STEEL

ESTABLISHED 1882

Contents

Volume 106—No. 23 **June 3, 1940**

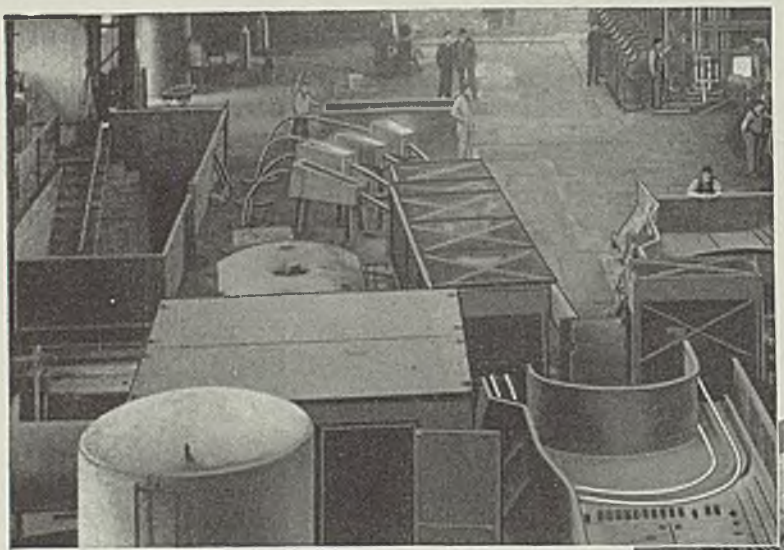
PRODUCTION • PROCESSING • DISTRIBUTION • USE

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.

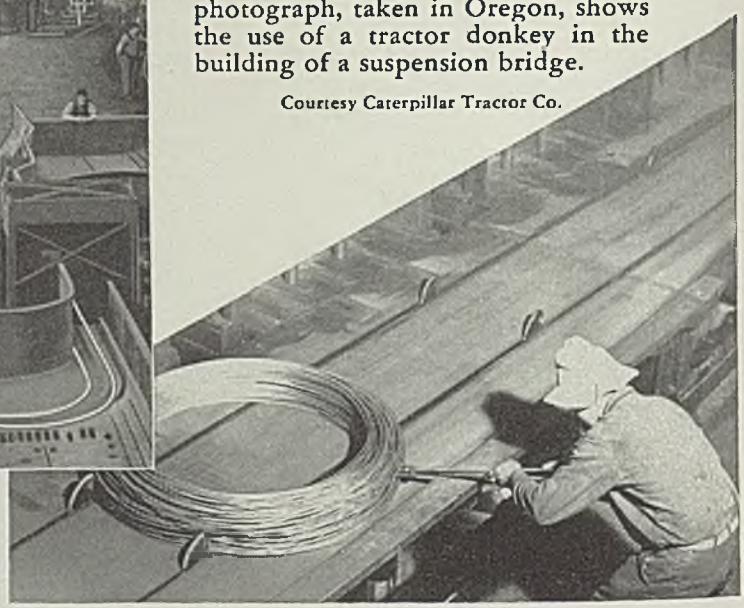
Morgan Continuous Rod Mills are rolling up new records in uniformity and capacity that meet the most exacting requirements of customers—*and stockholders.*

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
WORCESTER, MASSACHUSETTS, U. S. A.

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.

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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.

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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.

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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.

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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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Stainless Steel
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Write for Stock List

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.

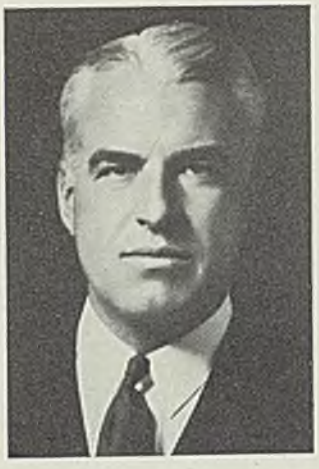
Authority for naming the commission exists in the 1917 national defense act which provides as well for a national defense council composed of six members of the cabinet, including the secretaries of war, navy, agriculture, interior, commerce, and the treasury. The President said, however, that for the 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.

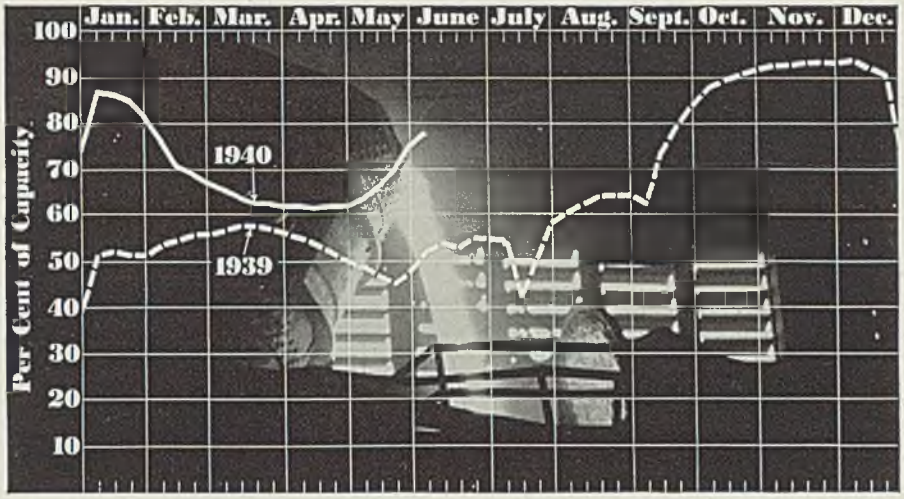
An average of 33.4 hours was worked per week by wage earners in April. This was slightly more than the average of 32.3 hours worked per week in March, and the average of 32.1 hours per week in April 1939.

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.

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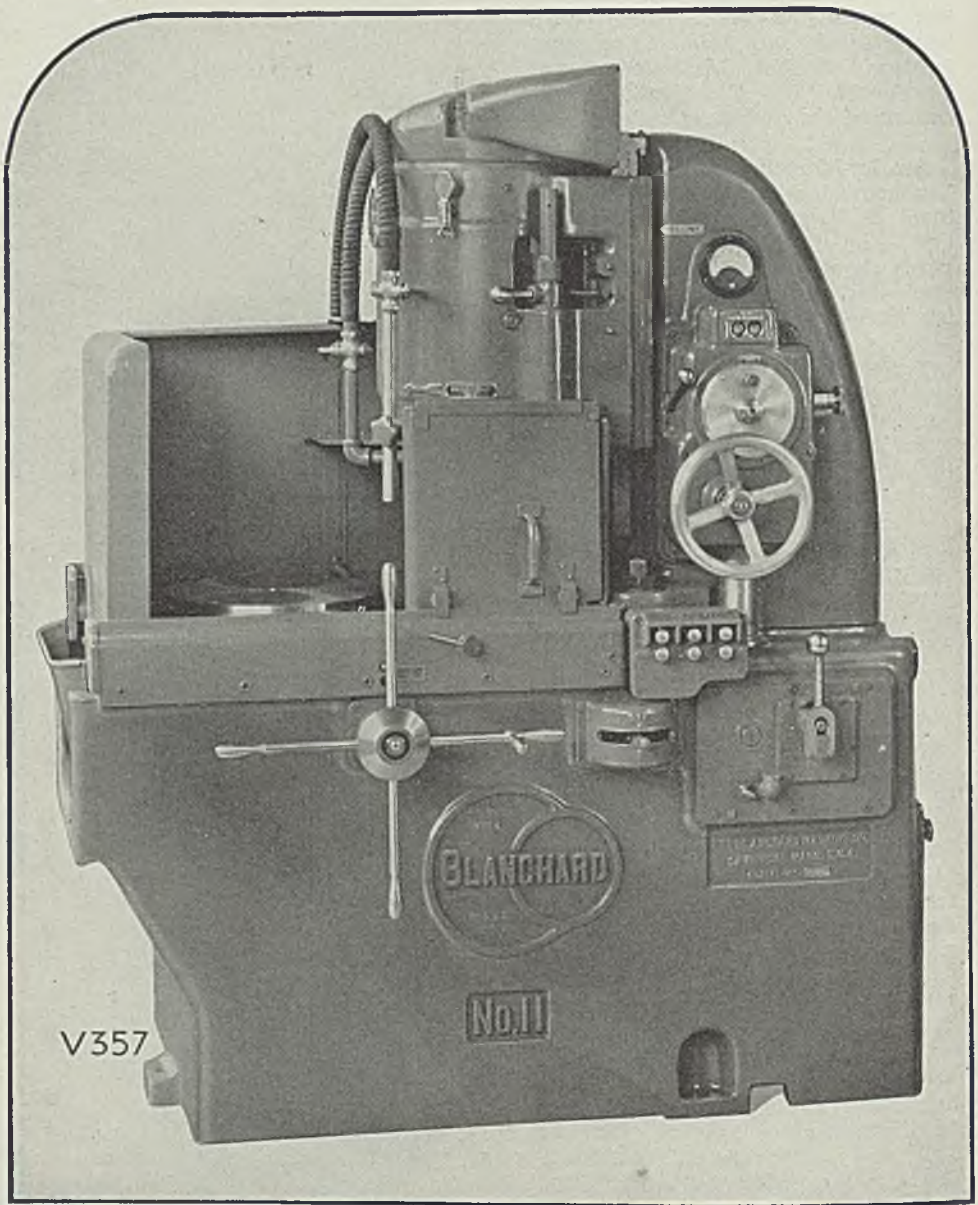

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Windows of WASHINGTON

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.

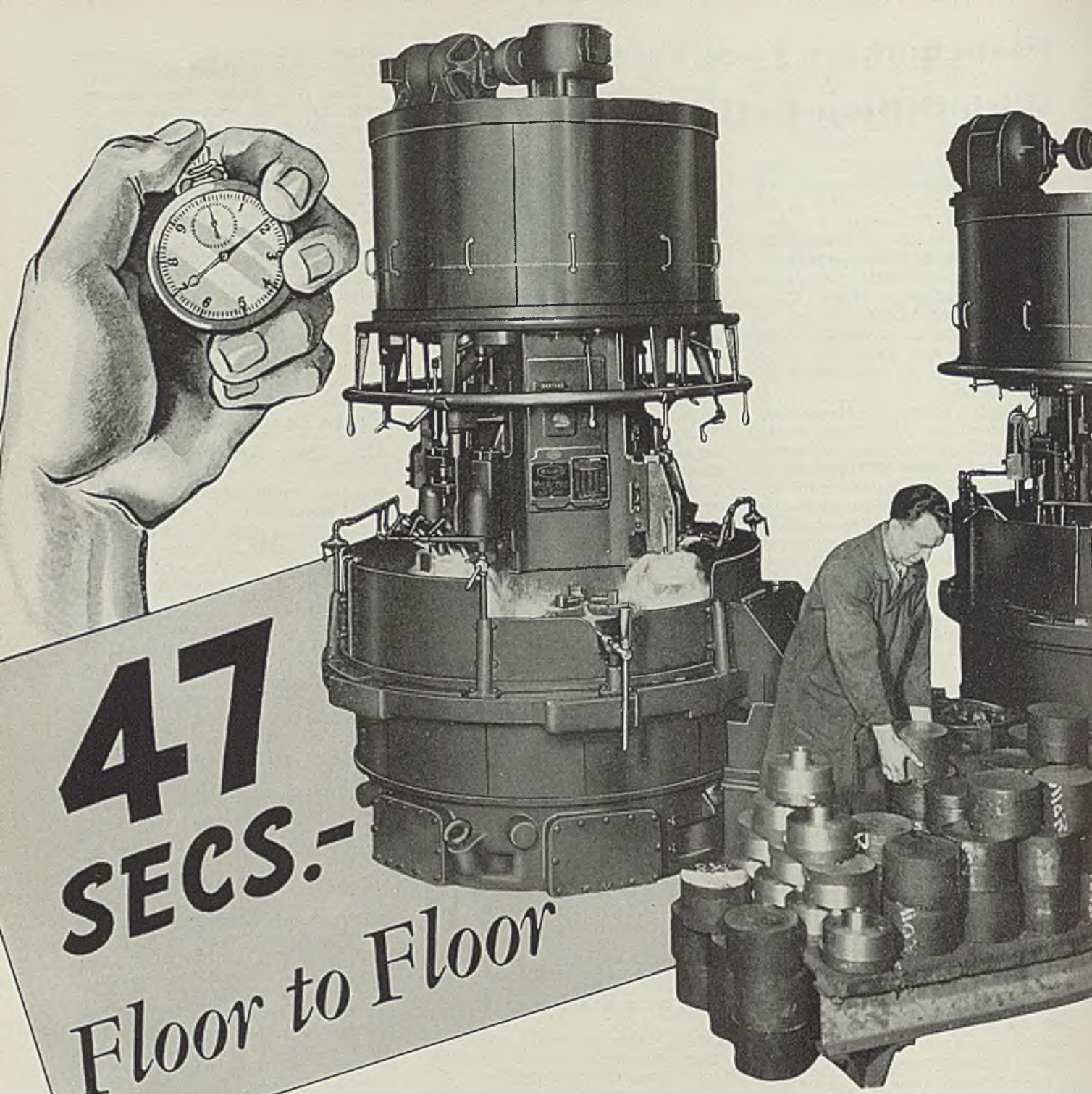
Tillage implement exports were valued at $987,516, an increase of 74 per cent over $563,516 in April, last year. Tractors, parts and accessories exports totaled $7,861,117, more than 40 per cent larger than $5,512,495 in April, 1939. Harvesting machinery exports totaled $500,438, a decline of 5 per cent 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.

THE BULLARD COMPANY

BRIDGEPORT, CONNECTICUT

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.

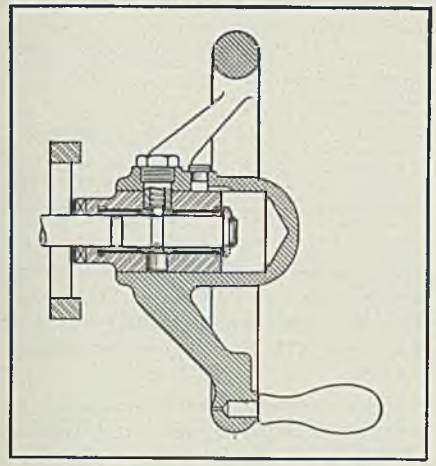
The combined total of depreciation reserves and additions to surplus in the period was $222,000,000 less than the amount actually spent by the companies for modernization.

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.

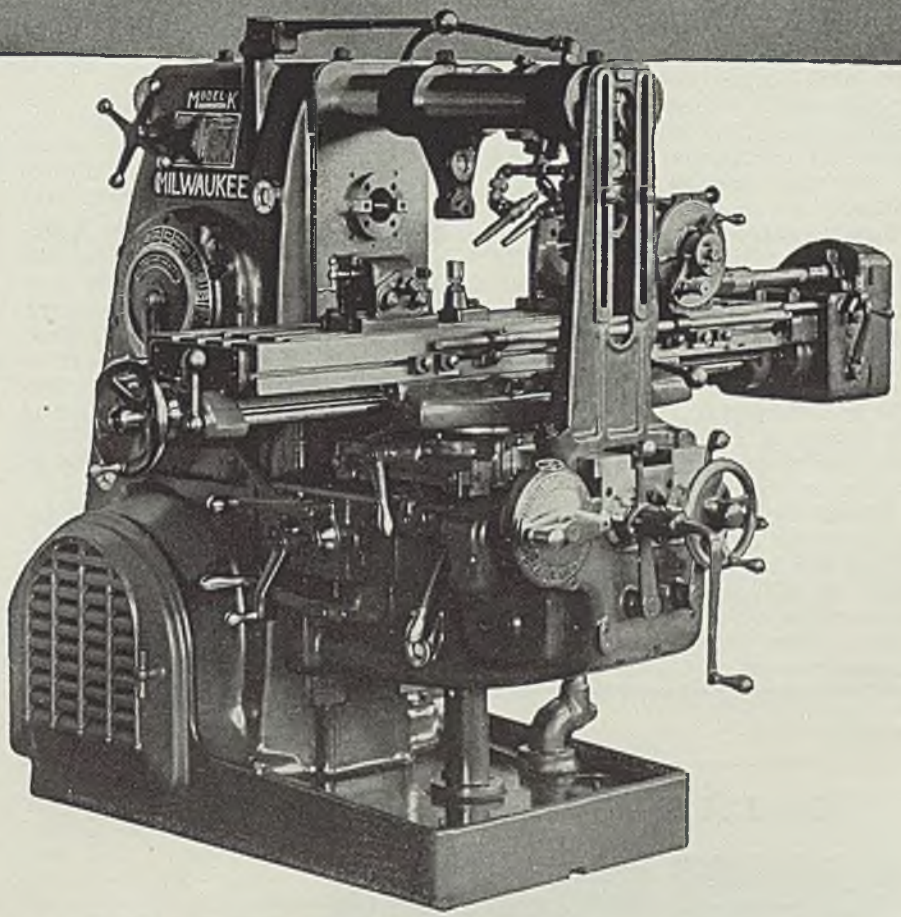
■ April household vacuum cleaner sales totaled 170,209 units, an increase of 36.08 per cent above the 125,026 of April 1939, according to Vacuum Cleaners Manufacturers' association, Cleveland.

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.

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ESTABLISHED 1866
Torrington, Conn., U.S.A.

Makers of Needle and Ball Bearings

New York Boston Philadelphia Detroit
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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

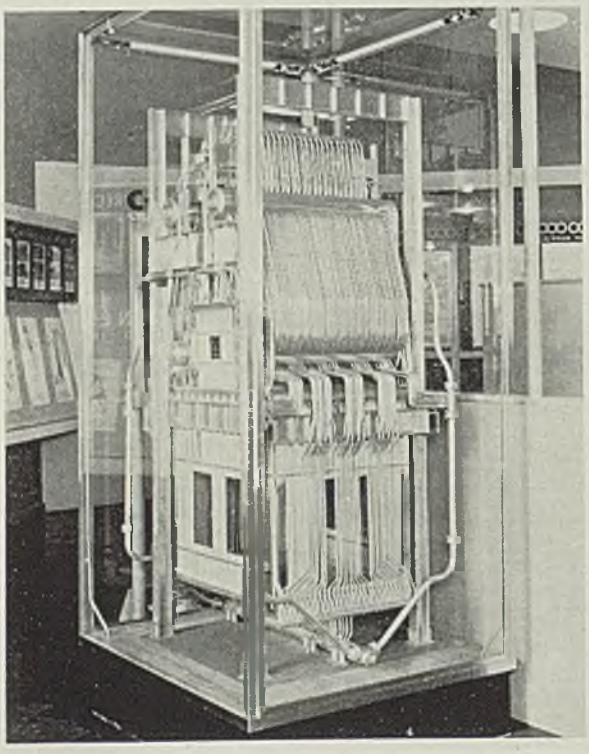
UNITED STATES IMPORTS FOR CONSUMPTION OF IRON AND STEEL PRODUCTS

(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.

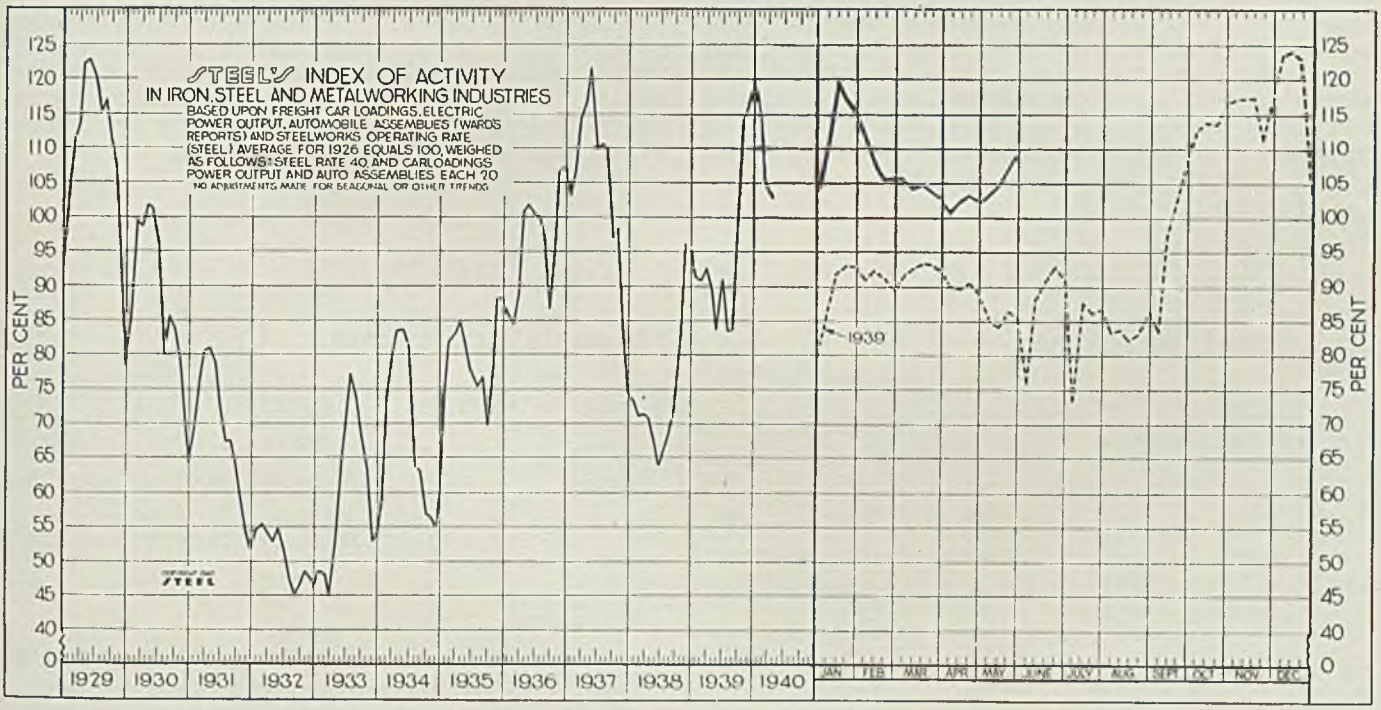
The BUSINESS TREND

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.

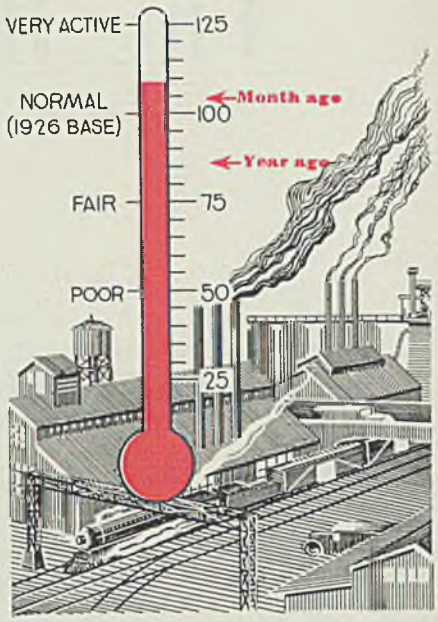
Industrial and residential construction have been important factors in bolstering business activity throughout the past month. Private engineering awards during the latest period recorded further gains and remained well above the total for same 1939 week. Public construction has lagged in recent weeks.

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.

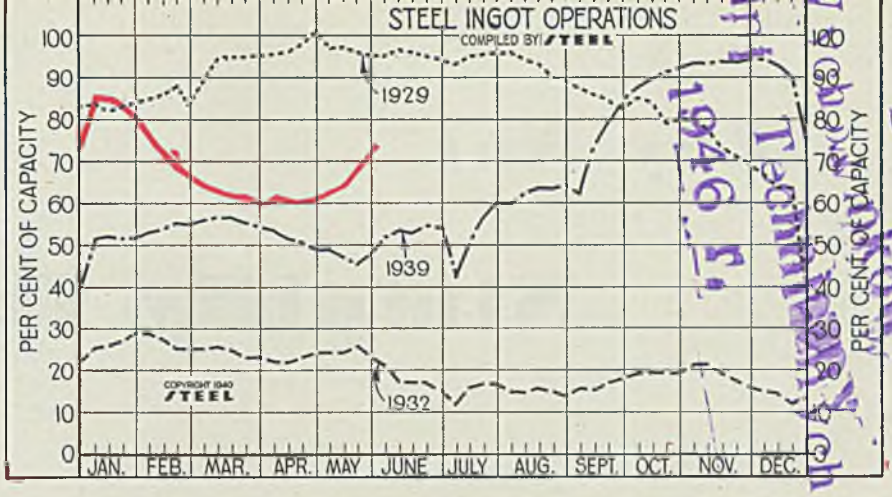
Commodity Prices

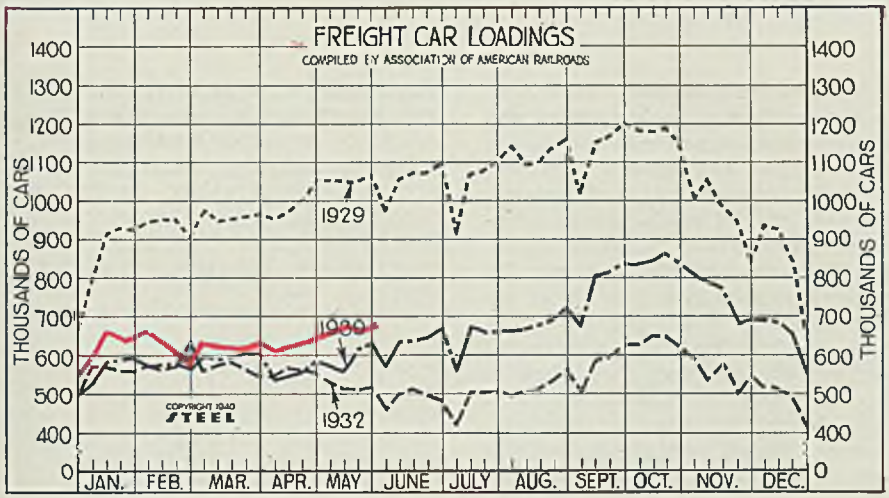
	Apr., 1940	Mar., 1940	Apr., 1939
STEEL's composite average of 25 iron & steel prices	$36.69	$36.83	$36.34
U. S. Bureau of Labor's index	78.6	78.4	76.2
Wheat, cash (bushel)	$1.28	$1.24	$0.90
Corn, cash (bushel)	$0.78	$0.72	$0.64

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)

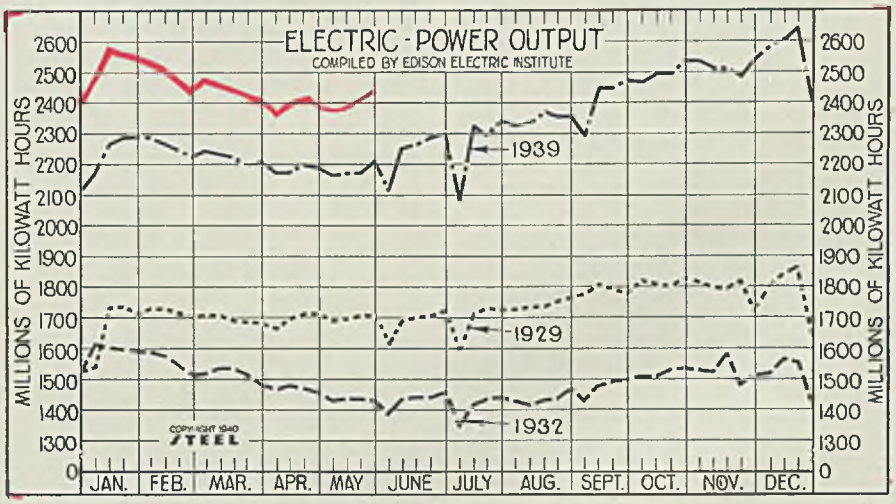
Week ended	1940	1939	1938	1937
Mar. 2.....	634	599	553	734
Mar. 9.....	621	592	557	749
Mar. 16.....	619	595	540	759
Mar. 23.....	620	605	573	761
Mar. 30.....	628	604	523	727
Apr. 6.....	603	535	522	716
Apr. 13.....	619	548	538	751
Apr. 20.....	628	559	524	761
Apr. 27.....	645	586	543	782
May 4.....	666	573	536	767
May 11.....	681	555	542	774
May 18.....	679	616	546	779
May 25.....	685†	628	562	795

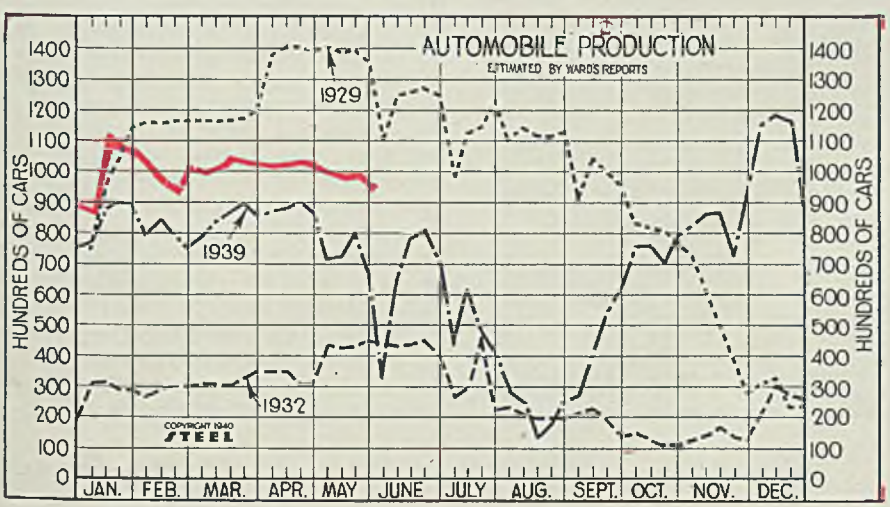
†Preliminary.

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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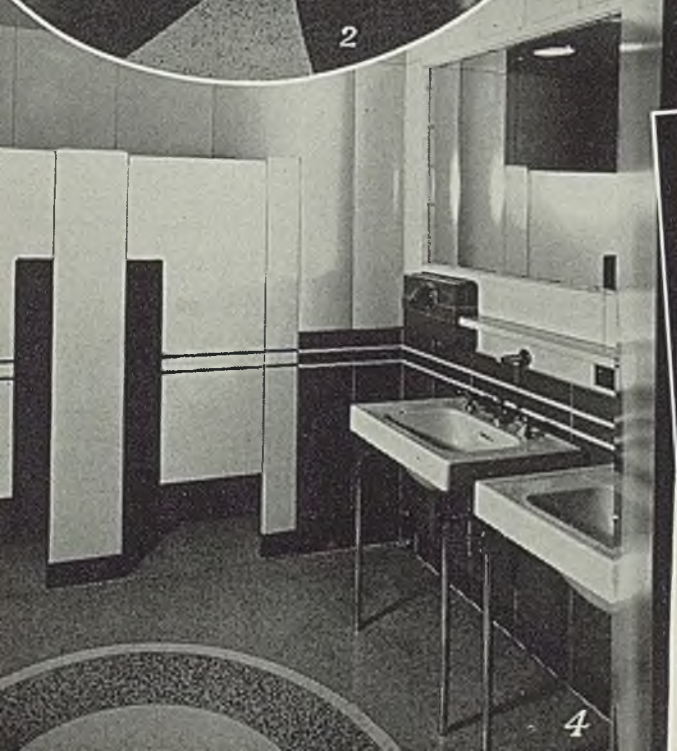
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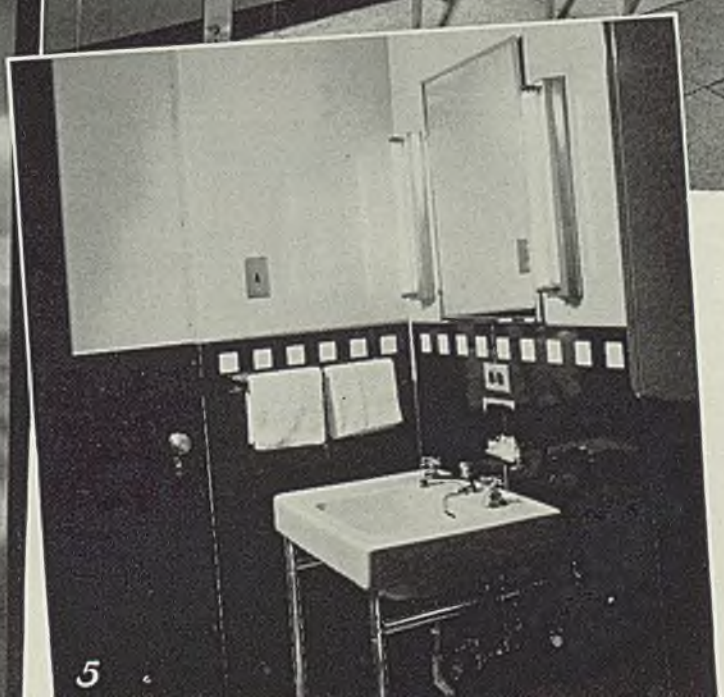
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Iron Powders in Europe

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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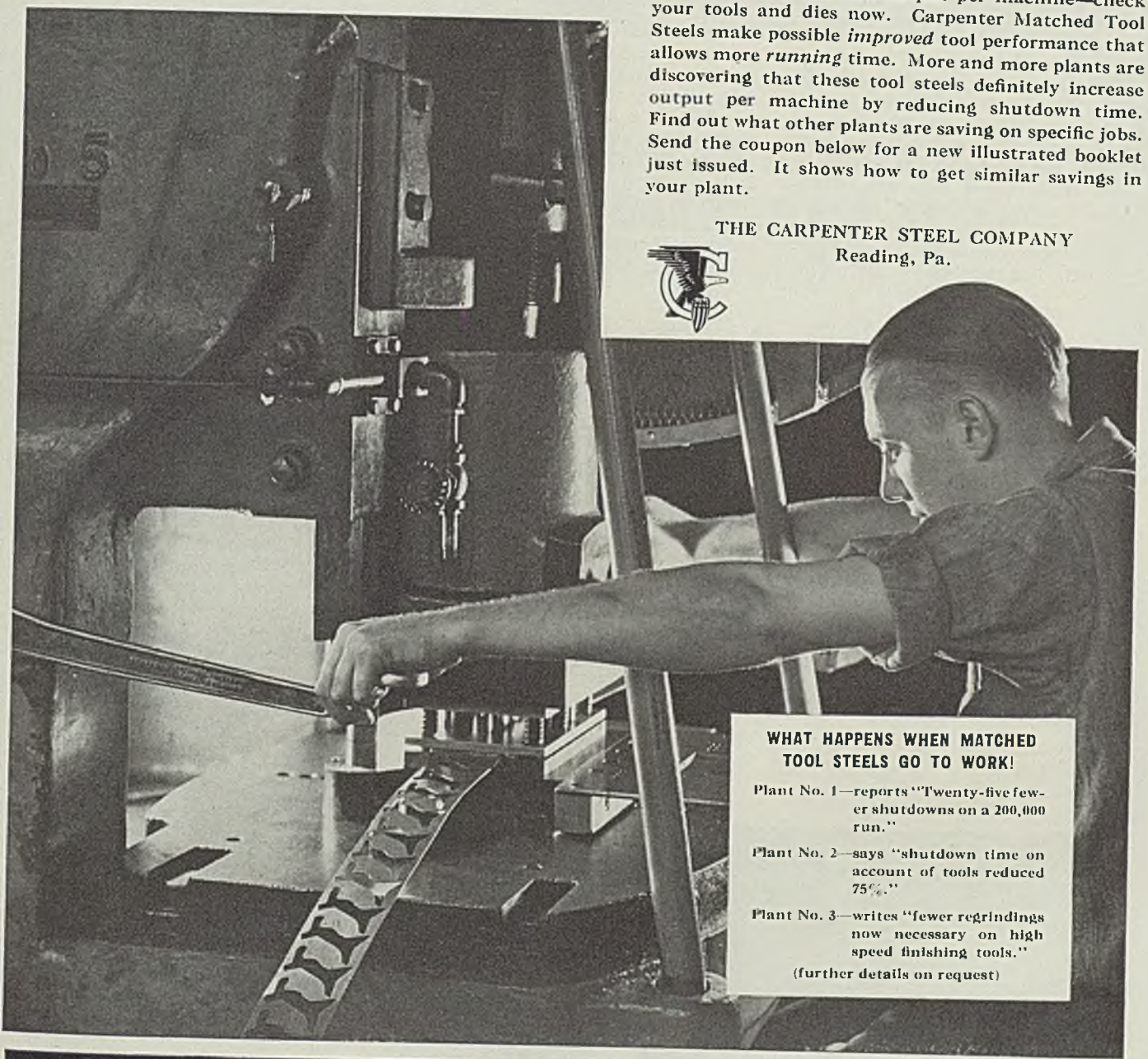

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as basis metals. Such powdered steels made on a pilot plant are being marketed in England.

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.

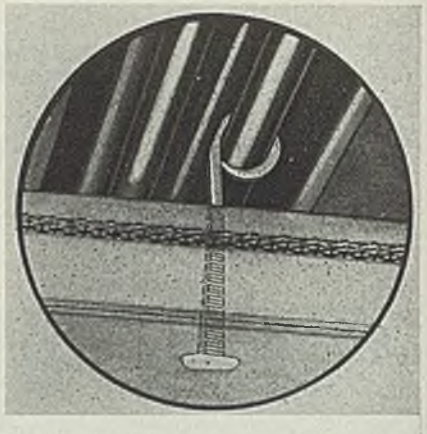


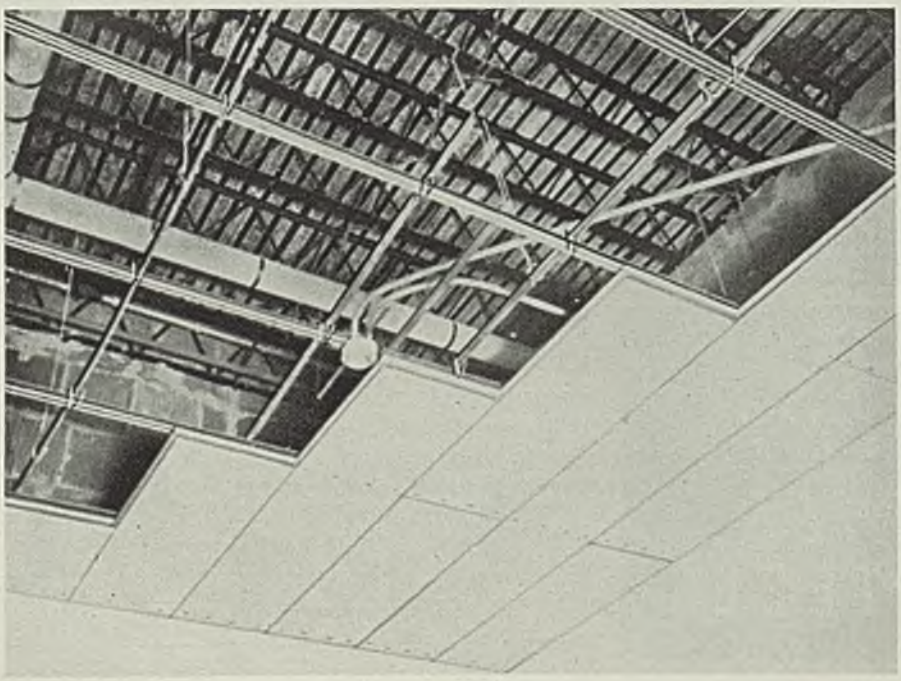
Fig. 1—Close-up view of rectangular cross-section nail acting as hanger to hold the gypsum board ceiling tightly against steel nailing channel. Oval-shaped spot in the lower portion of the illustration is the nail head

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.

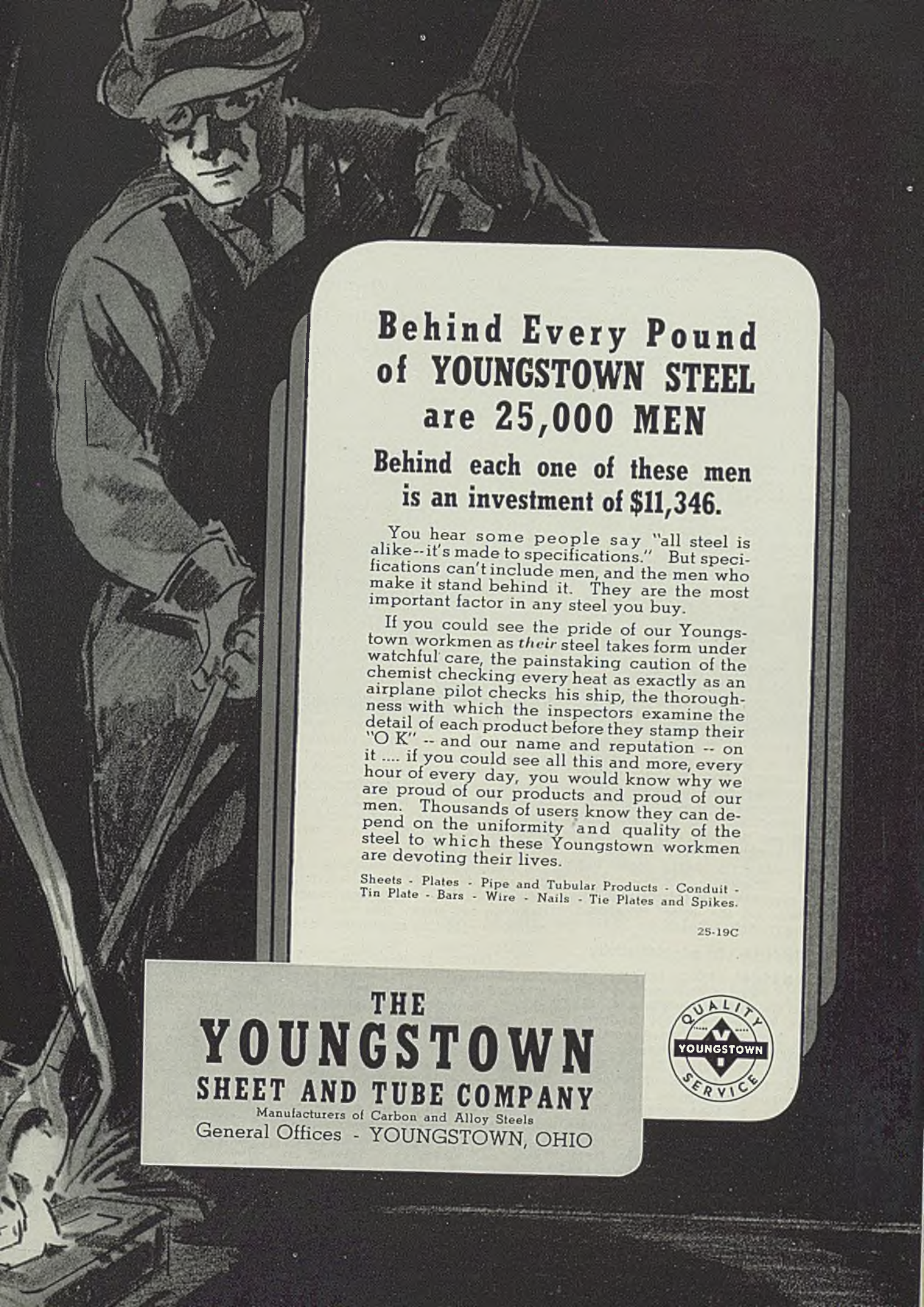
Specially-designed long rectangular cross-section nails are used to fasten ceiling material to the channels. These nails are driven through the ceiling material and, because of their shape, are guided by the contour of the channels and rods so that they wrap around the bar tightly, thus becoming hangers. 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.



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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.

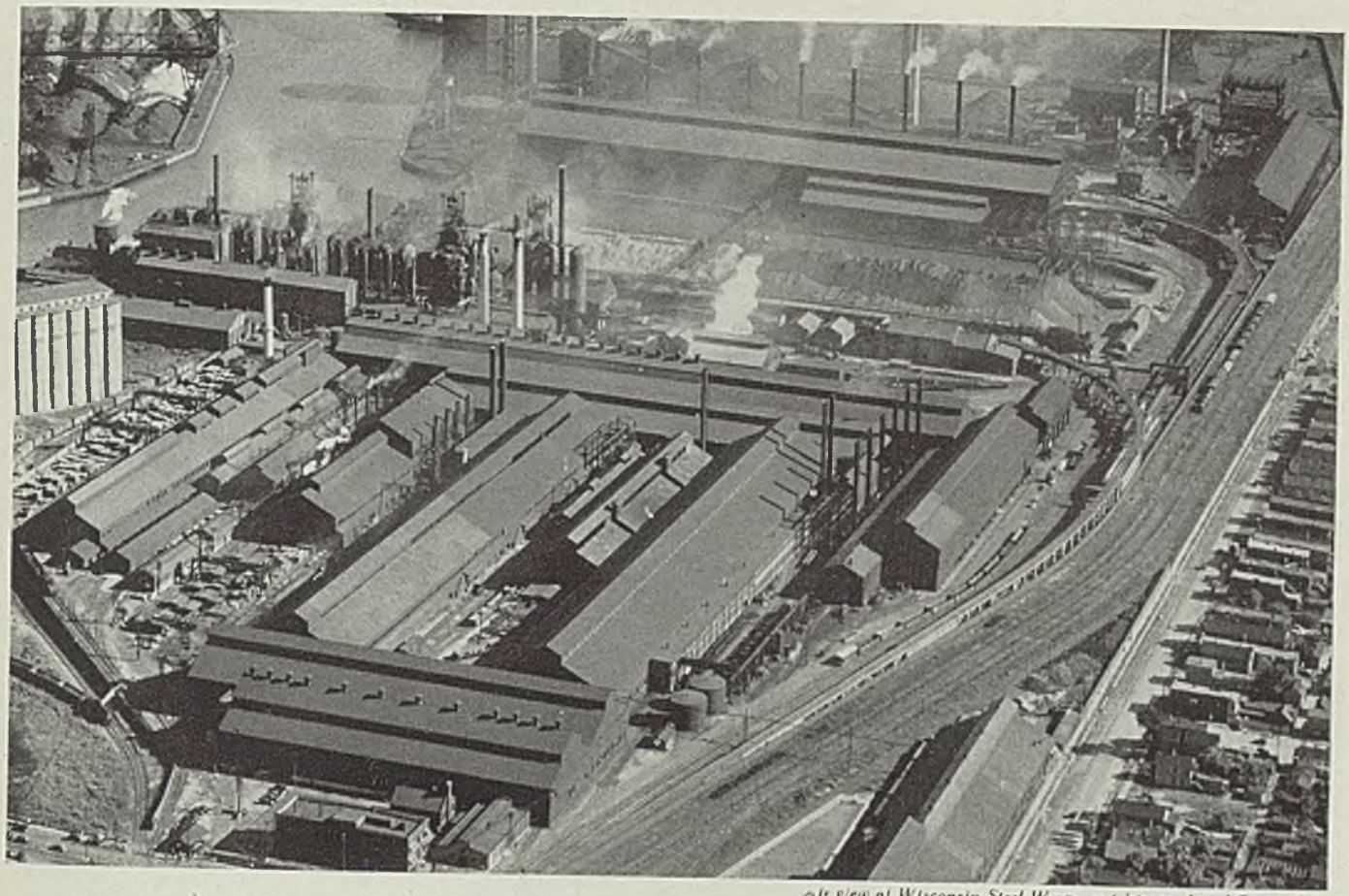
Excess Paint Dissolved

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.

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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.

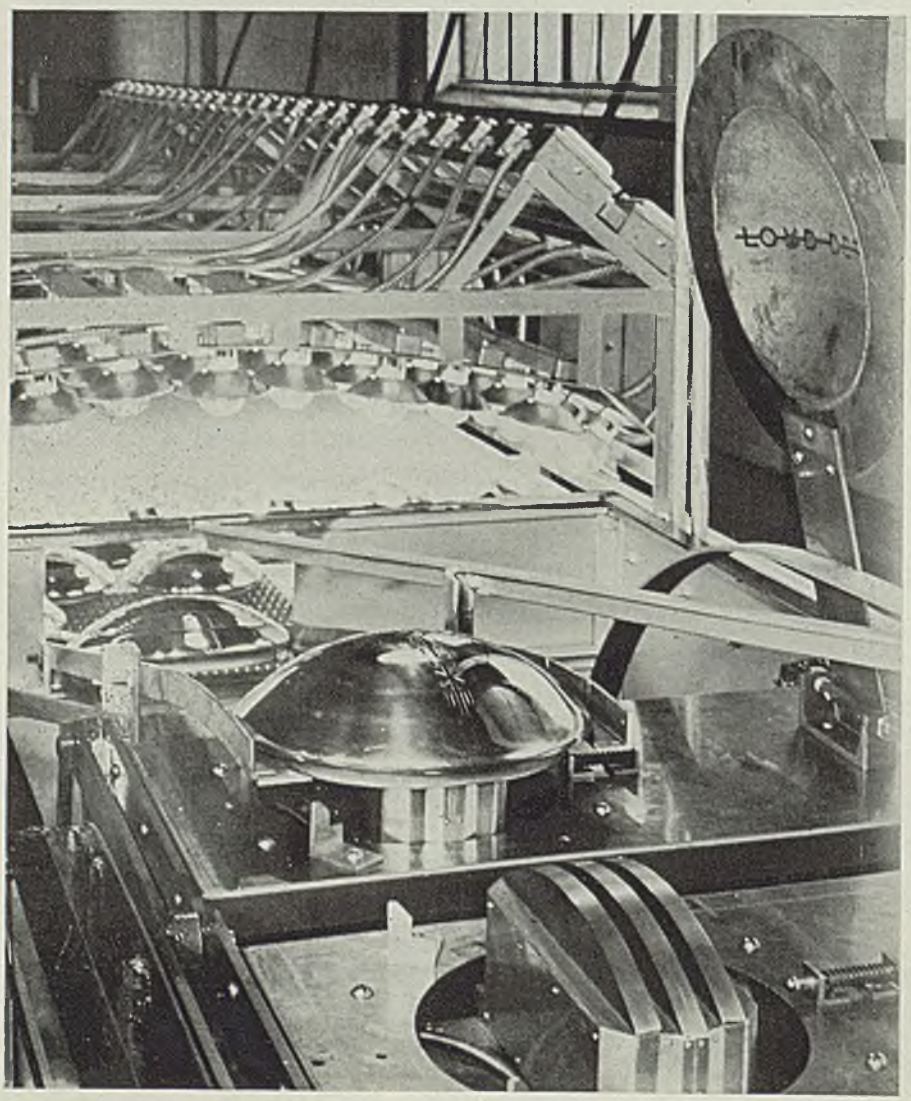
The horn button illustrated is an interesting piece of masking with this particular system because after the horn buttons are stamped, a steel fastener plate is inserted in the reverse side of the button. Placing this inset in has a tendency to distort the original stamping, making it almost impossible 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

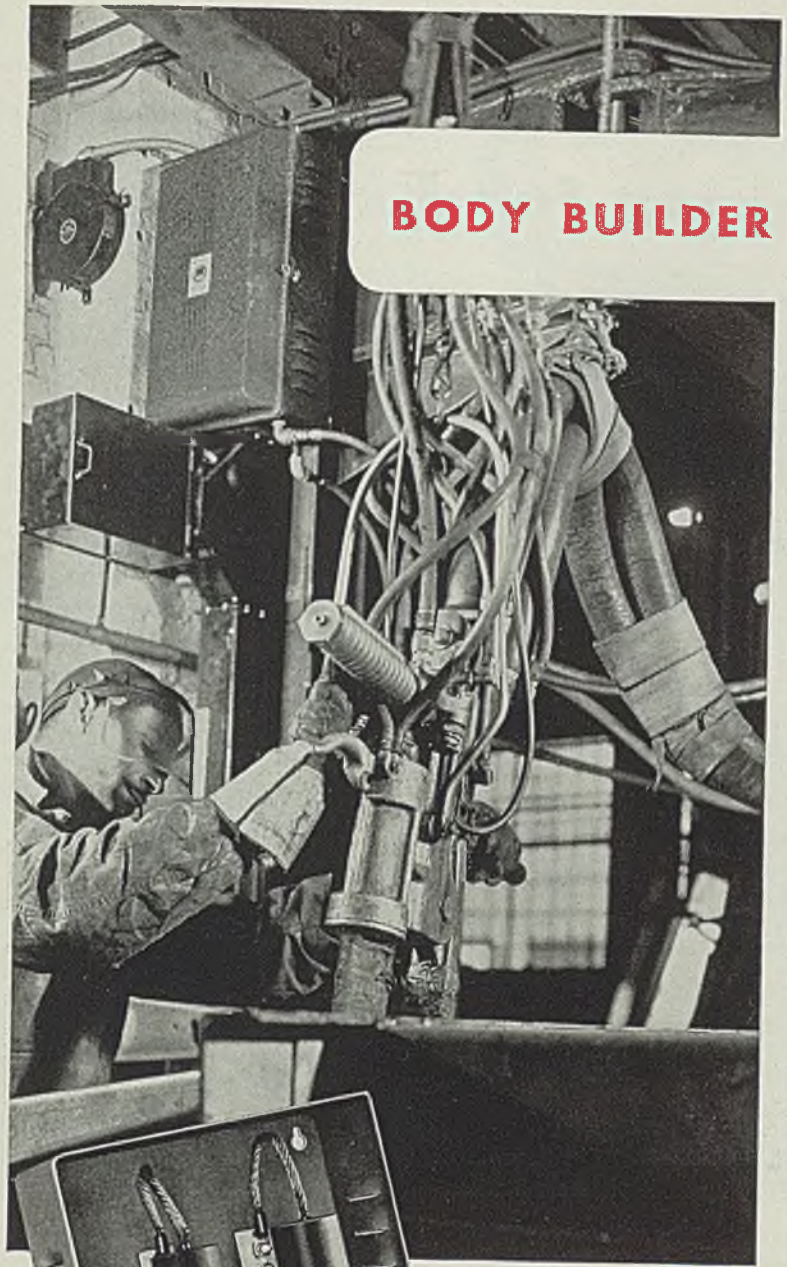


♦

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

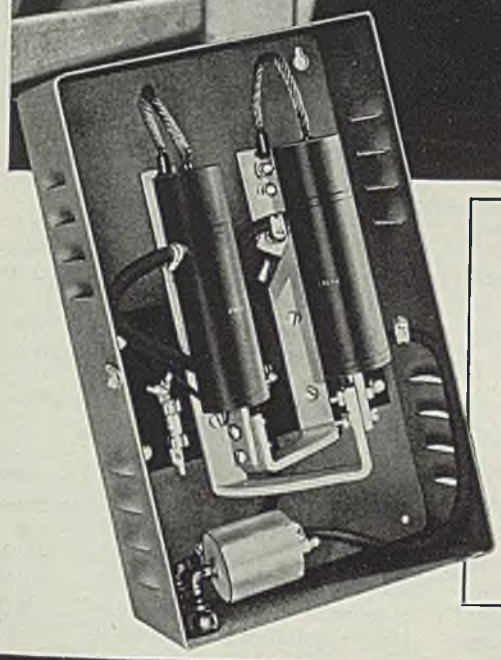
WELD-O-TROL—the new resistance welding switch WITHOUT A SINGLE MOVING PART was an important factor in an installation of five Weld-O-Trol equipped gun-welders at Gar Wood Industries, Inc.

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.

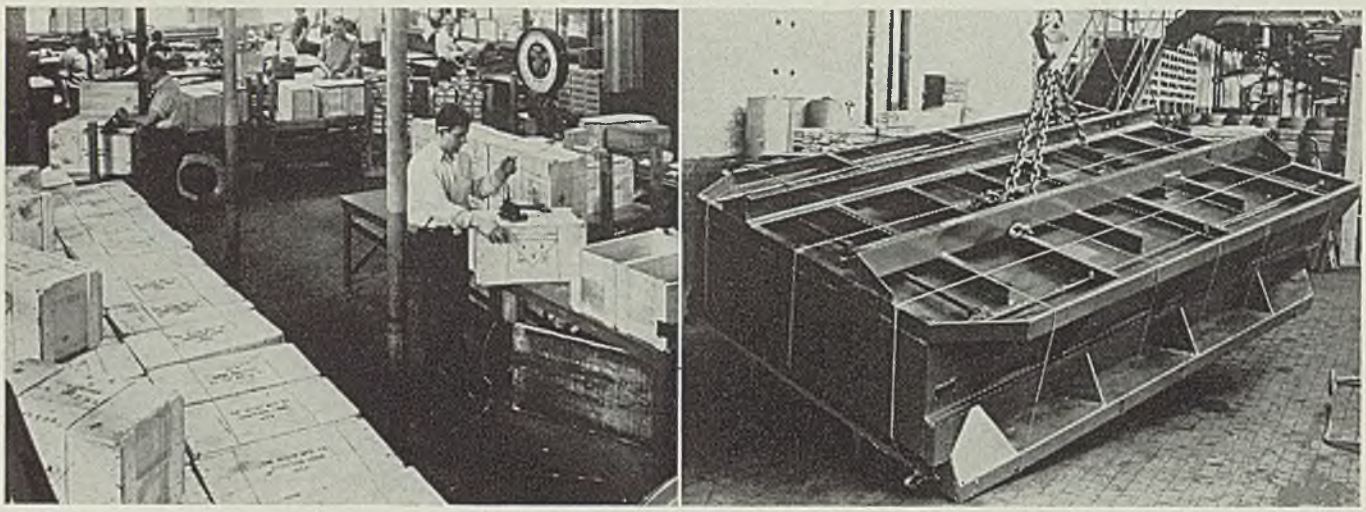
Tune in "Musical Americana", N. B. C. Blue Network, every Thursday evening.

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.

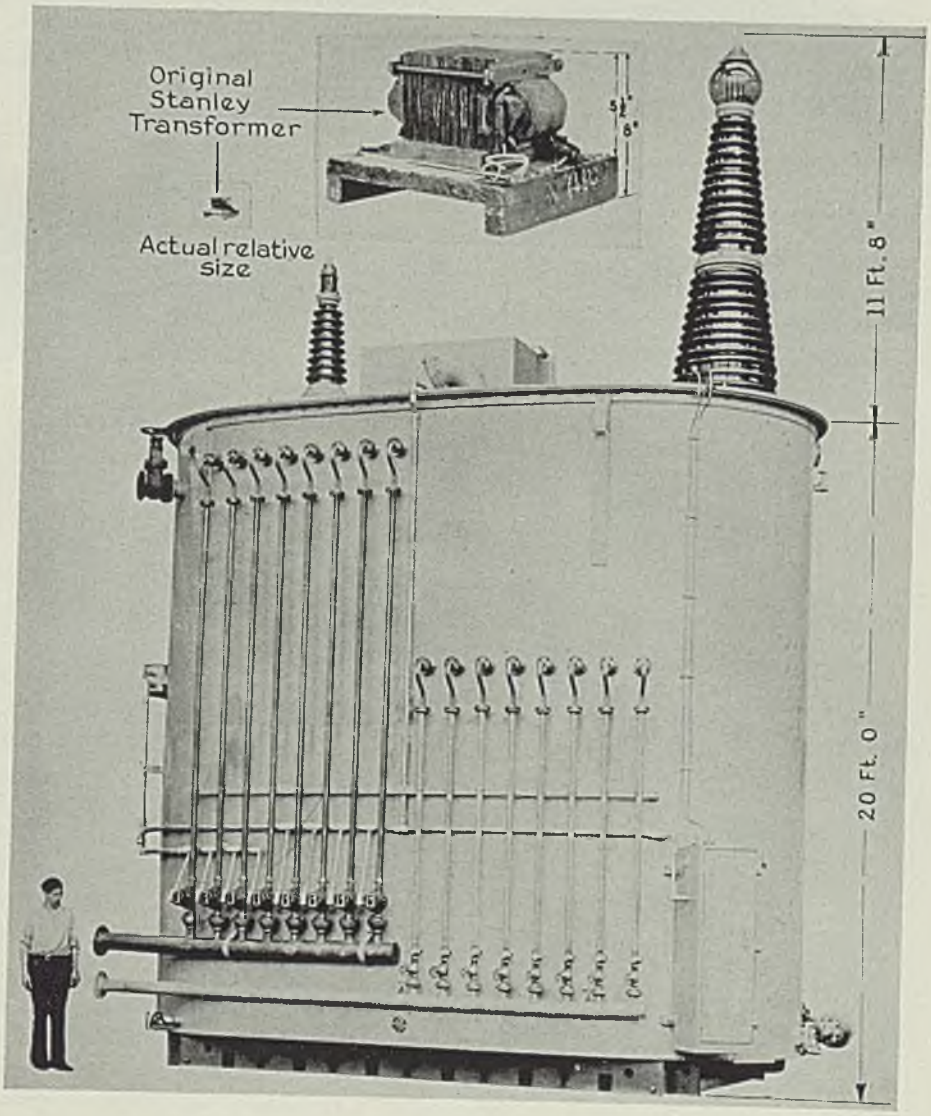
A transformer construction was devised using the newly developed high quality strip in such a way that its outstanding properties could be utilized to the fullest extent. The magnetic flux induced in the silicon strip is all in the direction of the length or rolling direction of the strip, which is the 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

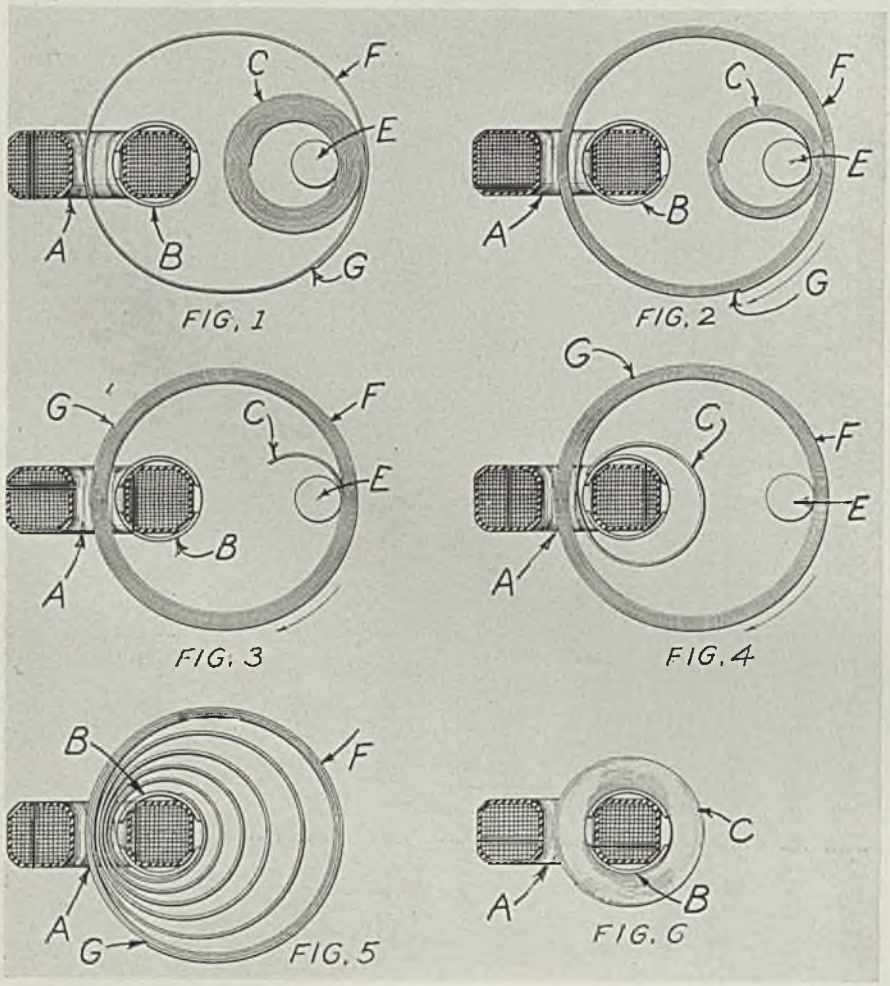
with the large loop F which permits the strip to be unwound from the core C and simultaneously rewound into the loop F.

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.

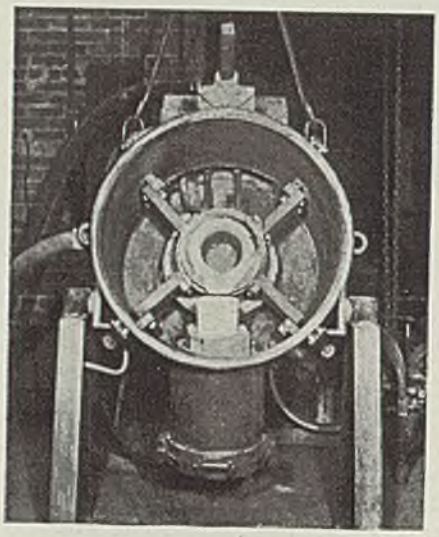
Why not get in touch with them today?

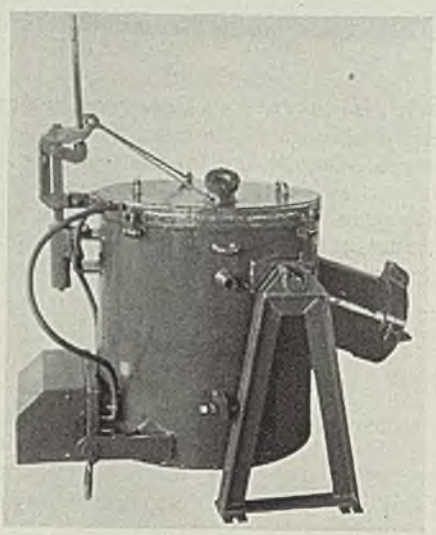
GENERAL ELECTRIC

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





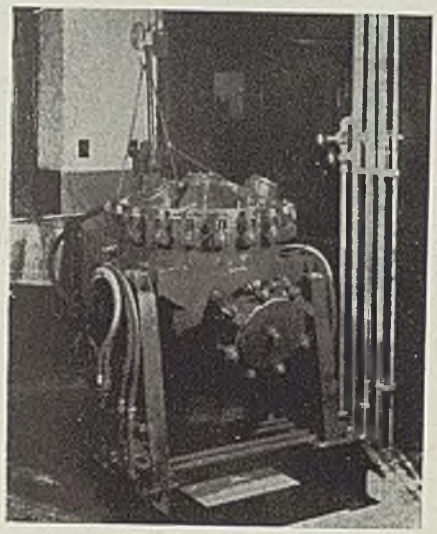


Fig. 1. (Left)—Vacuum furnace tilted and with lid removed to show hot top on mold. Fig. 2. (Center)—This vacuum induction melting furnace has 50-pound capacity. Fig. 3. (Right)—Pressure melting furnace is much heavier construction, has 50-pound capacity

■ 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.

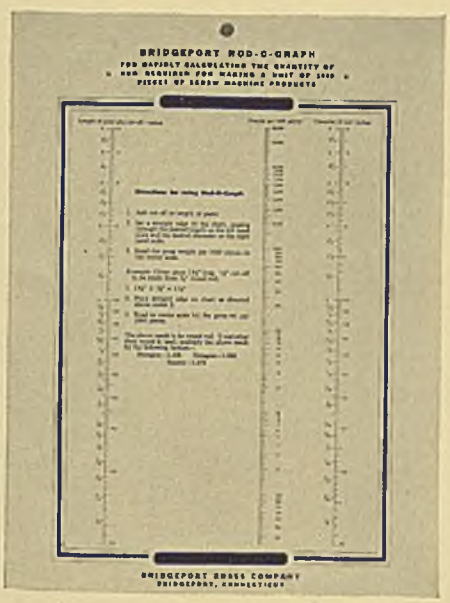
In percussive welding, electrical energy is discharged across the areas to be welded and a hammer-like blow is applied. In the equipment now on the market, the metals to be joined are connected to a source of high voltage, and are moved toward each other until an arc forms across the gap.

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.)

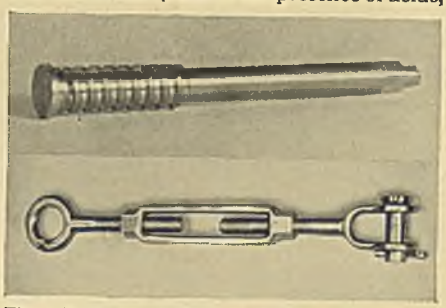
Wide Range of Usefulness

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

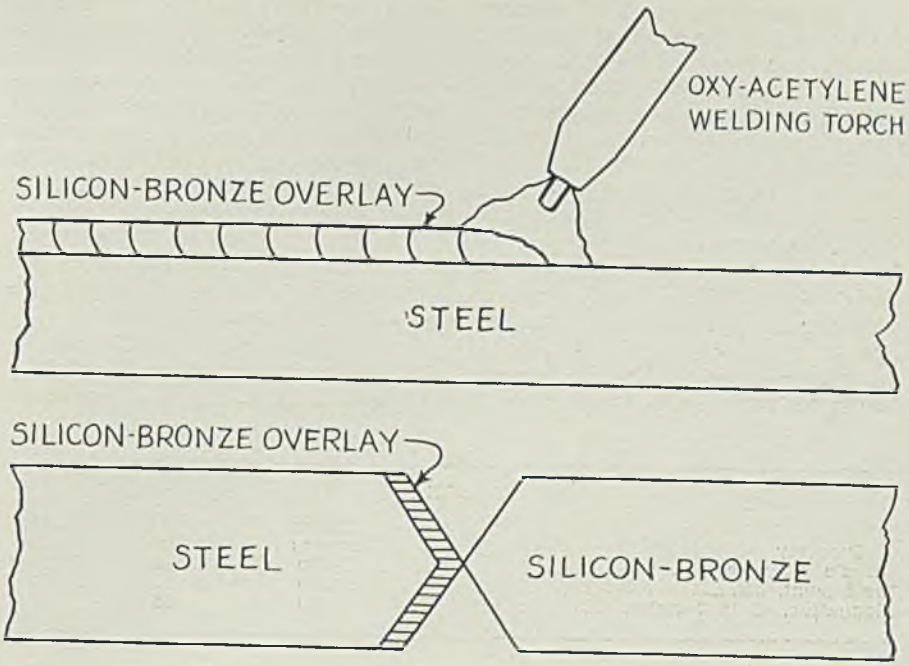


Fig. 1—Method of applying overlay of bronze to steel before welding

Fig. 2—Showing joint set up for welding silicon bronze to steel

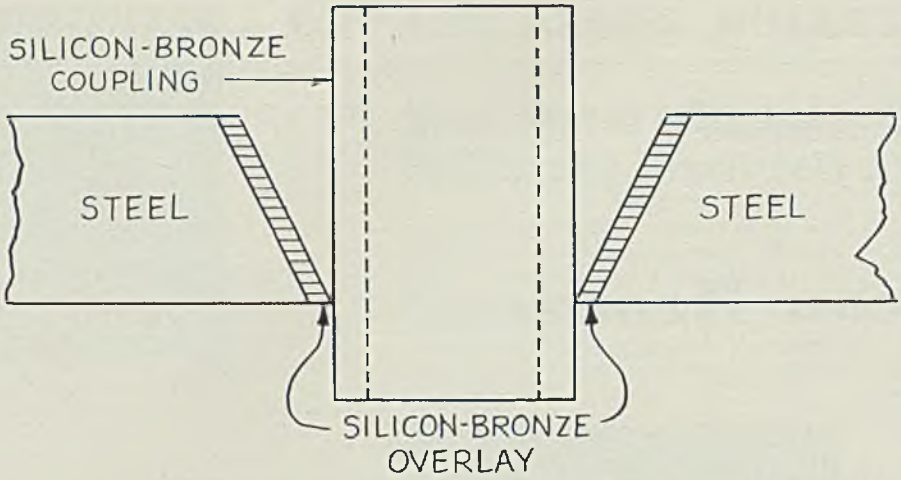


Fig. 3—Method of welding a bronze coupling, collar or outlet to a steel tank or other fabrication

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.

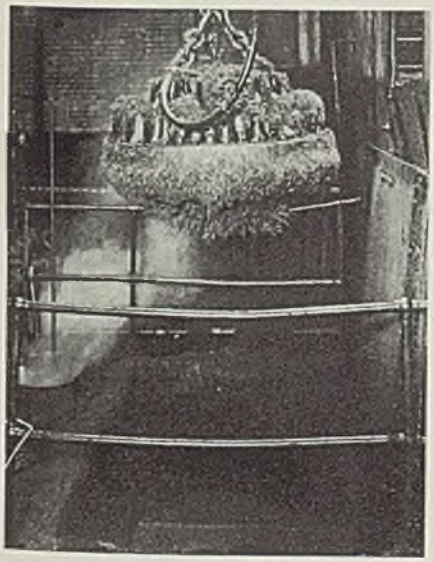
Coolant is reclaimed from the mixture of oil and water by allowing the mixture to flow to a large compartment sump where the oil is constantly removed by means of floating skimmers. This oil in turn is pumped to settling tanks from which it is drawn and sent through centrifugal separators to remove fine 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.

