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Published by The Penton Publishing Co., Penton Building, Cleveland, Ohio. E. L. Shaner, President and Treasurer; G. O. Hays, Vice President; F. G. Steinebach, Secretary.

Member, Audit Bureau of Circulations; Associated Business Papers Inc., and National Publishers' Association.

Published every Monday. Subscription in the United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $6; two years $10; all other countries, one year $12. Single copies (current issues) 25c.

Entered as second class matter at the postoffice at Cleveland, under the Act of March 3, 1879.
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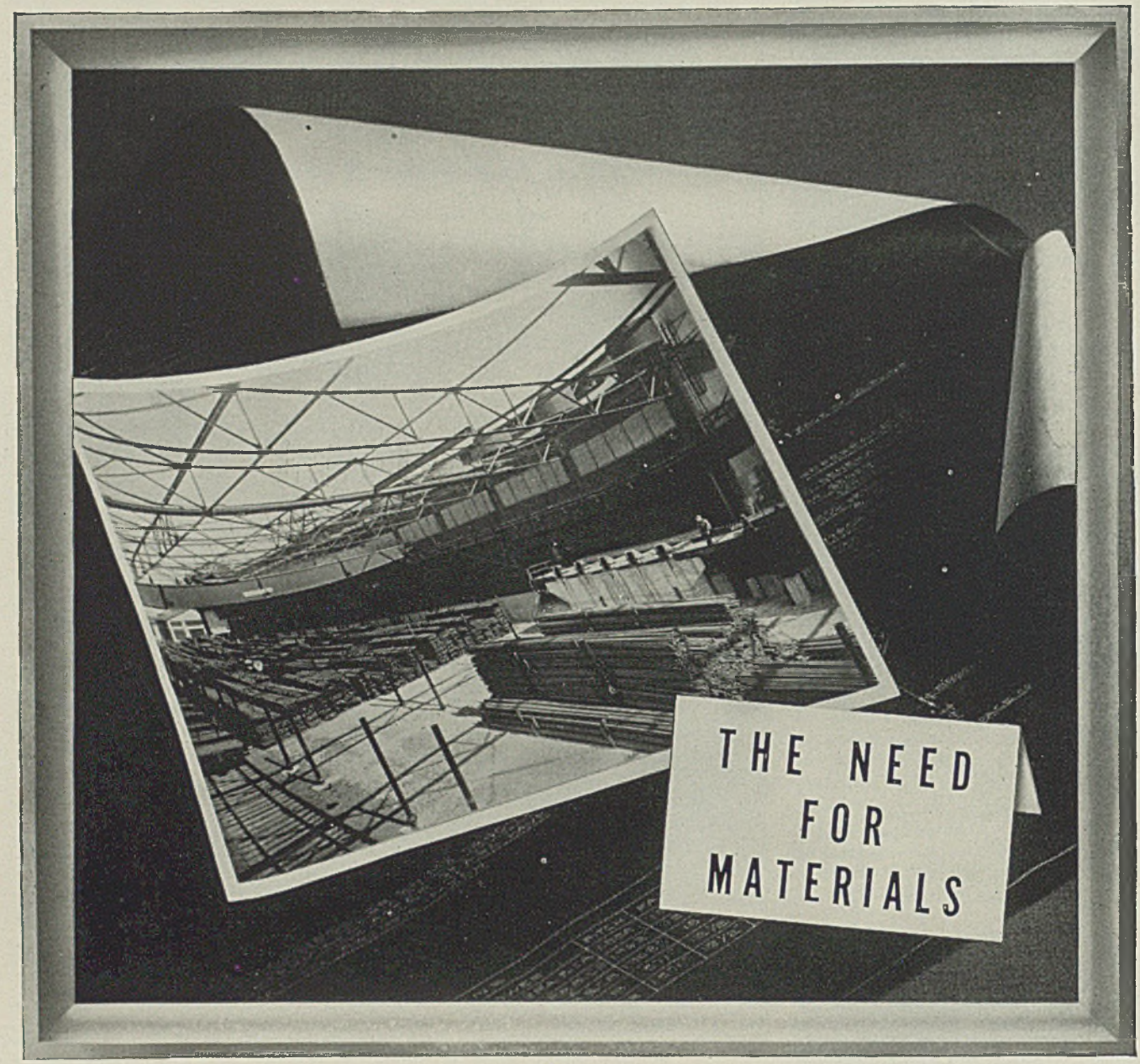
STEEL

ESTABLISHED 1882

Contents

Volume 110—No. 18 **May 4, 1942**

PRODUCTION • PROCESSING • DISTRIBUTION • USE



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HIGHLIGHTING THIS ISSUE OF STEEL

DESPITE President Roosevelt's clearly expressed intent to avert inflation it was apparent last week (p. 42) that the War Labor Board still is giving serious consideration to steelworkers' demand for a dollar-a-day wage increase. Inland Steel Co.'s analysis (p. 65) points out that this would add $160,000,000 to the industry's payroll, and inevitably lead to inflation. . . . Quarterly financial statements show (p. 43) a sharp reduction in earnings. In view of all this, Bethlehem's President Grace (p. 42) did not take seriously reports afloat in Washington last week that the government contemplates ordering a 5 per cent reduction in steel prices. . . . "Union maintenance" as ordered by the War Labor Board (p. 67) in Federal Shipbuilding case provides for a closed shop that is more closed than ever a closed shop was supposed to be; it regiments workers beyond their power to resist.

• • •

Pullman-Standard's contract for construction of 50 all-steel anti-submarine patrol ships at Chicago (p. 63) is made possible by similarity of fabrication technique. . . .

Pullman To Build Ships

WPB plans to salvage 10,000 tons of tin and 1,000,000 tons of black plate from used tin cans (p. 51); raises to eight the number of detinning plants needed for the job. . . . Further expansion of steel capacity is "not contemplated" by government experts, who lay more stress on use of existing plants (p. 51). . . . Wright Aeronautical Corp.'s system for segregating and salvaging scrap of strategic metals with colored V's for identification is described (p. 59).

• • •

Conversion program for all non-essential civilian-goods producers (p. 52) is strengthened by appointment of industrial consultants. . . .

Conversion Is Made Easier

Shippers' Board estimates freight car requirements (p. 58) in second quarter will be up 14.6 per cent. . . . This week STEEL presents a complete list of strategic, critical war materials, supplies of which are scarce (p. 68). . . . Canadian plebiscite of April 27 (p. 64) opens the way for drastic conscription in army and industry. . . . Sewing machine manufacture (p. 50) will halt June 15 to save critical materials and free part of the industry's facilities for war uses. . . . Hourly wages for steelworkers passed the dollar-an-hour mark in March for the first time in history (p. 45) . . . This week's plant conversion feature (pp. 38-41) tells how Britain has handled the problem.

• • •

A practical and efficient program for training maintenance men is presented (p. 72) by Walter J. Brooking. It could well be adopted by other plants who have had to expand their training programs. . . .

Training For Maintenance

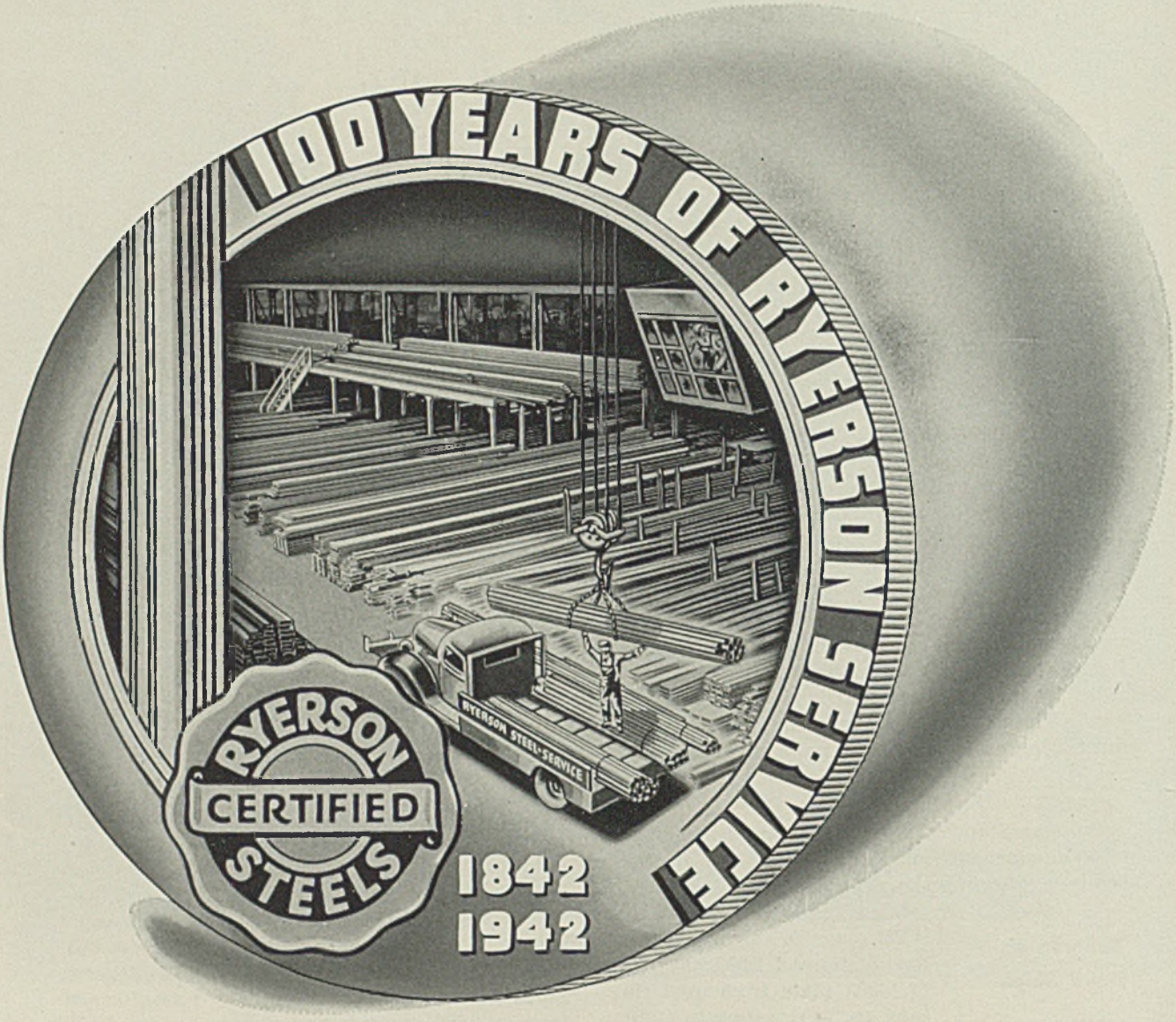
Harold Lawrence describes an almost foolproof welding procedure (p. 78) for those difficult-to-weld alloys—block or cascade welding. . . . Flame straightening has many applications today, says C. W. Hale, for it is a quick and simple method (p. 85) of correcting distortion in a wide variety of metal parts and assemblies. . . . A new synthetic hard rubber (p. 88) that will withstand temperatures 100 degrees Fahr. higher than the best hard rubber made from natural crude is announced.

• • •

How one company is successfully tackling the problem of how to get war work quickly is a story (p. 74) of vision and ingenuity in developing a conversion program that really works. . . .

To Get War Work Quickly

Details of a method (p. 82) for tripling the life of mold stools for ingot molds are presented. . . . A unique erection method (p. 86) is employed to set up a 50,000-gallon watersphere without the use of any supports outside the structure, doing away with all guy lines. . . . Dr. C. B. F. Young concludes his detailed discussion (p. 91) of how silver plating can be utilized as a substitute coating in the present emergency. . . . A chain conveyor on a continuous production line (p. 92) speeds making shell cores for cast steel shell bodies.



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STEEL

May 4, 1942

ALL OF US ARE IN THE ARMY NOW

Within a few hours after a recruit enters the army he is greeted by the taunting words of the famous old initiation song:

"You're in the Army now;
You're not behind the plow.
You'll never get rich,
You ------- of a -------;
You're in the Army now!"

In due time the soldier learns from hard experience the sordid implications of this verse. He adapts himself to army discipline, and in doing so becomes accustomed to taking orders — no matter how absurd they may appear to be and regardless of whether or not he thinks the man who issues the orders is competent. In short, he subordinates his personal opinions to the official routine of the army.

In effect, President Roosevelt's speech of Tuesday evening was simply a polite notification to us home folks that we too "are in the army now." He was telling us that in total war all citizens are "in the army." Although he didn't tell us in so many words that we'll "never get rich", he intimated the same result in his seven principles for wartime civilian economy. These are as follows:

1. We must through heavier taxes keep personal and corporation profits at a low reasonable rate.
2. We must fix ceilings on prices and rents.
3. We must stabilize wages.
4. We must stabilize farm prices.
5. We must put more billions into war bonds.
6. We must ration all essential commodities which are scarce.
7. We must discourage installment buying and encourage paying off debts and mortgages.

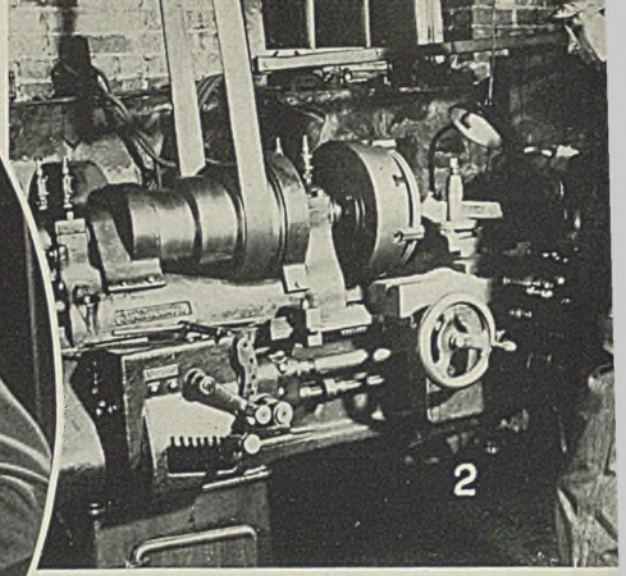
Some of these principles are in the process of being made effective through executive order. Others — including those pertaining to taxes and farm prices — require action by Congress. The lawmakers also may choose to take a hand in wage controls.

These three points — taxes, farm prices and wages — should be thrashed out carefully. Every effort should be made to refine the program so that it will bear equitably upon all economic groups.

But once the pattern is established and the rules clearly defined, then it is the duty of citizens to be good soldiers — to exercise a bit of self-discipline. We're in the army now.

E. L. Shaner

Editor-in-Chief



Here is how the gre

"CONVER

Part III—Britain Gets Under Way

THE SHOCK of Dunkerque drove home the necessity of converting every available man and machine to war production, and Britain swung into its conversion program for vengeance. Through a remarkably efficient system of subcontracting, the British soon discovered that a small plant that could not make a whole tank could make "bits and pieces" of tanks. Thus both large and small plants soon found war work they could handle.

Specialization: At first, most converted plants merely supplemented curtailed normal production with war work, but that didn't work. For example, an eyelet maker was turning out eyelets for army shoes and rivets for tanks on the same machinery. But that did not make for top efficiency so the eyelet concern agreed to make only rivets. But the demand for eyelets equalled or exceeded that of peacetime. What to do?

The answer was in a system of industry "concentration" whereby, say, two eyelet firms made only rivets while a third made only eyelets.

But it wasn't as easy as that because the two firms making rivets could not help being concerned about their chances of re-establishing themselves, in competition with the third firm, in the eyelet business after the war. In certain industries where drastic changes had been made in machinery, this concern was especially acute.

"Industry" Products: To be sure all firms start out with equal opportunities after the war, the British government "took steps". The industry product is made without any tradename but with a "war" name, and its maker is not permitted to advertise that he is its producer. Thus no one company has a chance to benefit by the industry conversion. Already similar programs are in process of development in this country. The "Victory" bicycle is perhaps the most familiar product to result so far.

Conversion of British automobile plants, however, was done without such a serious upheaval of equipment as is occurring in this country. Models are not so standardized, and because of small production it has not been economically wise for the British automobile industry to invest heavily in highly specialized machines. Thus their plants were more easily converted to war production.

"Fit" Expert Workers: Although British automobile production was curtailed drastically at the start of the war, export production was continued for a time to provide foreign exchange for the purchase of munitions. Because of the great need for skilled mechanics, tool and die makers in the converted auto industry, an industry-wide survey of employes was made. It succeeded in finding several hundred men in less skilled jobs who could be fitted into tool rooms and experimental departments where their services are proving invaluable.

Fortunately, in England as in the United States, some of the best engineering brains were concentrated in the auto industry, and they were for the most part able to take all their baffling conversion problems in stride.

Referring back to the "bits and pieces" system, obviously it is somewhat more expensive than conventional mass production although it features all the basic advantages of mass production. Not only is there the added expense of transporting the bits and pieces to the parent firm for assembly, but the cost of providing extra tools and gages, technical assistance, supervision and inspection, as well as organizing the distribution of raw materials and the like. All these may easily add 10 per cent to the cost of the finished product.

Further, a bomb or some other interruption may hold up the delivery of vital parts at the final assembly plant. So to be safe, the prime contractor may order more than he actually needs.

