscellaneous items, river and harbor improvement, Keweenaw waterway, Michigan, to Carnegie-Illinois Steel Corp., Pittsburgh by lot, pro. 379; bids May 15, United States engineer, Duluth.

1250 tons, truss and stringer bridge, Hoosic river, North Adams, Mass., to American Bridge Co., Pittsburgh; Carlo Bianchi & Co. Inc., Framingham, Mass., general contractor.

1211 tons, hangar, cold weather experimental station, Fairbanks, Alaska, to

Columbia Steel Co., San Francisco.

775 tons, building, National Biscuit Co., Denver, Colo., to American Bridge Co., Pittsburgh.

760 tons, Grand avenue viaduct, Kansas City, Mo., to Kansas City Structural Steel Co., Kansas City.

750 tons, plant for Leslie Salt Co., Centerville, Calif., to Herrick Iron Works, Oakland, Calif.

700 tons, construction trestle, Caddoa, Colo., to United Construction Co.

435 tons, addition, Yellow Truck & Coach Mfg. Co., Pontiac, Mich., to Whitehead & Kales Co., Detroit.

389 tons, state highway bridge, Little Rock, Ark., to J. B. Klein Iron & Foundry Co., Oklahoma City, Okla.

385 tons, bolt shop, Aluminum Company of America, Vancouver, Wash., to Bethlehem Steel Co., San Francisco.

355 tons, floating bulkhead gates, specification 1354-D, Parker dam, Earp, Calif., to American Bridge Co., Pittsburgh.

300 tons, service garage addition to Brost Motors Inc., Buffalo to Buffalo Structural Steel Co., Buffalo. Siegfried Construction Co. Buffalo, general contractor.

285 tons, bridge 5349, Hillsborough county, Florida, to Bethlehem Fabricators Inc., Bethlehem, Pa.

260 tons, building, Indianapolis, Ind., to Hugh J. Baker Co., Indianapolis.

250 tons, power house, air base, Fairbanks, Alaska, for United States government, to Midland Structural Steel Co., Cicero, Ill.

250 tons, addition, North America Aviation Corp., Los Angeles, to Bethlehem Steel Co. Los Angeles.

230 tons, bridge, section 31F, Oglesby, Ill., to Mississippi Valley Structural Steel Co., Decatur, Ill.

225 tons, bridge R-56007, Sullivan county, Pennsylvania, to Fort Pitt Bridge Works, Pittsburgh.

225 tons, transmission towers, galvanized, Columbia-Nashville line, Tennessee Valley authority, Knoxville, Tenn., to Nashville Bridge Co., Nashville; bids May 20.

215 tons, bridge X3 and B1, Dearborn, Mich., to Fort Pitt Bridge Works, Pittsburgh.

215 tons, girls' dormitories A and B. Connecticut State college, Storrs, Conn., to Connecticut Steel Erection Co., Hartford, Conn.

210 tons, station changes, Chicago Rapid Transit Co., Chicago, to Hansell-Elcock Co., Chicago.

200 tons, beam span bridge, Bremer county, Iowa, to Clinton Bridge Co., Clinton, Iowa.

180 tons, building C, medium security prison, Huttonsville, W. Va., for state, to American Bridge Co., Pittsburgh.

170 tons, bridge, Illinois Central system, Murphysboro, Ill., to American Bridge Co., Pittsburgh.

165 tons, Milwaukee county, Wisconsin, to Wisconsin Bridge & Iron Co., Milwaukee.

150 tons, substation, Public Service Electric & Gas Co., Burlington, N. J., to Lehigh Structural Steel Co., Allentown, Pa.

150 tons, bowling alley, for L. L. Leveque Co., Columbus, O., to Fort Pitt Bridge Works, Pittsburgh.

145 tons, buildings D and E, Shellmar Products Co., Mt. Vernon, O., to Mt. Vernon Bridge Co., Mt. Vernon, O.

140 tons, store building, for Henry estate, Detroit, to Whitehead & Kales Co., Detroit.

140 tons, car conditioning building, Chevrolet Motor Co., Norwood, O., to R. C. Mahon Co., Detroit.

135 tons, addition, building 17, Campbell Soup Co., Camden, N. J., to Lehigh Structural Steel Co., Allentown, Pa.

135 tons, freight depot, Seaboard Air Line, Atlanta, Ga., to Calvert Iron Works Inc., Atlanta, Ga.

135 tons, power house, cold weather experimental station, Fairbanks, Alaska, to Milwaukee Bridge Co., Milwaukee.

130 tons, overpass, Garland, Pa., for state, to Bethlehem Steel Co., Bethlehem, Pa.

130 tons, apartment in San Francisco for Ghiradelli, to Western Iron Works, San Francisco.

125 tons, H columns, two bridges at Pescadero, San Mateo county, Calif., for state, to Columbia Steel Co., San Francisco.

115 tons, bridge, section 48X3, Vermilion county, Rossville, Ill., to Milwaukee Bridge Co., Milwaukee.

105 tons, bridge, Crawford-Warren counties, Pennsylvania, to Fort Pitt Bridge Works, Pittsburgh.

100 tons, re-decking, bascule bridge, Hanover street, Baltimore, to American Bridge Co., Pittsburgh.

320 tons, state bridges FAP-180-C and D, Moreau Junction, S. Dak., to Bethlehem Steel Co., Bethlehem, Pa.

Unstated tonnage, structural steel units, sliding and rolling gates with gate lifting devices, special project No. 9, Panama, schedule 4027, to Bethlehem Steel Export Co., New York, $92,316; Bids May 8, Washington.

Shape Contracts Pending

5500 tons, sections 3 and 4, Long Island railroad, Atlantic avenue grade crossing, Brooklyn; bids June 20.

2500 tons, Woodrow Wilson high school, Queens, New York; bids June 11.

2400 tons, four store houses, naval supply depot, Oakland, Calif.; bids June 5.

2200 tons, shop building, naval air station, Jacksonville, Fla.

1800 tons, infirmary building No. 2, Deer Park, N. Y., for state.

1268 tons, piling, Caddoa Dam, Arkansas River, Colo.; bids soon.

1000 tons or more, plant addition Boeing Aircraft Co., Seattle; Austin Co., Cleveland, general contractor.

900 tons, bridge for Southern Pacific Co., Pajaro river, Chittenden, Calif.; Columbia Steel Co., San Francisco, low.

875 tons, bridge, Highland, N. Y.—Shohola township, Pennsylvania; bids to state highway department, Harrisburg, Pa., June 7.

850 tons, steel sheet piling, East River drive section, New York; bids June 4.

800 tons, racks, Calvert Distillery Co., Baltimore; Gabriel Steel Co., Detroit, low.

650 tons, buildings, Brockway Glass Co., Brockway, Pa.

500 tons, mill buildings, for Westinghouse Electric & Mfg. Co., Mansfield, O.

500 tons or more, hangar, Ladd Field, Fairbanks, Alaska; Columbia Steel Co. low.

450 tons, addition to factory, for Pratt & Whitney division, United Aircraft Corp., East Hartford, Conn.

375 tons, tunnel supports, Continental Divide tunnel, near Grand Lake, Colo.; bids June 20.

325 tons, steel parts for lock crossing access bridge, Kentucky lock; bids

June 12, Tennessee Valley authority, Knoxville, Tenn.

300 tons, foundry addition, Bullard Co., Bridgeport, Conn.; Turner Construction Co., New York, general contractor.

240 tons, buildings, for Beverly hospital, Beverly, Mass.

230 tons, national guard hangar, municipal airport, Baltimore, for state.

225 tons, tech school building, Northwestern university, Evanston, Ill., R. C. Wieboldt Co., Chicago, general contractor.

217 tons, 252-foot three-span bridge, Bennington, Vt.; Frank J. Shields Inc., Southbridge, Mass., contractor, $74,929.60; bids May 24, Montpelier, Vt.

200 tons, overpass, Gravois avenue and Missouri Pacific railway, St. Louis; new bids asked June 7.

200 tons, state bridge RC-40-25, Orange county, New York.

200 tons, building, Montgomery Ward & Co., Cumberland, Md.

180 tons, overpass, Cape May, N. J., for state.

170 tons, building, for Smith Paper Inc., Lee, Mass.

165 tons, building, for Centenary Collegiate Institute, Hackettstown, N. J.

150 tons, bachelor officers' quarters, Alaska, for United States navy.

147 tons, bridge over Verdugo wash for Glendale, Calif.; bids June 13.

140 tons, state bridges FAP-837-A, Blackhawk county, Iowa.

125 tons, administration building, airport Baltimore.

125 tons, recreation building, Loyale high school, Baltimore.

125 tons, brush factory, I. Sekin Co., Baltimore.

110 tons, alterations to building, for Pittsburgh Press Publishing Co., Pittsburgh.

100 tons, power plant addition and alterations, Decatur, Ind., bids June 6.

100 tons, central school, Ripley, N. Y.

100 tons, overpass, Luzerne county, Pennsylvania; bids to state highway department, Harrisburg, Pa., June 7.

Unstated, shapes and miscellaneous items, Coulee dam; bids to Denver, June 5.

Unstated, bearing plates, rail bases, etc., Coulee project; Carnegie-Illinois Steel Corp., and Bethlehem Steel Co., low.

Unstated, capstans for Puget Sound and Pearl Harbor navy yards; Harbor Enterprise Foundry, San Francisco, low.

Ferroalloys

Ferroalloy Prices, Page 122

New York—Ferromanganese consumers, in expectation of higher prices and higher consumption, continue to increase specifications. A stronger manganese ore market is expected to boost alloy prices, with announcements likely around the middle of June for third quarter. At present, the market is $100, duty paid, eastern seaboard.

Spiegeleisen also may be advanced, as prices on the two products usually, although not always, follow the same trend. Domestic, 19 to 21 per cent, is now $32, Palmerton, Pa., and 26 to 28 per cent, $39.50. Tungsten and chrome alloys reflect more average strength.

Behind the Scenes with STEEL

Big Chief Charlie

■ If you have a youngster at home who won't go off to bed as per schedule, save this issue of STEEL and your problem is solved. Keep it in a handy place and you'll be able to scare the living daylights out of him by threatening to have that big bad injun, Chief Fleetweld, "get him". It'll work like a charm with the kids, but anyone over ten will see at a glance that the "Chief" is no one other than his old friend, A. F. "Charlie" Davis, V. P. of Lincoln Electric Co., ardent Ohio State alumnus and football fan, editor, author and advertising man. Charlie picked up his new title down in Tulsa at the International Petroleum Expo when he was inducted ceremoniously into the Welding Forum and presented with a tomahawk and head gear of the Osage Indian tribe and herewith we present him in all his glory.

Speaking Of Production

■ We just heard a story that began last July when Butler Manufacturing Co., Kansas City, Mo., and 16 other companies received invitations to bid on 40,000 steel grain bins for the federal government, to be used in storing some 70,000,000 bushels of corn. The entire industry equipped to make such bins could only turn out 15,000 in the 90 days the government was allotting. Butler, however, located a factory at Galesburg, Ill.; took a lease contingent upon receiving the job; ordered $200,000 worth of machinery, dies, etc., on the same basis; and worked its engineering staff around the clock on designs. On August 2, Butler was awarded 20,500 of the bins, or over half. Part of the factory had to be rebuilt, concrete floors and loading docks put in. The Burlington laid several thousand feet of rails to the plant. By August 18 the plant was in operation with 342 fabricating operations and 100 major parts to each bin. Twenty-three million bolts and nuts and 22,000 tons of sheets went into the job and three 8-hour shifts a day turned out one complete bin every two minutes. On October 13, three days before expiration of the contract time, Butler shipped the last unit. And to make the story even better, all office and plant workers, for their co-operation and *esprit*, received a 10 per cent bonus.

Wrong Again

■ Engineering editor Erle Ross warns us to put on ear muffs and blinders for giving the answer last week as "the square of one equals one". To date no bombardment has begun, the class apparently realizing by now that we're to be excused on the finer points of mathematics, having meant, of course, the square root of one. All the puzzles in file are easy even for us. Know any good tough ones?

At Long Last

■ Next week pick up your copy of STEEL with bated breath; brace yourself on solid ground and open it up with a stout heart. Next week comes the announcement you've been waiting for. Details on STEEL's new service. Don't miss it!

New & Different

■ See page 61 this week for the beginning of a new and different advertising series by Hanlon-Gregory Galvanizing Co.

SHRDLU

—The Market Week—

Reinforcing

Reinforcing Bar Prices, Page 121

New York—Except for 650 tons for a housing project at Elizabeth, N. J., reinforcing bar buying is confined mostly to small lots with prices showing but slight improvement. Inquiry is not heavy, but the number of smaller projects is increasing.

Pittsburgh — Definite tendency toward better price has been noticed in some sections, although current placements are not bringing much more than 1.80c in most cases. Sellers expect the level will probably come to rest somewhere between 1.80 and 1.90c. Inquiries are fairly numerous and placements are in good volume. Unplaced material now on the market totals fairly large and export inquiry is good.

Chicago — Total tonnage pending shows a slight upward tendency, as small jobs are numerous. Producing trade remains optimistic over near-future prospects for increased business because of signs of plant expansions and improved private construction. Prices continue to show firmer tendencies.

San Francisco—Reinforcing bar awards were the heaviest for any week in May and totaled 4945 tons. This brought the aggregate to date to 63,620 tons, compared with 77,029 tons for the same period last year.

Seattle — Small tonnages feature the market although several important projects will be up for decision soon. Jobs pending include 750 for the Spokane postoffice addition, 180 tons for the Swift packing plant, Seattle, 130 tons for Washington state highway work and 300 tons for the Cottage Grove dam spillway, bids to U. S. engineer, Portland, June 14.

Reinforcing Steel Awards

855 tons, bureau of reclamation, invitation 32,801-A, New Kirk, N. Mex., to Carnegie-Illinois Steel Corp., Chicago.

650 tons, housing project, Elizabeth, N. J., to Truscon Steel Co., Youngstown, O.

400 tons, building 18, Eastman Kodak

Concrete Bars Compared

	Tons
Week ended June 1	5,137
Week ended May 25	7,899
Week ended May 18	10,647
This week, 1939	10,485
Weekly average, year, 1940	8,010
Weekly average, 1939	9,197
Weekly average, April	9,875
Total to date, 1939	229,629
Total to date, 1940	176,890

Includes awards of 100 tons or more.

Co., Rochester, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.; Ridge Construction Co., contractor.

390 tons, pumping stations, army engineers, Baltimore, to Bethlehem Steel Co., Bethlehem, Pa.; Sordoni Construction Co., contractor.

350 tons, bridge, Hoosic river, North Adams, Mass., to Carnegie-Illinois Steel Corp., Pittsburgh; Carlo Bianchi & Co., Inc., Framingham, Mass., contractor.

350 tons, store, Sears, Roebuck & Co., Cleveland, to Republic Steel Corp., Cleveland, through Paterson-Leitch Co., Cleveland. Albert M. Higley Co., contractor.

290 tons, viaduct, Grand avenue, Kansas City, Mo., to Sheffield Steel Corp., Kansas City, Mo. J. A. Tobin Construction Co., contractor.

285 tons, dam, Youghiogheny river, army engineers, Somerfield, Pa., to Bethlehem Steel Co., Bethlehem, Pa. Holmes Construction Co., contractor.

222 tons, plant for Loose-Wiles Biscuit Co., Oakland, Calif., to Herrick Iron Works, Oakland, Calif.

220 tons, highway project FAGM-438-B, Pulaski county, Arkansas, to Jones & Laughlin Steel Corp., Pittsburgh, through Arkansas Foundry Co.; Ottinger Bros., contractors.

200 tons, highway mat reinforcement, Milford, Conn., to Truscon Steel Co., Youngstown, O.; A. I. Savin Construction Co., Hartford, Conn., contractor.

200 tons, subway, Western avenue, Chicago, Santa Fe railroad, to Inland Steel Co., Chicago, through Joseph T. Ryerson & Son Inc., Chicago.

175 tons, east parking area, contract 6, Washington, to Sweets Steel Co., Williamsport, Pa.; Jeffress-Dyer Inc., contractor.

170 tons, store, Sears-Roebuck Co., Rochester, N. Y., to Truscon Steel Co., Youngstown, O.; A. Friedrich & Sons, contractors.

150 tons, store, John H. Eckhardt, Buffalo, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.; Metzger Construction Co., contractor.

130 tons, grade elimination project, Milwaukee county, Wisconsin, to Inland Steel Co., Chicago, through Joseph T. Ryerson & Son Inc., Chicago.

100 tons, school building, Chester, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

Reinforcing Steel Pending

2900 tons, store house, specification 9686, naval air base, Alameda, Calif.; general contract to Johnson, Drake & Piper, Latham Square building, Oakland, Calif., at $918,690.

2116 tons, Caddoa dam, Caddoa, Colo., army engineers, Denver; bids June 15.

1368 tons, viaduct, San Rafael, Marin county, Calif., for state; bids June 12.

950 tons, pressure conduits, contract A, army engineers, Massillon, O.

850 tons, flood control project, Chicopee, Mass.

700 tons, extensions of shipways, navy yard, Philadelphia; Duffy Construction Corp., New York, contractor. $201,785, bids May 15, Washington.

682 tons, pumping plant, Gila project, Ariz.; bids June 13.

600 tons, flood wall, section 1, Corning, N. Y.; army engineers, Binghamton, N. Y.

520 tons, for Coulee dam; bids at Denver May 29.

450 tons, overpass, Cravois avenue and Missouri Pacific railway, St. Louis; new bids asked June 7.

420 tons, McCook Field housing, Dayton, O.

340 tons, procurement invitation 5665, N. Kansas City, Kans.; bids May 31.

325 tons, housing project, Fall River, Mass.; general contract bids postponed to June 12.

325 tons, Harbor Terrace housing, Fall River, Mass.; bids June 5.

300 tons, spillway, Cottage Grove dam, Oreg.; bids to United States engineer, Portland, June 14.

292 tons, Panama Canal schedule 4067; bids May 29.

240 tons, apartment building, Indianapolis, Ind.; E. A. Carson Co., contractor.

225 tons, Wayne Hills housing, Portsmouth, O.

205 tons, flood control culverts, army engineers, Kingston, Pa.

200 tons, beef house, Armour & Co., Kansas City, Mo.

200 tons, six pumping stations, army engineers, Ironton, O.

161 tons, state highway project R-220, section 7, Pike county, Pennsylvania; bids June 7.