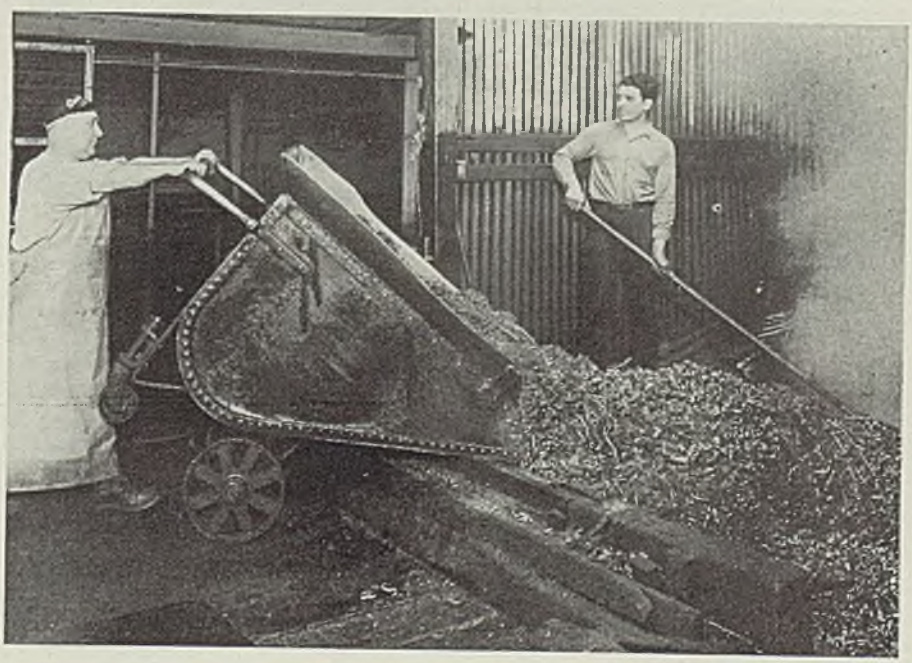
This recovery system has another excellent feature. In heating the oil to 190 degrees Fahr. for efficient centrifuging, the oil is completely sterilized so there is no chance of infecting the screw-machine operators.

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.

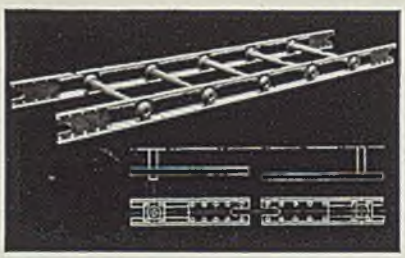
Synchronous Control

■ 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

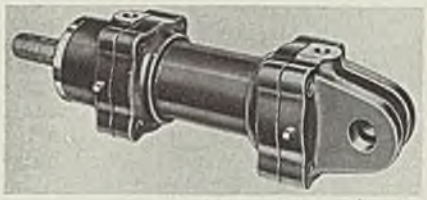
■ Aluminum Ladder Co., Tarentum, Pa., announces a portable aluminum sectional telescoping ladder for general maintenance work around plants and office buildings. It is light in weight and has great strength. Ladder is constructed in five sections each 6 feet long. Total



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

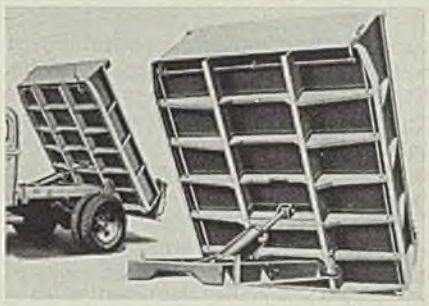
■ Hannifin Mfg. Co., 621 South Kolmar avenue, Chicago, has added to its line of high pressure hydraulic cylinders a standard swivel mounting type, models BN and B2N. Model BN is a cylinder with a small diameter piston rod, while the latter is a cylinder with a two to one



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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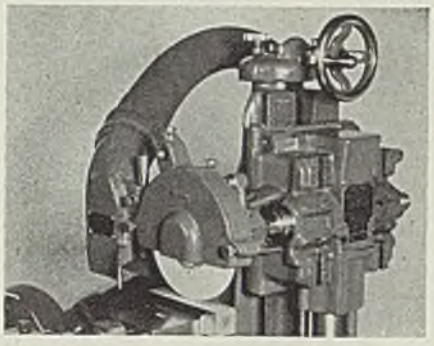
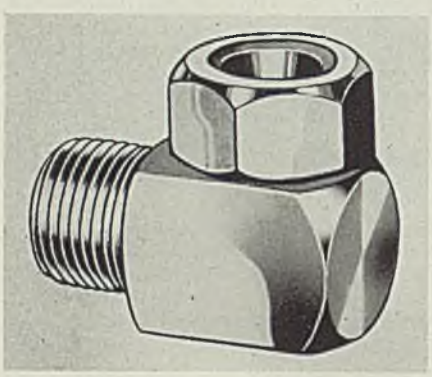
blown into a spiral separator where the heavier particles are removed by centrifugal force, and slowly dispersed over the whole area of the



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.

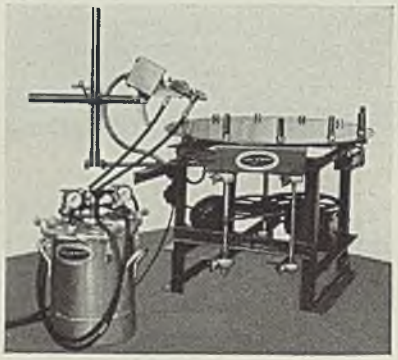
Electric Sander

■ 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

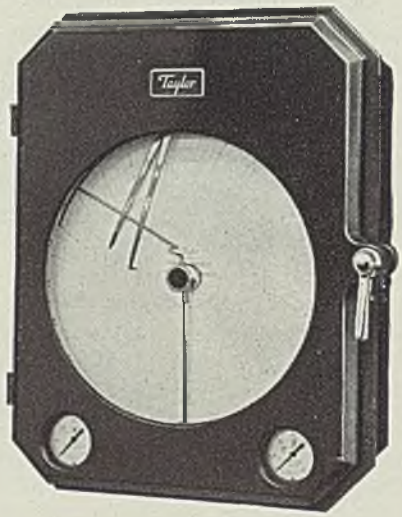
■ Eclipse Air Brush Co., Newark, N. J., has introduced an automatic sprayer to coat the inside and outside of steel tubes, 4 inches long,



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

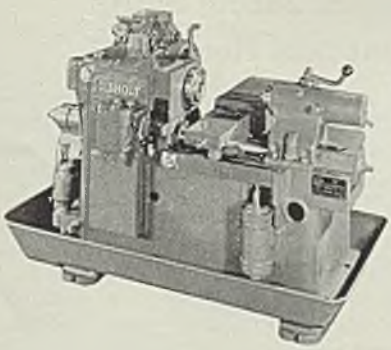
■ Industrial Products Co., 800 West Somerset street, Philadelphia, has introduced an emergency fire suit for combating emergency fires. Jumper suit with overshoes attached is made from asbestos cloth. It is adjustable at waist automatically for any normal size. Extra long

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:

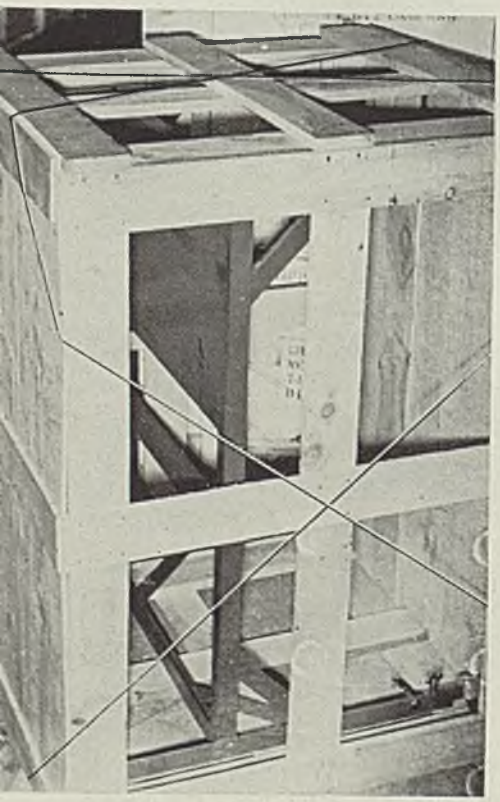
Another considerable reason for strong packing is the pilfering in transit. It is probable that no amount of care in packing can entirely prevent this, yet strong well-nailed wire-bound or strapped boxes are more immune than those which burst when merely dropped on the floor at a certain angle.

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.

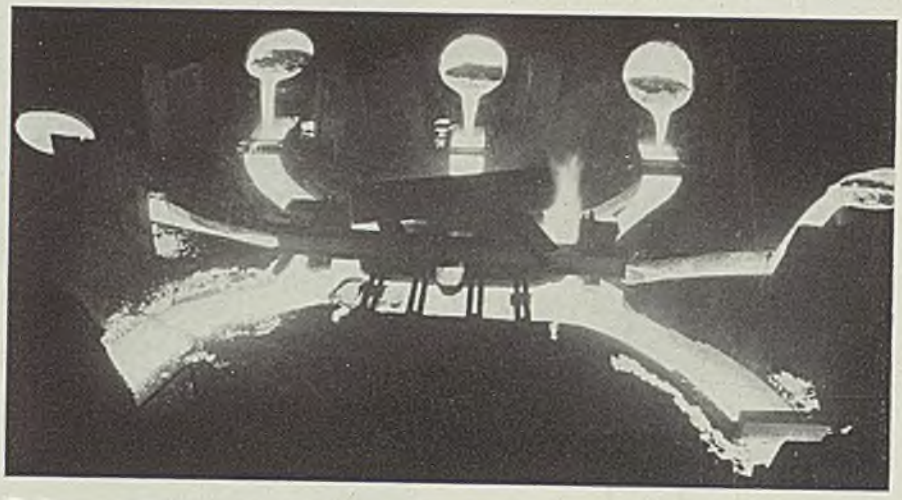
Diagonal metal bracing has several advantages over wood diagonal bracing. It may be applied more quickly since the sawing and nailing operations are eliminated and it is cheaper, the metal binders costing less than the wood braces. Other savings, such as in shipping weight and space, also are effected. 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.

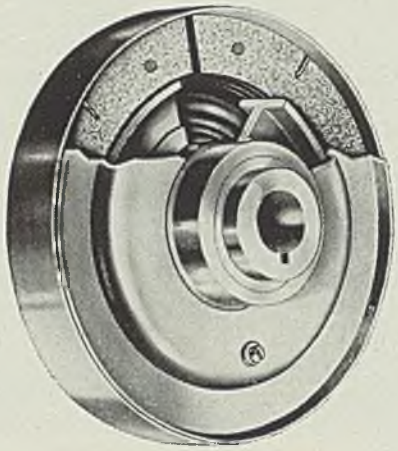
Industrial Truck

■ 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.

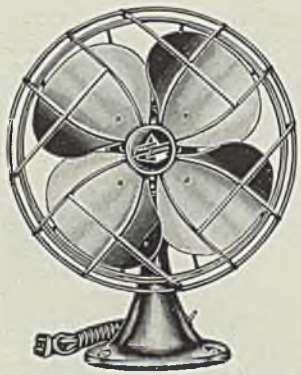


Reflector

■ 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

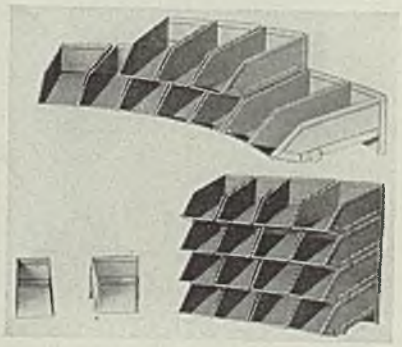
■ Mosebach Electric & Supply Co., 1170 Arlington avenue, Pittsburgh, has developed cast bronze numbering plates for numbering plants,

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

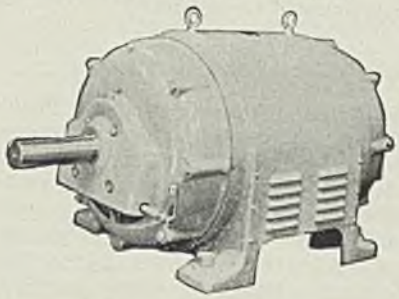
■ Stackbin Corp., Providence, R. I., announces a new larger size assembly bin. It is 12 inches long, 4



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

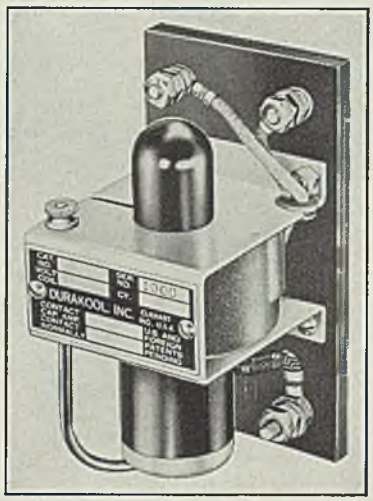
may be flushed frequently and there is no chance of caking resulting in insufficient lubrication.

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

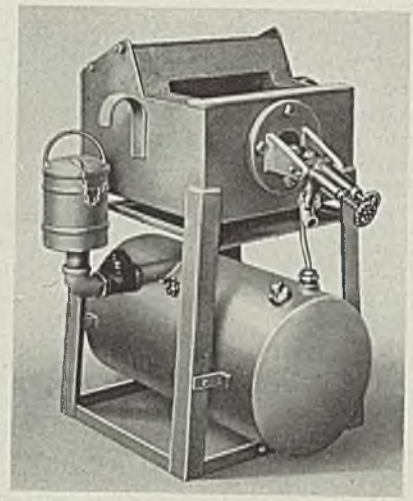
■ Acme Protection Equipment Co., 3647 Liberty avenue, Pittsburgh,

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-

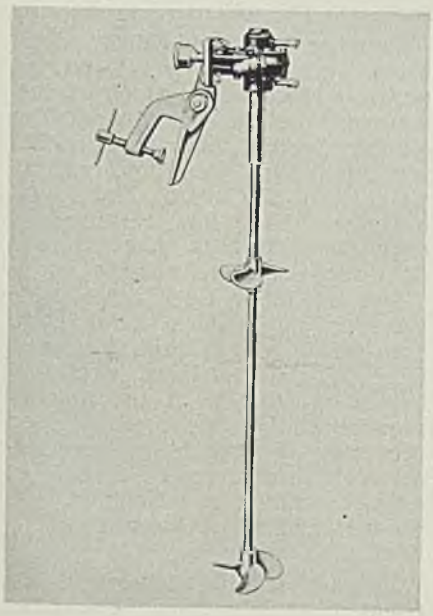


duces white hot rivets in 3 minutes from cold start and heats 200 rivets per hour.

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

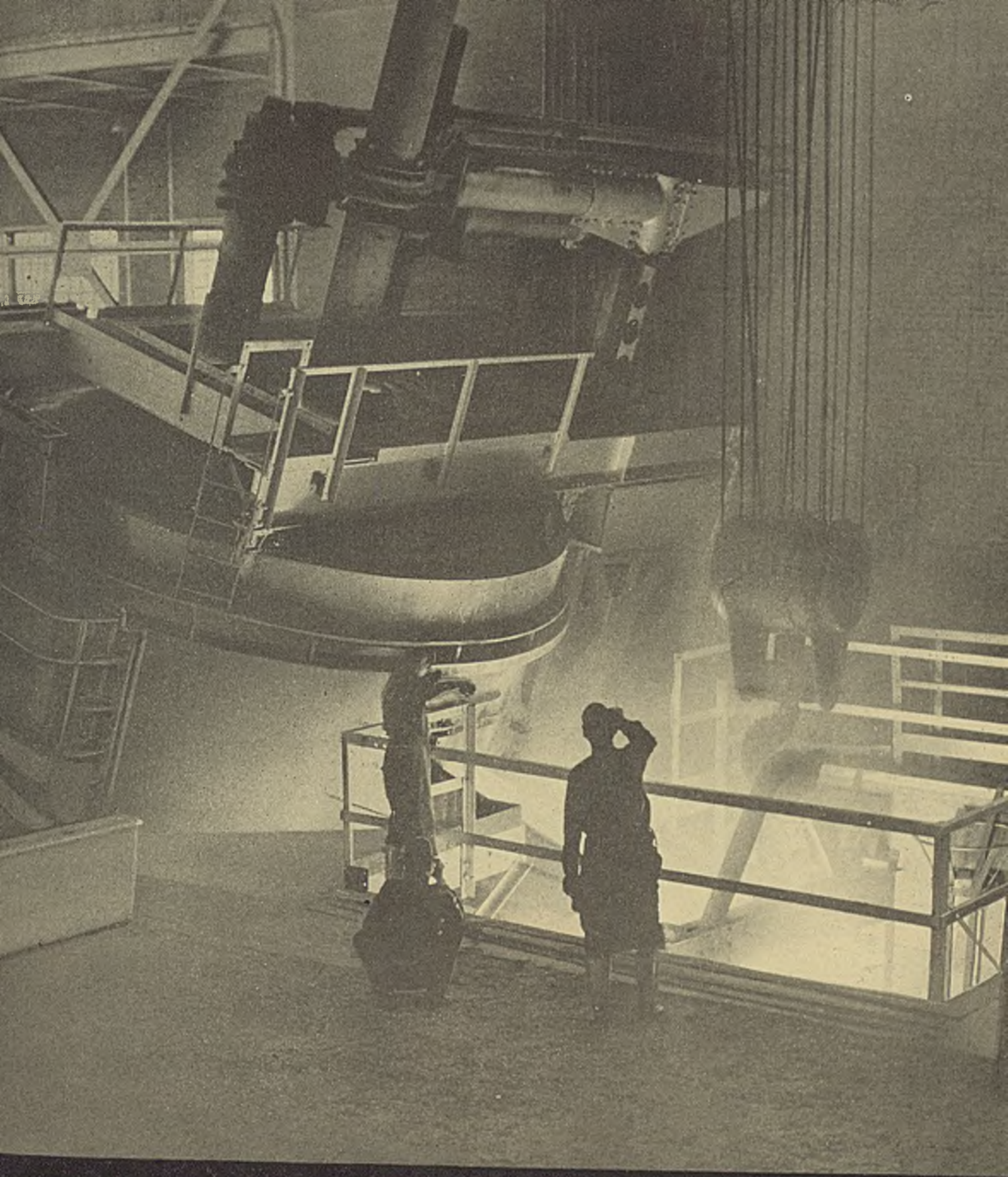
■ A new type of construction for furnace walls and arches, called Thinsulite, is announced by M. H. Detrick Co., 140 South Dearborn street, Chicago. It is suitable for boiler walls, water wall backing, oil still heaters, stress relieving furnaces and all areas not exposed to actual abrasion.

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

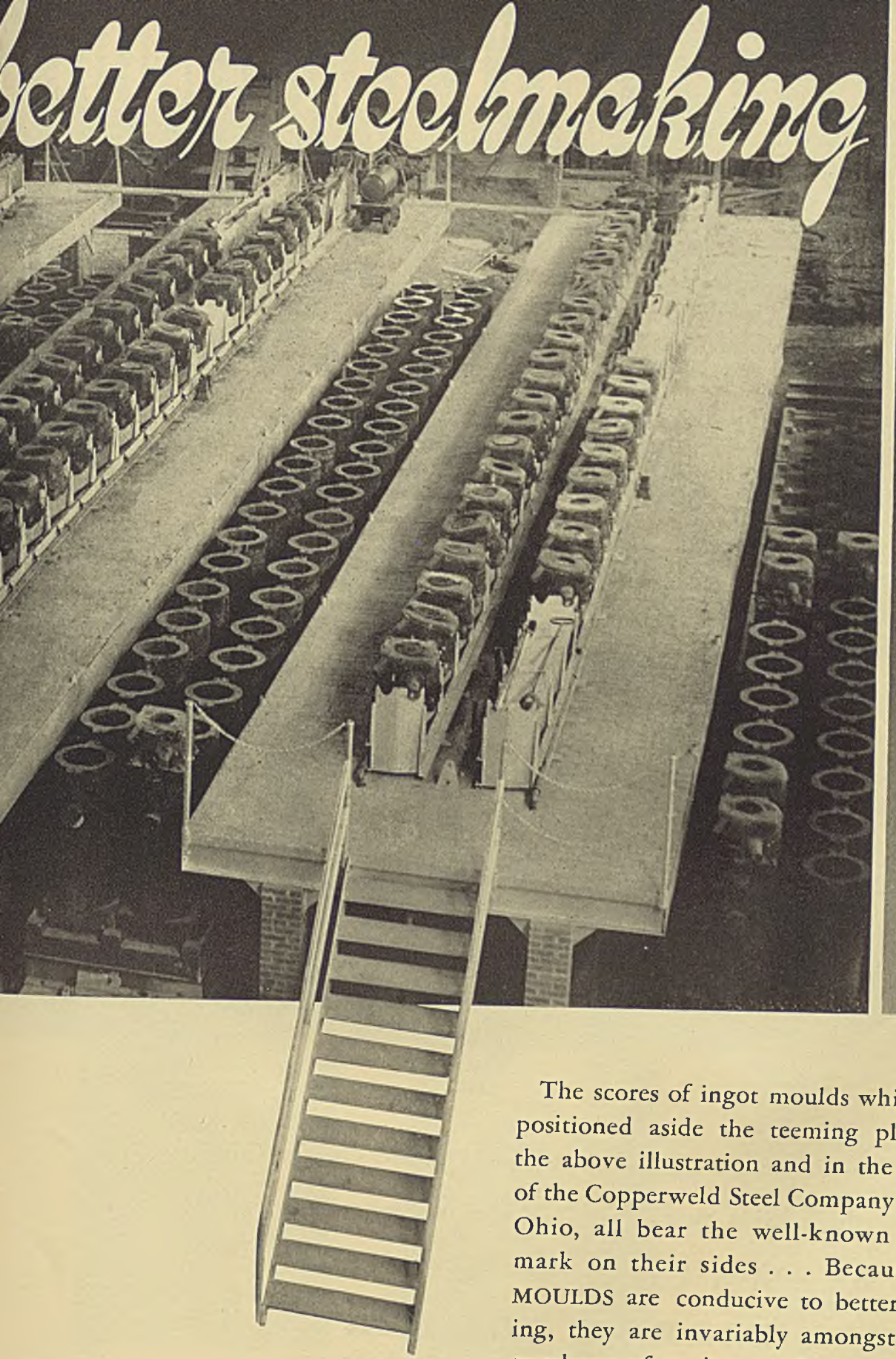
at Warren, Ohio

V

Steps toward

VALLEY MO

GENERAL OFFICE: HUBBARD, OHIO

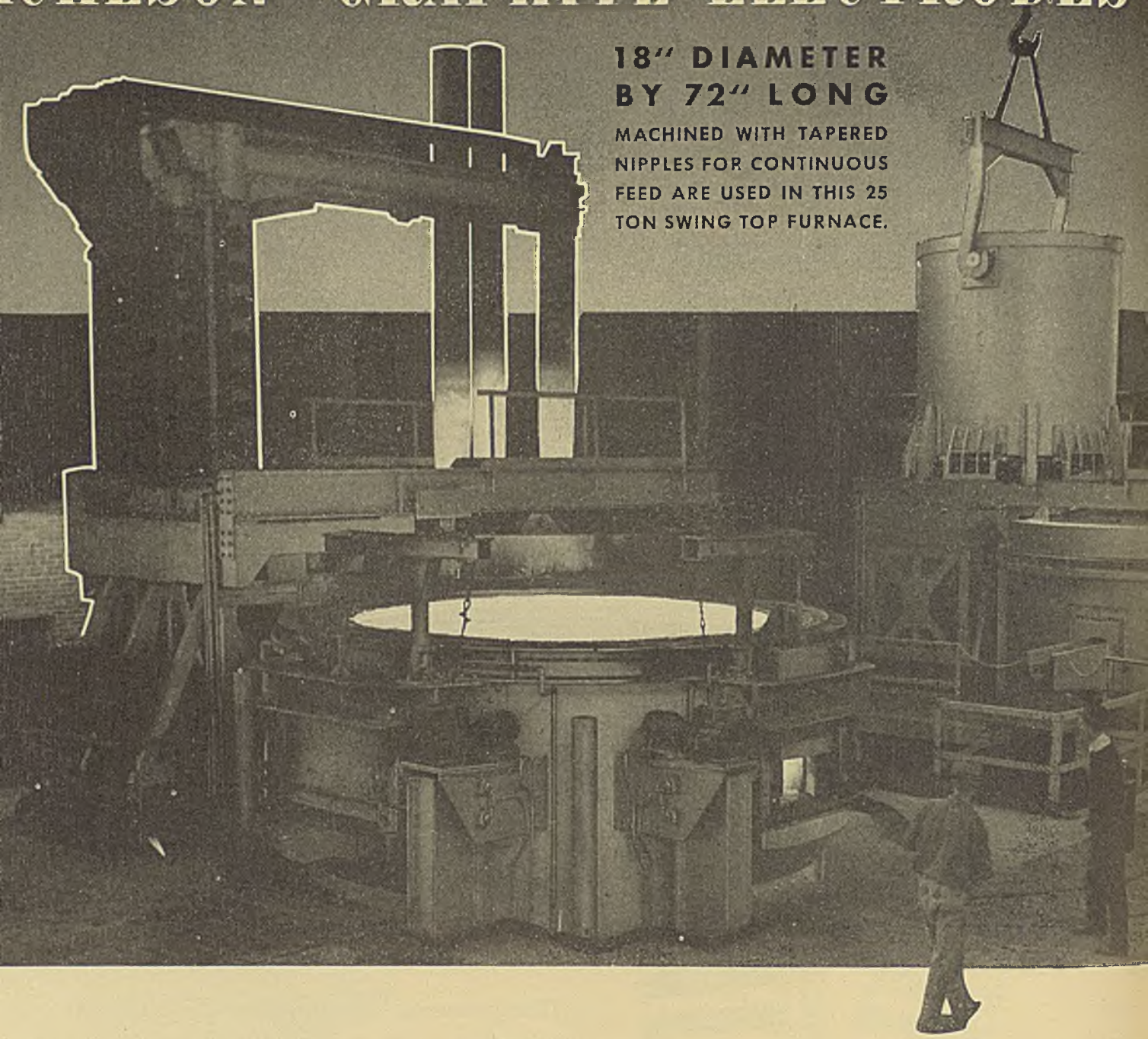


The scores of ingot moulds which you see positioned aside the teeming platforms in the above illustration and in the new plant of the Copperweld Steel Company at Warren, Ohio, all bear the well-known "V" trade mark on their sides . . . Because VALLEY MOULDS are conducive to better steelmaking, they are 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

UCC

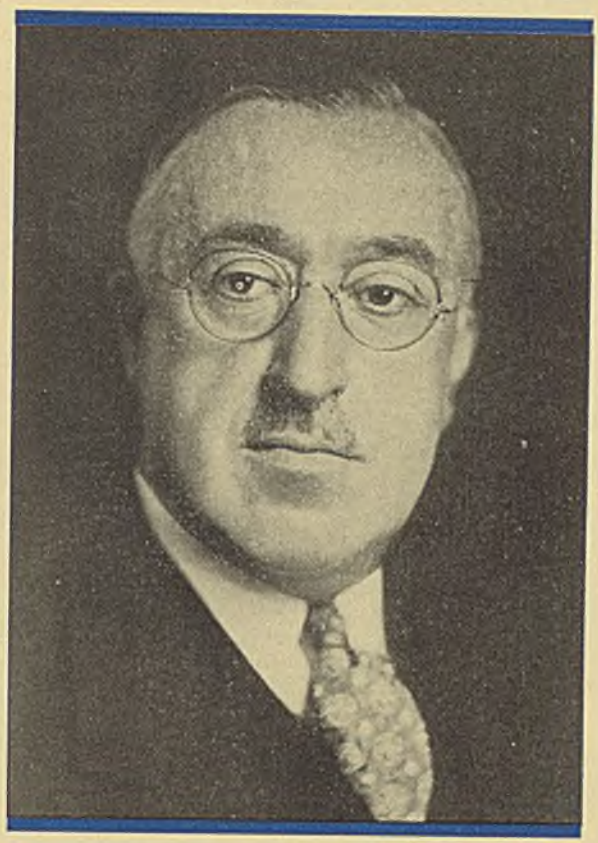
ELECTRODE SALES DIVISION

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

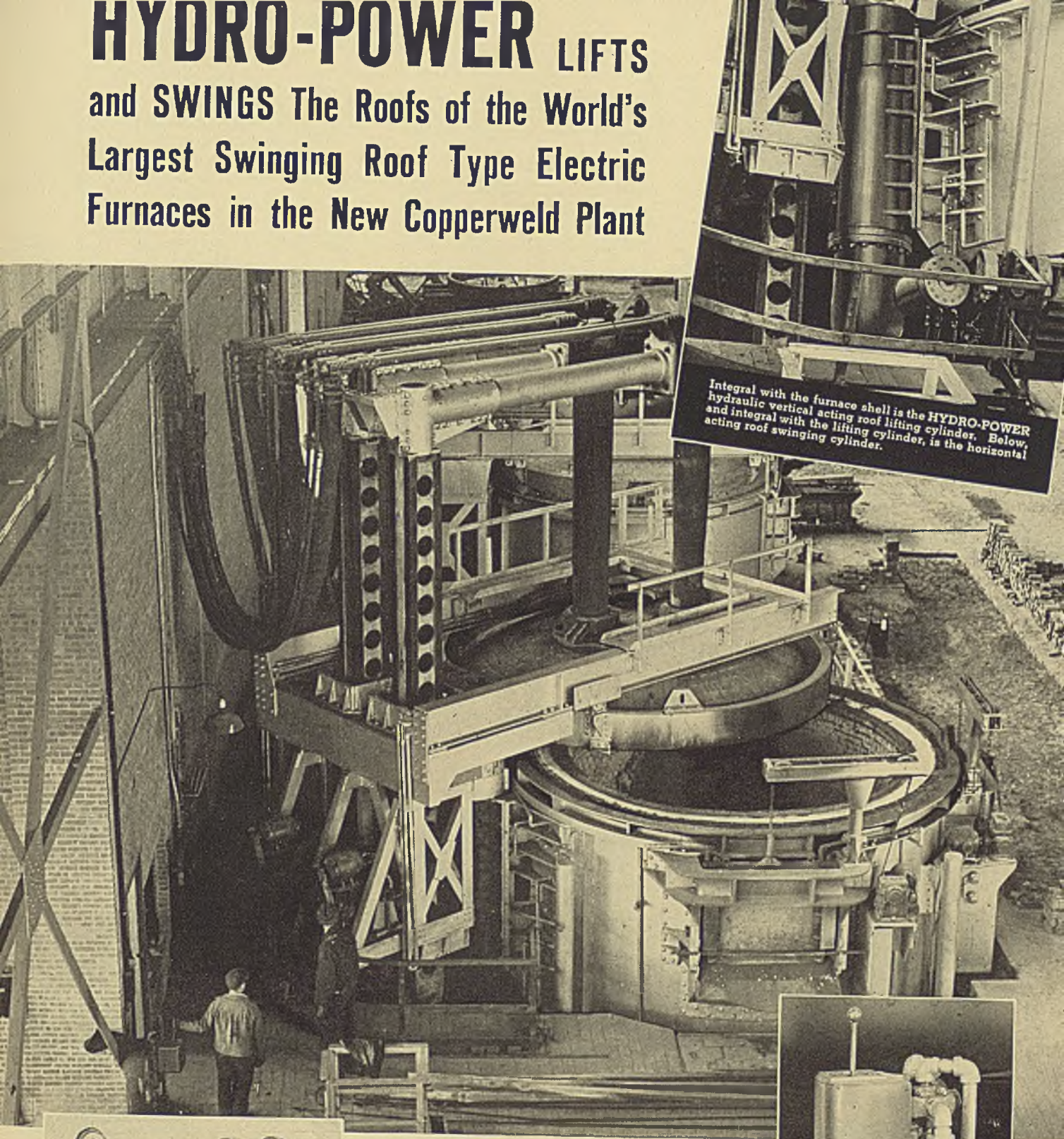
W. C. Morgenstern

Donald Schaffert

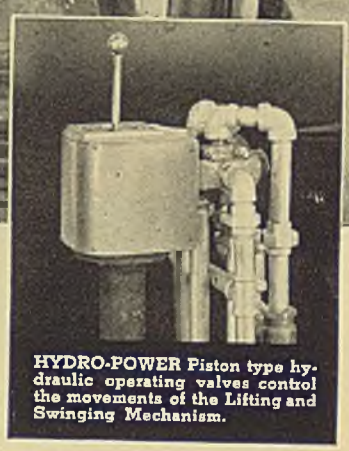
John B. Formet

H. F. Peschel

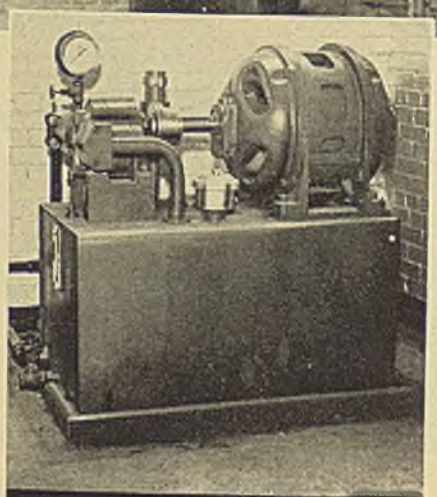
HYDRO-POWER LIFTS and SWINGS The Roofs of the World's Largest Swinging Roof Type Electric Furnaces in the New Copperweld Plant



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.

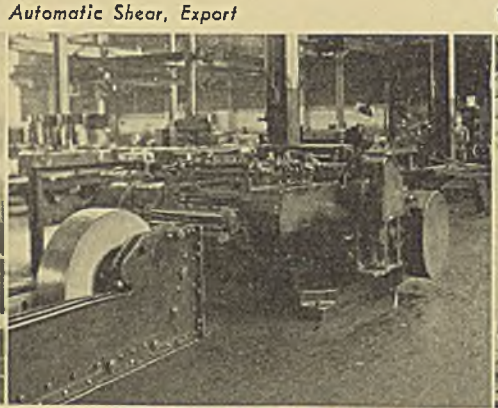
This specialized service has now been functioning for 25 years in the purchase and sale of high-grade existing rolling mills and steel works equipment. It has been extended to complete plants as well. Sales in this field have probably exceeded those of any other organization in it. Largest order, over 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.

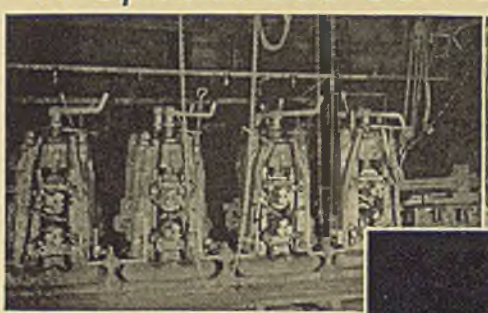
Automatic Cooling Bed, U. S.

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

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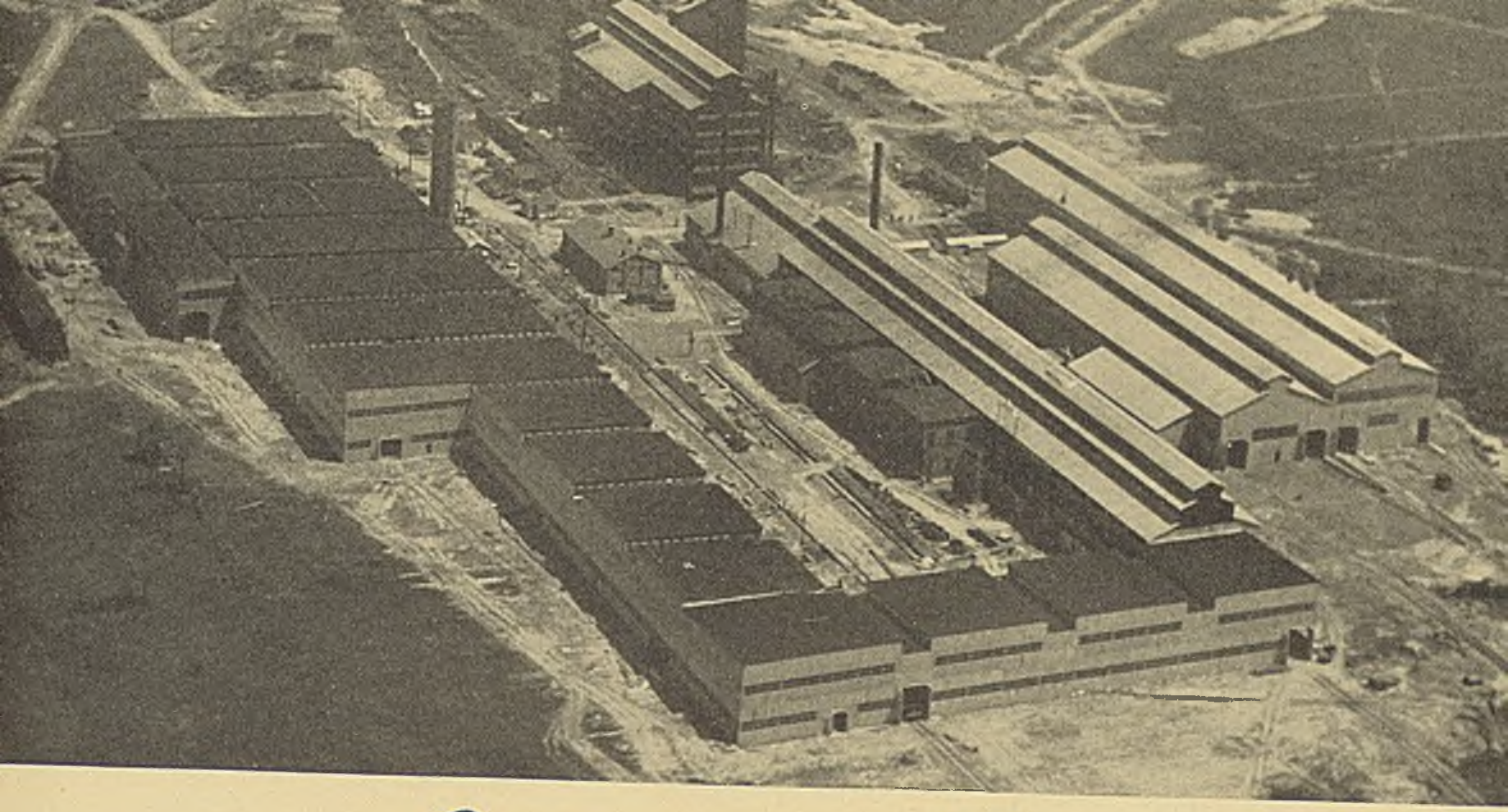


Copperweld's NEW ALLOY STEEL PLANT

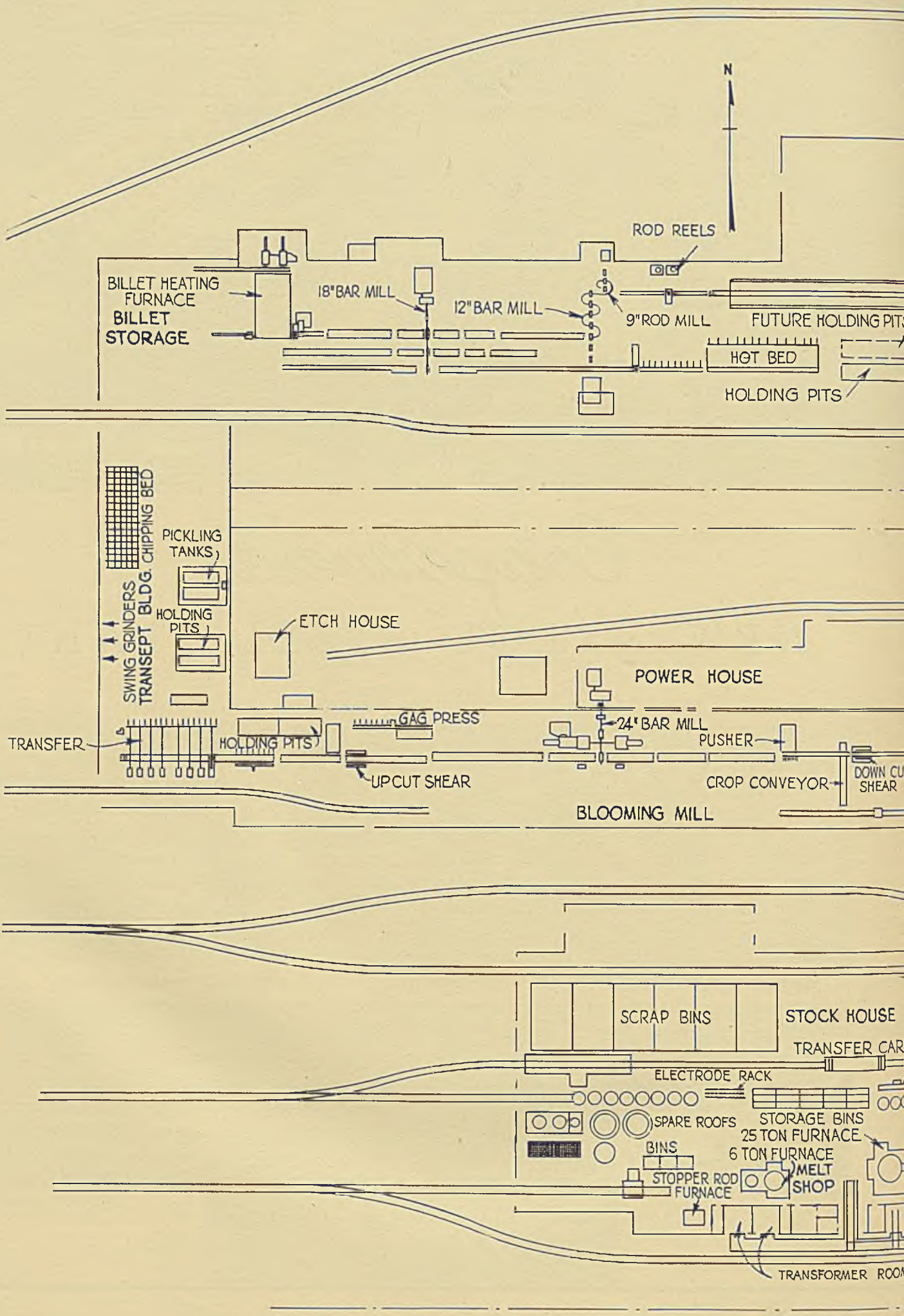
By John D. Knox
Associate Editor, STEEL

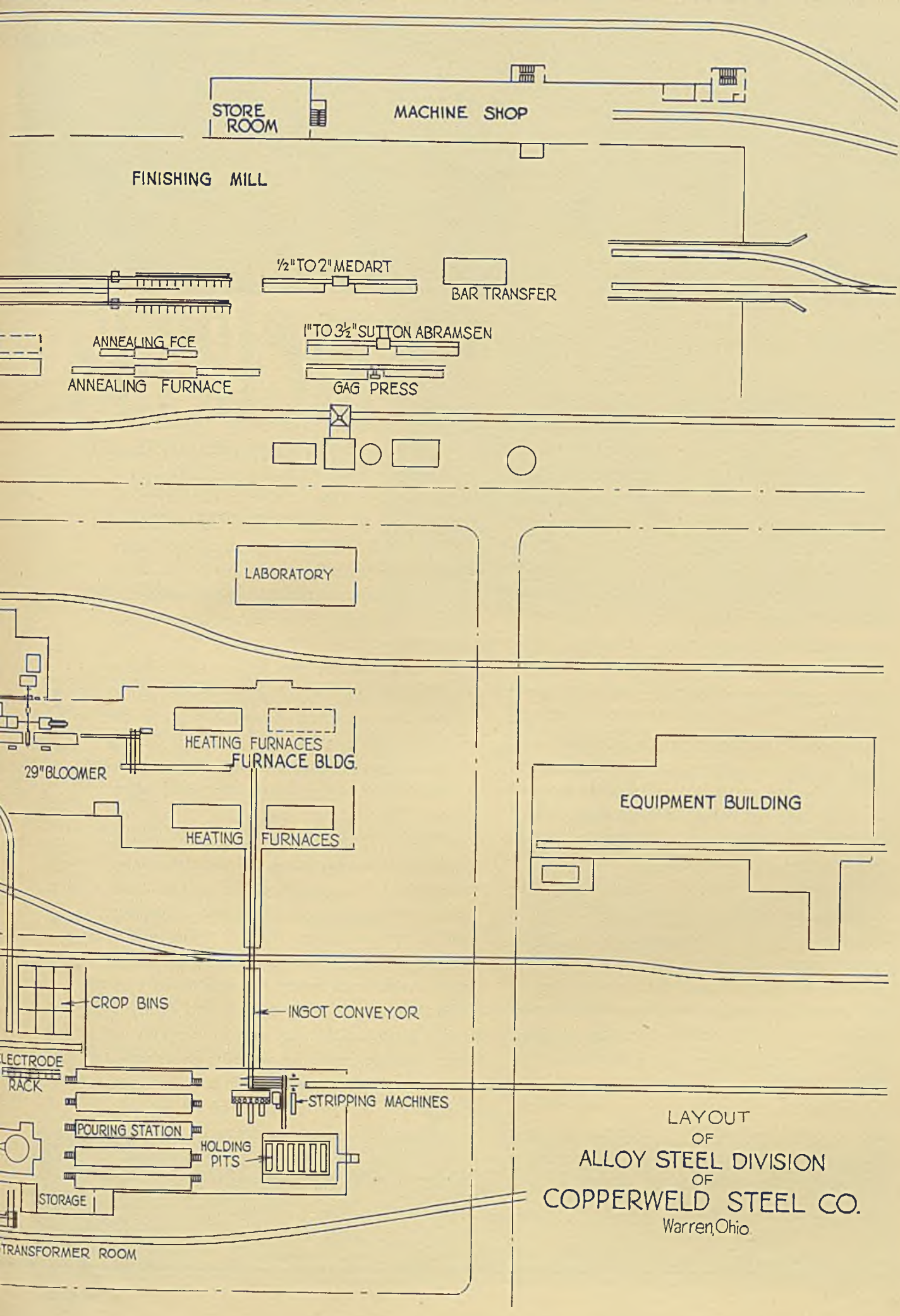
■ ALLOY STEEL now is being manufactured at the new plant of the Copperweld Steel Co., 2¼ miles north of Warren, O. on State highway, Route 45. The plant site includes 423 acres on the Mahoning river, and is served by the Baltimore and Ohio, Pennsylvania and Erie railroads. Standard S. A. E. types of 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.

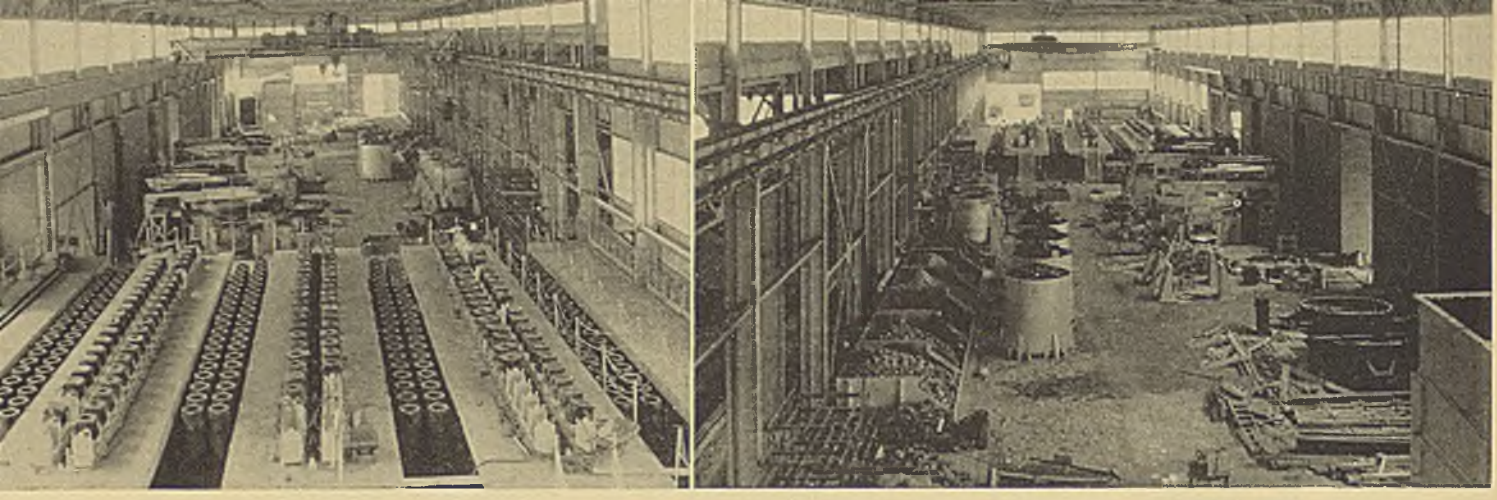
Approximately 7½ acres of floor space are under roof in modern day-light buildings—all served by cranes. The melt shop is housed in a building 78 x 500 feet, on the south side of the property with offsets provided for material storage, transformers, offices, test room and ladle stopper repair. The melt 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.

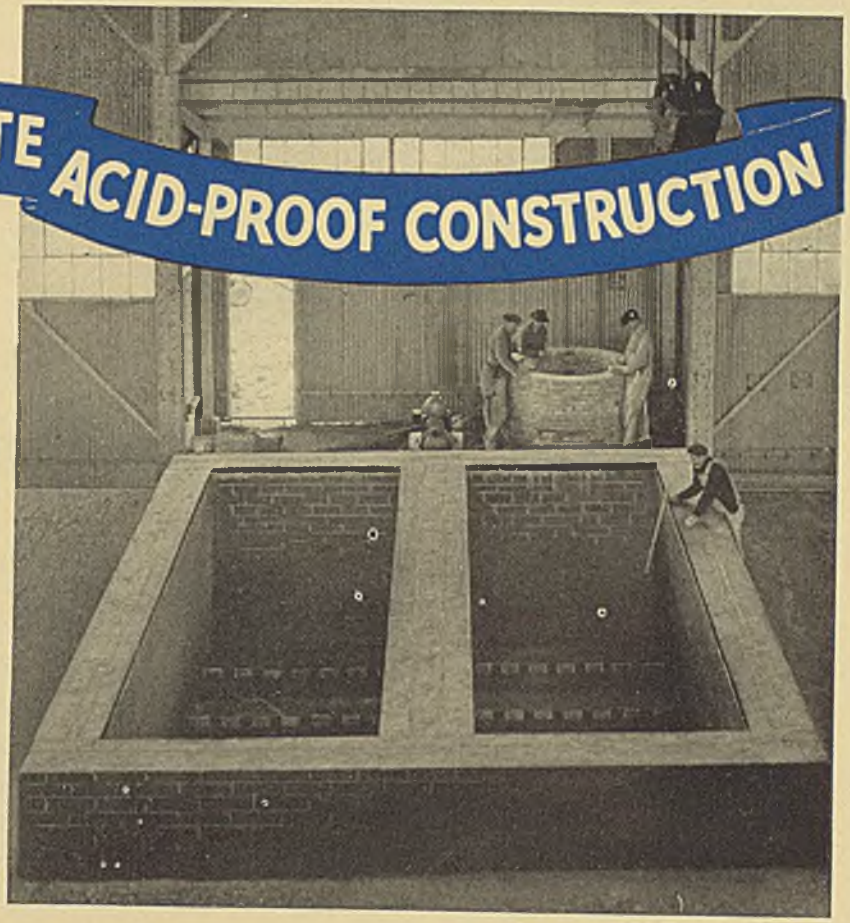
Smooth operation of the lift and swinging roof is attributed to the use of a heavy oil hydraulic lifting ram into which is incorporated a transverse oil hydraulic cylinder for swinging in both directions. Each oil system is of low pressure and interconnected. The rams made of forged alloy steel are interlocked. Jarring at each end of the swing is eliminated

Please turn to Page 96

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.
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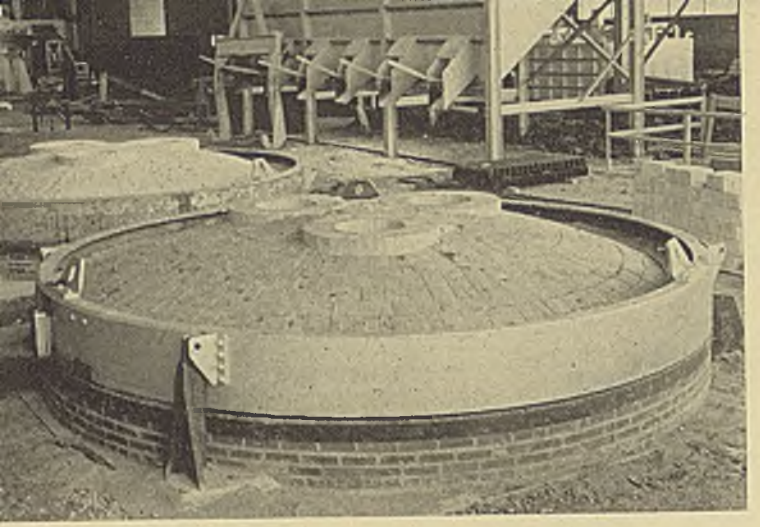


Matching forms where the furnace tops are relined and stored until ready for installation. Bins for dolomite and limestone in background

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.

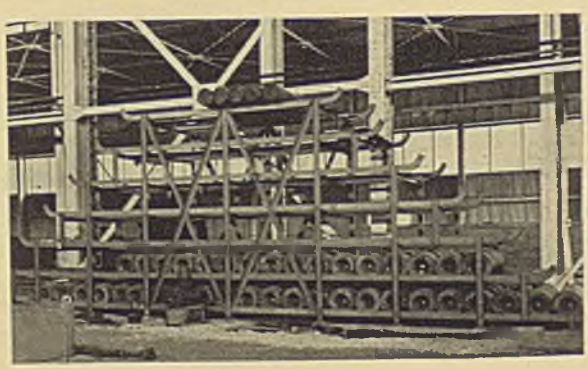
Flexible cables supplying power to the electrodes are water cooled. A desirable safety feature is that they are insulated from one another by rubber hose containers. This arrangement is becoming more and more important with the use of modern high-melting voltage.

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.

Please turn to Page 105



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

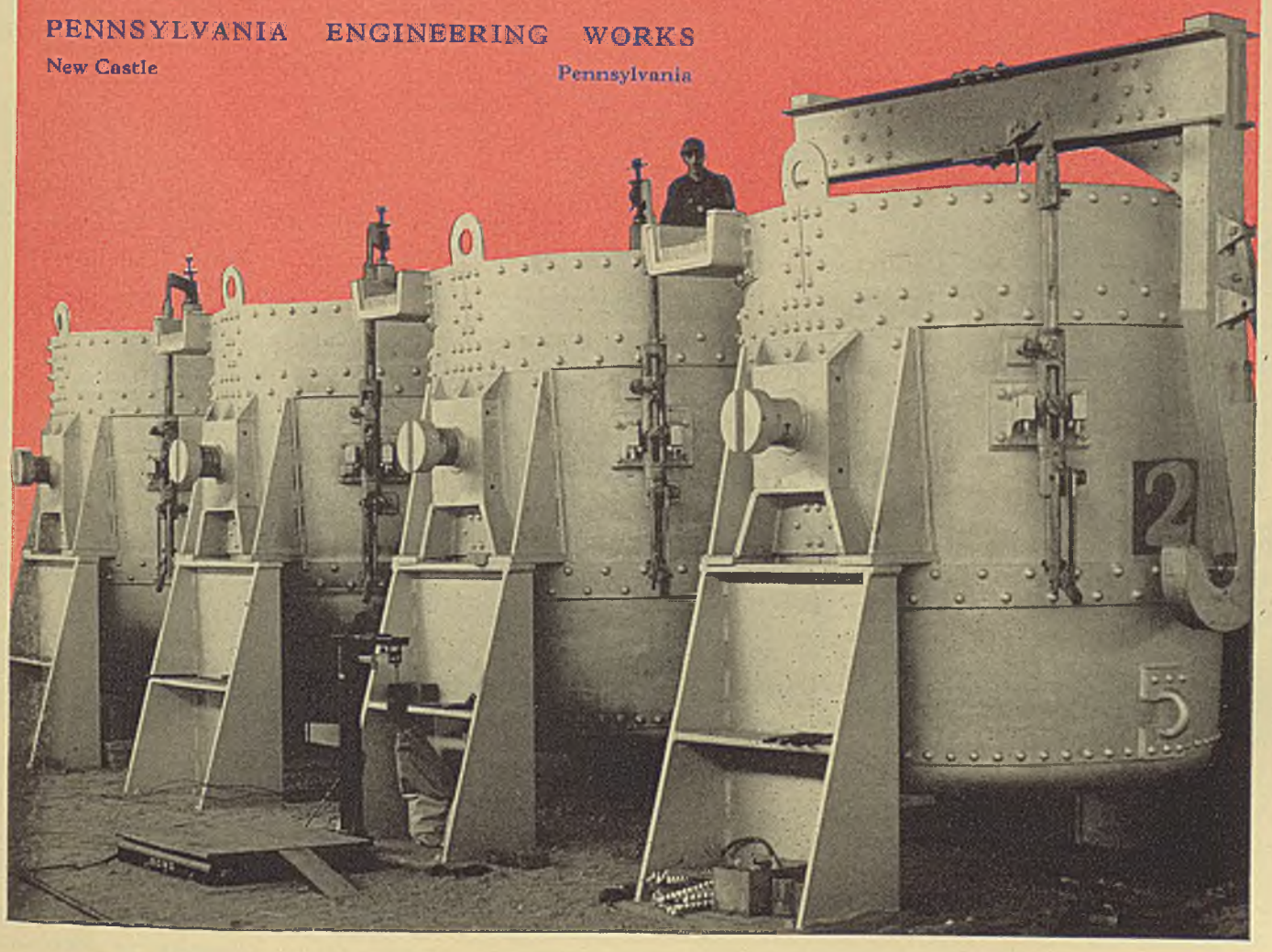
LADLES

for Copperweld Steel Co.

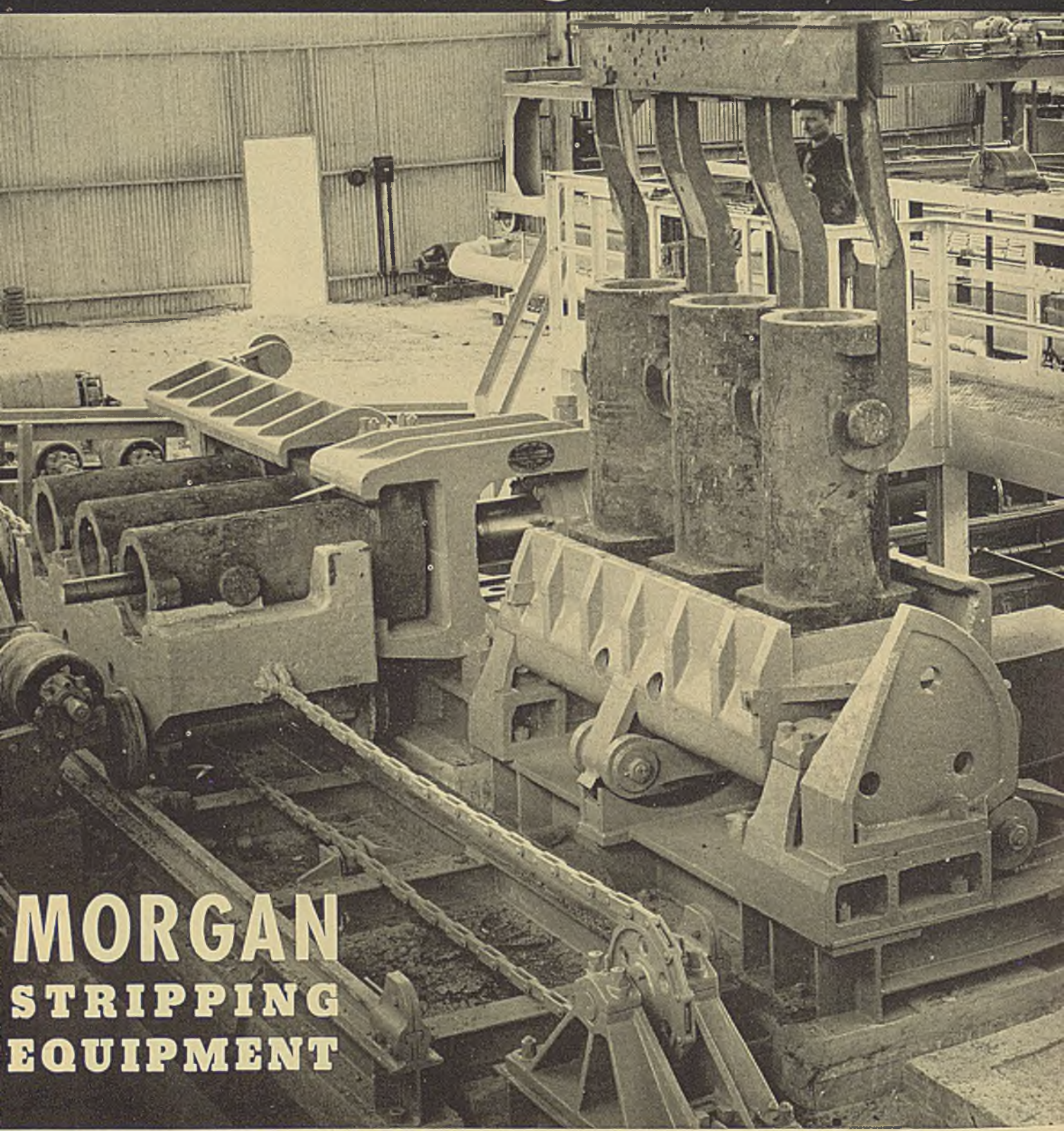
This row of sturdy, riveted, bottom pouring ladles—furnished for Copperweld Steel Company's new plant at Warren, Ohio, is but small evidence of PENNSYLVANIA ENGINEERING's contribution to the steel industry . . . Designers and builders of Blast Furnaces, Duplex Steel Plants, Hot Metal Mixers, Converters, 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*

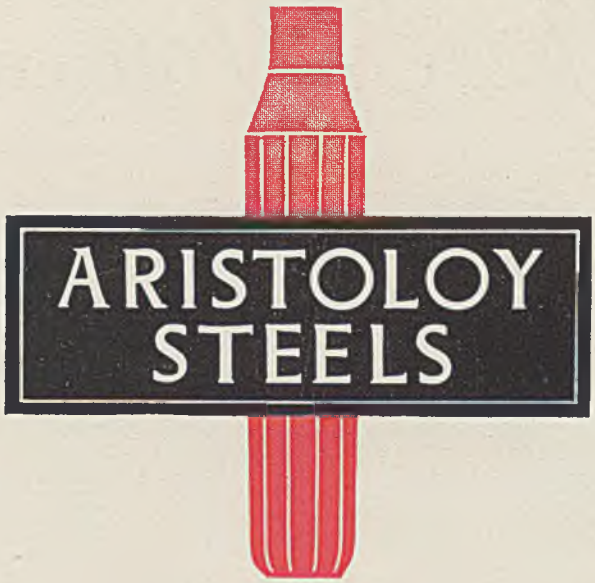


MORGAN STRIPPING EQUIPMENT

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

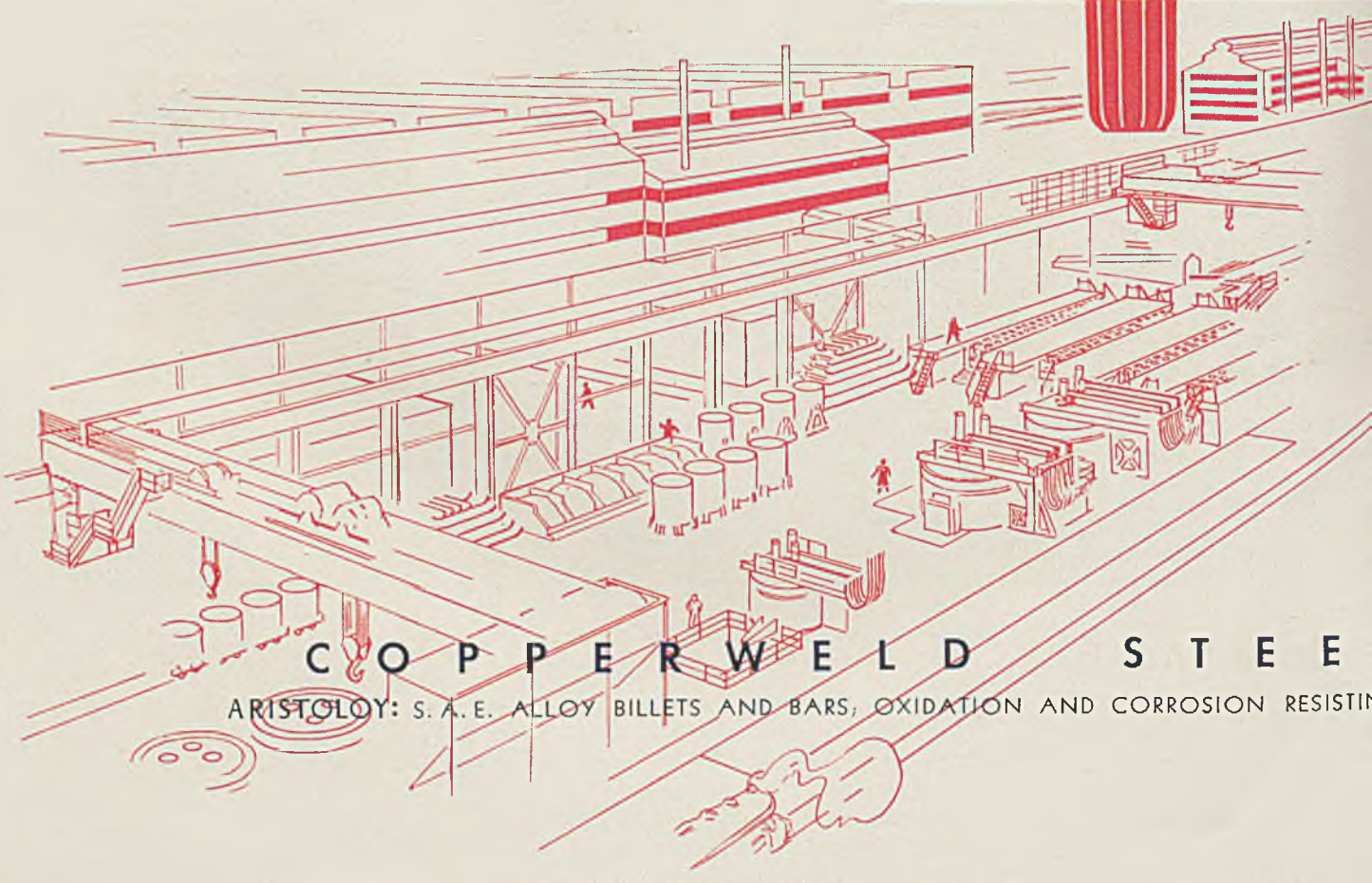
COPPERWELD STEEL COMPANY · Warren, Ohio

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

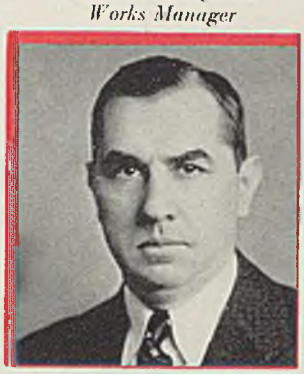
27 Years
SIDNEY D. WILLIAMS
Vice President & in Charge of Sales

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

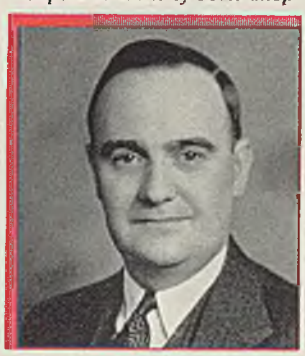


19 Years
FLOYD STROUP
Superintendent of Melt Shop

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



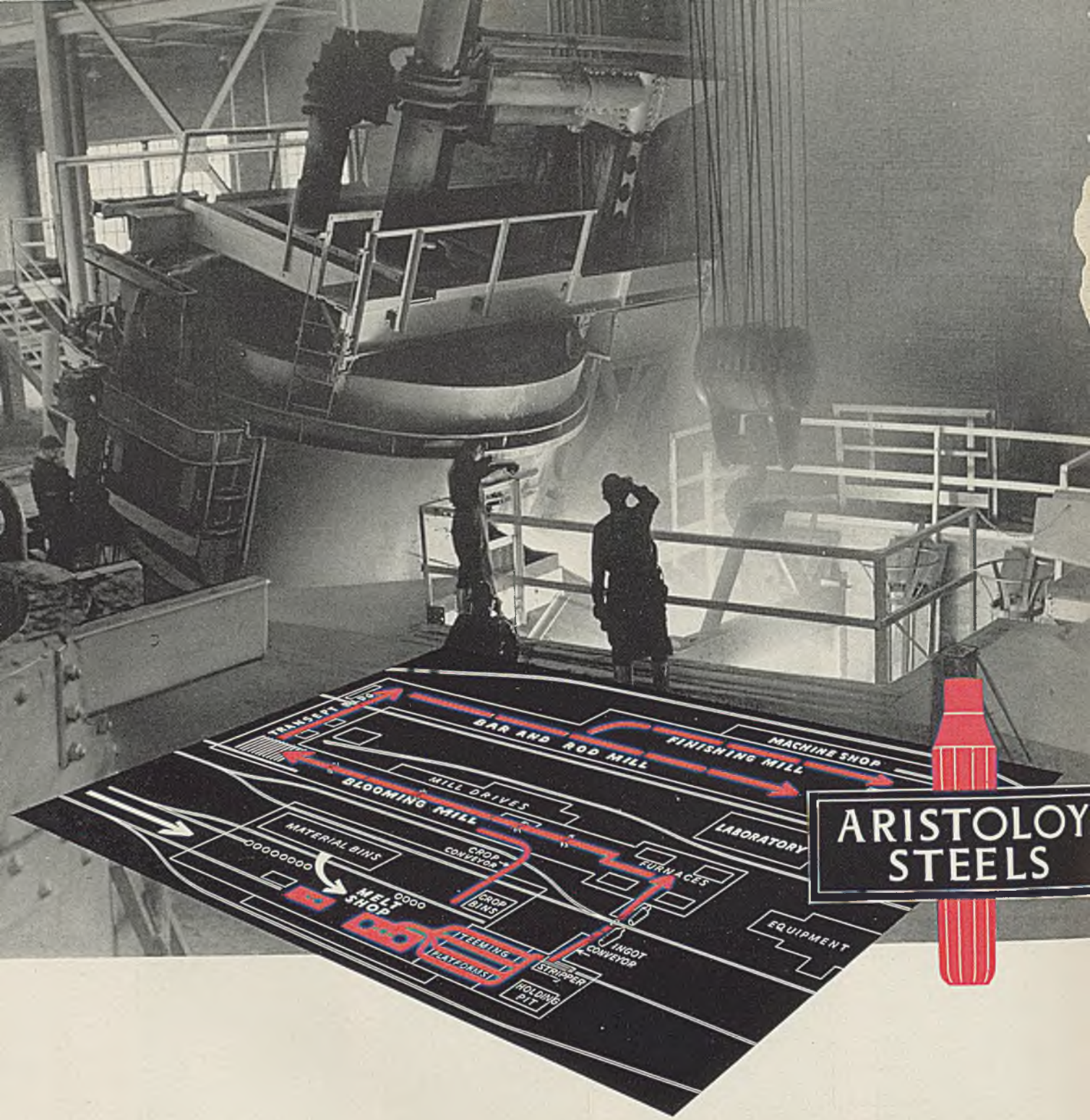
28 Years
JOHN P. SMITH
Chief Engineer

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



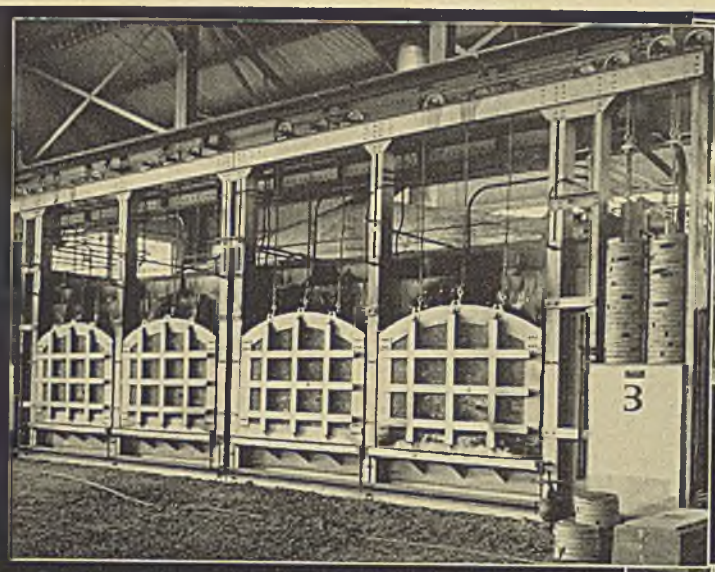
Direct production "flow" features this new plant layout. Material moves from bins to charge 25 ton melting furnaces in 15 minutes. Oversize transformers contribute to a rapid melting down of the furnace charge, resulting in more time for the all important refining period. Hot-top molds are teemed at 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.