Nullifies Bombing: However, this dispersal of industry has at least one advantage of great importance—*it makes it impossible for bombing to stop any one war product.*

Another important advantage is that it gets the work to the skilled workers, wherever they may be, thus eliminating the necessity for any movement of workmen to areas of concentrated production. This particular factor is also important from another angle—that of trans-

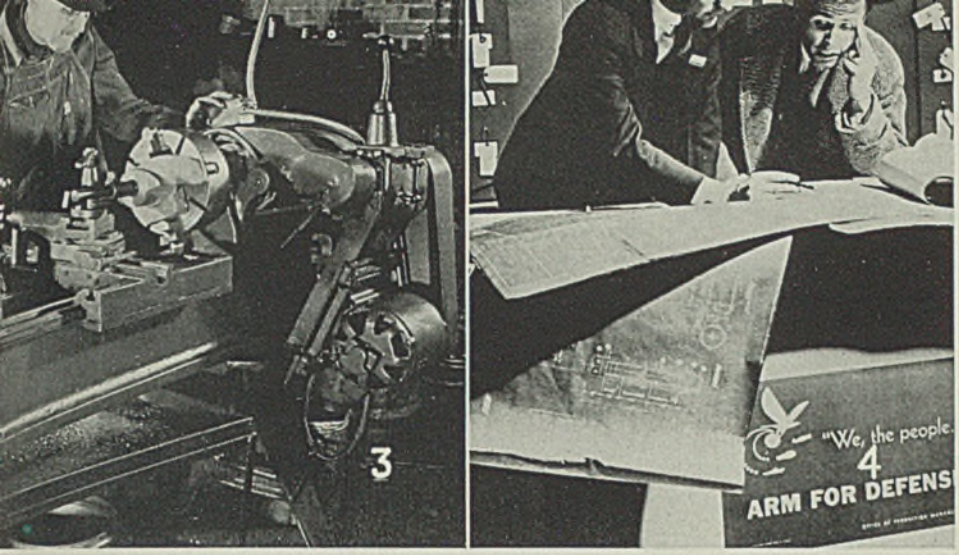


Fig. 1—An effective method of getting war work is to visit the displays of items needed and see what you can make in your plant. These displays are now set up within a short distance of most any manufacturer. See your local War Production Board Contract Field Office (list on page 26, Section Two, STEEL, April 20, 1942). Here a prospective manufacturer examines details of a machine gun assembly

Fig. 2—Workers at the shop of Wilbarger & Sons, Harrisonburg, Va., one of the Shenandoah Cooperative members, found delays from overhead belt drives were holding up war production. As any delay was intolerable to them, they immediately got busy figuring out a way to convert to direct gear transmission. See Fig. 4

Fig. 3—Now an individual electric motor drives this machine tool at Wilbarger's because ingenious workmen contrived to adapt the gears and transmission from an old Ford coupe to make it the effective speed change means shown here. This elimination of overhead pulley drive has resulted in an important increase in production

Fig. 4—This plant manager seeking war work, after studying the hundreds of bits and pieces of needed war products, is going over the detailed specifications of a part which he believes he can handle on his machines. Some of the bits and pieces can be seen on the display board in the background. This is part of the exhibit sponsored by the Contract Distribution Division of the War Production Board at St. Louis. All photos from Office of Emergency Management

rogram . . . .

YOUR PLANT

To War Production"

. . . . is being handled in Britain through a remarkably workable system of subcontracting. Regional boards sponsor co-operation meetings that clear up as many as 5000 bottlenecks in 15 minutes. A similar system appears inevitable here if we are to obtain sufficient production to fill the needs of our armed forces quickly. Some small industrial communities here are already in production on war orders obtained through co-operative community effort

portation and housing—twin problems that get increasingly worse with concentrated war production. Already these are serious in many sections of the United States, especially near new ordnance plants.

In Britain, the disadvantages of "bits and pieces"—increased cost, supervision and inspection—are considered insignificant compared with the fact that under this program the production of practically every suitable plant is geared to Britain's fight for life.

However, this TOTAL production for "total" war was not obtained just by going ahead and doing it, for first a WAY of doing it had to be set up. England employs government-industry-labor teamwork to fill a war order in the least possible time with the best suited machinery and materials in this manner:

The Plan Setup: Twelve regional boards were created, each with three representatives of labor and three of employers in addition to those from such governmental agencies as the Ministries of Labor, Supply, Aircraft, Production, the Admiralty and the Board of Trade. Each member is responsible to the group he represents, while the board is directly responsible to the country's top Production Executive.

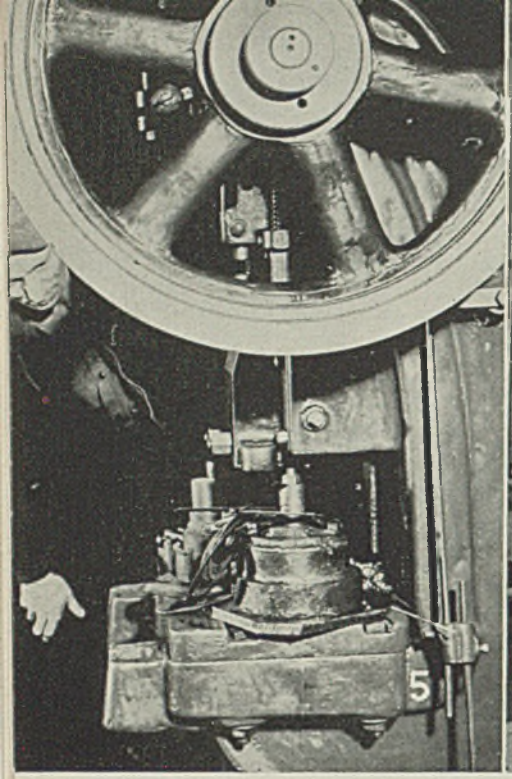
Broad powers of enforcement include "requiring persons to place themselves, their services and their property at the disposal of His Majesty". Little compulsion, however, is ever necessary.

These regional boards link the government with management and labor. Typical, although the largest, is the London and South Eastern Regional board. It follows principles laid down by central authorities, but makes full use of its own knowledge of local conditions to adjust policy to local circumstances.

How Boards Work: The board found that firms already in war production were sometimes idle for various periods of time because of changes in design, temporary shortages of material, or bottlenecks in production. Further, many firms had not converted to war production, and others could increase their output of war goods. The board discovered that although essentially local, it was not local enough; that it could not maintain close enough contact with all firms in its area.

By setting up ten clearing centers in its area, this board achieved the contact desired, for each center can maintain intimate relations with firms in its neighborhood. Each center collects and passes on information about machines and workmen available and needed, inspectors' reports, government contracts and the like. Any plant with spare capacity in any department now contacts its clearing center, thus making it possible to utilize much spare capacity that the board itself might never know existed. For example, the clearing centers found that even the huge plants with apparently as much war work as they could handle often had substantial temporary machine-tool capacity available.

"Clearing Centers" Aid: One of the most important functions of the clearing centers is to assist in converting plants to war production. Many firms need considerable guid-



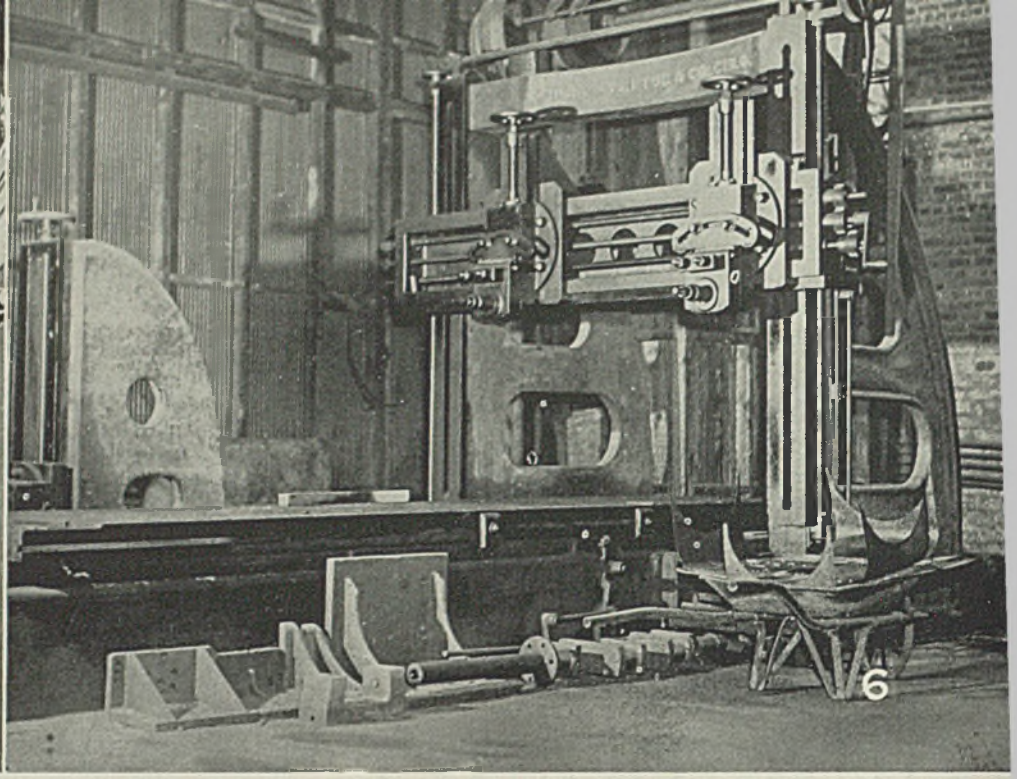


Fig. 5—The plant of J. R. Beery & Sons, Harrisonburg, Va., a member of the Shenandoah Valley Defense Cooperative, received a small contract for walnut-picking machinery (walnuts being used in manufacture of gas masks). The contract required that four units be turned out per hour. But a special jig was made for this punch press by workers at the shop and now production has been stepped up to 50 units per hour

Fig. 6—At the Penn Foundry Mfg. Co., Waynesboro, Va., three cavernous buildings filled with rusting machinery have been converted for war production as part of the effort by the Shenandoah valley men to get their plants' production facilities employed in our war effort. This useful and expensive big planer is now no longer idle but helps turn out needed ordnance items

ance and information. And it works the opposite direction as well, for when government representatives come seeking a plant to fill a war order, the clearing center can give them accurate last-minute information about spare capacity, backed by personal knowledge of the companies involved.

Typical of the close co-operation induced in the area as a result of the board's activities are meetings for the exchange of tools used in making planes, tanks, guns, shell and ships. Representatives of scores of companies come armed with lists of tools needed to fill urgent war work and with lists of tools for which they have no immediate use. By getting together, the men find they often can supply each other with just the tools required to keep the war work flowing in ever-increasing volume. Some tools are sold, others simply loaned.

Competition Out—Co-operation In: "There are no business competitors here today," one manufacturer said at one of these meetings recently. "We have only one job—to beat that man Hitler. By means of this conference, we intend to cut down paper transactions—and we do just that, for here you can fix up jobs that would take a month of letter writing. *In one part of the country, we have cleared up* 5000 *bottlenecks in just* 15 *minutes.*"

But this kind of wholehearted co-operation did not come easily. In the beginning it was common for two fierce competitors to refuse to sit in on the same discussion. Gradually, however, they came to a realization that assistance to any manufacturer is assistance to King and Country.

In the United States, too, competitive producers and manufacturers are busy working out means to up our war output. The Shenandoah Valley Defense Cooperative is one of the most striking of many co-operative community and industry efforts now under way.

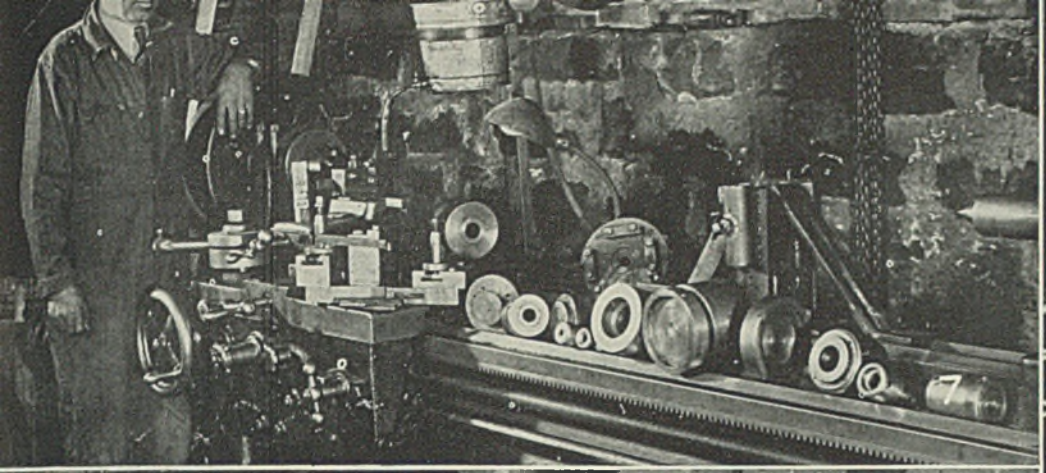
Shenandoah Plundered: During the Civil war, the Shenandoah valley was virtually a frontier—a broad breadbasket, alternately plundered by both Confederate and Union armies. Rebuilding after the war was a long, hard process, but rebuild they did. The result is a people whose soil has a hold on them, a hold that wealth, power or the temptation of big-city money cannot break.

There is industry in the Shenandoah, for not all are farmers. Most of the skills now there were not born in the valley. In the nineteen-twenties when jobs were easy and paid high, some of the men of the Shenandoah went to Detroit and Pittsburgh, into auto plants where they learned the feel of a lathe and other skills. They made good money—and saved it to come back to the Shenandoah and establish their own small factories, machine crafts shops, bringing with them high precision machine tools, engine lathes, milling machines, drill presses. They brought back the tools and the skills to operate them, and they passed them on to their sons.

Co-operatives Flourish: While industry never got very big in the Shenandoah, it was skilled, efficient and manned by workmen proud of their efficiency. Almost as soon as there was any industry in the valley, there was co-operative industry, for co-operatives had flourished there ever since the forehanded farmers of the Shenandoah set up their own insurance co-operative to cover their rebuilt barns, silos and storage bins after the Civil war. Since it proved a highly successful enterprise, much business has been done there on a co-operative basis ever since.

When the R.E.A. came through in the middle thirties, it met eager co-operation. Thus it was really the R.E.A. that broke ground for the current co-operative war production efforts, for Luther Long, manager of the Shenandoah Valley Electric Cooperative, spark-plugged the co-op war-production idea.

The Shenandoah war-production co-operative is really an unusual and far-sighted community effort. The older men in the valley remember what war did to small communi-



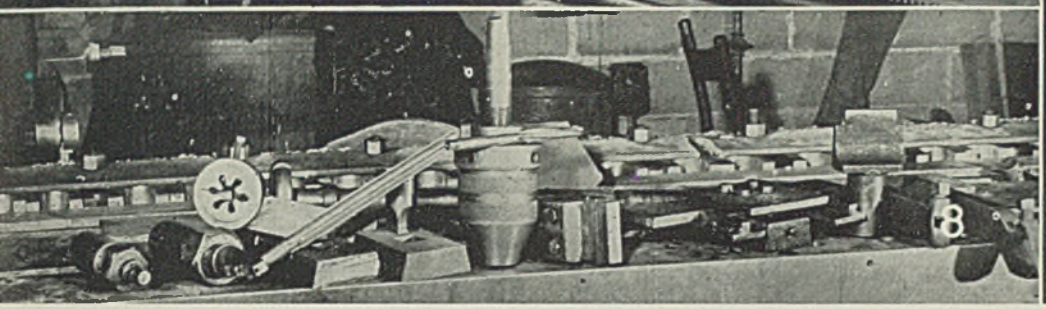


Fig. 7—These special jigs and chucks designed and built at Wilbarger's have resulted in speeding up war production tenfold. This is typical of the work being done in thousands of small American shops throughout the land by workers who are using all their ingenuity to speed the job of arming the best fighters in the world—our own armed forces

Fig. 8—At the Braden & Van Fossen Works, Staunton, Va., another member of the Shenandoah Valley Defense Cooperative, production of small war orders in this and other shops is speeded up greatly by these special jigs, tools and tool holders—just a portion of those made here since Pearl Harbor. Speedy equipping of the armies of the United Nations depends upon immediate and effective use of all the skill and ingenuity of such men as those who made these items

Fig. 9—In the Shenandoah valley, Claude Spitzer's skilled hands supplement the production of machines to aid war production, for today every hand, every machine must be doing its share to help in America's battle for production. Office of Emergency Management photo, by Vachon

ties, for they have seen representatives of large-scale industry entice away a town's skilled workmen, seen them buy and move out their machine tools to denude the community of equipment and manpower, thus leaving it to stagnate when the emergency was over. They determined it would not happen this time, for the men of the Shenandoah have another outlook today. They were loath to leave the valley. *And they knew every production facility must be utilized to the utmost in war work.* But how to get it?

The Survey: As individuals, the mechanics and machine workers could do little—co-operative effort appeared to be the answer. So Luther Long surveyed their production facilities and found 375 machine tools capable of handling war work, these tools being idle as much as 90 per cent of the time (January, 1941). Enough skilled operators were found available to operate these machines 16 hours daily. The next step was to send representatives to Washington to find out why these facilities were not being used.

Action: The men in the Shenandoah are little people, but they form a group representative of thousands of small industrial communities throughout America. Representatives of such groups from all over the country have been coming to Washington with the same problem: How can our idle machines, so urgently needed, be put to work on war production? The answer lies in the Super-plan worked out by the Office of Production Management. It divides the country into 36 districts, each district pattern consisting of a federal reserve bank or branch bank to act as a clearing house between the prime contractor, who gets his orders from the government, and the subcontractors in the district to whom work may be farmed out.

A board of technical experts works with the bank, analyzing each manufacturing process and separating it into parts. It then arranges for making those parts by subcontracting the work to the small shops and factories in the district. Other experts aid the board by furnishing financial, legal and business advice. If any manufacturer needs money, the bank can usually set up some satisfactory arrangement.

Avoid "Ghost" Towns: *While it may be somewhat more expensive to let contracts to small shops like these, that is not the point, for their production facilities are needed, NOW.* To build additional plant facilities in cities would only bottleneck other existing industries, cause transportation and housing difficulties, result in serious economic and social rehabilitation problems after the emergency. These are the things that create "ghost" towns. But the men of the Shenandoah and thousands of others like them, with intelligent government backing, are well on the way to preventing such a catastrophe.

That the system works in the Shenandoah is evidenced from contracts already let. On May 20, 1941, the Shenandoah Valley Defense Co-operative of Dayton, Va., completed a contract with the A. F. Jorss Iron Works Inc., Washington. This is believed to be the first war-production contract ever to be obtained by any co-operative in the United States. The Jorss company is a prime contractor for transportation auxiliaries for anti-aircraft searchlight equipment, devices resembling an elaborate vise and designed to hold such delicate equipment as sound detectors and searchlights in place on a truck.

It Works: The co-operative was awarded a subcontract for screw machine parts for these units. The co-operative in turn parcelled the work out to three member shops: Braden & Van Fossen Machine Works, Staunton, Va.; J. R. Beery

(*Please turn to Page* 116)

Profits Falling, Steel Industry Faces "Squeeze Play" by Government

✦

OPA "official memorandum" suggests reduction in finished products prices, while SWOC demands for wage increase pend before WLB . . . U. S. would lose heavily in tax revenues

✦

DIVERGENCIES between the policies of the Office of Price Administration and the National War Labor Board threaten to subject the steel producing industry to a new "squeeze play."

OPA, according to Washington reports, is toying with the idea of further reducing steel prices. "Official memorandums," capital correspondents learn, mention an average cut of 5 per cent in prices for finished products.

WLB is studying the request of the Steel Workers Organizing Committee for a $1 a day wage advance in the case of the Little Steel" companies. While a decision in this case is not expected until June, recent decisions by the board and comments by board members, especially its chairman, W. H. Davis, indicate that it is not improbable the board will recommend at least some wage increase. The board last week announced that if a wage increase is granted in this case it will be retroactive to the date it was certified.