160 tons, shop additions, Pratt & Whitney division, United Aircraft Corp., East Hartford, Conn.

160 tons, power house, Hutsonville, Ill., for Central Illinois Public Service Co., Springfield, Ill.

160 tons, bridge, Highland, N. Y.-Shohola township, Pennsylvania; bids to state highway department, Harrisburg, Pa., June 7.

142 tons, East river bulkhead, contract 22, New York; bids June 4.

130 tons, Washington state crossings; bids in at Olympia.

130 tons, box sewer, Milwaukee.

122 tons, flood control wall, Coeur d'Alene, Idaho; bids to United States engineer, Seattle, June 20.

110 tons, relief sewers, division C and D, Sandusky, O.; bids June 12.

110 tons, grade separation, Ford and Miller roads, Detroit.

110 tons, Northwest stations, Commonwealth Edison Co., Chicago.

100 tons, bridges, route 29, section 1B and 1C, Union county, New Jersey; bids June 7.

100 tons, building, Coca Cola Co., St. Paul, Minn.

100 tons, plus 200 tons of piling, for flood control; bids to United States engineers, Louisville, Ky.

100 tons, bridge, Shawnee county, Topeka, Kans.

100 tons, overpass, Luzerne county, Pennsylvania; bids to state highway department, Harrisburg, Pa., June 7.

Pig Iron

Pig Iron Prices, Page 122

Pittsburgh—Blast furnace operations are moving up although pig iron buying has not appeared in volume. Foundry demand is fair, many melters planning to increase stocks to avert possibility of an emergency shortage. Sellers are preparing to make their margins somewhat larger and this has resulted in a larger increase than might be expected from the gain in buying.

Chicago — Buying shows further gains. Considerable tonnage has been booked and except for a small amount of spot consists entirely of third quarter material, sellers state.

Boston — With average foundry inventory of pig iron lower, accompanied by prospects of increased melt, pig iron buying is improving with several large individual purchases closed. Stronger scrap prices and depletion of stocks of foreign iron in this district are also factors stimulating demand for pig iron.

New York—Pig iron sellers here anticipate a further increase in the movement of pig iron in June, judging from the character of present specifications. Practically all sellers experienced a substantial improvement in shipments in May, and also a sharp improvement in orders.

Philadelphia—Crest of the wave of pig iron for third quarter coverage is believed to have passed last week. No price advance is believed imminent unless consumers press for tonnage too far beyond their normal requirements. Apparently most tonnage needed through September now has been entered. This included several round tonnages from non-integrated steel mills.

Buffalo—While recent buying has subsided, pig iron producers report current tonnage on books is the best since the final quarter of 1939. Merchant iron releases continue to come through in good volume with shipments for May expected to aggregate at least 10 per cent better than the June volume.

Cincinnati—Pig iron melters are contracting freely for third quarter. The buying movement shows signs of being the heaviest of the year.

St. Louis—Pig iron melters show increased interest in commitments to cover the remainder of second quarter, and some substantial tonnages have been placed. Shipments are increasing and it is expected the movement for May will show an increase of 20 to 25 per cent compared with April.

Scrap

Scrap Prices, Page 124

Pittsburgh — Prices on some grades moved up last week, although most of the market is temporarily frozen by a combination of several factors, including imminence of railroad list closings, lack of adequate supplies, small mill interest at current prices, uncertainty of the foreign situation.

Cleveland — Closing of railroad lists this week is expected to give better insight into the situation and

bidding is likely to be spirited as melters seek further supplies for enlarged production.

Chicago — Prices were unchanged last week, though an easier tone became noticeable. Sensitive to foreign developments and to a freer flow of material prices ceased their upward tendencies. Dealer-broker trading in No. 1 heavy melting steel returned to a $17 to $17.25 level, with little material moving.

Boston—Upward trend in iron and steel scrap prices continues with demand slightly heavier. For eastern Pennsylvania shipment, turnings and breakable cast are firmer, while for New England No. 1 machinery cast and stove plate show additional strength. No. 1 heavy melting steel for dock delivery, export, is now $15.50 with sellers seeking slightly better prices from brokers.

Philadelphia — Further advances have developed in steelmaking grades with No. 1 steel now $19, No. 2 $17.50 and heavy cast $19.50 to $20.

Detroit—Events abroad have increased apprehension among dealers over future trend of business, but shortage of scrap in steel mills in the face of a mounting steelmaking rate has served to carry prices higher. Practically all grades are up 50 cents a ton.

Cincinnati—Iron and steel scrap prices are higher, heavy melting steel advancing 75 cents, dealers paying $14.50 to $15.

San Francisco—Scrap prices on the Pacific coast have advanced on No. 1 and No. 2 heavy melting steel, f.o.b. cars metropolitan area, Los Angeles and San Francisco, $1 a ton and No. 1 is now being quoted at $12.50 to $13 a net ton with No. 2 at $11.50 to $12. While no new orders for material for export have been placed this year, it is reported that exporters are buying for speculation.

Warehouse

Warehouse Prices, Page 123

Pittsburgh—Warehouse operators are releasing all booked tonnages for immediate delivery and are building stocks cautiously to a higher level. Prices are strong on nearly all products.

Chicago — Business generally shows no significant trend. Some mill interests report heavier warehouse ordering of steel pipe, which has been in good demand. All warehouse products are moving in their usual proportions.

New York—Volume with most warehouses continues at a steady level with May business about equal to that of the previous month. Demand covers a broad list of products with some improvement in heavier lines.

Philadelphia — Warehouse sales have not followed the sharp upward trend in mill demand but May proved somewhat better than April. Galvanized sheets now are quoted 4.50c for 1 to 9 bundles, 4.25c for 10 to 24 and 4.00c for 25 to 49.

Cincinnati — Warehouse business continues active and broad. May tonnage was better than in April. A pickup in building materials fails to develop into other than a moderate increase. Prices are unchanged.

Buffalo—A small gain is noted in

demand for iron and steel warehouse items, but the improvement is not equal to the increase in mill operations. Some distributors, experiencing better inquiries from industries connected with munition manufacturing, report business for the month is running 10 to 15 per cent ahead of the previous month, with a substantial part of this volume going to the aircraft industry.

Nonferrous Metal Prices

	Copper										
May	Electro, del. Conn.	Lake, del. Midwest	Casting, refinery	Straits Tin, New York Spot	Straits Tin, New York Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
25	*11.25	11.50	11.00	53.00	50.00	5.00	4.85	6.00	19.00	14.00	35.00
27	*11.37½	11.50	11.12½	52.50	49.87½	5.00	4.85	6.00	19.00	14.00	35.00
28	*11.37½	11.50	11.12½	53.50	50.75	5.00	4.85	6.00	19.00	14.00	35.00
29	*11.37½	11.50	11.12½	54.00	51.50	5.00	4.85	6.00	19.00	14.00	35.00
30	Holiday										
31	11.50	11.50	11.25	55.00	52.25	5.00	4.85	6.00	19.00	14.00	35.00

*Based on sales by custom smelters; mine producers unchanged at 11.50c.

MILL PRODUCTS

F.o.b. mill base, cents per lb., except as specified. Copper brass products based on 11.50c Conn. copper

Sheets

Yellow brass (high) 18.31
Copper, hot rolled 20.12
Lead, cut to jobbers 8.25
Zinc, 100 lb. base 11.00

Tubes

High yellow brass 21.06
Seamless copper 20.62

Rods

High yellow brass 13.26
Copper, hot rolled 16.62

Anodes

Copper, untrimmed 17.37

Wire

Yellow brass (high) 18.56

OLD METALS

Nom. Dealers' Buying Prices

No. 1 Composition Red Brass

New York 6.87½-7.12½
Cleveland 8.00-8.25
Chicago 7.50-7.75
St. Louis 7.75-8.25

Heavy Copper and Wire

New York, No. 1 ..... 8.50-8.75
Cleveland, No. 1 ..... 9.00-9.25
Chicago, No. 1 ..... 8.75-9.00
St. Louis 8.75-9.25

Composition Brass Turnings

New York 6.50-6.75

Light Copper

New York 6.50-6.75
Cleveland 7.00-7.25
Chicago 6.75-7.00
St. Louis 6.75-7.00

Light Brass

Cleveland 3.50-3.75
Chicago 4.25-4.50
St. Louis 4.25-4.50

Lead

New York 4.50-4.75
Cleveland 3.90-4.15
Chicago 3.90-4.10
St. Louis 4.00-4.25

Zinc

New York 3.00-3.25
Cleveland 2.75-3.00
St. Louis 3.25-3.50

Aluminum

Misc., cast, Cleveland 8.00
Borings, Cleveland 6.50
Clips, soft, Cleveland 14.00
Misc. cast, St. Louis 7.75-8.00

SECONDARY METALS

Brass ingot, 85-5-5-5, less carloads .. 12.00
Standard No. 12 aluminum ... 14.00-14.50

Steel in Europe

Foreign Steel Prices, Page 123

London — (*By Cable*) — All steel producing plants in Great Britain are now operating continuously, seven days per week. Steel deliveries are completely controlled, the June output already being allocated. Commercial and export users are severely restricted. No changes in price are expected before the end of June. The iron ore situation is satisfactory, supplies being made up from Spain and North Africa. Tin plate production is at about 65 per cent of capacity. Exports are mainly to France. Most galvanized sheets are absorbed by domestic needs. French steel prices have been increased 5 per cent.

Iron Ore

Iron Ore Prices, Page 124

New York—Due to excessively high ocean rates, prices on most North African iron ores still available for delivery here have long since reached a point where tonnage is no longer attractive to American consumers.

Asking prices on North African low phos and basic ores now run around the equivalent of 19 to 20 cents per unit, c.i.f. Atlantic seaboard, and manganiferous approximately 19 cents. Swedish ores, as the case for the past several weeks, are not even quoted, consumers declare.

Heavy shipments are coming in from Chile and Cuba (where the leading eastern consumer has properties) and some is beginning to move again from Brazil; however, eastern buyers are turning more to the Lake ores to supplement requirements.

Foreign manganese ore prices are higher with further increases likely inasmuch as trouble in the Mediterranean apparently looms ahead. Tungsten ores likewise are strong, but reflecting little change at present.

Nonferrous Metals

New York—Europe's war again was an important factor in nonferrous metal market developments last week. Outstanding in foreign buying were purchase of 75,000 tons of ingot copper by France and closing on a major portion of a prospective 25,000-ton order by England. The Allies generally are buying copper, zinc and copper and brass products here at a rate which indicates they expect an extended war. Prin-

cipal price changes were advances of ⅛-cent in casting copper and in custom smelters' quotation on electrolytic copper.

Copper—Electrolytic copper prices stiffened on heavier demand at midweek, when sales in the domestic market reached a peak for more than three months. At the close both custom smelters and mine producers quoted 11.50c, with export 11.37½c, f.a.s. Part of active domestic demand apparently was coverage by fabricators against British and French orders for fabricated brass and copper products.

Lead — Prices were steady throughout the week at 4.85c, East St. Louis, and 5.00c, New York. Unlike zinc and copper, lead has been affected little by wartime demand. Domestic business continues fairly satisfactory, with the statistical position excellent. Stocks declined further in April to the lowest level since Jan. 1.

Zinc—Prices held on the basis of 6.00c, East St. Louis, for prime western, with the market strengthened by good domestic and foreign demand. The Allies have been active buyers of zinc, including products.

Tin — Quotations rose steadily during the week, with Straits spot closing at 55.00c, an advance of 2 cents. Demand was moderately active.

Antimony—New buying was confined to small lots, with 14.00c, New York, prevailing for American spot in cases. Chinese spot nominally was unchanged at 16.50c, duty paid, New York.

Paint Engineers Inc., Hawthorne, N. J., has recently been organized to manufacture paints and varnishes, and also serve in a consulting capacity. The new firm is headed by Robert E. Mitchell, president. The past 12 years Mr. Mitchell has been manager, paint sales division, Joseph Dixon Crucible Co.

CONSTRUCTION and ENTERPRISE

Ohio

CLEVELAND, O.—Lakeside Steel Improvement Co., 5418 Lakeside avenue, will build an addition of 12,000 square feet to allow expansion of several departments, at cost of about $25,000. Edward G. Hoefler, 5005 Euclid avenue, is architect.

CLEVELAND—Adams Engineering Co., manufacturer of machine tools, cutters and lathe tools, has removed to 1696 East 119th street to obtain larger quarters. William P. Adams is in charge.

DEFIANCE, O.—Lavoie Corp. is being reorganized to manufacture buses and commercial vehicles. Martin W. Snyder, Youngstown, O., is president. Plant may be located at Youngstown, directors now making survey of several locations.

KENTON, O.—P. K. Strong, city engineer, plans a sewage disposal plant costing $250,000. Will ask WPA grant to finance it.

LOWELLVILLE, O.—Lake Erie Limestone Co., subsidiary of Republic Steel Corp., Roy L. Leventry, district manager, is building new fluxing stone plant, with 3000 tons per day capacity. Equipment cost is about $300,000. Hunter Construction Co., Youngstown, O., is contractor.

MANSFIELD, O.—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., will build a one-story addition 70 x 360 feet and a two-story addition 80 x 80 feet, costing $250,000, and with equipmbent $500,000. Albert Kahn Inc., 345 New center building, Detroit, is architect. (Noted May 27).

WILLOUGHBY, O.—Patt Bros Co., 72 Vine street, manufacturer of noodle machines and strainers, has taken out incorporation papers to enable it to increase capital and plans additional equipment and probable plant enlargement. Sylvester, Henry and Anthony Patt and John A. Fatica are officers.

Connecticut

DANBURY, CONN.—Waterworks commissioners, city hall, F. Ward DeKlyn, chairman, is having preliminary plans drawn for a filtration system and other waterworks units, to cost about $140,000.

Metcalf & Eddy, 1300 Statler building, Boston, are engineers.

DARIEN, CONN.—Board of selectmen is planning construction of an incinerator. H. W. Taylor, 11 Park place, New York, is engineer.

NIANTIC, CONN.—Planta Engineering Corp., 9 Rockefeller plaza, New York, plans stone crushing plants at Niantic, Tylerville, Middletown and Hartford, with concrete mixing plant at the latter. Cost estimated at $650,000.

STAMFORD, CONN.—J. Haurahan, selectman, plans a sewer system and disposal plant to cost about $2,250,000. L. E. Tuttle, bureau of streets and sewage, 204 Atlantic street, is engineer.

Massachusetts

GARDNER, MASS.—Florence Stove Co., Gardner, will let contract soon for a factory addition costing $40,000. G. A. Johnson, 22 Elm street, Worcester, Mass., is engineer.

PITTSFIELD, MASS.—General Electric Co., Schenectady, N. Y., has awarded contract to J. W. Bishop Co., 109 Foster street, Worcester, Mass., for a plastics manufacturing plant here, to cost about $50,000. (Noted April 8).

QUINCY, MASS.—Bethlehem Steel Co., Bethlehem, Pa., will build a one-story boiler plant 145 x 165 feet, costing $40,000. United Engineers & Constructors Inc., 1401 Arch street, Philadelphia, are engineers.

SPRINGFIELD, MASS.—Monsanto Chemical Co. and Resinox Corp., F. G. Gronemeyer in charge, 600 Worcester street, Indian Orchard, a suburb, will build a 100 x 140-foot four-story plant costing $150,000. J. R. Worcester Co., 79 Milk street, Boston, are engineers. (Noted May 27).

New Hampshire

WINCHESTER, N. H.—Water commission, city hall, C. Walker, chairman, plans a waterworks, including steel standpipe and steel pipelines, to cost about $100,000. Whitman & Howard, 89 Broad street, Boston, are engineers.

Rhode Island

PROVIDENCE, R. I. — Narragansett Electric Co., 49 Westminster street, is building two steel oil tanks with combined capacity of 1,780,000 gallons. New England Power Co., 441 Stuart street, Boston, is engineer.

New York

ASTORIA, N. Y.—Consolidated Edison Co. of New York Inc., 4 Irving place, New York, will build four 2,000,000-gallon oil tanks at cost of $400,000. E. L. Griffith, care owner is engineer.

BUFFALO—Socony-Vacuum Oil Co. Inc., 1103 Elk street, J. A. Brown, president, plans a 165-mile six-inch pipe line from Buffalo to Syracuse, N. Y., at cost of about $700,000.

KENDALL, N. Y.—Town board plans pumping facilities and a filtration plant of waterworks, costing about $50,000.

LARCHMONT, N. Y. — Larchmont-Mamaroneck joint sewage disposal commission asks bids June 18 for a 120-ton incinerator. H. W. Taylor, 11 Park Place, New York, is engineer.

NIAGARA FALLS, N. Y.—Acheson Graphite Co., Buffalo avenue, has let contract to Walter S. Johnson Building Co., 2532 Hyde Park boulevard, Niagara Falls, for a one-story addition, 50x200 feet, costing $40,000. (Noted April 29).

ROCHESTER, N. Y.—Rochester Gas & Electric Corp.. Herman Russell, president, will install a large turbo-generator costing $755,000 to provide additional power for local industries now making expansions.

SHERIDAN, N. Y. — Republic Light, Heat & Power Co., Jackson building, Buffalo, is developing natural gas properties with wells, pipe lines, booster stations and other facilities at cost of more than $50,000.

New Jersey

BAYONNE, N. J.—Hudson Iron & Metal Co., East Thirty-third street, will build a one-story machine shop 50 x 200 feet at cost of $40,000.

Pennsylvania

EAST PROSPECT, PA.—Boro council has voted $2000 bonds for water supply.

WARREN, PA.—Royal Mfg. Co., 19 North First street, Duquesne, Pa., will build an oil refinery costing about $50,000. M. Kovaks, care owner, is engineer.

Michigan

KALAMAZOO, Mich.—American Cyanamid Co., L. R. Verdon, manager, is building two additions to its plant on Miller road, to cost about $100,000. All manufacturing and sales departments will be removed to the new plant.

LANSING, MICH.—Oldsmobile division, General Motors Corp., Detroit, C. L. McCuen, general manager, has bought properties of Ryan-Bohn Foundry Co., at Lansing, and will build an addition to house heavy stamping plant.

THREE RIVERS, MICH.—Wells Mfg. Corp., O. Ash, vice president and general manager, will build a 60 x 200-foot plant with wing 25 x 50 feet on a 10-acre site, at cost of $40,000.

Illinois

ROCK ISLAND, ILL.—Birtman Electric Co., manufacturer of washing machines, vacuum cleaners and electric irons, has awarded contract to the Austin Co., 16112 Euclid avenue, Cleveland, for design and construction of a 35,000-square foot addition to house its plating room, punch press and machine shop departments.