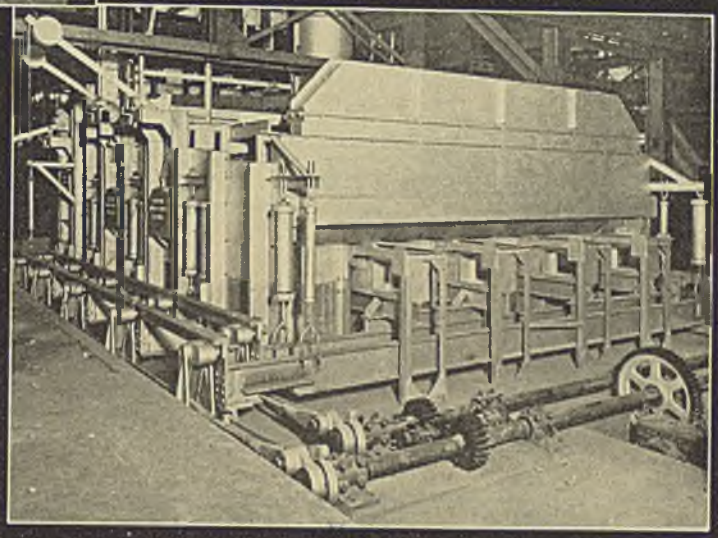
It has also been our privilege to furnish furnaces at the Glassport plant of the Copperweld Steel Company.

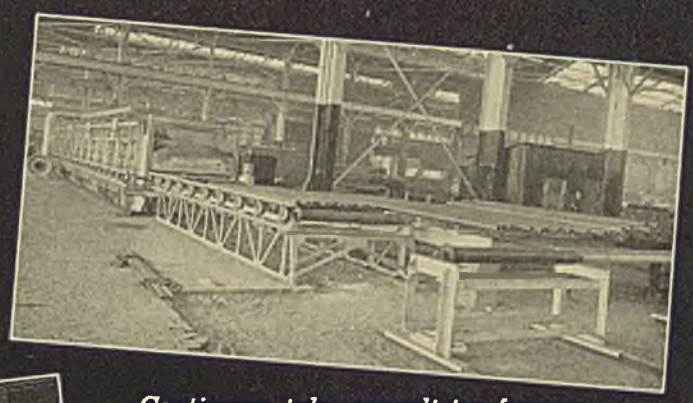
Another of our recent developments are P. I. E. cover furnaces *(illustrated below) for manufacturers of sheets, strip coil and wire.

Pennsylvania Industrial Engineers will continue to serve the steel industry with new developments to meet the needs of a rapidly progressing industry.

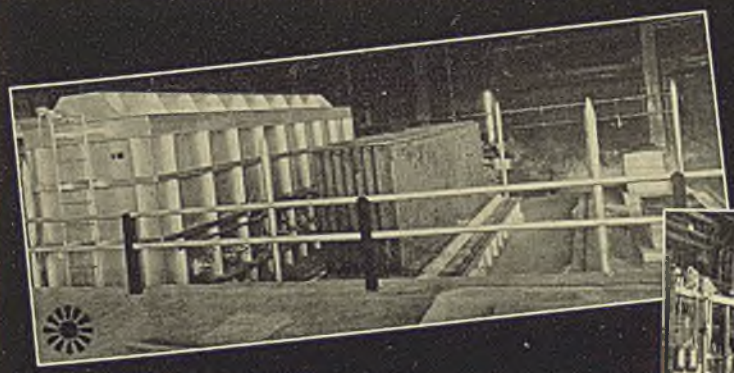
May we have the opportunity to help solve your furnace problems?

PENNSYLVANIA INDUSTRIAL ENGINEERS
2413 W. Magnolia St. Pittsburgh, Pa.





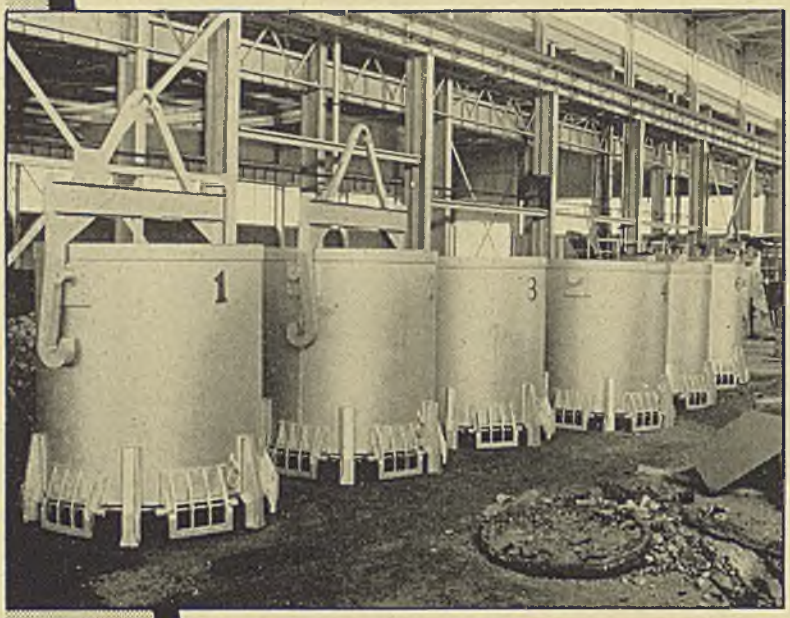
Continuous tube normalizing furnace.



New type P.I.E. annealing cover.

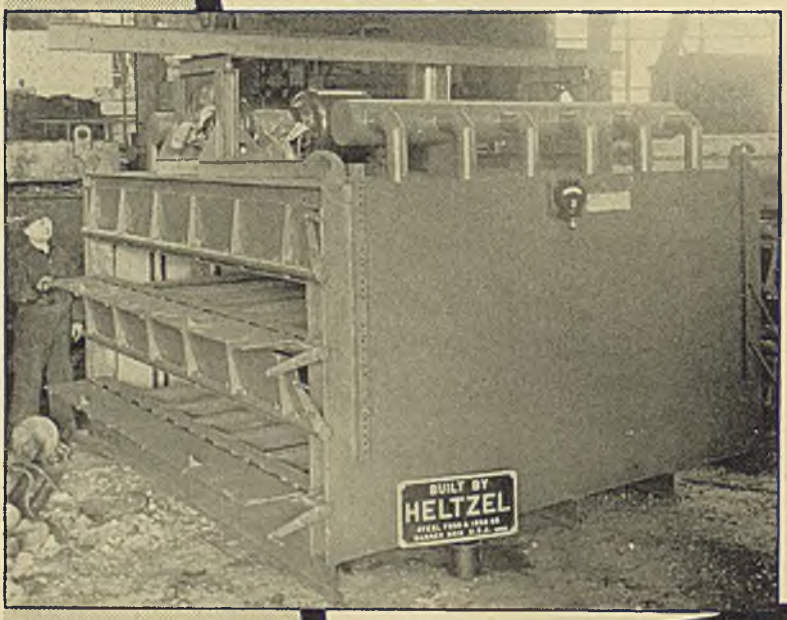
Group of hammer furnaces for alloy steel.

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.

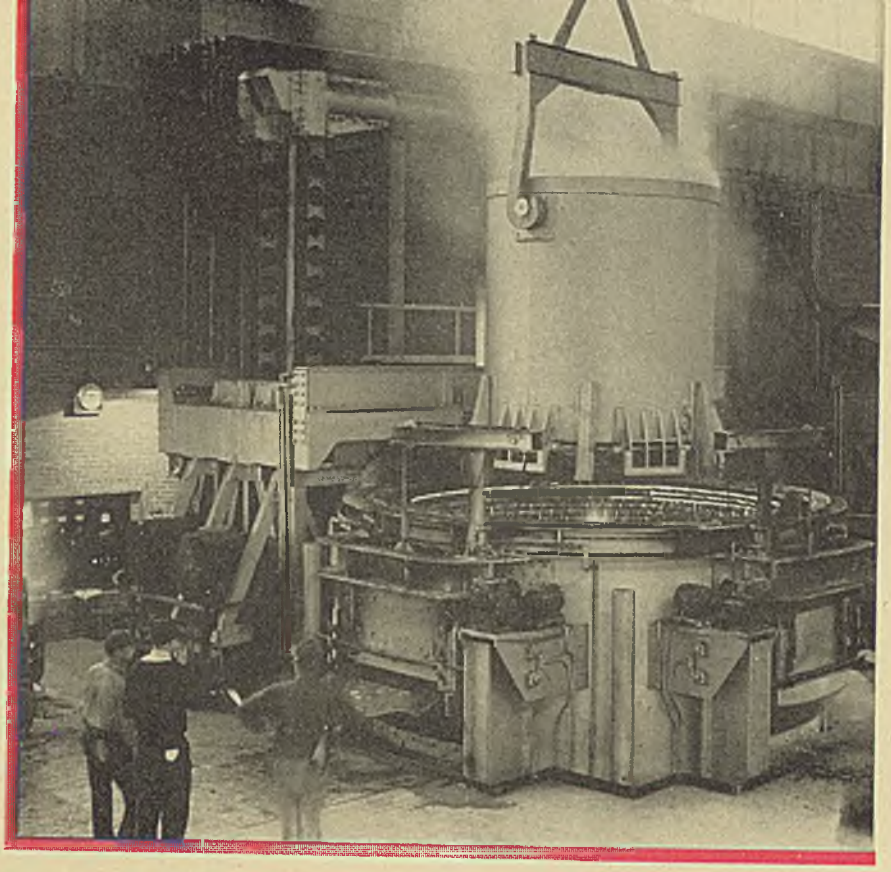
Flame-cut, welded machine bases . . . gear drive and oil-tight transmission cases from 6" — 8" — 10" — 12" material . . . welded steel blast furnace pipes . . . gas burners . . . annealing furnaces . . . special dust collecting systems . . . neutralizing plants . . . elevator housings . . . stacks . . . 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.

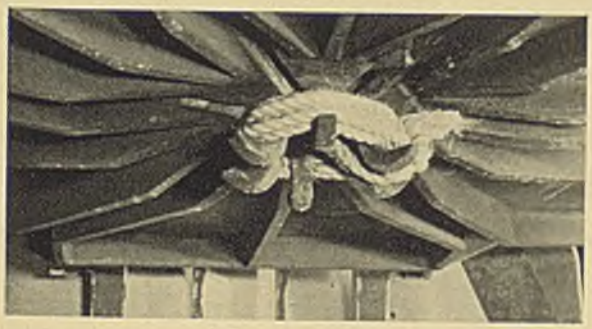
Warren Ohio



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.



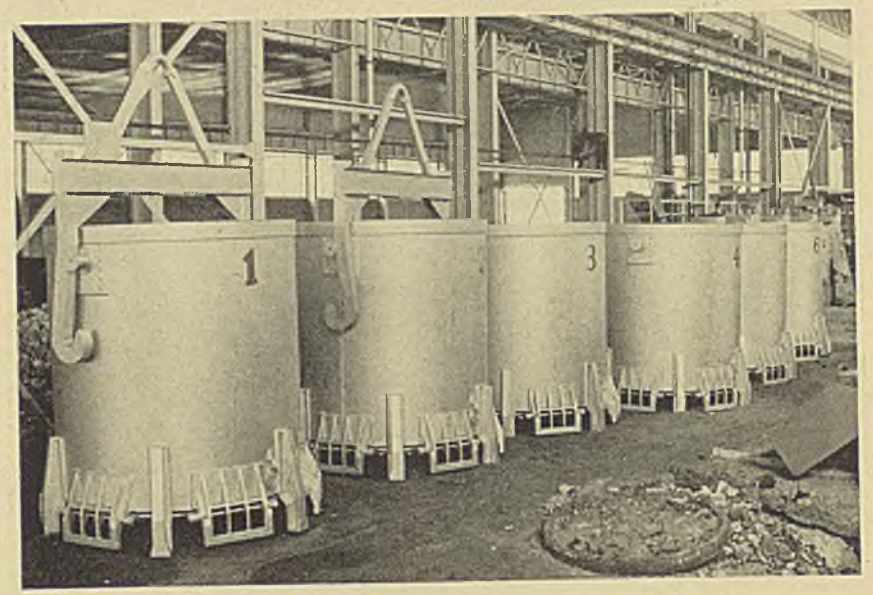
Bottom of charging bucket showing rope tie for holding segments in closed position

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-

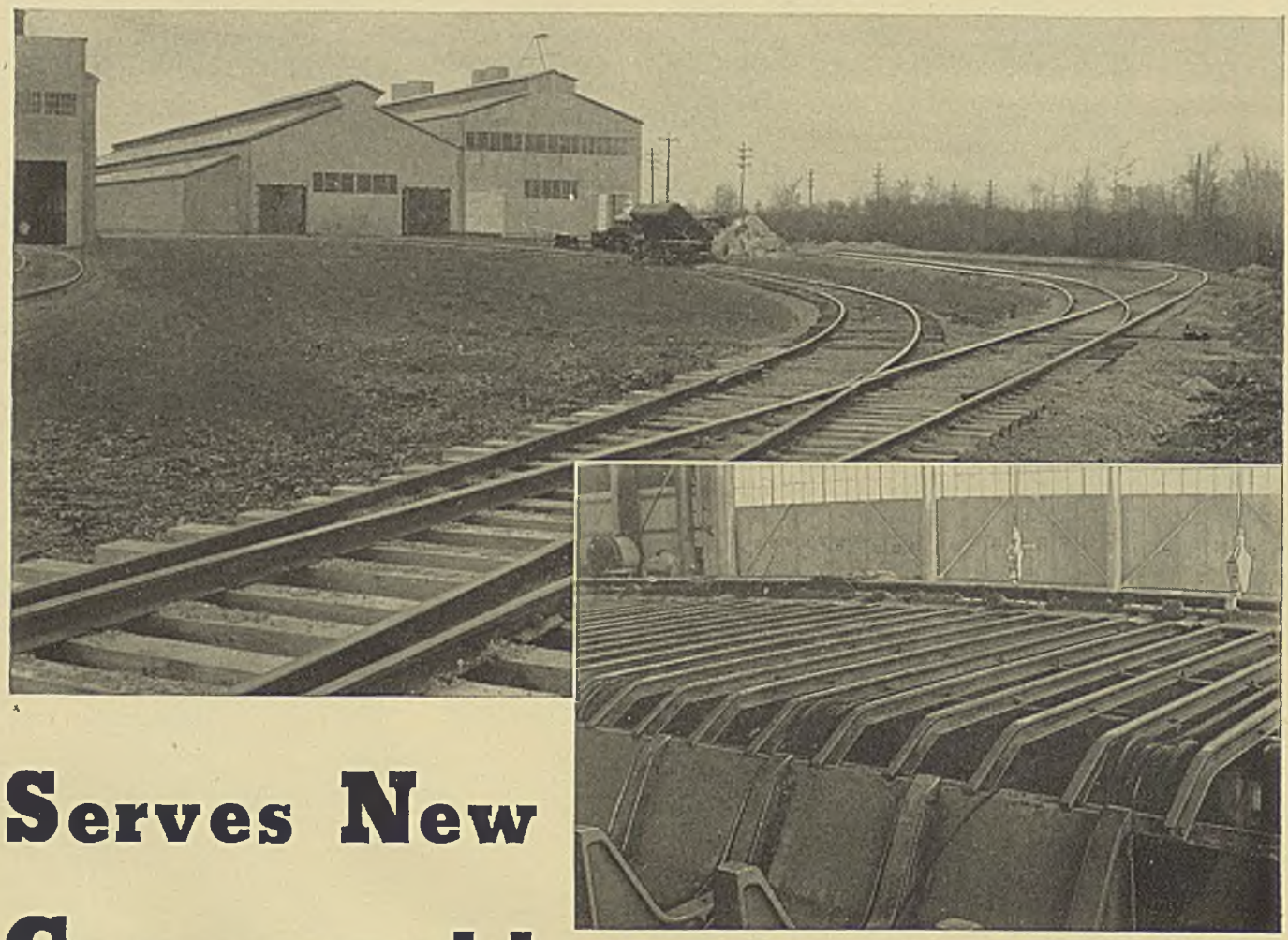
Please turn to Page 109

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.

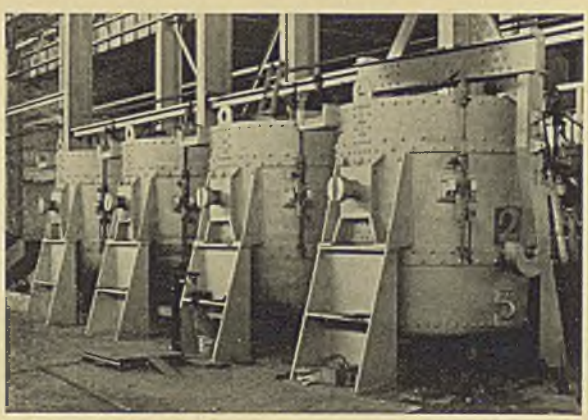
Steel ladles are relined in a concrete pit built near the entrance of the melt shop. Capacity is had for two ladles

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.

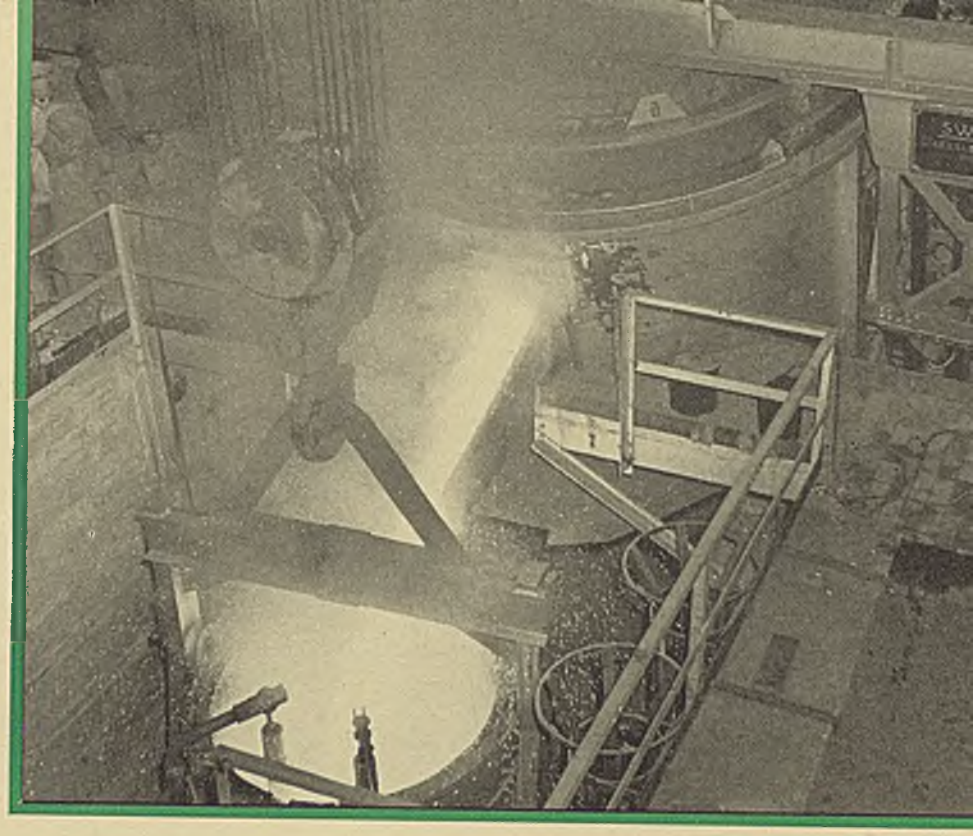
UHL CONSTRUCTION COMPANY
6001 BUTLER ST. PITTSBURGH, PA.
Phone STerling 4422

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.



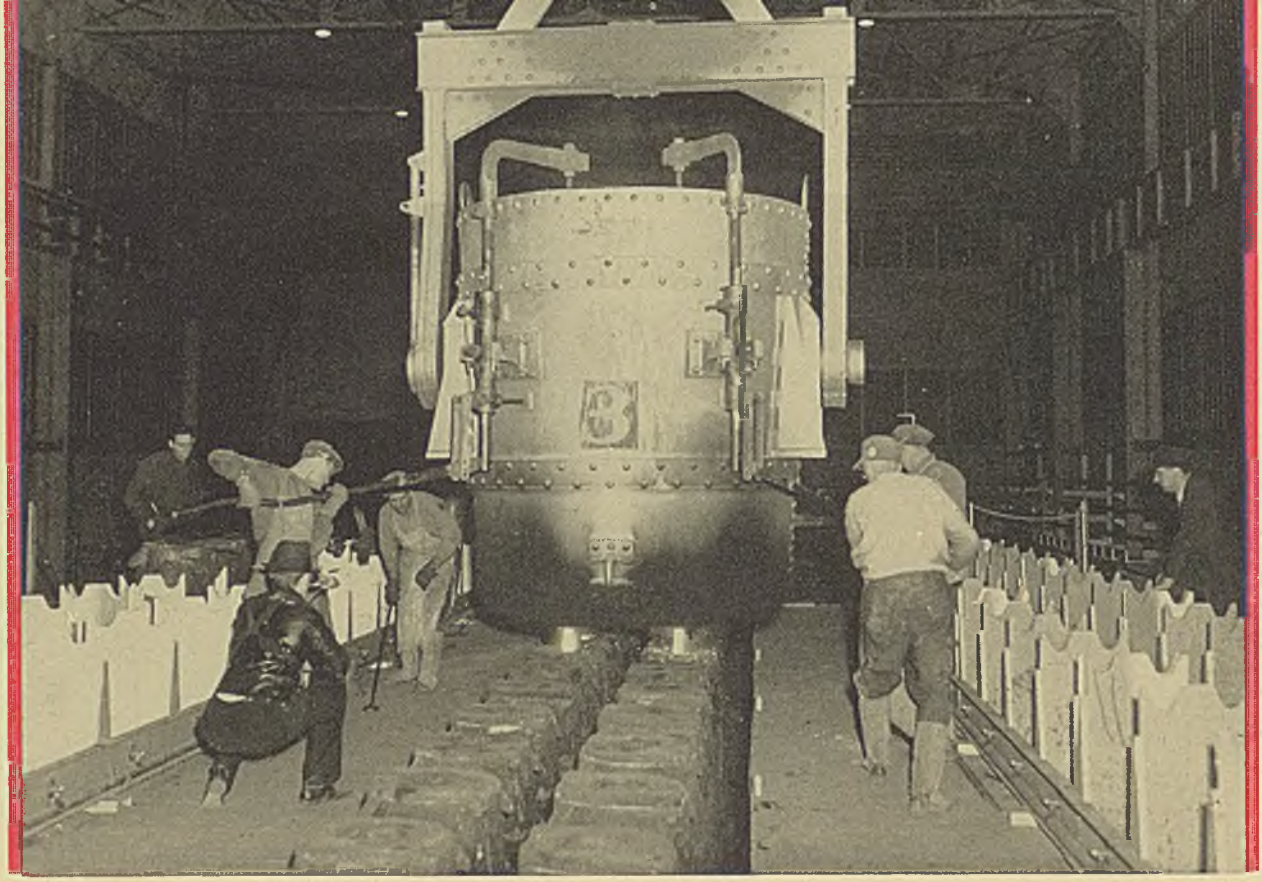
Heat of steel being poured from one of the 25-ton electric furnaces. Casting pit serves both furnaces

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.

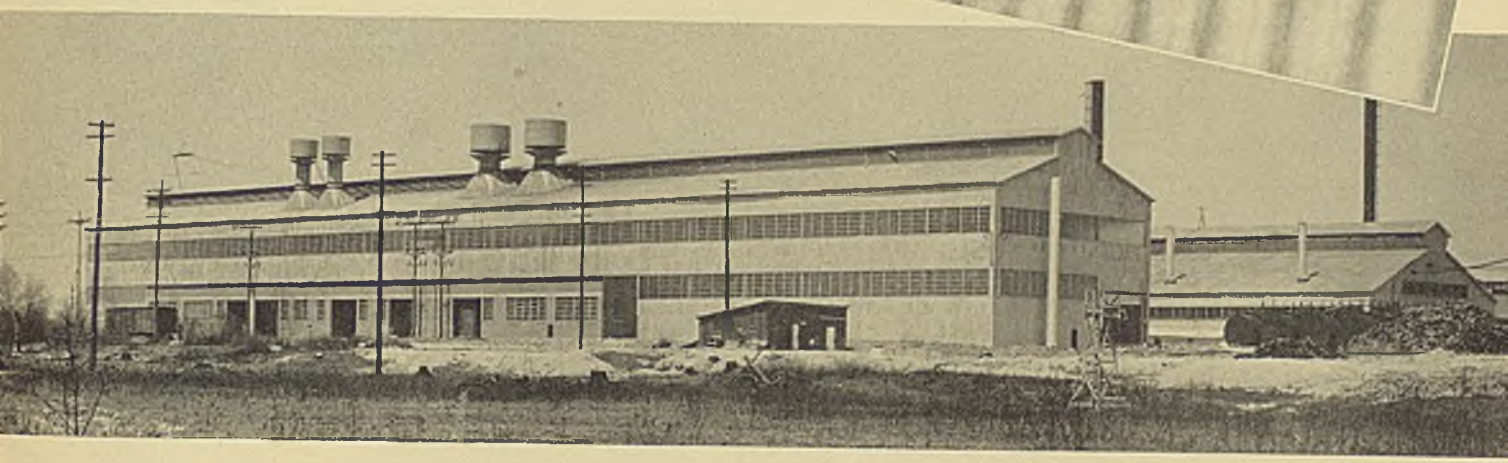
When the bars are free of the back shear table an electrically-driven kickoff pushes them into a cradle at floor level whence they are transferred by crane into two holding pits located near the sidewall. Or the bars may

Please turn to Page 114

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)

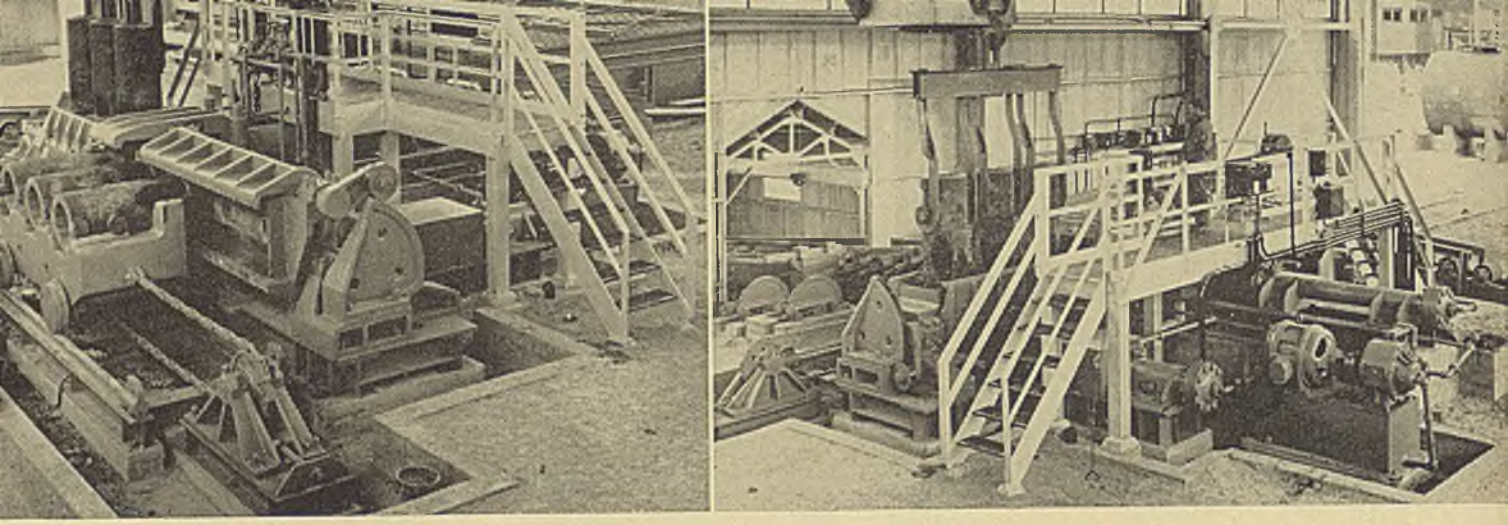
√ **HIGHWAY METAL**
(Pure Iron)

√ **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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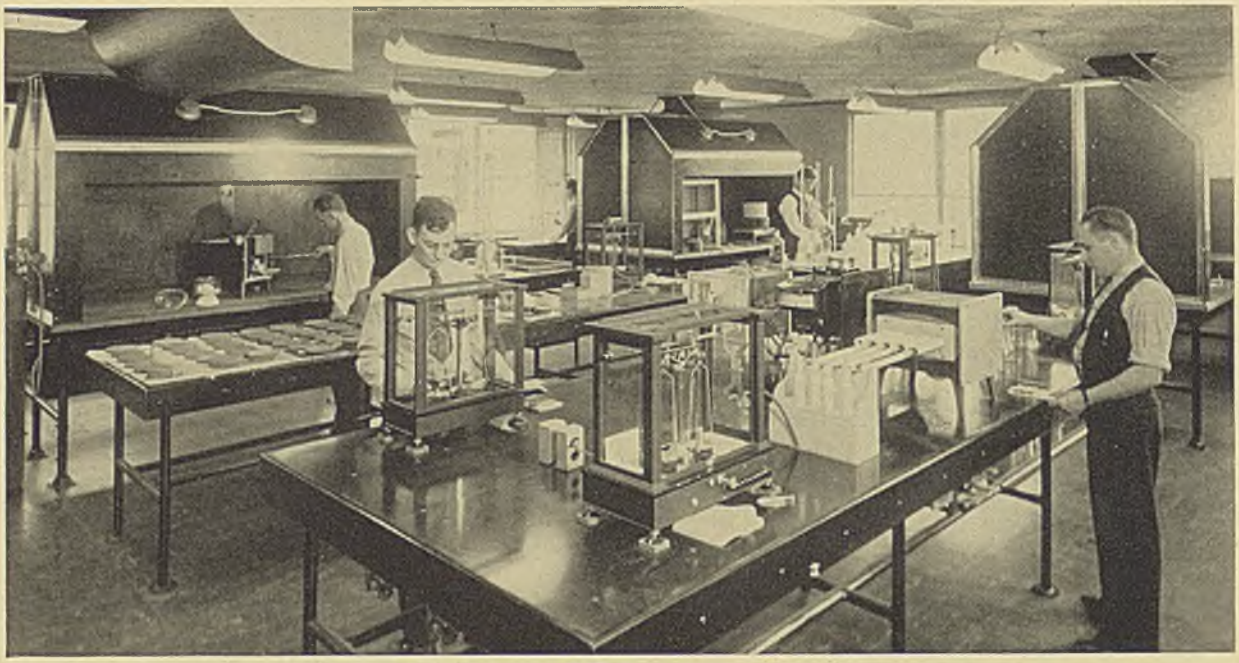


General view of chemical laboratory which is built with soundproof ceiling and lighted with fluorescent lamps

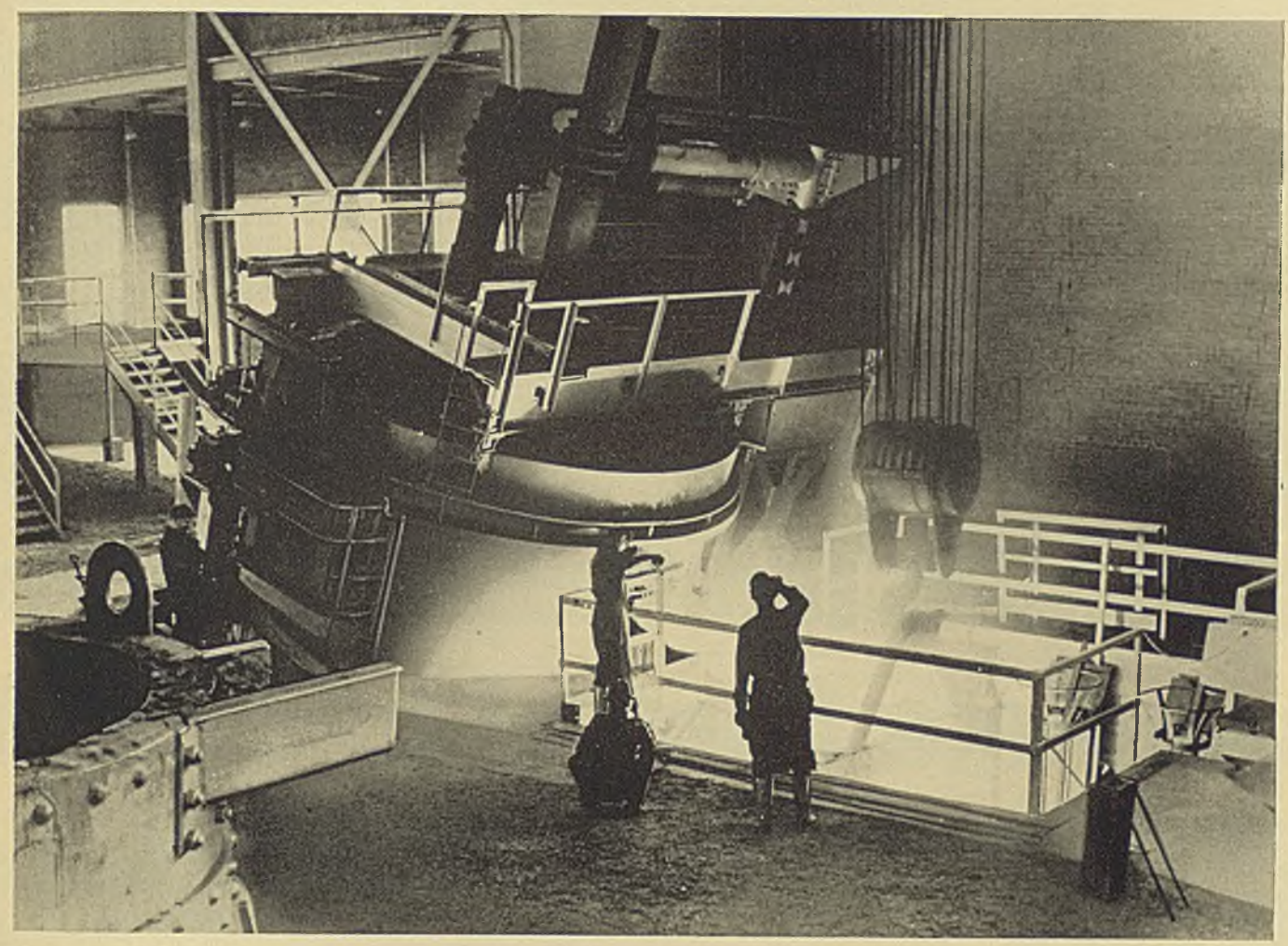
for annealing the bars before shipment as well as a gag press and two straightening machines which handle bars from ½ to 5 inches diameter.

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.



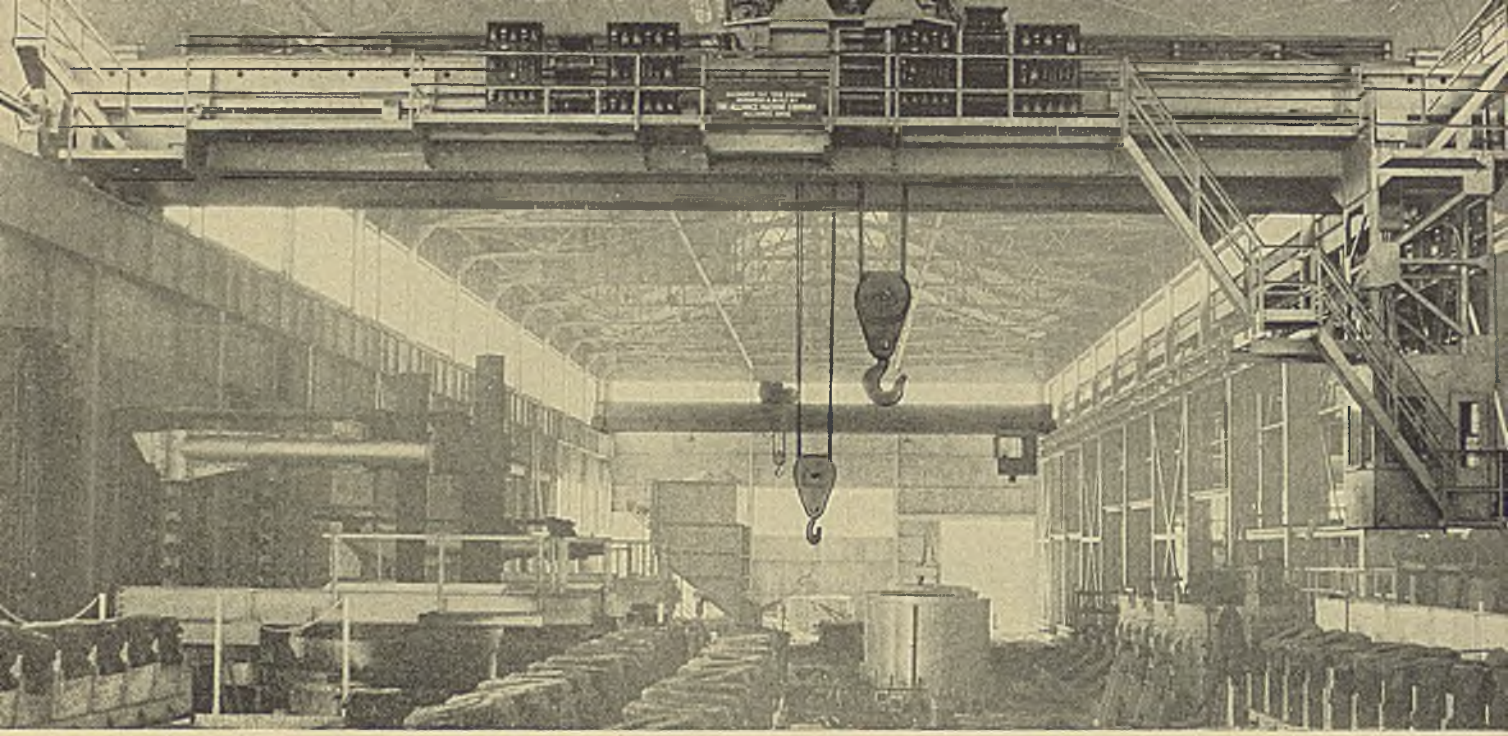
16′-0″ Swindell Swinging-Roof Electric Arc Melting Furnace
at the Copperweld Steel Co., Warren, Ohio.

SWINDELL

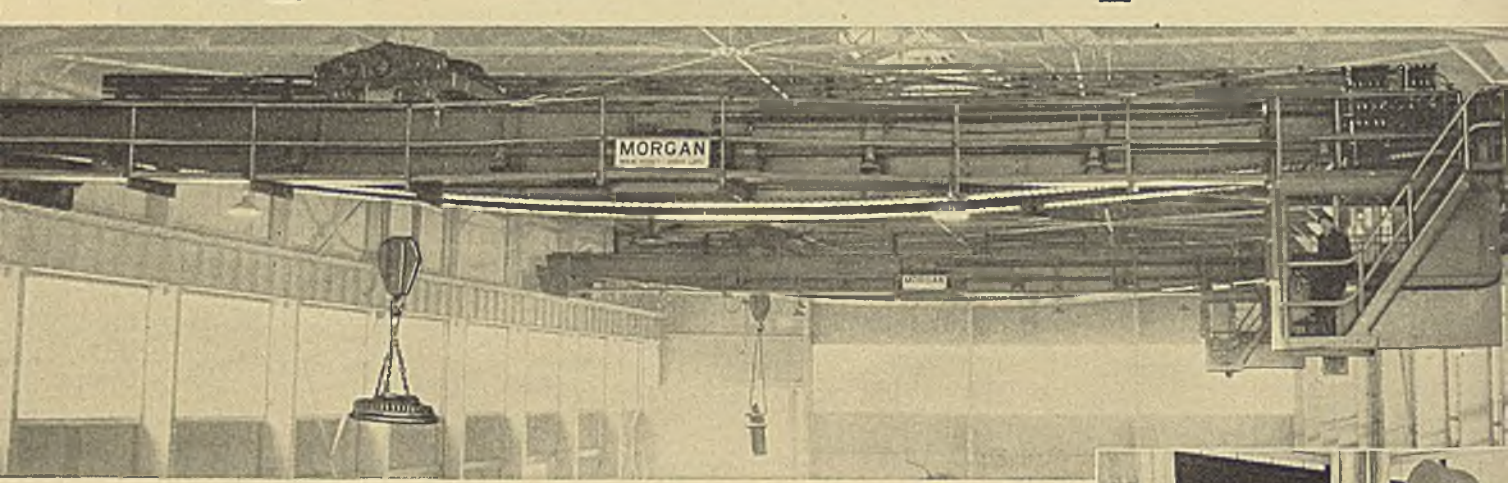
ELECTRIC ARC MELTING FURNACES

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.

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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.

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Abrasive Products Co., So. Braintree, Mass.

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Abrasive Co., Tacony & Fraley Sts., Philadelphia, Pa.
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Ampco Metal, Inc., Dept. S-527 3830 W. Burnham St., Milwaukee, Wis.
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American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka Ind.
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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.
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Ames Bag Machine Co., 1991 E. 66th St., Cleveland, O.

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SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
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SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

BALLS (Steel)
(*Also Stainless)
*Strom Steel Ball Co., 1850 So. 54th Ave., Cicero, Ill.

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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.

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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.

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Electric Storage Battery Co., The, 19th St. and Allegheny Ave., Philadelphia, Pa.
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(*Also Stainless)
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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.

VALVES (Check)
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.

VALVES (Electrically Operated)
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Hunt, C. B., & Son, Salem, O.
Ross Operating Valve Co., 6474 Epworth Blvd., Detroit, Mich.

VALVES (Gas and Air Reversing)
Blaw-Knox Co., Blawnox, Pa.

VALVES (Gate)
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.

VALVES (Globe)
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co. Inc., Bridgeport, Conn.

VALVES (Hydraulic)
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)
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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)
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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.
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Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

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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.

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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

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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.

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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)
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Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

WIRE (Threaded)
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WIRE (Welding)—See WELDING RODS OR WIRE

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WIRE CLOTH
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Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

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Ludlow-Saylor Wire Co., The, Newstead Ave. & Wabash R. R., St. Louis, Mo.
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Townsend Co., New Brighton, Pa.
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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

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Hubbard, M. D., Spring Co., 413 Central Ave., Pontiac, Mich.
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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.
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Youngstown Sheet & Tube Co., The Youngstown, O.

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Hazard Wire Rope Div. of American Chain & Cable Co. Inc., Wilkes-Barre, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
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Where-to-Buy Products Index carried in first issue of month.

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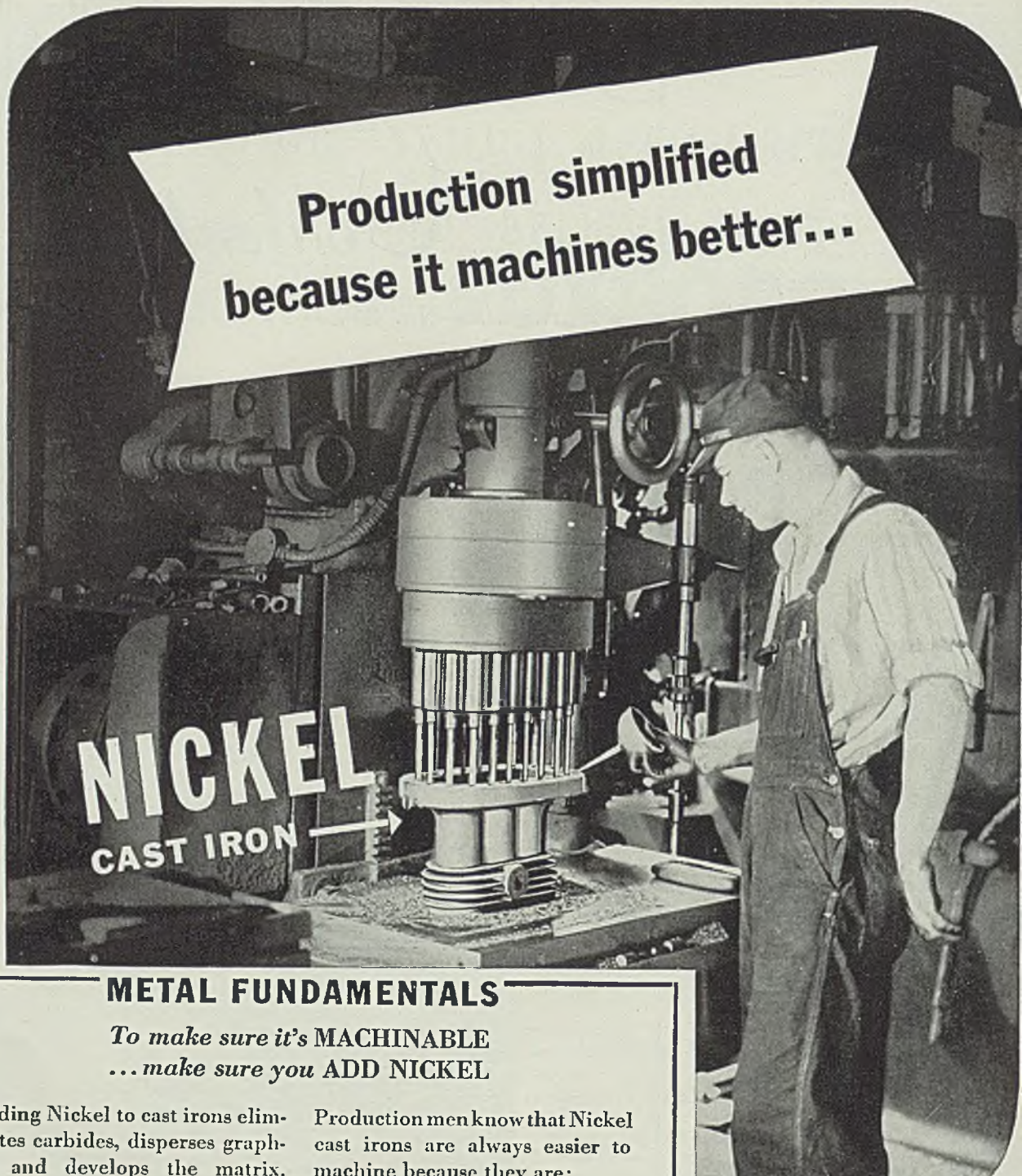
Volume 106—No. 24 **June 10, 1940**

PRODUCTION • PROCESSING • DISTRIBUTION • USE



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STEEL
PRODUCTION • PROCESSING • DISTRIBUTION • USE

HIGHLIGHTING THIS ISSUE

■ RAPIDLY moving events last week did much to dispel doubts as to the amount of understanding and drive behind the national defense program. President Roosevelt repeatedly (p. 21) gave assurance that the national defense commission will have complete charge of the program and its execution. Based on a report by E. R. Stettinius Jr., he declared the situation surrounding strategic materials to be "well in hand." He named Mr. Stettinius chairman of a committee to report immediately on consolidation of government purchases. . . . On the other hand, congress (p. 23) added impetus to its program of legislation aimed at implementing execution of the defense program.

• • •

A good start has been made at augmenting the defense commission's personnel. John D. Biggers (p. 22) becomes a chief aide. Defense mobilization of the machine tool industry has been placed under Harold S. Vance as right-hand man to William S. Knudsen. Other assistants to Mr. Knudsen are George J. Mead, head of the aeronautical section, and E. F. Johnson, assistant on ordnance. W. L. Batt is Mr. Stettinius' assistant on raw materials. Others are to be drafted. . . . It was indicated last week (p. 21) that the senate would follow the example of the house in empowering the President to prohibit exports of machine tools and other equipment and materials of war.

Aides to Commission

• • •

As steel production moved up 3 points last week (p. 27) to 81½ per cent of ingot capacity, it was predicted (p. 91) that operations soon will go to near capacity. Domestic consumers are spreading their buying over the coming months so as to enable the mills better to meet government and Allied requirements. The steel orders placed by the Allies last week were estimated (p. 21) at 200,000 to 300,000 tons, with more to come. Shipment on pig iron and scrap contracts placed by Italy is jeopardized by the withdrawal of that country's ships from world channels. . . . New chairman of the United States Steel Corp. of New Jersey (p. 23) is Irving S. Olds.

Spread Buying

• • •

Many modern tools are more versatile. The press brake (p. 48) is being used extensively for both light and heavy-duty multiple punching, alone or as part of a progressive punching, notching, forming setup. Through novel fixtures, broaching machines (p. 71) are used for press-fit assembly of precision parts. Reverse bends that frequently occur when press-forming light-gage sheets, due to whipping of the sheet (p. 66), are avoided through a support principle that is applicable to any production problem. . . . Blaw-Knox Co. uses a 4000-ampere arc welder (p. 51) with which it can join plates from ½ to 2¼ inches thick; experiments on thinner and thicker material are under way.

Tools More Versatile

• • •

Charles H. Jennings (p. 72) tells how distortion may be avoided in making fillet-welds. . . . C. T. Elder (p. 52) describes the use of electric heat in order to guard against breakdowns of electrical equipment that result from condensation and absorption of moisture. . . . W. J. Auburn (p. 56) discusses accepted practices in export packaging of steel sheets, tin plate, bolts, screws, tools and other products. . . . Harold Lawrence (p. 62) tells of economies that can be effected in cutting with the oxygen torch. . . . High-grade galvanized sheets are produced in a Welsh mill (p. 60) on equipment of latest American design. . . . Northwestern university (p. 79) is adding a technological institute.

Avoiding Distortion

E C Kreutzberg

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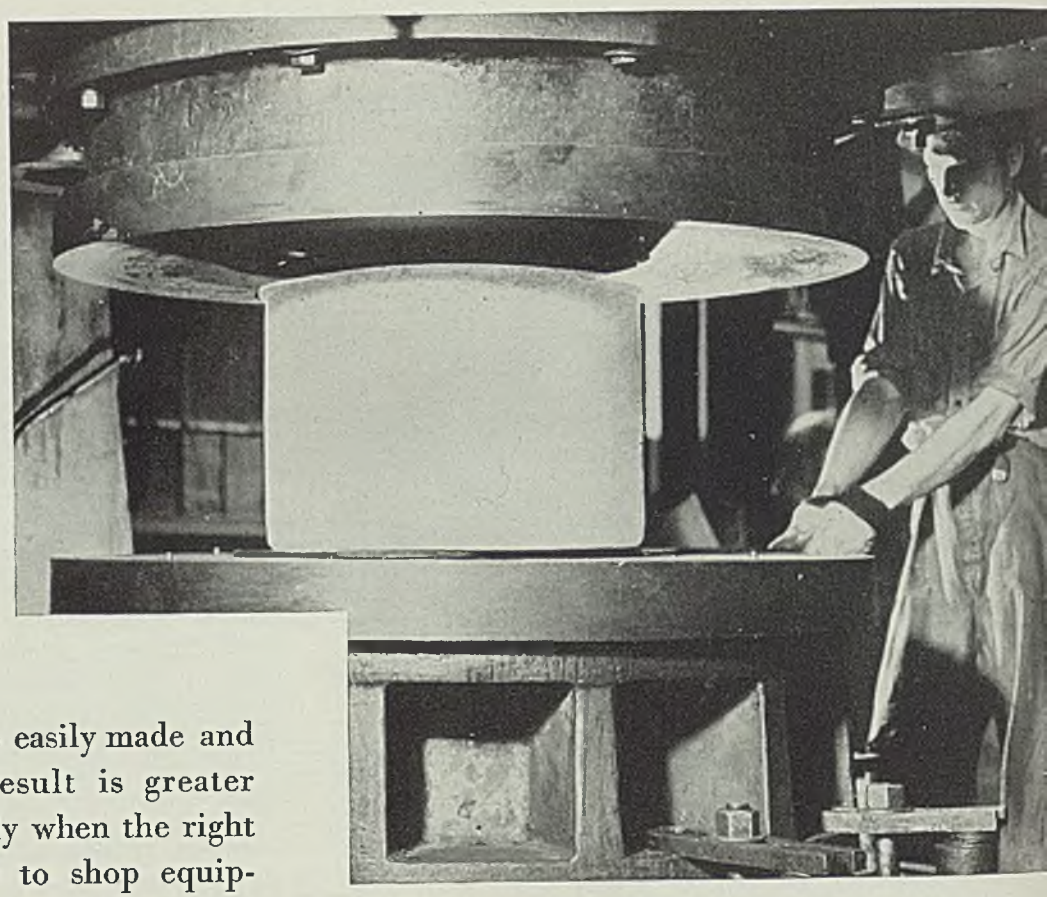

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Defense Plans Go Forward: Broader Powers for Stettinius. Knudsen

Former U.S. Steel Chairman Heads Group To Study Government Purchases.

Commission in Complete Charge.

Machine Tool Industry Already Mobilized.

Unification Approaching on Aircraft Program.

Roosevelt Calls More Industrialists To Aid.

■ INDUSTRY'S role in planning and developing this country's national defense program last week began to emerge from the nebula that has surrounded Washington since its announcement.

The national defense commission has been assured it will have complete charge of the program. The commission has been and is being augmented by top-ranking executives who have suspended for the time their careers in private industry in favor of the defense plan.

E. R. Stettinius Jr. has been named chairman of a committee which will study the problems of government purchases through the procurement division. The army and navy will be represented on the committee, as will be Don Nelson, procurement director.

A report on the consolidation of purchases has been asked for immediately.

President Roosevelt has asked the army and navy to consult with William S. Knudsen, in charge of industrial production, regarding all important contracts.

At the commission's second meeting last Thursday, Mr. Stettinius, in charge of raw materials, made a preliminary report on strategic materials, including tin and manganese. Later the President announced this situation is "well in hand."

The President also announced that no action has yet been taken to embargo machine tool exports. The President, however, is reported to be supporting a bill in congress which would control exports of machine tools and military equipment. The house already has passed the bill and it is expected to be acted upon by the senate June 10.

A national inventors' council, composed of outstanding scientists and industrial research experts, to stimulate development of new defense weapons, is being created by Secretary of Commerce Harry Hopkins. Hopkins has urged legislation authorizing the patent commissioner to keep such inventions secret and to withhold grant of a patent if publication might be detrimental to the defense program.

Answers to many other questions being asked by businessmen are still awaited. Neither the defense program's ultimate size, cost, nor speed of execution can be forecast on the basis of information available.

Only certainties are that it will be big, expensive and—at the start—comparatively slow moving.

Allies Now Buying Substantial Tonnages of Steel

■ ORDERS for between 200,000 and 300,000 tons of steel reportedly were placed with several United States producers by France last week. Although details were withheld, it was understood most of the orders were for rounds for shell manufacture, early delivery being demanded.

Heavy tonnages of shell steel, bars and semifinished are under negotiation and may be placed early this week. Great Britain's mills, operating on a 24-hour, 7-day week basis, are exerting every means to increase production, but Britain wants to purchase large amounts of semifinished here to keep rolling mills and forging plants working full time.

French production has been seriously curtailed by the German invasion, and it is believed future purchases from there will be finished products or products that will require a minimum of finishing.

Most allied steel buying to date has been placed on the other side. In the future an increasing amount of this business will be placed by the Anglo-French purchasing commission in New York. Offices of the commission, at 15 Broad street and the adjacent building at 37 Wall street, are being expanded as rapidly as possible. It is proposed to use three additional floors.

Additional personnel arrived last week to facilitate the commission's steel purchases. So far the commission has devoted most of its activities to procuring equipment and material other than steel.

The commission has placed about $600,000,000 of orders for American airplanes and accessories since the "real war" began a month ago. Aircraft orders since January, 1939, have totaled $1,200,000,000.

Informed quarters declare deliv-

eries have been speeded up in the past two months, although no official reports on deliveries are available. The navy department last week released 50 of its Curtiss scout bombers for shipment to the Allies. Others will follow.

Large stocks of war equipment left over from the World war may soon be sold by the United States to Great Britain and France. Solicitor General Francis Biddle has ruled such sale would violate neither international law nor the present neutrality act.

The equipment, classified by the army as "surplus," includes 100,000 old British Enfield rifles; 10,000 Lewis, Vickers and Marlin machine guns; 58,000 old fashioned guns for airplanes; 98 obsolete 40-ton British tanks; 300 British 75-mm field guns; 110 British 6 and 7-inch field guns; 133 British 8-inch howitzers; 245 trench mortars; considerable stocks of shells and ammunition.

Much of the equipment was made in British factories during the World war before American factories were geared to the war's demands.

Acute demand for war equipment for immediate delivery, result of heavy Allied losses in Flanders, is reported to have led British and French agents to attempt to buy the stocks despite obsolescence.

Complete Plan To Co-Ordinate Machine Production

■ AN ORDERLY, clear-cut procedure for the manufacture of machine tools for national defense has been established and production will go forward rapidly as soon as specific requirements are determined, Clayton R. Burt, chairman of the defense committee of the machine tool industry, said last week.

"The production plan was developed in conference with William S. Knudsen, of the government's advisory defense commission in charge of manufacturing. The plan is as follows:

"1. The setting up of a machine tool co-ordinating committee, consisting of Mr. Knudsen as chairman, and Harold S. Vance, chairman of the board, Studebaker Corp., as vice chairman, two representatives from the defense committee of the machine tool industry, two representatives from the navy, and two representatives from the army.

"2. This co-ordinating committee will then determine the specific requirements of the army, the navy, United States manufacturers, and foreign customers, and establish priorities for the guidance of the machine tool industry in filling these requirements. In determining priorities national defense will take precedence over all other considerations.

"3. It is anticipated that congress will shortly pass a law authorizing the navy to requisition for national defense purposes machine tools now on order for foreign customers. This, however, is purely a matter of selection and is not in any sense an embargo upon foreign shipments.

"4. The machine tool industry will undertake to make deliveries of machine tools in time to meet the requirements of the national defense program by expanding present working forces and facilities, and by subletting production of parts, and if necessary complete machines, to various factories not engaged in important government work.

"5. The machine tool industry will inaugurate a comprehensive program of training the additional men required to speed up production.

"It is expected that in the near future the army and the navy will be prepared to submit details covering sizes, kinds and types of machines which will be required, and the time at which they must be available. As soon as this specific information has been obtained, the machine tool industry, under priority rulings of the co-ordinating committee, will be able to set up definite delivery schedules.

"It must be emphasized that this program covers not merely machine tools to be purchased by the army and navy, but the entire machine tool needs of the United States. Machine tools bought directly by the government will represent only a small share of the machine tools actually needed for national defense purposes. The largest portion will be those required by manufacturers of aircraft, munitions, and other types of defense equipment. It is for this reason that the establishment of the co-ordinating committee to determine priorities is of the utmost importance."

More Industrial Leaders Drafted by Administration

■ PRIVATE industry last week was called upon to supply additional talent to supervise and plan the national defense and industrial mobilization program.

John D. Biggers, president, Libby-Owens-Ford Glass Co., Toledo, O., who had charge of the census of unemployed a year ago, will be added to the national defense commission as a chief aide. It is understood he will work with Mr. Knudsen who has charge of industrial production in the defense program.

H. S. Vance, board chairman, Studebaker Corp., South Bend, Ind., has been placed in charge of the machine tool section under Mr. Knudsen.

George J. Mead, former vice president and director of United Aircraft Corp., East Hartford, Conn., is being transferred from the treasury department to be director of the aeronautical section. He will be assisted by Capt. Sidney M. Kraus.

E. F. Johnson, former General Motors executive, will assist Mr. Knudsen with ordnance problems.

W. L. Batt, president, SKF Industries Inc., Philadelphia, and chairman of the commerce department's business advisory council, is already on duty with the commission. He is working on raw materials problems, with Mr. Stettinius.

Allen W. Morton, vice president, Koppers Co., Pittsburgh, and Gano Dunn, president, J. G. White Engineering Corp., New York, also will be industrial aides to the commission.

Dr. Theodore Yntema, University of Chicago, will be an economic advisor and statistical expert for the defense group. Dr. Yntema directed preparation of the United States Steel Corp.'s presentation before the temporary national economic committee last winter.

Charles G. Leith, University of Wisconsin geologist, has been designated as a consultant on strategic materials.

Another business adviser will be Clarence Francis, president, General Foods Corp., New York.

Numerous others will be added to this list within the next few days. Invitations to serve have been issued to representatives of various industries.

In addition to the personnel being recruited outside the government, Mr. Stettinius and Mr. Knudsen are being assigned staff members of the army and navy. Col. James H. Burns, formerly associated with Assistant Secretary of War Louis H. Johnson, and Capt. Allen Reed, of the navy, already have been assigned to Mr. Stettinius.

Naval Expansion Bill Finally Passed; Status of Appropriations

■ SENATE last week approved the $1,473,756,000 naval appropriation bill, already passed by the house, and the measure was sent to the President.

Corresponding army supply bill carrying $1,823,252,000 at week's end was awaiting approval of conference report by both houses.

Earlier in the week the senate without a dissenting vote, had passed the Vinson bill proposing an 11 per cent increase in naval vessels which authorized a total additional expenditure of $654,902,270. This bill provides for the construction of 22 new warships to cost $372,750,000, 22 auxiliary vessels estimated to cost $183,000,000, and 1011 more airplanes for the navy to cost $99,152,270.

The President's latest defense estimates contemplate a total of $4,625,000,000 for the army and navy next year. The Chief Executive's latest "over a billion dollars" request last week was revealed to include $960,400,409 in cash and $317,540,761 in contract authorization.

Of this, the army would receive $452,751,239 cash and $254,176,761 contract authorization. More than one-third—$180,889,395 in cash and $109,259,597 in authorization is for planes and equipment for the air corps, while $96,513,530 in cash and $90,085,520 in contract authorization, is asked for tanks, guns and other equipment under the ordnance department.

An emergency fund of $200,000,000 is proposed for stimulating production of munitions. Construction of more than 25 powder and arms plants is contemplated under this appropriation, either by private companies or the government.

Navy would receive $507,253,170 cash and $63,560,000 in authorizations. A total of $222,400,000 is allowed for construction of ships including armor and armament, which would provide for starting three aircraft carriers, 13 cruisers, 30 destroyers and 22 submarines, together with auxiliary vessels and patrol craft.

Included in the large warship program are vessels authorized by the Vinson bill. Construction of 19 other warships is provided under funds carried in the regular 1941 naval supply bill.

An additional $25,000,000 in contract authorization is allowed for the "rental and conversion" or acquisition and conversion of ships for use as auxiliaries and patrol craft. A total of $103,800,000 is asked for construction of naval bases and increasing shipbuilding facilities at navy yards.

New Chairman of U. S. Steel Corp. Experienced in Law, Economics

■ IRVING S. OLDS, since 1936 a director and finance committee member of United States Steel Corp., New York, was elected chairman of the corporation last week, succeeding Edward R. Stettinius Jr. Tendered to permit him to devote his services to the national defense committee, Mr. Stettinius' resignation as chairman of the board of directors and as a member of the finance committee was accepted at a special board of directors' meeting earlier in the week.

Associated with White & Case, a New York law firm, since 1911, before which he had served as secretary to Mr. Justice Holmes, United States Supreme Court, Mr. Olds was admitted to the firm as a partner in 1917. He was counsel for the purchasing department of the British war mission to United States during 1917-1919, and in 1918 was appointed special assistant in United States war department.

Mr. Olds has been engaged, since the World war ended, and as a member of White & Case, in legal work related to matters of organization and administration of corporate business enterprises.

Irving S. Olds

Graduated from Yale university and Harvard law school, Mr. Olds was admitted to the bar in Pennsylvania in 1910, and in 1912 to the New York bar. He was born at Erie, Pa.

Actively participating in industry since 1924, Mr. Stettinius that year entered General Motors Corp., New York, through the Hyatt roller bearing division at Newark, N. J. Two years later he was appointed assistant to John L. Pratt, vice president and a director of the corporation. In November, 1930, he became assistant to Alfred P. Sloan Jr., General Motors president, and was elected a vice president in 1931.

When W. J. Filbert was made chairman of the Steel corporation's finance committee in 1934, Mr. Stettinius went to United States Steel as the committee's vice chairman. He succeeded Mr. Filbert as chairman when the latter retired in December, 1935, was also made a director. Mr. Stettinius had been chairman of the board since April, 1938, when he succeeded Myron C. Taylor.

Thyssen Says Germany Will Be Defeated

■ Germany's weak spot is its lack of industrial preparedness, according to Fritz Thyssen, exiled German steel leader who financed Hitler's rise to power. In a message to the *American Magazine* he said Germany will be defeated despite its "astounding" early successes.

"Never was a war so recklessly started and with less industrial preparation," he added, saying he vigorously opposed what he considered to be an 'unjustified war' and that he had vainly warned Field Marshal Goering the country was not ready to fight.

"Hitler did not consult his ministers or the Reichstag about going to war. Therefore he blundered," Thyssen said.

Baldwin Locomotive Opens New Dispensary

■ Baldwin Locomotive Works, Eddystone, Pa., last week placed in service a modern $20,000 6-room dispensary covering 1700-square feet of floor space. A full-time physician and registered nurse have been added to the staff. Dispensary will remain open for night shifts under a trained nurse.

Novel feature is a dental room where non-accident dental work, if desired, is done at moderate cost.

Buy Steel To Avoid Overloading Mills, Purchasing Agents Told

■ REAL problem in the present drive for national defense is to find men with the skill necessary for operation and manufacture of war materials, Louis Johnson, assistant secretary of war, stated at the annual convention of the National Association of Purchasing Agents, Cincinnati, last week. "The (defense) program must be extended vigorously so that no prudent enemy will be tempted to attack us," he said.

An appeal to spread steel buying regularly over the coming months so that it will not add to difficulties of mills endeavoring to meet the government's rearmament needs, was made by Frank H. Carter, purchasing agent, Maryland Drydock Co., Baltimore.

"We should make a careful survey of our immediate requirements, as well as those for the future, and build up adequate stocks to carry us only until such time as the mills will be able to schedule other rollings from which to replace those items which have been consumed in our production program. . . There is an apparent tendency on the part of mills to hold to reasonable prices and avoid a runaway market.

"Many things may happen to change the price structure, but with every indication of high operations, which mean more economical production and higher profits, it is reasonable to assume the steel industry will do its part to keep the market on an even keel."

Object to Price Cuts

In discussing base prices and extras, N. J. Clarke, vice president in charge of sales, Republic Steel Corp., Cleveland, said: "I am convinced that most purchasers are opposed to sudden upsets in the price structure of materials used in the manufacture of their products. If they have reasonable inventories on hand they face substantial write-downs, which, rightly or wrongly, reflect on the buyer's judgment.

"Moreover, they are at once confronted with the necessity of deciding whether to load up at the low level or wait for a still lower price at the risk of missing the boat entirely. Production plans, based on a certain price level, must be revised. If the flurry is a short one, it is highly questionable whether the lower prices benefit anyone.

"This spring, for example, when unwarranted price concessions began to appear in certain steel markets, some of the severest criticism was heard from important steel users."

Greatly increased demand for steel products points to capacity or near capacity operations in the near future, according to Mr. Clark.

A special committee of American Iron and Steel institute now is engaged in efforts to codify the existing underlying information necessary in working out rational standardization for the steel industry, according to R. E. Zimmerman, vice president in charge of research and technology for the United States Steel Corp.

That all nonferrous metals are moving into stronger positions and that price trends should reflect this situation in the near future was the opinion expressed by Fred A. Compton, purchasing agent, Detroit Edison Co., Detroit.

"Private enterprise hasn't been washed away entirely by the flood of depression fears, and restrictive legislation but it has been seriously weakened," said Charles R. Hook, president, American Rolling Mill Co., Middletown, O.

Interstate trade barriers exist today which are a serious interference to the movement of trade, according to Irvin E. Walton, purchasing agent, Heppenstall Co., Pittsburgh. Hundreds of laws, ordinances and regulations, aimed at products brought in from other states, have been put into force throughout the country, and many of these are in conflict with similar regulations in other states.

Concerted action by large numbers of citizens in all states will be necessary to break down these interstate trade barriers, he said.

The new president of the association is George E. Price Jr., purchasing agent, Goodyear Tire & Rubber Co., Akron, O.

Canadian Railroad Shops Will Receive Large Allied Tank Orders

TORONTO, ONT.

■ CANADA is preparing to manufacture large numbers of tanks for the Allies, and at the same time is speeding up production of other war *materiel.* British war supply board soon will place the tank orders with railway equipment manufacturing companies which are almost fully equipped to start production.

Guns, shells, munitions and other contracts are planned on a much more extensive scale. Large purchases of machinery and tools will be necessary to effect the increase.

Canada's aircraft industry is slated for sharp rise in operations, following announcement from London that the British government will not be able to continue supply aircraft for the commonwealth air training plan. Additional orders soon may be placed in the United States, while Canadian plants will be enlarged and new equipment installed. Plants also will be established here to produce engines for Canadian built aircraft.

Purchases made by the department of munitions and supply, Ottawa, Ont., and its predecessors, now exceed $300,000,000. These figures include some $260,000,000 for Canadian account. Orders include the following: Railway equipment, $24,900,000; shipbuilding, $47,000,000; defense projects, $13,700,000; antisubmarine defense, $2,000,000; aircraft, $46,800,000 and miscellaneous, $34,300,000.

Department of munitions and supply last week awarded 765 contracts, valued at $2,893,953. Following are the more important awards:

Mechanical transport, General Motors Products of Canada Ltd., Ottawa, $78,881; W. D. Beath & Son Ltd., Toronto, $99,173; Canadian Top & Body Corp. Ltd., Tilbury, Ont., $120,022; Brantford Coach & Body Ltd., Brantford, Ont., $41,424; Cockshutt Plow Co. Ltd., Brantford, Ont., $41,424; Ford Motor Co. of Canada Ltd., Windsor, Ont., $92,350.

Aircraft, Robert Mulhall, Ottawa, $14,653; MacDonald Brothers Aircraft Ltd., Ottawa, $13,402; National Steel Car Corp. Ltd., Hamilton, Ont., $32,200; Canadian Kodak Co. Ltd., Toronto, $39,031.

Machinery and tools, Canadian Fairbanks-Morse Co. Ltd., Ottawa, $28,448.

Electrical equipment, Canadian General Electric Co. Ltd., Ottawa, $8004; Northern Electric Co. Ltd., Ottawa, $6005; Norton Steel Works Ltd., Toronto, $6290.

Dominion Steel & Coal Corp. Ltd., Sydney, N. S., now is shipping to Great Britain between 75 and 80 per cent of its entire output. This compares with 30 per cent or less a year ago.

Reports Britain Exports Machine Tools in Effort To Hold Markets

■ DETERMINATION to hold and even increase her foreign markets is indicated by Great Britain's continued shipments of machinery and machine tools to Latin-American countries, even while importing similar equipment from United States, according to A. E. Reed, assistant vice president and export manager, W. S. Tyler Co., Cleveland. Mr. Reed returned recently from a trip throughout South America where he studied prospective markets for steel and nonferrous products.

Faced with the problem of financing a war on a scale far greater than at first anticipated, England is showing signs of regimenting exports and in some instances is creating blocked sterling accounts, the sole purpose of which is to force reciprocal purchases of its products by the countries from whom it buys.

Natural inter-American sympathy, however, plus advantages United States possesses in transportation facilities, superior delivery possibilities and high quality of products combine to make the United States potentially the chief supplier of Latin-American needs. Preference for American products is strong, with very few exceptions, Mr. Reed discovered.