Despite President Roosevelt's declaration against further wage increases in his anti-inflation speech April 28, WLB Chairman Davis said he thought wages would remain flexible.

Thus the steel industry faces the possibility of action to raise the floor under its costs, and to lower the ceiling over selling prices.

Even if the wage increases were denied by the WLB, other factors are even now increasing costs.

Taxes for the current year will be much greater than last.

Overtime will become more common as more workers are drawn into the armed forces and the labor shortage becomes more acute.

First quarter earnings statements of producers (see pp. 43-44) show sharp declines from income in the comparable period last year. In most cases profit was little more than half the 1941 figure, despite the fact that operations continued at practical capacity. This was due to wage increases granted last spring—prices remaining constant—and to necessity for larger provisions for taxes and contingencies.

While it appears improbable that OPA actually will direct a reduction in prices under present conditions, an examination of the facts to determine what such a cut would mean is not amiss.

STEEL'S composite price for finished steel products under the OPA ceiling is $56.73 a ton. An average reduction of 5 per cent would amount to $2.84 a ton. Assuming finished steel production this year reaches 65,000,000 tons, the loss in revenue to producers would amount to $184,000,000.

Steel companies currently are employing more than 650,000 workers. If only the base 5-day 40-hour week were worked, the wage increase demanded by SWOC, if granted throughout the industry, would cost more than $160,000,000.

The loss through the rumored price reduction plus the minimum increase in wage costs would lower the steel industry's gross income by $344,000,000, more than net income in 1941 of $327,328,000 (see page 43).

What the increase in tax costs will be, of course, is still unknown. However, proposals under consideration by Congress and the Treasury make a stiff advance in rates certain.

Increases in costs caused by more overtime work and other advanced costs likewise are unknown factors.

It must be remembered that the reductions in revenue mentioned are reductions in profit before taxes. The total tax impact on such earnings, according to reliable estimates, probably will be between 85 and 90 per cent. Consequently, the reduction in earnings before taxes would be reflected to a greater extent in government tax revenue than in the industry's net earnings.

Thus while the government would effect some savings—at least theoretically—by ordering a reduction in steel prices, the savings would be offset by loss of taxes.

The same loss in tax revenue would result from increasing wage costs, and the government would gain very little through increased personal income taxes to offset that loss.

The wage increase asked by SWOC would be hard to justify on any ground. Advances already granted since the beginning of the emergency far exceed the increase in living costs (see Bethlehem report below).

Practically all authorities agree that a further increase would seriously impede the government anti-inflation program. It is, in fact, contrary to the President's declaration: "You will have to forego higher wages for your particular job for the duration of the war,"—address to nation, April 28.

Bethlehem's Billings at Record High, but Earnings Are Lower

BETHLEHEM Steel Corp. reports net profit of $6,140,688 for first quarter, compared with $10,436,028 for the quarter in 1941.

First quarter billings of $306,000,000 reached a new high and were at an annual rate of $1,200,000,000. They compare with $185,000,000 in the first quarter last year, and total billings for 1941 of $961,000,000. Despite total peak billings for the quarter, President Grace pointed out, net earnings amounted to only 2 per cent, against 3.6 per cent in the corresponding period last year. Earnings on annual investment, he added, were at the rate of 4.67 per cent. Last year the return on investment was 6.09.

Tax provisions amounted to $19,190,000, against $7,270,000 a year ago.

Provision for taxes on income of $24,190,000 was based on required

amount under existing laws, plus $5,000,000 reserve for expected tax increases.

Predicting a greater scrap shortage next winter President E. G. Grace, at a press conference following the quarterly meeting of directors, said nothing shoud interfere with the speediest possible completion of the country's blast furnace expansion program.

Bethlehem's steel production in the first quarter was 98 per cent of capacity, the first drop in many months below 100 per cent. The capacity was revised upward slightly at the beginning of the year, but if scrap had been available the percentage would have at least been sustained. At present, however, the rate is back at about 100 per cent, entirely for war work.

Company-financed expansion during the first quarter amounted to $7,000,000, and that rate of expenditure probably will be maintained throughout the year. Mr. Grace did not indicate the amount of government-financed expansion in which Bethlehem is interested.

The company's navy shipbuilding program is substantially ahead of schedule. Its yards are on schedule on their share of the 8,000,000 tons of merchant ships which are to be built in this country this year, and they expect to make "more than the share allocated before the year is over." Ways and means to this end are now shaping up, he said.

Bethlehem payrolls established a new high in the first quarter at $133,800,000, up about 96 per cent from $68,400,000 in the corresponding period a year ago. The average hourly rate was $1.154, against $0.973, and average weekly earnings $48.74, compared with $37.23. These represented increases of 18.6 and 30.9 per cent, respectively, in contrast with 10.6 per cent increase in the cost of living.

Average number of working hours per week during the first quarter was 42.2, and 38.2 in the corresponding period last year; average number employed, 214,000, against 141,000. The number for March was 223,000.

Mr. Grace appeared confident there was nothing to reports circulating earlier in the week that OPA was considering a cut in steel prices of about 5 per cent.

U. S. Steel Subsidiaries Producing At Near-Capacity on "A" Orders

NET income of United States Steel Corp. for the first quarter amounted to $27,921,534, compared with $36,559,995 in the first quarter of 1941, and with $20,482,984 in the last three months of 1941. First quarter earnings were equivalent to $2.48 a common share.

Unfilled orders at the end of the quarter were about 2 per cent higher than at the end of the preceding period, and represent five to six months' backlog. Shipments of finished steel during the period were the highest for any first quarter and were only 3.5 per cent less than in the record fourth quarter of 1941. In tons, first quarter shipments were 5,136,418, or 101.5 per cent of capacity, compared with 5,321,501, or 105.8 per cent of capacity in the preceding period.

Chairman Irving S. Olds said the corporation's subsidiaries are operating at close to 100 per cent on orders carrying a rating of A-10 or higher. In March, shipments by all subsidiaries were 97 per cent in this category, while shipments by Carnegie-Illinois Steel Corp. were in excess of 99 per cent.

Good progress is being made on various expansion programs, Mr. Olds reported, although much of the steelmaking capacity may not get into operation before next year. Programs of the Tennessee Coal, Iron & Railroad Co., announced in 1940, will be almost completed in 60 to 90 days.

Capital outlays during the first quarter for additions and betterments were approximately $24,500,000. The unexpended balances for additions on March 31 amounted to $179,000,000.

Provision for taxes in the first quarter totaled $53,299,620, compared with $22,603,379 in the first quarter of 1941. Mr. Olds said the corporation had no way of knowing how much would be required but expressed the opinion the provision might be too small rather than too large.

The policy established in 1941 of providing for those expenditures which because of the high rate of operations must be deferred until a future time, and of providing for anticipated contingencies, is being continued in 1942. A reserve of $6,000,000 was set up in the first quarter.

Average employment in all subsidiaries during the quarter was 325,530, an all-time record.

Steel's Net Income Per Dollar of Sales Down 23%

Net earnings of the steel industry in 1941 amounted to about 6.2 cents on each dollar of the largest sales volume it ever recorded, American Iron and Steel Institute reports.

Although sales last year increased more than 50 per cent over 1940, due mainly to defense and war demands, earnings per dollar of sales declined 23 per cent.

Total sales for the industry in 1941 are estimated at $5,260,000,000 compared with $3,489,000,000 in 1940 and a prior peak of $3,800,000,000 in the first World War year of 1918.

The industry's profit of 6.2 cents on each dollar of sales compared with 8.1 cents in 1940. For 1942, earnings per dollar of steel sales are expected to be even lower than 1941.

Payrolls amounted to $1,679,000,000 in 1941, compared with $1,180,000,000 in 1940, an increase of about 40 per cent. These totals include payrolls of certain steel company subsidiaries which do not make iron and steel products.

Dividends paid to 532,000 stockholders of steel companies last year amounted to $167,000,000 or about 10 cents for each dollar of payrolls, compared with $138,000,000 and 11.7 cents in 1940.

Earnings of steel companies representing over 90 per cent of the industry's steelmaking capacity totaled $327,328,000 in 1941, after federal, state and other tax payments totaling $590,930 000. This compares with earnings of $281,228,000 in 1940, after tax payments of $225,323,000.

The return on aggregate investment last year was 8.1 per cent, compared with 7.5 per cent in 1940 and 9.2 per cent in 1929.

STEEL's compilations for the 25 leading companies showed 7.92 per cent for 1941, 7.57 for 1940 and 9.88 for 1929.

Tax payments were 162 per cent larger last year than in 1940, while output of finished steel rose 28 per cent.

Last year's net earnings were larger than for any year since 1929, but they were 28 per cent less than the $455,000,000 earned in 1929, although output of finished steel was over 35 per cent greater last year than in 1929.

Inland Steel Co.

Net profit of Inland Steel Co. totaled $2,528,090 in the first three months this year, after allowing $1,300,000 more for federal taxes than the current rates would require. This compares with $3,469,046 earned in first quarter, 1941.

Youngstown Sheet & Tube Co.

Youngstown Sheet & Tube Co. reported first quarter net profit of $2,576,579, against $4,576,197 last year. Profits from operations were $13,347,076 against $9,613,399 a year ago. Company charged off $2,469,-

554 for depreciation and depletion. Interest on funded debt was $600,943. Federal tax provisions were $7,700,000, including $2,320,500 for normal income and $5,379,500 for excess profits taxes, against $2,305,200 a year ago.

Republic Steel Corp.

Republic Steel Corp., Cleveland, reports consolidated net profit for the first quarter of 1942 as $4,716,962 after all charges, including estimated income and excess profits taxes of $18,000,000. Fourth quarter 1941 net amounted to $6,041,244.

National Steel Corp.

National Steel Corp., Pittsburgh, in annual meeting last week, declared a dividend of 75 cents per share on the capital stock payable June 13, 1942, to stock of record June 3, 1942. Statement was limited to this, and re-election of directors and officers.

Jones & Laughlin Steel Corp.

Jones & Laughlin Steel Corp., Pittsburgh, and subsidiaries, show consolidated profit, after all charges, of $2,491,718 for the quarter ended March 31, 1942. This compares with $4,160,507 in the same quarter year ago. Estimated provision for federal income and excess profits taxes was $5,420,000.

Rustless Iron & Steel Corp.

Rustless Iron & Steel Corp., Baltimore, reports net profit of $671,479.07 for the quarter ended March 31, 1942, against $581,697.85 for the period last year.

Midland Steel Products Co.

Net earnings of the Midland Steel Products Co., Cleveland, for the first quarter of 1942 amounted to $176,072.97, after all charges and after making provision for federal taxes. This compares with $543,643.18 for the first quarter of 1941.

Interlake Iron Corp.

Interlake Iron Corp., Chicago, reports net profit of $444,762 for first quarter, 1942, after federal income and excess profits taxes and provision of $75,000 for amortization of investment in Dalton Ore Co. This compares with $774,855 in the like 1941 period.

M. A. Hanna Co.

Consolidated net income of M. A. Hanna Co., Cleveland, for three months ended March 31 was $804,859, after all charges. Company earned $747,210 in the corresponding 1941 quarter.

Detroit Salvages Scrap for Cruiser, Two Battleships

DETROIT

ENOUGH iron an steel scrap was salvaged in 374 of Detroit's 2500 manufacturing plants during April to build two 35,000-ton battleships and a 6635-ton heavy cruiser, according to the industrial salvage section of the WPB's Bureau of Industrial Conservation, which last Thursday night held a conference for Detroit industrialists in Book-Cadillac hotel.

In its monthly report on industrial scrap movement from Michigan plants, the regional BIC office disclosed that a total of 85,961,286 pounds of iron and steel scrap were salvaged in April in industries of Detroit, Flint, Kalamazoo and Grand Rapids. This total includes both "production" and "dormant" scrap material.

Nonferrous scrap such as copper and brass moved from the same cities amounted to 1,494,747 pounds; rubber scrap, 56,036 pounds, and all other types of industrial scrap, 2,207,578 pounds. In Detroit alone, the industrial iron and steel scrap amounted to 84,972,899 pounds; nonferrous, 1,243,059; rubber, 54,416, and other types, 1,983,248 pounds.

Legion Gives Up World War I Trophies; Expects New Ones

BUFFALO

Trophies of World War I were removed recently from lawns in front of Lancaster's Town Hall, near here, and the headquarters of Lancaster-Washington Post 287, American Legion, in the drive for scrap. They yielded about three tons of metal. Included was a 3400-pound 8-inch howitzer, made in the Krupp works.

When this war is over the Legion post expects to obtain a new collection of souvenirs from German, Italian and Jap sources.

Even cemeteries are contributing to this drive for scrap metal. Unused urns, broken flower holders and other items are being collected in 27 cemeteries in western New York and turned over to salvage dealers, the proceeds being given to the United War and Community Fund.

March Scrap Consumption Was 4,840,000 Tons

Scrap consumption in March is estimated by the Institute of Scrap Iron and Steel Inc. at 4,840,000 gross tons, an all-time record. This compares with 4,276,000 tons in February, and 4,662,000 tons in March, 1941, which was the prior record. In first quarter this year scrap consumption totaled 13,706,000 tons, compared with 13,112,000 tons in the corresponding period last year.

$54,000,000 War Bonds Bought by Steel Employes

Almost three-fourths of all employes of the steel industry are subscribing for war bonds at a rate exceeding $54,000,000 a year, according to American Iron & Steel Institute.

These workers, numbering 484,000, have voluntarily authorized deductions from pay checks. Indicating an average contribution per man of $9, current aggregate purchases are in excess of $4,460,000 per month, the survey discloses.

Employes in the steel industry who entered military service during a period of approximately 15 months ended Dec. 31, numbered 21,984.

Their replacement and employment of additional thousands were accomplished without serious curtailment of production at any time.

Of the total, 19,601 were inducted into or volunteered for service in the Army. In addition, 2383 enlisted in or were called to active duty by the National Guard, Coast Guard, and the reserve units of the Army, the Navy and the Marine Corps.

MEETINGS

Steel Distributors To Study War Orders at Chicago Meeting

Priorities and price schedules will engage attention of 800 steel distributors at a Town Hall Meeting in Chicago, May 13, at the Drake hotel.

Experts from the War Production Board and the Office of Price Administration will come from Washington to explain their policies and objectives, including J. R. Stuart, Warehouse Unit, and R. J. Stayman, Distress Stocks Unit, of the former organization; and Clair Wilcox, Iron and Steel Section, and P. M. Malin and E. L. Wyman of the Warehouse and Jobber Unit, of the latter.

Automotive Engineers To Hold Special Local Meetings

This year's annual summer meeting of the Society of Automotive Engineers "will be taken to the society's membership" by special local meetings and a special issue of the SAE Journal in July. Continued presence of diplomats of enemy countries at White Sulphur Springs, Va., and the lack of sufficient Pullman accommodations ruled out the geared-to-war meeting as planned.

Machine Tool Dealers Told Peak Output Is Near

"The machine tool industry is rapidly approaching continuous operations," said George H. Johnson, president, National Machine Tool Builders' Association, in speaking to the Associated Machine Tool Dealers of America at their spring meeting in Cleveland, last week.

"Many plants are there already. The industry is attempting to solve problems caused by scarcity of raw materials, and is making every effort to simplify and eliminate unnecessary details of finishing.

"It would appear now that machine tool production is so great we are rapidly approaching the point where they can machine all available material."

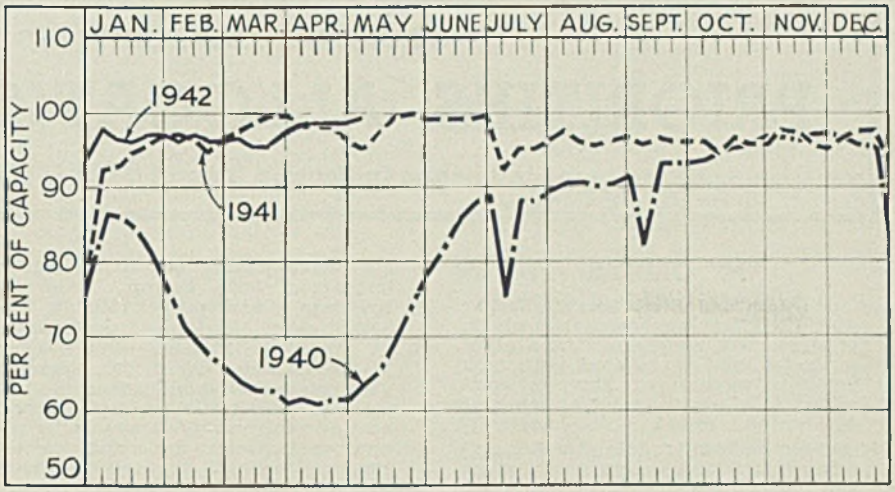
In speaking generally of the industry, Mr. Johnson, who is president of Gisholt Machine Co., Madison, Wis., remarked: "The term 'machine tool dealer' is a misnomer. It carries with it the idea of the salesman whose function is that of persuading the customer to buy. As a matter of fact, the machine tool dealer is a machine tool production engineer. His daily work is to help the contractors for America's vast war effort solve the production problems that must be overcome, one by one, to secure the enormous production required. It is his job to bring to the machine tool builder specific and complete information which will enable the latter to do his work with the utmost effectiveness.

"His greatest part in the industry is to be certain that the user of machine tools chooses the right type and the correct number of tools and specifies the proper delivery dates. Dealers can be of further assistance in sending the builder orders complete in every detail"

New Blast Furnace Raises Tennessee's Capacity 17%

A new blast furnace at Birmingham, Ala., blown in last week increased Tennessee Coal, Iron & Railroad Co.'s pig iron capacity 17 per cent. Construction started April 18, 1941. It is reported to be the first in the South with an all-welded outer shell.

This completes an expansion program started by the United States Steel Corp. subsidiary in November, 1940, which has included enlarged production facilities at ore mines, coal mines and quarries and addition of a battery of 73 by-product coke ovens. A new project announced in March will provide another battery of 73 coke ovens, opening of another coal mine and installation of electrolytic tinning facilities.



PRODUCTION . . . . Up

PRODUCTION of open-hearth, bessemer and electric furnace ingots last week advanced ½-point to 99 per cent, highest since June, 1941. Five districts increased, one declined and six were unchanged. A year ago the rate was 95 per cent; two years ago it was 63½ per cent, based on capacities as of those dates.

Chicago—Up ½-point to 105 per cent of capacity, equal to the all-time peak made in the week ended April 18. Repairs prevented a higher mark. Only one of six plants here was under 100 per cent and one reached 112.4 per cent.

Cincinnati — Gained 1½ points to 89 per cent, three open hearths under repair.

Detroit — Advanced 5 points to 92 per cent, only two open hearths being idle.