District of Columbia

WASHINGTON — Bureau of supplies and accounts, navy department, asks bids as follows: June 7, schedule 1739, one motor-driven toolmaker's precision lathe for Puget Sound, Wash.; schedule 1745, two motor-driven medium-duty and precision type larges for San Diego, Calif.; schedule 1783, one motor-driven universal horizontal milling machine for Sewalls Point, Va.; schedule 1802, one portable boring bar and equipment for Philadelphia; schedule 1792, one motor-driven vertical type hydraulic honing and N. J.; June 11, schedule 1778, one motor-driven vertical typehydraulic honing and lapping machine for delivery aboard vessel at owner's option; schedule 1784, one motor-driven shear and coper punch for San Diego, Calif.; schedule 1835, fifty portable electric nibblers for Philadelphia.

Tennessee

CHATTANOOGA, TENN.—Morningside Chemical Co., 202 Morningside drive, is having plans prepared by Critchfield & Law, architects and engineers, 809 Pine street, Chattanooga, for a one-story plant to cost $150,000.

West Virginia

NEWELL, W. VA.—New Castle Refractories Co., Newell, will build a one-story, 35 x 100-foot plant. Nellis Construction Co., East Liverpool, O., is general contractor. Cost is about $40,000.

Missouri

ST. LOUIS—A. Leschen & Sons Rope Co., H. J. Leschen, president, 5909 Kennerly avenue, will let contract soon for a one-story plant addition 35 x 150 feet, including traveling crane and other equipment, at cost of $40,000.

TIPTON, MO.—Co-Mo Electric Co-operative, Thomas C. Briscoe, president, has awarded contract to C. A. Hooper Co.,

Madison, Wis., at $110,000 for 149 miles rural transmission lines. A. Y. Taylor & Co., Central building, Kansas City, Mo., are engineers.

ST. LOUIS—American Stove Co., 2001 South Kingshighway boulevard, plans factory addition to cost about $300,000.

Minnesota

GLENCOE, MINN.—McLeod Power Co-operative, R. A. Fischer, project manager, is completing survey for additional rural transmission lines for which $130,000 has been set aside by REA.

WILLMAR, MINN.—Kansas Pipe Line & Gas Co. is seeking authority to build a 2300-mile pipe line through Kansas, Nebraska, the Dakotas and Minnesota to serve 102 communities. Estimated cost is $14,550,000.

Texas

FORT WORTH, TEX.—Texas Refining Co., K. Kimbell, manager, 2330 Medford court East, Fort Worth, has bought plant of J. D. Middleton, at Greenville, Tex., and will improve and enlarge at cost of about $40,000.

HOUSTON, TEX.—Reed Roller Bit Co. has let contract to Sam D. Cook for a one-story addition 92x125 feet, reinforced concrete.

North Dakota

GRAND FORKS, N. DAK.—Rue Construction Co., Bismarck, N. Dak., is low bidder on 240 miles of rural transmission lines for North Dakota Rural Electric Co-operative. M. S. Hyland, 1114 Eighth avenue North, Fargo, N. Dak., is consulting engineer.

TOWNER, N. DAK.—WPA has approved $44,865 project for extension of water and sewer systems, including mains and Imhoff tank. Kenneth McDonald is city auditor.

South Dakota

MILBANK, S. DAK.—Whetstone Valley Electric association has been incorporated with $400,000 capital and will seek loans to construct about 500 miles of rural transmission lines. Leo P. Flynn, Milbank, is attorney.

Iowa

ALGONA, IOWA—City, L. Misbach, mayor, is having plans prepared for power plant costing about $250,000. Burns & McDonnell Engineering Co., 107 West Linwood boulevard, Kansas City, Mo., is engineer. (Noted May 27).

DYERSVILLE, IOWA — City, Helen Hall, clerk, is taking bids to June 11 for a sewage disposal plant costing $35,000. E. E. Schenk, 300 Waterloo building, Waterloo, Iowa, is engineer.

JANESVILLE, IOWA — WPA has approved $27,000 grant to city, E. R. DuBois, mayor, for sewage disposal plant costing $34,000. E. E. Schenk, 214 Waterloo building, Waterloo, Iowa, is consulting engineer.

OSAGE, IOWA—Hubbard Engineering Co., 80 East Jackson boulevard, Chicago, is making survey for power and light plant for city.

Wyoming

BASIN, WYO.—Big Horn Rural Electric Co., Maurice N. Roush, superintendent, is seeking an additional loan of $100,000 from REA for 100 miles of transmission lines in Big Horn and Washakie counties.

California

BAKERSFIELD, CALIF. — McCarthy Tank & Steel Co. has been incorporated by E. R. McCarthy, Bakersfield.

LOS ANGELES—B. Brookins Aircraft Corp. has been incorporated by Walter Brookins and M. L. Brookins, Glendale, Calif. and Noah O. Brookins, Los Angeles. Ellis I. Hirschfeld, Bankers building, Los Angeles, is representative.

LOS ANGELES—Acme Steel Co., 3479 Union Pacific avenue, will build a warehouse 60x227 feet, costing $25,000.

LOS ANGELES — Anderson Knife & Mfg. Co., has been incorporated with $25,000 capital by F. W. Bahls, 639 South Spring street, and associates.

Washington

SEATTLE—Boeing Aircraft Co., P. G. Johnson, president, will increase its plant floor space immediately 75 per cent, adding 600,000 square feet, at cost of about $2,000,000. Will provide for machine and sheet metal shops, welding and jig operations, overhead cranes and other facilities.

SEATTLE—Universal Aircraft Corp. has been organized with $50,000 capital to manufacture airplane parts, by P. D. Miller, 1010 Second avenue, and associates.

WHERE-TO-BUY

A classified list of advertisers according to products. ¶Index to advertisements gives page number of any advertiser.

ABRASIVES (Blast Cleaning)
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., 61st St. and A. V. R. R., Pittsburgh, Pa.

ABRASIVE CLOTH
Abrasive Products Co., So. Braintree, Mass.

ABRASIVES (Polishing)
Abrasive Co., Tacony & Fraley Sts., Philadelphia, Pa.
Carborundum Co., The, Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

ACCUMULATORS
Elmes, Chas. F., Engineering Wks., 243 N. Morgan St., Chicago, Ill.
Farquhar, A. B., Co., Limited, 403 Duke St., York, Pa.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.

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Air Reduction Sales Co., 60 E. 42nd St., New York City.
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ACID-PROOF LININGS
Atlas Mineral Products Co. of Pa., The, Mertztown, Pa.
Cellcote Co., 750 Rockefeller Bldg., Cleveland, O.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

ACIDS (Pickling)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Ampco Metal, Inc., Dept. S-527 3830 W. Burnham St., Milwaukee, Wis.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

AIR COMPRESSORS—See COMPRESSORS (Air)

AIR CONDITIONING EQUIPMENT
Lintern Corp., The, 7960 Lorain Ave., Cleveland, O.
Peabody Engineering Corp., 580 Fifth Ave., New York City.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Worthington Pump & Machinery Corp., Harrison, N. J.

AIRLESS BLAST CLEANING EQUIPMENT
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka Ind.
Pangborn Corp., Hagerstown, Md.

ALKALI CLEANING COMPOUNDS
Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

ALLOYS—See FERROALLOYS

ANGLES, CHANNELS—See BEAMS, CHANNELS, ANGLES

ANNEALING BOXES—See BOXES (Annealing)

ANNEALING COVERS
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.

AXLES
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

BABBITT METAL
Cadman, A. W., Mfg. Co., 28th and Smallman Sts., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

BAGS (Cotton)
Ames Bag Machine Co., 1991 E. 66th St., Cleveland, O.

BALING PRESSES
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

BALL TRANSFERS
Mathews Conveyer Co., 114 Tenth St., Ellwood City, Pa.

BALLS (Brass or Bronze)
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Strom Steel Ball Co., 1850 So. 54th Ave., Cicero, Ill.

BALLS (Special Alloy Metals)
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

BALLS (Steel)
(*Also Stainless)
*Strom Steel Ball Co., 1850 So. 54th Ave., Cicero, Ill.

BANDS—See HOOPS AND BANDS

BANDS (Iron and Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

BAR BENDERS
Kardong Bros. Inc., 346 Buchanan St., Minneapolis, Minn.

BAR DRAWER AND STRAIGHTENING MACHINES
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.

BARGES (Steel)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Dravo Corp. (Engin'r'g Works Div.), Neville Island, Pittsburgh, Pa.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Maryland Dry Dock Co., Baltimore, Md.

BARRELS (Steel)
Petroleum Iron Works Co., Sharon, Pa.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

BARS (Alloy)
Ampco Metal Inc., Dept. S-527 3830 W. Burnham St., Milwaukee, Wis.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co., McKeesport, Pa.
LaSalle Steel Co., Dept. 4-A, P. O. Box 6800-A, Chicago, Ill.
Midvale Co., The Nicetown, Philadelphia, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

BARS (Brass, Bronze or Copper)
Copperweld Steel Co., Warren, O.
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
Revere Copper & Brass Co. Inc., 230 Park Ave., New York City.

BARS (Concrete Reinforcing)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., Youngstown, O.

BARS (Iron)—See IRON (Bar)

BARS (Steel)
(*Also Stainless)
*Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
*Copperweld Steel Co., Warren, O.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Weirton Steel Co., Weirton, W. Va.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., Youngstown, O.

BATTERIES (Storage)
Electric Storage Battery Co., The, 19th St. and Allegheny Ave., Philadelphia, Pa.
Graybar Electric Co., 420 Lexington Ave., New York City.

BATTERY CHARGING APPARATUS
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

BEAMS, CHANNELS, ANGLES, ETC.
(*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Inland Steel Co., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., Youngstown, O.

BEARINGS (Ball)
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
New Departure Div., General Motors Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Torrington Co., The, Torrington, Conn.

BEARINGS (Babbitt)
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.

WHERE-TO-BUY

BEARINGS (Brass, Bronze)
Ampco Metal, Inc., Dept. S-527 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 28th and Smallman Sts., Pittsburgh, Pa.
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
Lawrence Copper & Bronze, Bessemer Bldg., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.
Shoop Bronze Co., The 344-60 W. 6th Ave., Tarentum, Pa.

BEARINGS (Journal)
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Division, General Motors Sales Corp., Harrison, N. J.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Needle)
Torrington Co., The, Torrington, Conn.

BEARINGS (Non-Metallic)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.

BEARINGS (Oilless)
Rhoades, R. W., Metalline Co., 50 Third St., Long Island City, N. Y.

BEARINGS (Quill)
Bantam Bearings Corp., South Bend. Ind.

BEARINGS (Radial)
American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa.
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.
Link-Belt Co., 519 No. Holmes Ave., Indianapolis, Ind.
New Departure Div., General Motors Corp., Bristol, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St., and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roll Neck)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.
Morgan Construction Co., Worcester, Mass.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Shoop Bronze Co., The, 344-60 W. 6th Ave., Tarentum, Pa.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roller)
American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa.
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Rolling Mill)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa.
Bantam Bearings Corp., South Bend, Ind.
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.
Morgan Construction Co., Worcester, Mass.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Thrust)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Link-Belt Company, 519 No. Holmes Ave., Indianapolis, Ind.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BELTING (Chain and Link)
Baldwin-Duckworth Div., 326 Plainfield St., Springfield, Mass.
Link-Belt Co., 220 So. Belmont Ave., Indianapolis, Ind.

BELTING (Metal, Conveyor, High and Low Temperature)
Cyclone Fence Co., Waukegan, Ill.

BELTING (Rubber)
Garlock Packing Co., The, S 3-40, Palmyra, N. Y.
United States Rubber Co., 1230 Sixth Ave., New York City.

BENDING AND STRAIGHTENING MACHINES
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
Alliance Machine Co., The, Alliance, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Farquhar, A. B., Co., Limited, 403 Duke St., York, Pa.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Kardong Bros., Inc., 346 Buchanan St., Minneapolis, Minn.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.

BENZOL AND TOLUOL RECOVERY PLANTS
Koppers Co., Engineering and Construction Div., 300 Koppers Bldg., Pittsburgh, Pa.
Koppers Co., Tar & Chemical Div., 901 Koppers Bldg., Pittsburgh, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
Youngstown Sheet & Tube Co., Youngstown, O.

BILLETS (Alloys and Carbon Steel)
Alan Wood Steel Co., Conshocken, Pa.
Andrews Steel Co., The Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Firth-Sterling Steel Co., McKeesport, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Stanley Works, The, New Britain, Conn.
Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

BILLETS (Forging)
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.

BILLETS (Forging)—Con.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Copperweld Steel Co., Warren, O.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Jones and Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

BILLETS AND BLOOMS (*Also Stainless)
*Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
*Copperweld Steel Co., Warren, O.
*Firth-Sterling Steel Co., McKeesport, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., Youngstown, O.

BINS (Storage)
Petroleum Iron Works Co., Sharon, Pa.

BLAST CLEANING EQUIPMENT (Sand)
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.

BLAST FURNACE CLEANING (Gas)
Peabody Engineering Corp., 580 Fifth Ave., New York City.

BLAST FURNACE SPECIALTIES
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brassert, H. A., & Co., 310 S. Michigan Ave., Chicago, Ill.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

BLAST FURNACES—See FURNACES (Blast)

BLOCKS (Chain)
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

BLOWERS
General Electric Co., Schenectady, N. Y.
Ingersoll-Rand Co., 11 Broadway, New York City.
Sawyer Electrical Mfg. Co., 5715 Leneve St., Los Angeles, Cal.
Stewart Furnace Div., Chicago Flexible Shaft Co., 1106 So. Central Ave., Chicago, Ill.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Trufio Fan Co., 600 Mercer St., Harmony, Pa.

BLOWPIPES (Oxy-Acetylene)
Linde Air Products Co., The,

BLUE PRINTING MACHINES
Pease, C. F., Co., The, 2688 W. Irving Park Blvd., Chicago, Ill.

BLUE PRINTING SUPPLIES and EQUIPMENT
Pease, C. F., Co., The, 2688 W. Irving Park Blvd., Chicago ,Ill.

BOILER HEADS
Bethlehem Steel Co., Bethlehem, Pa.

BOILER TUBES—See TUBES (Boiler)

BOILERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Oil Well Supply Co., Dallas, Texas.

BOLT AND NUT MACHINERY
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
Landis Machine Co., Inc., Waynesboro, Pa.

BOLTS (*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

BOLTS (Carriage and Machine)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.

BOLTS (Special)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS (Stove)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Townsend Co., New Brighton, Pa.

BOLTS (Stove, Recessed Head)
American Screw Co., Providence, R. I.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., Waterbury, Conn. 30 E. 42nd St., New York City.

BOLTS (Track—See TRACK BOLTS

BOOKS
International Correspondence Schools, Box 9374, Scranton, Pa.

BORING MACHINES (Precision)
Barnes, W. F. & John, Co., 201 S. Water St., Rockford, Ill.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Heald Machine Co., Worcester, Mass.

BOXES (Annealing)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
National-Erie Corp., Erie, Pa.
Petroleum Iron Works Co., Sharon, Pa.
Union Steel Casting Co., 62nd & Butler Sts., Pittsburgh, Pa.
United Engineering & Foundry Co., First National Bank Bldg., Pittsburgh, Pa.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

BOXES, (Open Hearth Charging)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.
Petroleum Iron Works Co., Sharon, Pa.

BRAKE SHOES
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.

BRAKE LININGS
Garlock Packing Co., The, S 3-40, Palmyra, N. Y.

BRAKES (Electric)
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.

BRAKES (Press)
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.

BRICK—(Insulating)—See INSULATING BRICK

BRICK (Refractory)—See REFRACTORIES, CEMENT, ETC.

BRICK (Acid Resisting)
Keagler Brick Co., 1443 W. Market St., Steubenville, O.

BRICK (Ladle)
Globe Brick Co., The, East Liverpool, O.

BRICK (Silicon Carbide)
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.

BRIDGE CRANES (Ore and Coal Handling)—See CRANES (Bridge)

BRIDGES, BUILDINGS, VIADUCTS, STACKS, ETC.
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Belmont Iron Works, 22nd St., and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Blaw-Knox Co., Blawnox, Pa.
Columbia Steel Co., San Francisco, Calif.
Petroleum Iron Works Co., Sharon, Pa.

BROACHING CUTTERS
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

BROACHING MACHINES
Bullard Co., The, Bridgeport, Conn.
Cincinnati Milling Machine Co., & Cincinnati Grinders, Inc. Oakley Sta., Cincinnati, O.

BUCKETS (Charging)
Heltzel Steel Form & Iron Co., Warren, O.

BUCKETS (Clam Shell, Dragline Grab, Single Line)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Blaw-Knox Co., Blawnox, Pa.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.

BUCKETS (Single Hook, Automatic Dump, Automatic Single Line)
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

BUILDINGS (Steel)—See BRIDGES, BUILDINGS, ETC.

BULLDOZERS
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
Beatty Machine & Mfg. Co., 944 150th St. Hammond, Ind.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

BURNERS (Acetylene)—See TORCHES AND BURNERS

BURNERS (Automatic)
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Peabody Engineering Corp., 580 Fifth Ave., New York City.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

BURNERS (Fuel, Oil, Gas, Combination)
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Peabody Engineering Corp., 580 Fifth Ave., New York City.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Stewart Furnace Div., Chicago Flexible Shaft Co., 1106 So. Central Ave., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

BUSHINGS (Bronze)
Ampco Metal, Inc., Dept. S-527 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 28th and Smallman Sts., Pittsburgh, Pa.
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
Lawrence Copper & Bronze, Bessemer Bldg., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.
Shoop Bronze Co., The, 344-60 W. 6th Ave., Tarentum, Pa.

BUSHINGS (Jig)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

BUSHINGS (Oilless)
Rhoades, R. W., Metaline Co., 50 Third St., Long Island City, N. Y.

BY-PRODUCT PLANTS
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

CAISSONS (Pneumatic)
Dravo Corp., (Contracting Div.), Neville Island, Pittsburgh, Pa.

CALCIUM METAL AND ALLOYS
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

CAP SCREWS—See SCREWS (Cap, Set, Safety-Set)

CAR DUMPERS
Alliance Machine Co., The, Alliance, O.
Industrial Brownhoist Corp., Bay City, Mich.

CAR PULLERS and SPOTTERS
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
Link-Belt Co., 2410 W. 18th St., Chicago, Ill.