American metalworking machinery, while highly respected, frequently is considered less desirable than either British or German equipment because it is believed too highly specialized and is too expensive. Comparatively undeveloped, Latin-American industries require simpler equipment for production of high tolerance articles. American tool builders are not inclined to turn out such equipment while faced with large backlogs for their regular product.

American Products Favored

German trade penetration of South and Central American markets in recent years has been largely at Great Britain's expense, has not kept pace with growth of United States' exports to those nations. Japan, despite frequent sensational reports to the contrary, seems completely out of the picture as far as trade domination in Latin America is concerned. Imports from Japan of 14 major Latin-American nations declined about one-third during the past year, aggregated only 1.6 per cent of their total. Nations principally involved in the struggle for the southern markets are and have been United States, Great Britain and Germany.

Future, as well as present Latin-American imports from United States seem to be limited only by ability of those nations to pay for their purchases, most of which today are on a cash or short term basis. It is obvious their imports will rise in proportion to our purchases of Latin-American products, and here lies the key to the future. Every new product of Latin America that we can buy and every increase we can make in the traditional imports from that area will come right back to us in increased sales of our manufactured products.

With possible exception of Argentina, traditionally pro-British in its import program, Mr. Reed found United States is definitely favored throughout Latin-America as a source of manufactured articles. Germany's market gains of recent years are being doubly dispelled, by war and by weakness inherent in her barter trade system. Many of the southern republics have on hand large trade balances in blocked marks, entirely useless at present and not very satisfactory at best.

Reciprocity Is Key to Problem

Industrial development in Latin America, at present in its first stages, Mr. Reed feels, will not injure our ultimate trade volume. Lacking the reservoir of skill, experience and financial resources that has taken generations for the older industrial nations to build up, the American republics will be in position to manufacture only a fraction of their needs for many years. Their productive facilities will be engaged in fabrication of relatively easily manufactured articles. Specialized and precision items as well as those products that require large volume production to achieve low costs, will still be imported, probably from United States, since it seems the favored source for such equipment.

One factor adversely affecting our trade development in Latin America, the price differential between United States' products and European equipment, said Mr. Reed, is being rapidly narrowed, at least for the period of the war.

United States' problem is to determine how best we can increase our purchases from Latin-American nations without injuring our domestic economy. Upward trend in industrial activity during 1939 was reflected in increased purchases from Latin-Americas, resulted in immediately greater exports to the same nations.

Exports of metals and manufactures from United States to Latin-Americas during first six months of the European war increased 137 per cent; machinery and vehicle exports increased 27 per cent. Increase in total exports to the same nations was more than 50 per cent, to better than 359 million dollars.

Commerce department statistics indicate the Latin-American nations imported during the fairly normal, peace-time year of 1937 substantially more than 200 million dollars worth of iron and steel products, vehicles and machinery. Although complete figures are not available, it seems probable United States furnished well above 50 per cent of that total. This was despite strenuous efforts by Britain and Germany to take over Latin-American outlets.

Metalworking Machine Exports Reach New Peak

■ Additional details regarding United States exports of power-driven metalworking machinery in April show an increase of more than 600 per cent over April, 1939, in the value of some classifications.

As reported in STEEL, June 3, page 33, the exports reached the new record monthly value of $21,281,332, an aggregate gain of 140 per cent over April, 1939, when they totaled $8,854,755. Expansion was reflected in all classifications. Some of the most important:

	April 1940	April 1939
Lathes	$3,823,750	$1,104,093
Milling machines	2,173,723	1,520,573
Thread-cutting and automatic screw machines	2,078,130	318,433
Vertical boring mills, chucking machines	843,652	291,093
Gear cutters	678,213	198,952
Vertical drilling machines	1,400,979	187,249
Planers and shapers	429,766	348,268
Surface grinders	519,932	185,753
Internal grinders	946,807	271,892
External cylindrical grinders	813,712	392,978
Other grinders	1,090,954	310,367
Sheet and plate metalworking machines	1,020,457	661,681
Forging machinery	805,763	615,961

■ First graduating exercises for Thompson Products Inc., Cleveland, apprentices were held last Friday night at Cleveland club, Cleveland. Twelve were presented with diplomas and class rings by Fred C. Crawford, company president. To graduate, an apprentice must serve four terms of approximately 2080 hours each.

Steel for Sale Output In April 3,005,218 Tons

■ Finished steel made for sale totaled 3,005,218 net tons in April, according to American Iron and Steel institute, New York. Total for first four months this year is 13,578,203 tons.

Of the April production, 191,291 tons or 6.37 per cent went into further finished products and 371,532 tons or 12.37 per cent was exported. Of the first four months' total, 864,674 tons, or 6.37 per cent went into further finished products and 1,674,346 tons, or 12.37 per cent, was exported.

Products, less those for conversion, took 68.9 per cent of ingots produced.

April finishing operations were at a rate of 63.8 per cent of capacity, and for first four months, 71.6 per cent. Number of companies continues at 153.

Beginning with this month, American Iron and Steel institute will issue a monthly analysis of finished steel products, with totals to date, rather than its quarterly report.

Pig Iron Production Rate Shows Uptrend

■ Actual coke pig iron production in United States during May totaled 3,497,318 net tons, according to complete reports. Average daily rate of production was 112,817 tons, compared to 104,635 in April. These figures are essentially as reported in STEEL, June 3, p. 26, which compilation included some estimates.

Furnaces in blast May 31 totaled 170, instead of 171 as previously reported. Ensley No. 6 stack of Ten-

AMERICAN IRON AND STEEL INSTITUTE
Capacity and Production for Sale of Iron and Steel Products — April - 1940

		Number of companies	Items	Annual Capacity Net tons	Production for Sale—Net Tons: Current Month: Total	Current Month: Shipments: Per cent of capacity	Current Month: Shipments: Export	Current Month: Shipments: To members of the industry for conversion into further finished products	To Date (4 Months 1940): Total	To Date: Per Cent of capacity	To Date: Shipments: Export	To Date: Shipments: To members of the industry for conversion into further finished products
Steel Products	Ingots, blooms, billets, slabs, sheet bars, etc.	32	1	xxxxxxx	291,776	xxx	60,180	109,232	1,365,619	xxx	376,390	473,847
	Heavy structural shapes	8	2	5,205,300	174,006	40.7	16,909	-	710,720	41.3	57,655	xxxxxxx
	Steel piling	4	3	328,000	11,200	41.6	656	-	40,378	37.2	3,789	xxxxxxx
	Plates—Sheared and Universal	19	4	5,855,450	246,916	51.4	40,091	2,065	1,124,523	58.1	127,934	12,163
	Skelp	7	5	xxxxxxx	33,344	xxx	1,004	15,787	151,548	xxx	21,166	55,335
	Rails—Standard (over 60 lbs.)	4	6	3,647,600	154,023	51.5	4,891	-	644,637	53.4	26,096	xxxxxxx
	Light (60 lbs. and under)	6	7	306,800	8,670	34.4	2,100	-	33,850	33.4	9,085	xxxxxxx
	All other (Incl. girder, guard, etc.)	2	8	118,000	2,114	21.8	850	-	13,090	33.5	2,270	xxxxxxx
	Splice bar and tie plates	15	9	1,300,200	56,270	52.7	563	-	222,426	51.7	3,318	xxxxxxx
	Bars—Merchant	35	10	xxxxxxx	255,347	xxx	38,167	19,686	1,301,250	xxx	117,318	106,406
	Concrete reinforcing—New billet	14	11	xxxxxxx	95,370	xxx	25,071	-	321,442	xxx	100,132	xxxxxxx
	Rerolling	18	12	xxxxxxx	11,702	xxx	148	-	38,732	xxx	3,626	xxxxxxx
	Cold finished—Carbon	18	13	xxxxxxx	45,798	xxx	1,435	-	209,430	xxx	3,912	xxxxxxx
	Alloy—Hot rolled	15	14	xxxxxxx	66,494	xxx	3,319	3,552	274,051	xxx	16,243	18,981
	Cold finished	14	15	xxxxxxx	6,840	xxx	489	-	30,336	xxx	979	xxxxxxx
	Hoops and baling bands	5	16	xxxxxxx	7,683	xxx	645	-	29,000	xxx	1,841	xxxxxxx
	TOTAL BARS	53	17	12,372,465	489,234	48.2	69,274	23,238	2,204,241	53.9	244,051	125,387
	Tool steel bars (rolled and forged)	15	18	110,220	5,280	58.4	211	-	21,876	60.0	943	xxxxxxx
	Pipe and tube—B. W.	13	19	1,737,860	65,587	40.0	6,114	-	261,741	45.5	27,174	xxxxxxx
	L. W.	10	20	1,360,360	24,242	21.7	3,580	-	97,355	21.6	13,402	xxxxxxx
	Electric weld	5	21	731,520	18,745	31.2	2,121	-	72,464	30.0	9,095	xxxxxxx
	Seamless	15	22	3,159,840	122,893	47.4	14,417	-	562,091	53.8	59,759	xxxxxxx
	Conduit	6	23	151,145	5,906	47.6	11	-	20,912	41.8	562	xxxxxxx
	Mechanical Tubing	13	24	554,825	18,410	40.4	973	-	89,986	49.0	4,197	xxxxxxx
	Wire rods	19	25	xxxxxxx	62,692	xxx	14,408	11,813	316,531	xxx	74,815	50,504
	Wire—Drawn	37	26	2,255,210	100,165	54.1	16,121	707	436,287	58.5	56,516	5,764
	Nails and staples	19	27	1,091,690	41,184	46.0	5,451	-	174,625	48.4	20,115	xxxxxxx
	Barbed and twisted	16	28	438,270	16,421	45.7	2,868	-	58,133	40.1	9,240	xxxxxxx
	Woven wire fence	15	29	772,790	22,223	35.0	239	-	79,741	31.2	851	xxxxxxx
	Bale ties	11	30	119,050	5,069	51.9	68	-	16,400	41.7	113	xxxxxxx
	All other wire products	6	31	27,030	1,215	54.8	-	-	3,501	39.2	-	xxxxxxx
	Fence posts	13	32	147,485	4,548	37.6	20	-	15,977	32.8	250	xxxxxxx
	Black plate	12	33	653,295	29,761	55.5	1,661	9,220	121,714	56.3	5,602	40,507
	Tin plate—Hot rolled	9	34	1,201,960	37,309	37.8	3,993	-	181,628	45.7	55,276	xxxxxxx
	Cold reduced	10	35	2,930,860	197,365	82.1	34,615	-	751,860	77.6	157,118	xxxxxxx
	Sheets—Hot rolled	26	36	xxxxxxx	309,459	xxx	32,828	10,496	1,651,427	xxx	167,806	50,802
	Galvanized	16	37	xxxxxxx	87,248	xxx	16,451	-	396,385	xxx	61,843	xxxxxxx
	Cold rolled	18	38	xxxxxxx	155,063	xxx	6,073	-	725,724	xxx	31,948	xxxxxxx
	All other	15	39	xxxxxxx	39,200	xxx	3,765	-	189,056	xxx	8,444	xxxxxxx
	TOTAL SHEETS	27	40	13,255,610	590,970	54.3	59,117	10,496	2,962,592	67.6	270,041	50,802
	Strip—Hot rolled	24	41	3,525,110	86,201	29.8	6,929	8,733	443,738	38.1	26,330	50,365
	Cold rolled	35	42	1,313,360	51,852	48.1	1,483	-	228,940	52.7	6,075	xxxxxxx
	Wheels (car, rolled steel)	5	43	419,035	14,900	43.3	296	-	73,753	53.2	1,945	xxxxxxx
	Axles	5	44	472,280	4,207	10.9	183	-	32,116	20.6	1,533	xxxxxxx
	Track spikes	11	45	327,275	10,071	37.5	135	-	39,666	36.6	1,640	xxxxxxx
	All other	3	46	9,100	449	60.1	-	-	3,544	117.7	-	xxxxxxx
	TOTAL STEEL PRODUCTS	133	47	xxxxxxx	3,005,218	xxx	371,532	191,291	13,578,203	xxx	1,674,346	864,674
	Estimated total steel finishing capacity based on a yield from ingots of 68.9 %	-	48	53,714,800	xxxxxxx	63.8	xxxxx	xxxxxxx	xxxxxxx	71.6	xxxxxxx	xxxxxxx
	Pig iron, ferro manganese and spiegel	27	49	xxxxxxx	400,247	xxx	17,479	76,525	1,709,844	xxx	96,533	431,654
	Ingot moulds	4	50	xxxxxxx	22,585	xxx	229	-	109,823	xxx	682	xxxxxxx
Iron Products	Bars	10	51	160,600	1,373	10.4	45	65	9,347	17.6	79	769
	Pipe and tubes	3	52	109,377	2,575	28.7	75	-	11,222	31.0	445	xxxxxxx
	All other	3	53	71,180	776	13.3	1	154	4,070	17.3	811	1,158
	TOTAL IRON PRODUCTS (ITEMS 51 to 53)	12	54	276,247	4,724	20.8	121	219	24,639	27.0	1,335	1,927

Total steel products produced for sale, less shipments to members of the industry for conversion into further finished products: Current month 2,813,927 *N.T.;* 63.8 *% of Finishing Capacity.*
To date 12,713,529 *N.T.;* 71.6 *% 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

nessee Coal, Iron & Railroad Co., in Alabama, was taken out of blast May 31. Two furnaces were reported blown in June 1: Duquesne No. 6, Carnegie-Illinois Steel Corp., and Monessen No. 2, Pittsburgh Steel Co., both in Pennsylvania. Interlake Iron Corp. banked its Federal B furnace, in Illinois, Jan. 1.

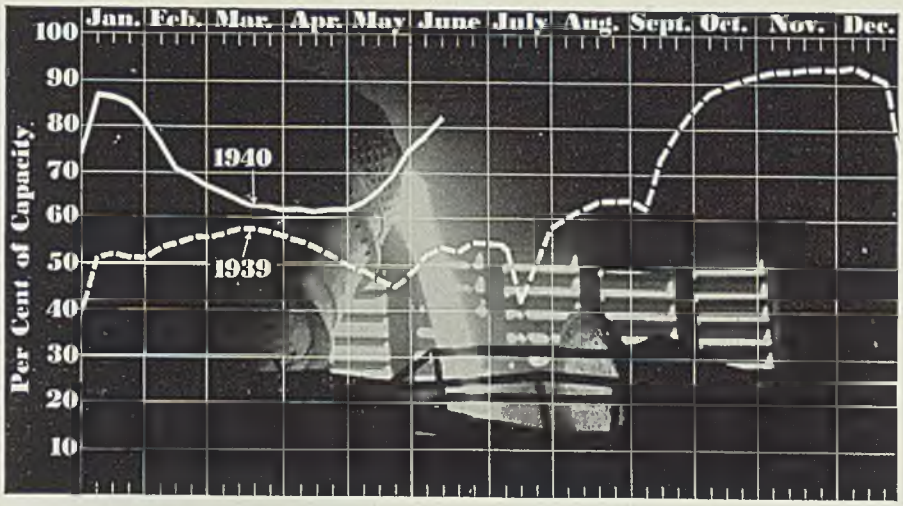
May Ingot Output 20 Per Cent Over April

■ Open hearth and bessemer steel ingot tonnage produced in May rose more than 20 per cent over April, to a total of 4,841,403 net tons, according to the American Iron and Steel institute. April output was 3,974,706 tons, while in May, 1939, a total of 3,295,164 tons was produced. Last month's output was 47 per cent larger than in May, 1939.

Average operations in May were 72 per cent of capacity, compared with 61.04 per cent in April and 48.64 per cent in May, 1939. Average weekly production last month was 1,092,867 tons, against 926,505 tons in April and 743,829 tons per week in May, 1939.

Aggregate tonnage in five months this year was 23,145,214 tons, compared with 17,434,843 tons in the corresponding period in 1939. Average weekly output in first five months this year was 1,065,617 tons and in the same portion of 1939 it was 807,912 tons.

In May 94.6 per cent of the ingots were made in open hearths.



PRODUCTION... Up

■ STEELWORKS operations last week advanced 3 points to 81.5 per cent. Eight districts increased output, one reported a slight loss and three were unchanged. A year ago the rate was 53.5 per cent; two years ago, 25.5 per cent.

Birmingham, Ala. — Unchanged at 85 per cent with 12 open hearths in production.

Detroit—Rose 1 point to 75 per cent

Buffalo—Advanced 14 points to 84 per cent as several open hearths were added. Indications point to an increase this week.

Central eastern seaboard — Up 2 points to 73 per cent, smaller producers being more active.

Youngstown, O. — Advanced 9 points to 67 per cent, with 60 open hearths and three bessemers active, and schedules for further additions this week. Youngstown Sheet & Tube Co. and Republic Steel Corp. each blew in one blast furnace, giving each 100 per cent pig iron production.

Chicago — Increased 3 points to 86 per cent as larger producers added to open hearth activity. Further gains are forecast.

New England — Gained 10 points to 66 per cent, the first upward movement in this district for three weeks.

Pittsburgh — Added 1 point to 80 per cent, with further increase expected this week.

Wheeling — Steady at 79 per cent, with little change indicated.

Cincinnati — Further gain of 6 points to 70 per cent reflects increased output of flat-rolled stock.

Cleveland — Held at 82 per cent with schedules for this week showing no change.

St. Louis — Down 1 point to 56 per cent.

Steel Ingot Statistics

Period	Calculated Monthly Production—All Companies—Open Hearth—Net tons	Open Hearth—Per cent of capacity	Bessemer—Net tons	Bessemer—Per cent of capacity	Total—Net tons	Total—Per cent of capacity	Calculated Weekly production, all companies net tons	Number of weeks in month
1940 Reported by Companies which in 1939 made 97.97% of Open Hearth and 100% of Bessemer.								
Jan.	5,369,601	86.40	285,714	56.10	5,655,315	84.11	1,276,595	4.43
Feb.	4,203,508	72.37	205,527	43.19	4,409,035	70.16	1,064,984	4.14
March	4,073,196	65.54	191,559	37.62	4,264,755	63.42	962,699	4.43
April	3,798,371	63.11	176,335	35.76	3,974,706	61.04	926,505	4.29
May	4,582,694	73.74	258,709	50.80	4,841,403	72.00	1,092,867	4.43
5 mos.	22,027,370	.....	1,117,844	.....	23,145,214	.....	1,065,617	21.72
1939 Reported by Companies which in 1939 made 97.97% of Open Hearth and 100% of Bessemer.								
Jan.	3,413,783	55.35	165,080	27.22	3,578,863	52.83	807,870	4.43
Feb.	3,149,294	56.55	219,621	40.10	3,368,915	55.07	842,229	4.00
March	3,621,177	58.71	217,950	35.93	3,839,127	56.67	866,620	4.43
April	3,122,418	52.27	230,356	39.22	3,352,774	51.11	781,532	4.29
5 mos.	16,411,369	.....	1,023,474	.....	17,434,843	.....	807,912	21.58
May	3,104,697	50.34	190,467	31.40	3,295,164	48.64	743,829	4.43
June	3,314,012	55.48	209,868	35.73	3,523,880	53.71	821,417	4 29
July	3,308,029	53.75	256,798	42.43	3,564,827	52.74	806,522	4.42
Aug.	3,965,515	64.29	276,479	45.58	4,241,994	62.62	957,561	4.43
Sept.	4,436,792	74.45	332,676	56.77	4,769,468	72.87	1,114,362	4.28
Oct.	5,626,685	91.22	453,492	74.77	6,080,177	89.75	1,372,500	4.43
Nov.	5,694,788	95.34	452,995	77.12	6,147,783	93.71	1,433,050	4.29
Dec.	5,468,880	88.87	353,134	58.35	5,822,014	86.13	1,317,198	4.42
Total	48,226,070	66.43	3,358,916	47.05	51,584,986	64.70	989,355	52.14

The percentages of capacity for 1939 are calculated on weekly capacities of 1,392,331 net tons open hearth ingots and 136,918 net tons Bessemer ingots, total 1,529,249 net tons; based on annual capacities as of Dec. 31, 1938, as follows: Open hearth ingots, 72,596,153 net tons; Bessemer ingots, 7,138,880 net tons.

The percentages of capacity operated for 1940 are calculated on weekly capacities of 1,402,899 net tons open hearth ingots and 114,956 net tons Bessemer ingots, total 1,517,855 net tons; based on annual capacities as of Dec. 31, 1939 as follows: Open hearth ingots, 73,343,547 net tons; Bessemer ingots, 6,009,920 net tons.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended June 8	Change	Same week 1939	Same week 1938
Pittsburgh	80	+ 1	43	19.3
Chicago	86	+ 3	52.5	22
Eastern Pa.	73	+ 2	37	25.5
Youngstown	67	+ 9	51	25
Wheeling	79	None	73	38
Cleveland	82	None	53	31
Buffalo	84	+14	44	23
Birmingham	85	None	67	58
New England	66	+10	40	25
Cincinnati	70	+ 6	68	16
St. Louis	56	— 1	47	39.3
Detroit	75	+ 1	57	18
Average	81.5	+ 3	53.5	25.5

MEN of INDUSTRY

■ A. F. ALLEN, secretary-treasurer, and a director, American Steel & Wire Co., Cleveland, was honored recently at a dinner attended by his associates in the Wire company, for his completion of a half century of service with subsidiaries of the United States Steel Corp. He was presented with the corporation 50-year gold service medal. Mr. Allen joined the former Illinois Steel Co. in June, 1890, and nine years later became associated with American Steel & Wire. He served successively as clerk in the secretary's office, assistant treasurer, assistant secretary; in 1901 was elected secretary and in 1928, treasurer. Mr. Allen is also vice president, secretary and a director, Cyclone Fence Co.

♦

John Slezak has been elected president, Turner Brass Works, Sycamore, Ill., maker of liquid fuel appliances. He formerly was vice president and general manager.

♦

J. C. Harrington has been elected president and general manager, National Forge & Ordnance Co., Irvine, Pa. He succeeds the late C. E. Wilder, with whom he worked for a number of years as chief assistant.

♦

Albert C. Schweitzer has been named eastern district traffic manager, United States Steel Corp. subsidiaries. He succeeds Charles W. Trust, recently named general traffic manager. He has been assistant traffic manager of the eastern district since 1938.

♦

John W. Murphy, associated with Bethlehem Steel Co., Bethlehem, Pa., since 1924 as a salesman, and located in the Baltimore district since 1930, has been promoted to assistant manager of sales, Baltimore district. Before joining Bethlehem he was with the Midvale Steel & Ordnance Co. as a concrete reinforcing bar engineer and sales representative in its Boston office.

John W. Murphy

A. F. Allen

♦

William B. Castle, vice president and director, Interlake Iron Corp., in charge of the Zenith division, Duluth, has retired, after 60 years' active association with the industry, including iron ore, steamship and blast furnace experiences. He will continue his directorship.

♦

Sir H. C. Harold Carpenter, professor of metallurgy, Royal School of Mines, Imperial College of Science and Technology, London, and past president of both the Iron and Steel institute and Institute of Metals, has been named 1940 medallist of the Japan Institute of Metals, Tokyo.

♦

Lawrence E. Barringer, engineer in charge of electrical insulation, General Electric Co., Schenectady, N. Y., has been awarded the 1940 Benjamin G. Lamme medal of Ohio State university, Columbus, O., for "achievement in the field of research and development of materials for electrical insulation."

♦

William H. Pratt, consulting engineer, General Electric Co., West Lynn, Mass., works, has retired after 45 years' service. After graduating from Massachusetts Institute of Technology, Mr. Pratt joined the West Lynn works in 1895.

♦

C. R. Mitchell Jr. has been made assistant district manager of sales at New York for Allegheny Ludlum Corp., Pittsburgh. A graduate of the University of Pittsburgh in 1928, he began work with the former Allegheny Steel Co. in 1931. From that year until 1934, when he was transferred to the New York office, Mr. Mitchell's activities were in various capacities in the mill at Brackenridge, Pa.

♦

J. S. Bennett has been appointed manager of sales, American Engineering Co., Philadelphia, maker of Lo-Hed hoists, Hele-Shaw pumps, Taylor stokers and marine deck auxiliaries. William H. Schultze has been made sales manager, marine division, and C. L. Myers continues as sales manager, stoker division.

♦

A. I. Richardson has been appointed manager of Allis-Chalmers Mfg. Co.'s district office at Dallas, Tex. He was previously located at the company's district office in Charlotte, N. C. A native of Texas, Mr. Richardson joined Allis-Chalmers in 1925, spending two years in the shops prior to preparing for sales engineering work. Since then he has been with the company's district offices at Atlanta, Ga., Chattanooga, Tenn., and Charlotte, N. C.

♦

Stanley M. Mercier has been made chief engineer, conveyor division, Jeffrey Mfg. Co., Columbus, O., maker of coal mining machinery, electric locomotives, chains, conveying and crushing machinery. Mr. Mercier will direct all conveyor engineering and engineering sales activities. Born and educated in England, Mr. Mercier has had varied experience in industrial and construction engineering, design and

Stanley M. Mercier

sales, and has been associated with many outstanding construction operations in the country the past decade.

♦

Victor A. Olsen, works manager, Cadillac Motor Car division, General Motors Corp., Detroit, and for 21 years active with this division, has been named general manager, Detroit Transmission division of General Motors.

Clarence A. Raftrey, the past several years assistant works manager, succeeds Mr. Olsen as works manager.

♦

G. L. Crawford has been appointed Buffalo district manager in charge of sales of all products, Wickwire Spencer Steel Co., New York. He succeeds A. G. Bussmann, recently promoted to general sales

G. L. Crawford

manager. Mr. Crawford, with Wickwire since 1927, continues as sales manager of structural products, the position to which he was appointed in April, 1939. His headquarters are at the company's Buffalo offices, 70 Niagara street.

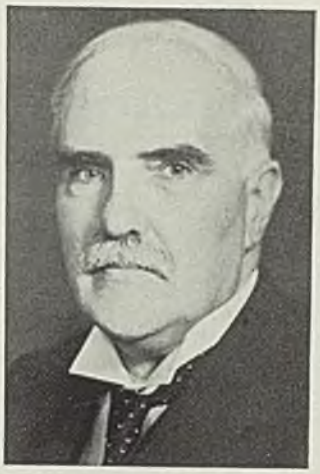
♦

E. H. Anchors, formerly branch manager for Air Reduction Sales Co. at Atlanta, Ga., has been named manager of the Oklahoma City, Okla., district. He began his career 15 years ago with the Commercial Acetylene Supply Co., and was southern manager of that company when it was acquired by Air Reduction. Since that time he has served continuously as branch manager at Atlanta.

♦

T. D. Cartledge and L. A. Bliss have been elected vice presidents, Linde Air Products Co., a unit of Union Carbide & Carbon Corp., New York. E. J. Hayden has been elected vice president, central division.

Mr. Cartledge has been general sales manager, and Mr. Bliss, works manager. Mr. Hayden has been



John Craig

Whose election as president, British Iron and Steel institute, was noted in STEEL, June 3, p. 33. Mr. Craig is chairman and managing director, Colvilles Ltd., Glasgow, Scotland, with which oganization he has been associated since 1888. Mr. Craig is a past president, National Federation of Iron and Steel Manufacturers, now the British Iron and Steel Federation; a director, British Iron & Steel Corp. Ltd.; is on the council of the Federation of British Industries, and holds directorships in several other firms

manager of the central division.

E. B. Suydam, heretofore assistant general sales manager, has become general sales manager, to succeed Mr. Cartledge, and P. B. Pew, formerly assistant works manager, has been made works manager, to succeed Mr. Bliss.

C. K. Bryce has been elected vice president, Oxweld Acetylene Co., also a unit of Union Carbide & Carbon. Mr. Bryce was formerly manager of factories.

♦

Dr. Edward R. Weidlein, director, Mellon institute, Pittsburgh, has announced appointment of Dr. Edward E. Marbaker to the incumbency of

H. Rodgers Dorney

Who has been elected president, Baltimore Steel club, Baltimore, as reported in STEEL, May 20, p. 28. Mr. Dorney is local representative for Jones & Laughlin Steel Corp.

the industrial fellowship founded by O. Hommel Co., Pittsburgh, maker of frits, ceramic chemicals, colors and bronze powders. Mr. Marbaker has been a fellow of Mellon institute 20 years, engaged in research and development work in chemistry, ceramics and metallurgy.

♦

John G. Bergdoll, associated with York Ice Machinery Corp., York, Pa., about 26 years, has been promoted to chief engineer. He was first employed as a machinist's apprentice in 1914 and since then has occupied the positions of draftsman, equipment development engineer, product engineer, and assistant chief engineer.

♦

Sir William Larke, director, British Iron and Steel Federation, London; A. O. Peech, director, United Steel Companies Ltd., Sheffield; and Dr. C. H. Desch, superintendent, metallurgy department, National Physical Laboratory, Teddington, were re-elected vice presidents of the council of the British Iron and Steel institute at the institute's annual general meeting in London, May 2-3.

Re-elected members of the council were E. J. Fox, managing director, Stanton Ironworks Co. Ltd., Nottingham; Dr. T. Swinden, director of research, United Steel Companies Ltd., Sheffield; Dr. A. McCance, director, Colvilles Ltd., Glasgow; P. B. Brown, deputy chairman, Hadfields Ltd., Sheffield; and J. R. Menzies-Wilson, director, Stewarts & Lloyds Ltd., Glasgow.

Announcement of new president and vice president of the institute, and details concerning medal awards and honorary memberships were presented in STEEL for June 3, p. 33.

♦

Chicago Bridge & Iron Co., Chicago, has made the following changes in its sales department: S. C. Hamilton, district sales manager at Birmingham, Ala., has been transferred to Houston, Tex.; R. A. Williams, who has been handling the sale of Morse filter plants, has been moved to the Dallas, Tex., office. H. F. Stearns has been made district sales manager at Birmingham. He formerly was in the New York office. A. H. Heineman has also been moved from New York to Birmingham sales department, while Herbert A. Guerin will go from the Cleveland office to the New York office. George Jewett, of Chicago, will go to New York; Ray Menefee, of the Chicago engineering department, will go to Cleveland; William Fickett has been transferred from Chicago drafting room to the sales office, and Kenneth Sandbach has been transferred from the Hillside erection office to Philadelphia sales office.

Medals for Invention, Discovery Awarded by Franklin Institute

■ FRANKLIN institute, Philadelphia, has made its 1940 awards of medals for invention and discovery. Among the awards, formally presented on May 15, were the following:

Edward Longstreth medal for the encouragement of invention, to:

James Slayter, vice president in charge of research and development, Owens-Corning Fiberglas Corp., Newark, O., for "his achievement in devising improved methods and apparatus for making spun and blown glass filaments."

Richard L. Templin, chief engineer of tests, Aluminum Co. of America, New Kensington, Pa., for "the ingenious application of mechanisms resulting in the development of the Templin automatic autographic deformation recorder."

Maxwell M. Upson, president, Raymond Concrete Pile Co., New York, for "his contributions to the scientific development of foundation engineering and construction, characterized by genius for invention and technical skill."

John Price Wetherill medal for discovery or invention in the physical sciences, or for new and important combination or methods already known, to:

Edward E. Kleinschmidt, Highland Park, Ill., and Howard L. Krum, Beverly Hills, Calif., for "their part in the development of a successful electrically-operated duplicate typewriting machine now known as the teletypewriter."

Other Awards

George R. Henderson medal for distinguished contributions in the field of railway engineering, to:

William E. Woodward, vice president in charge of design, Lima Locomotive Works Inc., for "his accomplishments in locomotive engineering and his important contributions in the field of steam locomotive design."

Elliott Cresson medal for recognition of distinguished contributions in the realm of physical science, to:

Frederick M. Becket, president, Union Carbide & Carbon Research Laboratories Inc., and consultant, Union Carbide & Carbon Corp., New York, for "his outstanding achievements in the development of processes for the production of low-carbon ferroalloys, which have led to the wide use of many of the now well-known alloy steels, particularly low-carbon stainless steels and the higher chromium oxidation-resistant steels; and also for his many inventions and contributions in the field of electrometallurgy."

Franklin medal for workers in physical science or technology, whose efforts.....have done most to advance a knowledge of physical science or its applications, to:

Arthur H. Compton, Ryerson physical laboratory, University of Chicago, Chicago, for "his brilliant experiments on various properties of x-rays, some of which involved new methods of attack, and, in particular, for his discovery and theoretical treatment of the Compton effect."

Leo H. Baekeland, founder and retired president, Bakelite Corp., New York, for "his inventions and his contributions to the improvement of the industrial arts, and, in particular, of his invention and manufacture of the synthetic product, bakelite."

Certificate of Merit, to:

George H. Ernsbarger, Honolulu, and Frank L. McCarty, Ogden, Utah, for "the development of a simple, rugged and ingenious device for loading a jigging conveyor."

Died:

■ CLINTON E. WILDER, president and founder, National Forge & Ordnance Co., Irvine, Pa., May 23 at his home in Warren, Pa. Born in Keene, N. H., 61 years ago, Mr. Wilder learned the machinist's trade in his youth and continued in the steel business all his life. Before organizing his own firm he was superintendent, Driggs Ordnance Co., Sharon, Pa., and of the Erie Forge Co., Erie, Pa. In 1915 he organized National Forge & Tool Co., Erie, and operated there until 1916 when he acquired the buildings and property of the Irvine Steel & Forge Co., Irvine, Pa. The outgrowth of this was the incorporation in 1927 of the National Forge & Ordnance Co., which is now observing its twenty-fifth anniversary.

C. E. Wilder

♦

John J. Crozier, 64, president, Kennett Foundry & Machine Co., Kennett Square, Pa., and vice president, International Reclaiming Corp., New York, May 29.

♦

John J. Jackson, 71, general counsel for Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., for 29 years before his retirement in 1938, May 27. He also was assistant treasurer, Westinghouse Lamp Co.

♦

Harry G. Marburger, for 21 years superintendent, Northville, Mich., plant of Ford Motor Co., in Detroit, May 29.

♦

Russell M. Scott, 55, for nearly 30 years superintendent of the foundry of Packard Motor Car Co., Detroit, and in later years associated with foundries of Pontiac Motor division, and McKinnon Industries Ltd., St. Catherines, Ont., in Detroit, May 30.

♦

Henry C. Yeiser Sr., 87, who retired as president, Globe-Wernicke Co., Cincinnati, 12 years ago, in Cincinnati, May 27. In 1882 he organized Globe Files Co., and later merged with Wernicke Co. to form the present company which he headed 46 years.

♦

V. D. Moody, 63, president, Moody Engineering Co., New York, May 30 in that city. Before organizing his own firm in 1910, he worked for a time with General Electric Co., Schenectady, N. Y. In recent years he was consulting engineer for many American and foreign firms, including Bethlehem Steel Co. He was a member, American Society of Mechanical Engineers, American Petroleum institute, and Society of Professional Engineers.

♦

John Wesley Collins, 54, manager of Detroit plants, Aluminum Co. of America, in Detroit June 1. A native of Strathroy, Ont., he went to Detroit in 1905 and was employed in gray iron and aluminum jobbing foundries in that territory, joining Aluminum Castings Co. in 1910 as molder on experimental and sample castings. He rose through successive positions until becoming manager. He was a member, American Foundrymen's association and of a number of Detroit social organizations.

Expanding Production Increases Hazards to Health of Workmen

■ IN ADDITION to improving existing programs for safeguarding the health of millions of industrial employes, speakers at the joint meetings of the American Association of Industrial Physicians and Surgeons and American Industrial Hygiene association in New York, June 4-7, urged prompt action to protect workers from dangers of new materials and methods which may develop as industry swings into production for national defense.

Pressure for increased output, congestion and hastily improvised production facilities are included among problems to confront industrial hygienists, according to Dr. Donald H. Cummings, director, division of industrial hygiene, University of Colorado, Denver, who touched on steps to be taken at steel plants. Explosives, being highly toxic, and heavier production of munitions, will greatly increase problems of the industrial hygienists.

Advocates Welding Safeguards

Suitable clothing to be worn by welders to fend off fumes created by the fusing flame was advocated by Dr. C. P. McCord, medical director, Industrial Health Conservancy Laboratories, Detroit, and Drs. G. C. Harrold and S. F. Meek, Industrial Hygiene Laboratories, Chrysler Corp. This should be in addition to protection against injurious rays of light and heat. Greater use of welding in shipbuilding, aircraft assembly and automobile production, the latter often involving 300 or more welding operations per vehicle, was cited as enhancing the growing importance of industrial hygiene in welding plants.

Attended by 1500 medical directors, industrial hygienists, plant chemists, safety engineers, industrial nurses and others concerned with health and safety in industry, the convention exhibits included 65 booths showing new equipment and facilities related to progress in shop hygiene and medicines for the protection and health of workers.

Dr. Leroy U. Gardner, director, Saranac Laboratory for the Study of Tuberculosis, of the Edward L. Trudeau Foundation, was awarded the William S. Knudsen plaque for outstanding achievement in industrial medicine, first awarded in 1939. For 11 years Dr. Gardner has made an intensive study of silicosis, causes, treatment and prevention.

William P. Yant, Mine Safety Appliances Co., Pittsburgh, president of the American Industrial Hygiene Association, reviewing a program for protection against use of new substances or materials, also processes, said the recommendations will be circulated among 50,000 industrial physicians and surgeons, also hygienists and others engaged in allied fields. Key centers of application will be determined by close to 5000 engaged full time in industrial practice.

Smaller plants without industrial medical departments were urged to seek advice from public facilities as provided by numerous states by Dr. Michael Lake, medical director R. H. Macy & Co., New York. Most states are increasingly conscious of the need of such advisory services.

Health and its protection are prime factors in national defense, said Maj. Gen. Amos A. Fries, U. S. army, retired, and, whether the nation be at peace or war, this assures important places for the industrial physician and hygienist in the mobilization of industry for national defense.

Warren A. Cook, division of industrial hygiene and engineering research, Zurich General Accident and Liability Insurance Co., Chicago, is the new president of the American Industrial Hygiene association. Re-elected as secretary is Gordon C. Harrold, Industrial Hygiene Laboratories, Chrysler Corp., Detroit. He formerly served as secretary-treasurer. Members resolved to offer cooperation for national defense and authorized the new president of the organization to write letters announcing the action and stand of the association to Dr. Thomas Parran, surgeon general of the United States public health service and head of the war and navy medical services.

Awarded British Medal For Work in Metallurgy

■ Newly elected president of the British Institute of Metals, Lieut. Col. R. M. Preston, director of Rio-Tinto Co. Ltd., London, England, was inducted into office at the organization's general meeting last month by Dr. C. H. Desch, retiring president. During the sessions Dr. Paul D. Merica, International Nickel Co., New York, was announced winner of the Institute's platinum medal for 1940, in recognition of his services to metallurgy.

Papers presented at the meeting included:

"The Influence of Alloying Elements on the Crystallization of Copper. II—Large Additions and the Part Played by the Constitution," by Dr. L. Northcott, research department, Woolwich.

"The Structural Changes in Copper Effected by Cold Rolling and Annealing," by Dr. Maurice Cook and Dr. T. Le Richards, research physicists, I.C.I. Metals Ltd., Birmingham.

"The Aging of High Purity 4 Per Cent Copper-Aluminum Alloy," by Dr. Marie L. Gayler and R. Parkhouse, metallurgy department, national physical laboratory, Teddington.

Aircraft Industry Enlarges Facilities

■ Air Associates, Garden City, N. Y., last week began construction of a $300,000 plant at Bendix, N. J., to double present capacity, according to F. Leroy Hill, president. Company expects to move into new quarters containing 70,000 square feet of floor space, by next September.

Aviation Corp. has acquired for its wholly-owned subsidiary, Aviation Mfg. Corp., New York, physical assets and name of Barkley-Grow Aircraft Corp., Detroit, according to Harry Woodhead, president, Aviation Mfg. Corp.

Curtiss-Wright Corp., Buffalo, is considering enlargement of the Caldwell-Wright airport and the construction of a $2,000,000 warplane plant, to employ 1000 workers, at Newark, N. J.

Massachusetts Institute of Technology, Cambridge, Mass., will enlarge aviation research facilities by a $100,000 addition to its engine research laboratory, made possible through a gift by Alfred P. Sloan Jr., chairman of the board, General Motors Corp., Detroit.

Adel Precision Products, Los Angeles, is planning to expand facilities by construction of a two-story factory building.

Harvill Aircraft Die Casting Corp., Los Angeles, will buy ten acres of land near municipal airport and erect a plant with 52,000 square feet of floor space, tripling capacity. This will be the second time recently that the company has tripled its capacity.

Long Beach Aircraft Corp., Long Beach, Calif., has been incorporated with a capital of $100,000 to operate an aircraft school and manufacturing plant.

Manta Aircraft Corp., Los Angeles, has been incorporated with a capital of 100,000 shares of no par stock.

B. Brookins Aircraft Corp., Los Angeles, has been organized, represented by Ellis I. Hirschfeld, Bankers building, Los Angeles.

Windows of WASHINGTON

By L. M. LAMM
Washington Editor, STEEL

WASHINGTON

■ THE HOUSE passed the 1940 federal aid highway bill June 4. This authorizes the appropriation of $178,500,000 for highway construction for each of the fiscal years 1942 and 1943. Allocations to the various highway programs, as itemized in the bill, are as follows:

Regular federal aid	$93,750,000
Secondary federal aid	18,750,000
Grade crossings	37,500,000
Forest roads	10,500,000
Public land roads	1,875,000
National park roads	5,625,000
Parkways	7,500,000
Indian roads	3,000,000

The amounts originally recommended by the May 1 report of the house roads committee totaled $238,000,000. These are reduced 25 per cent in the bill as approved. The reduction amounts to $59,500,000 and was agreed to by a special meeting of the roads committee, May 29. The pared amounts now carried in the bill provide $357,000,000 for highway construction for the two fiscal years. Regardless of the 25 per cent reduction, the total shows an increase of $7,500,000 over the amount authorized by the federal aid highway act of 1938.

"Aid in Defense"

Charles M. Upham, engineer-director, American Road Builders' association, stated: "The legislation is invaluable to the national defense plans now being put into effect by our government. Modern highways throughout the nation will insure swift and efficient transportation of mechanized units, motorized troops and mobile supplies. They are physical assets that play a major role in modern warfare."

Rep. Wilburn Cartwright, Oklahoma, chairman of the roads committee told house members it is generally agreed that roads are as necessary a part of national defense as guns and ammunition and that their importance justifies much larger federal authorization and appropriations than have ever been proposed.

APRIL DOMESTIC MANGANESE ORE PRODUCTION DOWN 18%

Domestic production in April of manganese ore containing 35 per cent or more of manganese was 4100 gross tons, compared to 5200 tons in March, according to the bureau of mines. April shipments were 3500 gross tons, compared with 5400 tons in March.

Domestic producers' stocks April 30 totaled 1800 tons, against 1300 tons on March 31.

April imports, for consumption, of metallurgical manganese ore containing 35 per cent or more manganese totaled 71,670 gross tons and contained 33,401 tons of manganese. Russia supplied 32 per cent; Union of South Africa, 23 per cent; Brazil, 18 per cent; Gold Coast, 11 per cent; Cuba, 6 per cent.

BUREAU REPORTS ON STRATEGIC MINERALS

With the national defense program swinging into action, the bureau of mines last week reported on results of the first nine months of the strategic minerals survey conducted jointly with the geological survey.

Although the United States is far from self-sufficient in strategic minerals, the general outlook for locating important domestic deposits is definitely more encouraging than anticipated at the start of the search. Dr. R. R. Sayers, acting director, bureau of mines, said the situation with regard to five minerals, essential in peace and critical in war, is somewhat promising. These minerals are manganese, chromite, tungsten, mercury and antimony. The nickel situation, he said, is less encouraging and results in tin are classed as rather negative.

The following, according to the bureau, are percentages of the nation's peacetime requirements produced from domestic mines during a recent five-year period: Manganese, 5 to 6; chromium, 1; mercury, 40; tungsten, 50; nickel, 0.5; tin, 0.2; antimony, 10.

NAMES SEVEN CONCILIATORS FOR INDUSTRIAL PEACE

Secretary of Labor Frances Perkins last week assigned seven conciliators to help avert labor troubles in key industries.

She acted as a CIO-AFL race for supremacy in the aircraft industry began. With organizers of the AFL International Association of Machinists already active in the field, the CIO board directed its leaders and the United Automobile Workers' Union to formulate an immediate program for national organization of the industry, which is expanding rapidly.

The seven conciliators are:

Aviation manufacturing: Thomas M. Finn.

Steel: James F. Dewey.

Shipbuilding: Philip W. Shappell.

Machine tools: J. E. Addicks.

Building trades: Howard Colvin.

Rubber, chemicals: W. C. Liller.

CONGRESS TO CONSIDER WAGNER ACT AMENDMENTS

Critics of the national labor relations act and the labor board last week won a point in congress when the house overrode administration objections and voted 292 to 106 to consider proposed amendments to the act.

The representatives adopted a procedural rule whereby two bills—one sponsored by the regular house labor committee and the other by the special Smith committee which has been investigating the board's administration of the act—will be voted upon.

The Smith committee's bill, comprising 17 drastic amendments,

would abolish the present board and establish a new one divested of administrative powers, and would make other important changes in board procedure.

The house labor committee's proposal would enlarge the board to five members, provide for continued recognition of craft unions as bargaining agencies, grant employers caught in interunion disputes the right to petition the board for representation elections and guarantee labor contracts be effective for at least one year.

SUPREME COURT TO RULE ON WAGE-HOUR, LABOR ACT CASES

United States Supreme Court has adjourned until October. Before recess, the tribunal agreed to pass on litigation involving constitutionality of the wage-hour law. Justice department sought a review of a decision holding the act could not be applied to the production of goods not directly connected with interstate commerce. The law was challenged by a Georgia lumber company.

The court also agreed to review litigation which applies specifically to the H. J. Heintz Co., Pittsburgh, in which a circuit court held the national labor relations board has authority if agreement is reached, to require an employer to enter into a written collective bargaining contract with a labor organization.

Supreme Court declined to reconsider a decision holding the Sherman antitrust act bars any combination which tampers with the price structures. The opinion ruled that a group of oil companies had violated the legislation by conspiring to raise the price of gasoline in several midwestern states.

RFC AID FOR MINERAL DEVELOPMENT FAVORED

Senate committee on banking and currency has favorably reported a bill to authorize the reconstruction finance corporation to make loans for the development of deposits of strategic and critical minerals and other metallic and nonmetallic minerals and to authorize the RFC to make loans for mineral development purposes.

Under existing law, the RFC is authorized to make loans for mineral development purposes to corporations, individuals and partnerships engaged in the development of deposits of tin, etc. The bill would authorize the corporation to make such loans to those who are engaged in the development of deposits of strategic and critical minerals which in the opinion of the corporation would be of value to the United States in time of war.

Maximum loan which the RFC is permitted to make by existing law to anyone for mineral development purposes is $20,000. The bill as reported would enable the corporation to make additional loans, not in excess of $20,000, to anyone who has previously obtained a loan for such purposes from the corporation and who has spent the funds previously obtained as to justify the corporation's making an additional loan for such purposes.

PRESIDENT ASKS AUTHORITY FOR DOLLAR-A-YEAR MEN

President Roosevelt last week proposed to congress that authority be granted government officials to employ "persons of outstanding experience" at $1 a year to aid in the national defense program. The President's message:

"Provided, That until such time as the President shall declare the present emergency at an end the head of any department or independent establishment of the government may, notwithstanding the provisions of existing law, employ any person of outstanding experience and ability at a compensation of $1 per annum."

URGES STANDARDIZATION IN STEEL ANALYSES

Lack of standardization "seriously hampers" the mass production of steel, essential in speeding up the nation's defense program, Dr. Lyman J. Briggs, director, bureau of standards, told the thirtieth national conference on weights and measures last week.

Dr. Briggs said he attended a technical discussion on airplane developments recently in which it was disclosed that the multiplicity of types and kinds of steel demanded by the various industries was a "bottleneck" in the production of motors and planes.

Declaring the production of these special steels slows up production and increases overhead, the speaker said he believed the number of steels could be reduced and that steps are already being taken to this end.

RECORD RAILWAY EQUIPMENT EXPORTS ARE IN PROSPECT

United States exports of railway equipment in April, valued at $2,792,213, were the highest for any month since January, 1938. Indicating prospects for a record export year, the value of the total shipments of equipment in the first four months this year, amounting to $6,930,286, equals approximately the value of shipments in the first ten months of 1939. April exports almost equaled the combined totals of March, at $1,594,678, and February, at $1,429,220.

More than 75 per cent of the April exports were to Brazil, including 14 steam locomotives, valued at $1,500,607, and 243 freight cars, valued at $589,742. Shipments to noncontiguous territories during April were valued at $13,380.

AWARD CONTRACT FOR 12,500 TONS OF CHROMIUM ORE

Award of a contract for 12,500 long tons of chromium ore at $24.50 per ton to E. J. Lavino & Co., Philadelphia, agent for the Rhodesia Chrome Mines Ltd., was announced by the procurement division. The contract was for $306,250.

Award was made on the bids opened May 24. The ore will be delivered f.o.b. cars, Philadelphia harbor, Philadelphia.

GOVERNMENT IRON, STEEL AWARDS TOTAL $2,176,893

During the week ended May 25, the government purchased $2,176,892.57 worth of iron and steel products under the Walsh-Healey act as follows: Pennsylvania Forge Corp., Philadelphia, $44,269.38; Florence Pipe Foundry & Machine Co., Philadelphia, $18,381.96; Joseph T. Ryerson & Son Inc., Jersey City, N. J., $22,449.44; Lynchburg Foundry Co., Lynchburg, Va., $10,780; General Railway Signal Co., Rochester, N. Y., $11,550.28; United States Steel Export Co., Washington, $19,697.61.

New York Air Brake Co., New York, $79,552.31; The J. B. Beard Corp., Shreveport, La., $108,919.59; Continental Roll & Steel Foundry Co., East Chicago, Ind., $19,972.30; Henry Disston & Sons Inc., Philadelphia, $12,447.00; Pennsylvania Forge Corp., Philadelphia, $44,767.50; Standard Steel Works, North Kansas City, Mo., $19,468.20; Taylor-Wharton Iron & Steel Co., Easton, Pa., $129,770.25; Builders Iron Foundry, Providence, R. I., $105,509.94; Wilson - Weesner - Wilkinson Co., Knoxville, Tenn., $13,225.00.

Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., $13,264.98; Budd Wheel Co., Detroit, $259,466.80; United States Steel Export Co., Washington, $14,427.38; Jones & Laughlin Steel Corp., Pittsburgh, $21,242.45; Continental Gin Co., Birmingham, Ala., $72,521.40; Harrington & Richardson Arms Co., Worcester, Mass., $192,497.50; Remington Rand Inc., Buffalo, $171,569.58; Wm. R. Bootz, successor to Crescent Stove Works, Evansville, Ind., $92,749.44; Wm. Scrimgeour, Washington, $11,424.84; The Singer Mfg. Co., Elizabeth, N. J., $278,875.67; Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y., $20,078.77; Alan Wood Steel Co., Conshohocken, Pa., $194,370 (estimated); and Westinghouse Electric & Mfg. Co., Washington, $72,183.

April Steel Exports Decline, But Four-Month Volume Rises

■ United States exports of steel and iron, excluding scrap, totaled 391,754 gross tons, valued at $29,223,257, compared with March shipments of 457,052 tons, valued at $34,220,853, a decline of 14 per cent in volume, according to the metals and minerals division, department of commerce. Corresponding figures for April, 1939, were 153,884 tons, valued at $12,245,537.

Despite the April decrease, total exports for four months were 1,681,455 tons, valued at $127,958,676, nearly three times the figures for the corresponding months of 1939, which were 585,547 tons, valued at $44,802,484.

Shipments to every continental area except Africa were lower in April than in March. Trade with Europe totaled 137,583 tons in April, 153,326 tons in March. North and Central America and the West Indies took only 65,935 tons, compared with 73,870 tons in March. South American countries bought 77,552 tons against 125,874 tons the preceding month. Shipments to Africa, largely because of trade with the Union of South Africa, increased from 14,645 tons in March to 25,182 tons in April.

Nonalloy ingots and other semi-finished steel were exported in largest volume, 79,551 tons, including 48,717 tons to the United Kingdom, 10,996 tons to Japan and 9620 tons to Switzerland. Nonalloy "other" plates were second in volume with 40,430 tons, 10,073 tons to Canada, 5863 tons to the Union of South Africa and 5272 tons to the United Kingdom.

Scrap exports in April totaled 221,152 gross tons, valued at $3,575,940, showing an increase over 206,928 tons, valued at $3,387,037, in March. In April, 1939, scrap exports were 240,124 tons, valued at $3,595,271. For four months this year scrap exports totaled 850,253 tons, valued at $14,667,833, while in the corresponding months last year the total was 1,005,183 tons, valued at $14,932,564. In April the United Kingdom received 77,160 tons, Italy 74,459 tons, Japan 38,421 tons and Canada 20,710 tons.

U. S. FOREIGN TRADE IN IRON AND STEEL, INCLUDING SCRAP

Gross Tons

	1940		1939	
	Exports	Imports	Exports	Imports
Jan.	583,521	8,274	362,672	27,664
Feb.	671,301	6,740	359,690	19,149
Mar.	663,980	5,096	474,360	25,369
April	612,906	6,674	394,008	44,083
May	.....	.....	532,641	28,142
June	.....	.....	588,856	32,587
July	.....	.....	513,664	30,851
Aug.	.....	.....	477,078	28,328
Sept.	.....	.....	575,613	29,874
Oct.	.....	.....	591,856	19,189
Nov.	.....	.....	605,555	15,216
Dec.	.....	.....	600,437	14,709
Total	.....	.....	6,076,429	315,161

UNITED STATES EXPORTS OF IRON AND STEEL PRODUCTS

Gross Tons

Articles	Apr. 1940	Mar. 1940	Jan. thru Apr. 1940
Pig iron	16,285	26,146	76,415
Ferromanganese and spiegeleisen	111	301	5,889
Other ferroalloys	312	479	2,011
Ingots, blooms, etc.:			
Not containing alloy	79,551	89,874	284,413
Alloy, incl. stainless	553	285	4,723
Steel bars, cold fin.	4,050	3,794	15,542
Bars, iron	251	2,651	6,527
Bars, concrete	9,090	13,880	61,224
Other steel bars:			
Not containing alloy	29,364	38,852	115,086
Stainless steel	137	65	340
Alloy not stainless	3,176	2,193	8,294
Wire rods	15,516	19,124	58,352
Boiler plate	940	1,463	3,956
Other plates, not fab.:			
Not containing alloy	40,430	32,641	129,388
Stainless steel	40	51	104
Alloy, not stainless	219	148	923
Skelp iron or steel	989	2,420	15,332
Sheets, galv. iron	412	610	2,895
Sheets, galv. steel	13,600	14,780	59,667
Sheets, "black" steel:			
Not containing alloy	32,573	44,372	145,656
Stainless steel	198	176	766
Alloy, not stainless	1,098	636	2,751
Sheets, black iron	1,624	5,679	12,774
Strip steel, cold-rolled:			
Not containing alloy	2,906	4,299	16,612
Stainless steel	54	41	228
Alloy, not stainless	56	31	139
Strip steel, hot-rolled:			
Not containing alloy	9,816	12,868	44,880
Stainless steel	20	18	41
Alloy, not stainless	52	103	194
Tin plate, taggers' tin	32,306	44,376	201,626
Terneplate (including long ternes)	159	528	1,713
Tanks, except lined	4,299	2,380	10,171
Shapes, not fabricated	19,864	16,751	64,152
Shapes, fabricated	3,873	5,479	22,948
Plates, fabricated	692	572	6,239
Metal lath	84	182	492
Frames and sashes	106	128	477
Sheet piling	534	238	2,756
Rails, 60 lbs.	1,828	10,548	26,432
Rails, under 60 lbs.	2,160	858	5,191
Rails, relaying	1,708	1,510	4,716
Rail fastenings	400	1,025	3,090
Switches, frogs, crsgs.	189	606	1,671
Railroad spikes	273	491	1,801
R.R. bolts, nuts, etc.	71	119	771
Boiler tubes, seamless	1,658	1,953	7,507
Boiler tubes, welded	248	167	716
Pipe:			
Seamless casing and oil-line	11,313	8,355	46,076
Do., welded	5,153	3,845	17,191
Seamless black	1,011	4,633	10,469
Pipe fittings:			
Mall. iron screwed	436	392	1,842
Cast-iron screwed	198	272	912
Pipe and fittings for:			
Cast-iron pressure	1,746	1,443	11,737
Cast-iron soil	1,020	864	4,101
Pipe, welded:			
Black steel	2,347	3,542	12,486
Black wrought-iron	663	351	1,991
Galvanized steel	4,171	3,549	17,861
Galv. wrought-iron	515	848	2,656
All other pipe, ftgs.	672	1,542	5,703
Wire:			
Plain iron or steel	6,470	9,238	30,021
Galvanized	5,304	4,564	15,868
Barbed	2,145	2,060	8,359
Woven-wire fencing	339	389	1,505
Woven-wire scn cloth:			
Insect	43	85	200
Other	182	191	779
Wire rope and cable	754	1,011	3,279
Wire strand	77	161	487
Electric welding rods	273	303	1,136
Card clothing	2	1	5
Other wire	2,061	1,343	6,611
Wire nails	4,414	4,254	18,301
Horseshoe nails	102	85	372
Tacks	70	65	279
Other nails, staples	373	419	1,360
Ordinary bolts, machine screws	1,280	1,199	4,745
Castings:			
Gray-iron (incl. semisteel)	299	426	1,496
Malleable-iron	130	174	586
Steel, not alloy	104	177	750
Alloy, incl. stainless	50	278	641
Car wheels, tires, and axles:			
Wheels and tires	873	1,724	4,175
Axles, no wheels	137	240	715
Axles with wheels	694	11	779
Horseshoes and calks	38	100	148
Forgings, n.e.s.:			
Not containing alloy	2,008	1,709	7,045
Alloy, incl. stainless	412	318	1,197
Total	391,754	457,052	1,681,455
Scrap, iron and steel	218,778	205,041	842,272
Scrap, tin plate	798	702	2,368
Tin plate circles, strips, cobbles, etc.	530	533	1,843
Waste-waste tin plate	748	466	2,738
*Terne plate clippings and scrap	298	186	1,032
Total scrap	221,152	206,928	850,253
GRAND TOTAL	612,906	663,980	2,531,708
Iron ore	369	1,830	3,673

*New class.

Increasing Stainless Steel Wire Plant's Capacity

■ Allegheny Ludlum Steel Corp., Pittsburgh, will double production capacity at its Dunkirk, N. Y., stainless steel wire plant by completion soon of a new building now under construction and addition of new highspeed drawing equipment, according to W. F. Detwiler, chairman of the board.

The Dunkirk plant, it is said, will be the only one of its kind in the country devoted exclusively to production of stainless steel wire from hot rod down to 0.003-inch gage. The expansion will make this fourth time stainless steel wire capacity has been doubled.

California Chapter of Scrap Institute Organized

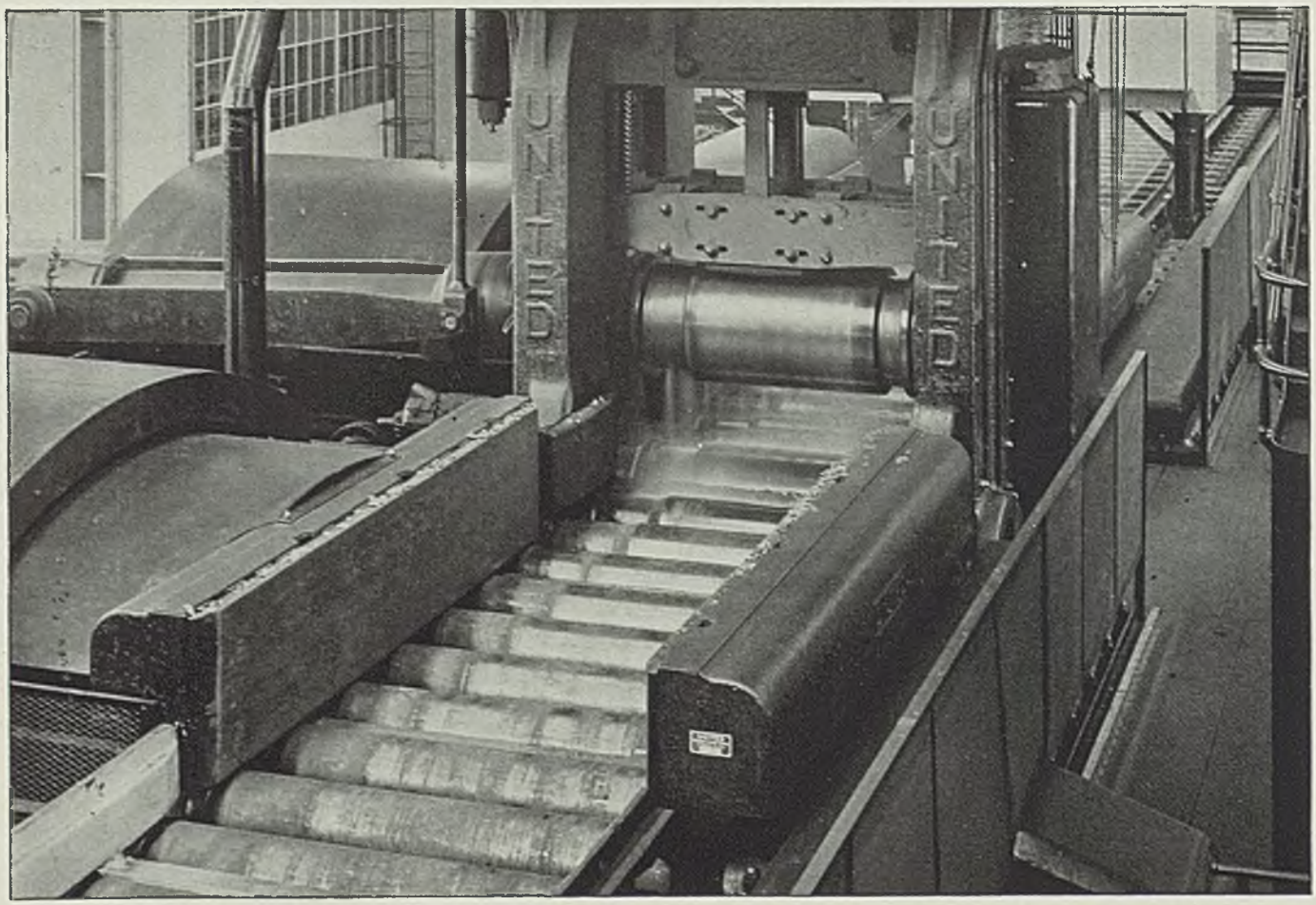
■ Iron and steel scrap dealers between Fresno and San Diego, Calif., have organized a California chapter of the Institute of Scrap Iron and Steel Inc., New York.

At a recent initial organization meeting, M. F. Berg, California Mill Supply Corp., Los Angeles, was elected president; David Rosenthal, Eastern Iron & Metal Co., Los Angeles, was elected vice president; Lester Finkelstein, Foundry Supply Co., Los Angeles, was elected treasurer; and P. W. Keen, Biddle Trade bureau, Los Angeles, secretary.

Bar Mill Wage Steady

■ Monthly settlement of bar mill wage base by Amalgamated Association of Iron, Steel and Tin Workers and the Western Bar Iron association last week developed a card rate for June on boiling, bar and 12-inch mills at 2.15c; on guide and 10-inch mills, 2.25c, rates that have been unchanged since June, 1939.

ONE *Good turn* AFTER ANOTHER



ON HYATT ROLLER BEARINGS tables, cranes, motors, and cars are increasing steel mill production, and profits. Everywhere it's just one good turn after another when shafts, gears, and wheels run on these dependable bearings. Specify Hyatts for your new equipment . . . use Hyatts for your changeovers. Where can we help *you?* Hyatt Bearings Division, General Motors Sales Corporation, Harrison, New Jersey; Chicago, Pittsburgh, Detroit and San Francisco.

This **UNITED 44" BLOOMING MILL**, with its Hyatt-equipped table, at Indiana Harbor, Youngstown Sheet & Tube, is typical of the many blooming and slabbing mills throughout the country, built by United, with Hyatt Roller Bearings.

HYATT

ROLLER BEARINGS

QUIET

Mirrors of MOTORDOM

By A. H. ALLEN
Detroit Editor, STEEL.

DETROIT

■ IN HIS new office in the Federal Reserve building on Connecticut avenue in Washington William S. Knudsen, former head of the largest automobile company in the world and now in charge of emergency defense preparations for the mightiest nation of the world, must be pushing back his felt hat to ruffle his iron-gray locks at the enormity and complexity of the job he faces. Coordinating the national production plant to meet demands for a vast complement of defense equipment is something no American has been called on to do for a long time; it is a job which must be basically distasteful when the ultimate goal and the ultimate cost are considered.

Yet there could have been no more happy choice for the post, no person who combines the attributes of efficiency and a scintillating personality to a greater degree than this 6 foot 2-inch great Dane who came to America 40 years ago and rose to national fame in the intervening years. Of one thing you can be sure—Knudsen will be the boss; he reports only to the President and assumed his new role only with the understanding he would be free of political interference and official red tape.

He is a man who has a keen faculty for organization, who knows how to delegate responsibility to the right assistants so that he can free himself for the task of overall supervision. His interoffice communications, with their familiar blue-penciled "K" at the end, will be missed throughout the General Motors executive organization, but so thorough and well-knit is this family that the boss' leave of absence will cause scarcely a ripple in the routine.

C. E. Wilson, executive vice president, who normally functions in Knudsen's absence, will continue as active overseer of GM operations.

One of Mr. Knudsen's first tasks will be the stimulation of aircraft engine manufacture and it seems a foregone conclusion Detroit plants will be called into this picture. In the high-power engine field, there are four main types of engines which observers consider likely for immediate attention.

These engines are the Allison liquid cooled 1000-horsepower plant, used in three types of pursuit planes and ordered in large numbers by the Allies; the Rolls-Royce Merlin 1200-horsepower engine, described in these columns some months ago and now signed over to American plants to manufacture; the Wright and Pratt & Whitney radial air cooled engines which likely will be licensed to other manufacturers.

Auto Plants Ready

The Allison plant in Indianapolis has undergone several expansions in recent months but production of the engine is still under 100 per week. Details of this plant, design of the engine and production rates are being kept very quiet under the eagle eye of the war department, but a trip to Indianapolis is all that is needed to indicate the immense speeding up and expansion of facilities which has been accomplished.

The Cadillac plant here supplies numerous steel parts for the Allison engine and, in view of the space available, probably could be set up easily and quickly to turn out complete engines.

Packard will figure prominently in engine production, already having license to produce a sleeve valve engine and being in production on high-power marine engines for torpedo boats, both projects having been mentioned in this department.

Ford has stated he can equip his plant to turn out 1000 planes a day, which is no idle boast either. Given a standardized design and the order to proceed, Ford could in a few months be in quantity production. Some are wondering whether such a move may not already have started, in view of the pressure which suddenly has been applied to Ford tool and die programs. It is understood that some die work has even been let out to the Graham plant here on a "time and material" basis by Ford. Certain equipment orders have been given "rush" instructions, with no explanation offered.

The Ford plant would seem to be a logical source for mass output of the smaller types of training ships and light combat and reconnaissance plants and engines, leaving the larger types to plants already established in this field. The Rouge plant could absorb the manufacture of 1000 airplanes daily without seriously disturbing output of passenger cars and trucks, in the opinion of Mr. Ford.

Briggs Mfg. Co. is another possible source of large aircraft engines, in view of its extensive experimental work with the British Aspen engine.

All in all, with the intensive cooperation of Detroit builders, the supply of aircraft engines may be a good deal simpler than many have been led to imagine.

No. 2 problem on Mr. Knudsen's agenda probably will be the determination of how to fill needs for machine tools. Last week, dispatches from Washington told of an embargo being placed on foreign shipments of machine tools, not as a punitive measure but simply for the protection of domestic buyers.

Suspension of foreign shipments

might work a serious hardship on the Allies who have bought heavily, chiefly boring mills and milling machines. Many machine tool companies have refused to load up on foreign business, and currently are making every effort to give quick attention to hard-pressed customers busy on government work.

The case is cited here of a company producing aircraft parts for a large engine builder. Doubling of production demands necessitated new equipment urgently. Getting in touch with a machine tool builder in Ohio, the situation was explained and within two days a necessary machine had been shipped, installed and was in operation. There are hundreds of cases like this one.

A few machine tool companies have grabbed off all the foreign business they could manage and in one case this policy resulted in a definite loss of prestige among domestic customers. Other companies have large numbers of foreign inquiries on hand, but do not even bother to enter them on books, reserving them in the event of a breathing spell in domestic demand, which is not likely now.

Magnesium Bottleneck Seen

Machine tool company executives were considerably upset in recent conferences with army and navy officials in Washington when only the most haphazard procurement plan was disclosed by the military experts, and considerable intramural bickering was evident.

Already the ghosts of large, idle plants, eating their heads off in years to come when armament manufacture may have tapered, are invading the dreams of parts manufacturers in this area. One plant here, which has gone along for years with a force of about 30 men and has made a nice profit in the gage business is faced with the problem of meeting immediate demand for its product from aircraft engine builders which would necessitate expanding its facilities and working force to the point where 300 men would be required.

Emphasis on aircraft production spotlights another bottleneck which is going to require some reaming. That is the supply of aluminum and magnesium, the latter particularly, now used extensively in aircraft, both in engines and fuselages. Dow Chemical Co. is virtually the only source of magnesium metal and despite steady expansion is reported booked solid until the first of next year.

Used in cast, rolled and extruded forms, these light metals have assumed new vital importance. Plans are under way to open a new magnesium casting plant in Buffalo by July 1, to be operated by American Magnesium Corp., Cleveland, Aluminum Co. of America subsidiary. Both Curtiss-Wright and Pratt & Whitney are buying large quantities of magnesium castings, and the new Buffalo plant is calculated to relieve some of the pressure on the Cleveland division. About $400,000 is being spent on equipment, the plant being an old one, idle since 1932. Employment will approximate 300.

Other nonferrous foundries are being urged to embark on production of magnesium castings, but eyeing the deficiency in supplies of the raw material they are cautious about such ventures.

From his vantage point as director of materials, supplies in the present defense preparations, Edward L. Stettinius likely is already concentrating on constrictions of this type. Another appears to be developing in heat treated alloy steels of the type used extensively in aircraft manufacture. Deliveries of 14 or 16 weeks on this type of material are common. A number of warehouses have expanded stocks to include these high-grade alloy steels. Lack of sufficient heat treating equipment is one explanation offered for the inability to get prompt shipments.

■ DEFENSE preparations and the war in Europe have stolen the show from topics of discussions usually heard at this time. Business men watch the headlines and then stop at brokers' offices to notice the effect on the tape. Sentiment naturally is strong in favor of the Allied cause and keen students of current events will tell you that business in this country for the next few months hinges entirely on the ability of France and England to stave off the German onslaught. They reason that if Germany subdues Paris and has any success with an attack on England, popular feeling here will undergo a profound sinking spell which will offset any business gains which may result from the billions to be spent on armament. On the other hand, if the Allies make a successful stand, the country is in for a mild business boom this summer and fall.

■ MEMORIAL DAY race at Indianapolis this year was actually only three-fourths of a race because of the rain which brought out the yellow flag, keeping all cars in position for the last 125 miles. Only three cars made the full 500-mile jaunt, with Wilbur Shaw in an 8-cylinder supercharged Maserati, one of seven Italian-built cars, the winner. Shaw's second consecutive win seemed to establish the fact that foreign engines finally have been brought to the point where they will hold together for the long race.

The Maserati engine, used in Shaw's car, typifies recent European racing practice in structural design, according to *Automotive Industries*, with split-type crankcase of magnesium alloy, with bronze-backed shell bearings babbitt lined. Fuel was an alcohol blend. Engineers paid tribute to the superior design of the Maserati chassis.

New contract between Briggs Mfg. Co. and UAW-CIO has been signed and became effective June 7. Announcement was made by union officials who also made public a letter from W. P. Brown, president, in which he stated, "employes who have been members of the UAW-CIO at any time since Jan. 1, 1937, have accepted a contractual obligation to be members in good standing during the life of the agreement we have just completed. Therefore they should pay their dues promptly and take an active part in the affairs of the union so that proper and responsible representation may be assured."

Rejection of a proposed new contract with General Motors Corp. by the UAW-CIO led to the arrival of federal conciliators from Washington to attempt to iron out differences. The corporation offered a 2½ per cent wage increase in the form of vacation pay, insisted on the right to discharge aliens and employes guilty of sabotage. The union seeks a 10 per cent wage increase and "streamlined" grievance procedure.

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	432,433
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	.....