St. Louis — Removal of two open hearths for repair and addition of one by another producer resulted in a net loss of 5 points to 88 per cent.

Birmingham, Ala. — Unchanged at 95 per cent with 23 open hearths active.

Buffalo — Shifts in productive equipment made no change in the rate, which continued at 93 per cent, with 40 of 43 open hearths producing.

Central eastern seaboard — With scrap supply at the better level of the past few weeks production continues at 94 per cent.

Cleveland — Addition of two open hearths by one interest and an increase by another lifted the rate 6 points to 93½ per cent, the highest level since February.

New England — Up 8 points to 93 per cent, with two producers at capacity.

Pittsburgh — Held at 95½ per cent for the third week.

Wheeling — Steady at 82½ per cent since the last week of March.

Youngstown, O. — Improved volume of scrap enabled producers to continue production at 94 per cent.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended May 2	Change	Same week 1941	Same week 1940
Pittsburgh	95.5	None	93	58
Chicago	105	+ 0.5	96	59.5
Eastern Pa.	94	None	95	57
Youngstown	94	None	89	50
Wheeling	82.5	None	88	94
Cleveland	93.5	+ 6	92.5	70
Buffalo	93	None	90.5	44
Birmingham	95	None	90	83
New England	93	+ .8	95	53
Cincinnati	89	+ 1.5	90.5	53
St. Louis	88	— 5	98	42.5
Detroit	92	+ 5	88	70
Average	99	+ 0.5	*95	*63.5

*Computed on basis of steelmaking capacity as of those dates.

Steelworkers' March Wage Rates at Record High

Steel employment, hourly earnings and payrolls both increased during March, according to the American Iron and Steel Institute. Employes totaled 653,000, compared with 651,000 in February and 613,000 in March, 1941.

Payrolls amounted to $116,998,000, against $108,563,000 in the short month of February.

Wage-earning employes averaged $1.001, the first time in history that average wages exceeded one dollar. In February, the figure was 99.5 cents, and in March, 1941, 87.7 cents.

An average of 38.1 hours per week was worked by wage earners in March, against 39 hours in February, and 38.5 in March, 1941.

REVISIONS AND ADDITIONS TO

PRIORITIES—ALLOCATIONS—PRICES

as published in Section Two of STEEL, April 20, 1942

"M" ORDERS

M-24-b: Iron and Steel Scrap, effective April 22. Requires segregation of tin plate and tin alloy scrap from other scrap for delivery to steel mills, and prohibits mixture of any tin component in a bundle or car of scrap or delivery of a mixed car or bundle.

M-80 (Amendment): **Sole Leather,** effective April 25. Orders entire stock and production of heavyweight sole leather set aside for military and Lend-Lease requirements for shoes. Previously 80% of such leather was set aside.

"P" ORDERS

P-126: Refrigerating and Air Conditioning Machinery, issued April 20. Provides A-1-a rating for deliveries of materials required for repairs in case of breakdown of equipment used primarily to condition food in warehouses, meat-packing houses, or for Army, Navy or Maritime Commission; or for blast furnace air conditioning; A-3 rating to avert threatened breakdown of such equipment or for actual breakdown of equipment in retail establishments or in manufacturing plants engaged in filling defense orders; A-8 rating to avert threatened breakdown in latter type of establishments or for emergency service for all other types of air conditioning or refrigerating equipment, except domestic refrigerators. Ratings may be applied only by designated emergency service agencies and their suppliers. PD-399 used to apply for serial number for agencies.

P-129: Communications, effective April 23. Provides A-3 rating for deliveries to an operator of radio or wire communication service of materials essential for maintenance, repair, and protection of service. Inventory is fixed at 27½% of dollar value of materials used for all purposes during 1940. P-130, effective April 23, provides A-3 rating to operator or supplier for materials costing under $50 and used in normal course of operations.

"L" ORDERS

L-4-b: Storage Batteries, effective April 25, 1942. Restricts production of automobile replacement batteries between April 1 and Sept. 30, 1942, to 75% of number sold in corresponding 1941 period. Limits production after April 29 to specified sizes. Producer's stocks on first of month limited to number sold in 60 days of 1941 corresponding to 60 days following inventory date.

L-23-a: Domestic Cooking Appliances, effective April 25, 1942. Iron and steel consumption May 1-15 in manufacturing fuel-burning type of appliance limited to one-eighth amount permitted to be used from Jan. 1 through April 30, 1942.

L-31 (Amendment): **Natural Gas,** effective April 23. Extends restrictions on delivery of natural and mixed natural and manufactured gas to consumers in parts of Iowa, Kansas, Minnesota, Nebraska, Oklahoma and South Dakota.

L-42 (Addition): **Plumbing and Heating Products,** issued April 25. Schedule VIII establishes specifications for low pressure thermostatic radiator traps, float and thermostatic traps, boiler return traps, strainer and supply valves, effective June 15. Schedule IX limits size of gas water heater storage tanks to 20, 30 and 40-gallon sizes, effective May 15. Bans use of copper or copper alloys and eliminates metal jackets.

L-50 (Amendment): **Telephone Industry,** effective April 23. Limits repair of telephone equipment to essential maintenance repair or protection of service. Limits further installation of residential extensions to those required for essential use of persons in preferred category. Discontinues use of open copper line wire to provide local exchange service. Directs conservation of existing equipment and facilities whenever resulting in saving of critical materials.

L-78 (Amendment): **Fluorescent Lighting Fixtures,** effective April 23. Permits manufacture of fixtures with lamp capacity of 30 watts or less if materials were ordered by April 2 and on hand by April 20, 1942. Such fixtures also may be made if materials are acquired under A-2 preference rating assigned under Production Requirements Plan. Prohibits manufacture after May 16 of fixtures with lamp capacity of more than 30 watts except to fill orders rated A-2 or better.

L-83 (Amendment): **Industrial Machinery,** issued April 20. Postpones effective date of restrictions on machinery production from April 9 to May 15.

L-90: Corsets, Combinations and Brassiers, effective April 23.

L-92: Fishing Tackle, effective April 23. Prohibits use of metals, plastics and cork in making non-commercial fishing tackle after May 31, except fish hooks, which may be made at 50% of 1941 rate.

L-98: Domestic Sewing Machines, effective April 25. Bans production after June 15, 1942. Output until that date restricted to 75% of 1940 rate. Manufacture of repair and replacement parts during six months beginning May 1 permitted at 125% of average 1940-41 rate.

L-99: Bag Osnaburg and Bag Sheetings, effective April 20.

L-104: Metal Hairpins and Bob Pins, effective April 25, 1942. Production next 90 days limited to 50% of 1941 average rate. Only low carbon steel wire of gage less than .035-in. may be acquired for making these products. Hairpins may be sold only in packages containing less than 100 pins.

L-105: Helmets, effective April 29. Bans production and sale of helmets for civilian use during air raids, except on order by government agencies or other United Nations.

L-108: Finishes of Metalworking Equipment, effective April 27, 1942. Finishes applied after April 30 limited to one coat of primer or sealer; no filler; two coats of paint, enamel or lacquer of "old machine-tool gray."

PRICE SCHEDULES

General Maximum Price Regulation, issued April 28, 1942, by OPA, with a few exceptions establishes ceiling quotations of manufacturers, wholesalers and retailers for commodities and services not covered by the following separate schedules. The general regulation fixes the highest levels charged during March, 1942, as ceiling prices, these taking effect May 18 for products sold at retail, May 11 for manufacturers' and wholesalers' prices and July 1 for services sold at retail.

No. 4 (Amendment)—**Iron and Steel Scrap,** effective April 28. Increases by $4 a ton bundles made exclusively of tin coated material.

No. 6 (Amendment)—**Iron and Steel Products,** effective April 21. Permits increase of about 5% in manufacturers' prices for steel screen cloth.

No. 63 (Amendment)—**New Tires and Tubes,** effective April 25. Increases maximum retail prices of passenger car sizes by 16%.

No. 67 (Amendment) — **New Machine Tools,** issued April 21. Authorizes Gould & Eberhardt, Newark, N. J., to increase maximum price on 209 shapers manufactured on subcontract by Henry & Wright Mfg. Co., Hartford, Conn. Authorizes maximum price of $16,548.08 for 104 automatic machines manufactured on subcontract by Sullivan Machinery Co., Claremont, N. H., for Cleveland Automatic Machine Co.

No. 115—Silk Waste, effective April 25.

No. 116—China and Pottery, effective April 27. Fixes maximum prices at levels prevailing Oct. 1-15, 1941.

No. 117—Used Egg Cases, effective April 23.

No. 118—Cotton Products, effective May 4.

No. 119 — Tires and Tubes (Original Equipment), effective April 27. Maximum prices for automobile and truck tires and tubes fixed at 5% above highest levels prevailing in 1941.

No. 120—Bituminous Coal, May 18, 1942. Fixes mine prices at Oct. 1-15, 1941 levels.

No. 121—Miscellaneous Solid Fuels, May 18, 1942. Fixes producers' prices at Dec. 15-21, 1941 levels.

No. 122—All Solid Fuels, May 18, 1942. Fixes prices for dealers other than producers at Dec. 15-21, 1941 levels.

No. 123—Wool Waste, effective April 28.

No. 124—Rolled Zinc Products, May 11, 1942. Fixes prices at Nov. 29, 1941 levels.

No. 125—Nonferrous Castings, May 11, 1942. Fixes prices at Oct. 1-15, 1941 levels.

No. 126—Fluorspar, May 11, 1942. Fixes producers' prices at Jan. 2, 1942, levels.

No. 127—Finished Piece Goods, effective May 4.

No. 128—Processing Piece Goods, effective May 4.

No. 129—Paper, Products, Raw Materials, May 11, 1942. Fixes prices generally at Oct. 1-15, 1941 levels.

For additional revisions and additions please see STEEL of April 27, p. 30.

No. 130—Newsprint Paper, May 11, 1941.

No. 131—Camelback, May 11, 1941. Manufacturers' prices fixed at March, 1942, level.

No. 132—Waterproof Footwear, May 11, 1942.

No. 133—Farm Equipment, May 11, 1942. Fixes retail prices at Oct. 1-15, 1941, level.

No. 134—Road Machinery, May 11, 1942. Rental charges to user fixed at Oct. 1-15, 1941 levels.

No. 135—Mixed Fertilizer, April 28, 1942.

No. 136—Machines and Parts, effective May 18. Maximum prices for new units and machine work are Oct. 1, 1941, levels. For used units, maximums are 85% of Oct. 1 prices of nearest equivalent new machine or part (if rebuilt and guaranteed), 55% for others. Covers accessories, such as perishable tools, as well as complete machines.

No. 137—Motor Fuel, effective May 18. maximum prices at service stations are highest March, 1942 levels.

No. 138—Ferromanganese, effective May 1, 1942. Carload lots of 78-82% grade, f.o.b. Atlantic Seaboard, $135 per gross ton. Differential for each 1% manganese down to 75% and up to 85% is $1.70. Prices are f.o.b. Rockdale or Rockwood, Tenn., for Tennessee Products Corp., Birmingham for Sloss-Sheffield Steel & Iron Co. Extras per gross ton: $6 for packed carload lots; $10 for gross ton lots packed; $13.50 for less than ton lots when packed down to 200 pounds, $18 less than 200 pounds. Premiums for crushing to specified mesh are those of April 28, 1942.

MISCELLANEOUS ORDERS

Priorities Regulation No. 9, effective April 25. Governs issuance and use of ratings for export. Ratings assigned may not be applied without export license or other authorization to export. PD-1-a used to apply for ratings until new form is approved for each type of export product. PD-311 used for petroleum products exports.

Sweeping Price Order Directed Chiefly at Light Consumers Goods

GENERAL Maximum Price Regulation issued last week by OPA establishing rigid government controls over retail and wholesale prices and rents to halt the rising cost of living will not affect many of the present products of the metalworking industries. Most of these already are under separate price ceilings.

The regulation covers most consumer goods, including appliances, clothing and food and limits prices to the highest charged during the month of March.

Excepted from the General Maximum Price Regulation were a number of commodities where special and unusual circumstances make the enforcement of the schedule impractical or where the regulation would work undue hardship. Included among these are:

1. All waste materials up to the level of the industrial consumer.
2. Zinc, lead and tin industrial residues.
3. Certain machines and parts manufactured in the course of subcontracting—including certain machines and parts specially designed for war production use, also services performed on materials furnished by the customer, which will result in such machines.
4. Antimony ore and concentrates.
5. Instrument jewel bearings.

Special situations in connection with prices of all these commodities, as well as services performed on materials furnished a sub-contractor by the customer led to the exceptions, officials of OPA stated.

The principal reasons for excluding from the general price order all waste materials up to the level of sales to the industrial consumer, officials said, were the difficulty in arriving at any price uniformity and the fact that inflation of prices in transactions preceding sales to industrial consumers is prevented by control at this point.

An "industrial consumer" is defined in the supplementary regulation as "any person who processes any scrap material otherwise than by sorting, cleaning, baling, compressing or reducing in size by any means."

Among handlers below the industrial consumer, the methods and costs of collecting scrap are so widely divergent that arriving at any price formula is very difficult, officials added.

Certain Metal Scraps Excepted

Zinc, lead, tin industrial residues, such as zinc skimmings, zinc ashes, sal skimmings, flue dust, lead drosses, lead slags, lead ashes, lead sludges, residue of tin, solder, babbitt, type material including drosses, scruffs, acidy drosses, fumes, sludges and slags, etc. are excluded from the General Maximum Price Regulation. Such scraps, officials reminded, were excepted in previous maximum price schedules for zinc and lead because of difficulties in setting up any fixed schedules.

The supplementary regulation excepts from the general order maximum prices for any machines or parts for which the manufacturer had no established price in effect Oct. 1, 1941, and which is manufactured pursuant to order for incorporation in a product manufactured by the buyer.

The Supplementary Regulation, too, excludes from the general order "any work on material furnished by a customer performed on any machine used for cutting, abrading, shaping, forming or joining of any metal or plastic."

This results in excluding from the general regulation parts and sub-assemblies sold, or the machining of parts to specifications, for incorporation into specially-designed war products.

Pointing out that a forthcoming maximum price regulation for machinery includes almost all types of machinery now manufactured, but excludes many types of machines or parts which would be manufactured or machined by a sub-contractor for assembly by a prime contractor into various essential war machines or parts, officials said:

"Information presently available does not permit a determination that the highest price of these commodities and services during March, 1942, properly reflects the problems peculiar to their manufacture of supply. The price administrator, therefore, is of the opinion that these commodities and services should be excluded from the General maximum price regulation until such time as additional information is available."

Antimony Ores Not Included

Antimony ores and concentrates drew an exception from the general maximum price regulation because over 90 per cent of the antimony produced in the United States is imported in the form of ores and concentrates from Bolivia and Mexico. The entire Bolivian production is sold under contract to the Metals Reserve Co. which has been requested to resell such ore at prices properly reflecting existing prices for antimony metal and products using antimony ore or metal.

Mexican production comes largely from small producers and it is deemed important to permit the price of antimony to reflect the recent increase approved in the price of antimony metal.

Supplies of instrument jewels until recently had come almost entirely from Switzerland. The need for such jewels in war production work, particularly precision instruments in aircraft, tanks, etc., has resulted in greatly expanded American production. The broadening mass production shortly will present an entirely new-price structure. As soon as complete lines of the new jewel-machine equipment are in operation, OPA officials say, it will be possible to make price determinations for American-made jewels.

In addition to the General Maximum Price Regulation, OPA last week issued a number of new separ-

(*Please turn to page* 115)

Windows of WASHINGTON

Freight car builders with larger inventories than they can use under WPB limitation may now sell surplus to other producers in the industry through cancellation of prior preference order requiring A-2 ratings for such transactions . . . . Railroads face prospect of acute labor shortage with 117,000 new jobs to be filled and more men needed to cover turnover . . . . Leather-working machinery sought for ordnance work will soon carry A-9

By L. M. LAMM
Washington Editor, STEEL

WASHINGTON

IN ORDER to make full use of existing inventories in the hands of freight car makers before permitting them to receive additional raw materials, War Production Board has issued an order cancelling all preference ratings of A-2 or lower on material for car construction which has not already been received by or placed in transit to the producers.

At the same time, the order, Supplementary General Limitation Order No. L-97-a-1, effective April 29, permits any producer to sell and deliver any material which he has on hand or in transit to any other producer of freight cars. This will permit balancing of inventories between producers by sale or exchange, and will assure maximum utilization of all supplies now on hand.

The supplementary order was issued because some producers now have larger inventories of certain types of material than they will be allowed to use under this year's freight car building program as authorized by WPB's requirements committee. WPB has approved construction of only 18,000 freight cars this year over and above the 36,000 cars authorized by the Supply Priorities and Allocation Board program announced last fall.

The number of cars to be built by each producer is being scheduled by the WPB's transportation branch, and the order will allow producers to transfer to other manufacturers materials in their inventories which are in excess of the amount required for the number of cars they will be permitted to build.

Railroad's Labor Problem

Already facing an acute labor shortage in many departments of maintenance and operation, American railroads are confronted with the necessity of finding enough men to fill an estimated 117,000 new jobs for the remainder of 1942.

Current estimates, meanwhile, indicate that employment in war industries will increase from about 7,500,000 to about 15,000,000 men and that about 4,000,000 men will be needed in the armed forces by the end of this year, thereby further complicating the railroads' manpower problem.

This situation was disclosed last week by Joseph B. Eastman, director of the Office of Defense Transportation, upon receipt of a report by Otto S. Beyer, director of the division of transport personnel, based on information obtained from the Interstate Commerce Commission, Railroad Retirement Board and the railroad industry.

Mr. Beyer's report indicates that aside from filling the 117,000 new jobs, 167,000 men will be needed to meet labor turnover, 22,000 more will be necessary to replace selectees, and 14,000 will be required to take care of vacations which many workers will be taking for the first time under the award of the Emergency Board in December, 1941. This makes a total increase of 320,000 men needed by the railroads for the rest of this year.

Shoe, Leather Working Machinery Deliveries Restricted

Manufacturers of shoe machinery, leather working machinery and tanning machinery have been prohibited by the WPB from accepting or filling any orders except those bearing an A-9 or higher preference rating.

A formal order governing distribution of these types of machinery is being prepared. Meanwhile J. S. Knowlson, director of Industry Operations, has forbidden acceptance of further orders except those rated A-9 or better.

Orders now on manufacturers' books which fall below the A-9 classification may be filled only upon specific WPB authorization. The restrictions do not apply to deliveries and acceptance of orders for repair or maintenance parts.

The production facilities of the shoe machinery, leather working machinery and tanning machinery industries are needed for the production of ordnance. Shipments of machinery on low ratings or without ratings must be halted in order to facilitate war work.