WHERE-TO-BUY

CARBIDE
Linde Air Products Co., The, 30 E. 42nd St., New York City.
National Carbide Corp., 60 E. 42nd St., New York City.

CARS (Charging)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.
Pennsylvania Engineering Works, New Castle, Pa.

CARS (Cinder Pot)
Pressed Steel Car Co., (Koppel Div.) Koppers Bldg., Pittsburgh, Pa.

CARS (Dump)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Pressed Steel Car Co., (Koppel Div.) Koppers Bldg., Pittsburgh, Pa.

CARS (Industrial and Mining)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Petroleum Iron Works Co., Sharon, Pa.
Pressed Steel Car Co., (Koppel Div.) Koppers Bldg., Pittsburgh, Pa.

CARS (Scale)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

CASTING WASHER EQUIPMENT
Pangborn Corp., Hagerstown, Md.,

CASTINGS (Acid Resisting)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
Ampco Metal, Inc., Dept. S-527 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 28th and Smallman Sts., Pittsburgh, Pa.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
International Nickel Co., Inc., The, 67 Wall St., New York City.
National Alloy Steel Co., Blawnox, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.

CASTINGS (Alloy Steel)
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Damascus Steel Casting Co., New Brighton, Pa.
Electro-Alloys Co., The, Elyria, O.
National-Erie Corp., Erie, Pa.
Ohio Steel Foundry Co., Lima, O.
Springfield, O.
Pittsburgh Rolls, Div. of Blaw-Knox Co., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Union Steel Casting Co., 62nd and Butler Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Brass, Bronze, Copper, Aluminum)
Ampco Metal, Inc., Dept. S-527 3830 W. Burnham St., Milwaukee, Wis.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Cadman, A. W., Mfg. Co., 28th and Smallman Sts., Pittsburgh, Pa.
Lawrence Copper & Bronze, Bessemer Bldg., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.
Shoop Bronze Co., The, 344-60 W. 6th Ave., Tarentum, Pa.

CASTINGS (Die)—See DIE CASTINGS

CASTINGS (Electric Steel)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Damascus Steel Casting Co., New Brighton, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
National-Erie Corp., Erie, Pa.
Reading Steel Casting Div. of American Chain & Cable Co. Inc., Reading, Pa.
West Steel Casting Co., 805 E. 70th St., Cleveland, O.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Gray Iron, Alloy, or Semi-Steel)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Canton Pattern & Mfg. Co., The, Andrews Pl. S.W., Canton, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Columbia Steel Co., San Francisco, Calif.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Oil Well Supply Co., Dallas, Texas.
Shenango Penn Mold Co., Dover, O.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

CASTINGS (Heat Resisting)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
Electro-Alloys Co., The, Elyria, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
National Alloy Steel Co., Blawnox, Pa.
Shenango Penn Mold Co., Dover, O.

CASTINGS (Malleable)
American Chain & Cable Co. Inc., Bridgeport, Conn.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Erie Malleable Iron Co., W. 12th & Cherry Sts., Erie, Pa.
Lake City Malleable Co., 5026 Lakeside Ave., Cleveland, O.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CASTINGS (Manganese Steel)
Damascus Steel Casting Co., New Brighton, Pa.

CASTINGS (Steel) (*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Damascus Steel Casting Co., New Brighton, Pa.

CASTINGS (Steel)—Con. (*Also Stainless)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
National-Erie Corp., Erie, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O.. Springfield, O.
Oil Well Supply Co., Dallas, Texas.
Pittsburgh Rolls, Div. of Blaw-Knox Co., Pittsburgh, Pa.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.
Steel Founders' Society of America, 920 Midland Bldg., Cleveland, O.
Strong Steel Fdry Co., Hertel & Norris Ave., Buffalo, N. Y.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Union Steel Casting Co., 62nd and Butler Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
West Steel Casting Co., 805 E. 70th St., Cleveland, O.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Wear Resisting)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
Shenango Penn Mold Co., Dover, O.

CASTINGS (Worm and Gear Bronze)
Ampco Metal, Inc., Dept. S-527, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 28th and Smallman Sts., Pittsburgh, Pa.

CEMENT (Acid Proof)
Atlas Mineral Products Co. of Pa., Mertztown, Pa.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

CEMENT (High Temperature)
Carborundum Co., The, Perth Amboy, N. J.
Norton Company, Worcester, Mass.

CEMENT (High Temperature Hydraulic)
Atlas Lumnite Cement Co., Dept. S3, Chrysler Bldg., New York City.

CEMENT (Refractory, High Temperature)
Johns-Manville Corp., 22 E. 40th St., New York City.

CENTRAL STATION EQUIPMENT
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

CHAIN (Conveyor and Elevator)
Baldwin Duckworth Div., 326 Plainfield St., Springfield, Mass.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 220 So. Belmont Ave., Indianapolis, Ind.

CHAIN (Draw Bench)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Malleable)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Lake City Malleable Co., 5026 Lakeside Ave., Cleveland, O.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Power Transmission)
Link-Belt Co., 220 So. Belmont Ave., Indianapolis, Ind.

CHAIN (Roller)
Baldwin Duckworth Div., 326 Plainfield St., Springfield, Mass.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Sling)
American Chain & Cable Co. Inc., Bridgeport, Conn.

CHAIN (Sprocket)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Steel-Finished Roller)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 220 So. Belmont Ave., Indianapolis, Ind.

CHAIN (Welded or Weldless)
American Chain & Cable Co. Inc., Bridgeport, Conn.

CHAIRS (Steel)
Harter Corp., The, Sturgis, Mich.

CHARGING MACHINES (Cupola)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.

CHARGING MACHINES (Open Hearth)
Morgan Engineering Co., The, Alliance, O.

CHARGING MACHINES AND MANIPULATORS (Autofloor Type)
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

CHECKER BRICK
Loftus Engineering Corp., 509 Oliver Bldg., Pittsburgh, Pa.

CHECKS (Metal)
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.

CHROME ORE
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

CHROMIUM METAL AND ALLOYS
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

CHROMIUM PLATING PROCESS
United Chromium, Inc., 51 E. 42nd St., New York City.

CHUCKING MACHINES (Multiple Spindle)
National Acme Co., The, 170 E. 131st St., Cleveland, O.

CHUCKS (Automatic Closing)
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.

CLAMPS (Drop Forged)
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

CLEANER (Floor-Oil Absorbent)
Sta-Brite Mfg. Co., 3914 So. Wabash Ave., Chicago, Ill.

CLEANING EQUIPMENT (Metal)
Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.

CLEANING SPECIALTIES
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.
Pennsylvania Salt Mfg. Co., Dept. E., Pennsalt Cleaner Div., Philadelphia, Pa.
Sta-Brite Mfg. Co., 3914 So. Wabash Ave., Chicago, Ill.

CLIPS (Packaging)
Consumer's Steel Products, 6454 E. McNichols Rd., Detroit, Mich.

CLUTCHES (Friction)
Jones, W. A., Fdry. & Mach. Co., 4437 W. Roosevelt Rd., Chicago, Ill.
Twin Disc Clutch Co., 1379 Racine Ave., Racine, Wis.

CLUTCHES (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

COAL OR COKE
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Koppers Co., Gas & Coke Div., 300 Koppers Bldg., Pittsburgh, Pa.
Koppers Coal Co., 300 Koppers Bldg., Pittsburgh, Pa.
New England Coal & Coke Co., Boston, Mass.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.

COAL OR COKE—(Con.)
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., Youngstown, O.

COAL, COKE, ORE AND ASH HANDLING MACHINERY
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Koppers Co., Engineering & Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Koppers-Rheolaveur Co., 300 Koppers Bldg., Pittsburgh, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

COILERS (Rod and Bar)
Sommerfeld Machine Co., Corey Ave., Braddock, Pa.

COKE—See COAL OR COKE

COKE OVEN MACHINERY
Alliance Machine Co., The, Alliance, O.
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.

COKE OVENS (By-Product)
Koppers Co., Engineering and Construction Div., 100 Koppers Bldg., Pittsburgh, Pa.

COLUMBIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

COMBUSTION BULBS
Norton Company, Worcester, Mass.

COMBUSTION CONTROLS
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.
Morgan Construction Co., Worcester, Mass.
Norton Company, Worcester, Mass.

COMPARATORS (Optical)
Jones & Lamson Machine Co., Springfield, Vt.

COMPENSATORS (Automatic)
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.

COMPRESSORS (Air)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
General Electric Co., Schenectady, N. Y.
Ingersoll-Rand Co., 11 Broadway, New York City.
Worthington Pump & Machinery Corp., Harrison, N. J.

CONCRETE (Heat Resistant)
Atlas Lumnite Cement Co., Dept. S3, Chrysler Bldg., New York City.

CONCRETE REINFORCING BARS—See BARS (Concrete Reinforcing)

CONDENSERS (Surface, Barometric, Multi-Jet)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Ingersoll-Rand Co., 11 Broadway, New York City.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
Worthington Pump & Machinery Corp., Harrison, N. J.

CONDUITS (Electric)
Youngstown Sheet & Tube Co., Youngstown, O.

CONDUITS (Pressure-Treated Wood)
Wood Preserving Corp., The, 300 Koppers Bldg., Pittsburgh, Pa.

CONNECTING RODS
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466 Pittsburgh, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.

CONTRACTORS—See ENGINEERS AND CONTRACTORS

CONTROL SYSTEMS (Automatic)
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

CONTROLLERS (Electric)
Allen-Bradley Co., 1320 So. Second St., Milwaukee, Wis.
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.

CONTROLS (Combustion) — See COMBUSTION CONTROLS

CONTROLS (Hydraulic)
Hydro-Power Systems, Inc., 604 Grant Bldg., Pittsburgh, Pa.

CONTROLS (Temperature)
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

CONVEYOR BELTS (High and Low Temperature)
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

CONVEYOR BELTS (Wire)
Cyclone Fence Co., Waukegan, Ill.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

CONVEYORS (Apron)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Mathews Conveyer Co., 114 Tenth St., Ellwood City, Pa.

CONVEYORS (Chain)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Mathews Conveyer Co., 114 Tenth St., Ellwood City, Pa.

CONVEYORS (Elevating)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Mathews Conveyer Co., 114 Tenth St., Ellwood City, Pa.

CONVEYORS (Overhead Trolley)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.

CONVEYORS (Roller—Power and Gravity)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Mathews Conveyer Co., 114 Tenth St., Ellwood City, Pa.

CONVEYORS (Vibratory)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

COPPER (Phosphorized)
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Revere Copper & Brass Co., Inc., 230 Park Ave., New York City.

COPPERING COMPOUND
American Chemical Paint Co., Dept. 310, Ambler, Pa.

CORRESPONDENCE COURSES
International Correspondence Schools, Box 9374, Scranton, Pa.

COTTER PINS
Hindley Mfg. Co., Valley Falls, R. I.
Hubbard, M. D., Spring Co., 413 Central Ave., Pontiac, Mich.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.

COUNTERBORES
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

COUPLERS
Hunt, C. B., & Son, Salem, O.

COUPLINGS (Flexible)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
Baldwin-Duckworth Div., 326 Plainfield St., Springfield, Mass.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.

COUPLINGS (Flexible)—Con.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
General Electric Co., Schenectady, N. Y.
Horsburgh & Scott Co., The 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.
Lovejoy Flexible Coupling Co., 4973 W. Lake St., Chicago, Ill.
Poole Fdy. & Mach. Co. Woodberry St., Baltimore, Md.
Waldron, John, Corp., New Brunswick, N. J.

COUPLINGS (Pipe)
Bethlehem Steel Co., Bethlehem, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Oil Well Supply Co., Dallas, Texas
Republic Steel Corp., Dept ST, Cleveland, O.
Youngstown Sheet & Tube Co., Youngstown, O.

CRANES, BRIDGE (Ore and Coal Handling)
Alliance Machine Co., The, Alliance, O.
Dravo Corp. (Engin'r'g Works Div.), Neville Island, Pittsburgh, Pa.
Industrial Brownhoist Corp., Bay City, Mich.

CRANES (Charging)
Alliance Machine Co., The, Alliance, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Creeper, Erection)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Ohio Locomotive Crane Co., Bucyrus, O.

CRANES (Electric)
Alliance Machine Co., The, Alliance, O.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

CRANES (Gantry)
Alliance Machine Co., The, Alliance, O.
Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Ohio Locomotive Crane Co., Bucyrus, O.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Gasoline and Diesel)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Ohio Locomotive Crane Co., Bucyrus, O.

CRANES (Hand)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
Industrial Brownhoist Corp., Bay City, Mich.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

CRANES (Jib)
Alliance Machine Co., The, Alliance, O.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Wright Mfg. Div. of American Chain & Cable Co. Inc., York, Pa.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

CRANES (Locomotive)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Ohio Locomotive Crane Co., Bucyrus, O.

CRANES (Monorail)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Traveling)
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.

CRANK SHAFTS
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Union Drawn Steel Co., Massillon, O.

CRUSHERS
American Pulverizer Co., 1539 Macklind Ave., St. Louis, Mo.

CUSHIONS (Pneumatic)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

CUTTERS (Die Sinking & End Milling)
Barber-Colman Co., 209 Loomis St., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.

CUTTERS (Gang Slitter)
Cowles Tool Co., 2086 W. 110th St., Cleveland, O.

CUTTING AND WELDING—See WELDING

CUTTING OILS—See OILS (Cutting)

CYLINDERS (Air or Hydraulic)
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hydro-Power Systems, Inc., 604 Grant Bldg. Pittsburgh, Pa.
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.

CYLINDERS (Pressure)
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

DEGREASERS
Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

DEOXIDIZERS
Vanadium Corp. of America, 420 Lexington Ave., New York City.

DIE BLOCKS
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.
Ampco Metal, Inc., Dept. S-527, 3830 W. Burnham St., Milwaukee, Wis.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Heppenstall Co., 47th and Hatfield Sts., Pittsburgh, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.,
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.

DIE HEADS
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Inc., Waynesboro, Pa.
National Acme Co., The, 170 E. 131st St., Cleveland, O.

DIE-SINKING MACHINES
Cincinnati Milling Machine Co., The, and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, O.

DIES (Cast)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.

DIES (Punching, Stamping, Blanking)
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

DIES (Steel, Embossing)
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.

DOLOMITE—FLUX AND REFRACTORIES
Basic Dolomite, Inc., Hanna Bldg., Cleveland, O.

DOORS & SHUTTERS (Steel, Fire, and Rolling)
Kinnear Mfg. Co., 1780-1800 Fields Ave., Columbus, O.

DRAFT GAGES (Indicating, Recording)
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

DRAFTING ROOM EQUIPMENT
Pease, C. F., Co., The, 2688 W Irving Park Blvd., Chicago, Ill.

DRILL HEADS (Multiple)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

DRILL RODS—See RODS (Drill)

DRILLING MACHINES (Radial)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

DRILLS (Portable—Pneumatic)
Ingersoll-Rand Co., 11 Broadway, New York City.

DRILLS (Twist)—See TWIST DRILLS

DRIVES (Chain)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

DRIVES (Cut Herringbone Gear)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Macklntosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

DRIVES (Hydraulic)
Hydro-Power Systems, Inc., 604 Grant Bldg., Pittsburgh, Pa.

DRIVES (Multi-V-Belt)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

DRIVES (Reciprocating)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

DRUMS (Steel)
Petroleum Iron Works Co., Sharon, Pa.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

DRYERS (Compressed Air)
Ruemelin Mfg. Co., 3882 N. Palmer St., Milwaukee, Wis.

DRYERS (Rotary)
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

DUST ARRESTING EQUIPMENT
Pangborn Corp., Hagerstown, Md.
Peabody Engineering Corp., 580 Fifth Ave., New York City.
Ruemelin Mfg. Co., 3882 N. Palmer St., Milwaukee, Wis.

ECONOMIC SERVICE
Brookmire Corp., 551 Fifth Ave., New York City.

ECONOMIZERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

ELECTRIC WELDING—See WELDING

ELECTRIC WIRING—See WIRE AND CABLE

ELECTRICAL EQUIPMENT
Allen-Bradley Co., 1320 So. Second St., Milwaukee, Wis.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City.

ELECTRODES (Carbon and Graphite)
National Carbon Co., W. 117th St. at Madison Ave., Cleveland, O.

ELEVATING AND CONVEYING MACHINERY—See CONVEYORS

ENGINEERS AND CONTRACTORS
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Brassert, H. A., & Co., 310 S. Michigan Ave., Chicago, Ill.
Morgan Engineering Co., The, Alliance, O.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Uhl Construction Co., 6001 Butler St., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

ENGINEERS (Consulting)
Brassert, H. A., & Co., 310 So. Michigan Ave., Chicago, Ill.
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Lindemuth, Lewis B., 134 E. 47th St., New York City.
Loftus Engineering Corp., 509 Oliver Bldg., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

ENGINES (Diesel)
Cooper-Bessemer Corp., Mt. Vernon, O.

ENGINES (Gas, Oil)
Fairbanks, Morse & Co., Dept. 96, 600 So. Michigan Ave., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York City.
Worthington Pump & Machinery Corp., Harrison, N. J.

ENGINES (Steam)
Oil Well Supply Co., Dallas, Texas.

FANS (Crane Cab)
Graybar Electric Co., 420 Lexington Ave., New York City.
Truflo Fan Co., 600 Mercer St., Harmony, Pa.

FANS (Exhaust Ventilating)
Graybar Electric Co., 420 Lexington Ave., New York City.
Sturtevant, B. F., Co. Hyde Park, Boston, Mass.
Truflo Fan Co., 600 Mercer St., Harmony, Pa.

FANS (High Temperature)
Garden City Fan Co., 332 S. Michigan Ave., Chicago, Ill.

FANS (Portable)
Graybar Electric Co., 420 Lexington Ave., New York City.
Perkins, B. F., & Son, Inc., Holyoke, Mass.
Trufio Fan Co., 600 Mercer St., Harmony, Pa.

FANS (Wall)
Graybar Electric Co., 420 Lexington Ave., New York City.
Trufio Fan Co., 600 Mercer St., Hermony, Pa.

FENCE (Chain Link)
Cyclone Fence Co., Waukegan, Ill.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.

FENCING (Wire)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

FERROALLOY (Briquets)
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

FERROALLOYS
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Electro-Metallurgical Sales Corp., 30 E. 42nd St., New York City.
International Nickel Co., Inc., The, 67 Wall St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROCHROME
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROMANGANESE
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FERROPHOSPHORUS
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FERROSILICON
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROSILICON (Aluminum)
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROTITANIUM
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROVANADIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FILES AND RASPS
Simonds Saw & Steel Co., Fitchburg, Mass.