Estimated by Ward's Reports

Week ended:	1940	1939†
May 11	98,480	72,375
May 18	99,030	80,145
May 25	96,810	67,740
June 1	61,255	32,445
June 8	95,560	62,395

†Comparable week.

Simplification Is Needed

■ EMPLOYERS generally have made considerable progress during the past couple of years in stabilizing their employment. The primary aim is toward greater security of income for the employe, improved industrial relations and more efficient operation under the social security system. Some employers have reached the point where they are able to guarantee their employes a definite number of work-weeks per year. They include mainly manufacturers of such products as soap and ham which the public consumes at a fairly uniform rate.

The steel industry has not been regarded up to recently as one in which stabilization of employment can be provided on a pronounced scale. Steel traditionally has been known as a "prince or a pauper," enjoying a feast or enduring a famine. When the orders came the steel production rate moved up rapidly. Men were added to payrolls in large numbers and prosperity reigned. When the peak was over men were laid off and times were lean.

Too Many Variables in Composition Prevent Employment Stabilization

Under the customs now prevailing in the steel industry there seems little hope for employment stabilization. The steel industry currently accepts orders involving in the neighborhood of 1000 to 1200 chemical combinations—with an average of some four variations of physical properties for each chemical combination. Under such a condition the industry is unable to do much in the way of utilizing slack periods to produce steel for use in subsequent bursts of activity.

Many thoughtful men in the steel industry recently have come to the belief that this perplexing and important problem can be solved—provided there is sufficient understanding and co-operation to undertake the required procedure. The approach would be along lines suggested by Earle C. Smith (STEEL of June 3, p. 44), chief metallurgist, Republic Steel Corp., Cleveland, before the recent meeting of the American Iron and Steel institute.

Mr. Smith finds that not more than 20 steels represent more than 1 per cent of the total output each. It is feasible, he held, to set up a list of "significant" steels from which to select a steel that will meet practically any requirement. On the basis of one-quarter of 1 per cent of the total tonnage, he believed that such a list should not include more than 200 significant steels. The proposal need not prevent any consumer from ordering, nor any mill from making, other steels—but it would be understood that costs mount when special steels are made in small quantities.

The proposal is interesting from another point of view—that of profits earned by the steel industry. It is a matter of common knowledge that one of the reasons why the steel industry fails to show a reasonable profit over the long pull is its custom of ignoring costs which in many cases ought to be charged as extras. Agreement on a list of significant steels would bring this matter of extra costs more glaringly into the limelight.

A List of "Significant" Steels Can Be Set up, If—

The present system in selling and making steel is grossly inefficient—and inefficiency such as this invites terrible penalties in the world of today. With the country alarmed over its future security, in the light of developments in the European war, inefficiency must be eliminated wherever it is found in our production system. In line with this a list of significant steels should be set up immediately. It can be done if steelmakers, with the full co-operation of consumers and specification-making bodies, determine to do it and to accept it. It is to be hoped they will not wait until an emergency forces the issue.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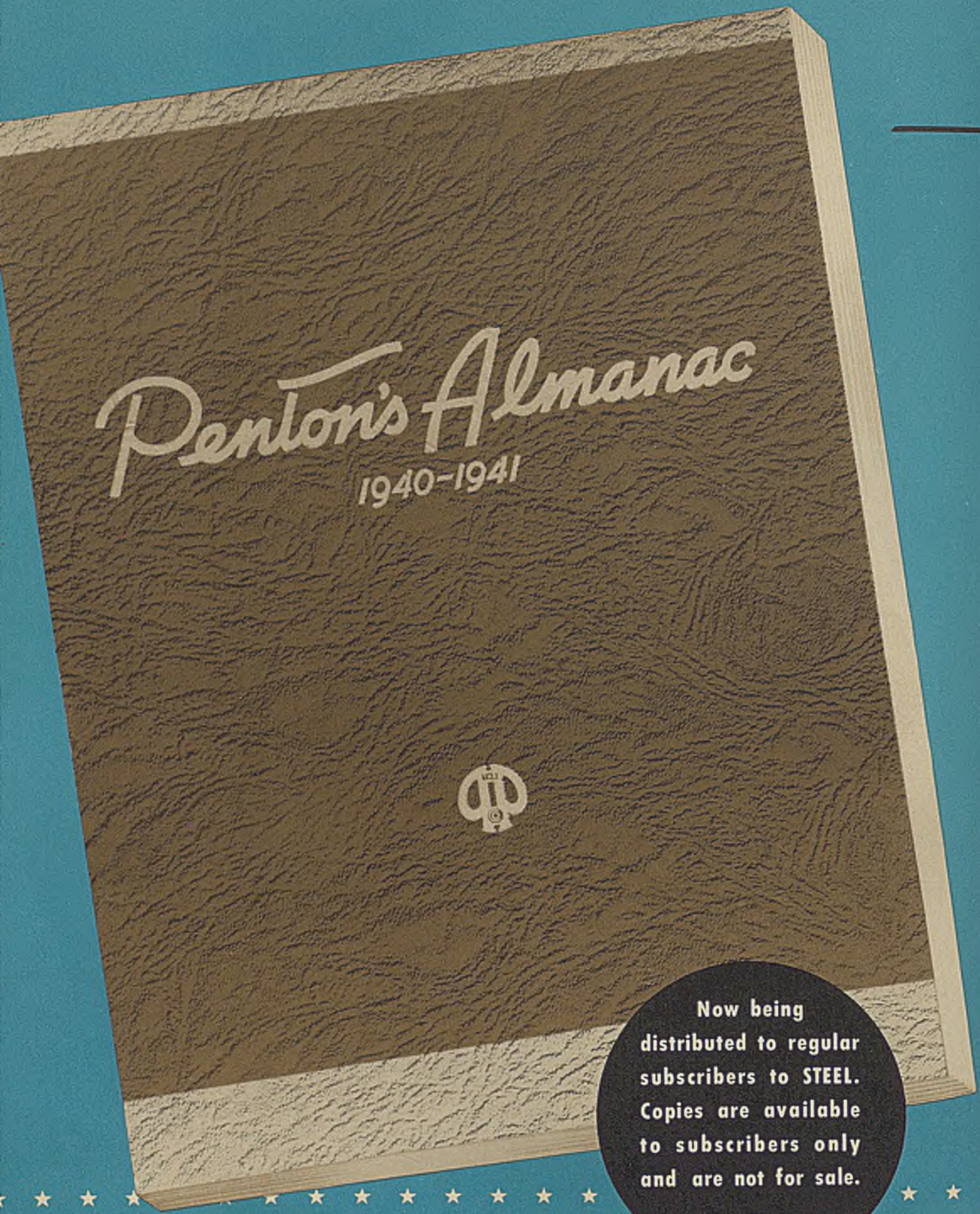

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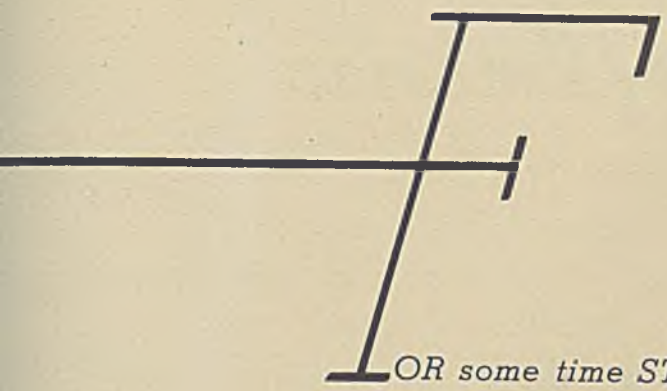

FOR some time STEEL has recognized a growing need for a convenient and authoritative source of statistical information on the metalproducing and metalworking industries. This has been evident from the increasing flow of inquiries to STEEL's Readers Service Department for a wide range of data, particularly for a time-saving reference book designed for the metal industries. To meet that need, and as an additional service to regular readers, the editors of STEEL have compiled and prepared for publication the first annual edition of Penton's Almanac, 1940-1941. » » Penton's Almanac represents months of planning and research and in its final form is a complete book of facts and figures covering every phase of the ferrous and non-ferrous metal industries. Vital statistics are fully tabulated and important developments digested, with the entire contents completely indexed for easy reference. » » As an addition to STEEL's regular weekly service, Penton's Almanac will give thousands of executives and operating officials an invaluable source of information heretofore difficult, if not impossible, to obtain.

SEE NEXT PAGE FOR DETAILED CONTENTS

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1940-1941

A complete reference book of facts and figures for the metalproducing and metalworking industries. 148 pages, 8⅝" x 11⅝", printed on coated paper stock and bound with durable cover. Cross-indexed for easy reference.

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LABOR—Employment and unemployment, 1900-1939 . . . Immigration statistics . . . Industrial disputes . . . U. S. Steel Corporation pension plan . . . Review of events, CIO, AFL . . . Walsh-Healey wage case . . . Automotive labor developments . . . States' action on organized labor

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AUTOMOTIVE—Production by years . . . Factory sales . . . Earnings and purchasing power for workers . . . Chronology . . . Registrations

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PRODUCTION—Monthly and annual steel ingot and pig iron production statistics and operating rates . . . Weekly steelworks operating rates . . . Steel and pig iron capacity figures . . . Steelworks district boundaries . . . Finished steel output . . . Exports, imports

RAW MATERIALS—Scrap, coke, iron ore, coal production and consumption data . . . Complete list of by-product coke ovens, owners, location, operators and type of ovens

MISCELLANEOUS—U. S. foreign trade with belligerents and neutrals in first six months of European war . . . Principal markets for American products; chief suppliers to U. S. . . . Truck traffic . . . Machine tools . . . Foundry equipment . . . Electrical goods . . . Nonferrous metals

BASING POINTS—Data on products by principal cities . . . Basing point chronology . . . Freight rates on principal steel products . . . U. S. tariffs on ferrous and nonferrous metal products . . . List of reciprocal trade nations

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CHRONOLOGY — MERGERS — ASSOCIATIONS AND SOCIETIES — HONORS CONFERRED — PERSONNEL CHANGES—OBITUARIES—BOOKS

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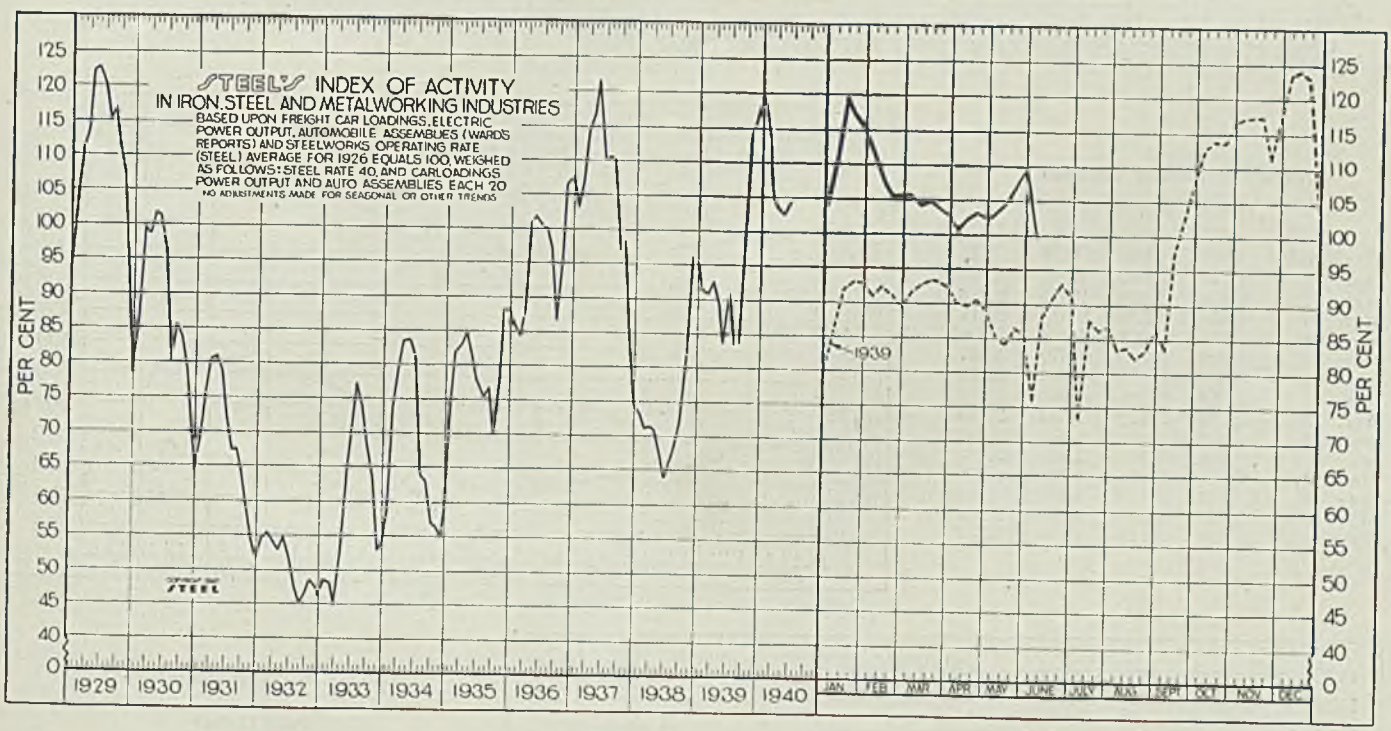
The BUSINESS TREND

Monthly Index Reverses Downward Tendency

■ INDUSTRIAL activity in the iron, steel and metalworking industries last month reversed the downward tendency in effect since the first of the year. STEEL's index average for May was 104.6, a gain of 1.9 points over the 102.7 level recorded the previous month and compares with 118.9 in December, the peak month last year. In May, 1939 the index average was 83.4.

Demand from domestic and foreign sources has recorded further improvement in recent weeks. This is particularly noticeable in the heavy industries. Near-capacity production schedules are being maintained in the machine tool, aircraft and shipbuilding divisions. The probability of accelerated demand from foreign sources and the proposed rearmament program will necessitate further expansion of activity in these industrial lines.

Due to the interruption of activity occasioned by the observance of Memorial day, STEEL's weekly index declined 9.9 points to 99.2 during the period ended June 1. In the comparable week of 1939, 1938 and 1937 the index declined 9.5, 8.4 and 10.5 points respectively. A sharp rebound is expected to be recorded by the index to still higher levels than prevailed before the holiday week.



STEEL'S index of activity declined 9.9 points to 99.2 in the week ended June 1:

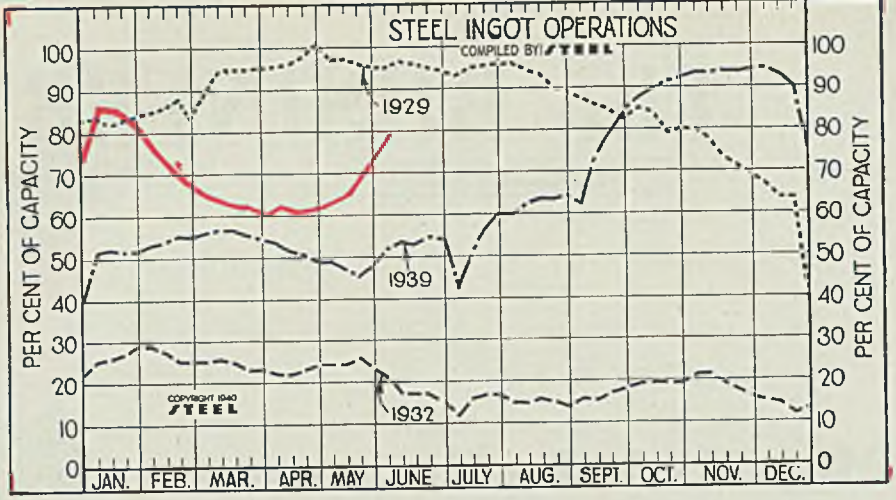
Week Ended	1940	1939
Mar. 23	103.7	93.2
Mar. 30	103.2	92.2
Apr. 6	101.8	90.0
Apr. 13	102.7	89.7
Apr. 20	103.4	90.4
Apr. 27	102.8	89.2
May 4	103.3	85.1
May 11	104.8	84.2
May 18	106.8	86.6
May 25	109.1	85.4
June 1	99.2	75.9

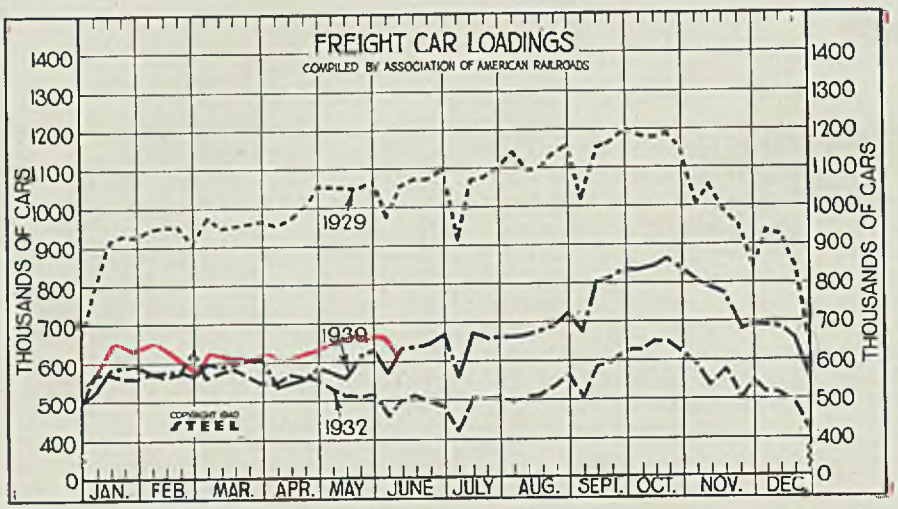
Mo. Data	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Jan.	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6	104.1
Feb.	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2	111.2
March	104.1	92.6	71.2	114.4	88.7	83.1	78.9	44.5	54.2	80.4	98.6	114.0
April	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0	101.7	122.5
May	104.6	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
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
June 1....	78.5	52.0	25.5	75.0





Freight Car Loadings

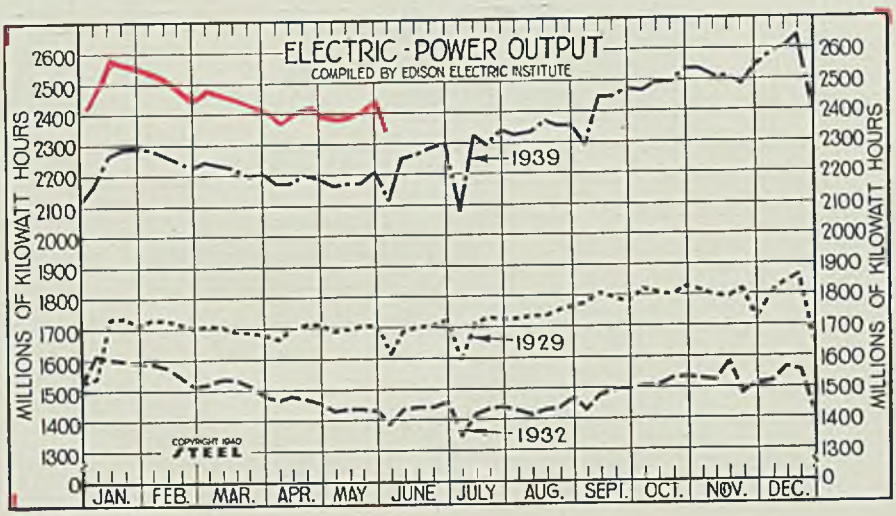
(1000 Cars)

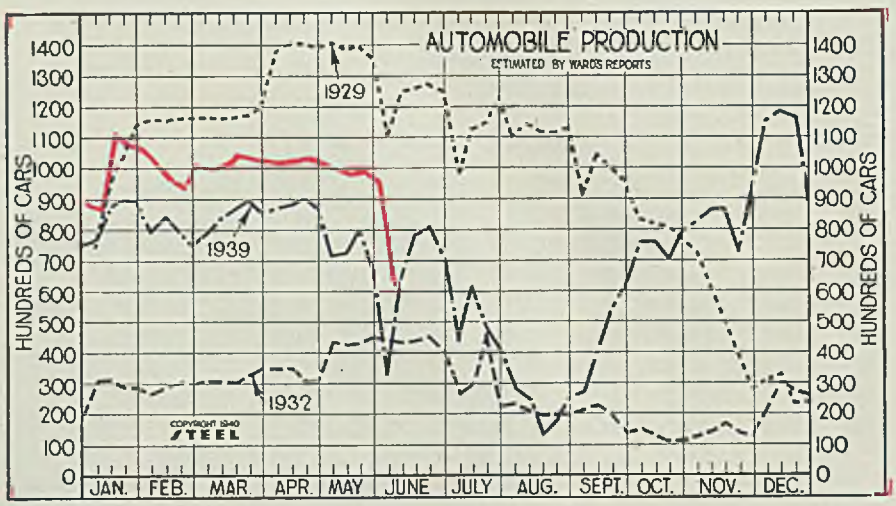
Week ended	1940	1939	1938	1937
Mar. 2.....	634	599	553	734
Mar. 9.....	621	592	557	749
Mar. 16.....	619	595	540	759
Mar. 23.....	620	605	573	761
Mar. 30.....	628	604	523	727
Apr. 6.....	603	535	522	716
Apr. 13.....	619	548	538	751
Apr. 20.....	628	559	524	761
Apr. 27.....	645	586	543	782
May 4.....	666	573	536	767
May 11.....	681	555	542	774
May 18.....	679	616	546	779
May 25.....	687	628	562	795
June 1.....	639	568	503	692

Electric Power Output

(Million KWH)

Week ended	1940	1939	1938	1937
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
June 1...	2,332	2,114	1,879	2,131

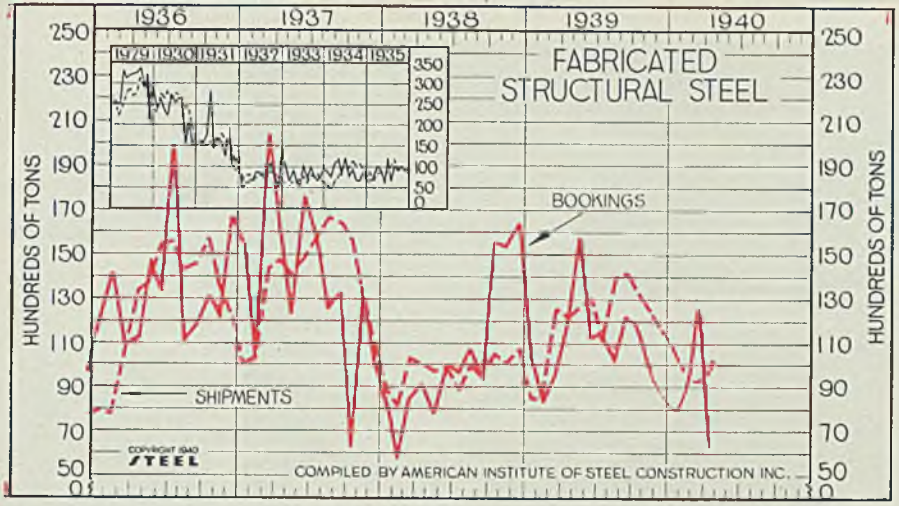




Auto Production

(1000 Units)

Week ended	1940	1939	1938	1937
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
June 1....	61.3	32.4	27.0	101.7



Fabricated Structural Steel

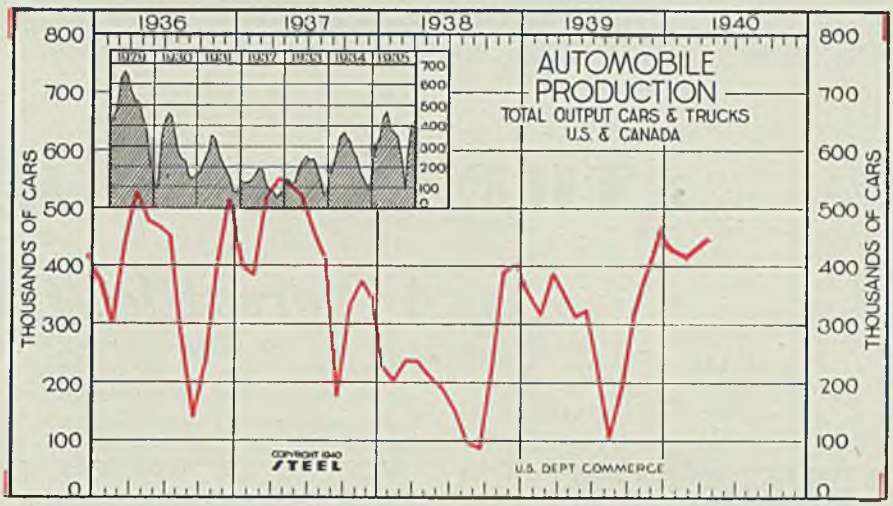
(1000 tons)

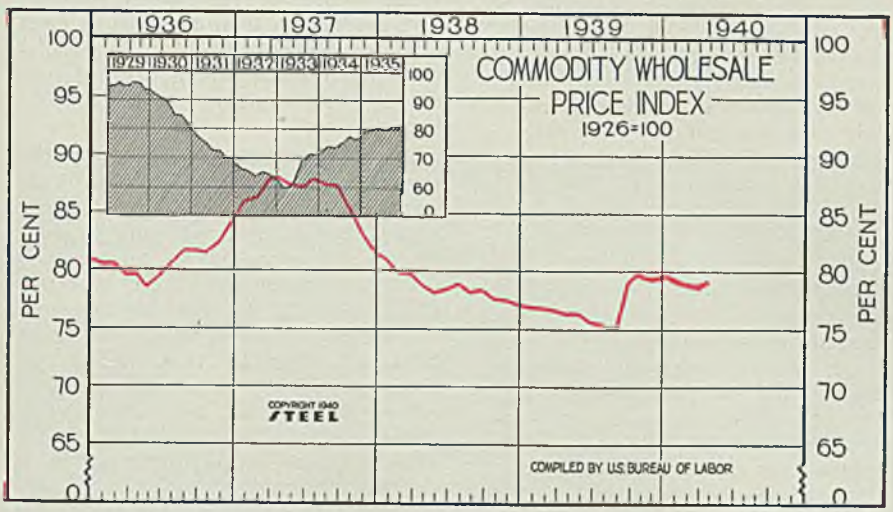
	Shipments			Bookings		
	1940	1939	1938	1940	1939	1938
Jan.	110.9	84.3	87.8	81.7	101.7	80.3
Feb.	97.2	84.4	81.2	98.9	82.7	57.1
Mar.	95.9	125.3	103.3	128.3	95.1	84.3
Apr.	102.9	120.9	100.0	63.5	118.3	91.2
May	.....	125.9	96.4	....	156.9	77.3
June	.....	130.1	98.6	....	111.6	99.9
July	.....	110.5	88.0	....	114.1	96.0
Aug.	.....	139.7	98.6	....	100.9	106.8
Sept.	.....	140.8	93.5	....	121.4	92.5
Oct.	.....	133.8	105.0	....	118.8	154.8
Nov.	.....	128.2	99.9	....	99.3	153.1
Dec.	.....	116.2	106.5	....	84.4	163.4
Total	....	1440.1	1158.8	....	1305.0	1256.6

Automobile Production

(Unit: 1000 Cars)

	1940	1939	1938	1937	1936
Jan.	449.3	357.0	227.1	399.2	377.2
Feb.	421.8	317.5	202.6	383.9	300.8
March	440.2	389.5	238.6	519.0	438.9
April	452.4	354.3	238.1	553.4	527.6
May	.....	313.2	210.2	540.4	480.5
June	.....	324.2	189.4	521.1	469.4
July	.....	218.5	150.4	456.9	451.2
Aug.	.....	103.3	96.9	405.1	275.9
Sept.	.....	192.7	89.6	175.6	139.8
Oct.	.....	323.0	215.3	338.0	230.0
Nov.	.....	370.2	390.4	376.6	405.8
Dec.	.....	469.0	407.0	346.9	519.1
Ave.	.....	311.0	221.3	418.0	384.7





All Commodity Wholesale Price Index U. S. Bureau of Labor

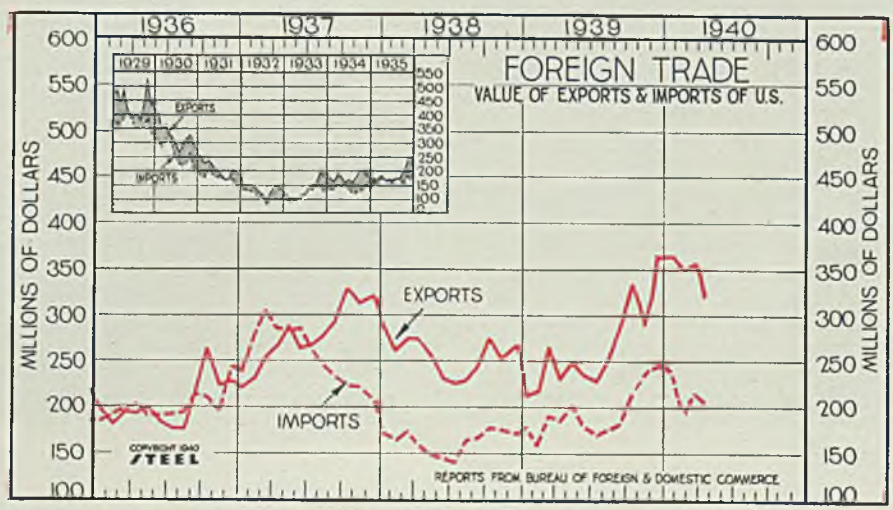
(1926 = 100)

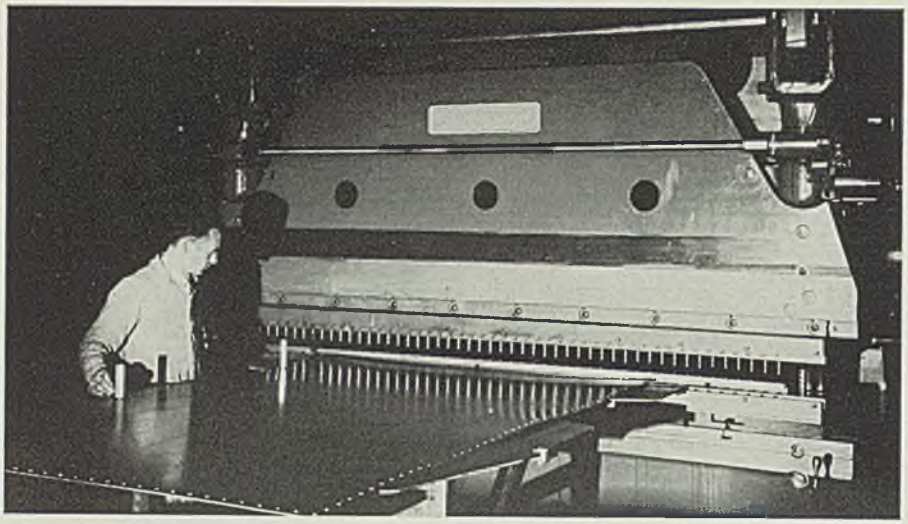
	1940	1939	1938	1937	1936
Jan.	79.4	76.9	80.9	85.9	80.6
Feb.	78.7	76.9	79.8	86.3	80.6
March	78.4	76.7	79.7	87.8	79.6
April	78.6	76.2	78.7	88.0	79.7
May	....	76.2	78.1	87.4	78.6
June	....	75.6	78.3	87.2	79.2
July	....	75.4	78.8	87.9	80.5
Aug.	....	75.0	78.1	87.5	81.6
Sept.	....	79.1	78.3	87.4	81.6
Oct.	....	79.4	77.6	85.4	81.5
Nov.	....	79.2	77.5	83.3	82.4
Dec.	....	79.2	77.0	81.7	84.2
Ave.	....	77.1	78.6	86.3	80.8

United States Foreign Trade

(Unit: $1,000,000)

	Exports		Imports	
	1940	1939	1940	1939
Jan.	$368.6	$212.9	$241.9	$178.2
Feb.	347.0	218.6	199.8	158.0
Mar.	352.3	267.8	216.7	190.5
April ...	324.0	231.0	212.2	186.3
May ...	.....	249.5	.....	202.5
June ...	.....	236.1	.....	178.9
July ...	.....	229.6	.....	168.9
Aug. ...	.....	250.8	.....	175.8
Sept. ...	.....	288.6	.....	181.5
Oct.	.....	332.1	.....	215.3
Nov. ...	.....	292.7	.....	235.4
Dec. ...	.....	367.8	.....	247.0
Total .	.....	$3,177.0	.....	$2,318.3





THE PRESS BRAKE

A Versatile Tool

The greatly improved precision of the modern press brake makes it suitable for both light and heavy-duty multiple punching operations, either alone or as part of a progressive punching, notching, forming setup. One such unit saves $18,000 in the first two months' use

■ WHILE known primarily for its ability to bend and form metal sheets and steel plate, the modern version of the press brake has increased its usefulness by solving a great variety of problems, not the least of which is the multiple punching necessary in high production of both industrial and consumer products.

Compared with many other metalworking tools, the modern steel press brake has developed rapidly since the early 1920's due largely to press brake manufacturers' continually exploring new avenues to utilize the versatility of this machine in an ever-increasing variety of applications.

Today press-brake punching applications range all the way from the thin sheets used in cameras, pans, ventilating systems, refrigerator cabinets, grain bins and lockers to the heavy plate used in oil tanks, automobile bumpers, tractor guards, road scraper blades, railroad freight and passenger cars, locomotives and similar heavy equipment.

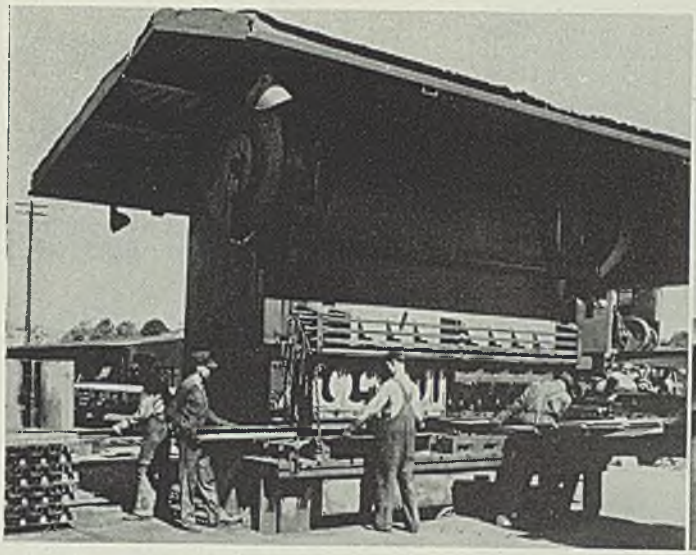
A typical example of heavy-duty operations is the multiple punching of carlines which are the steel ribs of metal freight cars. They extend from the floor up to the roof, across the top and down the other side. Thus, length of these units is approximately twice the car height plus its width. Typical webs of a carline are approximately 5/32-inch thick at punching points. About 242 holes are punched in each carline, and diameters generally are 13/32, 17/32 and 21/32-inch.

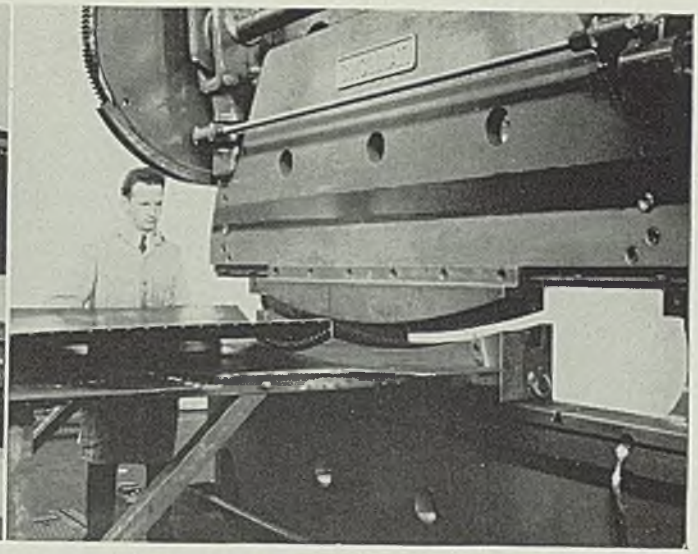
In one railroad shop, the method in use required 121 hits to punch a single carline in 8.2 minutes. When the press-brake method was adopted, only seven hits produce a finished carline in 1.2 minutes, a saving of 7 minutes on each unit. The press brake punches 400 carlines in 8 hours in contrast with a former output of 58 carlines in 8 hours.

There is, of course, a two-fold reason for this increase in production. First, the press brake itself has been greatly increased in accuracy, strength, rigidity, power and speed. Thus it can punch a large number of holes simultaneously and with great accuracy. Its long die surfaces maintain their accuracy for considerable periods of use. Second, well engineered die equipment with proper gags and adjustable center distances greatly facilitates punching maximum number and correct pattern of holes at each stroke. As will be seen in accompanying illustrations, a wide variety of die equipment can be used effectively.

Another railroad, faced with the problem of forming and multiple punching a lot of 18,000 hopper car stakes, found that a saving of over $1 per stake could be effected by installing a press brake of sufficient capacity to handle the job. A 12-foot Cincinnati all steel press brake similar to that shown in Fig. 1 was built to handle this car-stake job as well as punching of other sections of the hopper cars. The machine paid for itself in 4 months in making only two lots of 18,000 car stakes alone.

These side stakes of 3/8-inch mild steel are handled by three men as shown in Fig. 1. Two work stations are utilized. The first man feeds the punching station where forty-five 11/16-inch diameter holes are put into the blank at each stroke of the press brake. The punched piece goes to a second man for forming four bends at the second station. Third operator removes punched and formed car side stake from the press brake and a fourth man stacks the complete unit. One stake is produced at each hit. This setup saved $18,000 the first two





months of operation. Unit is mounted outdoors under a simple overhead covering as shown.

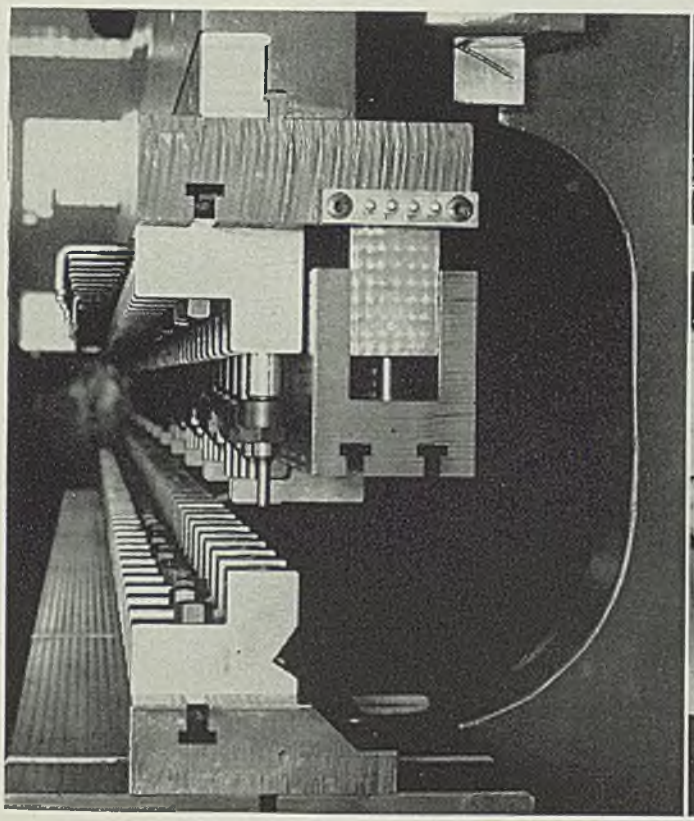
The speed, accuracy and dependability of this equipment have been of major importance in cutting several hundred dollars from the cost of building each car. The change from punching to forming of various parts is quickly and easily handled by sliding out the punching bolsters as a unit and inserting forming dies. As dies can be made in sections, it is simple to arrange a 2-station setup as described above.

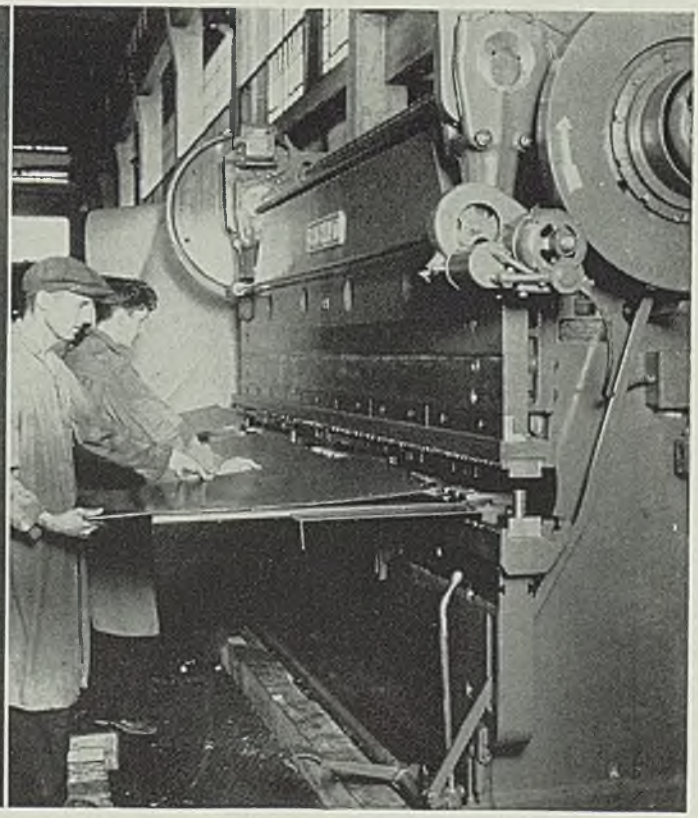
A manufacturer of large oil tanks found that the accuracy of press brakes in multiple punching was the answer to faster assembly and quicker disassembly. The stays or sections of the tank are of 1/8-inch steel. As shown in Fig. 2, the piece is fed to the dies from a gaging table with both ends and both sides punched in four successive hits. Punches are on fixed centers.

Punched pieces go to a second press setup, Fig. 3, where a flanging and curving operation is performed. Staves then are ready for fast assembly and disassembly in the field as bolt holes line up accurately.

An interesting press brake operation in the automotive field is the punching and trimming of bumpers. These bumpers usually are 5/32-inch high-carbon steel and are punched with four 15/32-inch square holes and three 17/32-inch round holes and trimmed

Fig. 1. (Upper left)—A 12-foot press brake multiple punching and forming freight-car side stakes of ⅜-inch mild steel at two working stations. Fig. 2. (Top page 1)—This unit with gaging table and fixed center punches makes the holes in four sides of ⅛-inch steel plates prior to flanging in Fig. 3 (upper right) which assures proper bolthole alignment. Fig. 4. (Lower left)—End view of adjustable punches, dies and stripper plate fingers. Many tool combinations are possible. Fig. 5. (Lower right)—Progressive 3-station setup for multiple punching and forming refrigerator cabinets—three operations at one handling of the material





on both ends in one hit. Several interchangeable trimming dies are provided to give different shaped ends as required for different makes of automobiles. Trimming dies and piercing punches and dies are adjustable endwise to shift the location of holes for different types and sizes of bumpers. The equipment thus is extremely flexible, accurate, fast and can be relied upon to give high output at low cost.

Fig. 4 is a closeup of an end of a typical press-brake setup showing arrangement of multiple punches and stripping units for high-production work. Such equipment is extremely flexible, as it can easily be modified to handle a wide variety of work.

Most large manufacturers of refrigerators use press brakes for multiple punching in combination with notching and forming operations to facilitate fabricating metal cabinets. A heavy-duty press brake permits combinations of die operations impossible on other types of equipment because of the minimum deflection between bed and ram across the entire die surface. Standard die surfaces of press brakes range in length from 4 to 20 feet, even greater lengths are available on special machines for multiple or combination operations. It is not difficult to arrange dies and punches on a press brake with various numbers of work stations so work can progress through trimming, notching, punching and forming operations in any sequence desired to give high output while maintaining close tolerances in all operations.

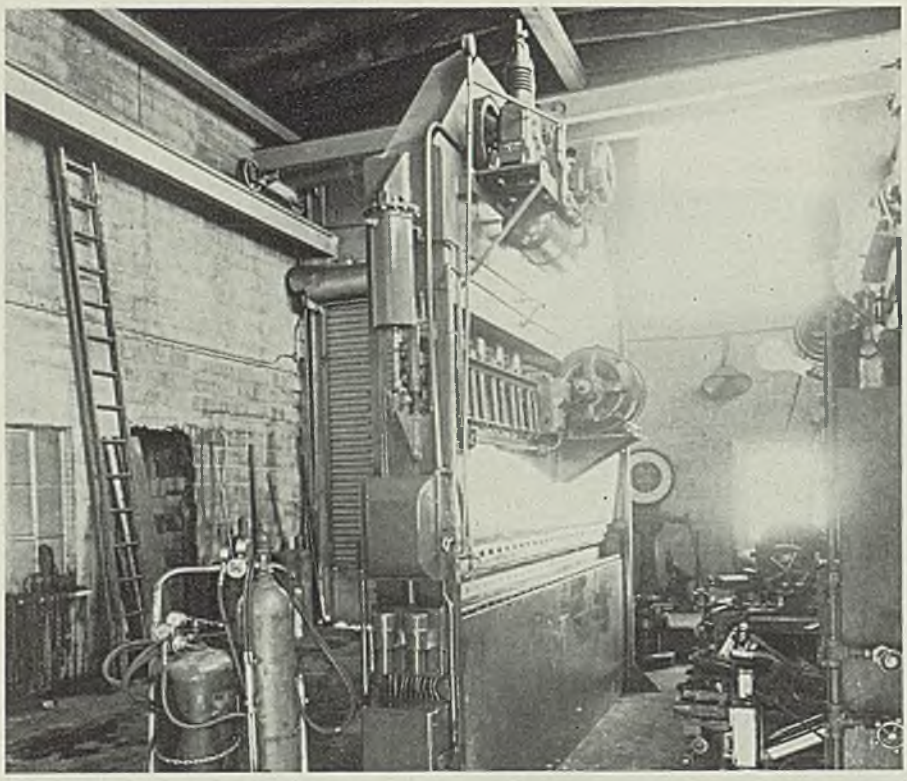
Modern Presses More Accurate

Punching pressures depend upon thickness of the sheet or plate, the perimeter of the holes, the number of holes and the kind of plate or sheet being worked. For instance, a 210 series 12-foot Cincinnati all-steel press brake with proper die equipment will punch in one hit approximately sixty 5/8-inch diameter holes through ½-inch mild steel plate. The equivalent of this is one hundred and twenty ⅝-inch holes through ¼-inch mild steel plate, all at one hit.

The answer to the question of how a modern press brake is different from those of the past lies in the increased accuracy of the machine. A modern press brake is extremely accurate because of its rigid construction and machine-tool refinements. This accuracy makes parts interchangeable, minimizes waste and improves the product. It has made the press brake one of the basic tools of high-production manufacturing today.

Typical of the progressive setups possible is that shown in Fig. 5, where a manufacturer of electric refrigerators is using a press brake for multiple punching and forming operations in making the refrigerator cabinets. In this 3-station setup, the work enters the press brake at the extreme rear (left) where one end is punched and notched at the same time a side is being punched at the middle or second station and one end is being formed at the third (right) station. At the next stroke of the press, opposite ends are punched and notched at station one, opposite sides are punched at station two and opposite ends are formed at the third station. Thus at each second stroke of the press, a part ready to assemble is produced. Each operator stands on a platform at the correct height most convenient for him to work.

Welded Dual Powered Press Brake



■ Unusual feature of the above press brake fabricated by Charles J. Griswold, Lockport, N. Y., is that it has two separate power systems. One is for forming operations on light sheet metal where the requirements call for pressures up to 7000 pounds, and the other is for heavier work. Hydraulic pressure for heavier work is applied by 10 jacks operated by connecting rods working in multiple from one 15-horsepower electric motor, having a capacity of 250 tons. Assembled entirely by welding, press is 14 feet long, 12½ feet high and weighs 7 tons. Photo courtesy Wilson Welder & Metals Co. Inc., 60 East Forty-second street, New York

Reports How Production Is Being Increased

■ How industry is stepping up production to handle unusual demands from certain domestic and foreign markets, refining training periods and cutting waste motion is embodied in a recent 28-page report, "Intensive Training of Industrial Employees" issued by the policy holders service bureau of Metropolitan Life Insurance Co., 1 Madison avenue, New York.

According to the report, some of the initial steps to be taken in meeting this problem include accurate determination of a company's labor requirements, careful analysis of the employe's qualifications coupled with proper placement and better organization of labor sources. It points out that reorganization of the skilled man's job, separating the less skilled phases of the work for which new men can be more quickly trained, has proved effective in speeding up training.

Another approach, the report states, is to improve the quality of the training by carefully meshing the essential training material with a detailed analysis of the production job. Individualizing the training as much as possible so as to give each employe the minimum instruction needed has been found much less wasteful than on a program based on average ability.

Could you use a . . .

4000 Ampere Arc Welder ?

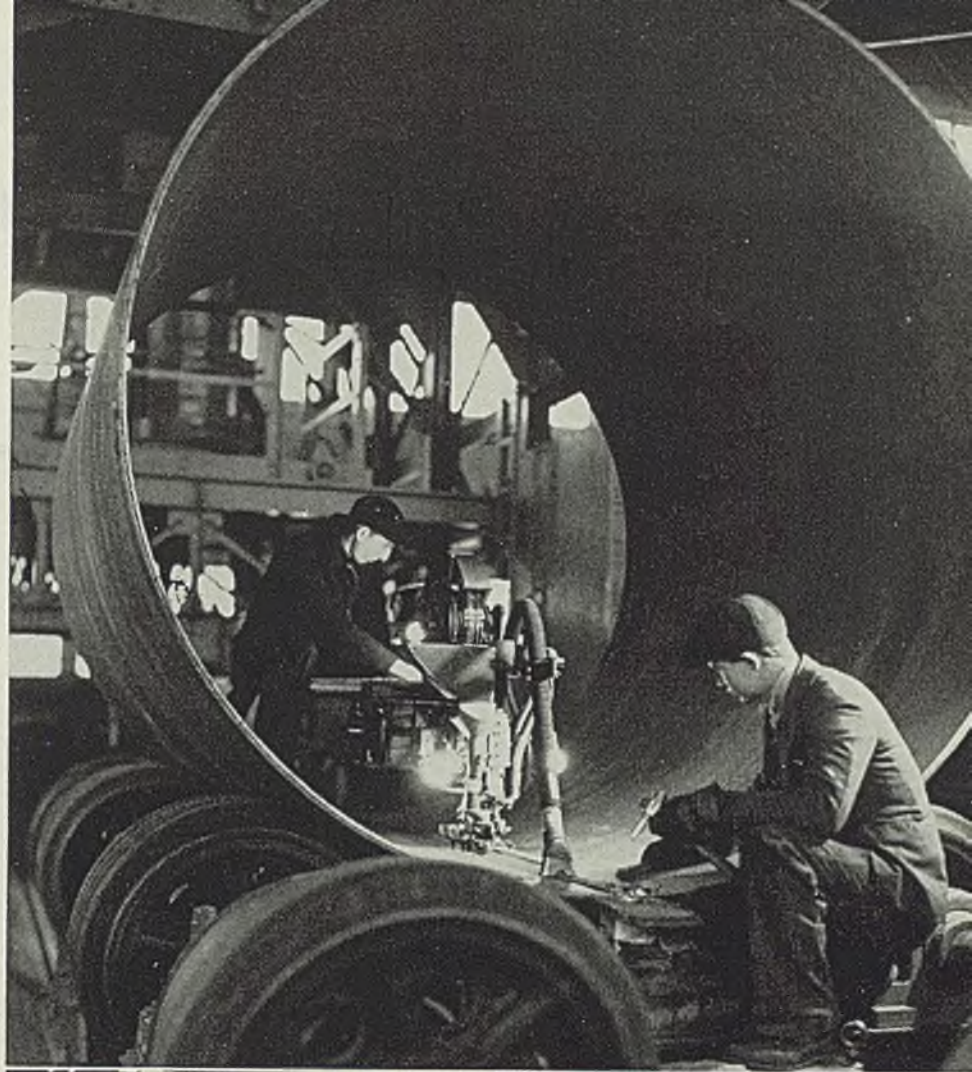
. . . Probably not! But a number of fabricators are already investigating the possibilities of such huge units as that shown here and recently built by The Linde Air Products Co., New York, for Blaw-Knox Co., Pittsburgh. The value of welders of this size is their ability to butt weld joints in heavy plate in one pass (on each side of the material). Although the machine shown here has an ultimate capacity of 4000 amperes, this amount has not been required up to this time as the maximum thickness that can be welded has not yet been determined.

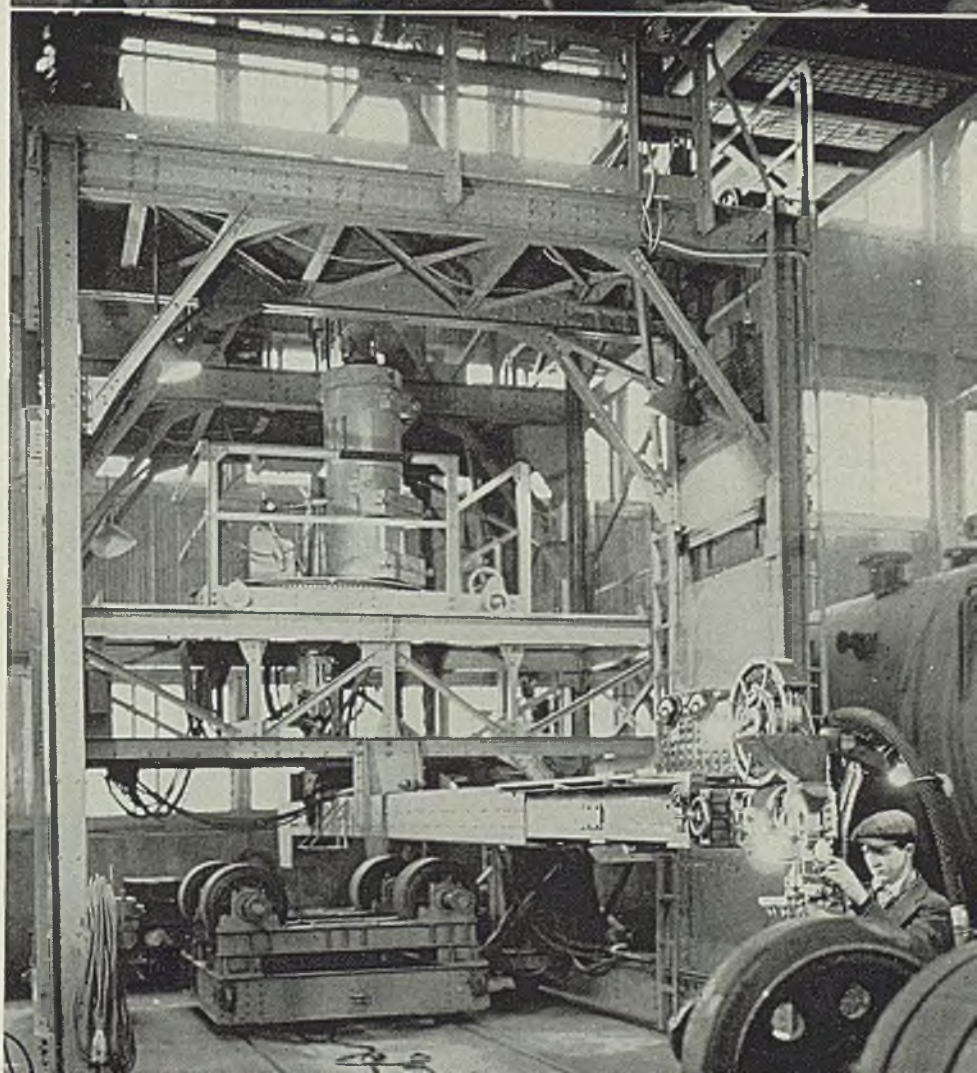
Possibilities Explored

In its use of this machine to date, however, Blaw-Knox Co. has explored rather thoroughly the possibilities on sections ranging in thickness from ½ to 2¼ inches. Some experimental welding also has been done on material as light as ¼-inch and as heavy as 2¾ inches, but no data are available on these extremes. A typical performance on a cylindrical shell made of ½-inch plate such as shown would be a welding speed of 16 inches per minute on the first side, laying a full weld at one pass, 18 inches per minute on the reverse side. A current of 900 amperes would be used for the first bead with 700 amperes for the finish bead on the reverse side. In the case of 2½-inch plate, the current would approximate 1600 amperes and speed would be about 8 inches per minute for both sides.

In the upper illustration the machine is welding a longitudinal seam on a cylindrical shell. The lights shown are not from the arc but from incandescent lamps on each side of the welding head. The arc in the Unionmelt method is covered and concealed by a heavy overcoat of granulated flux material, the excess of which is picked up by a built-in vacuum attachment. This upper illustration is a typical operating view just after the machine has begun welding. One man usually is located on the ram to handle the

(*Please turn to Page* 91)





Electric Heat for Protection and Preventative Maintenance

Use of electric heat from a variety of strip heaters now available offers a reliable, convenient, safe method of obtaining heated air necessary to prevent condensation

By C. T. ELDER
Cleveland Electric Illuminating Co.
Cleveland

■ CONDENSATION of moisture or "sweating" must be guarded against in connection with electrical equipment if excessive maintenance costs and breakdowns due to absorbed moisture are to be prevented.

Motors and motor-generator sets for continuous hot and cold-strip mills, ore handling equipment, large water pumps, air-compressor pumps and similar drives involves the problem of preventing condensation of moisture.

The solution offered here with proper modifications may be adapted easily to all circuit breakers, control equipment, high-voltage busbars, machine tools, gages, dies in storage, electrical parts, sheet and strip in storage and any area in which condensation of moisture would be detrimental.

Wattage Estimated Two Ways

Utilizing electric heat from the wide variety of standard strip heaters now available offers a reliable, convenient and safe method of obtaining the proper amount of heated air to prevent condensation.

The wattage depends upon cubic volume, voltage, horsepower, speed range and ventilation of equipment to be protected. Judgment based upon experience will indicate the proper wattage for most applications.

Two methods of estimating wattage may be employed. For open-type machines, allow approximately 1 kilowatt in strip heaters for each 7 tons of gross weight of the machine. For totally enclosed designs, only ¼-kilowatt per 7 tons of gross weight need be allowed. For machines of partially enclosed design, the wattage will vary between the limits given.

Another method to be modified by the common sense of the engineer in its application is to base the estimated required strip-heater wattage upon the losses of the machine. On this basis, the wattage could be taken as approximately 7½ per cent of the machine losses exclusive of windage and friction. If total machine losses were to be used as a basis of estimate, the 7½ per cent factor would revert to approximately 6 per cent for machines near the 360-revolutions-per-minute range. The proportion of windage and friction losses to total losses is different for various speeds, other factors remaining about the same. Thus, allowance must be made for speed, and the 6 per cent factor based upon a speed of 360 revolutions per minute modified accordingly.

Installation Simple

Installation of strip heaters is easily accomplished. For machines ventilated with filtered air, the strip heaters may be mounted on strap-iron supports in the air tunnels directly beneath the frame of each machine, 10 to 30 inches from the frame. With such an arrangement, it may be advisable to keep a fan in operation to insure positive circulation of warmed air through the machine, although this may not always be necessary. Strips may be mounted upon or enclosed in a suitable perforated or louvered sheet-metal housing as desired.

For other ventilating systems utilizing a basement, sub-basement or other space available under the machines, the strip heaters may be installed in a similar manner but of course should be enclosed in such a way as to direct the heat into the machine.

Open Machines Need Protection

Where neither scheme is feasible, the strip heaters may be assembled into a portable rack and plug-in facilities provided near the machine. Open machines should be furnished with a canvas tent to cover them when idle. Strip heaters then are placed under the tent adjacent to the machine. Care must be taken to prevent the portion of the machine near the strip heater from excessive heat. Properly placed baffles will do this. Estimates of wattage required then will approximate that for machines of totally enclosed design.

For totally enclosed machines, a tent is not required. Strip heaters are assembled into a box enclosure and a small fan arranged to introduce the warmed air into the machine housing through a duct.

Control of the electric circuit may be arranged in a number of ways. A manually operated switch of the conventional type with or without signal lights is quite satisfactory and may be arranged to control strip heaters for individual machines or for groups of machines as desired. A double-throw switch

can be used to avoid operation of the strip heaters when the machine is running, using one position of the switch to close the strip-heater circuit and the other position to close the control circuit of the machine.

Additional equipment may be provided such as relays, thermostats and interlocking devices of various types to furnish any degree of control desired.

Typical example of application of strip heaters to prevent condensation is seen in a 77-inch continuous hot-strip steel mill employing ten stands. These include two scale-breakers with roughing and finishing stands. Three motor-generator sets, each with one motor and two generators, are employed with a filtered-air duct ventilating system. Total rated horsepower of all mill motors including scalebreakers is 29,000 with total rating of the three synchronous motors on the motor-generator sets at 16,500 kilovolt-amperes. The six direct-current generators of the motor-generator sets are rated 14,000 kilowatts. Here, a total of 21 motors and generators are equipped with the strip heaters.

Banks Controlled by One Switch

All 21 strip-heater banks are connected to a single circuit controlled by one main switch. A signal light in the motor room indicates when the switch is closed. Strip heaters are mounted in the air duct, a fan maintaining positive air circulation. Total load of strip heaters employed is 120 kilowatts, 500 amperes at 240 volts.

The motor-room operator is responsible for turning the heaters on and off. Usual practice is to turn the heaters on as soon as the mill is shut down and to open the circuit when the mill resumes operation. On intermittent operation of the mill when several hours of running are alternated with several hours of idleness, this practice minimizes breathing and prevents sweating during extended periods of idleness.

Keeping the machines warm facilitates resumption of operations. Under ideal atmospheric conditions and for periods not over 10 or 12 hours, the heaters are not turned on. This is left to the judgment of the motor room operator.

If heaters are not turned off when the mill starts operation, the signal light informs the operator of the condition. However, even in hot weather no serious effect results if operation of heaters overlaps mill operation for a period not exceeding a half hour.

A second installation was made in a large continuous hot-strip mill provided with filtered-air ventilating duct system for motors and generators. This is a ten-stand mill with two scale-breakers. Strip heaters in perforated sheet-metal housings are situated in the ventilating tunnels beneath each motor and generator. Each bank of strip heaters is controlled individually in this installation, using a double-throw switch on the main control panel interlocked with the machine control.

All of the heater units were furnished by General Electric Co., Schenectady, N. Y., in both instances.

Use of strip heaters as described is a form of insurance. For instance, value of the rotating equipment in the 77-inch mill is approximately one and a half million dollars. On the large, high-voltage machine, a clean dry atmosphere is extremely important as a protection against alternate freezing and thawing. Protecting the insulation of high-voltage motors is especially important to prevent leakage and subsequent breakdown of the insulation. Installation of strip heaters can be made easily due to their small size and ease of mounting. An added advantage is that electric power forms a most dependable source of heat and needs no attendance over extended periods of time.

Reclaims Particles

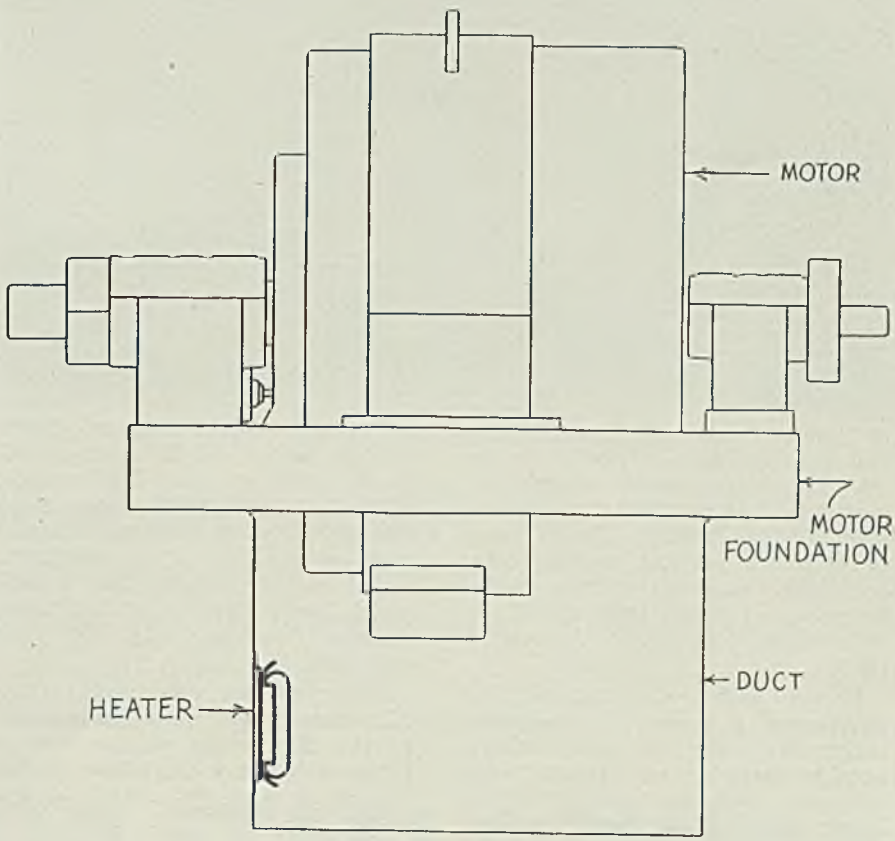
■ Besides conditioning water, fuel oil, coal, mineral and other waste particles can be reclaimed by a conditioner developed by Gale Separator Co. Inc., 405 Lexington avenue, New York.

The device has no moving parts, its gravity construction merely rolls, bounces and scrubs each individual particle or drop. Construction of the unit permits the flowing of the liquid mixture to be treated beneath a quiescent body of fluid, whereby the continual submergence causes the breaking up of its mixture, so that lighter liquids, separated oils and other substances immediately and automatically rise to the surface. The device will condition liquids of different specific gravities.

Waterproofing Material Seals Building Surfaces

■ A transparent material for waterproofing brick, stone and other building materials is announced by Flexrock Co., Twenty-third and Manning streets, Philadelphia. It is made of nitro-cellulose, lacquer, oils and a solvent of penetrating character and has enough body to clog up pores and open spaces.

The material, called Flexseal, has no color but takes on the color of the surface covered. It is applied by brush and spreads evenly.



Simplified line sketch to show method of placing electric unit heater in duct below rotating electric machinery

Prepainting Treatments of Various Types Covered in Test Reports

■ REPORT No. BMS44, "Surface Treatment of Steel Prior to Painting," by Rolla E. Pollard and Wilbur C. Porter, issued April 8, 1940, by national bureau of standards, details results of tests and studies of various methods used to improve the protective value of various pretreatments before paint is applied to the steel. Tests on pretreatments of galvanized steel surfaces and also plain steel surfaces are covered.

Effectiveness of various methods of pretreating galvanized steel was determined by tests which included: Untreated hot-dipped galvanized surface; proprietary phosphate treatment; a cold wash in aqueous zinc phosphate, a solution containing free phosphoric acid and an activating agent; an etching solution consisting of water containing 8 ounces of copper sulphate per gallon; a similar etching solution of water containing 8 ounces of zinc sulphate per gallon; and a number of other etching solutions as well as phosphate and dichromate treatments.

Plain steel surface pretreatment tests covered various pickling, phosphate, chromate and similar treatments.

A summary of conclusions from the tests on galvanized steel panels shows that the hot-dip phosphate treatments and cold-wash phosphate treatments improved both the adhesion and the corrosion protection of paints under widely varying conditions.

Most hot-dip treatments apparently were slightly superior to the cold wash. Acid-dichromate treatment apparently had considerable protective value in itself and had an inhibitive action under paints but did not improve their adherence. An oxalate-phosphate treatment prolonged the protective value of inhibitive paint under severely corrosive conditions but had little effect on other types and did not improve adhesion to an appreciable degree. All other pretreatments tested were found to have slight or negligible value in improving the protective ability of paints.

Hot-Dip Phosphate Found Best

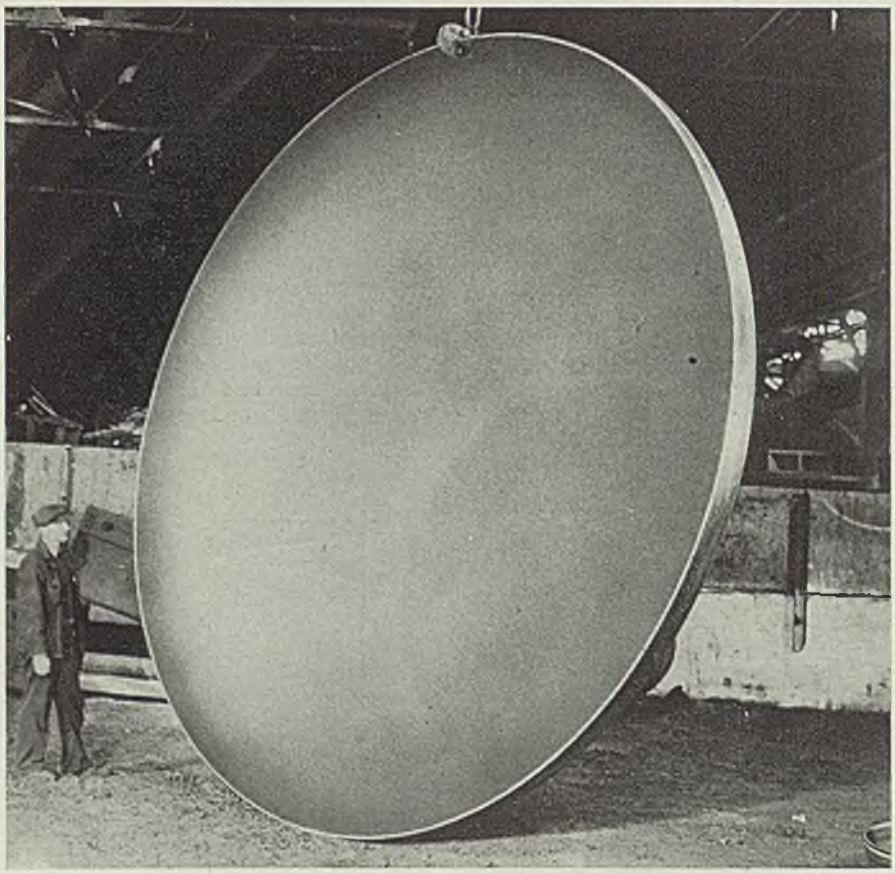
On the plain-steel pretreatment tests, results indicated that hot-dip phosphate treatments markedly improved the protective value of paints under both salt spray and accelerated weathering tests. Phosphate-chromate cold-wash treatments were only slightly inferior to hot-dip phosphate treatments in the improvement afforded. The hot-dip chromic-acid treatment improved paint protection as compared with a plain pickled surface but the improvement was not as marked as that obtained with the other treatments above. All other pretreatments tested were found to have little or no value in improving the protective action of paint.

It was noted under the severely corrosive conditions of the salt spray test that protective value of paints applied on rusted surfaces was decidedly inferior to that of paints applied on plain pickled surfaces.

Some of the pretreatments apparently were able to remove light rust. However, they improved the paint protection much more effectively when used on a rust-free surface.

Complete copies of the tests are available from superintendent of documents, United States government printing office, Washington. Price is 10 cents.

Large Bulkheads Spun from One-Piece Circles



■ Nineteen unusually large flanged and dished bulkheads, similar to the one illustrated, were shipped recently by Lukens Steel Co., Coatesville, Pa., to Buffalo Tank Corp., to be used in vertical, multiple compartment tanks for storage of lubricating oil at the Bayonne, N. J., refinery of Tide Water Associated Oil Co.

Formed with heating and spinning equipment that can handle even larger flat circles, the heads had an outside diameter of 15 feet, were 9/16-inch thick and incorporated a dish radius of 170 inches. They had a 11-inch corner radius, 3-inch straight flange and 35½-inch overall depth. Each weighed 5724 pounds.

The bulkheads were made of circles 203 inches in diameter—largest ever rolled. Out of the 20 plates rolled on the Lukens No. 5 mill, which has a distance of 206 inches between housings, only one plate was lost.

Flame cutting was used to produce the circular plates to conform to the dimensions of the storage tanks which had an outside diameter of 15 feet and stand 42 feet high.