There is ample machinery for the ordinary production of shoes, leather and leather products. Future expansion, if any, of these industries will be regulated by requiring machinery manufacturers to fill only rated orders having a direct relation to war and essential civilian requirements.

Members of Man Power Commission Selected

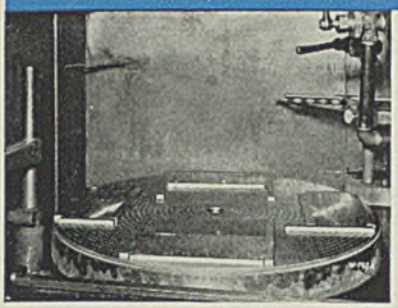
President Roosevelt has appointed eight members to serve with Chairman Paul V. McNutt on his recently announced Man Power Commission, the purpose of which is "to bring about the most effective mobilization and the maximum use of the nation's man power for the prosecution of the war."

Members include Wendell Lund, former executive secretary of the Michigan Unemployment Compensation Commission, who will represent the new WPB Labor Production Division; WPB Chairman Donald M. Nelson; Undersecretary of Navy James V. Forrestal; Secretaries Claude R. Wickard and Frances Perkins of the Agriculture and Labor Departments; Maj. Gen. Lewis B. Hershey, of the Selective Service System; Goldthwaite H. Dorr of the War Department; and Arthur S. Fleming of the Civil Service Commission.

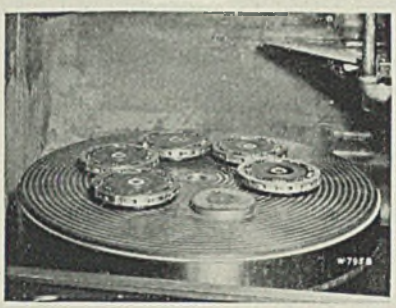
Use of Form PD-73 Is Extended Until June 1

Filing of Form PD-73 with all purchase orders for steel and iron products to be delivered before June 1 is

"PUT IT ON THE BLANCHARD"

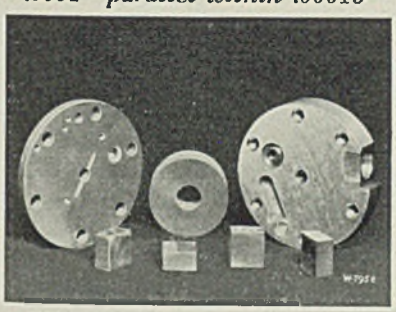


Sides ground parallel within .00015"

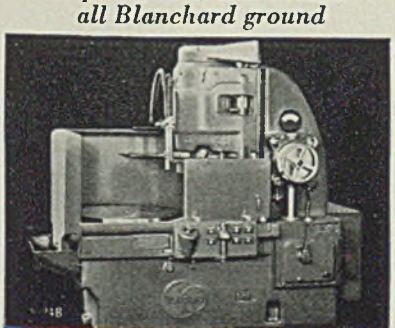


One end ground square with side within .0001"

Other end ground square within .0001" parallel within .00015"



End plate, roll, and blades — all Blanchard ground



No. 18 Blanchard Grinder

SQUARE

WITHIN .0001"

Two Blanchard No. 18 Surface Grinders, with Blanchard fixtures produce these refrigerator compressor blades to extremely close limits for accuracy and finish — at a rate of 1000 complete blades (ground 6 sides) every 8 hours.

360 blades are held on the chuck at one time while one side is being ground, then they are turned over and the other side is ground parallel within .00015". The ends and edges of the blades are then ground in six 10-station fixtures mounted on the chuck.

A Blanchard Demagnetizer is used between each operation on both the work and fixtures.

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required by the terms of Amendment 4 to General Preference Order M-21.

Amndment 3 to the steel order, issued recently, called for the elimination of PD-73 in the case of orders to be delivered after April 30.

Purpose of the new amendment is to allow purchasers and producers adequate time to re-classify all unfilled orders.

Amendment 4 also provides that it will not be necessary for a producer to secure the certification (which will replace PD-73 beginning June 1) in cases of orders previously placed to fill lend-lease, other export or warehouse requirements, inasmuch as these classifications remain the same as in PD-73.

All communications concerning General Preference Order M-21, amended and extended, should be addressed to the Iron and Steel Branch, War Production Board, Washington.

Mexican Pact To Stimulate Strategic Minerals Output

Metals Reserve Co., in conjunction with State Department, has completed arrangements with Mexican government, supplementing those made last July 15, which should result in substantial increase in production of strategic and critical metals and minerals in Mexico required in war effort of United States and necessary to hemispheric defense.

Under the agreement the mining industry in Mexico is assured by Mexican government of stabilized tax policy, no increases in railroad rates on mineral products and of co-operation in other ways to facilitate increased production. Assurances are also given by Mexican government and Mexican mining labor organizations of co-operative and liberal attitude in application of labor laws and regulations applying to certain phases of mining operations.

Metals Reserve Co. has agreed to purchase for period of agreement copper, lead and zinc in metallic form or in ores and concentrates imported to the United States at prices which should give stimulus to increased production.

Production of Chrome Concentrates Increasing

Three Montana properties alone will be producing by the end of this year chrome concentrates at a rate four times the previous peak of United States production in 1918, according to reliable informants.

One of these mills started production in March on a basis of 60,000 tons of concentrates annually, and plans are now underway to increase output by 150 per cent. Another mill will be in operation later this year, producing 150,000 tons annually, and a third is scheduled to produce 60,000 tons a year.

A mill is nearing completion in Oregon to recover chromite from bench gravels. It is under contract to deliver 30,000 tons of chemical grade concentrates to the Metals Reserve Co. A 400-ton mill to be erected in Wyoming by private interests will produce about 35,000 tons annually.

Synthetic Rubber Production Program Stepped Up by WPB

WPB has authorized the Reconstruction Finance Corp. to provide facilities for an annual productive capacity of 700,000 tons of buna S synthetic rubber to be in operation not later than the end of 1943.

This represents an increase of 100,000 tons in the buna S program previously authorized by the WPB, and is in addition to the planned capacity for butyl synthetic rubber and neoprene, totaling 100,000 tons.

WPB said that the 700,000-ton buna S program is to be given all the priority and allocation assistance needed to assure the production of not less than 350,000 tons during the calendar year of 1943.

All the synthetic rubber to be produced for many months must be reserved for military uses, and none will be available for civilian uses.

Permit Metal Windows for Certain Rated Projects

Limitation Order L-77 on metal windows has been amended to permit the manufacture of basement windows and residential-type casements for use in certain rated housing projects.

The amendment authorizes the manufacture of metal windows composed wholly of materials in a manufacturer's inventory prior to March 25 for use in a project to which a preference rating has been assigned by Order P-55, defense housing, Order P-19-d, publicly financed housing, or Order P-110 remodeling of houses in a defense area.

Sewing Machine Production To Be Discontinued June 15

A limited number of sewing machines and sewing machine attachments may be produced between now and June 15, after which production must cease, the WPB has ordered.

The order, General Limitation Order No. L-98, will result in a substantial saving of critical materials and will make available for war production at least a part of the industry's plant facilities.

Under the order, manufacturers may produce new machines and attachments until June 15 at a rate of 75 per cent of the 1940 rate. Machines completely assembled prior to June 15 may be installed in cabinets or on portable bases after the cutoff date, provided they come within the 75 per cent quota. The WPB estimates that this will result in a production of approximately 75,000 new machines, which when added to approximately 175,000 machines manufactured since the first of the year, will make 1942's total production approximate 250,000 machines. Production in 1941 was 800,000 machines.

Provision is also made in the order for the manufacture of repair and replacement parts during a six-month period beginning May 1, 1942, at a rate of 125 per cent of the rate during 1940 and 1941.

More Committees Named To Represent Industries

War Production Board last week named the following industry advisory committees in the metalworking field:

Truck Trailer

Government presiding officer, R. L. Vanlman.

Committee members: Harvey C. Fruehauf, Fruehauf Trailer Co., Detroit; Bert P. Bates, Highway Trailer Co., Edgerton, Wis.; M. N. Terry, Trailmobile Co., Cincinnati; W. C. Nabors, W. C. Nabors Co., Mansfield, La.; M. J. Neeley, Hobbs Mfg. Co., Fort Worth, Tex.; Harrison Rogers, Rogers Brothers, Albion, Pa.; N. A. Carter, Carter Mfg. Co., Memphis, Tenn.; Harry N. Brown, Keystone Trailer & Equipment Co., Kansas City, Mo.; Christopher Hammond Jr., Steel Products Co., Savannah, Ga.; H. C. Bennett, Utility Trailer Mfg. Co., Los Angeles; A. R. Trombly, Trombly Truck Equipment Co., Portland, Oreg.; C. H. Kingham, Kingham Trailer Co., Louisville, Ky.; J. L. Glick, Truck Engineering Co., Cleveland; F. H. McIntyre, Carolina Truck & Trailer Co., Charlotte, N. C.; Myles Standish, Omaha Standard Body Corp., Council Bluffs, Iowa; J. C. Farrell, Easton Car & Construction Co., Easton, Pa.; G. A. Burns, Butler Mfg. Co., Kansas City, Mo.

Lawn Mower

Government presiding officer, M. D. Moore.

Committee members: P. N. Case, Blair Mfg. Co., Springfield, Mass.; H. M. Cooper, Cooper Mfg. Co. Inc., Marshalltown, Iowa; W. C. Davis, G. W. Davis Corp., Richmond, Ind.; K. E. Golt, Toro Mfg. Corp., Minneapolis, Minn.; H. L. Heineke, Heineke & Co., Springfield, Ill.; O. T. Jacobsen, Jacobsen Mfg. Co., Racine, Wis.; R. C. Luecke, Milbradt Mfg. Co., St. Louis; W. S. McGuire, Dille & McGuire Mfg. Co., Richmond, Ind.; M. D. Perine, Pennsylvania Lawn Mower Works, Primos, Pa.; W. S. Watrous, Whirlwind Lawn Mower Co., Milwaukee, Wis.

Eight New De-Tinning Plants Now Planned by War Production Board

WASHINGTON

WPB has raised its sights on the construction of de-tinning plants. A few months ago it suggested to the Defense Plant Corp. that three such plants be erected; now it is planning for eight.

Board experts estimated that if only one-fourth of the tin cans used by housewives are processed, 10,000 tons of tin and 1,000,000 tons of black plate can be salvaged.

Reclamation of this amount of tin would aid considerably in easing a tight situation. The war in the Pacific has caused 73.6 per cent of our tin imports to be cut off. The Malay States and Netherlands East Indies alone formerly supplied 70 per cent of our requirements, and it is said in Washington that if the war stopped tomorrow it would be two years before these countries could export any tin to the United States, due to destruction of properties.

Nigeria still is supplying a small amount of tin to this country, and Bolivia is sending about 17 per cent of our normal needs. It would be difficult to increase Bolivian shipments materially, it is said, even if the United States supplied the money to open new mines.

Solder Substitutes Cut Use of Tin by 50 Per Cent

WPB officials are pleased with newly developed solder substitutes which have cut down use of tin for this purpose nearly 50 per cent. Tin conservation order amended March 17 limits tin content of solder to 30 per cent after May 1.

One large manufacturer has succeeded in bringing average tin content of solder to 30 per cent and expects by continued research to reduce this level further. Other manufacturers are expected to do the same.

If for any good reason other manufacturers are unable to reduce tin content to required amount, it will be necessary to appeal to WPB for relief for a reasonable period to enable them to complete their experiments.

If appeal is granted, it will be proper for can manufacturers to obtain solder of higher tin content from their suppliers provided the can manufacturer certifies to the solder supplier that appeal which is with WPB for intermediate relief has been approved. WPB is notifying solder suppliers that they must notify their customers of necessity for their prompt study of substitute solder because any variation above 30 per cent in tin content after May 1 will necessitate an appeal and an exception.

Price Ceiling for Bundled Tin Plate Scrap Raised

Revised Price Schedule No. 4 for iron and steel scrap has been amended to provide an upward adjustment in the price of bundles made exclusively of tin-coated materials.

The amendment, which became effective April 28, also adds a new requirement to the schedule with regard to rail or vessel shipping notices and stiffens the regulations covering mixed scrap shipments.

The amendment increases by $4 per gross ton the price of bundles made exclusively of tin-coated material. The former provision priced such bundles at $8 per gross ton below No. 2 dealers' bundles.

The reduction of the $8-per-ton differential to $4, OPA officials said, was made to assure a more adequate supply of exclusively tin-coated bundles to steel mills and other consumers using this type of scrap.

With regard to shipping notices, the new amendment requires that the shipper execute and mail a shipping notice simultaneously with shipments by rail or vessel to a consumer or his broker.

Such shipping notices must contain the date of shipment, number and initial of car or name of vessel, the consumer's or broker's purchase order number, the signature of the shipper or his duly authorized representative, and the specific grade of scrap as designated in the schedule.

The detailed shipping notice requirement is intended to eliminate all possibility of the shipper's escaping responsibility for upgrading through his failure accurately to designate the material shipped.

In connection with mixed shipments, the amendment withdraws the previous privilege under which consumers could authorize a mixed shipment. The inclusion in one vehicle of more than one grade of scrap puts the shipment in the classification of the unprepared scrap, and requires that it be priced at $2.50 per gross ton below the maximum price applicable for the lowest priced grade in the shipment.

British Change to Terne Plate For Petroleum Containers

Petroleum Board of the United Kingdom has agreed with the Ministry of Supply that the manufacture of cans for petroleum products shall be transferred from tin plate to terne plate and that the change of coating shall be made as speedily as possible, according to a report to the Department of Commerce. The covering of terne plate will be a mixture of 25 per cent tin and 75 per cent lead.

Further Steel Expansion "Not Contemplated" by WPB Experts

ADDITIONAL expansion in steelmaking capacity—above the 10,000,000-ton program now in process—is not being planned by WPB steel expansion officials, it was learned last week.

Speculation on the probability of a new program was aroused when President Roosevelt threw out the suggestion at a recent press conference that the entire war production effort might be increased further, and that additional steel might be required.

WPB, however, is understood to be placing greater emphasis on use of present plants and less on new construction.

The 10,000,000-ton expansion was proposed about a year ago. Since then production goal for ships, tanks, guns, airplanes and other war material requiring large quantities of steel has been stepped up sharply. Some government officials believe that if an additional 10,000,000 tons of capacity was needed a year ago to effect the production goals then contemplated, the present program should necessitate further expansion.

WPB's steel experts realize most executives in the steel industry do not consider it feasible to expand further. However, they believe further expansion can be accomplished if needed.

One contention is that more ore carriers should be built for use on the Great Lakes. Originally it was proposed the Maritime Commission should build 25 new vessels, but only 16 were included in the program as finally approved.

Industrial Consultants Aid Armed Forces in Conversion Program

WASHINGTON

FACILITIES of civilian industry which can be used to break bottlenecks in war production are being made available to the armed services and the Maritime Commission through special industrial consultants in the WPB Bureau of Industry Branches.

Men thoroughly familiar with the existing machinery and facilities in their own industries have been brought into the government service, usually on a temporary basis, to give government procurement officers a full picture of the resources of American industry which can be used in the expanding munitions and ship program.

Primary objective of this conversion program is to make additional facilities available for war production. For example, facilities of the structural steel and steel car industries have begun in recent weeks to produce parts for ships which would otherwise have required construction of new plants. Other facilities available for war work have been located and put into use in the office machinery, paper machinery, railroad equipment, domestic washing machine, steel furniture, stove, and vacuum cleaner industries.

Consultants who have been appointed by the WPB are outstanding executives with production and engineering experience. They are men with direct personal knowledge of the facilities of the industries about which they offer advice on conversion problems.

Serve Only As Advisors

Chief function of these industrial consultants is to furnish information to Army, Navy and Maritime Commission procurement officers about the types of war work which each industry can handle, both in prime and subcontracts. They do not, however, enter into any direct negotiations for placing orders.

Government procurement officers who are checking the production schedules of prime contractors inform the consultants of the Bureau of Industry Branches when special facilities are needed immediately to expedite various kinds of war production. The consultants, with their detailed knowledge of the tools and skilled labor available in their industries, often can tell where the needed facilities may be found, without waiting for the construction of new buildings and equipment. The procurement officers who are furnished with this information can then arrange the placing of contracts to speed up delivery dates.

Objective set by WPB Chairman Nelson is to convert to war work every usable facility in every manufacturing industry which is not required for minimum civilian needs. To attain maximum speeds in war production, the program now being followed puts primary emphasis on utilization of existing tools and production lines, rather than on a changeover of plants which would consume valuable time in retooling.

No Time For "Wet-Nursing"

In announcing this industrial approach to the problems of conversion, Mr. Nelson said that first consideration must be given to efficiency in filling war orders. Time does not permit a detailed program of placing war orders with every company affected by a WPB limitation or conservation order. In many cases, civilian production facilities are not readily adaptable to war work, which often requires tools working with closer tolerances and with different functions from those used generally in civilian production.

Activities of the industrial consultants are therefore directed primarily toward finding existing facilities to speed the war effort. A progress report on conversion will be issued soon by WPB.

Consultants actively engaged in this program are as follows:

N. L. Etten, American Wringer Corp., Woonsocket, R. I., household appliances.

D. C. Smellie, Hoover Vacuum Cleaner, North Canton, O., household appliances.

D. D. Burnside, American Stove Co., St. Louis, stoves

E. E. Berry, Beloit Iron Works, Beloit, Wisc., pulp and paper machinery.

S. H. Arnolt, Atlas Steel & Tube, Warsaw, Ind., metal furniture.

W. E. Chollar, Remington Rand Co., Bridgeport, Conn., office machinery.

Alvin Haas, Yates American Co., Beloit, Wis., wood working machinery.

Fred Erbach, Yates American Co., Beloit, Wis., wood working machinery.

John Lehman, Harris, Seybold, Potter Co., Cleveland, printing machinery.