FILING CABINETS (Blueprint, Drawing and Tracing)
Pease, C. F., The, 2688 W. Irving Park Blvd., Chicago, Ill.

FILTER CLOTH (Asbestos)
Johns-Manville Corp., 22 E. 40th St., New York City.

FIRE CLAY—See REFRACTORIES

FIRE DOORS & SHUTTERS—See DOORS & SHUTTERS

FITTINGS (Electric Steel)
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.

FLAME HARDENING
Air Reduction Sales Co., 60 E. 42nd St., New York City.
Linde Air Products Co., 30 E. 42nd St., New York City.
National-Erie Corp., Erie, Pa.

FLANGES (Welded Steel)
King Fifth Wheel Co., 5027 Beaumont Ave., Philadelphia, Pa.

FLOORING (Monolithic)
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.
Johns-Manville Corp., 22 E. 40th St., New York City.

FLOORING (Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Blaw-Knox Co., Blawnox, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc. 16th & Rockwell Sts., Chicago, Ill.
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

FLUE DUST CONDITIONERS
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

FLUE GAS ANALYZERS
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

FLUORSPAR
Hillside Fluor Spar Mines, 38 S. Dearborn St., Chicago, Ill.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FLUXES (Soldering, Welding & Tinning)
American Chemical Paint Co., Dept. 310, Ambler, Pa.

FORGING BILLETS—See BILLETS

FORGING MACHINERY
Alliance Machine Co., The, Alliance, O.
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
Erie Foundry Co., Erie, Pa.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.

FORGING ROLLS
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.

FORGINGS (Brass, Bronze, Copper)
American Brass Co., The, Waterbury, Conn.
Ampco Metal, Inc., Dept. S.-527, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.

FORGINGS (Drop) (*Also Stainless)
American Forge Div. of The American Brake Shoe & Fdry Co., 2621 So. Hoyne Ave., Chicago, Ill.
*Atlas Drop Forge Co., Lansing, Mich.
*Bethlehem Steel Co., Bethlehem, Pa.
Oil Well Supply Co., Dallas, Texas.
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

FORGINGS (Hollow Bored)
Atlas Drop Forge Co., Lansing, Mich.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.

FORGINGS (Iron and Steel) (*Also Stainless)
American Forge Div. of American Brake Shoe & Fdry. Co., The, 2621 S. Hoyne Ave., Chicago, Ill.
*Atlas Drop Forge Co., Lansing, Mich.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Oil Well Supply Co., Dallas, Texas.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.,
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

FORGINGS (Upset)
American Forge Div. of The American Brake Shoe & Fdry. Co., 2621 So. Hoyne Ave., Chicago, Ill.
Atlas Drop Forge Co., Lansing, Mich.
Bethlehem Steel Co., Bethlehem, Pa.

FROGS AND SWITCHES
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp. Pittsburgh-Chicago.

FURNACE INSULATION—See INSULATION

FURNACES (Blast)
Brassert, H. A., & Co., 310 So. Michigan Ave., Chicago, Ill.
Pennsylvania Engineering Works, New Castle, Pa.

FURNACES (Brazing)
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.

FURNACES (Electric Heating)
Ajax Electrothermic Corp., Ajax Park Trenton, N. J.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.
Pittsburgh Lectromelt Furnace Corp. P. O. Box 1257, Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

FURNACES (Electric Melting)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
General Electric Co., Schenectady, N. Y.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1257, Pittsburgh, Pa.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.

FURNACES (Forging)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., 1106 So. Central Ave., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

FURNACES (Galvanizing)
Salem Engineering Co., 714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., 1106 So. Central Ave., Chicago, Ill.

FURNACES (Gas or Oil)
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., 1106 So. Central Ave., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

FURNACES (Heat Treating, Annealing, Carburizing, Hardening, Tempering)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Carborundum Co., The, Perth Amboy, N. J.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Heltzel Steel Form & Iron Co., Warren, O.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., 1106 So. Central Ave., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Wean Engineering Co., Warren, O.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

FURNACES (Laboratory)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.

FURNACES (Non-Ferrous Melting)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.

FURNACES (Open Hearth)
Brassert, H. A., & Co., 310 S. Michigan Ave., Chicago, Ill.
Criswell, James, Co., Keenan Bldg., Pittsburgh, Pa.
Pennsylvania Engineering Works, New Castle, Pa.
Lindemuth, Lewis B., 134 E. 47th St., New York City.

FURNACES (Recuperative)
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

FURNACES (Rivet Heating)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

FURNACES (Sheet and Tin Mill)
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

FURNACES (Steel Mill)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Criswell, James, Co., Keenan Bldg., Pittsburgh, Pa.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

FURNITURE (Tubular Steel)
Harter Corp., The, Sturgis, Mich.

WHERE-TO-BUY

GAGE BLOCKS
Dearborn Gage Co., 22036 Beech St., Dearborn, Mich.

GAGES
Brown & Sharpe Mfg. Co., Providence, R. I.
Greenfield Tap & Die Corp., Greenfield, Mass.

GAGES (Draft)
Peabody Engineering Corp., 580 Fifth Ave., New York City.

GALVANIZING (Hot Dip)
Acme Galvanizing, Inc., Milwaukee, Wis.
Acme Steel & Malleable Iron Works, Buffalo, N. Y.
American Hot Dip Galvanizers Assoc., Inc., 903 American Bank Bldg., Pittsburgh, Pa.
American Tinning & Galvanizing Co., Erie, Pa.
Atlantic Steel Co., Atlanta, Ga.
Buffalo Galvanizing & Tinning Works, Inc., Buffalo, N. Y.
Cattie, Jos. P., & Bros., Gaul and Liberty Sts., Philadelphia, Pa.
Diamond Expansion Bolt Co., Inc., Garwood, N. J.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Fanner Mfg. Co., The, Cleveland, O.
John Finn Metal Works, San Francisco, Calif.
Gregory, Thomas, Galvanizing Works, Maspeth, N. Y.
Hanlon-Gregory Galvanizing Co., 5515 Butler St., Pittsburgh, Pa.
Hubbard & Co., Oakland, Calif.
Independent Galvanizing Co., Newark, N. J.
International Derrick & Equipment Co., Columbus, O.
Joslyn Co. of California, Los Angeles, Calif.
Joslyn Mfg. & Supply Co., Chicago, Ill.
Koven, L. O., & Bro., Inc., Jersey City, N. J.
Lehigh Structural Steel Co., Allentown, Pa.
Lewis Bolt & Nut Co., Minneapolis, Minn.
Missouri Rolling Mill Corp., St. Louis, Mo.
National Telephone Supply Co., The, Cleveland, O.
Riverside Foundry & Galvanizing Co., Kalamazoo, Mich.
San Francisco Galvanizing Works, San Francisco, Calif.
Sanitary Tinning Co., The, Cleveland, O.
Standard Galvanizing Co., Chicago, Ill.
Wilcox, Crittenden & Co., Inc., Middletown, Conn.
Witt Cornice Co., The, Cincinnati, O.

GALVANIZING PLANTS FOR SHEETS
Erie Foundry Co., Erie, Pa.
Wean Engineering Co., Warren, O.

GAS HOLDERS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Petroleum Iron Works Co., Sharon, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

GAS PRODUCER PLANTS
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.

GAS RECOVERY COKE OVEN AND GAS PLANTS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

GAS SCRUBBERS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Brassert, H. A., & Co., 310 So. Michigan Ave., Chicago, Ill.
Peabody Engineering Corp., 580 Fifth Ave., New York City.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

GASKETS (Asbestos, Metal or Rubber)
Garlock Packing Co., The, S 3-40, Palmyra, N. Y.
Johns-Manville Corp., 22 E. 40th St., New York City

GAUGES (Indicating and Recording)
General Electric Co., Schenectady, N. Y.

GEAR BLANKS
Ampco Metal, Inc., Dept. S-527, 3830 W. Burnham St., Milwaukee, Wis.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
King Fifth Wheel Co., 5027 Beaumont Ave., Philadelphia, Pa.
National-Erie Corp., Erie Pa.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.
Waldron, John, Corp., New Brunswick, N. J.

GEAR MACHINERY (Generating)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.

GEARS (Non-Metallic)
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.

GEARS (Steel Laminated)
Waldron, John, Corp., New Brunswick, N. J.

GEARS (Worm)
Cleveland Worm & Gear Co., 3270 E. 80th St., Cleveland, O.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

GEARS AND GEAR CUTTING
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
General Electric Co., Schenectady, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Jones, W. A., Fdry. & Mach. Co., 4437 W. Roosevelt Rd., Chicago, Ill.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Macklntosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
National-Erie Corp., Erie, Pa.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., 25th St., Pittsburgh, Pa.
United Engineering & Fdry Co., First National Bank Bldg., Pittsburgh, Pa.

GENERATING SETS
Electric Generator & Motor Co., 4519 Hamilton Ave., Cleveland, O.
Fairbanks, Morse & Co., Dept. 96, 600 So. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Reliance Electric & Eng. Co., 1081 Ivanhoe Rd., Cleveland, O.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

GENERATORS (Acetylene—Portable and Stationary)
Linde Air Products Co., The, 30 E. 42nd St., New York City.

GENERATORS (Electric)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-26.
Reliance Electric & Eng. Co., 1081 Ivanhoe Rd., Cleveland, O.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

GRABS — FOR SHEETS, COILS, INGOTS
J-B Engineering Sales Co., 1743 Orange St., New Haven, Conn.

GRATING
Blaw-Knox Co., Blawnox, Pa.
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

GREASE (Lubricating)—See LUBRICANTS (Industrial)

GREASE RETAINERS AND SEALS
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.

GRINDERS (Pedestal, High Speed)
Sawyer Electrical Mfg. Co., 5715 Leneve St., Los Angeles, Cal.

GRINDERS (Portable—Pneumatic)
Ingersoll-Rand Co., 11 Broadway, New York City.

GRINDERS (Precision Thread)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Jones & Lamson Machine Co., Springfield, Vt.

GRINDERS (Single Slide Internal)
Bryant Chucking Grinder Co., Springfield, Vt.

GRINDERS (Surface)
Brown & Sharpe Mfg. Co., Providence, R. I.
Heald Machine Co., Worcester, Mass.
Norton Company, Worcester, Mass.

GRINDING COMPOUNDS
Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.

GRINDING DISCS
Abrasive Products Co., So. Braintree, Mass.

GRINDING MACHINES (Automotive Reconditioning)
Heald Machine Co., Worcester, Mass.
Landis Tool Company, Waynesboro, Pa.

GRINDING MACHINES (Centerless, Internal and External)
Cincinnati Milling Machine Co., The, and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES (Chucking)
Cincinnati Milling Machine Co., The, and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Heald Machine Co., Worcester, Mass.
Landis Tool Company, Waynesboro, Pa.

GRINDING MACHINES (Crank Pin, Cam, Piston, Valve Face)
Cincinnati Milling Machine Co., The, and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Landis Tool Company, Waynesboro, Pa.
Norton Company, Worcester, Mass.

GRINDING MACHINES (Oscillating)
Cincinnati Milling Machine Co., The, and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Landis Tool Company, Waynesboro, Pa.

GRINDING MACHINES (Plain and Universal)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine Co., The, and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Landis Tool Company, Waynesboro, Pa.
Norton Co., Worcester, Mass.

GRINDING MACHINES (Roll)
Cincinnati Milling Machine Co., The, and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Landis Tool Co., Waynesboro, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Norton Co., Worcester, Mass.

GRINDING MACHINES (Rotary Surface)
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES (Tool and Cutter)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine Co., The, and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Kearney & Trecker Corp., 5926 National Ave., Milwaukee, Wis.
Landis Tool Co., Waynesboro, Pa.
Norton Co., Worcester, Mass.

GRINDING (Shear Knife)
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.

GRINDING WHEELS
Abrasive Co., Tacony & Fraley Sts., Philadelphia, Pa.
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

GRINDING WHEELS (Segmental)
Abrasive Co., Tacony & Fraley Sts. Fraley Sts., Philadelphia, Pa.
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Norton Company, Worcester, Mass.

GUIDE SHOES
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

GUIDES (Mill)
Ampco Metal, Inc., Dept. S-527, 3830 W. Burnham St., Milwaukee, Wis.
National-Erie Corp., Erie, Pa.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

GUNS (Blast Furnace Mud)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

GUNS (Steam, Hydraulic, Electric)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

HAMMERS (Chipping, Riveting, Calking)
Ingersoll-Rand Co., 11 Broadway, New York City.

HAMMERS (Drop)
Alliance Machine Co., The, Alliance, O.
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.

HAMMERS (Steam)
Alliance Machine Co., The, Alliance, O.
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The Alliance, O.

HANGERS
Grinnell Co., Inc., Providence, R. I.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

HANGERS (Shaft)
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Division, General Motors Sales Corp., Harrison, N. J.
New Departure Div., General Motors Corp., Bristol, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

HEADING MACHINERY
Ajax Mfg. Co., 1441 Chardon Rd., Cleveland, O.

HEATERS (Air)
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

HEATERS (Electric Space)
Cutler-Hammer, Inc., 315 No. 12th St., Milwaukee, Wis.

HEATERS (Unit)
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Grinnell Co., Inc., Providence, R. I.

HELMETS (Blast Cleaning)
Pangborn Corp., Hagerstown, Md.

HITCHINGS (Mine Car)
American Chain & Cable Co., Inc., Bridgeport, Conn.

HOBBING MACHINES
Barber-Colman Co., 209 Loomis St., Rockford, Ill.

HOBS
Barber-Colman Co., 209 Loomis St., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.

HOISTS (Chain)
Ford Chain Block Div. of American Chain & Cable Co., Inc., 2nd & Diamond Sts., Philadelphia, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

HOISTS (Electric)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Wright Mfg. Div. of American Chain & Cable Co. Inc., York, Pa.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

HOISTS (Monorail)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard-Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

HOISTS (Pneumatic)
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
Ingersoll-Rand Co., 11 Broadway, New York City.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.

HOOKS (Chain)
American Chain & Cable Co., Inc., Bridgeport, Conn.

HOOPS AND BANDS
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn.
Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

HOSE (Rubber)
Lowman-Shields Rubber Co., 209 First Ave., Pittsburgh, Pa.
United States Rubber Co., 1230 Sixth Ave., New York City.

HUMIDIFIERS (Industrial)
Grinnell Co., Inc., Providence, R. I.

HYDRAULIC MACHINERY
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Alliance Machine Co., The, Alliance, O.
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Farquhar, A. B., Co., Limited, 403 Duke St., York, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Morgan Engineering Co., The, Alliance, O.
National-Erie Corp., Erie, Pa.

HYDRAULIC PRESSES—See PRESSES (Hydraulic)

HYDRAULIC UNITS
Barnes, W. F. & John, Co., 201 So. Water St., Rockford, Ill.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Hydro-Power Systems, Inc., 604 Grant Bldg., Pittsburgh, Pa.

INDICATORS (Temperature)
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

INDICATORS (Blast Furnace Stock Line)
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

INGOT MOLDS
Bethlehem Steel Co., Bethlehem, Pa.
Shenango-Penn Mold Co., Oliver Bldg., Pittsburgh, Pa.
Valley Mould & Iron Corp., Hubbard, O.

INHIBITORS
American Chemical Paint Co., Dept. 310 Ambler, Pa.
Parkin, Wm. M., Co., The, 1005 Highland Bldg., Pittsburgh, Pa.

INJECTORS (Lead)
Dietzel Lead Burning Co., Coraopolis, Pa.

INSTRUMENTS (Electric Indicating and Recording)
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

INSULATING BLOCK
Armstrong Cork Co., 985 Concord St., Lancaster, Pa.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATING BRICK
Armstrong Cork Co., 985 Concord St., Lancaster, Pa.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATING CONCRETE
Atlas Lumnite Cement Co., Dept. 53, Chrysler Bldg., New York City.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.

INSULATING POWDER AND CEMENT
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Armstrong Cork Co., 985 Concord St., Lancaster, Pa.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.

INSULATION (Building)
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.

INSULATION (Furnace, Boiler Settings, Ovens, Steam Pipe, Etc.)
Armstrong Cork Co., 985 Concord St., Lancaster, Pa.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.

IRON (Bar)
Ryerson, Jos. T., & Son Co., 16th & Rockwell Sts., Chicago, Ill.

IRON ORE
Alan Wood Steel Co., Conshohocken, Pa.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The, Youngstown, O.

JIGS AND FIXTURES
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.

KETTLES (Galvanizing)
Petroleum Iron Works Co., Sharon, Pa.

KEYS (Machine or Woodruff)
Moltrup Steel Products Co., Beaver Falls, Pa.

KNIVES
American Shear Knife Co., 3rd and Ann Sts., Homestead, Pa.
Cowles Tool Co., 2086 W. 110th St., Cleveland, O.

LABORATORY WARE
Norton Company, Worcester, Mass.

LADLES
Hollands Mfg. Co., 342-352 E. 18th St., Erie, Pa.
Pennsylvania Engineering Works, New Castle, Pa.
Petroleum Iron Works Co., Sharon, Pa.

LAMPS (Industrial)
General Electric Co., Dept. 8-E, Nela Park, Cleveland, O.

LAPPING MACHINES
Cincinnati Milling Machine Co., The, and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Norton Company, Worcester, Mass.

LARRIES (Coal)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

LATHE DOGS (Drop Forged)
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

LATHES
Jones & Lamson Machine Co., Springfield, Vt.
LeBlond, R. K., Machine Tool Co., Dept. J-11, 2694 Madison Rd., Cincinnati, O.
South Bend Lathe Works, 856 E. Madison St., South Bend, Ind.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LATHES (Automatic)
Brown & Sharpe Mfg. Co., Providence, R. I.
Jones & Lamson Machine Co., Springfield, Vt.

LATHES (Engine)
Sommerfeld Machine Co., Braddock, Pa.

LATHES (Roll Turning)
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Lewis Fdry. & Mach. Co., P. O. Box 1586, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LATHES (Turret)
Brown & Sharpe Mfg. Co., Providence, R. I.
Bullard Company, The, Bridgeport, Conn.
Jones & Lamson Machine Co., Springfield, Vt.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LEAD (Chemical, Corroding, Desilvered)
St. Joseph Lead Co., 250 Park Ave., New York City.