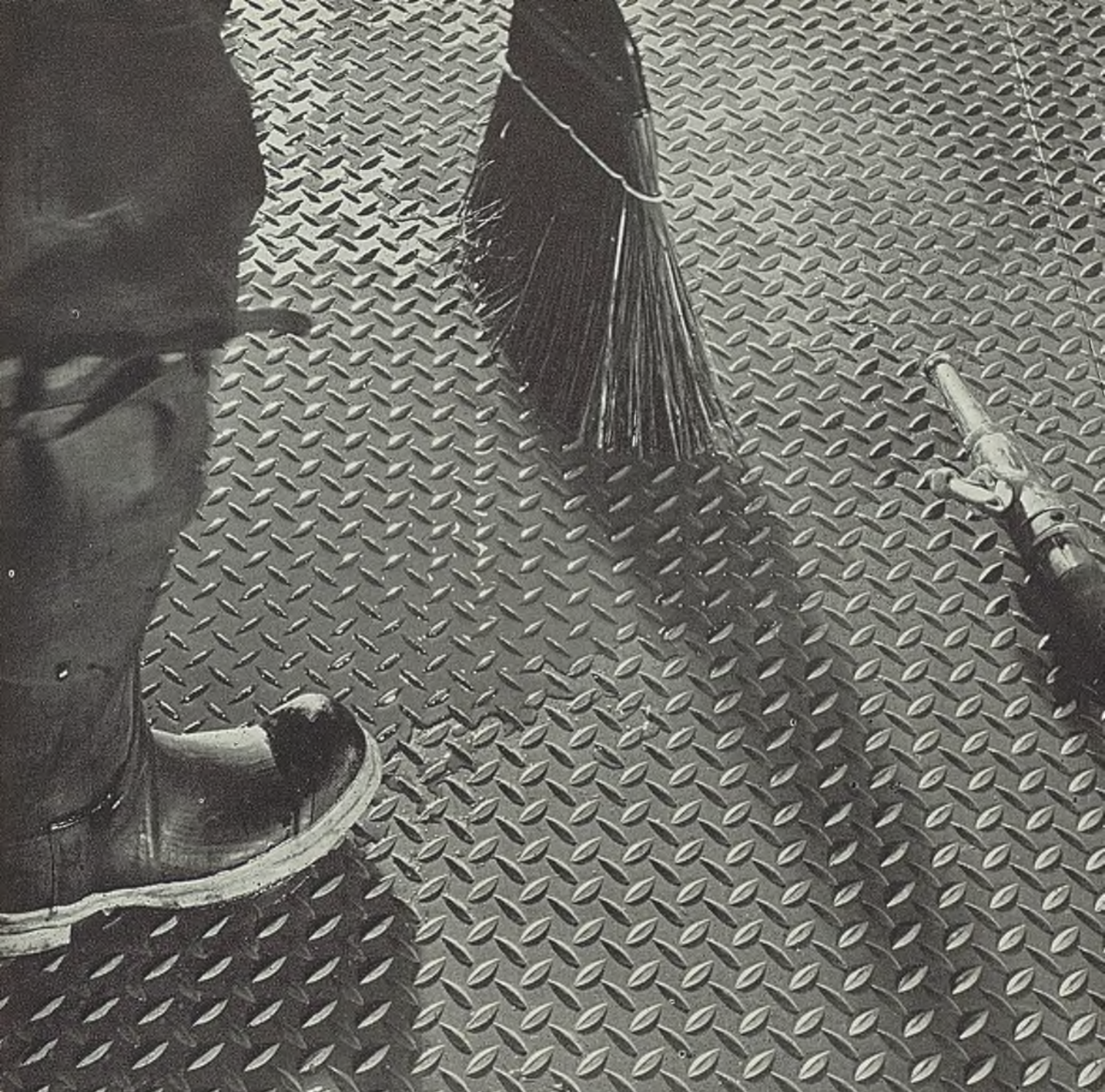


Photo shows the Super-Diamond Pattern of "A.W." Rolled Steel Floor Plate. Provides completely safe tread from any angle, under any condition.

Floor troubles ended for good . . . Wherever floors do double duty—traffic aisles, stair treads, railroad running boards and platforms, car steps, truck body floors, engine rooms, catwalks, refinery towers—"A.W." Rolled Steel Floor Plate helps to prevent dangerous and costly slips and falls. Reduces maintenance to a minimum. With "A.W." Floor Plate, there are no worn and slippery surfaces to endanger men on foot or upset floor trucks. Write for folder giving complete engineering data.

ALAN WOOD STEEL COMPANY

MAIN OFFICE AND MILLS, CONSHOHOCKEN, PENNA. : : SINCE 1826 : : DISTRICT OFFICES AND REPRESENTATIVES—Philadelphia, New York, Boston, Atlanta, Buffalo, Chicago, Cincinnati, Cleveland, Denver, Detroit, Houston, New Orleans, St. Paul, Pittsburgh, Roanoke, Sanford, N.C., St. Louis, Los Angeles, San Francisco, Seattle, Montreal—A. C. Leslie & Co. PRODUCTS INCLUDE—Steel Products in Carbon, Copper or Alloy Analyses : : Sheared Steel Plates : : Hot Rolled Sheets and Strip : : "A.W." Rolled Steel Floor Plate

Packing for Export

Wood cases with high-tensile wire ties as reinforcement provide excellent protection to metal products such as tin plate, bolts, screws, tools. New package for steel sheets is waterproof, rigid

Part II

By W. J. AUBURN
Gerrard Co. Inc.
Chicago

■ THE WOODEN box is probably the most commonly used package. When correctly made, it makes an efficient container for many kinds of goods. There are a number of different styles of boxes. The best type for general export service is the box with cleated ends. The cleats afford extra nailing surface, they strengthen the ends and they add greatly to the rigidity of the container. Boxes with uncleated ends generally should not be used for export except in the case of very light or small packages. Satisfactory boxes can be made of practically any of the commercially important species of lumber.

Cement-coated nails should always be used in preference to smooth uncoated nails as they have much greater holding power. Also, because of their thinner gage they cause less splitting of the wood in driving.

Nails should never be driven so the heads are sunk below the surface of the wood as this greatly reduces their holding power. As previously mentioned, all boxes for export should be wire tied or metal strapped.

Boxes and crates should always be lined with a strictly waterproof lining. Many shippers use asphaltum waterproofed paper for this purpose because it is absolutely waterproof. Also it can be folded and bent into corners without breaking the waterproof coating. For wrapping around machinery and other irregularly shaped articles, a cloth-covered asphaltum waterproofed paper is generally used. The cloth covering prevents the paper from tearing.

Shippers of bolts, nuts, screws, small tools, razor blades and tool steel generally use a cleated wooden case strapped with two galvanized wires.

One prominent Eastern set screw manufacturer has been shipping large cargoes of cap, socket and set screws to London for the British wartime industries. The cases are wire strapped with two 13-gage high-tensile wires.

To Riga, Latvia, and to Reval, Esthonia, go oil pumps in cases, each weighing 300 pounds and up. These use two 10-gage wire straps and a good grade of lumber.

Takes Much Punishment

An interesting case of foreign shipments making a return trip to and from Tientsin, China, occurred at the height of the Sino-Japanese war. The shipment involved about 25 wooden cases of tinned foods from the Heinz food factories, and it was destined for the U. S. army post at Tientsin, China. Due to the movement of Japanese troops around Tientsin, the post was moved and when the shipment arrived it was unclaimed and returned to the shipper at San Francisco. Then it moved to Tacoma and finally to the Heinz warehouse in Seattle. Two latitudinal round wire straps protected this shipment of tinned foods half way around the world and the cases upon return showing nothing but a little wear and accumulated dirt. The tin cans of food were as originally shipped.

STEEL of July 10, 1939, detailed shipping of steel dump truck bodies without benefit of wooden cases, telescoped, and tied with heavy galvanized wire tightly re-enforced. This saved $16 in lumber for the unit of two. Heavy channels on the bottom of each body served as

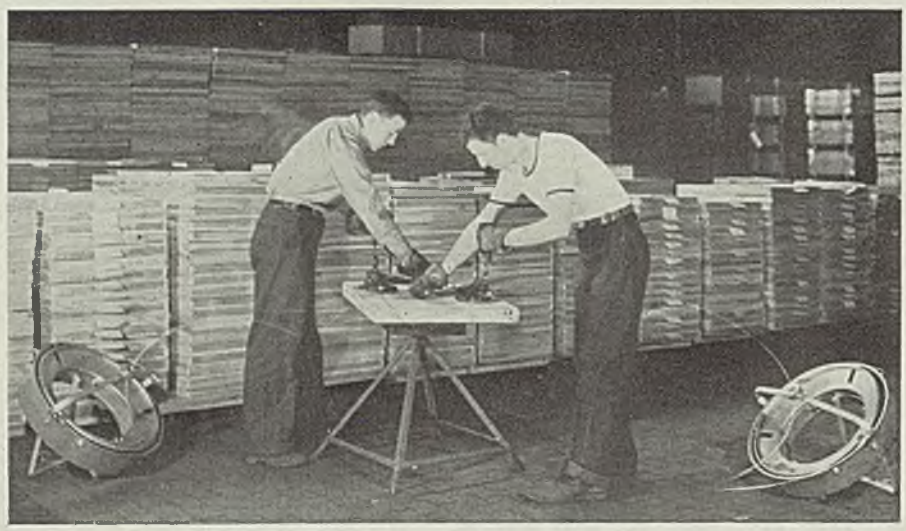


Fig. 1—Here 100 to 200-pound packages of tinplate are being made up for export shipment. Revolving work table helps handle the wire application

This is NEWS!

...NEWS THAT MEANS MORE SALES FOR METAL EXPOSITION EXHIBITORS

When this story broke in the newspapers, metal men forgot political news for a while—forgot World War No. 2—and started to speculate about this biggest National Metal Exposition which will open in October at Cleveland.

If this is the biggest Metal Exposition in 22 years, they said, we'd better be there to get our share of the business. Because last year 33,000 of our best prospects attended the Metal Exposition.

And so . . . to the Metal Exposition headquarters in Cleveland . . . have come letters, wires and telephone calls by the dozens. Reserving spaces for big and little companies who sell the metal industry everything from pyrometers to tons of steel.

But there are still plenty of good spaces left at the regular $1.00 a square foot rate because Cleveland's ample Public Auditorium provides more than 150,000 square feet for the Metal Exposition.

So write or wire collect today for full particulars. Address: W. H. Eisenman, Director, National Metal Exposition, 7301 Euclid Avenue, Cleveland, Ohio.

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COOPERATING SOCIETIES

American Society for Metals
Wire Association
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Iron & Steel Division and Institute
of Metals Division of the American Institute
of Mining & Metallurgical Engineers

NATIONAL METAL EXPOSITION

AND METAL CONGRESS

OCTOBER 21-25, 1940 *Cleveland, Ohio*

MANAGED BY AMERICAN SOCIETY FOR METALS

Fig. 2. (Upper)—Large steel sheets are protected by first wrapping with waterproof paper, covering with hot tar, adding sheet metal cover and tying to skids. Fig. 3. (Lower)—These 20-gage sheets, 43 x 92 inches, have added protection provided for the corners by 16-gage steel rails, clinched tightly at all corners and tied into the package

skids and the entire unit minus lumber saved considerable stowage displacement in the steamer hold.

One of the larger steel mills in the Chicago-Northern Indiana area ships export tin plate in packages weighing 100 to 200 pounds.

The box is of ¼-inch thick lumber and is not of plywood. The bottom is usually one piece. Tops often are several short pieces nailed to ends and sides.

As illustrated, these boxes are wire-strapped with three 14-gage galvanized wires of especially high strength. Two wire binders are strapped over the length of the box and one across the breadth or width. This makes three wires per tinplate box, giving adequate reinforcement and rigidity two ways.

Preparation for shipping of these cases is handled by two men and consists of four operations—picking up, wire tying or strapping of three wires, stencilling of address, destination, markings, etc., and repiling. These two men handle 60 boxes per hour or one per minute. The special turntable stand aids in maintaining this speed easily.

(*Please turn to Page* 92)

Establishes Polishing, Buffing Laboratory

■ Industrial Equipment division, Continental Roll & Steel Foundry Co., East Chicago, Ind., has established a testing laboratory for making polishing and buffing time and method studies. Laboratory discoveries are being submitted to users and prospective users of Continental polishing and buffing equipment.

There is no obligation on the part of manufacturers who wish to submit pieces or parts to the laboratory to determine if they will lend themselves to semiautomatic polishing and buffing. Manufacturers and platers are invited to write for details for shippineg sample parts to obtain a free laboratory test.

Treatise on Machine Shop Tools and Use

■ *Machine Shop Training Course,* by Franklin D. Jones; cloth, two volumes, 6 x 9 inches; Vol. I, 474 pages, 221 illustrations, Vol. 2, 552 pages, 209 illustrations; published by Industrial Press, New York; supplied by STEEL, Cleveland, at $6 for both volumes, $4 for either separately.

This is a treatise covering elementary and advanced machine shop practice, especially adapted to shop courses, self-instruction and technical or trade school use. The volumes may be used independently, each covering about half the subjects.

The first volume starts with fundamental principles underlying all metal-cutting operations and continues with various branches of lathe work, followed by general applications of turret lathes and automatic machines and proceeds to consideration of drilling, reaming and boring equipment.

The second volume deals with tapping, thread cutting with dies, thread milling, grinding and rolling and other advanced operations.

The course not only explains how but gives reasons why. It not only deals with all standard types of machine tools and illustrates their use by typical applications but includes shop problems with complete solutions and much information on many closely allied subjects.

Introduces Double Action Forging Hammer

■ Pneumatic Drop Hammer Co., Braintree, Mass., announces a new shockless, double action drop forging hammer capable of striking 60 to 75 blows per minute.

By proper arrangement and control the opposing heads of the unit meet each other with the same force at impact. The upper head which is lifted by air and dropped by gravity, weighs approximately 1500 pounds without dies and has a maximum stroke of 24 inches. The lower head is in the ratio of 2 to 1 and has a maximum stroke of 2 inches. Acceleration of lower head is rapid and on the basis of force times distance a sufficiently large cylinder is used to give required foot poundage to resist or neutralize the dropping weight.

Thus a total of about 6000 foot pounds is developed at impact.

The release of the lower head is controlled by the dropping head through a cam adjustable to the stroke setting of the hammer. Hammer heads are parted at impact and returned through a second cam, all action being controlled through a foot treadle. With this foot treadle the operator can produce light or heavy blows at will.

Movement of the lower or anvil head does not interfere with handling of work on dies. The No. 2 hammer delivering 6000 foot pounds is comparable to a 2000-pound board drop hammer and weighs about 8 tons.

Foundation members heavy enough to support weight of the hammer, together with a pit to accommodate members below the floor line is all that is required. Hammer is quiet in operation and requires minimum head room.

Sheet Galvanizing Machine

New units installed in English plant have speed range up to 120 feet per minute and individual capacity of 45 to 50 tons per turn. Production rate is high. Part of output used for bomb shelters

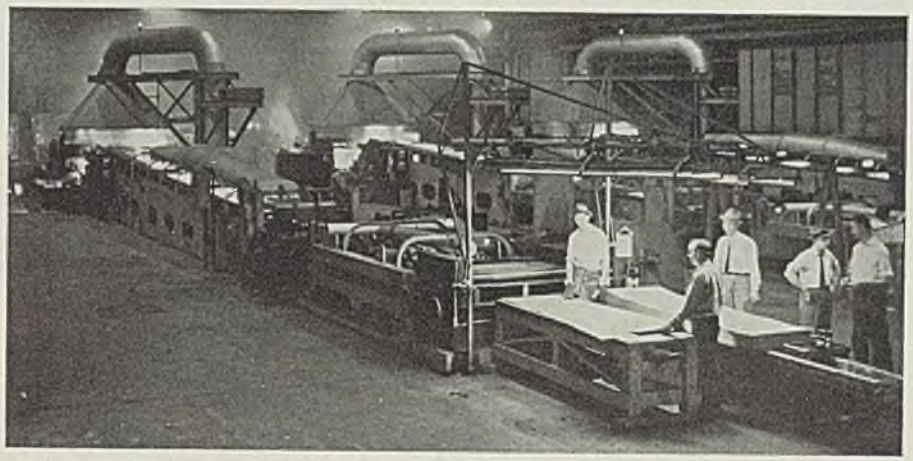
By VINCENT DELPORT
European Manager, STEEL

■ WHEN A GALVANIZED sheet has been made with all the resources rendered available by modern engineering and technical skill, it has a beauty of its own when it presents itself, at the end of the line, with its uniform spangled coating, a perfectly flat surface and straight edges. To obtain such a result it is essential that the highest grade material be used, and that the best plant and equipment be conducted under strict control and accurate timing from beginning to end of the process. If something goes wrong at the last stages, all the attention and skill, and the benefits of intricate and expensive machinery used in the earlier stages have been expended in vain.

Galvanized sheets which qualify as ranking among the best in the world are made at the Ebbw Vale Works of Richard Thomas & Co., Ltd. in Monmouthshire on the borders of England and Wales, thanks to the combination of factors enumerated above: technical skill, constant supervision and the finest type of machinery obtainable, giving the highest rate of production compatible with superior quality.

One of the outstanding features of the Ebbw Vale Works is the galvanizing plant designed by Wean Engineering Co. Inc., Warren, O. It is the first plant of its kind to be in operation in Europe and has been working for about nine months.

One of the first things to attract the notice of the visitor when entering the premises is the complete absence of fumes, which is due to the design and efficiency of the fume extracting plant. In fact, cleanliness, clear lighting and general good working conditions are a prominent feature of the whole of the Ebbw Vale Works.



Galvanizing units similar to those recently installed at the Ebbw works. Richard Thomas & Co., Ltd., England

The sheets to be galvanized arrive by rail from the rolling mills at one end of the galvanizing department in closely packed bundles weighing from 3 to 5 tons. They are unloaded by an overhead traveling crane and placed on buggies which bring them to a station where the bundles are discharged and opened. The sheets are then separated and placed in cradles in lots of from 2500 to 3000 pounds. The cradles are suspended from a large beam and thus carried by the overhead crane into the pickling vats.

Two Aetna-Taylor pickling units are used, each vat measuring 17 feet 6 inches x 7 feet 4 inches x 7 feet 6 inches deep. The beam carrying the sheets in their cradle is lowered onto two articulated arms, one at each extremity of the vat. These arms receive an alternative up-and-down movement by means of an electric motor and the sheets are thus constantly moving in the warm pickling bath where they remain for periods ranging from 15 to 20 minutes. At the end of the pickling operation the cradles are lifted out and the sheets are rinsed in two swilling vats. It is considered that this process of pickling is the most positive method known.

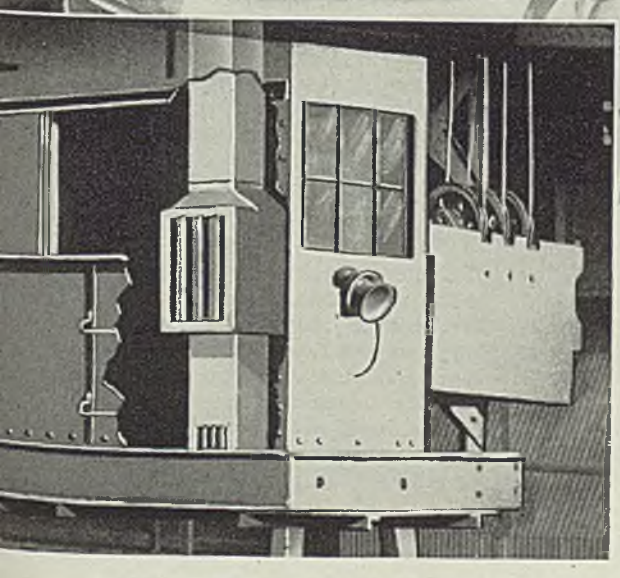
The sheets are now ready for the galvanizing operation, but immediately before entering the galvanizing kettle they are first subjected to an additional cleansing in a water tank which is the first link in the continuous line.

The first unit in a galvanizing line is the acid dip, consisting of a series of rubber-covered pinch rolls, acid-resisting guides which convey the sheets one after the other through a strong solution of acid contained in a rubber-lined steel tank. From the acid dip the sheets are mechanically fed into the kettle of molten zinc, the surface of which is protected from oxidation by a layer of ammonia flux. The sheet enters the bath through the flux box which contains muriate of ammonia. In-

(*Please turn to Page* 91)

HOT AS HELL AT THE

Yet-COMFORTABLE IN THE CAB



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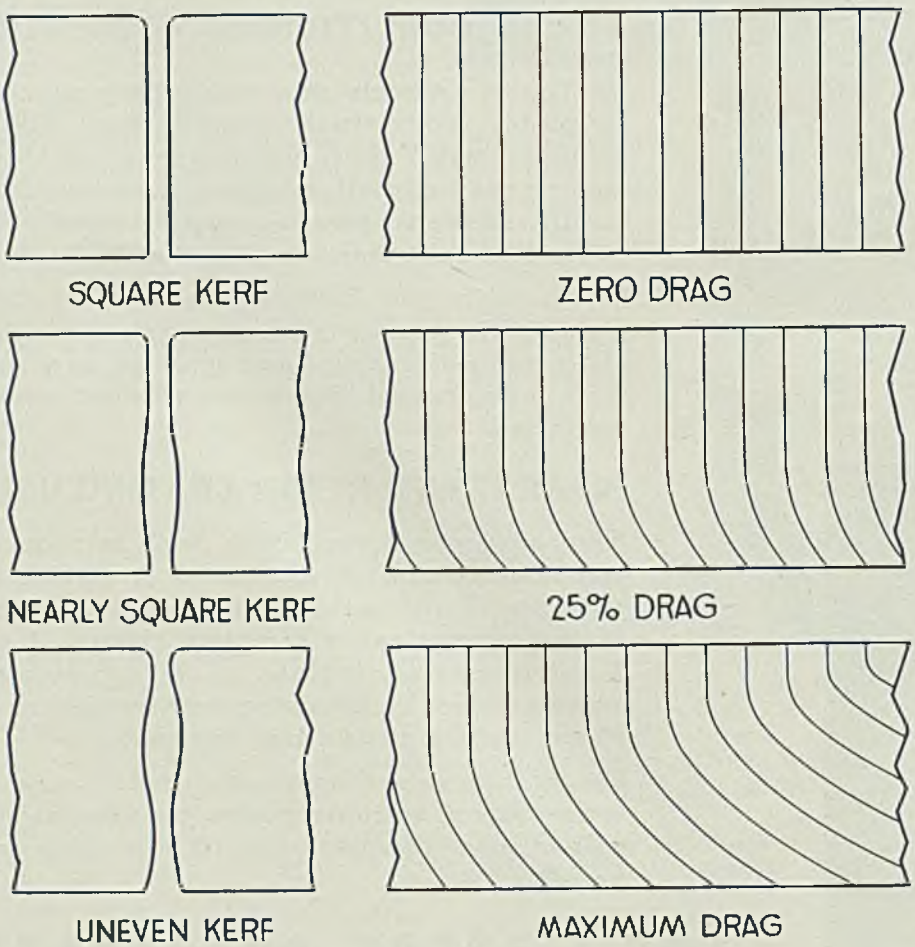
Economical Oxygen Cutting

Economies follow adoption of three standard cuts. Costs show maximum ratio of 2 to 1. Correct oxygen pressure is essential for low cost. New method cleans tips by soaking

By HAROLD LAWRENCE

■ MANY savings are possible in the use of present equipment. Those torches and machines that are already working in the shop often can yield further economies.

In machine cutting it might be well to adopt standard cuts which can be designated by the engineering department on the drawings. Figs. 1, 2 and 3 illustrate three possible types of cuts. First is the precision cut which is slow but which requires no machine work after the cut is made. Second is the standard cut which is square enough for all ordinary applications. Finally, there is the rough cut which can be used where severing alone is wanted without any demands as to edge contour.



Adopting these three standard cuts will do much to reduce costs if the standard or rough cut is employed wherever possible. From top to bottom —precision cut with square kerf and zero drag, standard cut with nearly square kerf and 25 per cent drag, rough cut with uneven kerf and maximum drag

To determine the amount of saving possible under this plan, tests were run on 7/8-inch plate making cuts almost 10 feet long. The results given in Table I show the substantial savings possible by making the quality of cut no better than that demanded by the particular job.

Pressures Must Be Followed

Generally the quality of cut is associated with the amount of drag. Figs. 1, 2 and 3 also show drags corresponding to each type of cut. Any experienced operator can cut steel to certain drag limitations. For that reason cuts may be specified by name or by drag with the sure knowledge that kerf contours of the desired shape will result. The savings in total cost will come about as a natural result.

What about operating pressures? Here a hard and fast rule is required.

The pressures specified by the manufacturer of the equipment MUST be followed. Seldom is it advisable to exceed these values. Frequently excess pressures result in ragged cuts and greater oxygen consumption. Sometimes "souping up" oxygen pressures results in a much higher overall cost because the extra speed is gained at too great

TABLE I

	Precision Cut	Standard Cut	Rough Cut
Oxygen	$0.0784	$0.0525	$0.0392
Acetylene	0.0115	0.0077	0.0058
Labor	0.0596	0.0397	0.0298
Overhead (100%)	0.0596	0.0397	0.0298
Total cost	$0.2091	$0.1396	$0.1046

a gas cost. Cutting tables should be supplied every man that uses a cutting torch and foremen in the shop should be held responsible for proper use of equipment.

A handy arrangement to enable accurate control of cutting pressures is a small pressure gage that may be attached to the cutting torch. This device allows the direct reading of oxygen pressures at the torch without needing to allow for hose pressure drops at the regulator.

Frequently these little presnure gages will disclose leaks in the oxygen hose that might not be detected in any other way. Too, the alibi of pressure drops in the hose is taken away from the cutter who feels that too much pressure is almost impossible.

Torch Tip Size Important

Another important point is size of torch tip for different thicknesses of metal. Table II shows importance of using proper size of tip as well as proper pressure. This information may well be included in cutting tables supplied operators. Since even a slow man can change a tip in less than a minute, it is folly to let a man use one large tip for all cutting. Equipment suppliers want efficient use of their torches almost as much as good shop operators. To that end most oxygen suppliers maintain service men whose sole function is to enable the user to get good operating results. Taking advantage of this service will help put gas cutting on a modern controlled basis.

Whenever possible it is a good idea to have one maintenance man for all cutting equipment including the tips. The great difference in oxygen flow that results from slight increases in cutting orifice diameter may be seen in Table II. Even the best cutter gets into bad tip-cleaning habits, so such work should be done by a man trained by one of the suppliers to care for cutting tips properly. Most companies do this training for nothing or for a nominal charge.

Cutting tips are tools. Being tools they should be checked out of the tool room.

If any tip becomes clogged or dirty, it should be returned to the store room for a new one. That way the tool keeper is able to return all tips to the maintenance man for cleaning.

Some shops may desire to follow the older scheme of allowing the cutter to clean his own tips. In that case the cutter should be provided with a complete set of tip drills along with data on drill sizes of all the holes in the tips he uses. In extreme cases shops have been known to throw away tips after they have been cleaned a couple of times. The claim was made that tips are the cheapest part of the cutting process and the decrease in gas consumption paid for the new tips required.

One new method of tip cleaning deserves mention. Radiator cleaning compounds are available that will clean the iron oxide from the tips without hurting the copper and copper alloys. This eliminates necessity of using drills and maintains correct hole size. Some of these compounds are poisonous so care should be exercised in handling them. Rinsing the tips in clean water and blowing them out with compressed air is all that is needed after an overnight soaking in the cleaning compound.

TABLE II

Oxygen Consumptions for Different Size Tips at Fifty Pounds per Square Inch Pressure

Drill Size Number	Diameter of Hole Inch	Oxygen Cu. Ft./Hr.
56	0.0465	90
54	0.0550	126
52	0.0635	181
49	0.0730	234
45	0.0820	310
41	0.0960	430

Periodically inspect all cutting equipment from the generator to the tip seat. Not only is gas wasted through even small leaks but these leaks can be dangerous. Soap and water such as are used in testing tanks for leaks may be used to detect such escaping gas.

Better gas flow may come from reversing the direction of flow through hose lines. Frequently particles in the hose set up disturbing flow currents. Reversing the hose keeps these obstructions to a minimum. Do not patch a hose forever.

Leaking patches will more than pay for new hose. Heavy duty hose with light "tail" hoses represent a good combination. The heavy duty hose stands less chance of being cut while the tail hose is flexible enough to make manipulation of the torch quite easy.

Ingenuity in cutting has been overlooked more than the same attribute in welding. Where cutting operations seem less important than the welding activities this is apt to be true. The same cost-saving jigs that make the superintendent and general manager conduct mutual admiration meetings over lowered welding costs per unit are possible with cutting.

Sometimes a machine torch may be operated by hand in a suitable jig with quite a saving. Other times awkward hand cuts may be eliminated by a simple torch holder. There are many possibilities in cost saving when the oxygen cutting process is employed. Sometimes the control needed seems too simple to warrant special investigation. Most foremen can save more money than they realize through adequate control to make oxygen cutting economical.

Inorganic Finish Steps Up Heating Efficiency

■ A new inorganic finish, called Pyronamel, which is fire, moisture and rustproof has been developed by Porcelain Enamel & Mfg. Co., Eastern and Pemco avenues, Baltimore, in co-operation with the engineers of Norge Heating and Conditioning division, Borg-Warner Corp., Detroit.

The finish is being used on heat drums of Norge Fastemp furnaces, and according to tests has rendered the heating units more efficient than before.

Medium Produces Pencil Blue Prints

■ Ink like opacity from hard drawing pencils is produced by a new transparent medium called P. T. M. developed by Frederick Post Co., Box 803, Chicago. Blue prints can be made from drawings produced by ordinary hard drawing pencils on this medium giving a solid background and sharp white lines. It produces solid and sharp details on Blacline, keeping the background uniformly white.

The back side of the medium is dust protected by ice glazed finish, similar to the reverse side of tracing cloth, the surface also being moistureproof.

Product is available in rolls 20 yards long in widths of 30, 36, 42 or 54 inches.

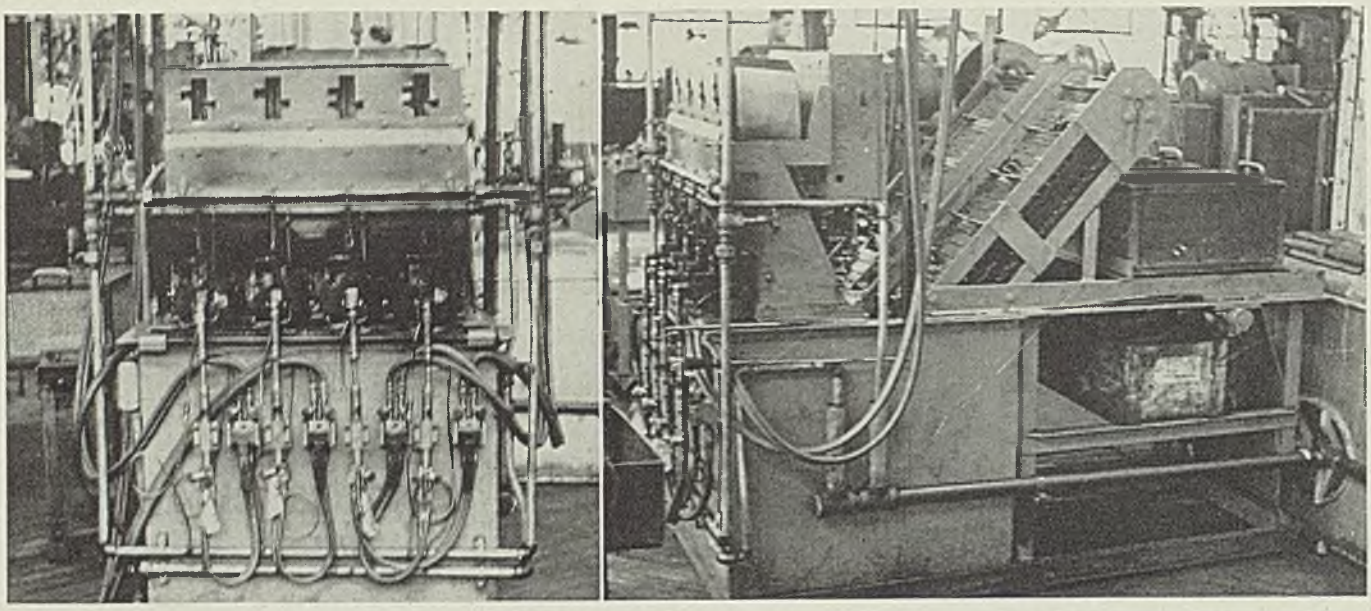


Fig. 1. (Left)—Front view of automatic flame hardening machine showing four sets of torches, valves and openings for parts

Fig. 2. (Right)—Side view. Note continuous conveyor with flights to carry work up out of water quench tank into which it is deposited automatically by the machine

Transmission Shifter Yokes Are Flame Hardened Automatically

■ IN GETTING into production on 1940 models, an automobile manufacturer was confronted with the problem of hardening the wearing surfaces of shifter yokes used in a new type transmission. The hardened area had to be confined to the locating slots and the countersunk holes and is run where the steel ball works back and forth when shifting from one gear speed to another. Flame hardening this part called for heating two different points at the same time.

Special flame-hardening tips were designed for the job, and the machine built utilizes 12 of these special tips designed by Air Reduction Sales Co., New York.

Yokes Handled Rapidly

Machine itself is designed to handle 200 pairs of yokes an hour. Fig. 1 shows a front view of the machine, which automatically hardens the forward and reverse shifter yokes. The pieces are fed in at the top slots, there being two slots for each type of yoke. The yokes slide down a T-slide and are held in position by a finger which is timed to move back and allow the yoke to drop into the quenching tank below after it has been heated to the proper temperature.

Fig. 2 is a side view of the machine. Here the control box which houses the electric control equipment that times the cycle of yoke movement can be seen mounted behind the front panel and up above the other portions of the machine. This control can be set to give any period required to heat the work properly.

After yoke has been fed in through a top slot and heated, timer releases the piece dropping it into the water quench immediately below. Here a small conveyor picks up the pieces and carries them out of the quench tank, delivers them to baskets shown on the back end of the machine in Fig. 2. From this point the parts are run through a cleaner and then are ready for the assembly line.

As can be seen in Fig. 1, each of the four torches in position at the bottom of the T-slide has a control valve block for lighting and turning off the torch. This block also acts as a safety device.

Two 6-cylinder acetylene manifolds and one 20-cylinder oxygen manifold deliver the gases to the torches with the necessary safety devices and regulators.

Two of these automatic flame-hardening machines are utilized by this automobile manufacturer, one at each of two different plants. These two machines will harden all the shifter yokes that go into all 1940 models built by this manufacturer.

•

Crane Brake Wheels Now Cast in Meehanite

■ As a result of recent experiments, Meehanite Research Institute, 311 Ross street, Pittsburgh, recommends casting heavy duty crane brake wheels in Meehanite metal. Four different types and sizes of these wheels cast recently by Rosedale Foundry & Machine Co., Pittsburgh, have tensile strength of 50,000 pounds per square inch or better and approximate brinell hardness of 220.

Experience in service has revealed that these wheels possess improved freedom from distortion. Also it has been found that the wheel surfaces do not glaze with continued use and therefore provide constant gripping power.

Discusses Shipping of Enameled Products

■ Porcelain enamel finish when over 0.025-inch in thickness is more easily damaged than when the coating is under 0.018-inch, stated C. S. Pearce, managing director Porcelain Enamel institute, 612 North Michigan avenue, Chicago, at a recent meeting.

Principal defects discovered by examination of several thousand damaged parts revealed: Heavy application of porcelain enamel coatings, improperly designed steel shapes, steel shapes broken in fabrication and poor bonding of the enamel coating.

Supporting Fixtures of Bending Press Eliminate Reverse Bends

■ A PROBLEM often encountered with light-gage material on bending presses is a reverse bend inadvertently formed due to whipping of the sheet, caused by difficulty of supporting the metal during action of press.

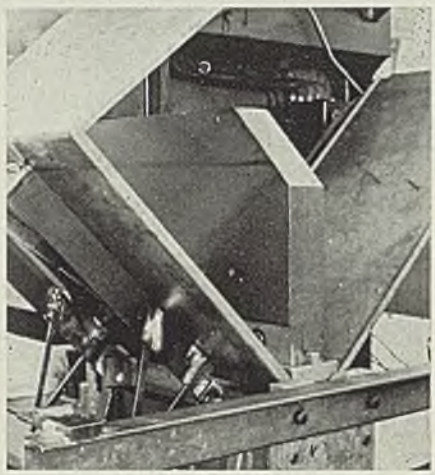
When done by hand, work of this kind requires skilled operators and is often a slow process. Illustrations show how one Ohio manufacturer met this problem in forming the inner liner of a typical refrigerator.

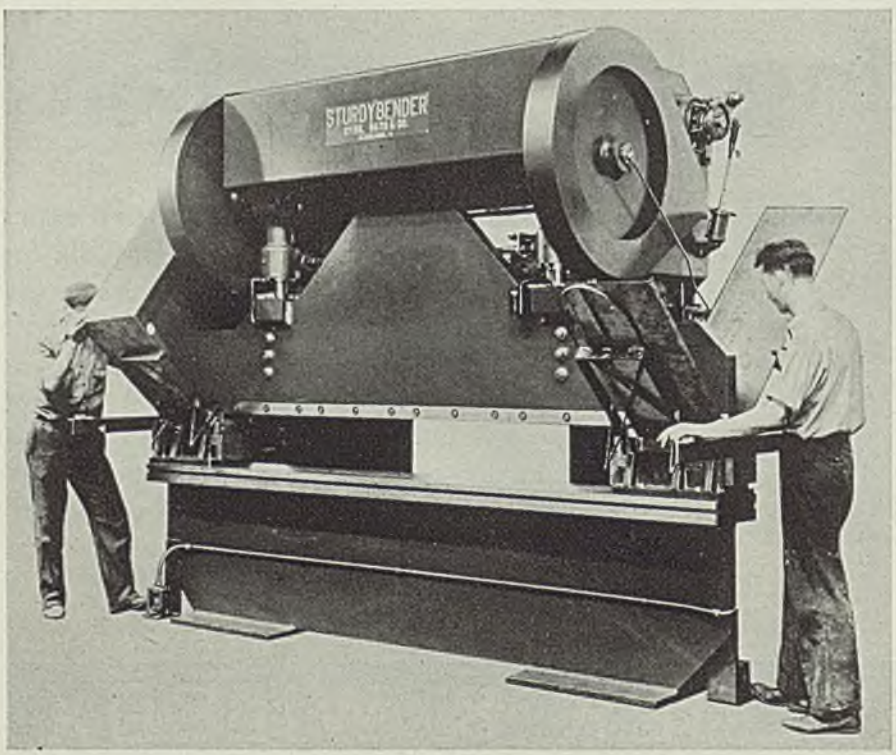
The sheets were first blanked and then formed on bending presses. Close-up view shows the bending of the straight flanged sheet into the desired box section. This was done by a special fixture which supported the metal during bending process, gaging being done from holes already punched in the sheet for other purposes.

As the die was of the triple action type, flanges were taken around the corner smoothly by a special spring die arrangement. Raising fixture or supporting arms prevented occurrence of reverse bends and put the operation on a production basis. The work was done on a Cyril Bath & Co. Sturdybender press having an overhanging bed on each end. Thus with two operators, a completed box was finished and ready for the back to be welded at better than 80 per hour.

Frequently it is desirable to make boxes with flanged edges without cutting out the corners. This can be done by making corners of a larger radius as is done on the front edge of the cabinet. Back edge has a developed notch in it because the back is welded over the flange at this point.

This principle of supporting the sheet is applicable to any production problem where handling of work causes reverse bends, or where work is a source of danger to operators when so handled.





Below, two operators can prepare for welding more than 80 boxes per hour. At right, above, close-up view showing the arms supporting the sheet during the bending operation

New Solder Joins Metals with Low Heat

■ A new method of metal joining, called reaction soldering, developed by Colonial Alloys Co., East Somerset, Trenton avenue and Martha streets, Philadelphia, joins metals speedily, providing a strong joint that does not have a tendency toward electrolytic corrosion.

Method is not restricted to one metal or group of metals and it works with both ferrous and nonferrous metals. It also can be used to fill breaks, cracks, etc.

The solder, a powder which contains a combination of selected electro-positive metals with chemicals, acts somewhat like brazing but without the high temperature of brazing.

Its reaction chiefly depends only on the application of low heats. Application is simple, consisting of applying the solder, either in powder or paste form, to the joint and heating.

Torch, flame, oven, soldering iron, electricity or any other method of heating may be used.

Finds Labelling Each Gear Aids Users

■ An innovation in its production and marketing of cast iron gears has been instituted by Braun Gear Corp., Brooklyn, N. Y. . . . . each gear is labeled with its actual physical properties determined on test specimens representative of the gear itself.

The label attached to each gear bears an identification number, tensile strength and both brinell and Rockwell C hardness ratings. The gear buyer also is provided with a list of additional typical properties, including shear and torsional strengths, modulus of elasticity, etc.

Purpose is to render greater assistance to the engineer in designing new equipment and making proper gear replacements in existing equipment, also to dispel the idea that cast iron gears are not dependable. Applications for these gears include conveying, baking and creamery equipment, hoisting units and the like.

The innovation is an outgrowth of the development of cast iron gears of superior properties. The gears certified by Braun are machined from nickel-chromium-molybdenum cast iron blanks analyzing: Carbon, 3.10 per cent maximum; silicon, 2.10 to 2.40 per cent; manganese, 0.80 to 0.90 per cent; nickel,

(Please turn to Page 92)

BETWEEN HEATS WITH Shorty

■ Say fellers:

Took a short cut through the cast house of No. 3 blast furnace yesterday. 'Twas 'bout a half hour before castin' time and the gang had the iron troughs slicked up, the gates in place, the cinder runner leveled off and the clay gun loaded ready to plug the iron notch when the cast was finished.

Sittin' on the bench near the wheel that 's used to operate the cold blast valve was Skippy Hirsch, the blower on No. 3, and Jimmy Duncan.

Jimmy was an old time furnaceman and had been through many a tough "sityeation" when the goin' at the furnace wasn't so good. A pass had been signed for 'im earlier in the day for he wanted to do some visitin' at the plant to get a few pointers on the way we use soda ash in the ladle for desulphurizin' the metal.

Restin' Their Bones

There they were—sittin' on the bench like a couple of old cronies, chattin' away for dear life, gesticulating with their hands as though an important decision was 'bout to be made.

He was tellin' Skippy 'bout a bad breakout at a furnace he worked at in Pittsburgh a few years ago.

"Fourteen men never went home when the turn ended, Skippy," he sez. "I can see 'em yet. Molten iron came so fast and 'xplosions knocked down so much of the sheet iron roofin' that they never had a chance. And I thought my time had come, too."

"How big a furnace were you handlin'?", I inquired.

"Well, Shorty," he sez, "she was built to throw 600 tons of iron in 24 hours. She stood a 100 feet high, had a bosh diameter of 22 feet, a hearth diameter of 15 feet and a top diameter of 15 feet. Then we had 12 steel bands on 'er to reinforce the bosh brickwork each 7½ x 1¼ inches, made to withstand a pressure of 250 pounds per square inch. Plenty big enough, they were."

"What blast pressure were y' carryin' at the time she let go?" asked Skippy.

"Oh, I'd say 17 pounds at the furnace gage. We had the two blowin' engines turnin' over for 44,000 cubic feet of air per minute. We were usin' 84 per cent of Mesabi ore in the burden and I suppose we had 'bout 800 tons of ore, coke and limestone inside of 'er when she let go."

Kept His Poise

"Didya get knocked off your feet, Jimmy?", Skippy inquired.

"No. Y' see I was 'bout 30 or 40 feet 'way from the stack watchin' the iron run into the ladles. It all happened on the first cast on the night turn, 'round 7 o'clock in the evenin'. We'd nearly four ladles out of 'er when all of a sudden there was a loud crack, 'n a flash, 'n then an 'xplosion, 'n then more 'xplosions as the molten iron and cooling water met."

'N then, fellers, Jimmy couldn't tell the rest of the story for he was usin' his bandanta handkerchief.

* * *

Molten iron flowed out as though a dam had burst . . . workmen engaged in the vicinity of the furnace screamed as molten metal engulfed them . . . roaring sound of sheet iron falling everywhere . . . clouds of dust drew a curtain over the scene . . . more explosions, but much lighter than at the start . . . clouds of steam rising through the gaps in the cast house roof . . . then silence, momentarily.

Whistles shrieked . . . men with fire hoses played streams of water on the mess . . . the atmosphere cleared.

After what seemed hours, workmen shod with wooden shoes with a ring of iron on the underside walked over the floor of hot iron to do what they could for human forms—now silent. 14 in all.

* * *

"Next day, fellers," continued Jimmy, "we started checkin' up. Found the rivets holdin' some of the nine bosh bands had been sheared by the force of the 'xplosion; others were broken at points where the strain proved the greatest. In fact, the 'xplosion tore out seven-tenths of 'er bosh.

"Glad we don't use bosh bands in our design nowadays, Shorty. Huh?"

"Yea," I sez, "the cast steel armor we're usin' now on our boshes has put an end to such a story as you've just related, Jimmy, and a man 's got more of a chance of steppin' over his doormat at the close of a turn than he had when you were furnacein' 30 years ago."

* * *

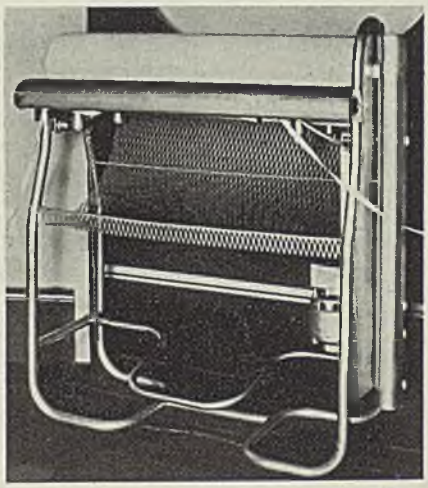
"Okey, Skippy, to put the drill in the iron notch?", inquired the Pollak keeper tendin' the furnace.

"Yea. Go ahead, Son, lay on 'er."

Well, fellers, the drill started hummin' and as I walked 'past the furnace on my way to the steps leadin' onto the stove platform, I glanced at the steel-clad bosh and I sez to myself, "Shorty, it seems as though no achievement was ever wrought, but somewhere a life was laid down on the way. No distinction was ever won but a bit of life went to the winning of it. A drawin' pen in the hands of draftsmen has made the blast furnace a safer place to work." Well, I'll be seein' you.

"Shorty" Long

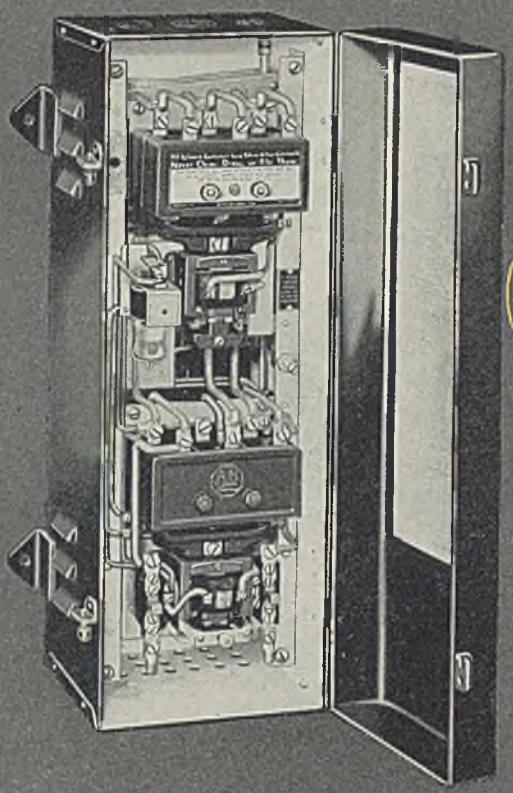
Tubular Ironer

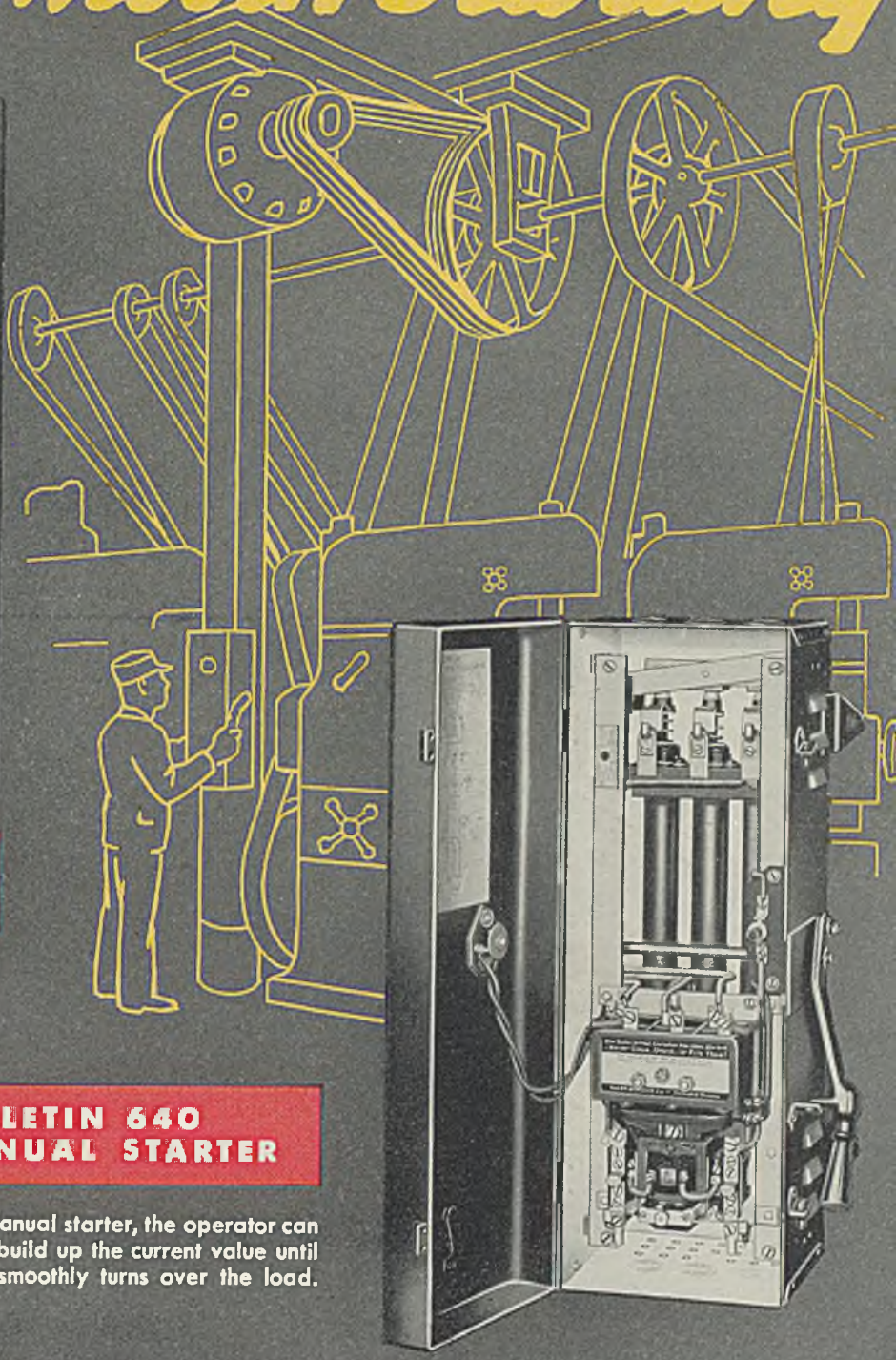


■ Latest outlet for tubular steel is in the fabrication of the all-steel domestic ironer shown above, shortly to appear on the market. Made by MiLady Inc., 5221 General Motors building, Detroit, it features tubular steel and welded frame, chromium plated steel shoe supported by four springs, expanded steel mesh catcher and cylinder, the latter mounted in oilless bearings on a rigid tubular center member. Power is supplied by a 1/20-horsepower motor, and heat provided by full-length electric element in the shoe.

For Machines that need

Velvet-Smooth Starting





BULLETIN 740
AUTOMATIC STARTER

This single-step automatic starter, with its compression resistors, provides smooth acceleration for squirrel-cage motors.

BULLETIN 640
MANUAL STARTER

With this manual starter, the operator can gradually build up the current value until the motor smoothly turns over the load.

ALLEN-BRADLEY

COMPRESSION RESISTANCE STARTERS

QUALITY

How to get VELVET-SMOOTH ACCELERATION

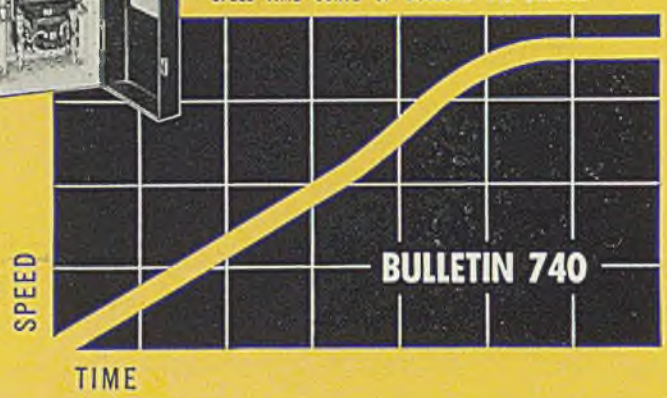
Avoid Shock

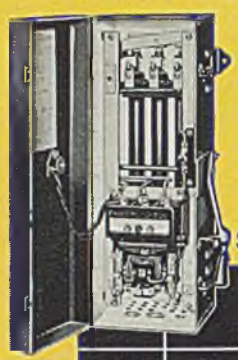
o gears and connected machinery

ere are many applications where it would be highly desirable to start uirrel-cage motors smoothly, without shock—either to improve the prod- t or to reduce wear and tear on belts, gears, and connected machinery. ere is where one of the starters described below fits ideally into the picture.

For Automatic Starting

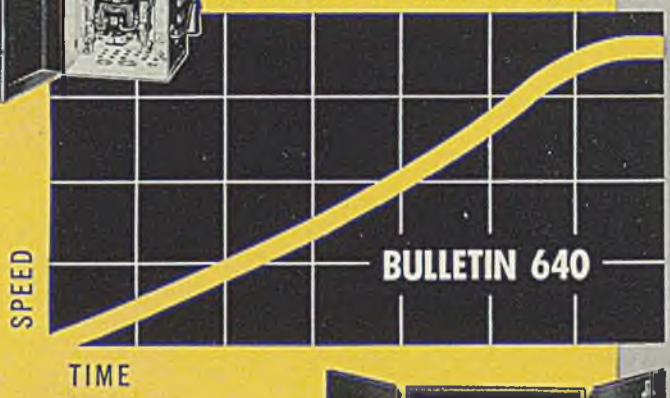
The Bulletin 740 starter is controlled by push buttons or other pilot device. The Bradleyunit compression resistors can be easily adjusted to meet exactly the starting torque requirements of the motor load.





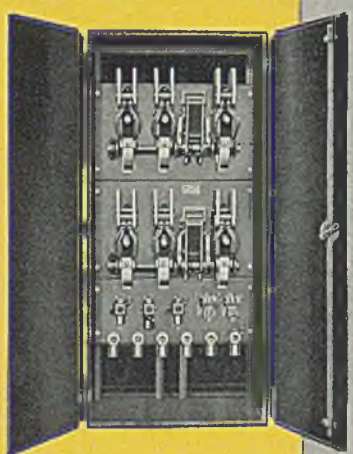
For Hand Starting

With the Bulletin 640 starter, the operator has the motor starting speed under his full control. Thus, shock to connected machinery can be eliminated. By reducing machine wear and tear, maintenance expense is saved.



Large and Small Sizes for Every Industrial Need

Allen-Bradley compression resistance starters have been used by industry for many years to control conveyors, textile machines, punch presses, wire drawing machines, line shafts, V-belt drives, band saws, chain drives, and other such equipment. Available in capacities up to 250 hp, 220-440-550 v.



Bulletin 740 starter, rated 250 hp, 220 volts, showing main contactors and auxiliary relays.

Send for these

EDUCED-VOLTAGE TARTER BULLETINS --

Includes bulletins on manual and automatic resistance type starters and on automatic transformer type starters.

A-B

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Milwaukee, Wisconsin

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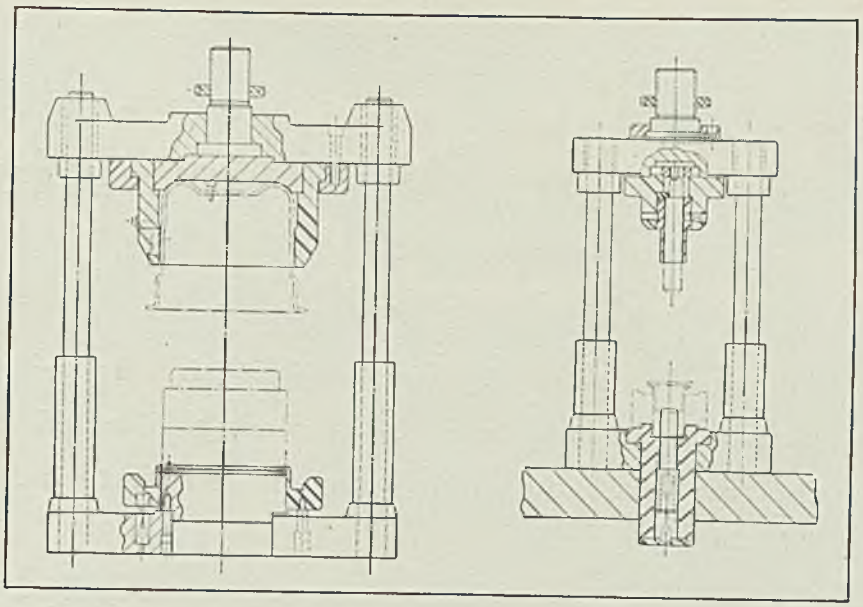
ALLEN-BRADLEY

MOTOR CONTROL

QUALITY



Broaching Machines Assemble Press-Fit Parts

THE USE of hydraulic broaching machines in assembling press-fit parts appears a development with considerable possibilities in obtaining greater tool flexibility and thus decreasing obsolescence. Two interesting fixtures for presss-fit assembling of precision parts are in use at the plant of a leading manufacturer of electric refrigerators. They are used respectively for pressing the eccentric shaft into the rotor and for assembling the motor stator in the motor housing.

Both fixtures are mounted on standard hydraulic broaching machines, this type of equipment having been generally adopted for such operations at this plant due to its greater range of shop application and because it thus cuts machine and tool obsolescence.

As shown in accompanying diagram, the fixture at the left is used for pressing the motor housing over the motor stator, employing a 10-ton Colonial Utility broaching machine. The fixture which is quickly removable requires no clamping of the parts, it will be noted.

The stator is placed in the lower half of the fixture within a locating collar and its rotary position is determined by means of a pin in the fixture. The housing is slipped into the top of the fixture which is attached to the hydraulic ram of the machine. Locating here is by means of a pin through a hole in the housing. The housing is retained in the upper fixture by a simple leaf spring, bearing against a plug in the housing.

Housing Pressed Over Stator

As the ram moves down, the motor housing is pressed over the stator. When it contacts the locating collar in the lower fixture, it pushes the collar down against spring pressure to complete the assembly. When the ram reaches the bottom of the stroke it returns automatically to the top. The weight of the assembly releases it from the upper fixture while the collar in the lower fixture raises the assembly off the locating pin. The assembly thus is freed automatically and is merely lifted off and other parts inserted. While these operations are extremely fast, only minimum effort is required.

In the second fixture, at right in the diagram, eccentric shafts are pressed into a rotor with a press fit.

A 6-ton Colonial Utility broaching machine is used for this operation. The same general principle of avoiding clamping or locking of parts also is followed here. The rotor is placed in the lower fixture, being slipped with its bore over a central guide plug. The eccentric shaft is slipped into the upper half —attached to the hydraulic ram. The upper fixture is so designed that the shaft will slip into it in only one position, locating being by means of the offset eccentric shaft itself. It is prevented from dropping out of the fixture by a simple ball detent, bearing against the shaft.

As the ram moves down and the eccentric shaft enters the rotor bore, the guide pin of the lower fixture is depressed ahead of it against spring pressure. Thus guiding is continuous, assuring absolute alignment without clamping. When the ram automatically returns to the top, the assembly is free so it can be lifted from the fixture and additional pieces inserted.

Angular Distortion

Fillet-weld distortion minimized by reducing number of passes or beads and by reducing size of weld. Increase in rod size and weld current do not increase distortion

By CHARLES H. JENNINGS

Research Laboratory
Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

■ DEPOSITION of a fillet weld between two members at right angles to each other results in two general types of distortion: Shortening of the members adjacent to the weld, and an angular rotation of the members. Shortening occurs in a plane parallel to the weld axis and is the combined result of the deposited weld metal shrinking and the nonuniform heating and cooling of base metal adjacent to the weld. Angular rotation, caused primarily by shrinkage of the deposited weld metal, reduces the included angle between the members on the weld side.

It is the purpose of this article to illustrate the influence of weld size and number of passes or weld layers on the angular distortion produced by fillet welds. While actual values of angular distortion given cannot be used to determine distortion expected in a welded structure, they are of importance in determining the weld size and establishing the most desirable welding procedure.

Here ⅜ x 2 x 10-inch plates were used. No attempt was made to restrict their deformation. Heavier plates would have produced different angular rotations because of the difference in their thermal capacities. Also if the plates had been held rigidly against rotation the overall angular distortion would have been greatly decreased.

This decrease in distortion would have been obtained at the expense of additional stretching of the deposited weld metal during cooling and possibly by local deformation of the plates adjacent to the welds. Thinner plate members in a rigid structure result in greater local distortion. Similarly, the heavier the plate members in a rigid structure, the lower the local distortion. Consequently shinkage must be taken care of by stretching of the weld deposit. Localization of this stretching entirely in the weld deposit probably is part of the cause of cracks sometimes produced when depositing small sized welds between thick plates.

Test procedure consisted of depositing fillet welds between pairs of ⅜ x 2 x 10-inch plates that had previously been tack welded together to form a 90-degree included angle. Measuring included angle between plates after welding and subtracting this from the original angle gave a measure of the angular distortion produced.

Two Movements Indicated

Specimens 1 to 6 inclusive were welded with 5/32-inch diameter all-position type electrodes. Specimens 7 and 8 were welded with 3/16-inch diameter downhand type electrodes. Table I gives complete welding data on the eight specimens tested.

The measured angular distortion produced by the fillet welds is tabulated in Table II. Curves plotted from these data are given in Fig. 1. The extent of distortion obtained is easily seen in Fig. 2, which shows sections cut from the test specimens.

Close examination of the welded specimens indicates two types of angular movement. Welds containing only one or two layers appear to bend simply by rotating around the weld as a fulcrum. Welds containing large numbers of layers produce a more complicated type of distortion as may be seen from Fig. 2.

Deposition of the first few layers of weld metal produces simple rotation of the plates around the weld. Deposition of additional layers of weld metal tends to increase this

TABLE I—Welding Conditions

Specimen	Size weld	No. of passes	Type of Welding electrode	current	Position of welding	Remarks
1	5/16	1	AP	150	Horizontal	
2	⅜	3	AP	150	Horizontal	Joint cooled between passes
3	½	6	AP	150	Horizontal	Same as 2
4	11/16	10	AP	150	Horizontal	Same as 2
5	½	2	AP	135	Vertical	Welding upward cooled between passes
6	½	6	AP	140	Vertical	Welding downward cooled between passes
7	5/16	1	DH	225	Flat	
8	⅜	2	DH	225	Flat	Same as 2

TABLE II—Angular Distortion

Specimen	Weld size	No. of layers	Position of welding	Type of electrode	Angular distortion in degrees
1	5/16	1	Horizontal	AP	1
2	⅜	3	Horizontal	AP	3
3	½	6	Horizontal	AP	7
4	11/16	10	Horizontal	AP	13
5	½	2	Vertical up	AP	2
6	½	6	Vertical down	AP	11.5
7	5/16	1	Flat	DH	1
8	⅜	2	Flat	DH	1.5

rotation, but the degree of fixity produced by the first layers tends to prevent it. Final result was to cause the plate to bend. Fig. 2 shows clearly the bending produced with large-size multiple-layer welds.

Angles of rotation given in Table II were obtained by measuring the angle between the unbent sections of plate extending beyond the weld.

From Fig. 1, two general trends are apparent: First, the angular distortion increases with an increase in the number of passes of weld metal deposited in making a weld. Second, the angular distortion increases with an increase in the size of the weld. Increasing the size of a weld, however, inherently requires an increase in the number of passes of weld metal required to make the weld, consequently it is believed that the increase in angular distortion accompanying an increase in weld size is primarily the result of the increased passes required.

The importance of the number of passes of weld metal on the angular distortion obtained is obvious from Fig. 1. Curve B illustrates the distortion trend as a function of the number of passes of weld metal deposited in the horizontal position with one type of electrode. The other points about the curve represent welds made in other positions or with other electrodes. These points do not all fall directly on the curve but they do, in all cases, follow the trend of the curve.

Curve A illustrates the distortion trend as a function of the weld size for welds made in the horizontal position with all-position type electrodes.

The angular distortion produced by ⅜-inch fillet welds made with different electrodes in different positions and with different numbers of passes also is plotted with this curve. It will be seen that the values of distortion obtained from these tests do not fall on the curve. The fewer the number of passes required to make the ⅜-inch weld, the lower was the distortion produced.

The two 5/16-inch fillet welds were both single pass welds. Even though different electrodes were used, the angular distortion was the same.

It is of interest to compare the results obtained on the 5/16-inch and ⅜-inch welds deposited with all-position electrodes in the horizontal position and down-hand electrodes in the flat position. In making the welds with the down-hand electrodes, 3/16-inch diameter electrodes were used in place of 5/32-inch diameter electrodes with 225 amperes in place of 150 amperes. Regardless of this larger electrode size and increased welding current, the amount of angular distortion was the same with the 5/16-inch weld but less with the ⅜-inch weld. This indicates that increasing the welding current and electrode size does not necessarily result in an increase in angular distortion.

The reason for this condition may be the result of three factors: Difference in type of electrode used, difference in position of welding and increased welding speed accompanying a larger diameter welding electrode.

In summing up the results of this investigation the following distortion trends are obtained:

First, the angular distortion produced by fillet welds is a function of the number of passes of weld metal used in making the weld. The greater the number of passes, the greater the angular distortion. In production work, therefore, it is desirable from the standpoint of the distortion to make any given size weld in as few passes as possible.

Second, angular distortion produced by fillet welds increases as the size of the weld increases. This condition, as previously discussed, is largely the result of the greater number of passes of weld metal required to make larger welds. Therefore to hold the angular distortion to a minimum, it is desirable to make fillet welds as small as is consistent with good design practice.

Third, angular distortion produced by fillet welds of a given size and number of passes was found to remain the same or to decrease as the electrode diameter and welding current increased. It is not known over what range of electrode diameters and currents this condition holds but it should be true for moderate variations. Therefore, increasing welding speed by increasing electrode diameter or welding current should not produce any additional trouble from the standpoint of angular distortion.

Fig. 1—Relation of distortion to weld size and the number of passes of weld metal

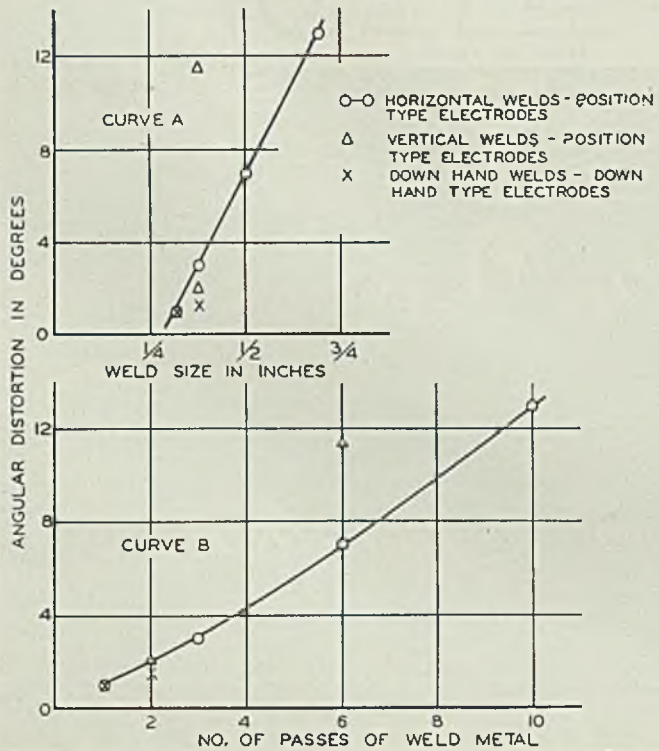
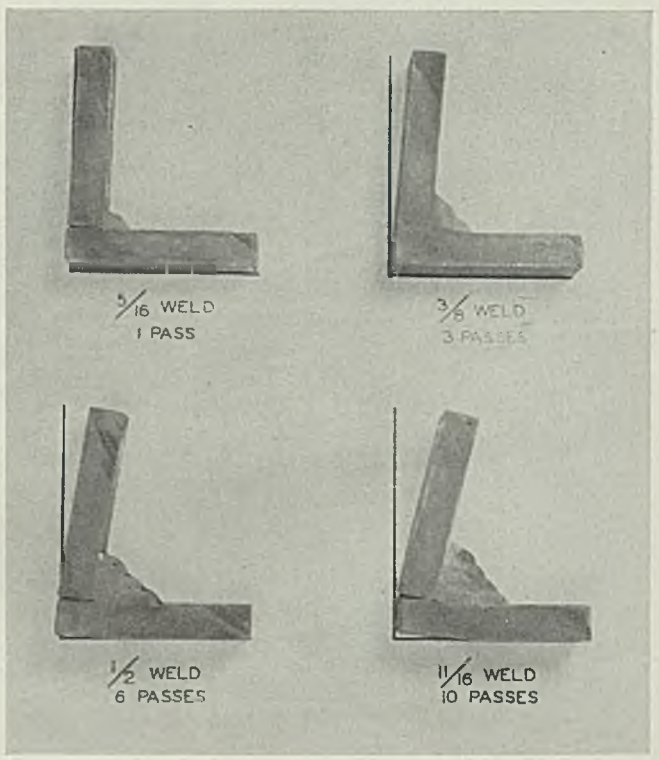


Fig. 2—Note how increased number of passes increases angular distortion and bends plate adjacent to weld



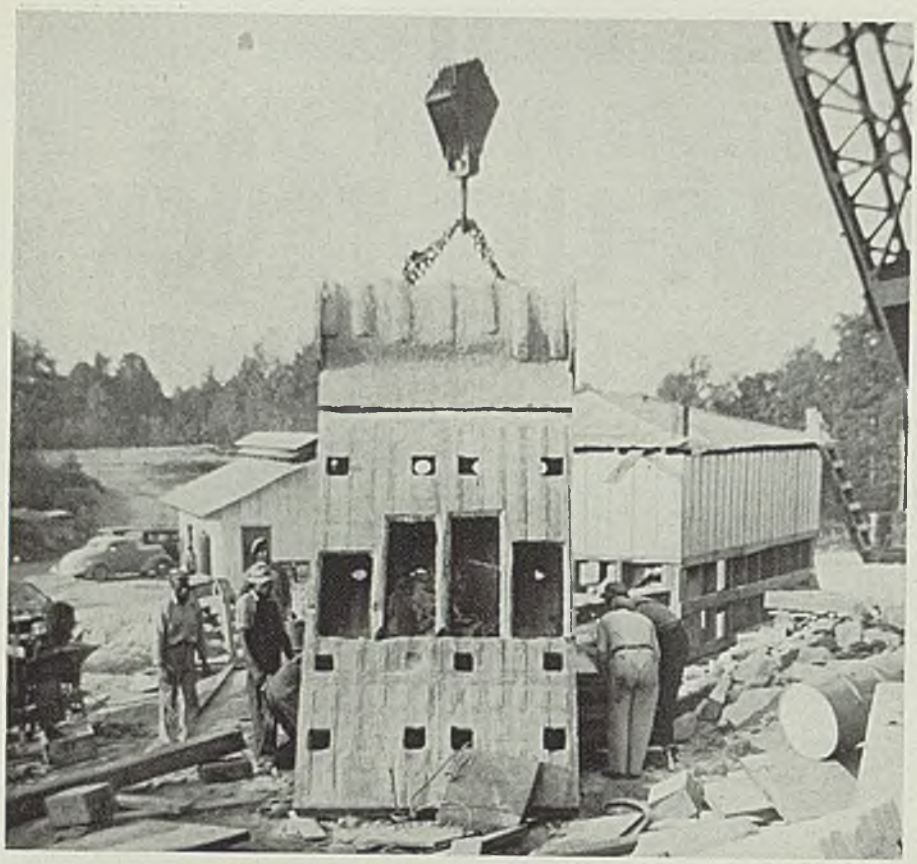


Illustration shows a 100-ton railroad crane moving the heavy lower section of the swing jaw in order to position it for welding

Arc Welding Used To Repair Huge 25,000-Pound Stone Crusher Jaw

■ WHILE crushing waste stone at the quarry of Rion Crushed Stone Corp., Rion, S. C., the lower section of the 25,000-pound swing jaw of a huge jaw crusher suddenly broke off entirely. Since failure of this crusher halted operations of the entire quarry, it was important that it be placed back in service as soon as possible, because of unfilled orders.