R. G. Conklin, Vulcan Lead Products, Milwaukee, lead products.

A. P. Nichols, Jr., Kansas City Smelting Co., Kansas City, Mo., lead products.

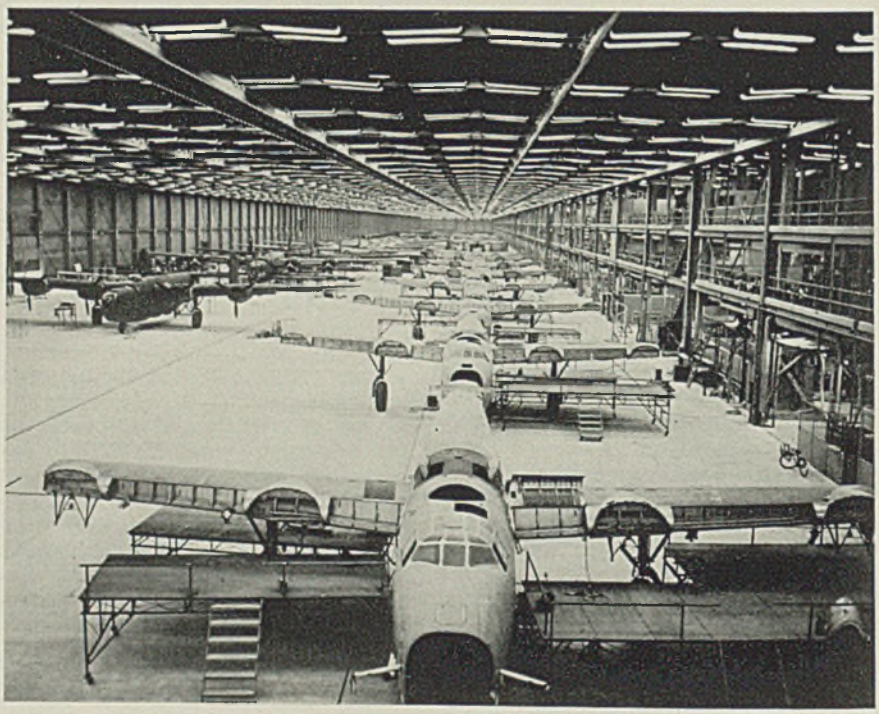
C. C. Lincoln, Virginia Lincoln Furniture Co., Marion, Va., wood furniture.

Dr. A. B. Pacini, American Home Products, Jersey City, N. J., toiletries and cosmetics.

L. C. Wilkoff, Youngstown Steel Car Co., Youngstown, O., car building.

Col. L. S. Horner, New Haven, Conn., builders hardware.

Bomber Assembly Line "Somewhere in the Southwest"



ONE year from the date ground was broken for Consolidated Aircraft Corp.'s new plant the first of four-motored B-24 land bombers came off the assembly line, 100 days ahead of schedule. At a brief ceremony recently the plant was transferred from The Austin Co., builders, to the Army Corps of Engineers, then to the Army Air Forces, and accepted for Consolidated by T. M. Girdler, chairman of the board. Location, widely publicized last year, now is simply referred to as "Somewhere in the Southwest". Photo shows a section of the mechanized assembly line

Higher Delivered Prices on Iron, Steel Permitted at Certain Points

WASHINGTON

AMENDMENT providing for increases in the delivered prices of iron and steel products at Toledo, O., Detroit and Eastern Michigan, and at Gulf Coast basing points was announced last week by OPA.

The amendment, No. 4 to Revised Price Schedule No. 6 for iron and steel products, was designed to correct internal inconsistencies in the price schedule arising out of the 6 per cent increase in railway freight rates put into effect March 18 of this year on certain iron and steel items. It became effective April 30.

Delivered prices applicable to Toledo, Detroit and Eastern Michigan and Gulf Coast basing points under the amendment may be increased 25 cents a gross ton on ingots, blooms, billets and slabs, and 2 cents a hundred pounds on all other iron and steel products.

The increases will be equally applicable to carload and less-than-carload shipments.

The variance between the 25 cents a gross ton and 2 cents a hundred pounds categories of increases, it is pointed out, results from the fact that railroad freight rates are lower for semifinished iron and steel products than for finished products.

Explaining the price increases, OPA officials pointed out that the practice of the steel industry on deliveries to the Ohio, Michigan and Gulf Coast points of consumption, before issuance of Price Schedule No. 6, was to quote delivered prices, which included transportation charges.

The practice was recognized in Price Schedule No. 6, and delivered prices in the areas covered in the amendment were frozen as of April 16.

When the freight rate rises came along, the revised schedule permitted increased freight costs to be passed on to the consumer on most steel products. In the case of the points listed in the new amendment, where quoted delivered prices had been frozen, passing on of the higher freight charges to consumer was not possible, however.

The amendment, thus, brings relief to steel companies quoting "delivered" prices for their products.

OPA officials reminded that "a flat delivered price will not generally be revised upward to reflect an increase in freight rates." But they added, in explanation of the action in the instance of delivered steel prices, "to place shipments into a particular area at an unusual, if minor, disadvantage might be to disturb the normal distribution and flow of materials."

Imported Nickel Scrap To Sell At Domestic Material Prices

Amendment requiring imported nickel-bearing scrap and secondary materials to be sold at not more than the maximum prices provided for domestic scrap was announced last week by OPA.

In the past, import charges under the law could be passed on to the ultimate consumer.

Since Congress removed tariff duties from nonferrous and iron and steel scrap, the reason for such special treatment has disappeared. However, since there is a possibility that the Congressional act removing tariff duties from nonferrous and iron and steel scrap may be interpreted by the Bureau of Customs as not applying to all nickel scrap and secondary materials, the amendment would permit passing on to the consumer of any duties not removed.

The amendment, it is pointed out, protects persons who imported scrap or had such metal in transit at the time of the effective date of the amendment. To any scrap already here, or shipments enroute, the seller may still add import charges, as in the past.

Restrict Manufacture of Protective Helmets

Production and sale of protective helmets, except on order by an agency of the United States or by one of the other United Nations, has been forbidden by the WPB to prevent the waste of critical materials and the manufacture of helmets not conforming to safety standards.

A protective helmet is defined to include any head covering intended for civilian use during air raids. The term does not include industrial, official, police, fire department or other helmets not represented as a means of civilian protection from the hazards of war.

The manufacture of civilian helmets is a recently-born industry. It is estimated that 1,000,000 helmets would require approximately 1500 tons of steel in addition to quantities of leather and lining materials.

Less Paint To Be Permitted On New Machine Tools

Fancy painting and finishing of metalworking machinery by machine tool builders will be banned after April 30 by WPB.

Limitation Order No. L-108 provides that only one coat of primer or sealer may be applied to new metalworking equipment. No filler may be applied and not more than two coats of paint, enamel or lacquer may be used. Any color other than "old machine tool gray" for the final coat of paint is prohibited.

The order was issued, the board stated, to reduce the time required for delivery of machine tools and to free the space now used for finishing, for more productive work. In some plants the saving in time may be a day or more in starting critically needed machines on their trip to production lines in war plants.

Considerable floor space is occupied in some plants by the finishing department and this area can be used in expanding strictly production operations.

The order applies to all types of machinery used for the processing of metal.

"Filler" is defined as any material used to fill in and smooth out irregularities in metal surfaces, and "primer or sealer" is any permanent protective coating of liquid applied to a metal surface prior to painting.

Heavy Trucks May Be Equipped With New Tires and Tubes

WPB has made it possible to equip heavy trucks produced under existing quotas with tires and tubes. Amendment No. 7 to Limitation Order No. L-1-a, effective April 25, rescinds the prohibition against putting tires and tubes on new trucks except for delivery to dealers.

It is estimated 5000 heavy trucks can be equipped with tires and tubes under the amended order. Arrangements have been made by the Rubber and Rubber Products Branch of the WPB to make these tires available. Only trucks having a gross vehicle weight of 16,000 pounds or more are eligible to receive tires and tubes under the amendment.

General Electric "Trust Case" Postponed To Aid War Effort

Justice Department at the request of Secretary of War Stimson and Secretary of Navy Knox has postponed prosecution of its anti-trust case against the General Electric Co. The requests were made on the basis that the war effort would be impeded if the defendants were forced to take time out from production and research to prepare for the trial, originally scheduled for June 15.

Justice Department had charged General Electric and its subsidiary, Carboloy Co., Inc., with monopoly and restraint of trade.

BULLARD

MESSAGE TO MEN IN A HURRY

THIS Mult-Au-Matic is in a plant that was an empty field only eight months ago.

The parts are Wright Cyclone crankshaft sections. Here's what the plant manager says about the Mult-Au-Matic shown in the job: "... a 15-ton Bullard Mult-Au-Matic does seven operations at once; it turns, faces, bores, reams, counterbores, recesses and chamfers."

Whenever there is lots of work to be done, in a hurry, you'll usually find Mult-Au-Matics in the key positions.

THE BULLARD COMPANY

BRIDGEPORT, CONNECTICUT

Mirrors of MOTORDOM

UAW-CIO helps FDR frame wartime economic policies, but wants WLB to frame wage rates PDQ. New strike technique substitutes name-calling for bodily harm . . . Chrysler tools potent Swedish antiaircraft weapon for mass production. Steel replaces aluminum in shell clips. Aircraft engine steel requirements becoming larger, with production far ahead of estimates

By A. H. ALLEN
Detroit Editor, STEEL

DETROIT

AS PREDICTED here a couple of weeks ago, the UAW-CIO "Victory through equality of sacrifice" program received thorough attention at Washington, proof being the President's message to Congress and his fireside chat to the nation last week. Even before the latter event, the UAW-CIO began beating its chest and, through George F. Addes, secretary-treasurer, stated it was "proud to have made a substantial contribution toward the framing of wartime economic policies". The union lists as its contributions the idea of limiting executives' salaries to $25,000 a year (the President said net income after taxes, not salaries); limitation of corporate profits; ceilings on prices of essential commodities, and rationing of essentials.

As might be expected, labor does not go along with proposals to freeze wages or farm prices. The UAW says it is "in accord with the President's view that this is a matter to be handled by existing agencies (the War Labor Board) rather than by legislation." However, the President made it pretty plain that his view was for a "freezing" of wages—and that this step was an essential part of his anti-inflation program. From the distorted decisions already handed down by the WLB, it is apparent that no economic salvation can be expected from this direction.

GM-UAW Dispute Up to WLB

The General Motors-UAW dispute over a contract again has been thrown back into the lap of the WLB after it had once rejected the matter. It is expected that shortly the board will hand down another of its characteristic decisions suggesting the "maintenance of membership" clause as a solution of contract squabbles. This is nothing but a sugar-coated attempt to impose the closed shop, so it probably will not be long before General Motors and then Chrysler join Ford in the tacit acceptance of the closed shop in its plants which have UAW-CIO contracts, and that includes about all of them.

The closed shop brought no termination of labor difficulties in Ford plants; in fact there has been an unending series of minor but persistent disputes and altercations which have harassed production and seriously unsettled efficiency. Latest of these was the instance of one section of the Ford working force protesting volubly because the company had employed Col. Lindbergh on its engineering staff.

Union pickets massed around the gates of the Dodge Truck Division of Chrysler Corp. last week, carrying a large placard reading, "This plant is working for Hitler today." According to the company the pickets prevented 350 maintenance men from entering the plant to complete retooling now in process in connection with a change in type of army truck being built there. The changeover, plus some delays in material shipments, caused a brief slackening of operations early last week, although an attempt was being made to effect the model change with a minimum of delay in output.

Essentially, the new truck design is said to involve a "low silhouette", accomplished by revising the frame construction to provide lower center of gravity and lower overall height. In maneuvers, some trucks have been reported in difficulty due to inability to make their way through wooded sections because of their high clearance. This, plus a few instances of tipping over because of a presumed too high center of gravity, led to the new model which, incidentally, is a much poorer target for enemy guns than was the earlier design.

Meanwhile, getting back to the subject of unions again, the Dodge local in Detroit, in the misguided effort of its president to get some publicity through erroneous interpretation of conditions at the moment, sent the usual letter to President Roosevelt (what a lot of mail he must be receiving these days!) complaining that the Dodge plant was doing too slow a job of converting to war production. He might truthfully have added that the work now in planning for this plant will require all the floor space and twice the normal employment of 25,000 when it matures to the full production stage. Obviously it takes time to tool up for new work. It takes time to fashion dies, to obtain new machinery, to set up new equipment and to obtain stocks of material and parts. The President can do nothing about this, nor can the newspapers. What conceivable good can be accomplished by falsely attempting to give the company a black eye in a period of national emergency escapes the reason of any impartial observer.

The technique of standing in front of plant gates with signs taunting workmen who have jobs to do there that they are "working for Hitler" or are "tools of the Axis" appears to be the latest form of union effrontery. It would seem to merit the investigation of the FBI, along with the idea of calling strikes "patriotic rallies." It is vicious, unwarranted and treasonable, particularly because it is so effective.

Tools for Volume Output of Bofors Antiaircraft Guns

One of the war products which Chrysler is pushing rapidly into volume production is the 40-millimeter Bofors antiaircraft gun, a Swedish design which has been adapted for mass production techniques. Chrysler is spending some $6,000,000 for equipment and tools to facilitate manufacture of interchangeable parts in sections of 11 of its plants in Michigan, Indiana and Ohio, in addition to two new gun

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parts plants which have been erected.

The gun itself comprises more than 500 individual parts, mostly steel, from small springs weighing a fraction of an ounce to the 8-foot barrel weighing 250 pounds. Major Daniel J. Martin of Army Ordnance has described the gun as answering the "tactical need for protection of field forces and installations against low-flying aircraft. . . . Its shells are detonated instantly on impact. Point-blank fire is made possible by tracking aircraft with reflecting sights and adjusting the corrector with great accuracy. Use of tracer shell permits making necessary corrections and observation of the shell group near the target.

Fully Automatic

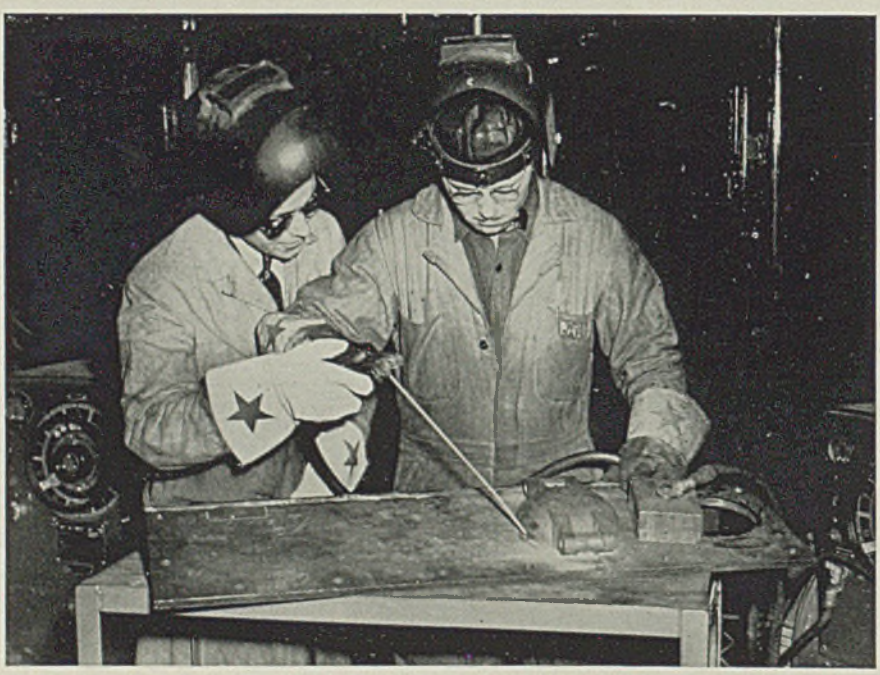
"Fire is usually in bursts of four to five rounds, full automatic. . . . Short firing time makes it possible to regulate the fire quickly. This is now necessary because the faster bombers remain within effective range for not more than 10 seconds. The sooner the burst reaches the target, the more rapidly can any necessary corrections be made.

"The rate of fire is 120 to 140 rounds per minute; the weight of gun in firing and traveling position is 4300 pounds; maximum range is 11,000 yards, horizontal. The magazine holds two cartridge clips, each containing four rounds and is filled by inserting the clips in the guide bars of the magazine. The loading mechanism is entirely automatic, permitting continuous fire, and the gun is loaded conveniently at all elevations.

"The principal projectile used with the Bofors 40-millimeter automatic gun is tracer shell with a supersensitive nose fuze. It consists of these main elements: Bursting charge, tracer composition, nose fuze and base fuze. When the round is fired, the tracer composition is ignited by the base fuze about 55 yards from the muzzle. The light from the burning tracer composition thus becomes visible from the gun emplacement and appears as a reddish star, showing the shell's trajectory. During automatic fire, the light emitted by the tracers, following one another in rapid succession, resembles a light beam. . . . The shell will burst even if it merely hits the fabric of an airplane wing, due to the split-second action of the nose fuze."

Automotive engineers and master mechanics are given the credit for redesigning the shell clip for projectiles used in this type of gun. This occurred about a year ago, at the time when substitutes for zinc and aluminum die castings were being studied. The shell clip was an aluminum die casting and after hearing that the clips were thrown overboard in naval operations with the gun, a group of engineers worked out an arrangement for stamping the clips out of sheet steel in a progressive die arrangement. They are being produced this way now, and by the millions, saving large quantities of sorely needed aluminum as well as thousands of dollars of the taxpayers' money.

Trainees Learn To Weld Armor Plate



INTENSIVE training program in all phases of armor plate welding is under way in Fisher Body Division plants. Here, an instructor (left), after classroom training, goes into the shop as a welding foreman to instruct workmen on the job

Fisher Body Institutes Extensive Training Programs

All peacetime employes of Cadillac Motor Car Division have now been returned to the payroll on war production, and new employes are being added, leading to an eventual doubling of the peak level of last year, which was a 40-year high. Cadillac is now in the third year of participation in war production and months back instituted upgrading methods, as a result of which the company now is employing women on production for the first time since the last World War.

Extensive training programs are now in progress in ten plant localities of Fisher Body Division, looking to eventual employment of 75,000 on war production. Commenting upon the difference in character of jobs involved in war work, E. F. Fisher, general manager, states, "I doubt if there is one man in any of our plants today who is doing a job exactly like he did in auto body building days. If the operation is similar, then the specifications and tolerances are so different as to make it almost a different job. Training involves instruction of workmen and supervisory staffs as well."

No Slackening in Demand

Steel interests in this territory report no slackening in demand and in fact are finding orders carrying high priority being pushed further away by direct allocations of material to specific customers. Vast quantities of alloy tonnage are on the books for aircraft engine work —cylinder barrels, connecting rods, propeller hubs, crankshafts, piston pins, etc. While schedules on this material are high, they are further complicated by the fact that production has developed much faster than anticipated, and, in one case at least, requirements call for 45 per cent additional tonnage for spares.

Shell steel orders likewise are bulking large, one recent inquiry being for a mere 23,000 tons. Structurals are difficult to get delivery on, and there is talk of using both wood and reinforced concrete to replace structural steel in certain new war plants.

In some instances the system of allocating tonnage is providing steel companies with knowledge about customers they never knew existed, or at least had never called on. This may prove to be a valuable asset in years to come, when sales efforts will have to be resumed.