LEAD (Tellurium)
National Lead Co., 111 Broadway, New York City.

LEAD WORK
Dietzel Lead Burning Co., Coraopolis, Pa.

LEVELING MACHINES
Erie Foundry Co., Erie, Pa.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
McKay Machine Co., Youngstown, O.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

LIFT TRUCKS—See TRUCKS (Lift)

LIFTERS (Rubber, Vacuum)
Lowman-Shields Rubber Co., 209 First Ave., Pittsburgh, Pa.

LIFTING MAGNETS—See MAGNETS (Lifting)

LIGHTING (Industrial)
General Electric Co., Dept. 8-E, Nela Park, Cleveland, O.
Graybar Electric Co., 420 Lexington Ave., New York City.

LINERS (Pump and Cylinder)
Shenango-Penn Mold Co., Dover, O.

LOCOMOTIVE CRANES—See CRANES (Locomotive)

LOCOMOTIVES (Diesel-Electric)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Plymouth Locomotive Works, Div. Fate-Root-Heath Co., Plymouth, O.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Diesel Mechanical)
Plymouth Locomotive Works, Div. Fate-Root-Heath Co., Plymouth, O.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Electric Trolley)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Gasoline-Electric)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Gasoline Mechanical)
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Oil-Electric)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Ingersoll-Rand Co., 11 Broadway, New York City.

LOCOMOTIVES (Storage Battery)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

LUBRICANTS (Industrial)
American Lanolin Corp., Railroad St., Lawrence, Mass.
Gulf Oil Corp. of Penna., Gulf Refining Co., 3813 Gulf Bldg., Pittsburgh, Pa.
New York & New Jersey Lubricant Co., 292 Madison Ave., New York City.
Penola, Inc., 34th & Smallman Sts., Pittsburgh, Pa.
Pure Oil Co., The, 35 E. Wacker Dr., Chicago, Ill.
Shell Oil Co., Inc., 50 W. 50th St., New York City.
Socony Vacuum Oil Co., Inc., 26 Broadway, New York City.
Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.
Tide Water Associated Oil Co., 17 Battery Place, New York City.

LUBRICATING SYSTEMS
Farval Corp., The, 3270 E. 80th St., Cleveland, O.

MACHINE WORK
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.

MACHINERY (Second Hand)
Emerman, Louis E., & Co., 1760 Elston Ave., Chicago, Ill.
Marr-Galbreath Machinery Co., 53 Water St., Pittsburgh, Pa.
West Penn Machinery Co., 1208 House Bldg., Pittsburgh, Pa.

MACHINERY (Special)
Alliance Machine Co., The, Alliance, O.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Barnes, W. F. & John, Co., 201 So. Water St., Rockford, Ill.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Bliss, E. W. Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Farquhar, A. B., Co., Limited, 403 Duke St., York, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National-Erie Corp., Erie, Pa.
National Roll & Fdry. Co., The, Avonmore, Pa.
Niagara Machine & Tool Works, 637 Northland Ave., Buffalo, N. Y.
Oil Well Supply Co., Dallas, Texas.
Shuster, F. B., Co., The, New Haven, Conn.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

MAGNESIA (Electrically Fused)
Norton Co., Worcester, Mass.

MAGNETIC SEPARATORS—See SEPARATORS (Magnetic)

MAGNETS (Lifting)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

MAGNETS (Separating)
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

MANGANESE METAL AND ALLOYS
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

MANGANESE ORE
Samuel, Frank, & Co., Inc., The, Harrison Bldg., Philadelphia, Pa.

MANIPULATORS
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.

MANIPULATORS (Forging)
Alliance Machine Co., The, Alliance, O.

MARKING DEVICES
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.
Helmer-Staley, Inc., 321 W. Huron St., Chicago, Ill.

METAL (Perforated)—See PERFORATED METAL

METAL BLAST ABRASIVES (Shot and Grit)
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., 61st St. and A. V. R. R., Pittsburgh, Pa.

METAL CLEANERS
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

METAL FINISHES
American Nickeloid Co., 1310 Second St., Peru, Ill.

METAL SPECIALTIES AND PARTS—See STAMPINGS

METAL STAMPINGS—See STAMPINGS

METALS (Nonferrous)
International Nickel Co., Inc., The, 67 Wall St., New York City.

MICROMETERS
Brown & Sharpe Mfg. Co., Providence, R. I.

MILLING CUTTERS
Barber Colman Co., 209 Loomis St., Rockford, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

MILLING MACHINES
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine Co., The, and Cincinnati Grinders Inc., Oakley Sta., Cincinnati, O.
Kearney & Trecker Corp., 5926 National Ave., Milwaukee, Wis.

MILLING MACHINES (Milling and Centering Combined)
Jones & Lamson Machine Co., Springfield, Vt.

MILLS (Blooming, Universal, Plate, Sheet, Tin, Bar, Strip, Etc.)—See ROLLING MILL EQUIPMENT

MOLDS (Ingot)—See INGOT MOLDS

MOLYBDENUM
Climax Molybdenum Co., 500 Fifth Ave., New York City.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

MONEL METAL (All Commercial Forms)
International Nickel Co., Inc., The, 67 Wall St., New York City.

MONORAIL SYSTEMS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

MOTORS (Electric)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Fairbanks, Morse & Co., Dept. 96, 600 So. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-26.
Reliance Electric & Eng. Co., 1081 Ivanhoe Rd., Cleveland, O.
Sawyer Electrical Mfg. Co., 5715 Leneve St., Los Angeles, Cal.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

MUCK BAR
Samuel, Frank, & Co., Inc., The, Harrison Bldg., Philadelphia, Pa.

NAILS
(*Also Stainless)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.

NAILS—Con.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
*Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

NAILS (Coated and Galvanized)
Wickwire Brothers, 189 Main St., Cortland, N. Y.

NAILS (Special Only—All Metals)
Townsend Co., New Brighton, Pa.

NICKEL (All Commercial Forms)
International Nickel Co., Inc., The, 67 Wall St., New York City.

NICKEL (Shot)
International Nickel Co., Inc., The, 67 Wall St., New York City.

NICKEL STEEL (Cold Drawn)
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Republic Steel Co., Dept. ST, Cleveland, O.
Union Drawn Steel Co., Massillon, O.

NOZZLES (Blasting)
Pangborn Corporation, Hagerstown, Md.

NOZZLES (Descaling)
Aldrich Pump Co., The, Allentown, Pa.

NUTS
(*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Elastic Stop Nut Corp., 1001-S Newark Ave., Elizabeth, N. J.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Tinnerman Products, Inc., 2039 Fulton Rd., Cleveland, O.

NUTS (Castellated)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS (Machine Screw)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.

NUTS (Self Locking)
Elastic Stop Nut Corp., 1001-S Newark Ave., Elizabeth, N. J.

NUTS (Semi-Finished)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS (Wing)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Parker-Kalon Corp., 194-200 Varick St., New York City.

OIL RETAINERS AND SEALS
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.
Garlock Packing Co., The, S 3-40, Palmyra, N. Y.

OILS (CUTTING)
Gulf Oil Corp. of Penna., Gulf Refining Co., 3813 Gulf Bldg., Pittsburgh, Pa.
Penola, Inc., 34th & Smallman Sts., Pittsburgh, Pa.
Pure Oil Co., The, 35 E. Wacker Dr., Chicago, Ill.
Shell Oil Co., Inc., 50 W. 50th St., New York City.
Socony-Vacuum Oil Co., Inc., 26 Broadway, New York City.
Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.
Tide Water Associated Oil Co., 17 Battery Place, New York City.

OILS (Lubricating)—See LUBRICANTS (Industrial)

OILS (Rust Preventive)
American Chemical Paint Co., Dept. 310, Ambler, Pa.

OPEN-HEARTH FURNACES—See FURNACES (Open-Hearth)

OVENS (Annealing, Japanning, Tempering)
Hagan, Geo. J., Co., 2400 E. Car-2200 W. Lake St., Chicago, Ill.
Stewart Furnace Div., Chicago Flexible Shaft Co., 1106 So. Central Ave., Chicago, Ill.

OVENS (Coke, By-Product Recovery)
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

OVENS (Core and Mold)
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.

OXY-ACETYLENE WELDING AND CUTTING—See WELDING

OXYGEN IN CYLINDERS
Air Reduction Sales Co., 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.

PACKING (Asbestos or Rubber)
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.
Garlock Packing Co., The, S 3-40, Palmyra, N. Y.
Johns-Manville Corp., 22 E. 40th St., New York City.
United States Rubber Co., 1230 Sixth Ave., New York City.

PACKINGS—MECHANICAL LEATHER (Cup, U-Cup, Flange and Vees)
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.
Garlock Packing Co., The, S 3-40, Palmyra, N. Y.

PAINT (Alkali Resisting)
Pennsylvania Salt Mfg. Co., Dept E, Pennsalt Cleaner Div., Philadelphia, Pa.

PAINT (Aluminum)
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

PAINT (Heat Resisting)
American Chemical Paint Co., Dept. 310, Ambler, Pa.

PAINT (Industrial)
Carey, Philip Co., The, Dept. 71, Lockland, Cincinnati, O.

PAINT (Marking)
Helmer-Staley, Inc., 321 W. Huron St., Chicago, Ill.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

PAINT (Rust Preventive)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Koppers Co., Tar & Chemical Div., 100 Koppers Bldg., Pittsburgh, Pa.

PAINT (Stick Form)
Helmer-Staley, Inc., 321 W. Huron St., Chicago, Ill.

PARTS (Precision)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

PERFORATED METAL
Chicago Perforating Co., 2443 W. 24th Pl., Chicago, Ill.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

PHENOL RECOVERY PLANTS
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

PICKLING COMPOUND
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Parkin, Wm. M., Co., The, 1005 Highland Bldg., Pittsburgh, Pa.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

PICKLING CRATES
Youngstown Welding & Engineering Co., The, Youngstown, O.

PICKLING EQUIPMENT
International Nickel Co., Inc., The, 67 Wall St., New York City.
Youngstown Welding & Engineering Co., The, Youngstown, O.

PICKLING MACHINERY
Erie Foundry Co., Erie, Pa.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

PICKLING TANK LININGS
Atlas Mineral Products Co., of Pa., Mertztown, Pa.
Cellcote Co., 750 Rockefeller Bldg., Cleveland, O.
Keagler Brick Co., 1443 W. Market St., Steubenville, O.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

PICKLING TANKS—See TANKS (Pickling)

PIERCER POINTS
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

PIG IRON
Alan Wood Steel Co., Conshohocken, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Brooke, E. & G., Iron Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Jackson Iron & Steel Co., Jackson, O.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Samuel, Frank & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

PILING (Iron and Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 South Dearborn St., Chicago, Ill.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Co., Dept. ST, Cleveland, O.

PILING (Pressure-Treated Wood)
Wood Preserving Corp., The, 300 Koppers Bldg., Pittsburgh, Pa.

PILLOW BLOCKS (Roller Bearing)
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.

PILLOW BOXES
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

PINS (Clevis)
Townsend Co., New Brighton, Pa.

PINIONS (Mill)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
National-Erie Corp., Erie, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.
United Engineering & Foundry Co., First National Bank Bldg., Pittsburgh, Pa.

PINS (Taper)
Moltrup Steel Products Co., Beaver Falls, Pa.

PIPE (Brass, Bronze, Copper)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Shenango-Penn Mold Co., Dover, O.

PIPE (Square and Rectangular)
Youngstown Sheet & Tube Co., The, Youngstown, O.

PIPE (Steel)
American Rolling Mill Co., The, 1770 Curtis St., Middletown, O.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PIPE BALLS
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

PIPE BENDING
Crane Co., 836 So. Michigan Ave., Chicago, Ill.

PIPE CUTTING AND THREADING MACHINERY
Landis Machine Co., Inc., Waynesboro, Pa.

PIPE FITTINGS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Grinnell Co., Inc., Providence, R. I.
Hydro-Power Systems, Inc., 604 Grant Bldg., Pittsburgh, Pa.
Oil Well Supply Co., Dallas, Texas.
Worthington Pump & Machy. Corp., Harrison, N. J.

PIPE LINES (Riveted and Welded)
Bethlehem Steel Co., Bethlehem, Pa.
Petroleum Iron Works Co., Sharon, Pa.

PIPE MILL MACHINERY
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PIPE STRAIGHTENING MACHINERY
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PIPE TOOLS
Greenfield Tap & Die Corp., Greenfield, Mass.
Hollands Mfg. Co., 342-352 E. 18th St., Erie, Pa.

PIPING CONTRACTORS
Grinnell Co., Inc., Providence, R. I.
Power Piping Co., Beaver and Western Ave., Pittsburgh, Pa.

PISTON RINGS
American Hammered Piston Ring Div., Koppers Co., Baltimore, Md.

WHERE-TO-BUY

PISTON RODS
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Heppenstall Co., 47th and Hatfield Sts., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.
Union Drawn Steel Co., Massillon, O.

PLANERS AND SHAPERS
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

PLANTS (Industrial)
Frank B. Foster, 829 Oliver Bldg., Pittsburgh, Pa.

PLATE CASTORS
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.

PLATES (Sheared or Universal) (*Also Stainless)
*Alan Wood Steel Co., Conshohocken, Pa.
*American Rolling Mill Co., The, 1770 Curtis St., Middletown, O.
*Bethlehem Steel Co., Bethlehem, Pa.
*Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Worth Steel Co., Claymont, Del.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PLATES (Stainless Clad)
*Granite City Steel Co., Granite City, Ill.

PLATES (Steel—Floor)—See FLOORING (Steel)

PLATES (Terne and Tin)—See TIN PLATE

PLUGS (Expansion)
Hubbard, M. D., Spring Co., 413 Central Ave., Pontiac, Mich.

PLUGS (Rolling Mill)
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

POLES (Tubular Steel)
National Tube Co., Frick Bldg., Pittsburgh, Pa.

POLISHING MACHINERY (Tube and Bar)
Medart Co., The, 3520 de Kalb St., St. Louis, Mo.

POTS (Case Hardening)
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

POTS (Melting)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hollands Mfg. Co., 342-352 E. 18th St., Erie, Pa.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.

POWER UNITS (Hydraulic)
Hydro-Power Systems, Inc., 604 Grant Bldg., Pittsburgh, Pa.

PREHEATERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

PRESSED METAL PARTS
American Forge Div. of American Brake Shoe & Fdry. Co., The, 2621 S. Hoyne Ave., Chicago, Ill.
Stanley Works, The, Pressed Metal Div., New Britain, Conn.

PRESSES
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Farquhar, A. B., Co., Limited, 403 Duke St., York, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Streine Tool & Mfg. Co., New Bremen, O.
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.

PRESSES (Bending)
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Extrusion)
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.

PRESSES (Forging)
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
Erie Foundry Co., Erie, Pa.
Farquhar, A. B., Co., Limited, 403 Duke St., York, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PRESSES (Forming and Braking)
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Farquhar, A. B., Co., Limited, 403 Duke St., York, Pa.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Hydraulic)
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
Chambersburg Engineering Co., Chambersburg, Pa.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Farquhar, A. B., Co., Limited, 403 Duke St., York, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National-Erie Corp., Erie, Pa.

PRESSES (Pneumatic)
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

PRESSES (Punching, Drawing, Coining, Blanking, etc.)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Farquhar, A. B., Co., Limited, 403 Duke St., York, Pa.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Riveting)
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

PRESSES (Scrap Bundling and Baling)
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

PRESSES (Stamping)
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Welding)—See WELDERS

PRESSURE VESSELS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

PRODUCER GAS SYSTEMS—See GAS PRODUCER PLANTS

PUG MILLS (For Blast Furnaces and Sintering Plants)
Bailey, Wm. M., Co., 702 Magee Bdlg., Pittsburgh, Pa.

PULLEYS (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

PULVERIZERS
American Pulverizer Co., 1539 Macklind Ave., St. Louis, Mo.

PUMP HOUSES
Dravo Corp. (Contracting Div.), Neville Island, Pittsburgh, Pa.

PUMPS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Oil Well Supply Co., Dallas, Texas.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Boiler Feed)
Aldrich Pump Co., The, Allentown, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Centrifugal)
Aldrich Pump Co., The, Allentown, Pa.
Allis-Chalmers Mfg. Co., Milwaukee, Wis
Brown & Sharpe Mfg. Co., Providence, R. I.
Fairbanks Morse & Co., Dept. 96, 600 So. Michigan Ave., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York City
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Fuel Injection)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

PUMPS (Hydraulic)
Aldrich Pump Co., The, Allentown, Pa.
Brown & Sharpe Mfg. Co., Providence, R. I.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Hydro-Power Systems, Inc., 604 Grant Bldg., Pittsburgh, Pa.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Reciprocating)
Aldrich Pump Co., The, Allentown, Pa.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Rotary)
Brown & Sharpe Mfg. Co., Providence, R. I.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Vacuum)
Ingersoll-Rand Co., 11 Broadway, New York City.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUNCHES (Multiple)
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Hanniftn Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

PUNCHING AND SHEARING MACHINERY
Beatty Machine & Mfg. Co., 944 150th St., Hammond, Ind.
Chambersburg Engineering Co., Chambersburg, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Continental Roll & Steel Fdry Co., E. Chicago, Ind.
Hanniftn Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PYROMETER TUBES
Norton Company, Worcester, Mass.

PYROMETERS
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

RAIL BREAKERS
National Roll & Foundry Co., The, Avonmore, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

RAILS (New and Relaying)
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh Pa.

RAILS (Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

REAMERS
Barber Colman Co., 209 Loomis St., Rockford, Ill.
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.
Greenfield Tap & Die Corp., Greenfield, Mass.

REAMERS (Pneumatic)
Ingersoll-Rand Co., 11 Broadway, New York City.

REAMERS (Sand, Ingot Mold—Pneumatic)
Ingersoll-Rand Co., 11 Broadway, New York City.

REBUILT EQUIPMENT
Emerson, Louis E., & Co., 1760 Elston Ave., Chicago, Ill.
Marr-Galbreath Machinery Co., 53 Water St., Pittsburgh, Pa.
West Penn Machinery Co., 1208 House Bldg., Pittsburgh, Pa.

RECEIVERS
Petroleum Iron Works Co., Sharon, Pa.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

RECORDERS (Combustion)
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

RECORDERS (Pressure, Speed, Temperature, Time)
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

REDUCERS (Speed)—See SPEED REDUCERS

REDUCTION GEARS
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
National-Erie Corp., Erie, Pa.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

REFRACTORIES (Dolomite)
Basic Dolomite, Inc., Hanna Bldg., Cleveland, O.