Investigation revealed the earliest possible delivery of a new swing jaw would mean laying off for 90 days, and then only if the first casting was free of slag inclusion. Also the cost would be $12,000 delivered.

It was finally decided to arc weld the broken jaw. The V-welds were prepared by oxyacetylene cutting, being made from one side only so outside welds could be made later. The cuts were cleaned by sandblasting.

The back step method was used on all welds with each bead being peened with an air hammer and thoroughly cleaned before the next was laid. At the points where the three vertical ribs join the broken casting, the ribs were cut off 3½ inches to allow for steel plates 3½ inches thick between the ribs and the broken casting. These were cut so all welds would be laid on good metal in the broken part, and then welded to the ribs. After all the welds were completed on the original swing jaw, a piece of steel 7 x 16 feet by 2½ inches was fillet welded on the face of the jaw for reinforcement.

The crusher was placed back in service 53 days after the accident with a total cost of $3,778.53, plus the five weeks it took to repair the crusher.

During the entire welding operation, the work was housed in a wood and sheet metal building built to shelter both the men and the job. The building was designed so it could be lifted by crane when a change of position in the jaw was necessary. A 100-ton railroad crane was used to position the jaw so welds could be made in flat position. Four welders did all of the work, two of them working during the day and two during the night shift.

One hundred pounds of 3/16-inch Hollup 18-8 stainless steel and 3600 pounds of 3/16-inch Hollup Sureweld B electrodes were used in the entire undertaking.

The accompanying table gives an itemized list of the cost as setup by the company.

Itemized Cost Sheet for Welding Jaw Crusher

Supervision	$ 250.00
Skilled labor	1,044.06
Common labor	479.02
Welding rods	338.74
Oxygen and acetylene	272.58
Steel plates	584.13
Compressor (day)	200.00
Compressor (night)	160.00
House	125.00
Electric power	180.00
Miscellaneous	145.00
Total	$3,788.53

Newer Levelers Turned Into Production Units

■ Edward W. Voss, 2882 West Liberty avenue, Dormont, Pittsburgh, announces design changes in recent installations of the Voss Ungerer leveler which now classify it as a production machine for flattening sheet, strip and plate.

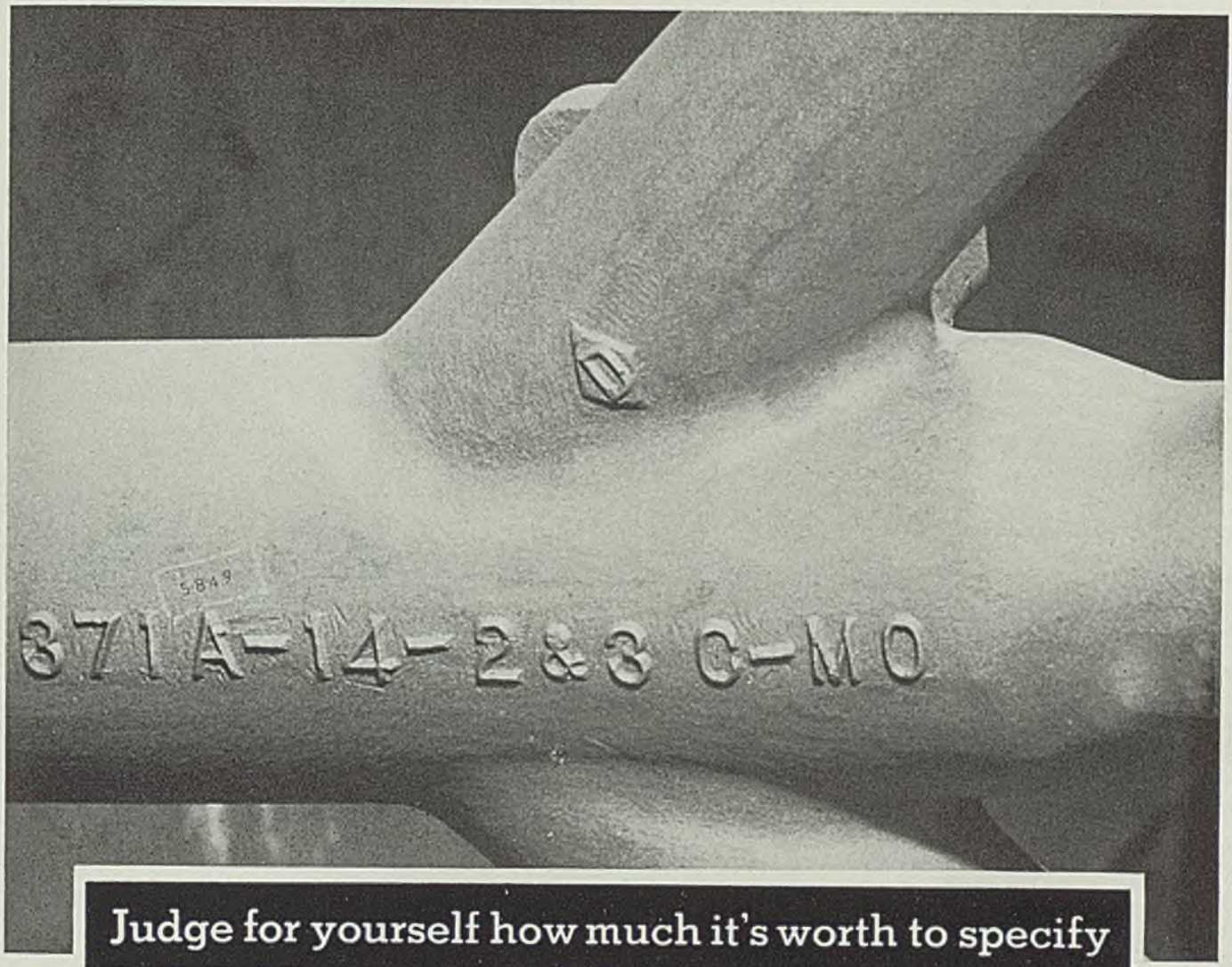
The new high-output leveler utilizes an adjustable backup roller system which embodies a multiplicity of staggered narrow backup rollers serving the double purpose of preventing the leveling rolls from bending in operation and flexing them for localized flattening of the material. This overall support overcomes the tendency of small diametered rolls to whip at high operating speeds or to deflect under pressure.

Other construction innovations include the location of the screwdown control motor on the top frame of the leveler, and the incorporation of an improved lubricating system for the rollnecks.

Washer Shipments Show Sixteen Per Cent Gain

■ April shipments of household washers totaled 135,179 units, an increase of 16.3 per cent over the 116,199 shipped in April 1939, according to American Washer and Ironer Manufacturers' association, Chicago. Ironer shipments aggregated 11,984, a 15.8 per cent increase over the 10,350 of April 1939.

Washers shipped the first four months this year totaled 546,455, an increase of 7.42 per cent above the 508,718 of the same 1939 period.



Judge for yourself how much it's worth to specify BIRDSBORO PRECISION CASTINGS

Look at this unretouched photo of a run-of-the-foundry industrial casting. Notice first the surface. Have you ever seen a cleaner steel casting—or one with fewer signs of gas-caused blemishes? Birdsboro Precision Castings are sound like this all the way through. Now check the detail on the cast numerals. Look at the sharp edges. No sign of wash or crumbling of the mold here. Every detail is exactly reproduced. Or look inside the rectangle beside the letter A. Can you read the numeral 5849? The width of the outline is scarcely thicker than a single grain of molding sand.

Surfaces like this plus high fidelity to pattern are the reasons why precision castings save money and speed production—why companies as far away from Eastern Pennsylvania as New England, Florida and the Mississippi River find it economical to specify steel and iron castings made by Birdsboro's Randupson Process of Precision Casting. Check up today on their savings for you.

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Plants at Birdsboro and Reading, Pa.

WELDED TUBULAR JOINTS *WITHOUT FLASH!*

• Now you can weld tubular parts without external flash or extrusion at the weld. Grinding of joints — expensive, and sometimes dangerous — is unnecessary . . . as demonstrated by the joints in this photograph of a bicycle frame as it left the welding machine.

Joints made by this method —the Hart Process of electric resistance welding (U.S. Patent No. 2,091,982)—are stronger than the tubes joined by it. There is no warpage. Costs are reduced. And the equipment required is not expensive.

Let us tell you more in detail how you can employ the Hart Process to make uniform, strong, sound, clean tubular joints. Write—Steel and Tubes Division, Republic Steel Corporation, Cleveland, Ohio—owner and licenser.

• • •

Steel and Tubes engineers are ready to help you in the selection, application and fabrication of Republic ELECTRUNITE Tubing. May we have one of our representatives visit you at your convenience?

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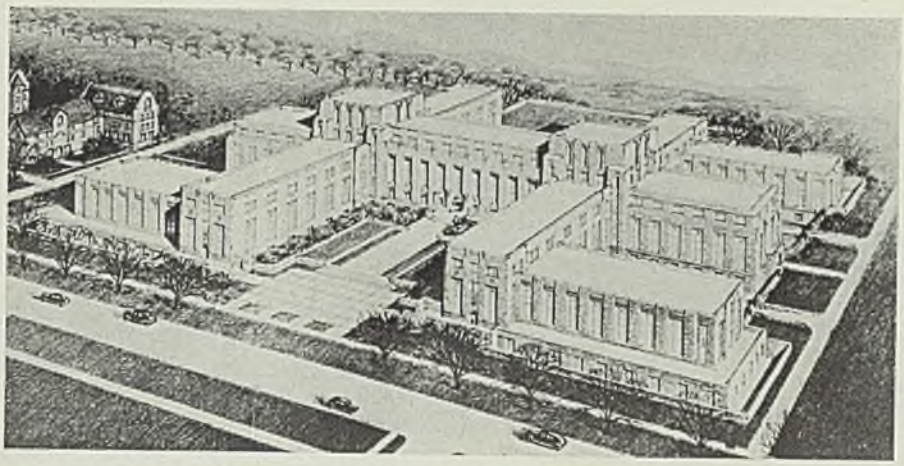


Northwestern Inaugurates New Technological Institute Facilities

■ PLANNED eventually to accommodate 400 students, a new technological institute building is now under construction at Northwestern university campus, Evanston, Ill. To be completed September, 1941, building will contain 450,000 square feet of floor space, use over 350 tons of structural steel and 2000 tons of reinforcing bars and contain approximately $500,000 worth of machinery.

As shown in accompanying illustration, center section is to be three stories with 2-story wings. Cost of building will be about $4,920,000, equipment in excess of $1,350,000. Construction of building and purchase of equipment were made possible by gift of $6,735,000 from the Walter P. Murphy Foundation.

Of the 350 separate rooms, at least 35 will be laboratories with most modern equipment. Structural testing laboratory will include a transverse-universal testing machine capable of exerting 1,000,000 pounds pressure at the midspan of a steel beam 55 feet long. This will be the only laboratory capable of testing beams of such length under actual working conditions, it is said.

Students will be enrolled under the co-operative plan whereby they will work three months in private industry at a job to provide practical experience alternated with three months of laboratory training at the institute. During freshman year, the student spends his first three consecutive 3 month periods at the institute, using the fourth quarter as summer vacation. At beginning of the second year he alternates between classroom and industrial work until completion of the course the fifth year. This requires the beginner to complete satisfactorily a year's work before being placed.

Enrollment of students in technological institute was begun in fall of 1939 with a selected class of 100. Registration in 1940 is limited to 180 students, and in 1941 to 250. Total enrollment of the institute upon completion will be limited to 800 students.

21 States Supply Raw Materials for Steel

■ Mines and quarries in 21 states, from the Atlantic seaboard as far West as the Rockies and beyond, have supplied the steel industry over the past 20 years with iron ore, coking coal and limestone, the chief raw materials used in the manufacture of iron and steel.

According to the American Iron and Steel institute, iron ore comes from 14 states, coking coal from 11 and limestone from 13. Most of the 21 states supply more than one of the three principal materials.

The mines and quarries for producing these materials give employment to tens of thousands of men.

Nearly 61 per cent of the domestic iron ore consumed by the steel industry over the past 20 years has come from mines in Minnesota. Iron mines in Michigan furnished 22 per cent of the ore used, while from Wisconsin came about 2 per cent. These three states constitute the famous Lake Superior district, which has yielded more iron ore than any other section of the world.

Alabama in the past two decades has produced about 10 per cent of the nation's iron ore.

The remaining five per cent of the domestic iron ore consumed by the steel industry came from Pennsylvania, New York, Wyoming, New Jersey, Colorado, Tennessee, Utah, Missouri, Georgia and New Mexico.

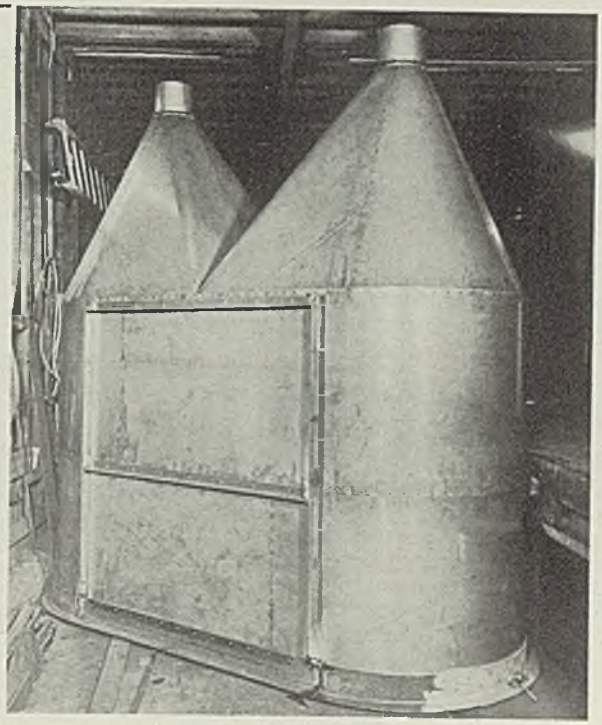
Pennsylvania has supplied about 27 per cent of the coking coal consumed by the steel industry. About 24 per cent has come from West Virginia.

Limestone and other fluxing stones used in the blast furnace to carry off impurities from the other materials, are available in almost every state in the country. Pennsylvania, Ohio and Michigan, however, all of which are important steelmaking states, supply more than three-fourths of the industry's limestone requirements.

Ten other states, including West Virginia, Alabama, Illinois, Colorado and Utah, also supply the steel industry with limestone.

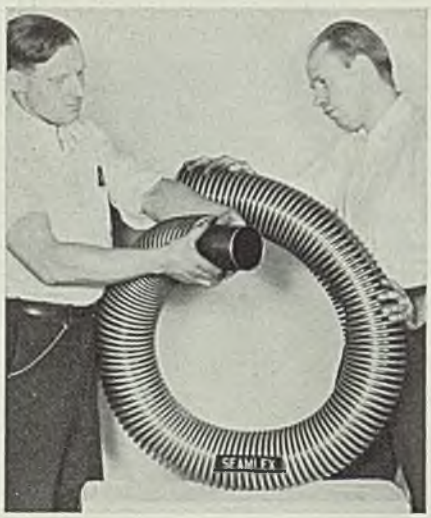
Stainless Food Tank

■ Because of its sanitary qualities, stainless steel is finding increasing application in equipment for food product manufacture. Grain storage tank of Enduro stainless fabricated by Georgen-Machwirth Co., 817 Sycamore, Buffalo, is 6 feet high below cones, holds 270 cubic feet. Upper part of tank, shown at bottom, is 9 feet 6 inches long, 4 feet 3 inches wide. Photo, courtesy of Republic Steel Corp., Cleveland



Seamless Metal Hose

■ Seamlex Co. Inc., Long Island City, N. Y., has developed a seamless bronze tube of unusual flexibility. It can be bent to a radius of 6 inches. Pronounced S-shaped corrugations ¾-inch deep are responsible for its flexibility. The convolutions form a lefthand helical thread, assuring uniform distribution of stress. Tube will withstand a safe internal working pressure of 150 pounds per



square inch. Suitable pipe thread couplings or flanges also are available in standard sizes.

Portable Oil Flusher

■ J. A. Honegger, Bloomfield, N. J., has placed on the market a Port-O-Flush portable pressure oil flusher and dispenser for use in flushing out oiling machinery and other processing or industrial equipment. Device works instantly and thoroughly because the oil is introduced into the bearing by air pressure at 60 to 100 pounds per square inch.

It will handle oils of all viscosities from that of kerosene, for flushing out bearings and transmissions of all kinds prior to oiling up to 600 W transmission oil for gear reduction drives. The flusher holds one quart of oil and is light in weight.

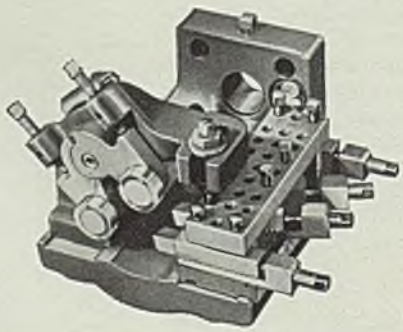
Welding Helmet

■ Sellstrom Mfg. Co., 615 North Aberdeen street, Chicago, announces a welding helmet No. 220S with hidden hinge. It is made of a new material that insulates against heat

and weighs only 15 ounces complete with lens and holder. Helmet is of lift-front type that gives operator a dense lens in the outer holder and a clear lens or less dense lens set in the inner holder. The inner and outer frames have concealed spring hinges which allow the outer holder to be raised or lowered in accurate positions. Holder is interchangeable and is held in position by two screws.

Multiple Cutter Turner

■ Gisholt Machine Co., Madison, Wis., has introduced a multiple cutter turner for turret lathes. It is capable of making several reducing

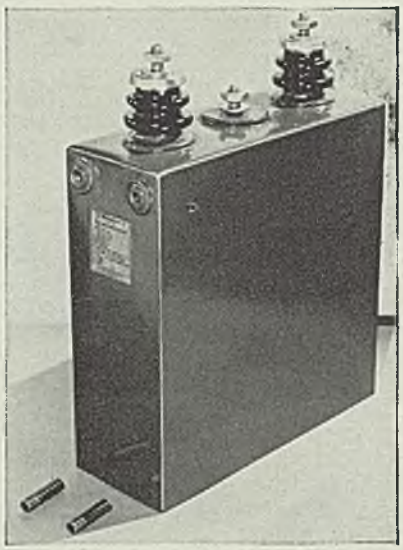


cuts simultaneously. Tool features rigid steel construction, hardened steel rollers mounted on roller bearings and adjustable roller arms that attach securely to the block. Setup operations are facilitated by the micrometer adjustment screws on the tool blocks. Turner is available in several sizes which permit turning diameters as small as ¾-inch and as large as 4¾ inches.

Capacitors

■ Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has placed on the market a line of water-cooled Inerteen capacitors for high-frequency service on induction furnaces and similar applications. Capacitor sections are made by winding a special grade of paper with thin copper foil. Foils are bonded on one end to the water tube so they conduct heat to the water and carry the current. Leads are brought out at the center and the ground terminals of each group of sections is near the ends of the case. The case is of welded construction with a recess at the bottom to aid in locating the unit on insulators. The top is of nonmagnetic stainless steel on ratings of 500 cycles and above.

The inlet and outlet water connections are tapped for ¼-inch standard pipe threads and short



tubes are furnished for attaching rubber hose. Complete unit is vacuum dried and impregnated and filled with capacitor Inerteen, a noninflammable fluid.

Nibbling Machines

■ W. J. Savage Co., Knoxville, Tenn., announces improved line of nibbling machines. Line incorporates direct-over-center drive and new tool holder. Up-set head tool makes it possible to cut stainless and other alloy steels, aluminum, brass, cop-

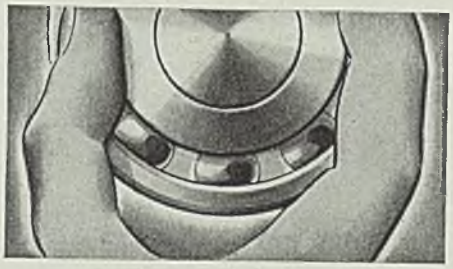
THE FAFNIR WIDE INNER RING BALL BEARING WITH SELF-LOCKING COLLAR

is the only ball bearing made which can be locked to the shaft with a finger-twist . . . a positive drive which grows tighter in service.

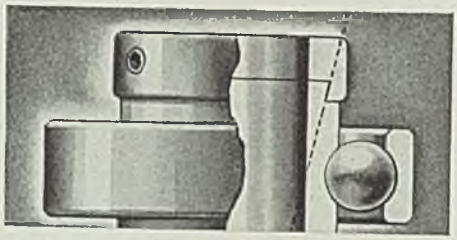
It requires no shaft shoulders, sleeves, threading, lock-nuts, adapters or precise adjustments . . . *nothing but fingers.* See how simple and dependable is the operation of its self-locking collar!

This is the end of the bearing's inner ring. Note that it is machined as an eccentric cam, its outer diameter purposely not concentric with the inner ring's bore.

This is the inside view of the Self-Locking Collar which fits over the extended inner ring of the bearing. It is machined as a mating cam, its counterbored recess purposely not concentric with its bore.



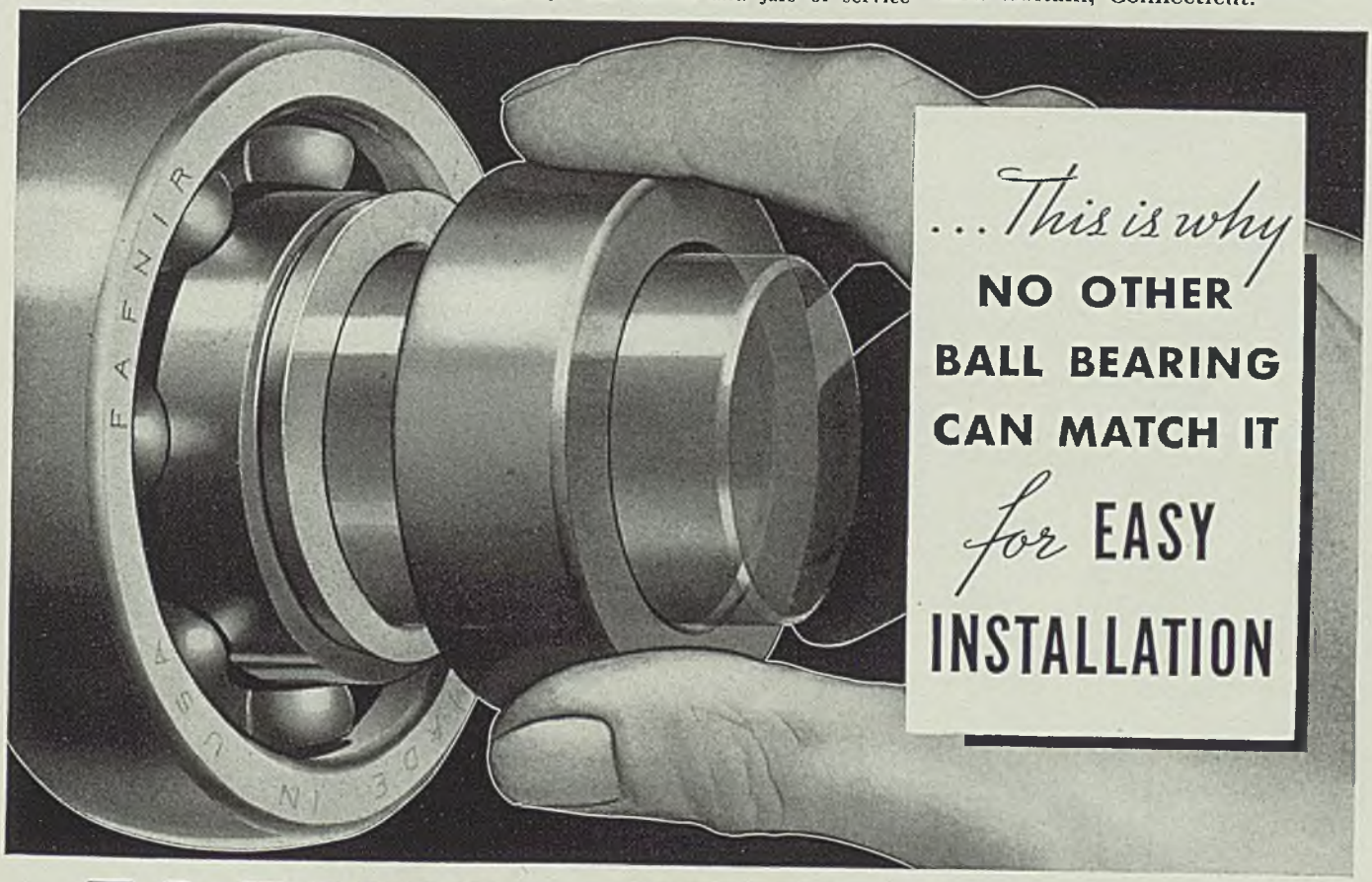
When the cams are engaged, and the collar is revolved a quarter-turn, the cam action locks the bearing's inner ring tightly to the shaft—with a positive *bind,* which eliminates slippage and affords great thrust capacity. The shocks and jars of service only lock it tighter, yet disassembly is quick and easy when required.



Furthermore, the cams are machined at an *angle* with the bore, to make accidental disengagement even more unlikely. A set-screw is provided, not as the sole driving means, but merely to hold the collar in locked position.

★ ★ ★

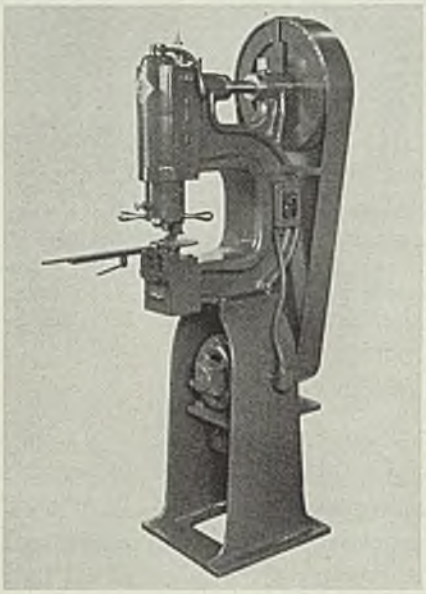
The extended inner ring provides greater shaft support. The deep-groove, large-ball Fafnir Ball Bearing provides a bonus in radial *and* thrust capacity. Easiest of all ball bearings to mount, and to disassemble, too; this Fafnir type is available in a wide line, with or without housings, seals or shields. The Fafnir Bearing Company, New Britain, Connecticut.



FAFNIR *Ball Bearings*

THE BALANCED LINE . . MOST COMPLETE IN AMERICA

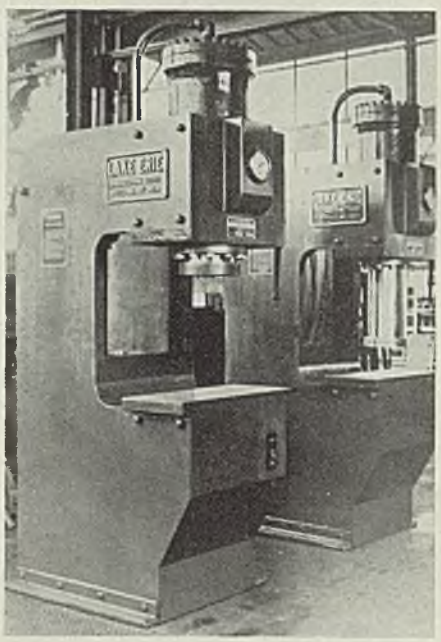
per and other materials. Starting holes are now punched under power. A new machine added to the line



has a capacity of 5/16-inch in mild steel. It handles sheets 24 inches wide of any length due to a revolving head which permits cutting at any angle on a 360 degree circle. Nibblers are available with cutting capacities in mild steel up to ⅞-inch and throat depths of 9, 12, 18, 30, 34 and 36 inches.

Straightening Presses

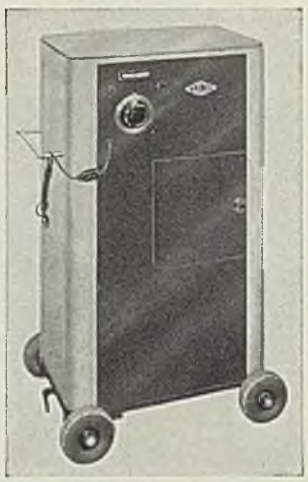
■ Lake Erie Engineering Corp., Kenmore station, Buffalo, announces addition of a line of hydraulic straightening presses using C type gap frame design. They are rated at 66-ton capacity and pressures are controlled accurately by hand lever. Heavy steel side plate design assures



rigidity. They have a stroke of 16 inches with fast operating speeds. Each press is self-contained with pumping unit enclosed in base. Working space is accessible for convenient handling of pieces. Presses are adapted for all types of straightening work including finished shapes such as aircraft parts and similar pieces requiring final straightening after drawing or forming.

Area Determinator

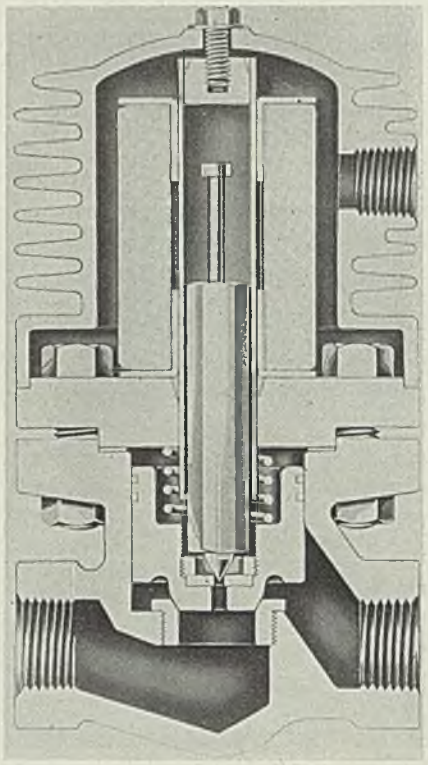
■ American Instrument Co., Silver Spring, Md., has introduced an area determinator for measuring the area of any flat object of any shape, color or texture that will fit into a circle 9.93 inches in diameter. It is accurate within 3 per cent of the true area. Reproducibility is within 0.2 per cent. This accuracy is not affected by the experience of the operator or the nature of the object's outline. Measured area is read directly from a dial. Instrument operates direct from the house current supply. Its overall dimen-



sions are 18 x 26 x 42 inches. The housing is mounted on four wheels having pneumatic tires.

Solenoid Valve

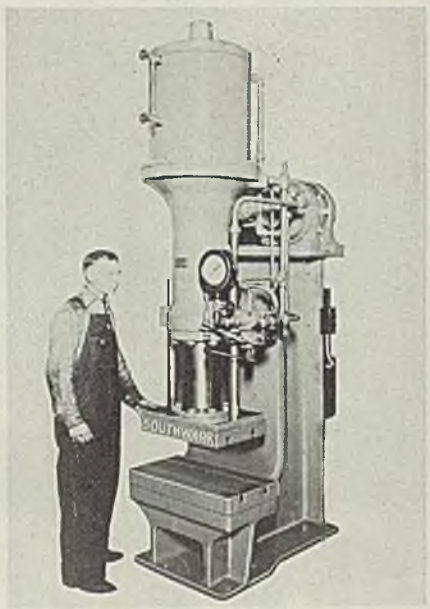
■ Hoppe Engineering Co., Indianapolis, Ind., announces a forged steel solenoid valve for severe service on steam, hot or cold water, hot or cold oil, air or gas lines. Its body and cap are massive and rugged, the cap being held with triplex steel bolt studs. The disk has a ball shaped face which seats against a flat angular face on the body seat ring. Top of disk is a piston, fitted into the upper portion of the body. Both disk and body seat ring are of Exelloy, a heat treated chromium iron. The solenoid is a glass insulated wire, and will withstand a temperature of 1000 degrees Fahr. It is available in sizes from ¼ to 2 inches either horizontal or



angle type bodies, screwed or flanged end.

Utility Presses

■ Baldwin Locomotive Works, Paschall post office, Philadelphia, announces two new presses for general utility work. These are self-contained and are designed for a wide range of work. A single control, either hand or foot operated, per-



mits operator to inch, stop or reverse platen at any point in its

The trouble is that we don't use the knowledge we possess.

ALL of us here knew the properties of MO-MAX Molybdenum Tungsten High Speed Steel, yet we did nothing about it until last year. Now our records prove that high speed tools made of MO-MAX are twenty per cent more efficient. That's a big saving in our production costs. We could have made that saving five years sooner if we had applied our knowledge. Certainly somebody here should have seen to it that we made some tests long before we did. Perhaps I should have done so myself. Anyway I don't want this organization to overlook any opportunities like that again. We can't pay high salaries for what people know, but we can and will pay well for what people do.

MO-MAX

TRADE MARK REG. U. S. PAT. OFF.

MOLYBDENUM-TUNGSTEN HIGH SPEED STEELS

Leading steel companies can supply you with their licensed brands of MO-MAX. For booklet with technical data and sources of supply, write The Cleveland Twist Drill Company, Cleveland, Ohio.

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stroke. By means of another control setting, presses may be operated semiautomatically. Standard presses are available in 65 and 80-ton capacities.

Adsorbers Free Air Lines of Odor

■ Dorex Adsorbers developed by W. B. Connor Engineering Corp., 114 East Thirty-second street, New York, are now being used extensively for the control and removal of odors, oil vapors and gases in compressed air lines. Each unit operates on the principle of the ordinary gas mask. An odor and vapor filter of specially prepared high activity cocoanut shell carbon is the absorption vehicle. This carbon will absorb and retain odors or vapors up to 20 per cent of its own weight. When saturated, it may be removed and reactivated for reuse.

The carbon is held in a compact perforated metal canister, which forms a filter unit, providing large surface area. The canister is housed in a cast shell. Installation is merely a matter of connecting the inlet and outlet pipe joints. Adsorbers also are available in many other types for handling odor problems in industrial nuisance-odor elimination and for odor control in air conditioning and ventilation.

Polishing Lathe

■ Divine Bros. Co., Utica, N. Y., announces a VCS polishing and buffing lathe which features self-aligning bearings, quick V-belt adjustment and enclosed motor. Its starter is mounted conveniently, being located on a pipe stand at the rear of machine. The lathe is equipped with a continuous duty, open, squirrel cage motor. This can be supplied in 3, 5 and 7½ horsepower.

Fire Extinguishers

■ Buffalo Fire Appliance Corp., 44 Central avenue, Buffalo, announces two new fire extinguishers of the carbon tetrachloride vaporizing liquid type. These are of the 1 and 2-gallon type. The extinguishers have an extra heavy brass seamless shell. The pump is double acting, and throws a continuous stream from 25 to 30 feet. There are no outside valves and the stream stops the minute the pumping stops.

Control Relay

■ General Electric Co., Schenectady, N. Y., has introduced a relay for controlling a stoker in conjunction with time switch, limit controls and room thermostat. It combines in one assembly a relay and low-voltage control transformer. Six terminals on a convenient terminal block provide means for line, load and limit control connections without use of a connection box. Three conduit openings for interconnecting with other control devices also are provided.

Welding Brackets, Nuts

■ Ohio Nut & Bolt Co., Berea, O., announces new rectangular welding nuts, bosses and brackets for use in the manufacture of almost any type of product made of metals and suitable for resistance welding. The welding brackets, bosses and nuts are available of the same material as the part to which they are to be welded. Bosses come in sizes ranging from ⅜ x 1 x ½-inch up to 13/16 x ⅜ x 1-inch.

The welding nuts are available in a similar range of outside dimen-

sions and with threaded holes for assembling, with screw threads ranging from ⅛ to ⅝-inch in diameter.

Brackets are made with welding projections on one or both legs or the welding projections may be placed on either the outside or the inside part of the leg. The widths of the brackets range from ⅜ to 13/16-inch and the thickness is the same for each leg ranging from ⅛ to ⅜-inch. These are furnished with tapped holes in one or both of the legs; or with drilled or reamed holes that serve as bearings for either push rods or revolving shafts.

Flow Meter

■ American District Steam Co., North Tonawanda, N. Y., has introduced a new flow meter for steam, water, air or gas. It operates in conjunction with an orifice plate in the pipe line and records the flow on a large, evenly divided chart by means of a frictionless mechanism. The internal moving parts within the meter comprise a magnet attached to a mercury container suspended from a spring.

A fixed, internally shaped bell surrounds the lower portion of the magnet and forms a seal with the mercury in the container directly beneath it.

Movement of container is directly proportional to the flow through the orifice and follower magnets in the external recording mechanism transmit the movement to a gravity-held pen arm which records on the chart.

The chart and integrator mechanism is driven by a synchronous alternating current clock motor. Meter is offered in four types, recording only, recording and integrating, indicating and recording and indicating, recording and inte-

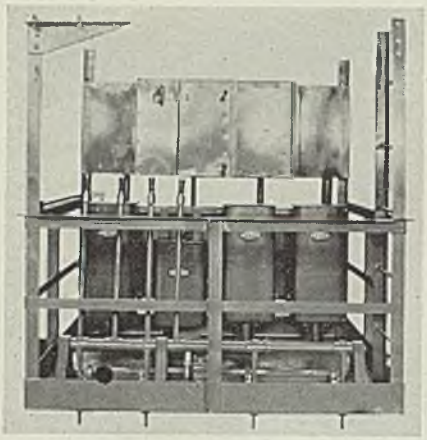
Face Shield

■ Boyer Campbell Co., 6540 Antoine street, Detroit, has placed on the market a new face shield for welding. It is equipped with a platacele window that slides in and out of a fiber frame. The fiber frame simplifies replacement and is interchangeable on all models of face shields made by this company except Nos. 10 and 20.

Crane Cab

■ Harnischfeger Corp., 4411 West National avenue, Milwaukee, has introduced an all-welded, full vision crane cab which is front lever operated. Its controllers are totally en-

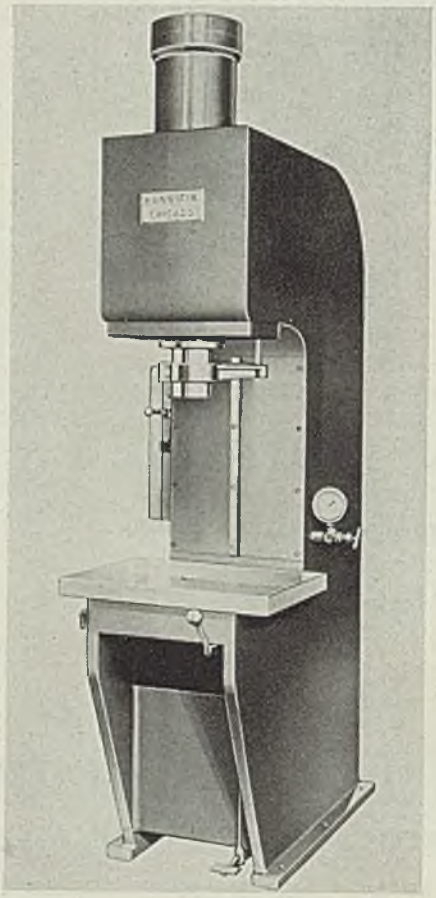
closed and mounted in rear of cage where they will not hinder operator's view. Controllers are of drum type



and all wiring is in conduit with junction boxes. Its sectional panel switchboard has inverse time overload relay protection. When door is open, safety-type main switch is inoperative. In addition to the hydraulically-operated foot brake, a mechanical brake is incorporated for emergencies.

Forcing Press

■ Hannifin Mfg. Co., 621 South Kolmar avenue, Chicago, has developed a new hydraulic forcing press of 25-ton capacity, featuring



welded steel frame construction, built-in motor-driven hydraulic power unit and sensitive pressure control which provides an infinitely variable pressure. Press has a stroke of 24 inches. Its table is 30 x 22 inches and overall height 113 inches. Unit is driven by a 10-horsepower motor, making it possible to attain speeds of 83 inches per minute.

Ring-Balance Meter

■ Republic Flow Meters Co., 2240 Diversey Parkway, Chicago, has introduced a mechanical ring-balance meter for metering steam, water, gas, air, etc., at static pressures up to 1000 pounds per square inch. It gives full scale readings on differentials as low as 3 inches of water. Meter is housed in a steel case suitable for exposed locations. It is

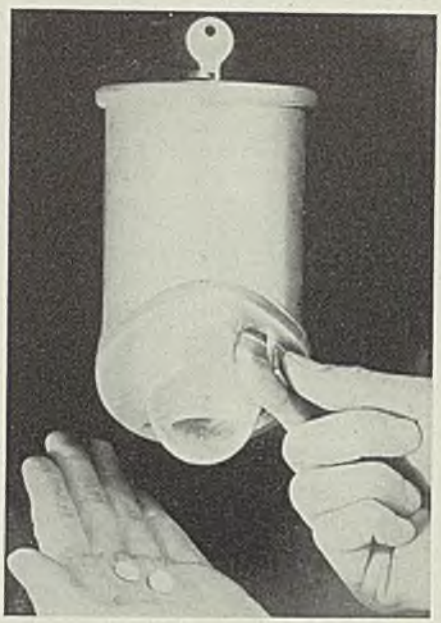
easily adjusted by changing a calibrating weight, has a 12-inch evenly graduated chart and is furnished with any combination of indicator, recorder and cyclometer integrator.

Stationary Tachometers

■ O. Zernickow Co., 15 Park Row, New York, has introduced an improved line of stationary tachometers which are unaffected by magnetic fields, electricity, changes in temperature or moisture. Improvements include ball bearing pendulum pivots, ball bearing swivel link and ball bearing driving spindle to eliminate friction. Tachometers are housed in housings 2¾ inches deep, equipped with a 6-inch dial.

Salt Tablet Dispenser

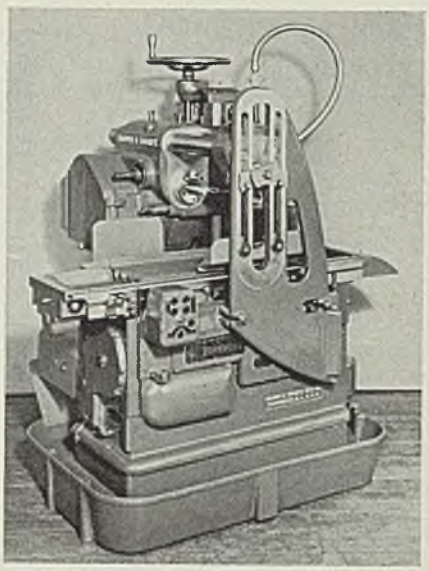
■ Milburn Co., 905 Henry street, Detroit, has placed on the market a new aluminum salt tablet dispenser specially plated and known as Dispens-Eze. It has a capacity of more than a thousand 10 or 15-grain tablets. Because of its aluminum plated construction it is impervious to attack from salt. Dispenser is equipped with a Yale lock which



both safe-guards contents and locks it to the wall bracket. Its list price is $6.00.

Milling Machines

■ Brown & Sharpe Mfg. Co., Providence, R. I., has placed on the market No. 12 electrically controlled plain milling machines of increased capacity. The column height of each has been increased 4 inches, providing a corresponding increase in the vertical adjustment of the spindle, total adjustment now being 10½ inches. The width of the base



has been increased 2½ inches with a corresponding increase in the horizontal dimension of the working space. This now gives a dimension

WASTE IS OBVIOUS HERE!

however..

IN THESE

BEARINGS...

. . . hidden waste caused by poor lubrication increased the power costs 25% until TYCOL GREEN CAST GREASES revealed this loss . . .

To quote the plant superintendent: "The grease formerly used on our difficult bearing lubrication job would not withstand the moisture conditions encountered. It gummed up in the bearings —power costs jumped as much as $250 per month. » » » "On the recommendation of Tide Water engineers we changed to Tycol Green Cast Greases because of their superior lubricating properties, and their ability to resist the washing action of water. Bearings are now better lubricated and excessive power costs have been banished. And we were surprised and delighted to learn that 25% more cars may now be hauled per locomotive because of the reduction in frictional losses." » » » This operator, like hundreds of others using Tycol Green Cast Greases, gets better protection—more effective lubrication—per pound of grease. Here's the reason: Tycol Green Cast Greases are made from the finest cylinder oils available. A minimum of soap—a maximum of oil—is used. More lubricating oil per pound assures more economical lubrication. » » » Call the Tide Water representative or office for full details.

TIDE WATER ASSOCIATED OIL COMPANY

TIDE WATER DIVISION

17 Battery Place • New York, N. Y.

Regional Offices: Boston, Philadelphia, Pittsburgh, Charlotte, N. C.

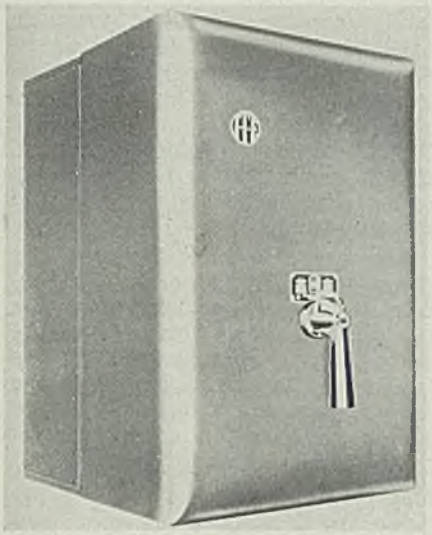
INDUSTRIAL TYCOL OILS-GREASES

TIDE WATER GREEN CAST GREASES

of 17 13/16 inches from the face of the spindle head to the arbor yoke support. All features of design and construction have been retained, although many minor improvements and refinements have been made throughout the machine.

Circuit Breaker

■ I-T-E Circuit Breaker Co., Nineteenth and Hamilton streets, Philadelphia, announces a new 600-ampere, 3-pole, type K.B. circuit breaker mounted in an individual steel enclosure of the pull-box type. Its interrupting ability is such that it can be rated at 20,000 root means-



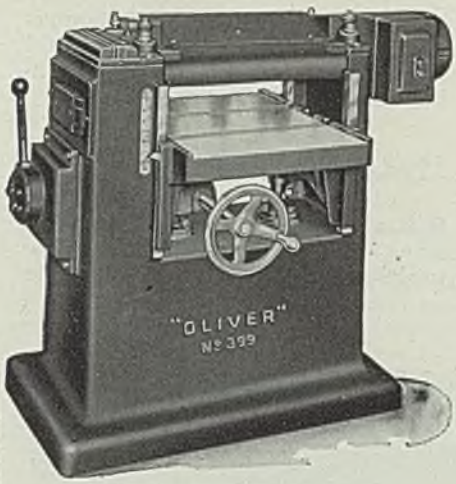
square. Unit is available electrically or manually operated for open mounting or for cubicle mounting in switchgear.

All Purpose Fan

■ Autovent Fan & Blower Co., 1805 North Kostner avenue, Chicago, announces a new Allvent, all purpose ventilating fan that provides any amount of air changes without objectionable noises. It features a V-belt drive and a 3-blade fan wheel which supplies or exhausts unusually large volumes of air at extremely low speeds.

Surface Planer

■ Oliver Machinery Co., Grand Rapids, Mich., announces a No. 399 single surface planer for planing boards up to 18 inches. It is powered by a 3-horsepower, 3600 revolutions per minute motor. Its cylinder is of extra heavy design and power rolls will give any desired feed from 15 to 35 feet per minute. Feed is controlled by lever at left of machine. Base is a one-piece casting, and table is supported on two large



screws which have adjustable nuts to maintain alignment with the cylinder. One-piece chipbreaker is controlled in operation with front pressure roll and adjusted by a screw.

Armor Cutter

■ Ideal Commutator Dresser Co., Sycamore, Ill., has introduced a handy pocket size BX armor cutter, jaws of which are formed to take BX cable of any make, 2 or 3-wire No. 12 or No. 14. Cutter cuts quickly and cleanly with one snip

without injury to wire insulation. Hardened steel cutting blade is removable for sharpening. It weighs only 12 ounces.

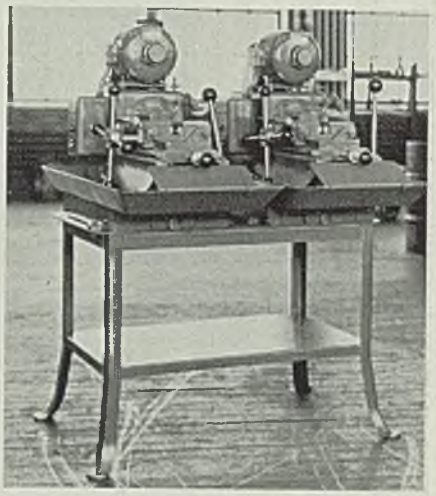
Time Stamp

■ International Business Machines Corp., 270 Broadway, New York, announces a new time stamp, Printime, base of which is curved away from the platen on all sides to increase the ease with which papers may be inserted in the throat for time stamping. It measures 9 3/4 x 3 3/4 inches at the base and is 5 inches tall. The type wheels, printing ribbon and electrically operated timing mechanism are all housed in the head of the stamp.

The weight of the head is counterbalanced so a slight downward pressure only is required to secure an even, legible imprint. Thicker parcels or bulky packages may be time-stamped by raising the head to a 90-degree angle with the base, and pressing them against the type wheels. The date line indicates in a straight line the year, month, date, hour and minute, a.m. and p.m.

Threading Machine

■ Geometric Tool Co., New Haven, Conn., has introduced a double spindle threading machine. It is furnished in three sizes with a com-



plete threading range from 1/16 to 1½-inch diameter (national fine thread series pitches only in the larger diameters). Machine is built up by units, thus one size of thread may be cut in one unit, another size in the other. If desired, only one unit need be operated.

Broaching Machine

■ Oilgear Co., 1301 West Bruce street, Milwaukee, announces a new XB-12 fluid power, variable speed twin horizontal broaching machine. It features simple push-button and

alternative toe-lever switch control and emergency stop pushbutton on

each side, independent variable broaching speed control of each crosshead, gravity and capillary feed lubrication of ways and liners, vertical adjustments for pullers, mechanism for adjusting crosshead stroke and vertical motor driven coolant pump and automatic directional coolant valve. Allsteel welded frame supports the trough, cylinders, pump, motor and coolant pump. The pump is arranged for direct drive and preset relief valves in the pump protect work, tools, pump and machine against overload. The two rams of the machine work alternately, one on the return while the other is pulling, so that production is limited only by the operator's ability.

The machine features a peak pulling capacity of 18,000 pounds and a cutting and return speed of 4 to 36 feet per minute. Its broaching stroke is 36 inches.

Hydraulic Pump

■ Racine Tool & Machine Co., Racine, Wis., has introduced a new model variable volume hydraulic pump rated at 1000 pounds pressure. Its shaft is of larger diameter, and oil seals of mechanical self- compensating type prevent leakage at the shaft end. Vane slots are now slanted away from the direction of rotation. This permits the use of wider vanes having greater strength and affords a wider sealing area against interior slippage of oil. Hydraulic balancing of the vanes is accomplished by an improved porting of the side plate. The side plates permit close working and sliding fits without the danger of scoring and seizing.

Pressure Pads

■ National Carbon Co. Inc., Madison avenue and West 117th street, Cleveland, announces resilient pressure pads for holder end of brushes to offset injurious effects of vibration on carbon brushes. The pads reduce and may eliminate such destructive effects as chipping and cracking of brushes, wear on the holder end of the brush and wear of the pressure finger tip.

The resilient material used for these pads is durable and will retain its resiliency throughout the life of the brush. The form of the pad and its exact location on the brush are dependent on the shape and dimensions of the pressure finger and location of its contact with the brush.

Cylindrical Exhaust

■ Industrial Equipment division, Continental Roll & Steel Foundry Co., East Chicago, Ind., announces a new cylindrical exhaust unit for collecting the exhaust from polishing and buffing wheels. It occupies a minimum of space, less than 4 cubic feet, and collects exhaust through dust hoods built around the wheel or unit being ventilated.

Exhaust is drawn into the unit by a vertical fan and is introduced into a spiral plenum chamber for complete precipitation. Unit's motor is totally enclosed and sealed against dust and dirt. Collected matter is removed periodically by means of a sliding tray. The unit can be installed on the floor at rear of machine or suspended conveniently overhead.

Monitor-Type Cab

■ Industrial Brownhoist Corp., Bay City, Mich., announces monitor-type cab for diesel locomotive cranes. It enables operator to see the loads better and also eliminates blind spots to the rear and sides. Cab is well ventilated and provided with windows opening on all four sides.

Sheet Galvanizing

(*Concluded from Page* 60)

side the kettle is the rig which by entering, double bottom and exit rolls through connecting guides convey the sheets through the bath onto the spangle conveyor.

The spangle conveyor is designed to evenly withdraw the heat from the sheet to promote uniformity of the spangle formation. This is also facilitated by magnetic rolls at the entering end of the spangle conveyor, which hold the sheet firmly on the conveyor until the crystals have formed.

Sheet Cooled by Air

From the spangle conveyor the sheet enters the cooling conveyor where it is cooled sufficiently by large volume low-pressure cooling air applied top and bottom. It is necessary to reduce the temperature of the sheet sufficiently to prevent warpage as it enters the water bath through a 9-roll flattener. The water in this bath is heated by steam and thermostatically controlled. Succeeding squeezer rolls and pressure air blast remove all moisture from the finished sheet before it enters the final unit in the line, the roller leveler with 17 flattening rolls. At the end of the line the sheets are assorted, branded and weighed.

The galvanizing department comprises two complete units such as the one described, the total length of the continuous line from the water tank immediately before the kettle, down to the final exit and leveling rolls being 108 feet.

Operations along the line are controlled by two Westinghouse control panels, one for each unit, placed just beyond the kettle. These enable the plant superintendent to start or stop the line, regulate the speed of flow through the bath—which ranges up to 120 feet per minute—regulate the temperature and other elements involved along the line.

The average capacity of each of these units ranges from 45 to 50 tons per 8-hour shift. It is of interest to note that only a few years ago an output of 200 tons per week for one line was considered fairly good production.

Many of the 14-gage sheets passing through the galvanizing units are intended for making parts for Anderson shelters. The sheets are sheared for correct size, the ends punched for assembling by bolts, and the sheets corrugated by means of a Stamco corrugating mill. The ends of the corrugated sheets are curved by passing through a pair of polished rolls, the correct bending being obtained by automatically stopping the machine by a template rod. The finished product is then stacked ready for shipment.

♦

4000-Ampere Arc Welder

(*Concluded from Page* 51)

controls while another follows the bead.

As shown in the lower illustration, the head in the upper view is only a small portion of the complete welder which travels over a considerable floor area on a large gantry running in rails set in the floor. Drives and controls are set so the head can be traversed along the weld seam throughout an extremely wide range of speeds. Similarly, control of current and feed of weld rod are adjustable throughout a wide range.

The trucks shown in inverted position in both illustrations have large bearing surfaces upon which are positioned tank sections to be welded. In the lower view, an operator is adjusting the rod feed mechanism at the welding head. The gantry, in addition to including provision for moving horizontally, also permits the entire head to be moved vertically as may be required. For details of the Unionmelt process of welding heavy plate in one pass, see STEEL Jan. 23, 1939, p. 48.

Packing for Export

(*Concluded from Page* 58)

Several other mills in this same territory are using these hand-operated machines for re-enforcement of tin-plate boxes of the same type.

In the export of steel sheets, a new packaging method has been developed to provide better protection to the material. In shipping prime electrical sheets, 240 per lift as illustrated in Fig. 2, waterproof paper is wrapped around the loose sheets. Tar is poured on top of the wrapping paper, sealing the steel sheet contents against moisture. A complete metal sheet then is applied to cover both top and bottom for final protection. This is followed by attaching six 8-gage galvanized high-tensile wires, half running each way of the lift and over longitudinal 2 x 4-inch skids which form an excellent base for handling at a later date.

On 20-gage prime steel sheets, 43 x 92 inches, a complete metal lift or package is fabricated as shown in Fig. 3. Both top and bottom of the package are covered by a waster sheet, on which are stencilled measurements, weight and destination. On all four sides or edges is a metal rail of about 16-gage steel that is clinched tightly on all corners to form adequate protection for this heavy package. Four 8-gage wires are ample for reinforcing purposes here.

♦

Metals and Alloys in Dictionary Listing

■ *Dictionary of Metals and Their Alloys*, by F. J. Camm; fabrikoid, 245 pages, 5½ x 8½ inches; published by Chemical Publishing Co., New York; supplied by STEEL, Cleveland, for $3.

Arranged in alphabetical form, this volume contains descriptions of a large number of metals and alloys, and in many cases supplies data on compositions and characteristics. The book also contains short chapters on heat treatment of tool steels, practical hints on hardening and tempering, spraying metallic coatings, rustproofing iron and steel, electroplating, polishing and finishing metal, chemical coloring of metals, hardness test, and an appendix with numerous tables.

Labelling Gears

(*Concluded from Page* 66)

0.75 to 1.25 per cent; chromium, 0.15 to 0.30 per cent; molybdenum, 0.40 to 0.60 per cent.

Physical properties are maintained within a narrow range and in every instance a minimum tensile strength of 50,000 pounds per square inch is guaranteed. Tests on a bar representative of the iron cast from one specific heat showed tensile strength of 52,500 pounds per square inch, Rockwell C hardness of 20 and brinell hardness of 223.

Typical Properties

Ultimate tensile strength, pounds per square inch	50,000
Ultimate strength in compression, pounds per square inch	150,000
Ultimate shear strength, pounds per square inch	58,000
Ultimate torsional strength, pounds per square inch	67,000
Modulus of elasticity	20,000,000
Torsional modulus of elasticity	7,500,000
Transverse strength, pounds (1.2 inches diameter bar, 18 inches span)	3,000
Transverse deflection, inches (1.2 inches diameter bar, 18 inches span)	0.4
Brinell hardness	220
Weight, pounds per cubic inch	0.26

The gears are given no heat treatment. Actually no gears have been produced so far with tensile rating of less than 52,000 pounds per square inch and the range has been up to 63,500. Typical properties are set forth in the accompanying table.

War and Defense To Swell Steel Demand

Consumers seek protection against future delivery delays. Production holds upward trend. Heavier buying by Allies imminent

MARKET IN TABLOID ★

Demand
Increasing; heavy war tonnage expected.

Prices
Holding in all lines, with continued scrap advance.

Production
Further rise of 3 points to 81½ per cent.

■ FACED with probable increased steel demand from the Allies and certain large requirements for domestic preparedness the steel industry believes it is on the threshold of practically capacity production.

Except for a sudden termination of the European war much steel will be required from the United States, directly to Great Britain and France and indirectly through Canadian manufacturers, now buying largely in this country. Added to this probability is the certainty that the program for enlarging protective policies by the Washington government will call for heavy supplies of steel in practically all forms, over an extended period.

Operations responded to increased demand last week, advancing 3 points to 81½ per cent, continuing the upward curve which started at the beginning of May.

In an effort to protect against shortage for ordinary uses steel consumers are beginning to buy more freely for future delivery, some seeking contracts into fourth quarter. Producers are not yet willing to assume commitments that far ahead, even though prices be specified as those prevailing at delivery. Pig iron buying is on the increase as it appears no change will be made in price for third quarter.

Interruption of shipments from Belgium, a large producer of bolts and nuts, has diverted much inquiry for these products to the United States, particularly on the part of Great Britain.

Current negotiations by the French commission are estimated to involve 200,000 tons or more, mainly shell rounds. British purchases are expected to be much smaller than those of France for some time. Placing of 200,000 six-inch finished shell forgings with Pullman-Standard Car Mfg. Co., for its Butler, Pa., plant, will require about 10,000 tons of steel.

Great increase in buying by the Allies seems imminent and changes are under way in methods of purchase and character of products desired. Practically all war steel buying in the past has been by government agencies in Great Britain and France, the Anglo-French purchasing commission in New York devoting most energies to equipment and materials other than steel. Personnel of the commission is being greatly enlarged and it is believed steel purchases will be handled directly through this agency. In the past most steel has been in the form of bars, semifinished and shell steel. Indications are that future buying will tend more to finished products or those requiring only minor finishing operations on the European side.

Steel ingot output in May, 4,841,403 net tons, was 20 per cent larger than in April and 47 per cent greater than in May, last year. The operating rate rose to 72 per cent of capacity in May, from 61.05 per cent in April.

Steel and iron exports in April fell 14 per cent short of the high level reached in March, but aggregate tonnage exported in four months was virtually three times that shipped in the same period last year. March total was 391,754 gross tons, excluding scrap, compared with 457,052 in March. Total for four months this year was 1,681,455 gross tons, against 585,547 tons in four months, 1939. Scrap exports increased somewhat, principal takers being the United Kingdom, Italy, Japan and Canada.

Iron ore movement from Lake Superior mines is starting the season with vigor, 7,244,549 gross tons being shipped in May, practically double the movement in the corresponding month last year, 3,601,453 tons.

Automobile output last week increased from the low point of the preceding week, 95,560 units being produced. This was only slightly under the average for May and indicates continued demand for cars, seasonal influences having less effect than usual.

Continued rise in the operating rate was the result of increased activity in eight districts, only one showing a decline and three holding steadily. Youngstown rose 9 points to 67 per cent, Pittsburgh 1 point to 80, Buffalo, 14 points to 84, Detroit 1 point to 75, eastern Pennsylvania 2 points to 73, Chicago 3 points to 86, New England 10 points to 66 and Cincinnati 6 points to 70. St. Louis dropped 1 point to 56 per cent. Birmingham at 85 per cent, Wheeling at 79 and Cleveland at 82 were unchanged.

Although consumers are buying little scrap, prices continue to strengthen and the composite of steelmaking grades advanced 29 cents last week, to $18.67, highest since the last week of November. The iron and steel composite increased 4 cents, because of scrap advances.

COMPOSITE MARKET AVERAGES

	June 8	June 1	May 25	One Month Ago May, 1940	Three Months Ago March, 1940	One Year Ago June, 1939	Five Years Ago June, 1935
Iron and Steel	$37.59	$37.55	$37.51	$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..	18.67	18.38	18.21	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 8, 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 ⅝-inch, Pitts.	2.00	2.00	2.00	1.92

Pig Iron

	June 8, 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.	18.00	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 tier, (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.	Alloy Diff.	Alloy S.A.E.	Alloy 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
⅞-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 1⅛ less, respectively. Wrought pipe, Pittsburgh base.

Butt Weld

Steel

In.	Blk.	Galv.
⅛	63⅛	54
¼	66⅛	58
1—3	68⅛	60⅛

Iron

¾	30	13
1—1¼	34	19
1½	38	21⅛
2	37⅛	21

Lap Weld

Steel

2	61	52⅛
2½—3	64	55⅛
3½—6	66	57⅛
7 and 8	65	55⅛
9 and 10	64⅛	55
11 and 12	63⅛	54

Iron

2	30⅛	15
2½—3½	31⅛	17⅛
4	33⅛	21
4½—8	32⅛	20
9—12	28⅛	15

Line Pipe

Steel

1 to 3, butt weld	67⅛
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	63⅛
12-inch, lap weld	62⅛

Iron

	Blk.	Galv.
¾ butt weld	25	7
1 and 1¼ butt weld	29	13
1½ butt weld	33	15⅛
2 butt weld	32⅛	15
1½ lap weld	23⅛	7
2 lap weld	25⅛	9
2½ to 3½ lap weld	26⅛	11⅛
4 lap weld	28⅛	15
4½ to 8 lap weld	27⅛	14
9 to 12 lap weld	23⅛	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 ⅜-inch incl. (per 100 lbs.)	$2.00
Do., over ⅜ 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	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. 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	4.25	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	4.64	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	3.85	....	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, June 6

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	British gross tons U. K. ports £ s d	Continental Channel or North Sea ports, gross tons‡‡ Quoted in dollars at current value	**Quoted in gold pounds sterling £ s d
Foundry, 2.50-3.00 Si.	$20.64 6 0 0	$33.23	3 18 0
Basic bessemer	....	.....	.....
Hematite, Phos. .03-.05	21.40 6 5 0	.....	.....
Billets	....	$31.95	3 15 0
Wire rods, No. 5 gage	....	60.71	7 2 6
Standard rails	$36.12 10 10 0	$48.99	5 15 0
Merchant bars	2.08c 13 10 0	2.77c	7 6 0
Structural shapes	1.93c 12 10 0	2.83c	7 9 0
Plates, †¼ in. or 5 mm.	1.98c 12 17 6	3.53c	9 6 0
Sheets, black, 24 gage or 0.5 mm	2.62c 17 0 0	2.98c	7 17 0°
Sheets, gal., 24 ga., corr.	3.13c 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.	$ 5.25 1 10 6	.....	.....

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	$19.09	5 11 0(a)	$15.13	788	$31.44	950	$25.33	63
Basic bess. pig iron	17.97	5 4 6(a)	.....	...	29.79	900	27.94	(b)69.50
Furnace coke	5.45	1 11 8	4.32	225	10.92	330	7.64	19
Billets	32.25	9 7 6	22.33	1,163	42.20	1,275	38.79	96
Standard rails	1.72e	11 3 0	1.44c	1,602	2.06c	1,375	2.38c	132
Merchant bars	2.16c	14 0 0††	1.31c	1,454	2.06c	1,375	1.98c	110
Structural shapes	1.91c	12 8 0††	1.27c	1,414	2.06c	1,375	1.93c	107
Plates, †¼-in. or 5 mm.	1.93c	12 10 6††	1.66c	1,848	2.42c	1,610	2.29c	127
Sheets, black	2.70c	17 10 0§	1.97c	2,193‡	2.85c	1,900‡	2.59c	144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.	3.21c	20 16 3	3.23c	3,589	4.80c	3,200	6.66c	370
Plain wire	3.00c	19 10 0	2.11c	2,340	3.00c	2,000	3.11c	173
Bands and strips	2.27c	14 15 0††	1.47c	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.	16.00
Bos. dock No. 1 exp.	15.75-16.25
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	18.00-18.50
Cleveland, No. 2	17.00-17.50
Detroit No. 1	†16.00-16.50
Detroit No. 2	†15.00-15.50
Eastern Pa., No. 1.	19.50-20.00
Eastern Pa., No. 2.	18.00
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	13.00-13.50
Los Ang., No. 2, net	12.00-12.50
N. Y. dock No. 1 exp.	15.50
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	13.00-13.50
San Fran., No. 2, net	12.00-12.50
Seattle, No. 1	13.00-14.00
Toronto, dirs., No. 1	11.00
Valleys, No. 1	20.00-20.50

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	†17.25-17.75
E. Pa., new mat.	19.50-20.00
E. Pa., old mat.	15.50-16.00
Los Angeles, net	10.00-10.50
Pittsburgh	19.00-19.50
St. Louis	†13.00-13.50
San Francisco, net	10.00-10.50
Valleys	19.00-19.50

BUNDLED SHEETS

Buffalo, No. 1	16.50-17.00
Buffalo, No. 2	15.00-15.50
Cleveland	14.50-15.00
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	†13.75-14.25
St. Louis	†9.50-10.00
Toronto, dealers	9.00

BUSHELING

Birmingham, No. 1.	15.00
Buffalo, No. 1	16.50-17.00
Chicago, No. 1	16.50-17.00
Cincin., No. 1 deal.	11.00-11.50
Cincin., No. 2 deal.	4.75- 5.25
Cleveland, No. 2	12.00-12.50
Detroit No. 1 new	†16.00-16.50
Valleys, new, No. 1	18.00-18.50
Toronto, dealers	5.50- 6.00

MACHINE TURNINGS (Long)

Birmingham	5.00
Buffalo	11.00-11.50
Chicago	11.00-11.50
Cincinnati, dealers.	7.00- 7.50
Cleveland, no alloy.	11.50-12.00
Detroit	†10.50-11.00
Eastern Pa.	12.00-12.50
Los Angeles	4.00- 5.00
New York	†7.50
Pittsburgh	13.00-13.50
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	11.50-12.00
Chicago	11.50-12.00
Chicago, spcl, anal.	14.50-15.00
Detroit	†11.50-12.00
Pitts., alloy-free	14.00-14.50

BORINGS AND TURNINGS

For Blast Furnace Use

Boston district	†5.25- 5.75
Buffalo	10.50-11.00
Cincinnati, dealers.	6.00- 6.50
Cleveland	12.00-12.50
Eastern Pa.	11.00-11.50
Detroit	†10.50-11.00
New York	†6.25- 6.50
Pittsburgh	10.00-10.50
Toronto, dealers	6.75

AXLE TURNINGS

Buffalo	16.00-16.50
Boston district	†9.00- 9.50
Chicago, elec. fur.	17.50-18.00
East. Pa. elec. fur.	17.50-18.00
St. Louis	†10.50-11.00
Toronto	6.00- 6.50

CAST IRON BORINGS

Birmingham	8.00
Boston dist. chem.	†8.25- 8.50
Buffalo	10.50-11.00
Chicago	10.50-11.00
Cincinnati, dealers.	6.00- 6.50
Cleveland	12.00-12.50
Detroit	†10.50-11.00
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.	23.50-24.00
Pittsburgh	24.00-24.50
St. Louis	†19.00-19.50

STEEL RAILS, SHORT

Birmingham	17.00
Buffalo	22.50-23.00
Chicago (3 ft.)	20.50-21.00
Chicago (2 ft.)	21.50-22.00
Cincinnati, dealers.	21.00-21.50
Detroit	†21.50-22.00
Pitts., 3 ft. and less	24.00-24.50
St. L., 2 ft. & less.	†19.00-19.50

STEEL RAILS, SCRAP

Birmingham	15.50
Boston district	†14.50-15.00
Buffalo	19.00-19.50
Chicago	17.50-18.00
Cleveland	20.00-20.50
Pittsburgh	21.00-21.50
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	13.00-13.50
Cincinnati, dealers.	10.50-11.00
Eastern Pa.	17.00
New York	†12.00-12.50
St. Louis	†10.50-11.00

RAILROAD WROUGHT

Birmingham	14.00
Boston district	†9.50-10.00
Eastern Pa., No. 1.	20.00-21.00
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	†15.50-16.00
Pittsburgh	17.00-17.50

FORGE SCRAP

Boston district	†7.00
Chicago, heavy	20.00-20.50

LOW PHOSPHORUS

Cleveland, crops	22.50-23.00
Eastern Pa. crops.	23.50-24.00
Pitts., billet, bloom, slab crops	24.50-25.00

LOW PHOS. PUNCHINGS

Buffalo	21.00-21.50
Chicago	19.50-20.00
Cleveland	19.50-20.00
Eastern Pa.	23.50-24.00
Pittsburgh	23.50-24.00
Seattle	15.00
Detroit	†18.00-18.50

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.	22.00-22.50
St. Louis	†19.00-19.50

STEEL CAR AXLES

Birmingham	18.00
Boston district	†18.00-18.50
Chicago, net	22.50-23.00
Eastern Pa.	23.50-24.00
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	†18.00-18.50
New York	†19.50-20.00
Eastern Pa.	23.50-24.00
St. Louis, 2¼-3¾"	17.50-18.00

CAR WHEELS

Birmingham, iron	13.00
Boston dist., iron	†14.50-14.75
Buffalo, steel	23.00-23.50
Chicago, iron	18.50-19.00
Chicago, rolled steel	20.00-20.50
Cincin., iron, deal.	17.75-18.25
Eastern Pa., iron	21.00-21.50
Eastern Pa., steel	23.50-24.00
Pittsburgh, iron	20.00-20.50
Pittsburgh, steel	24.00-24.50
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.	14.50-15.00
Chicago, auto net.	17.00-17.50
Chicago, railroad net	15.50-16.00
Chicago, mach. net.	15.50-16.00
Cincin., mach. deal.	18.50-19.00
Cleveland, mach.	22.50-23.00
Detroit, cupola, net.	†17.00-17.50
Eastern Pa., cupola.	21.00-21.50
E. Pa., No. 2 yard.	18.00-18.50
E. Pa., yard fdry.	18.00-18.50
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.	†14.25-14.75
New England, del.	15.00-15.25
Buffalo, break	16.50-17.00
Cleveland, break, net	15.50-16.00
Detroit auto net	†17.50-18.00
Detroit break	†16.00-16.50
Eastern Pa.	20.00-20.50
Los Ang., auto, net.	13.00-14.00
New York break	†16.50
Pittsburgh, break.	16.50-17.00

STOVE PLATE

Birmingham	10.00
Boston district	†11.00-11.50
Buffalo	14.50-15.00
Chicago, net	11.50-12.00
Cincinnati, dealers.	10.50-11.00
Detroit, net.	†10.50-11.00
Eastern Pa.	17.00
New York fdry.	†12.75
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.	21.00-21.50
Cincin. agri., deal.	15.00-15.50
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	10.00

Foreign Ore

Cents per unit c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mn. (asking price; no sales)	19.00
North African low phos. (asking price; no sales)	19.00-20.00
Spanish, No. African basic, 50 to 60% (asking price; no sales)	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, cif.	$28.00-30.00

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, 46%	50.00-53.00
Cuban, 50-51%, duty free	71.00-73.00

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

Sheets, Strip

Sheet Strip Prices, Pages 94, 95

Pittsburgh—Mills have been able to secure releases on almost all placed tonnage in the eastern half of the country. However, some outstanding low-priced material has not been released and sellers are actively soliciting this business. It now seems probable that all low-priced material will be shipped before the June 30 deadline, although considerable new material has been placed and may slow down deliveries somewhat. Sheet mill operations are now at 70 per cent of capacity, which indicates peak operations on active mills. Galvanized sheet operations this week were at 54 per cent. Demand continues to increase for narrow material, although automotive needs have been filled for 1940 models. Nearly all outstanding tonnage has been released for shipment as soon as possible and mill operations are moving upward to meet this demand and to keep shipments about equal to orders, thus preventing possible jam in deliveries.