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FROM AN ORIGINAL DRAWING BY ORISON MACPHERSON

BLAST FURNACE MEN SPEED IRON PRODUCTION FOR MORE FIGHTING STEELS

With the precision of a gun crew in action, a team of skilled men jumps to the task of replacing a burned-out tuyere in their blast furnace. Tools, parts and materials always ready, they snap into action. In a matter of minutes the job is done. The blower opens the wind valve. With a rush and roar the hot blast is on again. Iron for war steel keeps on smelting.

It is this work-coordination of men and management that sets today's record-breaking production pace at J&L.

No waste motions here, no wasted minutes, for these men at the blast furnaces and throughout the works are determined that fighting steels and more fighting steels shall be made *today*.

JONES & LAUGHLIN STEEL CORPORATION

AMERICAN IRON AND STEEL WORKS • PITTSBURGH, PENNSYLVANIA

PARTNER TO INDUSTRY IN WAR PRODUCTION

J&L STEEL

Freight Car Forecast Up 14.6% in Second Quarter

Regional Shippers' Advisory Boards estimate an increase of 14.6 per cent in freight car requirements for second quarter, over actual carloadings in the corresponding quarter last year. The estimate covers 29 principal commodities, as furnished to the car service division of the Association of American Railroads.

Total car requirements for second quarter are estimated at 7,475,175, compared with actual loadings of 6,525,083 in second quarter, 1941. Iron and steel products are expected to require 644,241 cars, an increase of 5.3 per cent; coal and coke 2,276,137, up 31.1 per cent; ore and concentrates 983,874, a gain of 12.5 per cent. Agricultural implements and machinery, other than automobile, estimated at 24,727 cars, represents a decline of 26.7 per cent from 33,732 cars in second quarter last year.

More Coal Needed as War Tasks Absorb Miners

"It has been estimated that between 10,000,000 and 15,000,000 tons of coal additional to that previously applied to the coke industry will be required this year," said W. D. Steele, Consolidation Coal Co., Fairmont, W. Va., addressing the nineteenth annual coal convention of the American Mining Congress, in Cincinnati, last week. "To produce this will require that other coal markets be combed and culled. . ."

Shortage of miners and skilled workers in anthracite mines this year and an acute situation in 1943 was predicted by W. B. Geise, Susquehanna Collieries Co., Nanticoke, Pa. It is estimated that of 89,000 employes at anthracite mines in the northern section of Pennsylvania 2500 have entered military service and 4500 have gone to work in war plants.

Thomas J. Thomas, associate director of the Office of Solid Fuels Co-ordination, said it will be necessary to maintain maximum output through the summer. Present indications are that the year's requirements will be 550,000,000 to 570,000,000 tons of bituminous and 60,000,000 tons of anthracite.

New Alloys Laboratory Exhales To Keep Out Dust and Gas

VANADIUM Corp. of America's new chemical laboratory building at Bridgeville, Pa., illustrated, features an unusual ventilating system for control of atmospheric dust and gases—to which tasks performed in analyzing alloys are extremely sensitive.

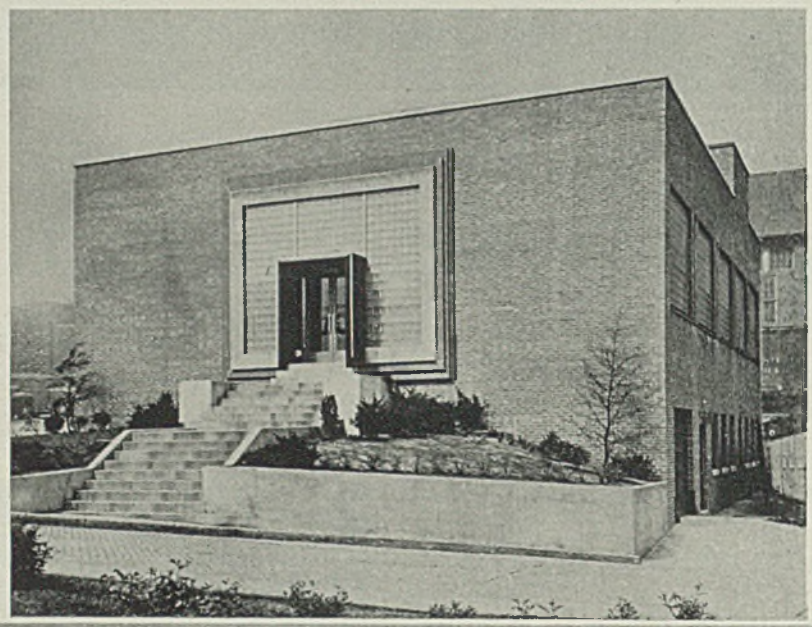
Air and temperature control of the rooms is facilitated by sealed walls of glass brick and glazed tile, acoustical-panel ceilings, and extra large insulating air spaces in walls and roof.

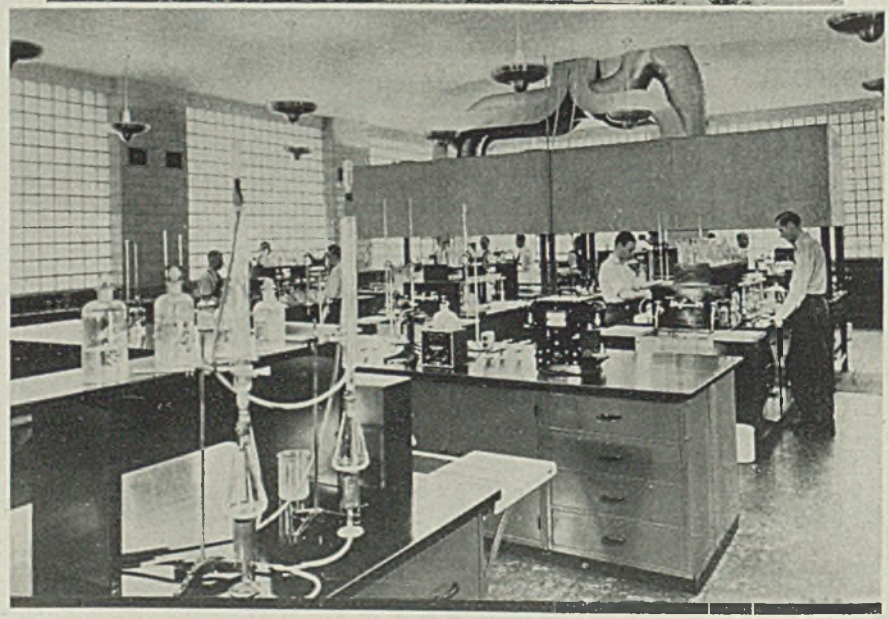
A perpetual positive pressure is maintained within the building, 8 per cent more air being delivered by the heating system into the rooms than is drawn off by the hoods. This produces a flow of air outward through doorways, stairshafts, storeroom and basement windows; preventing entry of dust or gases from without.

Of the large amount of air which the hoods must handle to evacuate gases, 75 per cent is supplied by forced air introduced around the upper periphery of the hoods. Only 25 per cent is drawn from the rooms, a draft across the backs of workers thus being avoided. To compensate for the loss of pressure through the hoods and to maintain an excess flowing away from the analytical rooms, air equivalent to 33 per cent of that drawn off by the hoods is delivered through the heating system, located in the basement. Air-handling equipment is in a penthouse.

Glass block and insulation contribute to a high degree of visibility and sound-proofing.

The laboratory was designed and built under supervision of O. M. Svensson, chief engineer for Vanadium, by Rust Engineering Co., Pittsburgh.





Colored V's Used to Match Machines and Scrap Metals In Wright Salvage System

SYSTEM for segregating and salvaging scrap steel, aluminum, magnesium and other metals and promptly reapplying them to the war effort has been evolved by the Wright Aeronautical Corp.

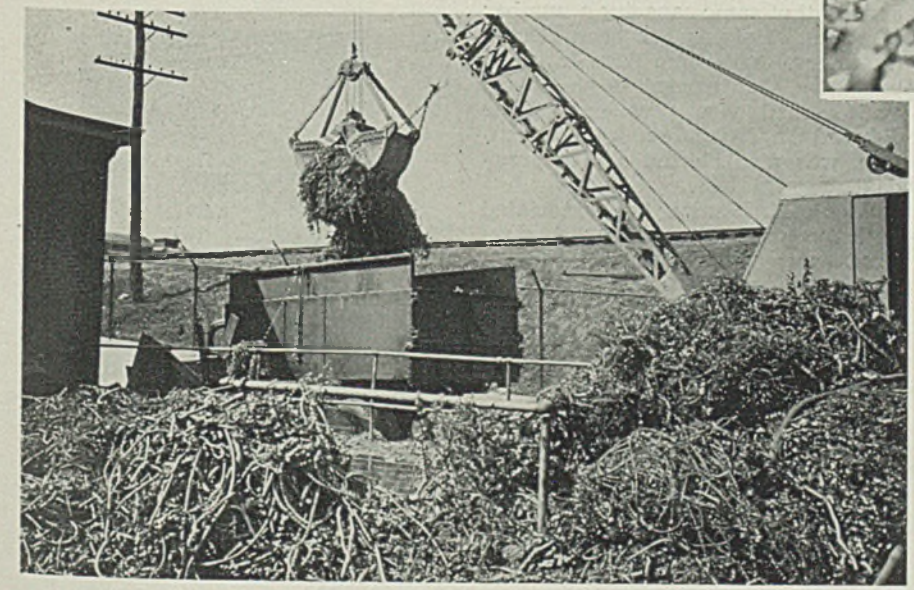
Each machine tool has a bin attached which catches and holds all shavings, chips, or whatever waste is produced by that machine. Wright now is employing "in-line" production methods where a machine is used on one specific part only, such a unit always producing the same kind of scrap.

Salvage collectors wheel large boxes up and down the factory aisles gathering the metal. To make sure there is no mixup, the containers are identified with the machine tools by a color-marking system. Containers are marked with a specific color for each metal, the coloring being in the form of a large "V" painted on the side of the box. Each machine tool is marked with a card bearing a "V" in the color corresponding to that on the scrap collection container. Thus a worker collecting steel, which is identified by a green and yellow "V", gathers the shavings and chips from every machine bearing a card marked in green and yellow. Collectors gathering aluminum alloy watch for cards with a yellow letter.

Although steel, aluminum and magnesium are the principal metals salvaged, the company also salvages copper, beryllium bronze, phosphor bronze, aluminum bronze, brass and a variety of others.

TO ASSURE segregation of the various kinds of scrap, salvage receptacles, above, are marked with colored "Vs" corresponding to an identical marking on the machine tool. Each color designates a different kind of metal, and the "V" on the container and on the machine tool must match before scrap is placed in the container

MAGNESIUM shavings in a Wright plant, right, ready to be shipped back to a magnesium mill and reapplied in the war effort



CLEANED of cutting oil by whirling, these steel shavings, left, are being loaded in a central salvage yard for shipment to steel mills. The Wright salvage system not only keeps various metals separate but segregates each alloy on a metal, thus enabling the high-grade steels and other alloys to be put back to most effective use

MEN of INDUSTRY

GEORGE T. CHRISTOPHER, vice president in charge of manufacturing, has been named president and general manager, Packard Motor Car Co., Detroit, succeeding **M. M. Gilman,** recently resigned. Mr. Christopher was also elected a director. Well known as a manufacturing expert in automotive circles, he joined Packard in 1934 as assistant vice president of manufacturing and a year later was elected vice president.

♦

G. A. Shallberg, former vice president and general counsel, Borg-Warner Corp., Chicago, has been elected executive vice president.

♦

Howard W. Broecker, formerly associated with Youngstown Sheet & Tube Co. and Interstate Iron & Steel Co. in the Chicago district, has been appointed assistant district manager in the Chicago district for Copperweld Steel Co., Warren, O.

♦

Frank J. Tone has retired as president, Carborundum Co., Niagara Falls, N. Y., and has been elected chairman of the board. He has been associated with the company about 47 years. **Arthur A. Batts,** since March, 1927, secretary, has been chosen president. **Charles Knupfer,** formerly vice president in charge of sales, has been named senior vice president and will continue as head of the sales department.

Henry P. Kirchner has been made executive vice president in charge of operations, having been vice president in that same capacity a number of years. He also has been elected a director. **F. Jerome Tone Jr.,** sales executive, was elected to the board and named vice president, while **Edward R. Newcomb,** sales executive, was also elected a vice president.

W. Sheridan Huss
Whose election as a director of Acme Steel Co., Chicago, was announced in STEEL, April 27, page 49. Mr. Huss is sales manager of the central district

G. T. Christopher

Howard W. Broecker

Frank H. Manley Sr., associated with the company since 1896, has retired as treasurer and he has been succeeded by **T. B. Foot. Frank A. Vockrodt,** formerly auditor, has been named secretary succeeding Mr. Batts, and **A. J. D'Arcangelo** and **Gilbert J. Stewart** have been named assistant treasurers.

♦

Arthur H. Losey has joined the staff of the Automatic Polishing and Buffing Division, Hammond Machinery Builders Inc., Kalamazoo, Mich. The past six years he was associated with the J. C. Miller Co., Grand Rapids, Mich., as engineer and advisor on polishing and buffing problems.

♦

W. A. Givens was elected to the newly created position of executive vice president, Allegheny Ludlum Steel Corp., at the annual meeting of stockholders April 24. He has been succeeded as vice president in charge of manufacturing by **Frank B. Lounsberry.**

The following officers were re-elected: Chairman of the board, **W. F. Detwiler;** president, **H. G. Batcheller;** vice president and technical director, **V. B. Browne;** vice presidents, **James O. Carr, E. B. Cleborne, A. F. Dohn, Lewis W. Hicks,** and **F. H. Stephens;** secretary-treasurer, **E. J. Hanley.**

♦

Norman E. Thompson has been appointed assistant general superintendent, Birmingham, Ala., division, southern district, Republic Steel Corp. **John L. Adcock** has been promoted to superintendent of blast furnaces and coke plants in that district. Mr. Thompson formerly was district superintendent of ore mines. Mr. Adcock heretofore has been foreman of the Gulf steel blast furnace.

♦

Major John Slezak has been assigned new duties as chief, Tank and Combat Vehicles Division, Chicago Ordnance District. He is on leave of absence from his position as president of Turner Brass Works, Sycamore, Ill. He joined the staff

Guy T. Avery
Works manager, Riverdale, Ill., plant of Acme Steel Co., who has been elected a director, as noted in STEEL, April 27, page 49

of the Chicago Ordnance district Jan. 26, 1942, as assistant chief, Ammunition Division.

♦

M. Rhine has been appointed manager, Industrial Department, General Electric Co., San Francisco. He will be responsible for that department's activities on the West Coast with the exception of Washington and Oregon. He has been associated with General Electric since 1904.

♦

Frank U. Hayes has been named assistant sales manager, Bullard Co., Bridgeport, Conn. Joining the company in 1935, a year later he was assigned as sales representative in the Middle Atlantic territory. In 1941, he became a technical advisor, tool section, production division, OPM, and upon his return to Bullard established the company's subcontracting division.

♦

David W. Jenkins has retired as general sales manager, Henry Disston & Sons Inc., Philadelphia, after 46 years of active service. He established the first company branch on the Pacific coast in 1909. Mr. Jenkins was responsible for the development of the company's first thin planer knife made of other than tungsten steel, and also for the acquisition by Disston of the Philbrick cutter-head and for establishment on the Pacific coast of the first manufacturing of wide-band saws. Mr. Jenkins intends to settle on the Pacific coast.

David W. Jenkins

♦

Sidney P. Cary has been named general superintendent, Buffalo Bolt Co., North Tonawanda, N. Y., succeeding the late George F. Blasier. Mr. Cary formerly was assistant general superintendent.

♦

Fred E. Lacey, Easton, Conn., has been elected president, Lacey Mfg. Co., Bridgeport, Conn. He remains as treasurer but is replaced as secretary by **S. W. Lasto,** Stratford, Conn.

M. Rhine

♦

W. D. Bronson has been appointed district manager at Chicago for Carboloy Co. Inc., Detroit. Heretofore assistant manager in Chicago, Mr. Bronson succeeds **W. W. Fullagar,** resigned. **Einar Almdale** has been transferred from the general office sales engineering department to Chicago as tool service engineer.

♦

John J. Carter, from 1925 to 1938 factory manager, Olds Motor Works, Lansing, Mich., has been appointed supervisor of production engineering for the Detroit region of the War Production Board.

♦

Gordon McMillin has resigned as metallurgist, Standard Brake Shoe & Foundry Co., Pine Bluff, Ark., and Memphis, Tenn., to join General Steel Castings Corp., Eddystone, Pa., as metallurgist.

♦

M. E. Goetz, manager, Chicago district, Republic Steel Corp., was awarded a plaque at the Safety Engineering dinner of the Greater Cleveland Safety Council April 27, in recognition of the district's accident prevention record during 1941.

♦

H. M. McCormack, former sales manager, Atlantic Division, American Can Co., New York, has been named general sales manager. **F. E. Uihlein,** heretofore Mr. McCormack's assistant, succeeds him as Atlantic division sales head.

♦

Robertson D. Ward, formerly treasurer, Carnegie Corp. of New York, has been elected assistant to the president, Freeport Sulphur Co., New York, and **Richard C. Wells** has been named assistant treasurer.

♦

J. Eugene Jackson, until recently metallurgical engineer, Copper Iron and Steel Development Association, Cleveland, has joined the War Production Board as senior industrial analyst. He is serving in the Salvage Unit, Disposition of Material Section, Inventory and Requisitioning Branch, Division of Industry Operations. This corrects the item used in STEEL, April 27, page 49, in which Mr. Jackson's present connection was misstated.

♦

N. K. VanDerzee has been appointed manager of the newly organized war contract division, Hudson Motor Car Co., Detroit. Associated with Hudson over ten years, Mr. VanDerzee has been eastern sales manager since 1940.

♦

Edward L. Ryerson, chairman of the board, Inland Steel Co. and Joseph T. Ryerson & Son Inc., has been elected a director, Atchison, Topeka & Santa Fe railroad, Chicago. **Myron C. Taylor,** former chairman, United States Steel Corp., New York, was re-elected a director of Santa Fe for a four-year term.

DIED:

Isaac McBurney Scott, 76, former president, Wheeling Steel Corp., Wheeling, W. Va., and pioneer in the industrial development of West Virginia, in Wheeling, April 27. He was chairman of the board, Sharon Tube Co. and Scott Lumber Co., president of Buckeye Rolling Mill Co., and had been a receiver for Follansbee Bros. Co. until its reorganization last year as Follansbee Steel Corp. Identified with the steel industry 59 years, he retired as president of Wheeling Steel in 1930, but remained active as a director and member of the executive committee.