REFRACTORIES (Fire Clay)
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Eureka Fire Brick Co., 1100 B. F. Jones Law Bldg., Pittsburgh, Pa.
Globe Brick Co., The, East Liverpool, O.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Keagler Brick Co., 1443 W. Market St., Steubenville, O.

REFRACTORIES (For High Frequency Furnaces)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Carborundum Co., The, Perth Amboy, N. J.
Norton Company, Worcester, Mass.

REFRACTORIES (Silicon Carbide)
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.

REFRACTORY CONCRETE
Atlas Lumnite Cement Co., Dept. S3, Chrysler Bldg., New York City.

REGULATORS (Pressure)
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.

REGULATORS (Temperature)
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

REINFORCEMENT FABRIC (Electric Welded)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

RESISTORS (Edgewound)
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.

RESISTORS (Graphite Disc)
Allen-Bradley Co., 1320 So. 2nd St., Milwaukee, Wis.

RHEOSTATS (Plating)
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.

RINGS (Steel)
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
King Fifth Wheel Co., 5027 Beaumont Ave., Philadelphia, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.

RINGS (Weldless) (*Also Stainless)
*Midvale Co., The Nicetown, Philadelphia, Pa.

RIVETERS (Hydraulic—Portable and Stationary)
Hanniftn Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

RIVETERS (Jam, Pedestal, Staybolt, Squeeze, Stationary, Yoke—Pneumatic)
Ingersoll-Rand Co., 11 Broadway, New York City.

RIVETERS (Pneumatic)
Hanniftn Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

RIVETING MACHINERY
Chambersburg Engineering Co., Chambersburg, Pa.
Shuster, F. B., Co., The, New Haven, Conn.
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.

RIVETS (*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland, O.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
*Russell Burdsall & Ward Bolt & Nut Co., Port Chester, Pa.
*Townsend Co., New Brighton, Pa.

RODS (Brass, Bronze, Copper, Nickel Silver, Silicon-Bronze)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.

RODS (Drill)
Firth-Sterling Steel Co., McKeesport, Pa.

RODS (Rounds, Flats and Shapes) (*Also Stainless)
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
*Copperweld Steel Co., Warren, O.
*Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.
Youngstown Sheet & Tube Co., The, Youngstown, O.

RODS (Steel and Iron)
Firth-Sterling Steel Co., McKeesport, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.

RODS (Welding)—See WELDING RODS

RODS (Wire)—See WIRE PRODUCTS

ROLL COOLERS (Internal, Water)
Hunt, C. B., & Son, Salem, O.

ROLL TABLES
Sommerfeld Machine Co., Braddock, Pa.

ROLLER LEVELERS (Backed-up)
Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.

ROLLING DOORS & SHUTTERS—See DOORS AND SHUTTERS

ROLLING MILL BEARINGS—See BEARINGS (Rolling Mill)

ROLLING MILL EQUIPMENT
Alliance Machine Co., The, Alliance, O.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Foster, Frank B., 829 Oliver Bldg., Pittsburgh, Pa.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Fdry. & Mach. Co., P. O. Box 1586, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa
Morgan Construction Co., Worcester, Mass.
Morgan Engineering Co., The, Alliance, O.
National Roll & Foundry Co., The, Avonmore, Pa.
Streine Tool & Mfg. Co., New Bremen, O.
United Engineering & Fdry Co., First National Bank Bldg.,
Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

ROLLING MILL EQUIPMENT (Used and Rebuilt)
Foster, Frank B., 829 Oliver Bldg., Pittsburgh, Pa.

ROLLS (Bending and Straightening)
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Hanniftn Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

ROLLS (Rubber Covered)
Lowman-Shields Rubber Co., 209 First Ave., Pittsburgh, Pa.

ROLLS (Sand and Chilled)
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.

Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O., Springfield, O.
Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

ROLLS (Steel and Iron)
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hyde Park Fdry. and Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Fdry. Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O., Springfield, O.
Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

ROLLS (Tinning Machine)
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.

ROOFING AND SIDING (Corrugated and Plain)
American Rolling Mill Co., The, 1770 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
New Jersey Zinc Co., 160 Front St., New York City.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Sons, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

ROOFING (Plastic and Liquid)
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

RUBBER GOODS (Mechanical)
Garlock Packing Co., The, S 3-40, Palmyra, N. Y.
Lowman-Shields Rubber Co., 209 First Ave., Pittsburgh, Pa.
United States Rubber Co., 1230 Sixth Ave., New York City.

RUST PREVENTIVES
Alrose Chemical Co., Mill St., 80 Clifford St., Providence, R. I.
American Chemical Paint Co., Dept. 310, Ambler, Pa.
American Lanolin Corp., Railroad St., Lawrence, Mass.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

RUST PROOFING PROCESS
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

SAFE ENDS (Boiler Tube)
National Tube Co., Frick Bldg., Pittsburgh, Pa

SAFETY DEVICES (Electric)
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
Linlern Corp., The, 7960 Lorain Ave., Cleveland, O.

SALT TABLETS
Morton Salt Co., 310 So. Michigan Ave., Chicago, Ill.

SAND CONDITIONING AND PREPARING MACHINERY
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

SAWING MACHINES (Hot and Cold)
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
Armstrong-Blum Mfg. Co., 5737 Bloomingdale Ave., Chicago, Ill.
Morgan Engineering Co., The, Alliance, O.
United Engineering & Fdry Co., First National Bank Bldg., Pittsburgh, Pa.

SAWS (Band—Metal Cutting)
Huther Bros. Saw & Mfg. Co., 1190 University Ave., Rochester, N. Y.
Simonds Saw & Steel Co., Fitchburg, Mass.

SAWS (Hack)
Armstrong-Blum Mfg. Co., 5737 Bloomingdale Ave., Chicago, Ill.
Simonds Saw & Steel Co., Fitchburg, Mass.

SAWS (Hot and Cold)
Huther Bros. Saw & Mfg. Co., 1190 University Ave., Rochester, N. Y.

SAWS (Inserted Tooth, Cold)
Huther Bros. Saw & Mfg. Co., 1190 University Ave., Rochester, N. Y.
Simonds Saw & Steel Co., Fitchburg, Mass.

SAWS (Metal Cutting)
Brown & Sharpe Mfg. Co., Providence, R. I.
Simonds Saw & Steel Co., Fitchburg, Mass.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SCAFFOLDING (Tubular)
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.

SCALES
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Fairbanks Morse & Co., Dept. 96, 600 So. Michigan Ave., Chicago, Ill.
Kron Co., The, Bridgeport, Conn.
Toledo Scale Co., 3216 Monroe St., Toledo, O.

SCALES (Monorail)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Kron Co., The, Bridgeport, Conn.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

SCALING TOOLS (Pneumatic)
Ingersoll-Rand Co., 11 Broadway, New York City.

SCHOOLS
International Correspondence Schools, Box 9374, Scranton, Pa.

SCRAP BALING PRESSES—See BALING PRESSES

SCREENS AND SIEVES
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
Chicago Perforating Co., 2443 W. 24th Pl. Chicago, Ill.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.
Koppers Co., Engineering & Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Ludlow-Saylor Wire Co., The, Newstead Ave. & Wabash R. R., St. Louis, Mo.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

SCREENS (Vibrating)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

SCREW EXTRACTORS
Greenfield Tap & Die Corp., Greenfield, Mass.

SCREW MACHINE PRODUCTS
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Hindley Mfg. Co., Valley Falls, R. I.
National Acme Co., The, 170 E. 131st St., Cleveland, O.

SCREW MACHINES (Automatic, Single and Multiple Spindle)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cone Automatic Machine Co., Windsor, Vt.
National Acme Co., The, 170 E. 131st St., Cleveland, O.

SCREW PLATES
Greenfield Tap & Die Corp., Greenfield, Mass.

SCREW STOCK—See STEEL (Screw Stock)

SCREWS
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.
Townsend Co., New Brighton, Pa.

SCREWS (Cap, Set, Safety-Set)
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Acme Co., The, 170 E. 131st St., Cleveland, O.

SCREWS (Cold Headed)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Townsend Co., New Brighton, Pa.

SCREWS (Conveyor)
Lee Spring Co. Inc., 30 Main St., Brooklyn, N. Y.

SCREWS (Drive)
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.
Townsend Co., New Brighton, Pa.

SCREWS (Hardened Self-Tapping)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Machine)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.

SCREWS (Machine, Recessed Head)
American Screw Co., Providence, R. I.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., Waterbury, Conn.

SCREWS (Self Locking)
Shakeproof Lock Washer Co., 2525 N. Keelor Ave., Chicago, Ill.

SCREWS (Sheet Metal, Recessed Head)
American Screw Co., Providence, R. I.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

SCREWS (Socket, Cold Forged)
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Thread-Cutting)
Shakeproof Lock Washer Co., 2525 N. Keelor Ave., Chicago, Ill.

SCREWS (Thumb)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Wood, Recessed Head)
American Screw Co., Providence, R. I.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.

SEAMLESS STEEL TUBING—See TUBES

SEPARATORS (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland, O.
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

SHAFT HANGERS—See HANGERS (Shaft)

SHAFTING
Bliss & Laughlin, Inc., Harvey, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
LaSalle Steel Co., Dept. 4A, P. O. Box 6800-A, Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.
Union Drawn Steel Co., Massillon, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

SHAKERS
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

SHAPERS
Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.

SHAPES (Steel)—See STEEL (Structural)

SHAPES, SPECIAL (Steel)
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Fort Pitt Spring Co., P. O. Box 1377, Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Union Drawn Steel Co., Massillon, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

SHEAR BLADES
American Shear Knife Co., 3rd and Ann Sts., Homestead, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.

SHEARS
Beatty Machine & Mfg. Co., 944 150th St., Hammond, Ind.
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.

SHEARS—Con.
Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.
Cleveland Punch & Shear Works, The, 3917 St. Clair Ave., Cleveland, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Fdry. & Mach. Co., P. O. Box 1586, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Streine Tool & Mfg. Co., New Bremen, O.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

SHEET BARS
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEET LIFTERS AND CARRIERS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
J-B Engineering Sales Co., 1743 Orange St., New Haven, Conn.

SHEET METAL PRODUCTS—See STAMPINGS

SHEET METAL WORKERS MACHINES
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Streine Tool & Mfg. Co., New Bremen, O.

SHEET STEEL PILING (New and Used)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.

SHEETS (Acid Resisting)
•International Nickel Co., Inc., The, 67 Wall St., New York City.

SHEETS (Black)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Andrews Steel Co., The, Newport, Ky.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.

SHEETS (Brass, Bronze, Copper, Nickel Silver, Silicon-Bronze)
American Brass Co., The, Waterbury, Conn.
Ampco Metal, Inc., Dept. S-537, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.

SHEETS (Corrugated)
American Rolling Mill Co., The, 1770 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Deep Drawing and Stamping)
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., The, 1770 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Electrical)
American Rolling Mill Co., The, 1770 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Galvanized)
American Rolling Mill Co., The, 1770 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Hot Rolled and Hot Rolled Annealed)
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., The, 1770 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Long Terne)
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Perforated)
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.

SHEETS (Reinforced)
Erdle Perforating Co., 171 York St., Rochester, N. Y.

SHEETS (Roofing)—See ROOFING AND SIDING

SHEETS (Stainless)
American Rolling Mill Co., The, 1770 Curtis St., Middletown, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Massillon, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.

SHEETS (Stainless Clad)
Granite City Steel Co., Granite City, Ill.

SHEETS (Tin)—See TIN PLATE

SHEETS (Tin Mill Black)
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

SHEETS—HIGH FINISH (Automobile, Metal Furniture, Enameling)
American Rolling Mill Co., The, 1770 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SIEVES—See SCREENS AND SIEVES

SIGNALING & INTER-COMMUNICATION EQUIPMENT
Graybar Electric Co., 420 Lexington Ave., New York City.

SILICO-MANGANESE
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

SILICON METAL AND ALLOYS
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Revere Copper & Brass Co., Inc., 230 Park Ave., New York City.

SKELP (Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

SLAG GRANULATING MACHINES (Blast Furnace and Open Hearth)
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

SMALL TOOLS
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.

SOAKING PITS
Criswell, James, Co., Keenan Bldg., Pittsburgh, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

SOLENOIDS (Electric)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

SOLVENT (Degreasing)
Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

SPECIAL MACHINERY—See MACHINERY (Special)

SPEED REDUCERS
Cleveland Worm & Gear Co., 3270 E. 80th St., Cleveland, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Jones, W. A., Fdry. & Mach. Co., 4437 W. Roosevelt Rd., Chicago, Ill.
Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.
New Departure Div., General Motors Corp., Bristol, Conn.

SPELTER (Zinc)
St. Joseph Lead Co., 250 Park Ave., New York City.

SPIEGELEISEN
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
New Jersey Zinc Co., 160 Front St., New York City.
Samuel, Frank, & Co., Inc., The Harrison Bldg., Philadelphia, Pa.

SPIKES (Screw)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Dept. ST, Cleveland, O.

WHERE-TO-BUY

SPIKES (Screw)—Con.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SPINDLES (Grinding)
Bryant Chucking Grinder Co., Springfield, Vt.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Heald Machine Co., Worcester, Mass.

SPLICE BARS (Rail)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

SPRINGS
(*Also Stainless)
Accurate Spring Mfg. Co., 3823 W. Lake St., Chicago, Ill.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Duer Spring & Mfg. Co., Pittsburgh, Pa.
Fort Pitt Spring Co., P. O. Box 1377, Pittsburgh, Pa.
Hubbard, M. D., Spring Co., 413 Central Ave., Pontiac, Mich.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
Raymond Mfg. Co., Div. Associated Spring Corp., Corry, Pa.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.
Washburn Wire Co., 118th St. & Harlem River, New York City.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

SPRINGS (Alloy)
Fort Pitt Spring Co., P. O. Box 1377, Pittsburgh, Pa.

SPRINGS (Coil and Elliptic)
Fort Pitt Spring Co., P. O. Box 1377, Pittsburgh, Pa.

SPRINGS (Oil Tempered—Flat)
Davis Brake Beam Co., Laurel Ave., & P. R. R., Johnstown, Pa.

SPRINKLERS (Automatic)
Grinnell Co., Inc., Providence, R. I.

SPROCKETS
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.

SPRUE CUTTERS
Shuster, F. B., Co., The, New Haven, Conn.

STACKS (Steel)—See BRIDGES, ETC.

STAINLESS STEEL—See BARS, SHEETS, STRIP, PLATES, ETC.

STAMPINGS
Accurate Spring Mfg. Co., 3823 W. Lake St., Chicago, Ill.
American Tube & Stamping Plant, (Stanley Wks.), Bridgeport, Conn.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Davis Brake Beam Co., Laurel Ave., & P. R. R., Johnstown, Pa.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Hubbard, M. D., Spring Co., 413 Central Ave., Pontiac, Mich.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Raymond Mfg. Co., Div. Associated Spring Corp., Corry, Pa.
Shakeproof Lock Washer Co., 2525 N. Keelor Ave., Chicago, Ill.
Stanley Works, The, Bridgeport, Conn.
New Britain, Conn.
Toledo Stamping & Mfg. Co., 90 Fearing Blvd., Toledo, O.
Whitehead Stamping Co., 1669 W. Lafayette Blvd., Detroit, Mich.

STAMPS (Steel)
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.

STAPLES (Wire)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STARTERS (Electric Motor)
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.

STEEL (Alloy)
Alan Wood Steel Co., Conshohocken, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Columbia Steel Co., San Francisco, Calif.
Copperweld Steel Co., Warren, O.
Crucible Steel Company of America, 405 Lexington Ave., New York City.
Firth-Sterling Steel Co., McKeesport, Pa.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Jessop Steel Co., 584 Green St., Washington, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Simonds Saw & Steel Co., Fitchburg, Mass.
Stanley Works, The, New Britain, Conn.
Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Washburn Wire Co., Phillipsdale, R. I.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

STEEL (Alloy, Cold Finished)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co., McKeesport, Pa.
LaSalle Steel Co., Dept. 4A, P. O. Box 6800-A, Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Union Drawn Steel Co., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

STEEL (Clad—Corrosion Resisting)
(*Also Stainless)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Copperweld Steel Co., Warren, O.
*Granite City Steel Co., Granite City, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.
Superior Steel Corp., Carnegie, Pa.

STEEL (Cold Drawn)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Union Drawn Steel Co., Massillon, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Cold Finished)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh Pa.
LaSalle Steel Co., Dept. 4A, P. O. Box 6800-A, Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Union Drawn Steel Co., Massillon, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Corrosion Resisting)

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 1770 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Crucible Steel Company of America, 405 Lexington Ave., New York City.
Firth-Sterling Steel Co., McKeesport, Pa.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

STEEL (Die)

Crucible Steel Company of America, 405 Lexington Ave., New York City.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL (Drill)

Crucible Steel Company of America, 405 Lexington Ave., New York City.

STEEL (Electric)

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Crucible Steel Company of America, 405 Lexington Ave., New York City.
Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

STEEL (High Speed)

Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Crucible Steel Company of America, 405 Lexington Ave., New York City.
Firth-Sterling Steel Co., McKeesport, Pa.
Jessop, Wm., & Sons Co., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL (High Tensile, Low Alloy)

Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST. Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Nitriding)

Firth-Sterling Steel Co., McKeesport, Pa.

STEEL (Rustless)—See STEEL (Corrosion Resisting)

STEEL (Screw Stock)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
LaSalle Steel Co., Dept. 4A, P. O. Box 6800-A, Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Union Drawn Steel Co., Massillon, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Spring)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Fort Pitt Spring Co., P. O. Box 1377, Pittsburgh, Pa.
Washburn Wire Co., 118th St. & Harlem River, New York City. Phillipsdale, R. I.

STEEL (Stainless)—See STEEL (Corrosion Resisting)

STEEL (Strip, Copper Coated)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Thomas Steel Co., Warren, O.

STEEL (Strip, Hot and Cold Rolled) (*Also Stainless)

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
*American Rolling Mill Co., The, 1770 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
American Tube & Stamping Plant, (Stanley Wks.), Bridgeport, Conn.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
*Firth-Sterling Steel Co., McKeesport, Pa.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
*Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Seneca Wire & Mfg. Co., Fostoria, O.
*Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Tennessee Coal, Iron & Railroad Co. Brown-Marx Bldg., Birmingham, Ala.
Thomas Steel Co., Warren, O.
Washburn Wire Co., 118th St. & Harlem River. New York City. Phillipsdale, R. I.
Weirton Steel Co., Weirton, W. Va.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

STEEL (Strip, Tin Coated)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City.