Chicago — Approximately 70 per cent of the low-priced material booked in April had been specified. Producers remain firm in earlier determinations to insist on shipments of low-priced tonnage before July 1. Automotive activity has dwindled, with no important movement expected till late July or early August, although some releases of material for early 1941 model runs already have been received.

Boston—Heavier releases against low-priced blanket cold strip orders are accompanied by a substantial volume of new buying for prompt delivery and some bookings for third quarter shipment. While new sheet buying is light, most consumers and distributors have releases in against orders and deliveries are heavier.

New York—Heavy sheet specifications have been filed to assure protection on contracts made at the recent reduced prices. Most buyers have covered their full tonnage and many are provided for most of third quarter and some even further. Consumers in general are finding normal outlet for their products and are taking sheet shipments in full.

Snead & Co., Jersey City, N. J., has been awarded the contract for 7500 steel bookstack shelves for the Library of Congress annex, taking a substantial quantity of sheets, bids May 22, to the architect of the capitol.

Philadelphia—Sheet specifications now are fairly well in on the low-priced tonnage booked recently. Some mills are adhering closely to the policy of taking only such tonnage as can be rolled and shipped by June 30. One mill in particular has filled its schedule on galvanized sheets taken at 3.30c, base, and refused to place additional business on its books at this figure.

St. Louis—Sheet consumers are cautious in placing orders after the final flurry to file specifications against low-priced contracts, for delivery before June 30.

Cincinnati — Sheet and strip releases against second quarter contracts are heavier and mills are pushing toward capacity. Export buying is heavier, all for prompt delivery. Some business has been placed for third quarter, but not enough to point the trend.

Birmingham, Ala. — Sheet releases have been heavy in the past week, and production is not running greatly in excess of deliveries.

Baltimore—Sheet buyers are taking tonnage at a faster rate than it is being consumed. Current consumption is fair, and prospects for

the summer in some lines are not encouraging. On the other hand, residential requirements, which are unusually good, are bolstering volume.

Toronto, Ont.—Sheet requirements are gaining rapidly, due to increased placing of war orders and inquiries indicate the Canadian mills will require capacity production to meet demand. The automotive industry has been placing more extensive orders and it is reported large orders are going to the United States, with others imminent.

Plates

Plate Prices, Page 94

Pittsburgh—Plate mill schedules are still at capacity with some buyers pressing for deliveries and new tonnage coming out constantly. Plate mill operators expect heavy demands when the rearmament program gets in full swing and are attempting to turn out all placed tonnage as rapidly as possible.

Chicago — Plates last week and the week previous met improved demand. Requirements are aided by tonnages for government use, bridgework, railroad car building, and heavy equipment manufacture. Petroleum industry needs also continue prominent, as do those of roadbuilding machinery. Prices are reported firmer than for many weeks past.

Boston — Storage tank plate requirements are heavier, contracts being topped by 675 tons for two oil units, 96,000-barrels each, Stamford, Conn. Miscellaneous buying has improved, small lot specifications predominating for prompt delivery. Fabrication by shipbuilders is well maintained with heavier releases expected shortly. The Worcester car shop has a new order for 77 trolley coaches, but railroad releases are not substantial.

Steel required for four steam-propelled cargo ships, awarded Bath Iron Works, Bath, Me., for American Export Lines Inc., New York, will approximate 22,000 tons, mostly hull plates.

Electric Boat Co., Groton, Conn., was the only bidder on construction of three submarines for the navy June 5, each taking close to 1000 tons of steel. The company offers to better the delivery dates requested by the navy department by five to six months.

New York—Current plate buying is slow but every indication is for a marked increase soon. Buying for export is imminent, the Allied program being well outlined and substantial tonnages will be needed for domestic armament. Other factors indicate a rapidly increasing demand for plates. Fabricators of domestic fuel oil tanks are at peak seasonal operations and have been specifying actively.

Philadelphia — Considerable speculation is noted regarding plate tonnage required for the anticipated new navy building program, which is said to include three aircraft carriers, 13 cruisers, in addition to a large number of other vessels. All plate mills in this area are busier but it is maintained that consumers are not rushing to cover ahead on anticipated requirements. Smaller independents are withholding action on third quarter prices, due to rapidly advancing raw material costs.

Birmingham, Ala.—Schedules are fairly well filled in plates, even in the absence of railroad demand. Most buying is by tank manufacturers, and deliveries are still being made to west coast points and for shipbuilding on the Gulf coast. Operations are at better than 80 per cent.

San Francisco—Activity in plates is confined to lots less than 100 tons and no large new inquiries have come out. To date this year 29,323 tons have been booked, compared with 17,246 tons for the corresponding period in 1939.

Baltimore—Railroad work is more promising. The Virginian Railway is inquiring for 15,000 tons of car steel, including a substantial tonnage of plates, for fabrication at Princeton, W. Va., and the Baltimore & Ohio, effective June 1, is inaugurating a new program at its Mt. Clare repair shops. Ship tonnage continues active. Miscellaneous plate demand, however, is sluggish.

Toronto, Ont.—Announcement that Canadian plants soon will go into production of tanks indicates buying of plates on a large scale soon will develop. Expansion of shipbuilding also will require large tonnages of plates. New business is said to be going almost exclusively to United States producers.

Plate Contracts Placed

2222 tons, armor plate, pro. 235, bureau of ordnance, navy department, items 1, 3, 6 and 8 to The Midvale Co., Nicetown, Pa.; items 2, 4, 5, 7, 9 and 10 to Carnegie-Illinois Steel Corp., Pittsburgh.

675 tons, two 96,000-barrel tanks, Michael Hoffman Fuel Oil Co., Stamford, Conn., to Chicago Bridge & Iron Co., Chicago.

510 tons, two oil barges, Lea River Lines, Leetsdale, Pa., to Nashville Bridge Co., Nashville, Tenn.

500 tons, 500,000-cubic-foot gasholder, metropolitan utility district, Omaha, Nebr., to Stacey Bros. Gas Construction Co., Cincinnati.

350 tons, two oil storage tanks, Narragansett Electric Co., Providence, R. I., to Bethlehem Steel Co., Bethlehem, Pa.

170 tons, four fermenting tanks, U. S. Industrial Chemicals Inc., Baltimore, to Ingalls Iron Works, Birmingham, Ala.

Unstated tonnage, steel barges for Pickwick Landing dam, Tennessee Valley authority, Knoxville, Tenn., to Treadwell Construction Co., Midland, Pa.; bids May 15, Knoxville, Tenn.

Plate Contracts Pending

1000 tons, 10,625 linear feet, 48-inch steel pipe, West Roxbury district, Boston; bids June 20, Metropolitan district commission, water division, Boston.

Unstated tonnage, two welded steel barges, United States engineer, first district, New Orleans; Treadwell Construction Co., Midland, Pa., $13,000, low, pro. 352, bids May 30.

Unstated tonnage, one to four 56-foot all-welded steel tugs, spec. 389, United States engineer, Philadelphia; bids June 9.

Bars

Bar Prices, Page 94

Pittsburgh—Releases from domestic consumers and additional buying for export are increasing production of merchant bars. Buying by jobbers has been much heavier as well as by miscellaneous manufacturers, and export tonnage is being accepted as rapidly as shipment can be arranged and credit established. Cold-finished shows little change in activity.

Chicago — Carbon bar demand continues to increase, although alloy needs in the past week were reported slightly lower. Government work is most prominent in bar needs. One large interest estimates approximately 40 per cent of present bar buying is directly or indirectly for government use. Prices continue firm, with practically no concessions reported.

Boston—Slightly heavier releases by industrial consumers of hot carbon and alloy bars is accompanied by mild improvement in warehouse specifications, secondary sellers in some cases rounding out stocks more liberally. Alloys continue relatively more active than merchant bars. Considerable part of volume is either directly or indirectly connected with government orders.

New York — Demand for merchant bars has increased as consumers seek to provide stocks against possible delivery delays later. Some inquiry has been made for fourth quarter at prices prevailing at time of shipment but sellers are not willing to commit themselves that far ahead. Currently plain carbon bars are available in three to four weeks but the period is being extended

rapidly, with expectation of considerable delivery delay shortly.

Philadelphia — Deliveries on bars are more extended but so far there has been no effort on the part of consumers to cover on more than normal requirements. Machine tool requirements still are high and forge shops are busier. A local maker of bearings will increase capacity shortly with the acquisition of an idle plant. Government buying is growing, recent purchases including alloy rods which will be shipped for Frankford arsenal to Standard Pressed Steel Co., Jenkintown, Pa., for fabrication into 24,000,000 alloy bullet cores.

Birmingham, Ala.—Little change is indicated in bars, with production steady at approximately 80 per cent. Manufacturers of agricultural implements account for most of the tonnage.

Baltimore—Merchant bar business is fairly good, with buyers laying in moderate stocks as a hedge against the possibility of more extended mill deliveries later on. A good tonnage is moving to shipyards, and more special steels are being ordered by electrical tool and precision instrument manufacturers.

Toronto, Ont.—New interest in merchant bars is developed as some consumers anticipate more difficulty in obtaining supplies later in the year, as mills become more heavily taxed in producing war materials.

Pipe

Pipe Prices, Page 95

Pittsburgh—Oil country business shows no signs of change, reflecting poor export market for oil and little noticeable increase in the domestic market. Stocking is increasing in the standard pipe markets, with warehouses building up bank of material in anticipation of possible delivery difficulties and recognizing the increasing share going to export. Pipe specialties, such as aircraft tubing, are moving well and bookings are running far ahead of production. Mechanical tubing releases are steady.

Boston—The largest steel pipe inquiry in months closes June 20 with the metropolitan district commission, Boston, 1000 tons, 48-inch, for installation in West Roxbury district. Cast pipe volume is bolstered by two contracts for 1910 tons for Lynnfield, Mass., and New Britain, Conn., to the Burlington, N. J., foundry. Industrial building needs enhance the outlook for merchant steel and wrought pipe.

Birmingham, Ala. — Pipe operations are on a satisfactory basis but hardly up to expectations. Most tonnage continues to come from municipalities, in small lots. Operations are on a four-day basis generally.

Seattle—Business is slow and prospects unpromising for the next 90 days. No important projects are developing. Award of 200 tons of 2 to 6-inch for a Portland water district awaits allocation of funds. Amity, Oreg., has purchased a small lot of 4-inch cast iron from Pacific States Cast Iron Pipe Co.

San Francisco—Only two large inquiries for cast iron pipe are in the market and no award has yet been made on 1250 tons of 6 to 12-inch pipe for Long Beach, Calif. Demand for small lots is reported to be holding up well. So far this year 14,632 tons have been placed, compared with 13,471 tons for the same period last year.

Cast Pipe Placed

105 tons, small sizes, Westover field, Chicopee, Mass., to Warren Pipe Co. of Mass., Everett, Mass.; bids May 21, constructing quartermaster.

Wire

Wire Prices, Page 95

Chicago — Bookings in the past month generally showed increases over April, with prospects considered good that orders soon will exceed those of a like period in May. Roadbuilding mesh requirements are in good volume. Rural demand is improving.

New York—Incoming wire orders are steadily improving, demand for manufacturers' wire and specialties leading, although buying covers a wide range. While most tonnage is for prompt delivery, mills are booking wire for third quarter shipment at firm prices. Demand for rope has registered gains with further improvement expected, notably in the maritime field. Government purchases of electric and other types of cable are heavy. Habirshaw Cable & Wire Corp., Yonkers, N. Y., has booked 72,920,000 feet, W-110-B wire at $6.95 per 1000 feet, f.o.b. mill, for the signal corps, army base, Brooklyn. This wire, with a copper core and combination copper-steel covering, insulated and braided, will make-up more than 65 car loads. Contract was placed under pro. 394, bids May 14.

Boston—Wire mill operations are higher, improvement in demand for specialties being notably reflected in this district. Orders for manufacturers' wire, rope and electrical cable are more numerous, several district mills having booked substantial government contracts for the latter. Limited bookings for July-August shipment are being made, but most incoming orders are for early delivery. Recent improvement in wire rods is maintained, but finishing departments in the aggregate continue to operate ten or more points above semifinished steel schedules with one exception where open hearths are at capacity.

Birmingham, Ala.—All wire products are in good demand with a quantity of releases against blanket buying. Production is approximating 85 per cent and shipments are little greater than output.

Baltimore—Good demand for nails for residential work here is being offset by a lag in business from rural distributors, which also extends to fencing and other merchant wire products. Manufacturers' wire demand is being fairly well sustained.

Rails, Cars

Track Material Prices, Page 95

Domestic freight car awards in May totaled 2010 units, compared with 2077 in April, bringing the total for five months to 8698, against 8208 in the comparable period in 1939. Comparisons follow:

	1940	1939	1938	1937
Jan.	360	3	25	17,806
Feb.	1,147	2,259	109	4,972
March	3,104	800	680	8,155
April	2,077	3,095	15	9,772
May	2,010	2,051	6,014	4,732
5 mos.	8,698	8,208	6,843	45,437
June	.....	1,324	1,178	548
July	.....	110	0	1,030
Aug.	.....	2,814	182	1,475
Sept.	.....	23,000	1,750	1,216
Oct.	.....	19,634	2,537	1,355
Nov.	.....	2,650	1,232	275
Dec.	.....	35	2,581	275
Total	.....	57,775	16,303	51,611

Missouri Pacific has completed allocation of rolling stock authorized by court some time ago, including six diesel-electric locomotives noted last week and five others placed since, a three-unit streamlined passenger train, 30 covered hopper cars and 200 stock cars.

The Virginian railway is inquiring for 15,000 tons of car steel for fab-

rication in its shops at Princeton, W. Va., for building 500 hoppers and for repairs to 1000 cars.

Locomotives Placed

Missouri Pacific five 55-ton diesel-electric switchers; two to General Electric Co., one each to H. K. Porter Co., Pittsburgh, Whitcomb Locomotive Co., Philadelphia, and Davenport-Besler Corp., Davenport, Iowa. Also one 1000-horsepower diesel-electric streamlined passenger locomotive to Electro-Motive Corp., La Grange, Ill.

Rail Orders Placed

Rio Grande du Sul, Brazil, 25,000 tons rails, to Inland Steel Co., Chicago.

Car Orders Placed

Boston Elevated Railway, Boston, 20 trolley cars to Pullman-Standard Car Mfg. Co., Worcester, Mass.

Donora Southern, 30 gondolas to Magor Car Corp., Passaic, N. J.

Missouri Pacific, 200 forty-ton stock cars to American Car & Foundry Co., New York, 30 seventy-ton covered hoppers, to Mount Vernon Car Mfg. Co., Mount Vernon, Ill., two streamlined coaches to St. Louis Car Co., St. Louis.

Car Orders Pending

Chief of engineers, war department, three 40-ton and three 15-ton flat cars; bids in, spec. 189.

Buses Booked

The a.c.f. Motors Co., New York: Ten for Safety Motor Transit Corp., Roanoke, Va.; ten for Worcester Street Railway Co., Worcester, Mass.; six for Edwards Motor Transit Co. Inc., Williamsport, Pa.; three for Citizens Rapid Transit Corp., Hampton, Va.

Shapes

Structural Shape Prices, Page 94

Chicago — Increased inquiry is noted, though orders are slightly lower. State highway bridge construction in Illinois and other western states account for close to 2000 tons on inquiry. Structural producers report increasing tendency to improve positions. Considerable tonnage for export has been noted by large interests here, this material reportedly being shipped to Canada and reconsigned to foreign ports.

Pittsburgh—New construction on industrial expansion, as well as public works jobs, continues to bring out substantial shape tonnage. Effects of the national defense program are already beginning to show, with additions to plants expecting to make munitions and machines of war now appearing.

Boston—For industrial plant expansions, structural steel lettings exceed 1000 tons, following award of several thousand tons for similar projects recently. Three shop buildings at Worcester and West Lynn, Mass., are involved. Bridge inquiry is more active, but limited mostly to small stringer and beam spans.

New York — Bridge and grade crossing inquiry is slightly heavier and more small industrial projects are appearing. Total active tonnage is less than in recent weeks. Inquiry is featured 3800 tons for state hospital buildings at Deer Park, N. Y.

Seattle—Award of 2100 tons for

Shape Awards Compared

	Tons
Week ended June 8.....	16,137
Week ended June 1.....	24,692
Week ended May 25.....	20,234
This week, 1939.....	22,416
Weekly average, year, 1940	18,089
Weekly average, 1939.....	22,411
Weekly average, May.....	22,717
Total to date, 1939.....	534,637
Total to date, 1940.....	416,040

Includes awards of 100 tons or more.

Behind the Scenes with STEEL

C'est Le Guerre

■ We clipped this dispatch from London out of the paper some time ago and just saw it now sticking out from under our blotter: *Members of the Women's Auxiliary of the Territorial Service will be required to show their pink forms whenever called upon to do so.*

Der Tag

■ Now it can be told—and quite nicely, too, in that snappy looking four-page announcement up front opposite E. C. Kreutzberg's editorial. STEEL's new service is off the press and in the mail—a copy of *Penton's Almanac*, 1940-1941, for every regular subscriber. Just sit tight (several mint juleps will do the trick) and your copy will show up before the week is out.

Competently Complete

■ We're pretty well sold on the whole idea of this Almanac and can see right now where it is going to establish itself right off the bat as standard equipment in thousands of up and coming plants and offices from key-oast to key-oast. As you will soon see when you take a peek at any of the 148 pages, this Almanac is no haphazard conglomeration bundled up in a pretty cover. It represents seven months of intensive research and planning and hard work by a competent staff under the direction of A. J. Hain, Managing Editor of STEEL. Much of the material in it is original, all of it is authoritative, and the selection, we feel, is excellent.

The Name's The Thing

■ There was more worrying and debating in naming this new offspring than the little woman and ourselves went through in deciding on a boy's name, which we have yet to use. "Cyclopedia," "Encyclopedia," "Guide Book," "Source Book" and a dozen others were all dragged across the conference table and buried with honors. From usage, "Almanac" seemed from all angles to hit the nail on the head and since reading habits in many a plant we've been in are the same as we recall back on the farm, we imagine many a reader will enjoy some fond and happy memories.

Fore!

■ Golf, they say, is a form of work made expensive enough for a man to enjoy it.

We're Swiss

■ The *New York Sun* practically libelled us with an AP news item from Cleveland last week. A thief, apparently, stole a typewriter and a radio from a local printing concern but is going to be out of luck unless he can get language lessons on the radio. The typewriter writes only Bohemian characters. The part we didn't care for was the headline they used: *Typewriter Speaks Shrdlu.*

Readers Comments

■ One of the jobs a publication constantly has on its hands is to prove interested readership by men who count. This week on page 4 there are four readers' comments from these four gentlemen: Edward G. Budd, president, Edward G. Budd Mfg. Co., Alfred P. Sloan Jr., Chairman, General Motors Corp., D. Angus Currie, president, Erie Foundry Co., and Ralph E. Flanders, president, Jones & Lamson Machine Co. We have a simple term for it: *Readership in the Right Places.*

Chasing Copy

■ Someone is going to fool around and get hurt in that Shell adv. on page 15 and if prospects of the Lintern Corp. (p. 61) are half as sweltered as we are at the moment that headline stopper should cinch many a sale.

SHRDLU

the plant extension of Boeing Aircraft Co., Seattle, has been placed with the Pacific Car & Foundry Co., Seattle. No large projects are up for figures but shops in this area have fair backlogs.

San Francisco—Structural shape lettings were the second largest this year, 7918 tons, bringing the year's aggregate to 89,307 tons, compared with 64,657 tons for the same period a year ago.

Toronto, Ont. — While plans are under way to curtail building activities, private works are going ahead and demand for structural steel is heavy.

Shape Contracts Placed

2150 tons, fabricating and erecting, assembly and repair shop, naval air station, Jacksonville, Fla., to Jones & Laughlin Steel Corp., Pittsburgh, $142,440; bids May 28, spec. 9671, on steel direct.

2100 tons, Boeing Aircraft Co. plant extension, Seattle, to Pacific Car & Foundry Co., Seattle.

1710 tons, District of Columbia armory, Washington, to Fort Pitt Bridge Works, Pittsburgh; Charles H. Tompkins Co., Washington, general contractor.

655 tons, addition, assembly plant, Ford Motor Co., Dallas, Tex., to Mosher Steel Co., Dallas.

605 tons, arch bridge, Red Cliff, Colo., to Minneapolis-Moline Power Implement Co., Minneapolis.

600 tons, Kanapolis dam, item 28, Ellsworth, Kan., to Commercial Shearing & Stamping Co., Youngstown, O.

560 tons, bridge repairs, Great Northern railway, St. Paul, Minn., to American Bridge Co., Pittsburgh.

530 tons, addition building 64, General Electric Co., West Lynn, Mass., to American Bridge Co., Pittsburgh.

480 tons, overhead crossing, Rock Springs, Wyo., to American Bridge Co., Pittsburgh.

400 tons, bridge over Pajaro river, Chittenden, Calif., for Southern Pacific Co., to Columbia Steel Co., San Francisco.

375 tons, telephone building, Fruitvale, Calif., to Bethlehem Steel Co., San Francisco.

350 tons, shapes and bars, barracks, mess hall, bakery and brig, naval air station, Jacksonville, Fla., to Steel Products Co., Savannah, Ga., and Bethlehem Steel Co., Bethlehem, Pa.; Artley Co., Savannah, general contractor, bids May 8, bureau of yards and docks, navy department.

340 tons, improvement Los Angeles river channel between Downey road and Atlantic boulevard, Los Angeles, to Columbia Steel Co., San Francisco.

335 tons, forge shop, Wyman-Gordon Co., Worcester, Mass., to Haarmann Steel Co., Holyoke, Mass.

330 tons, vocational high school, Chester, Pa., to Belmont Iron Works, Eddystone, Pa.

300 tons, underpass, Rock Springs, Wyo., to American Bridge Co., Pittsburgh.

300 tons, foundry building, Bullard Co., Bridgeport, Conn., to Lehigh Structural Steel Co., Allentown, Pa., through Turner Construction Co., New York.

285 tons, mill building, Worcester, Mass., to American Bridge Co., Pittsburgh.

275 tons, McCullough housing project, Baltimore, to Aetna Contracting Co.

255 tons, power station buildings, Harding street, Indianapolis, for Indiana Power & Light Co., to Hugh J. Baker Co., Indianapolis.

230 tons, state highway bridge, Dushore, Pa., to Fort Pitt Bridge Works, Pittsburgh.

217 tons, three-span bridge, Bennington, Vt., to Bethlehem Steel Co., Bethlehem, Pa. through Frank J. Shields Inc. Southbridge, Mass.

200 tons, plate girder bridge, Hardwick, Mass., to Phoenix Bridge Co., Phoenixville, Pa., through J. F. Fitzgerald Construction Co., Boston, contractor.

185 tons, bridge 27, WPSO-104-A (1) Ellsworth county, Kansas, to St. Joseph Structural Steel Co., St. Joseph, Mo.

185 tons, Dearing press room, Louisville, Ky., to Louisville Bridge & Iron Co., Louisville.

180 tons, grade separation, College avenue, Milwaukee, for state, to Wisconsin Bridge & Iron Co., Milwaukee.

180 tons, addition to warehouse, for Bopp Steel Co., Detroit, to Austin Co., Cleveland.

175 tons, bridge, Berks county, Pa., to Bethlehem Steel Co., Bethlehem, Pa., through Edward H. Ellis, Westville, N. J.

170 tons, bridge FAP-526B (2), Kaufman county, Texas, to North Texas Iron & Steel Co., Fort Worth, Tex.

160 tons, hydraulic gate hoists, Coulee dam, to Consolidated Steel Co., Los Angeles.

160 tons, state bridge, Batavia, O., Norfolk & Western railroad, to American Bridge Co., Pittsburgh.

140 tons, warehouse, for J. V. C. Terminal Corp., Carlstadt, N. J., to Bergen Iron & Engineering Co.

135 tons, state bridge, Oak Hill, O., to Brookville Bridge Co., Brookville, O.

130 tons, building, for Sears, Roebuck & Co., Oneonta, N. Y., to Bethlehem Contracting Co., Bethlehem. Pa.

120 tons, bridge EVSRC-1574, Gilmer county, West Virginia, to Wheeling Structural Steel Co., Wheeling, W. Va.

115 tons, 130-foot turntable, Denver & Rio Grande railroad, Denver, to American Bridge Co., Pittsburgh.

110 tons, garage, Buffalo-Niagara Electric Co., Buffalo, to Bethlehem Steel Co., Bethlehem, Pa.; J. W. Cowper Co., Buffalo, contractor.

110 tons, office and service building, Ohio Power Co., Newark, O., to C. E. Morris Co., Columbus, O.

100 tons, addition to factory, for Detroit Stamping Co., Detroit, to Austin Co., Cleveland.

100 tons, Lamakin Village, housing project, Chester, Pa., to Belmont Iron Works, Philadelphia.

100 tons, high school, Elizabethton, Tenn., to Johnson City Foundry & Machine Co., Johnson City, Tenn.

Shape Contracts Pending

4000 tons, for two buildings at Patterson aviation field, Dayton, O.; bids July 2

3800 tons, hospital buildings, Deer Park, N. Y.; bids June 12.

3300 tons, twenty buildings, Sitka and Kodiak, Alaska, for United States navy.

2100 tons, four landplane hangars, specification 9185, Alameda, Calif., for United States government.

1185 tons, sheet and H-piling, bridge substructure, St. Georges, Del., Pencher Construction Co., Cincinnati, general contractor.

1000 tons, power plant, West Reading, Pa., Utility Management Corp., Reading, Pa.; bids in.

800 tons, highway bridges, New York state; bids June 26, Albany, N. Y.

620 tons, four state highway bridges, various locations, Illinois; bids in.

550 tons, grade separation, Westchester avenue, Bronx, New York, for Triboro Bridge authority.

500 tons, two-story building, Curtiss-Wright Aircraft Corp., Caldwell, N. J.

451 tons, grade crossing elimination, route 23, section 8B, at Lehigh & New England railroad, near Sussex, N. J., including Papakating Creek bridge; bids June 21, E. Donald Sterner, state highway commissioner, Trenton.

430 tons, bridge, Clearfield County, Pa.; bids June 13.

430 tons, plate girder bridge, Clearfield county, Pennsylvania; bids to state highway department, Harrisburg, Pa., June 13.

400 tons, apartment house, for Leo Callhan, Rochester, N. Y.

360 tons, state highway bridge, Safford, Ariz.; bids in.

330 tons, office building, for Grayclan Co., Elizabeth, N. J.

300 tons, receiving building, for Westing-

house Electric & Mfg. Co., East Pittsburgh, Pa.

300 tons, power plant, Vienna, Md., Utility Management Corp., Reading, Pa.; bids in.

284 tons, two Washington state bridges, Clallam county; bids at Olympia, June 18.

265 tons, truss bridge, Northumberland county, Pennsylvania; bids to state highway department, Harrisburg, Pa., June 13.

263 tons, state bridge, Tionesta, Pa.

260 tons, state highway bridge, Ladysmith, Wis.; bids in.

250 tons, addition to factory, for American Metal Products Co., Detroit.

250 tons, state highway bridges, various locations, Wisconsin; bids in.

200 tons, state highway bridge, Burwell, Neb.; bids in.

200 tons, addition to high school, State College, Pa.

200 tons, addition for U. S. Electric Motors Co., Milford, Conn.

150 tons, building, for New England Telephone & Telegraph Co., Fall River, Mass.

140 tons, extension to garage, for United Electric railroad, Pawtucket, R. I.

140 tons, apartment building, for Garden apartments, Trenton, N. J.

126 tons (also 73 tons reinforcing) rebuilding Celilo locks, Columbia river; Travares Construction Co., Stevenson, Wash., low.

120 tons, repairs to bridge, Elkins, W. Va., for Western Maryland railroad.

120 tons, wide-flanged steel beam bridges, Chester, Halifax, Castleton and Lincoln, Vt.; bids June 14, H. E. Sargent, commissioner of highways, Montpelier, Vt.

115 tons, state bridge, Chelmsford, Mass.

110 tons, plant building No. 1, for B. F. Goodrich Co., Niagara Falls, N. Y.

110 tons, warehouse, for Detroit Gasket & Mfg. Co., Detroit.

106 tons, bridge carrying Mt. Vernon Memorial highway over north access to Washington national airport, Washington; bids June 14.

Unstated tonnage, Indiana state highway bridges; bids June 17.

Unstated, two transmission towers; Tacoma, Wash.; bids June 10.

Unstated, radial gates and hoists for Roza, Wash., irrigation project, and eleven 24-inch regulating valves for Coulee, Spec. 1370-D; bids to Denver June 17 and 18, respectively.

Unstated tonnage, 175,950 square feet sheet piling guard wall for locks and dams Nos. 11, 16, 18, 20 and 21 in Mississippi river; general contract to James Construction Co., St. Paul.

Tin Plate

Tin Plate Prices, Page 94

Operations continue to gain on increased export and domestic buying. Estimate this week is 76 per cent of capacity, representing virtual peak on most operating mills. Producers indicate they will probably not turn to obsolete units now idle. Some of current production is for increasing stock, both at mills and at consumers' plants.

Reinforcing

Reinforcing Bar Prices, Page 95

Pittsburgh—There is an apparent move toward firmer markets in concrete bars, with mills gradually building up bookings. Inquiries and orders continue active, both in private industry and from public jobs.

Chicago — Requirements for Northwestern university technological school, Evanston, Ill., are now estimated at close to 2500 tons, though actual figures are not yet reported. Volume of other work continues large though chiefly involving small lots individually.

New York — Distributors are striving to strengthen reinforcing bar prices with mills taking a firmer stand in view of heavy demand for other products. Lack of tonnage placed, however, has prevented a real test. Awards are featured by placing of 950 tons for a housing project in Jersey City, N. J.

San Francisco — Important reinforcing bar awards included 4780 tons for the improvement of the Los Angeles river channel between Fourth street and Olympic boulevard, Los Angeles, placed with Blue Diamond Corp. and 2000 tons for the treasury department, same city,

Baltimore—State road work is contributing chiefly to reinforcing steel demand here, with bids in on more than 1000 tons of mesh and additional work in prospect. Building construction requirements are light. Prices on mesh are steady, compared with continued unsettlement for most other forms of reinforcing steel.

Reinforcing Steel Awards

4780 tons, improvement Los Angeles river channel between Fourth street and Olympic boulevard, Los Angeles, to Blue Diamond Corp., Los Angeles.

2000 tons, treasury department, Los Angeles, invitation A-10096, to Trojan Steel Corp., Los Angeles.

1300 tons, national airport, Gravely Point, Va., to Rosslyn Steel Co., Washington,

Concrete Bars Compared

	Tons
Week ended June 8	14,920
Week ended June 1	5,137
Week ended May 25	7,899
This week, 1939	8,009
Weekly average, year, 1940	8,339
Weekly average, 1939	9,197
Weekly average, May	7,058
Total to date, 1939	237,638
Total to date, 1940	191,810

Includes awards of 100 tons or more.

through John McShain Inc., Philadelphia.

1200 tons, national guard armory, Washington, to Bethlehem Steel Co., Bethlehem, Pa., through Charles H. Tompkins, Washington.

950 tons, housing project, Jersey City, N. J., to Truscon Steel Co., Youngstown, O., through Weinstein & Rubin, contractors.

650 tons, housing development, Elizabeth, N. J., to ReRpublic Steel Corp., Cleveland, through Truscon Steel Co., Youngstown, O.; Andrew Christenson, contractor.

500 tons, Boeing Aircraft Co. plant extension, Seattle, to Seattle Steel Co., Seattle.

471 tons, Chicago park district, Chicago, to Calumet Steel Co., Chicago.

440 tons, highway project RC-40-28, Otsego county, New York, to Truscon Steel Co., Youngstown, O., through Arute Bros. Inc., New Britain, Conn.

401 tons, improvement Los Angeles river channel, between Downey Road and Atlantic boulevard, Los Angeles, to Bethlehem Steel Co., Los Angeles.

285 tons, Grand avenue viaduct, Kansas City, Mo., to Sheffield Steel Corp., Kansas City, Mo.

250 tons, stills, Tidewater Oil Co., Bayonne, N. J., to Bethlehem Steel Co., Bethlehem, Pa.; E. B. Badger & Sons, contractors.

220 tons, Lamokin Village, Chester, Pa., to American Steel Engineering Co., Philadelphia.

200 tons, bridge, Greenwood county, Kansas, to Sheffield Steel Corp., Kansas City, Mo.

182 tons, building addition, Sears, Roebuck & Co., Milwaukee, to Joseph T. Ryerson & Son Inc., Chicago.

150 tons, Lincoln apartments housing, Frederick, Md., to Bethlehem Steel Co., Bethlehem, Pa.; Sofarelli Bros., contractors.

140 tons, road work, Delaware county, Pa., to American Steel & Wire Co., Cleveland, through Union Paving Co., Philadelphia.

135 tons, garage, 125 South Wabash avenue, Chicago, to Ceco Steel Products Corp., Cicero, Ill.

125 tons, bridge, Medicine Lodge, Kans., to Sheffield Steel Co., Kansas City, Mo.

115 tons, road work, Lehigh county, Pa., to Bethlehem Steel Co., Bethlehem, Pa.; through Charles Riede Co., Lansford, Pa.

110 tons, bars and miscellaneous steel, Birch Hill dam, Massachusetts, to Bethlehem Steel Co., Bethlehem, Pa.; B. Perini & Son Inc., Framingham, Mass., contractor.

110 tons, office building for E. I. du Pont de Nemours & Co., Wilmington, Del., to Bethlehem Steel Co., Bethlehem Pa.; Turner Construction Co., contractor.

106 tons, Polk county, Ark., to Jones & Laughlin Steel Corp., Pittsburgh.

100 tons, school, Chester, Pa., to American Steel Engineering Co., Philadelphia, through Wark Co., Philadelphia.

Reinforcing Steel Pending

1400 tons, sections 3 and 4, grade crossings, Long Island railroad at Atlantic avenue, Brooklyn, N. Y.; bids June 20.

1250 tons, guard walls for locks and dams Nos. 11, 16, 18, 20 and 21 in Mississippi river; general contract to James Construction Co., St. Paul.

900 tons, bridge substructure, St. Georges, Del., Pencher Construction Co., Cincinnati, general contractor.

520 tons, bureau of reclamation, invitation B-38,273-A, Odair, Wash; Bethlehem Steel Co., Seattle, low.

500 tons, building for National Fire Insurance Co., Hartford, Conn.; George A. Fuller, contractor.

493 tons, (also shapes, gates, plates and cast iron pipe) Mill Creek, Wash., rolled filled dam, flood control project; Parker & Schram, Portland, and Eaton & Smith, San Francisco, general contractors.

400 tons, infirmary patients' building, Deer Park, N. Y.

390 tons, flood control project, York, Pa.; bids to United States engineer, July 9.

370 tons, grade elimination, Westchester avenue, New York, for Triborough bridge authority; Del Balso Construction Corp., New York, low.

300 tons, Catholic high school for boys, New York; George A. Fuller, contractor.

255 tons, including 75 tons mesh, concrete deck and approaches, Passaic river bridge, route 25, section 30C, Newark-Kearny, N. J.; bids June 21, E. Donald Sterner, state highway commissioner, Trenton; 182,890 linear feet, steel reinforcement trusses also required, about five pounds per foot.

250 tons, bridge substructure, Sec. 15-B, Peoria, Ill.; bids June 21.

215 tons, grade crossing elimination, Seaford, Del.; bids June 12.

188 tons, Panama, schedule 4067, Jos. T. Ryerson & Son Inc., Chicago, low.

175 tons, mats and bars, grade crossing elimination, route 23, section 8B, at Lehigh & New England railroad, near Sussex, N. J., including Papakating creek bridge; bids June 21, E. Donald Sterner, state highway commissioner, Trenton.

160 tons, plant for Buckeye Cotton Oil Co., Louisville, Ky.

155 tons, bulkhead, East River drive, New York; J. Rich Steers Inc., New York, low.

150 tons, relief culverts, flood control project, Kingston, Pa.; bids June 10 to U. S. Engineer, Baltimore.

150 tons, two pumping stations, Chicopee, Mass.

138 tons, bureau of reclamation, invitation 27,692-A, Deer Creek, Utah; bids June 10.

125 tons, Washington state highway work; bids at Olympia, June 18.

120 tons, two Washington state bridges; Goetz & Brennan, Seattle, general contractors.

118 tons, bridge carrying Mt. Vernon Memorial highway over north access to Washington national airport, Washington; bids June 14.

100 tons, water filtration plant, Camp Dix, N. J.; bids June 13.

100 tons, reservoir, Norristown, Pa., Norristown Water Co.; bids June 13.

100 tons, plate girder bridge, Clearfield county, Pennsylvania; bids to state highway department, Harrisburg, Pa., June 13.

100 tons, highway projects, Connecticut; bids June 10, Hartford, Conn.

Unstated, buildings at Sand Point, Seattle, naval air base; A. F. Mowat, Seattle, general contractor.

Unstated, 196-foot Montana state bridge; Walter Macklin, Billings, Mont., general contractor.

Pig Iron

Pig Iron Prices, Page 96

Pittsburgh—Blast furnace operations are heavier, with production schedules increased in many plants. Thirty-eight of 50 furnaces are blowing and repair work is being done on several additional stacks. Latest additions blown in on June 1 were one stack at Duquesne works, Carnegie-Illinois Steel Corp., and one at Monessen works of Pittsburgh Steel Co.

Chicago — Buying has leveled off but still continues at a fair rate. Most consumers have covered needs for third quarter. Shipments will be higher this month than last, undoubtedly, it is stated. So far this month, however, there has been little change in shipments except to steel mills in the midwest.

Boston—Considerable pig iron buying for third quarter delivery is being done at unchanged prices. While there has been no official announcement reaffirming prices, current transactions covering that period amount to the same. With stocks getting low Mystic furnace, Everett, Mass., will go into blast soon. Buying for prompt delivery is broader with individual orders inclined to be larger.

New York—Most pig iron consumers here are covered for at least third quarter and in various important instances for the remainder of the year on such future requirements as they can now see.

Philadelphia — Buying has slowed down as consumers now are fairly well covered through third quarter. A little interest is evidenced in even further coverage due to the rising scrap market, but producers are unwilling to sell for that period at present prices. Shipments are heavier.

Cincinnati—Pig buying for third quarter has been so rapid that most important users are covered, uncertainty of conditions having spurred commitments. Shipments are expanding, in keeping with a heavier melt. Demand from machine tool manufacturers is extremely active.

St. Louis—Pig iron shipments in May were 20 to 25 per cent larger than in April and June shows signs of further increase. Buying has increased since it has developed that prices for third quarter probably will not be changed. Reduced inventory is believed to have spurred buying.

Scrap

Scrap Prices, Page 98

Pittsburgh — Strength continues, although buying is in small volume. Some mills have been offering prices above current quotations in other sections of the country to compete with more favorably located mills, as available material here is low.

Chicago — Further uptrend in value of some items, particularly cast grades, was noted last week. Sentiment is stronger, due to continued increase in steel mill operations and indications of heavier scrap needs in the near future. Trading in No. 1 heavy melting steel, which subsided to $17 and $17.25 levels, has returned to $17.50 and higher, with railroad material bringing $18 and more. No. 1 steel remains quoted at $17 to $17.50, the latter figure still representing the price involved in most recent mill purchases.

Cleveland — Recent railroad closings show strong upward tendency in prices. The local market is still in the hands of dealers, consumers taking only small lots.

Boston—Iron and steel scrap prices for several grades have made further advances, notably for shipment to Pennsylvania, and yard dealers are inclined to hold out for yet higher quotations. Several inquiries from Canada for stove plate are noted. Steel for export, dock delivery, is firming and as high as $16 for No. 1 heavy melting steel is being paid.

New York — Sharp advances in prices affecting practically the entire list have lifted quotations for domestic and export about $1 per ton and in some instances more.

Philadelphia — Rising tendency continues in scrap with No. 1 steel up $1 a ton further at $19.50 to $20. No. 2 steel, which is relatively less scarce, is up 50 cents to $18. Practically the entire list participated in the advance. E. G. Budd Mfg. Co.'s June list of 2500 tons of new compressed sheets went at around $18, f.o.b. plant.

Buffalo—Following the recent advance of $1 a ton to $18.50 and $19 for steelmaking grades, prices have held firmly. Sentiment among scrap dealers continued strongly optimistic and the opinion prevailed in trade circles that prices could move only upward.

Detroit—The iron and steel scrap market continues active with prices up about 50 cents per ton, although some specialty items such as low-phosphorus plate and punchings for electric furnace are even stronger.

Cincinnati—Prices of iron and steel scrap are strong and tend higher, although heavy melting steel remains unchanged. Dealers are active in bolstering stocks, but mills are avoiding future tonnage commitments. Consumers are taking heavy shipments on orders, but laggard buying has been a factor in diversion of some tonnage to nearby districts.

St. Louis—The scrap market is quiet, with the sale of a small tonnage of specialties to an east side mill the only transaction of the week. Mills are proceeding cautiously in view of the international

situation, but are willing to buy from brokers at a lower basis than now prevails, which brokers are unwilling to concede.

San Francisco—Scrap prices have again turned upwards and No. 1 heavy melting steel, f.o.b. cars metropolitan areas of Los Angeles and San Francisco, are quoted at $13.00 to $13.50 a net ton, while No. 2 is priced at $12.00 to $12.50. Compressed sheets have also advanced and are now being quoted at $10.00 to $10.50. Movement of No. 1 heavy cast scrap is not heavy.

Warehouse

Warehouse Prices, Page 97

Chicago — Demand shows expansion. Trend appears more definitely upward, though business generally is not as yet significantly changed. Mills report tendency of distributors to increase stocks against heavier demand anticipated for near-future.

New York—Demand is broadening as to number of products with aggregate volume maintained. Except for galvanized sheets prices have a firmer tone. Despite the recent reduction, some distributors are shading 4.05c for No. 24 gage. A few larger individual orders for plates and lumped miscellaneous products are appearing.

Philadelphia — Demand is fairly well diversified but so far is showing relatively little increase over May volume. Prices are steadier.

Buffalo—Moderate stimulation of demand for iron and steel warehouse items has held over but prices and business have shown no further improvement.

Detroit—Warehouse sales are being maintained at an encouraging level, and specialty items such as heat treated alloy steels in aircraft grades are in particular demand.

Cincinnati—Warehouse sales are running counter to the usual seasonal declines and volume so far in June may presage greater tonnage than in May. Industrial needs, particularly for machine tool builders, tend heavier. Prices are strong and unchanged.

Iron Ore

Iron Ore Prices, Page 98

Cleveland—Lake Superior iron ore shipments in May totaled 7,244,549 gross tons, compared with 3,601,453 tons in May, 1939, according to the Lake Superior Iron Ore association, Cleveland. Shipments were 464,669 tons in April, the aggregate for the season being 7,743,196 tons, which is 4,084,945 tons greater than in the same period last year.

Comparisons by ports, 1939 and 1940, are as follows:

Port	Shipments In May	Season to June 1
Escanaba	346,000	406,378
Marquette	667,055	767,765
Ashland	740,621	779,077
Superior	2,410,034	2,640,618
Duluth	1,674,738	1,674,738
Two Harbors	1,406,101	1,440,642
U. S. total	7,244,549	7,709,218
Michipicoten	29,475	33,978
Grand total	7,274,024	7,743,196
Increase from year ago	3,672,571	4,084,945

New York — A substantial tonnage of foreign iron ore, running 0.02 and higher in phosphorus, has been sold here in the past few days at prices approximating the equivalent of 15 cents per unit, c.i.f. Eastern seaboard.

Trading in low phosphorus and basic ores, however, continues at a standstill, as asking prices appear prohibitive, with pig iron selling at its present levels. North African low phosphorus and Spanish North African basic are being offered at 19 to 20 cents per unit, c.i.f. Atlantic ports, and even recent quotations of 17 to 18 cents on low phosphorus from another foreign source has failed to attract much buying.

Meanwhile, the disposition among eastern buyers, who nominally are principal consumers of foreign ore, is to turn more and more toward Lake ore to supplement present stocks and such importations as they are bringing in, chiefly from South America and Cuba.

Tungsten ore prices are strong but unchanged, with Chinese wolframite holding at $23.50 to $24, per short ton unit, duty paid, and with domestic scheelite holding at approximately the same range. Recent offerings of Bolivian tungsten range around $22 to $22.50 per short ton unit, duty paid. However, specifications do not fully meet American standards; hence, little of this tungsten, it is said, is being bought, notwithstanding the fact that prices are lower than for Chinese tungsten and domestic scheelite.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 95

Heavy export inquiry for bolts and nuts is being received, largely as the result of Belgian exports being shut off. Great Britain is the largest inquirer, having been the principal outlet for Belgium. De-

liveries are to several of the Dominions as well as to the home land. Domestic buying shows moderate improvement but it is believed preparedness programs will stimulate tonnage sharply and already inquiries are being figured on tanks and similar equipment. Automotive requirements are tapering as the 1940 season wanes. Prices are steady with expectation that third quarter prices will show no change.

Nonferrous Metal Prices

June	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
1	11.50	11.50	11.25	55.00	52.25	5.00	4.85	6.00	19.00	14.00	35.00
3	11.50	11.50	11.25	54.75	52.50	5.00	4.85	6.25	19.00	14.00	35.00
4	11.50	11.50	11.25	54.62½	52.25	5.00	4.85	6.25	19.00	14.00	35.00
5	11.50	11.50	11.25	54.37½	51.87½	5.00	4.85	6.25	19.00	14.00	35.00
6	11.50	11.50	11.25	53.87½	51.75	5.00	4.85	6.25	19.00	14.00	35.00
7	11.50	11.50	11.30	54.37½	52.25	5.00	4.85	6.25	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) 18.56
Copper, hot rolled 20.12
Lead, cut to jobbers 8.25
Zinc, 100 lb. base 11.00

Tubes

High yellow brass 21.31
Seamless copper 20.62

Rods

High yellow brass 13.51
Copper, hot rolled 16.62

Anodes

Copper, untrimmed 17.37

Wire

Yellow brass (high) 18.81

OLD METALS

Nom. Dealers' Buying Prices

No. 1 Composition Red Brass

New York 7.12½-7.37½
Cleveland 8.25-8.50
Chicago 7.50-7.75
St. Louis 7.75-8.25

Heavy Copper and Wire

New York, No. 1 ..... 8.75-9.00
Cleveland, No. 1 ..... 9.25-9.50
Chicago, No. 1 ..... 8.75-9.00
St. Louis 8.75-9.25

Composition Brass Turnings

New York 6.75-7.00

Light Copper

New York 6.75-7.00
Cleveland 7.00-7.25
Chicago 6.75-7.00
St. Louis 6.75-7.00

Light Brass

Cleveland 4.25-4.50
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 .. 12.25
Standard No. 12 aluminum .. 14.00-14.50

Steel in Europe

Foreign Steel Prices, Page 97

London — (*By Cable*)—Every means is being taken in Great Britain to intensify steel and iron output further. All production is controlled and most is earmarked for war purposes. Large steel tonnages are wanted from America to keep rolling mills and forges working full time. Pig iron is now rationed and light foundries are obtaining government contracts. The tin plate trade is busy. Sheet and galvanized sheet exports are subject to domestic requirements. Steel output of France is seriously curtailed.

Semifinished Steel

Semifinished Prices, Page 95

Pittsburgh—Orders for semifinished steel for export continue to increase substantially, and releases from nonintegrated mills also are heavier. Deliveries on some items are beginning to drop behind, and with continuation of orders at present rate, delivery difficulties may be expected soon.

Coke Oven By-Products

Coke By-Product Prices, Page 95

New York — Coking operations having advanced slower than steel production, by-product output continues to move directly into consumption with little accumulation of supplies. Demand for xylol and toluol by lacquer and chemical industries is substantial with benzol releases somewhat spotty. Prices are unchanged and will carry through June. Naphthalene demand is heavy and for phenol fair. With new contract prices on sulphate of ammonia to be announced July 1, current activity is at a standstill.

Nonferrous Metals

New York—A strong price tone was imparted nonferrous metal markets last week by a tight supply situation in copper and zinc. Current and prospective consumption for manufacture of armaments helped to stimulate demand. Zinc advanced ¼-cent to 6.25c, while casting copper late Friday rose 5 points to 11.30c.

Copper—Most leading sellers sold all the prompt metal they had available at 11.50c, Connecticut. With the exception of a small tonnage booked early in the week at 11.37½c,

all export copper sales were made at 11.50c. Italy is reported to have suspended shipment against all copper on order here—estimated at 7500 tons—until further notice.

Lead — Lead demand was moderate throughout the week. Sellers have heavy backlogs and report shipments are tending to improve. The market continued firm at 4.85c, East St. Louis, and 5.00c, New York.

Zinc—The advance in prime western metal to 6.25c, East St. Louis, reflects the improved statistical position of slab metal. May shipments were the largest since November, but unfilled orders May 31 were the heaviest in six months. Little tonnage of intermediate and prime western grades still is available. Some export business was placed at a premium over the domestic market. May exports were larger than for any any full year since 1929.

Tin — Prices tended downward through most of the week but recovered part of the loss Friday to stand at 54.37½c for spot. The market was slow.

Antimony — Prices were unchanged at 14.00c, New York, for American spot and nominally 16.50c, duty paid New York, for Chinese spot. Business was light.

Construction and Enterprise

New York

HAMMONDSPORT, N. Y.—Curtiss-Wright Corp., Vulcan and Kenmore streets, Buffalo, will build an airplane factory costing about $40,000.

JAMAICA, N. Y.—Department of sanitation, New York, 125 Worth street, New York, will build a two-story sewage disposal plant at 132-32 150th avenue, costing $300,000. W. H. Fenton, care owner, is architect.

NIAGARA FALLS, N. Y.—Mathiesen Alkali Co., Buffalo avenue, E. M. Allen, president, will build a two-story plant 25 x 175 feet, costing over $40,000.

NIAGARA FALLS, N. Y.—Pittsburgh Metallurgical Co., Highland avenue, will build a one-story addition 75 x 154 feet, costing about $30,000.

NIAGARA FALLS, N. Y.—B. F. Goodrich Co., 500 South Main Street, Akron, O., A. Pellett in charge, will build a three-story plant 50 x 100 feet, costing about $40,000.

SIDNEY, N. Y.—Scintilla Magneto Co. Inc., a subsidiary of Bendix Aviation Co., will build three buildings 60 x 450 feet, and two 100 x 200 feet. General contract to Frank Lewis & Sons, Bainbridge, N. Y., at more than $100,000. A. Bekker is purchasing agent.

TONAWANDA, N. Y.—Eastern States Milling Corp., Military road, will build a two-story plant addition costing over $40,000. A. E. Baxter Engineering Co., 344 Delaware avenue, Buffalo, are engineers.

TROY, N. Y.—Troy Chain Co., Tyler street, J. Worton, president, is having plans prepared for a plant addition.

Connecticut

BRIDGEPORT, CONN.—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., will build a one-story service building 80 x 152 feet, costing $50,000.

NEW BRITAIN, CONN.—New Britain Machine Co., 140 Chestnut street, H. H. Pease, president, will build a one-story plant addition, including crane runways, at cost of about $40,000.

Rhode Island

PROVIDENCE, R. I.—Brown & Sharpe Mfg. Co., Promenade street, will build one-story 75 x 250 and 90 x 95 foot manufacturing buildings, costing $100,000.

Massachusetts

WORCESTER, MASS.—Worcester Wire Works, 70 James street, will build a one-story addition 130 x 225 feet. General contract has been let to Fiske-Carter Construction Co., 8 Norwich street. F. N. Cutting, 29 Pearl street, is engineer.

New Jersey

BENDIX, N. J.—Air Associates Inc., Box 333, Garden City, N. Y., plans a one and two-story airplane parts plant and offices at cost of $175,000.

NEWTON, N. J.—Campbell Co., Hicks avenue, will build a one and two-story plant 65 x 250 feet, costing $75,000.

Pennsylvania

CORRY, PA.—Raymond Mfg. Co., South Center street, E. Feldt, vice president and general manager, will build a plant addition costing about $40,000.

ESSINGTON, PA.—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., will build a three-story plant 120 x 300 feet, costing $100,000. General contract has been let to United Building Construction Co., 246 South Twenty-second street, Philadelphia.

SHARON, PA.—Westinghouse Electric & Mfg. Co., 469 Sharpsville avenue, will build an addition for salvage department, about 12,000 square feet. M. L. Fawcett is plant manager.

WARREN, PA.—Royal Mfg. Co., M. Kovacs, 19 North First street, Duquesne, Pa., in charge, will build six one-story and two two-story refinery buildings costing $100,000. (Noted June 3).

Ohio

ANDOVER, O.—General Electric Co., E. J. Edwards, engineer, Nela Park, Cleveland, will build a one-story factory costing about $40,000.

CHAGRIN FALLS, O.—Stephen Jencick Engineering Laboratories Inc., will lease plant here with about 15,000 square feet floor space for manufacture of diesel motor injection system. Stephen Jencick, 68 Water street, Chagrin Falls, is president.

CLEVELAND — Kromer-Nierman Co., 1835 East Twenty-fourth street, has been formed by W. R. Kromer and associates to manufacture temperature control and heating equipment.

CLEVELAND—Clark Controller Co., 1146 East 152nd street, will build an additional factory unit and has given contract to the J. L. Hunting Co., Ninth and Chester building, Cleveland.

CLEVELAND — Interstate Brass & Aluminum Co., newly organized, has leased a one-story factory building at 3319 St. Clair avenue for use as a foundry.

CLEVELAND—Steel Storage File Co., 2216 West Sixty-third street, plans to move its business from Cleveland, building new plant or remodeling an old one. Walter F. Regenhardt is president and treasurer.

CLEVELAND — Monmouth Products Co., 1929 East Sixty-first street, manufacturer of automotive parts and light stampings, is considering building new plant or remodeling old plant in new

location. Company forced to move by street extension passing through present plant. Ernest L. Davis is president.

LORAIN, O.—Flexo Co., 671 Broadway avenue, George W. Krause, manager, has leased plant for production of a flexible-handled safety razor.

MASSILLON, O.—Union Drawn Steel division of Republic Steel Corp., Harsh avenue SE, will spend about $200,000 rehabilitating and expanding its plant here. Part of building 150 x 700 feet will be remodeled and new equipment installed.

Michigan

DETROIT—Acme Sheet Metal Corp., 4628 Moran street, has been incorporated by Anthony J. Reis, to conduct an engineering and construction business.

DETROIT—Avigation Instrument Corp., Detroit city airport, has been incorporated with $5000 capital by Felix Preston, 760 Algonquin avenue, to deal in instruments used in navigation.

DETROIT — Stainless Steel Forming Corp. has been incorporated with $50,000 capital by George J. Haar, 5450 Grand River avenue, to manufacture stainless steel products.

DETROIT—Peninsular Tool & Die Co., 2222 Myrtle street, has been incorporated with $10,000 capital to manufacture jigs and dies, by Earl H. Harrison, 1641 Lawndale avenue, Detroit.

DETROIT—Peninsular Grinding Wheel Co., 729 Meldrum street, will build a two-story addition to its plant, 50 x 120 feet. H. D. Ilgenfritz, Detroit, is architect.

DETROIT—Lincoln Brass Works, 2067 Twelfth street, is having plans made by E. B. Arnold, care owner, for a one-story factory addition 95 x 105 feet, to cost about $40,000.

GRAND HAVEN, MICH.—Screw Machine Specialty Co. will build a one-story plant 50 x 100 feet.

WATERVLIET, MICH. — Watervliet Paper Co., manufacturer of coated papers, plans plant improvements to cost about $125,000.

WYANDOTTE, MICH.—All Metal Products Co. will build a storage building 60 x 200 feet. Carlton P. Campbell, Wyandotte, is architect.

Illinois

CHICAGO—Birtman Electric Co., 4140 West Fullerton avenue, has let contract to the Austin Co., 16112 Euclid avenue, Cleveland, for additions of 35,000 square feet to its plant at Rock Island, Ill., at cost of about $100,000, to increase capacity for production of washing machines, vacuum cleaners and electric irons.

FRANKLIN PARK, ILL.—Pipe Line Service Co., 205 Wacker drive, Chicago, will build a one-story factory addition. General contract has been let to Abell Howe Co., 53 West Jackson boulevard, Chicago. Cost estimated at $40,000.

Indiana

FORT WAYNE, IND.—International Harvester Co., 606 South Michigan boulevard, Chicago, will build a one-story manufacturing plant 147 x 686 feet costing $200,000. General contract has been let to Indiana Engineering Co. Inc., Utility building, Fort Wayne.

LAFAYETTE, IND.—Aluminum Co. of America, Gulf building, Pittsburgh, will build a one-story mill extension and tube mill. General contract has been let to A. E. Kemmer, Third and Brown streets, at cost of about $300,000.

WALTON, IND.—Town board, H. Becklay, chairman, is planning a deep-well pump, steel tank on tower and watermains, at cost of $20,000. M. L. Burden, 103½ North Harrison street, Alexandria, Ind., is consulting engineer. Bids June 12.

Missouri

ST. LOUIS—McCabe-Powers Auto Body Co., 1217 North Broadway, has let general contract to Fruin-Colnon Contracting Co., 502 Merchants Laclede building, for a factory and office building at 5926 North Broadway, one-story 90 x 350 and 90 x 100 feet. Cost about $50,000.

ST. LOUIS—Missouri Boiler & Sheet Iron Works, 908 South Twenty-third street, will build a one-story boiler plant 80 x 88 feet. General contract has been let to W. C. Harting Construction Co., 722 Chestnut street. Cost is about $40,000.

Wisconsin

AMERY, WIS.—Wisconsin Hydro Electric Co. plans construction of a steam plant and a substation.

COLBY, WIS.—Frank Jordan is having plans prepared for a one-story machine shop 32 x 52 feet.

COLUMBUS, WIS.—Public service commission has granted permisison to city for construction of a diesel engine electric generating plant to cost about $230,000.

FOND DU LAC, WIS.—Giddings & Lewis Machine Tool Co. will build a one-story plant 44 x 120 feet. F. J. Stepnoski & Son are architects.

GREEN BAY, WIS.—Green Bay Drop Forge Co. is building an addition to house a steel treating department.

MILWAUKEE—Chain Belt Co., manufacturer of concrete mixers, pumps and similar products, will build a two-story factory addition 31 x 123 feet. Eschweiler & Eschweiler, 720 East Mason street, are architects.

MONTREAL, WIS.—City has awarded contract to Frank Tomlinson, Ashland, Wis., for a one-story municipal garage and machine shop 48 x 104 feet. R. R. McDonnell is city clerk. C. J. Anderson, Ironwood, Wis., is architect.

RACINE, WIS.—Twin Disc Clutch Co., 1328 Racine street, will build a factory building and office costing $75,000.

WAUSAU, WIS.—Marathon Rubber Products Co., J. L. Usow, president, is planning construction of a factory addition.

Minnesota

MAPLE LAKE, MINN. — Minnesota rural power association, Harry Edmunds, Cedar, Minn., president, will build a diesel generating plant, costing, with equipment, about $500,000. Stanley Engineering Co., Muscatine, Iowa, is consulting engineer.

MINNEAPOLIS — Werner Transportation Co., 225 North Fifth street, will build a one-story maintenance shop addition 46 x 158 feet. Perry E. Crosier, Phoenix building is architect.

PARK RAPIDS, MINN.—Itasca-Mantrap electric co-operative, Don C. Servis, president, is preparing plans for 254 miles of rural transmission lines to serve 735 customers. George Taus, 5024 Indianola avenue, Minneapolis, is consulting engineer.

PELICAN RAPIDS, MINN.—Lake region electric co-operative, A. R. Knutson, superintendent, has plans for 200 miles of rural transmission lines.

RED LAKE FALLS, MINN.—Red Lake electric co-operative, Stephen Singer, secretary, will build 238 miles of rural transmission lines. Ellerbe & Co., E-1021

First National Bank building, St. Paul, Minn., are consulting engineers.

Texas

BRECKENRIDGE, TEX.—United Pipe & Metal Corp. has been incorporated with $8500 capital to deal in steel and iron, by J. Gachman, Dan Gachman and associates.

TEXAS CITY, TEX.—Carbide & Carbon Chemical Corp., Carbide and Carbon building, New York, will build chemical plant on new site between here and La Marque. In addition to chemical manufacturing buildings plant will include steam plant and compressor station using gas engine-driven compressors. Construction under direction of Ford, Bacon & Davis Inc., New York. (Noted May 27).

Kansas

WICHITA, KANS. — Beech Aircraft Corp. is having plans prepared by Overend & Boucher, architects, for a one-story factory addition.

WICHITA, KANS.—Cessna Aircraft Co. has given general contract to Walter Armagost for a one-story assembly plant 100 x 400 feet. Overend & Boucher are architects.

South Dakota

MILBANK, S. DAK.—Whetstone Valley Electric Association has been incorporated to build 500 miles of rural transmission lines. Fred Schwandt is president and Alfred J. Pew is secretary-treasurer.

Nebraska

CARROLL, NEBR. — Wayne county rural public power district has given contract to Elkhorn Construction Co., Norfolk, Nebr., for 213 miles of rural transmission lines.

HASTINGS, NEBR.—City, Raymond L. Crosson, clerk, has authorized improvements to municipal light plant, including overhead crane for turbine maintenance, new switchgear, changeover of distribution system from 2450 volts to 4150 volts and adjustable-type governor for 3500-KW turbogenerator, total cost $141,764. Black & Veatch, 4706 Broadway, Kansas City, Mo., are engineers.

Iowa

BROOKLYN, IOWA — Village, Jennie Schmitz, clerk, will take bids June 25 for municipal light and power plant to cost about $135,000, including two diesel generating units of 200 kilowatts each. Stanley Engineering Co., Muscatine, Iowa, are engineers. (Noted May 13)

DENISON, IOWA—City, R. L. Rule, clerk, takes bids of June 24 on a 1500-KW turbogenerator, exciter, air cooler, surface condenser and auxiliaries.

GALVA, IOWA—WPA has approved a $14,400 allotment for a sewage disposal plant, including Imhoff tank, filter, sludge bed clarifier and control house. I. E. Baumgartner is city clerk.

OSAGE, IOWA—City, F. J. Cromer, clerk, is making survey for construction of power and light plant. Hubbard Engineering Co., 80 East Jackson boulevard, Chicago, is consulting engineer.

Wyoming

BASIN, WYO.—Big Horn Rural Electric Co., M. N. Roush, superintendent, has applied for $100,000 additional funds to build 100 miles of rural electric lines.

California

LONG BEACH, CALIF.—Long Beach Aircraft Corp. has been incorporated with $100,000 capital by Harvey N. Martin, Long Beach, and associates.

LOS ANGELES—Manta Aircraft Corp. has been incorporated with 100,000 shares no par value by David R. Davis, Hollywood, Calif., John P. Davies, Altadena, Calif., and J. Norman Phillips, Los Angeles.

LOS ANGELES—Harvill Aircraft Die Casting Corp., 2344 East Thirty-eighth street, will buy ten acres near the municipal airport and erect a new plant with 52,000 square feet floor space and installation of additional equipment to triple output. James F. McNamara, general sales manager International Nickel Co., New York, and Stanley M. Tracy, treasurer, Driver-Harris Co., Harrison, N. J., are among directors of the company.

Oregon

PORTLAND, OREG.—Lord & Loryea, contractors, have been awarded a contract to build a power plant at the naval air base at Tongue Point, Oreg., on low bid of $126,570.

SPRINGFIELD, OREG.—Fred J. Voight, owner of a box factory at Eugene, Oreg., plans construction of a $15,000 plant here.

Washington

PUGET SOUND NAVY YARD, WASH. —Bids will be asked soon, as funds are allocated, for additional projects, including two seaplane ramps, hangar 240 x 320 feet, gas storage, barracks extension, fuel oil storage, equipment building, bomb storage and shop, torpedo storage, building extensions and other additions. About $2,000,000 will be available soon.

SEATTLE—Universal Aircraft Corp., recently organized with $1,000,000 capital, has bought the Stearman-Hammond airplane plant and will establish a plant at the Everett, Wash., airport. Ivan Merrick Sr., is one of the incorporators.

Canada

GLACE BAY, N. S.—Dominion Coal Co. Ltd., 43 Union avenue will rebuild burned machine shop and install new equipment. Total cost about $200,000.

HAMILTON, ONT.—Steel Co. of Canada Ltd., Wilcox street, has let general contract to Tope Construction Co., 677 Main street West, for a tin plate mill. Structural steel has been awarded to Dominion Bridge Co. Ltd., Lachine, Que.

OTTAWA, ONT.—Ottawa Aircraft Ltd., 301 Slater street, has let general contract for addition to its airplane plant to Doran Construction Co. Ltd., 78 Bank street, at cost of about $60,000.

WESTBORO, ONT. — Ketchum Mfg. Co. Ltd., Alexandria street, manufacturer of metal stampings, will build a plant addition costing about $50,000. J. B. Roper and Henry J. Morin, 95 Sparks street, are architects.

WINDSOR, ONT—Dominion Forge & Stamping Co. Ltd., Seminole road, has given contract to Allan Construction Co., 44 Wyandotte street, East, for $25,000 addition to its plant.

ARVIDA, QUE.—Aluminum Co. of Canada Ltd., 1010 St. Catherine street West, Montreal, Que., has given general contract to Foundation Co. of Canada Ltd., 1538 Sherbrooke street West, Montreal, for $3,800,000 plant addition here.

BROWNSBURG, QUE.—City will build aqueduct and sewage disposal station at cost of about $150,000. Ernest Gohier, 10 St. James street East, Montreal, is consulting engineer.

ROCK ISLAND, QUE. — Union Twist Drill Co., Butterfield division, is having plans prepared for a $25,000 plant addition. Robert and F. R. Linlay, 660 St. Catharine street West, Montreal, Que., are architects.

THURSO, QUE.—Singer Sewing Machine Co., 195 Sparks street, will build a plant addition to cost $60,000.

VALCARTIER, QUE.—Department of munitions and supply, Ottawa, Ont., will build additions, including testing building at the Dominion arsenal here.

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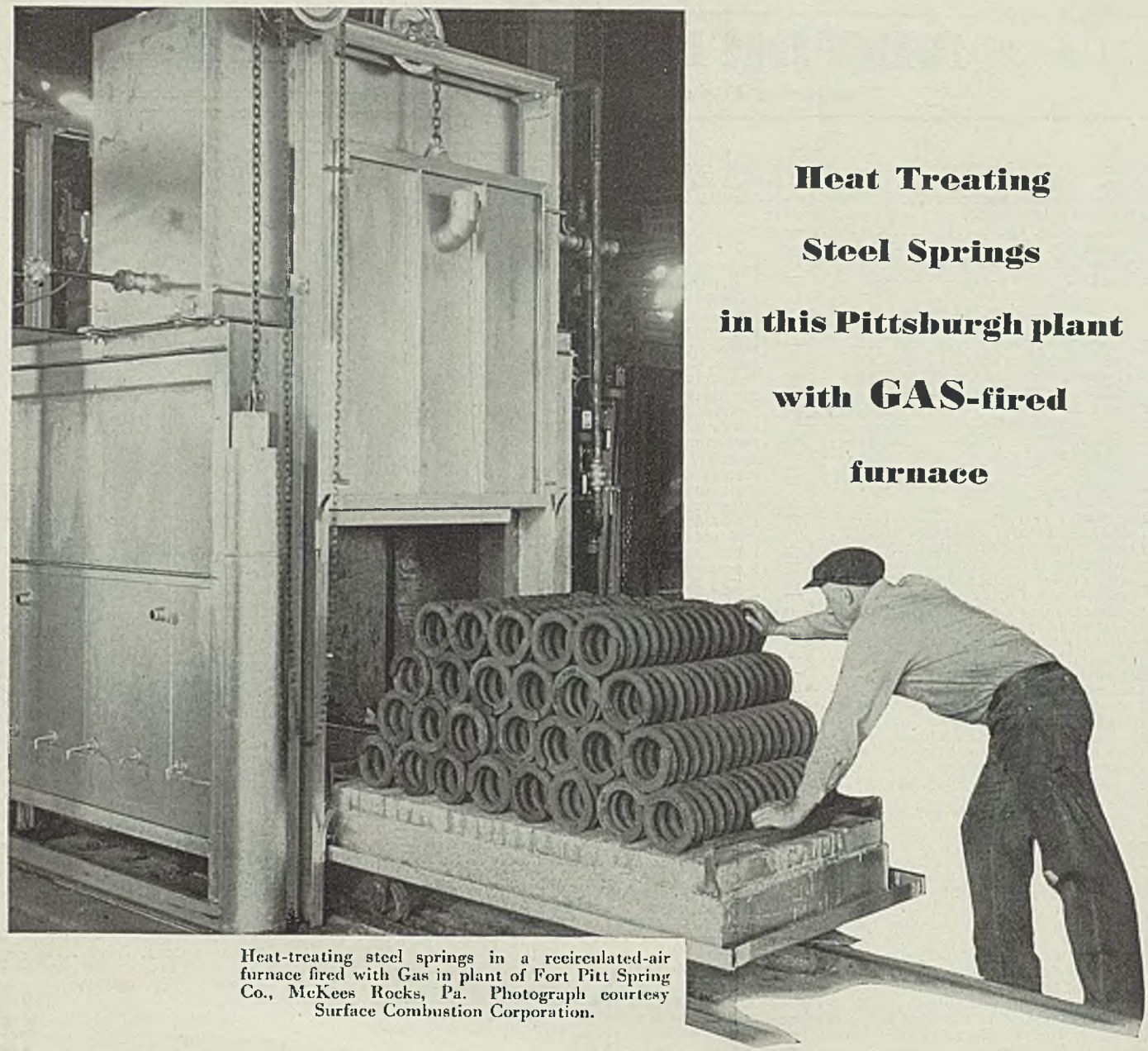

Heat Treating Steel Springs in this Pittsburgh plant with GAS-fired furnace

Heat-treating steel springs in a recirculated-air furnace fired with Gas in plant of Fort Pitt Spring Co., McKees Rocks, Pa. Photograph courtesy Surface Combustion Corporation.

The advantages of heating by means of recirculated air—with Gas fuel—are becoming accepted more and more by industry. Here is shown a typical recirculated-air furnace used in heat-treating in the plant of the Fort Pitt Spring Co., McKees Rocks, Pittsburgh—further evidence of the efficiency and other values of Gas fuel in the tempering of metals within narrow ranges of temperatures.

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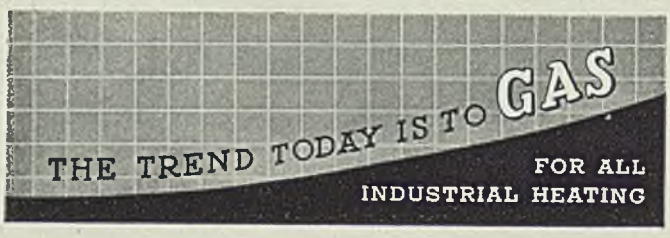

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