STEEL (Strip, Zinc Coated)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Thomas Steel Co., Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City.

STEEL (Structural) *(Also Stainless)

American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Belmont Iron Works, 22nd St. and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Tool)

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Copperweld Steel Co., Warren, O.
Crucible Steel Company of America, 405 Lexington Ave., New York City.
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Jessop, Wm., & Sons Co., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc. 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Vanadium Alloys Steel Co., Latrobe, Pa.

STEEL BUILDINGS—See BRIDGES, BUILDINGS, ETC.

STEEL DOORS & SHUTTERS—See DOORS & SHUTTERS

STEEL FABRICATORS—See BRIDGES, BUILDINGS ETC.

STEEL FLOATING AND TERMINAL EQUIPMENT

Dravo Corp. (Engin'r'g Works Div.), Neville Island, Pittsburgh, Pa.

STEEL PLATE CONSTRUCTION

American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Belmont Iron Works, 22nd St., and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Petroleum Iron Works Co., Sharon, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

STELLITE

Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.

STOKERS

Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Canton Pattern & Mfg. Co., The, Andrews Pl. S. W., Canton, O.

STOPPERS (Cinder Notch)

Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

STOPPERS (Rubber)

Rhoades, R. W., Metaline Co., 50 Third St., Long Island City, N. Y.

STORAGE BATTERIES—See BATTERIES (Storage)

STRAIGHTENING MACHINERY

Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Farquhar, A. B., Co., Limited, 403 Duke St., York, Pa.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Lewis Machine Co., 3450 E. 76th St., Cleveland, O.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Medart Co., The, 3520 de Kalb St., St. Louis, Mo.
Shuster, F. B., Co., The, New Haven, Conn.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.

SULPHURIC ACID

Cleveland-Cliffs Iron Co., The, Union Commerce Bldg., Cleveland, O.
New Jersey Zinc Co., 160 Front St., New York City.
Pennsylvania Salt Mfg. Co., Dept. E. Pennsalt Cleaner Div., Philadelphia, Pa.

SWITCHES (Electric)

Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.

SWITCHES (Electric)—Con.

General Electric Co., Schenectady, N. Y.
General Electric Co., Dept. S-E. Nela Park, Cleveland, O.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

TACHOMETERS

Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.

TANK LININGS

Ceilcote Co., 750 Rockefeller Bldg., Cleveland, O.
National Carbon Co., W. 117th St. and Madison Ave., Cleveland, O.

TANKS (Pickling)

Atlas Mineral Products Co. of Pa., Mertztown, Pa.
National Carbon Co., W. 117th St. and Madison Ave., Cleveland, O.
United States Rubber Co., 1230 Sixth Ave., New York City.

TANKS (Storage, Pressure, Riveted, Welded)

American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Petroleum Iron Works Co., Sharon, Pa.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

TANKS—WOOD OR STEEL (Rubber or Lead Lined)

Dietzel Lead Burning Co., Coraopolis, Pa.
United States Rubber Co., 1230 Sixth Ave., New York City.

TAPS AND DIES

Greenfield Tap & Die Corp., Greenfield, Mass.
Landis Machine Co., Inc., Waynesboro, Pa.
National Acme Co., The, 170 E. 131st St., Cleveland, O.

TESTING MACHINERY (Materials)

Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Hydro-Power Systems, Inc., 604 Grant Bldg., Pittsburgh, Pa.

TERMINALS (Locking)

Shakeproof Lock Washer Co., 2525 N. Keelor Ave., Chicago, Ill.
Thompson-Bremer & Co., 1640 W. Hubbard St., Chicago, Ill.

TERNE PLATE—See TIN PLATE

THERMOMETERS

Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

THREAD CUTTING TOOLS

Landis Machine Co., Inc., Waynesboro, Pa.

TIE PLATES

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

TIN PLATE

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Weirton Steel Co., Weirton W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TIN PLATE MACHINERY

Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Wean Engineering Co., Warren, O.

TITANIUM

Vanadium Corp. of America, 420 Lexington Ave., New York City.

TONGS (Chain Pipe)

Williams, J. H., & Co., 400 Vulcan Bldg., Buffalo, N. Y.

TOOL BITS (High Speed)

Firth-Sterling Steel Co., McKeesport, Pa.
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.
Jessop Steel Co., 584 Green St., Washington, Pa.

TOOL HOLDERS

Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

TOOLS (Pneumatic)

Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Ingersoll-Rand Co., 11 Broadway, New York City.

TOOLS (Precision, Lathe, Metal Cutting, etc.)

Brown & Sharpe Mfg. Co., Providence, R. I.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TOOLS (Tipped, Carbide)

Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TORCHES AND BURNERS (Acetylene, Blow, Oxy-Acetylene)

Air Reduction Sales Co., 60 E. 42nd St, New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.

TOWBOATS

Dravo Corp. (Engin'r'g Works Div.), Neville Island, Pittsburgh, Pa.

TOWERS (Transmission)

American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.

TOWERS (Tubular Hoisting)

Dravo Corp., (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.

TOY PARTS

Townsend Co., New Brighton, Pa.

TRACK ACCESSORIES

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

TRACK BOLTS

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TRAILERS (Arch-Girder)

Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

TRAMRAILS

American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

TRANSMISSIONS—VARIABLE SPEED

Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.

TRAPS (Steam and Radiator)

Johns-Manville Corp., 22 E. 40th St., New York City.

TREADS (Safety)

Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Dravo Corp. (Machinery Div.,) 300 Penn Ave., Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

TROLLEYS

American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Ford Chain Block Div. American Chain & Cable Co. Inc., 2nd & Diamond Sts., Philadelphia, Pa.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

TRUCKS AND TRACTORS (Electric Industrial)

Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Baker-Raulang Co., The, 2168 W. 25th St., Cleveland, O.
Towmotor, Inc., 1247 E. 152nd St., Cleveland, O.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

TRUCKS AND TRACTORS (Gasoline Industrial)

Baker-Raulang Co., The, 2168 W. 25th St., Cleveland, O.
Towmotor, Inc., 1247 E. 152nd St., Cleveland, O.

TRUCKS (Dump-Industrial)

Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Towmotor, Inc., 1247 E. 152nd St., Cleveland, O.

TRUCKS (Hydraulic Lift)

Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Towmotor, Inc., 2168 W. 25th St., Cleveland, O.

TRUCKS (Lift)

Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Baker-Raulang Co., The, 2168 W. 25th St., Cleveland, O.
Towmotor, Inc., 1247 E. 152nd St., Cleveland, O.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

TUBE MILL EQUIPMENT

Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.

TUBES (Boiler)

Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Steel & Tubes Division, Republic Steel Corp., Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBES (Brass, Bronze, Copper, Nickel Silver)

Bridgeport Brass Co., Bridgeport, Conn.
Revere Copper & Brass Co. Inc., 230 Park Ave., New York City.

TUBES (High Carbon)

Steel & Tubes Division, Republic Steel Corp., Cleveland, O.

TUBING (Alloy Steel) (*Also Stainless)

*Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
*National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Steel & Tubes Division, Republic Steel Corp., Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

TUBING (Copper, Brass, Aluminum)

Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.
Revere Copper & Brass Co. Inc., 230 Park Ave., New York City.
Shenango-Penn Mold Co., Dover, O.

TUBING (Seamless Steel)

Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Steel & Tubes Division, Republic Steel Corp., Cleveland, O.
Standard Tube Co., The, 14600 Woodward Ave., Detroit, Mich.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Youngstown Sheet & Tube Co., Youngstown, O.

TUBING (Square, Rectangular)

Steel & Tubes Division, Republic Steel Corp., Cleveland, O.

TUBING (Welded Steel)
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Republic Steel Corp., Dept. ST, Cleveland, O.
Revere Copper & Brass Co. Inc., 230 Park Ave., New York City
Steel & Tubes Division, Republic Steel Corp., Cleveland, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBULAR PRODUCTS
Steel & Tubes Division, Republic Steel Corp., Cleveland, O.

TUMBLING BARRELS (Coke Testing)
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

TUNGSTEN CARBIDE
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.

TUNGSTEN CARBIDE (Tools and Dies)
Firth-Sterling Steel Co., McKeesport, Pa.

TUNGSTEN METAL AND ALLOYS
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

TURBINES (Steam)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

TURBO BLOWERS—See BLOWERS

TURNTABLES
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

TURRET LATHES—See LATHES (Turret)

TWIST DRILLS
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, O.
Greenfield Tap & Die Corp., Greenfield, Mass.

VACUUM CLEANERS
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

VALVE CONTROL (Motor Operated Units)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

VALVES (Blast Furnace)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa

VALVES (Brass, Iron and Steel)
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co. Inc., Bridgeport, Conn.

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Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co. Inc., Bridgeport, Conn.

VALVES (Control—Air and Hydraulic)
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hunt, C. B., & Son, Salem, O.
Ross Operating Valve Co., 6474 Epworth Blvd., Detroit, Mich.

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Ross Operating Valve Co., 6474 Epworth Blvd., Detroit, Mich.

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Blaw-Knox Co., Blawnox, Pa.

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Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Crane Co., The, 836 So. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co. Inc., Bridgeport, Conn.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

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Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co. Inc., Bridgeport, Conn.

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Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Hunt, C. B., & Son, Salem, O.
Hydro-Power Systems, Inc., 604 Grant Bldg., Pittsburgh, Pa.

VALVES (Hydraulic De-Scaling)
Hunt, C. B., & Son, Salem, O.

VALVES (Lead)
Dietzel Lead Burning Co., Coraopolis, Pa.

VALVES (Needle)
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co. Inc., Bridgeport, Conn.

VALVES (Steam and Water)
Reading-Pratt & Cady Div. of American Chain & Cable Co. Inc., Bridgeport, Conn.

VALVES AND FITTINGS—See PIPE FITTINGS

VANADIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

VIADUCTS (Steel)—See BRIDGES, ETC.

VISES (Bench)
Hollands Mfg. Co., 342-352 E. 18th St., Erie, Pa.

WALKWAYS—See FLOORING—STEEL

WASHERS (Iron and Steel)
Hubbard, M. D., Spring Co., 413 Central Ave., Pontiac, Mich.
Thompson-Bremer & Co., 1640 W. Hubbard St., Chicago, Ill.

WASHERS (Lock)
American Nut & Bolt Fastener Co., Pittsburgh, Pa.
Beall Tool Co., East Alton, Ill.
Butcher & Hart Mfg. Co., Toledo, O.
Eaton Mfg. Co., Massillon, O.
National Lock Washer Co., The, Newark, N. J. and Milwaukee, Wis.
Philadelphia Steel & Wire Corp., Germantown, Philadelphia, Pa.
Positive Lock Washer Co., Newark, N. J.
Shakeproof Lock Washer Co., 2525 N. Keelor Ave., Chicago, Ill.
Thompson-Bremer & Co., 1640 W. Hubbard St., Chicago, Ill.
Washburn Co., The, Worcester, Mass.

WASHERS (Spring)
American Nut & Bolt Fastener Co., Pittsburgh, Pa.
Beall Tool Co., East Alton, Ill.
Butcher & Hart Mfg. Co., Toledo, O.
Eaton Mfg. Co., Massillon, O.
National Lock Washer Co., The, Newark, N. J., and Milwaukee, Wis.
Philadelphia Steel & Wire Corp., Germantown, Philadelphia, Pa.
Positive Lock Washer Co., Newark, N. J.
Shakeproof Lock Washer Co., 2525 N. Keelor Ave., Chicago, Ill.
Thompson-Bremer & Co., 1640 W. Hubbard St., Chicago, Ill.

WELDERS (Electric—Arc, Spot, Seam, Flash, Butt, Automatic Projection, Hydromatic, Etc.)
Federal Machine & Welder Co., Dana St., Warren, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Hobart Bros., Dept. ST-640, Troy, O.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-26.
Welding Equipment & Supply Co., 2720 E. Grand Blvd., Detroit, Mich.

WELDING
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-26.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

WELDING AND CUTTING APPARATUS AND SUPPLIES (Electric)
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Hobart Bros., Dept. ST-640, Troy, O.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-26.
Wilson Welder & Metals Co., 60 E. 42nd St., New York City.
Welding Equipment & Supply Co., 2720 E. Grand Blvd., Detroit, Mich.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

WELDING AND CUTTING APPARATUS AND SUPPLIES (Oxy-Acetylene)
Air Reduction Sales Co., 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
Welding Equipment & Supply Co., 2720 E. Grand Blvd., Detroit, Mich.

WELDING RODS (Alloys)
American Agile Corp., 5806 Hough Ave., Cleveland, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-26.
Maurath, Inc., 7311 Union Ave., Cleveland, O.
Metal & Thermit Corp., 120 Broadway, New York City.
Page Steel & Wire Div. of American Chain & Cable Co. Inc., Monessen, Pa.
Welding Equipment & Supply Co., 2720 E. Grand Blvd., Detroit, Mich.

WELDING RODS (Bronze)
Revere Copper & Brass Co. Inc., 230 Park Ave., New York City.
Welding Equipment & Supply Co., 2720 E. Grand Blvd., Detroit, Mich.

WELDING RODS OR WIRE
Air Reduction Sales Co., 60 East 42nd St., New York City.
American Agile Corp., 5806 Hough Ave., Cleveland, O.
American Brass Co., The, Waterbury, Conn.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bridgeport Brass Co., Bridgeport, Conn. Cleveland, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Hobart Bros., Dent. ST-640, Troy, O.
Lincoln Electric Co., The, Cleveland O. Dept. Y-26.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
Maurath, Inc., 7311 Union Ave., Cleveland, O.
Metal & Thermit Corp., 120 Broadway, New York City.
Page Steel & Wire Div. of American Chain & Cable Co. Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Revere Copper & Brass Co. Inc., 230 Park Ave., New York City
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Seneca Wire & Mfg. Co., Fostoria, O.
Washburn Wire Co., Phillipsdale, R. I.
Welding Equipment & Supply Co., 2720 E. Grand Blvd., Detroit, Mich.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Wilson Welder & Metals Co., 60 East 42nd St., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WHEELS (Car and Locomotive)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.

WHEELS (Track)
National-Erie Corp., Erie, Pa.

WINCHES (Electric)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

WIRE (Alloy Steel) (*Also Stainless)
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Firth-Sterling Steel Co., McKeesport, Pa.
*Page Steel & Wire Div. of American Chain & Cable Co. Inc., Monessen, Pa.
*Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Seneca Wire & Mfg. Co., Fostoria, O.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

WIRE (Annealed, Bright, Galvanized)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co. Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Seneca Wire & Mfg. Co., Fostoria, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE (Barb)
Bethlehem Steel Co., Bethlehem, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE (Cold Drawn)
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Washburn Wire Co., 118th St. & Harlem River, New York City.

WIRE (High Carbon)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co. Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.

WHERE-TO-BUY

WIRE (High Carbon)—Con.
Republic Steel Corp., Dept. ST, Cleveland, O.
Seneca Wire & Mfg. Co., Fostoria, O.
Washburn Wire Co., 118th St. and Harlem River, New York City.

WIRE (Music)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Washburn Wire Co., 118th St. and Harlem River, New York City.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

WIRE (Round, Flat, Square, Special Shapes)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., Los Angeles, Calif.
Page Steel & Wire Div., of American Chain & Cable Co., Inc., Monessen, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Seneca Wire & Mfg. Co., Fostoria, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Washburn Wire Co., 118th St. and Harlem River, New York City.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The Youngstown, O.

WIRE (Spring)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Washburn Wire Co., 118th St. & Harlem River, New York City.

WIRE (Stainless)
Firth-Sterling Steel Co., McKeesport, Pa.
Page Steel & Wire Div. of American Chain & Cable Co. Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

WIRE (Threaded)
Townsend Co., New Brighton, Pa.

WIRE (Welding)—See WELDING RODS OR WIRE

WIRE AND CABLE (Electric)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Graybar Electric Co., 420 Lexington Ave., New York City.

WIRE CLOTH
Cyclone Fence Co., Waukegan, Ill.
Seneca Wire & Mfg. Co., Fostoria, O.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

WIRE FORMS, SHAPES AND SPECIALTIES
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Firth-Sterling Steel Co., McKeesport, Pa.
Hubbard, M. D., Spring Co.,
Ludlow-Saylor Wire Co., The, Newstead Ave. & Wabash R. R., St. Louis, Mo.
Seneca Wire & Mfg. Co., Fostoria, O.
Townsend Co., New Brighton, Pa.
413 Central Ave., Pontiac, Mich.

WIRE MILL EQUIPMENT
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Lewis Machine Co., 3450 E. 76th St., Cleveland, O.
Morgan Construction Co., Worcester, Mass.
Shuster, F. B., Co., The, New Haven, Conn.

WIRE NAILS—See NAILS

WIRE PRODUCTS (*Also Stainless)
Accurate Spring Mfg. Co., 3823 W. Lake St., Chicago, Ill.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Hubbard, M. D., Spring Co., 413 Central Ave., Pontiac, Mich.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Leschen, A., & Sons Rope Co., 5909 Kennerly Ave., St. Louis, Mo.
Ludlow-Saylor Wire Co., The, Newstead Ave. & Wabash R. R., St. Louis, Mo.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Seneca Wire & Mfg. Co., Fostoria, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Townsend Co., New Brighton, Pa.
Washburn Wire Co., 118th St. and Harlem River, New York City.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The Youngstown, O.

WIRE ROPE AND FITTINGS (*Also Stainless)
American Cable Div. of American Chain & Cable Co. Inc., Wilkes-Barre, Pa.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Hazard Wire Rope Div. of American Chain & Cable Co. Inc., Wilkes-Barre, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Leschen, A., & Sons Rope Co., 5909 Kennerly Ave., St. Louis, Mo.
Macwhyte Co., 2912 14th Ave., Kenosha, Wis.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

WIRE ROPE SLINGS
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Leschen, A., & Sons Rope Co., 5909 Kennerly Ave., St. Louis, Mo.
Macwhyte Co., 2912 14th Ave., Kenosha, Wis.

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Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Lewis Machine Co., 3450 E. 76th St., Cleveland, O.
Shuster, F. B., Co., The, New Haven, Conn.
Williams, J. H., & Co., 225 Lafayette St., Buffalo, N. Y.

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Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

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New Jersey Zinc Co., 160 Front St., New York City.
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Where-to-Buy Products Index carried in first issue of month.

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