♦

Samuel Kirtland Hine, April 24 at his home in Youngstown, O. He was district manager for A. M. Byers Co. at Girard, O., when that company operated the Mattie blast furnace and the largest puddling mill in the world, both since dismantled. He retired from most of his activities in 1931, but continued as vice president, Youngstown Foundry & Machine Co.

♦

George W. Gwinn, 68, director, American Machine & Foundry Co., Brooklyn, N. Y., April 22. He had been associated with the company 50 years.

♦

R. Carl Hicks, 58, assistant secretary and treasurer, Dodge Bros. Inc., Detroit, from 1914 to 1927, in that city, April 27. Between 1932 and 1940 he was secretary-treasurer, Graham-Paige Motors Corp., and more recently had been treasurer, American Propeller Corp., Toledo, O., Aviation Corp. subsidiary. He resigned the latter post within the past month.

Activities of Steel Users and Makers

UNITED Engineering & Foundry Co., Pittsburgh, has agreed to construct a large foundry and machine shop at New Castle, Pa., George T. Ladd, president, told stockholders in annual meeting last week. The plant will be built at government expense and operated under lease. The company's backlog of orders requires continuous operations on a seven-day week schedule.

♦

To expedite deliveries to eastern Carboloy die users, Carboloy Co. Inc., Detroit, has appointed Hartley Wire Die Co., Thomaston, Conn., as eastern manufacturing unit for the production and servicing of all types of Carboloy dies. Simultaneously, the Eastern Die Servicing Facilities, formerly located at Worcester, Mass., have been moved to the Thomaston plant where they will operate as a Carboloy Co. Die Service Branch. The Worcester office of the company, however, will be continued.

♦

Reconstruction Machine Tool Corp., 199 Cantro street, New York, has opened a new rebuilding factory at 432 Bryant avenue, Bronx, N. Y.

♦

Detroit Rex Products Co., Detroit, is adding 30 per cent to the number of its field personnel, and in line with its expanded service policy in the metal cleaning industries, the company has established a New England branch office at 8 West Main street, Meriden, Conn.

♦

Packless Metal Products Corp. has moved its office and plant to new quarters at 31 Winthrop avenue, New Rochelle, N. Y.

♦

Chamberlain Engineering Ltd., unit of United States Stoneware Co., Akron, O., announced last week the purchase and early alteration of six buildings in a 10-acre tract at Ravenna, O., for manufacturing a synthetic, rubber-like resin. Heavy-duty, corrosion-resisting tank lining, tubing, gaskets and paints will be produced, a processing division being set up for handling and lining tank cars and other steel assemblies.

♦

Vermont Copper Co. Inc. has been formed at Montpelier, Vt., to exploit the state's copper belt, extending 20 miles from Strafford toward Corinth, according to L. E. Richwagen, state director, WPB. Engineering surveys by the company, headed by George A. Ellis, will be started shortly.

♦

Auburn Central Mfg. Corp., Connersville, Ind., has changed its name to American Central Mfg. Corp. No changes in personnel or business policy are contemplated.

♦

John W. Clarke Co., 327 South LaSalle street, Chicago, has been appointed sales and engineering representative by Struthers Dunn Inc., Philadelphia, covering Wisconsin, upper peninsula of Michigan, northern Illinois, Chicago, neighboring counties of Indiana and eastern border counties of Iowa.

♦

McKay Machine Co., Youngstown, O., will establish a $250,000 heavy machinery assembly plant in a building on Charles street. The expansion will also include installation of additional equipment in the main plant on West Rayen avenue, and later an addition to the Charles street plant.

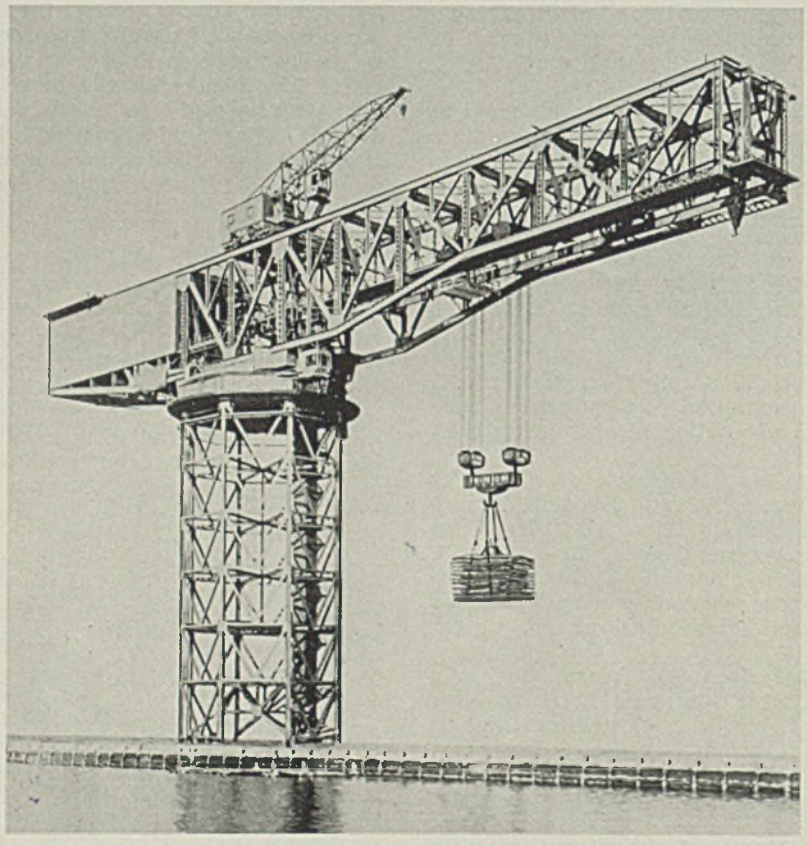
♦

National Lead Co., New York, which had its origin in Buffalo, will celebrate its 100th anniversary at a dinner meeting of the Buffalo Paint, Varnish and Lacquer Association in Hotel Statler, Buffalo, May 8.

♦

An expanded war production program, including both manpower and plant, raised Blaw-Knox Co.'s shipments in the first quarter this year to 50 per cent above those in the comparable 1941 period.

Hammerhead Crane for Navy Can Lift Million Pounds



HAMMERHEAD crane constructed by Heyl & Patterson Inc., Pittsburgh, for United States Navy, with lifting capacity of approximately 1,000,000 pounds. Two of these, reported to be the largest in the world, are already in operation. The company is now working 100 per cent for war production. Navy "E" was presented to it April 30

Electric Truck Sales Reduced in March

Domestic bookings of electrical industrial trucks totaled 376 units in March, compared with 427 in February, Industrial Truck Statistical Association, Chicago, reports.

Total net value of chassis only was $1,664,988, compared with $1,495,730 in February.

Seventeen non-elevating platform trucks had a net value of $44,565; 298 cantilever trucks were valued at $1,232,339; 17 light and heavy duty tractors had total net value of $45,855; 44 crane trucks had total value of $342,229.

Pullman-Standard To Build All-Steel Subchasers in New Chicago Shipyard

CHICAGO

CONSTRUCTION of the first all-steel anti-submarine patrol ships ever built in the Chicago region will begin in early summer at the shipyard now being erected by the Pullman-Standard Car Mfg. Co.

By means of streamlined production methods which call for fabrication of large sections of the ships in the company's car works, with final assembly on the ways, the yard will ultimately turn out a ship a week, according to Commander W. R. Dowd, supervisor of shipbuilding, U. S. N. for the vicinity of Chicago, and C. A. Liddle, Pullman-Standard president, who made the announcement jointly.

Present contract with the Navy calls for construction of 50 of the sleek, diesel-powered fighting ships. The Navy advanced $4,300,000 for the new plant.

The contract was awarded to Pullman-Standard because of the company's long experience in working heavy steel. While ample facilities to construct the normal 110-foot wooden patrol ship are to be found on the lakes and elsewhere, the Navy's real task was to find firms with steelworking experience for the larger, newly designed all-steel craft.

It was pointed out that many of the trades employed in car building are identical to those required in shipbuilding. Car workers who can be adapted readily to shipbuilding include welders, riveters, electricians, pipe and frame fitters, sheet metal workers, joiners, painters, plumbers, and cabinet makers.

Shipbuilding School

Although almost all present employes of the car works will work on the ships, several thousand more will have to be engaged from the outside and thoroughly trained in these and other shipbuilding crafts, it was said.

Facilities are already being set up with co-operation of public vocational training authorities for training these men and also workers who are needed by two other Chicago concerns with prime Navy shipbuilding contracts—Chicago Bridge & Iron Co., and Henry C. Grebe & Co. Vocational schools will be utilized for this further war-training effort.

In addition to ships, Pullman-Standard is turning out airplane parts, tanks, artillery shells, mortars and gun carriages.

Navy "E" Presented To Revere on "Patriot's Day"

"PATRIOT'S DAY." New England holiday commemorating the ride of Paul Revere 167 years ago, was celebrated April 20 at the New Bedford, Mass., Division of Revere Copper & Brass Inc., with presentation of the Navy "E" pennant to the corporation and "E" lapel pins to its employes. Edward H. R. Revere, a director, and a great-grandson of the patriot, who founded the business in 1801, is seen here with C. Donald Dallas, president, (center) receiving the banner from Rear Admiral H. A. Wiley, U.S.N. Retired

Vast War Plant Expansion Under Way in Midwest

CHICAGO

An aerial survey was made here recently in searching for a site for a Douglas Aircraft Co. plant to manufacture 20-ton cargo airplanes. A party of ten, including six governmental and war department officials headed by Merrill C. Meigs, chief of WPB's aircraft branch, and four Douglas executives spent seven hours studying this area.

Two Defense Plant Corp. projects in the Midwest were reported to have reached first stage of construction when ground was broken for a $50,000,000 aluminum sheet mill to be supervised by Aluminum Co. of America. Scheduled for completion in eight months, the mill will be second largest of its kind in the world and will employ upwards of 7000.

Chrysler Corp., Detroit, will operate the other factory, a $120,000,000 airplane engine plant which when finished is expected to be the largest war goods producer in this area. Employment may reach 27,000.

Farm Equipment Branch Sets Up Four New Sections

The WPB Farm Machinery and Equipment Branch has set up four sections to handle all problems relating to products formerly handled by the branch in general. They are:

Tractor and Farm Engine Section, Frank Bonnes, chief, formerly supervisor of farm tractor sales, International Harvester Co., Chicago.

Harvesting and Marketing Equipment Section, K. W. Anderson, chief, formerly assistant sales manager, John Deere Harvester Works of Deere & Co., Moline, Ill.

Tillage, Planting and Seeding Equipment Section, L. P. Richies, chief, former assistant secretary, Oliver Farm Equipment Co., Chicago.

Barn, Poultry and Miscellaneous Equipment Section, Stephen Mahon, chief, formerly executive vice president, James Mfg. Co., Fort Atkinson, Wis.

These sections will handle all appeals under Limitation Order L-26, regulating the production of all types of farm machinery and equipment.

Each section chief will be responsible only for the equipment assigned to him. If separate appeals are sent to the section having control over equipment covered by the appeal, matters will be expedited.

Drastic Conscription of Manpower in Canadian Army and Industry "Expected"

TORONTO, ONT.

C. D. HOWE, Minister of Munitions and Supply, stated last week that Canada's shipbuilding program is being expanded rapidly and total value of orders placed with Canadian builders to date exceeds $550,000,000. Contracts have been negotiated for the following additional vessels: 71 corvettes, 25 minesweepers and 16 trawlers to be used for minesweeping. Canada has launched nearly 200 combat ships, and 800 smaller boats.

He stated work is proceeding satisfactorily in 18 major and numerous smaller shipyards on the east and west coasts, the St. Lawrence river and the Great Lakes, and on construction of more than 700 naval units, including corvettes, minesweepers, fast patrol boats, base ships and miscellaneous craft.

Mr. Howe stated the cargo vessel construction program includes 172 ships at a cost of more than $325,000,000. Most of them will be 10,000 tons deadweight, and powered by made-in-Canada reciprocating engines.

To supervise and control operations of newly-built cargo vessels, a Crown company, Park Steamship Co. Ltd., has been incorporated. This company will have charge of chartering the vessels and allocating them to the ocean routes. R. B. Teakle, general manager of Canadian National Steamships, will be president. Head office will be in Montreal.

Aircraft Program Expanded

Other branches of Canada's war industry are being speeded up. Despite the fact that industry entered into a broad expansion campaign soon after the outbreak of war and has continued building activities during the past two years, there has been no sign of abatement. Hundreds of millions of dollars have been spent in the building of Canada's war machine and reports indicate an even greater expenditure may be made on some primary steel plants.

There has been some slowing in aircraft production, due to retooling preliminary to a greatly enlarged program. Additions are under way or planned for Canadian aircraft plants representing expenditure of approximately $10,000,000. New aircraft contracts recently placed or pending now exceed $100,000,000 in value.

In production of guns, rifles, tanks, explosives and other important war materials Canada is making an enviable record, and production is being expanded steadily through construction of new plants and additions. However, shortage of steel has been responsible for curtailed operations in some war industries and the supply of labor also has been an important factor against maximum output.

The labor problem is being solved by greater use of women and girls and restrictions on the movement of employes from one plant to another. Under present regulations no person between the ages of 17 and 45 may change employment without a special permit from the Labor Control Board. More drastic conscription of manpower, both for the army and industry, is expected soon as a result of the favorable vote on the plebiscite April 27, which relieved the King government of its pre-election pledges regarding conscription.

International Nickel Co. of Canada Ltd. has undertaken an expansion program requiring capital outlay of nearly $35,000,000, Robert C. Stanley, chairman and president, told stockholders last week. This will include opening of additional ore properties, new mine shafts, new surface and underground plant enlargement of concentrating, smelting and refining works.

This expansion, planned to be completed in 1943, will increase capacity by approximately 50,000,000 pounds of nickel per year over 1940 production.

A new plant has been provided at the company's Huntington works in the United States, for refining raw material supplied by the Metals Reserve Co. More than $3,000,000 has been appropriated for equipment to turn out special material for the United States Army and Navy at the Huntington works.

Aircraft Plants' Output $1,750,000,000 in 1941

Col. John H. Jouett, president, Aeronautical Chamber of Commerce of America, Washington, announced last week that $1,750,000,000 worth of planes, engines and propellers were built by the industry in 1941. This is somewhat in excess of STEEL'S estimate of $1,442,750,000 made Jan. 5.

According to the announcement, 1941 production of the aircraft industry was three and one-fifth times as large as that of 1940, the first war production year, when the value of output was $544,000,000. Aircraft companies are keeping up to or ahead of the schedules.

Tank Traps Tested by U. S. Army Engineers

ARMY engineers in training erect various types of barriers designed to halt various types of troops. Above is pictured a crib-type barrier impeding the progress of a light tank at Fort Belvoir, Virginia. NEA photo

Inland Steel Warns of Inflation if Labor Board Grants Wage Demand

Would add $160,000,000 to steel industry's payroll, and sweep throughout nation, with nine billions in total increase . . . Book of Facts analyzes testimony given in "Little Steel" hearing . . . "Union maintenance" more dangerous than closed shop

REASONS why Inland Steel Co., Chicago, will resist the imposition of union maintenance by the War Labor Board were outlined by Wilfred Sykes, president, in a statement to stockholders last week.

Inland Steel, Republic Steel Corp., Youngstown Sheet & Tube Co. and Bethlehem Steel Co. for the past eight weeks have been engaged in a closed hearing before a fact-finding panel of the WLB on demands of the Steel Workers Organizing Committee for a closed shop, check-off and $1 a day wage increase.

At request of the chairman of the panel, both sides pledged themselves not to reveal what transpired in the hearing room, but at the close of testimony the restriction was lifted.

Mr. Sykes told stockholders that SWOC's demands were contrary to the national interests in war time and called for an expression of national labor policy by Congress to avoid strife and disunity. His statement follows:

"On the question of whether a worker should be free to remain in our employ without the necessity of belonging to any particular union we have taken a firm position. In the midst of a great national crisis, questioning the right of a man to work unless he pays tribute to a labor organization, can only bring about strife and disunity.

"We feel that this is a question which, if faced honestly, would be submitted to Congress for an expression of national policy, and that it is not properly a subject for arbitration by the War Labor Board. We have so expressed our opinion.

"But, an interesting development is taking place which is not fully understood. Public indignation against the use of the war emergency to impose the closed shop upon industry has been so vigorous and so widespread that the War Labor Board has recently been substituting what it calls 'union maintenance'. And, because that phrase is new and different, the public does not understand the implications of what the board is doing.

"In many respects 'union maintenance' is a more undemocratic procedure and more dangerous to American institutions than the closed shop itself. Ostensibly it is a voluntary freezing of his own union status by the worker. He agrees that his dues shall be checked off by the employer and remitted directly to the union for the life of the contract.

"Thereafter, however, he never can withdraw. No matter how he may disapprove of the conduct of his union officials, he is powerless to resign. The right to withdraw from a union is the worker's inherent right of protest, just as much as his right to refuse to work for the company if he does not like the conditions existing in our plants.

Subtle Forms of Coercion

"And, there is the further difficulty that the employe's initial authorization of the check-off may in fact not be voluntary. Those who have watched dues picketing by the union outside the gates of our plant know that not only are many subtle forms of coercion employed to obtain union membership, but that often actual physical violence has been used.

"For the foregoing reasons we believe that union maintenance agreements are wrong and we shall continue to resist them.

"Our bargaining record with the Steel Workers' Organizing Committee is excellent, our compliance with the Wagner act has never been successfully questioned, and we shall submit our record to the War Labor Board with entire confidence that there are no circumstances which would justify their imposing so-called union maintenance upon us.

"Not only the closed-shop demand on us, but the request for an increase of $1 a day in pay for each worker is contrary to the national interest in wartime.

"The economic question involved in the wage demand is really one that should be determined as a part of a national wartime labor policy, since the reasons advanced by the union in support of their demand apply to every industry in the country. Because our company is in the highest bracket of excess profits taxes, it is estimated that perhaps as much as 85 per cent of the increase would be paid by the government through the medium of loss in taxes.

"Economic studies prepared by Dr. Theodore O. Yntema, University of Chicago, were presented . . . which show that Inland employes are among the highest paid workers in the country, and that wages have advanced much more rapidly than living costs."

A documentary record of the evidence presented to the WLB fact-finding panel in the Inland Steel case was made available to the public in a 200-page *Book of Facts*, published by the company last week.

In this book, Inland declares that if WLB granted SWOC's demand for a wage increase of 12½ cents an hour a spiral of uncontrollable inflation would be started. It is estimated that the increase would add $160,000,000 to the steel industry's annual payroll.

"If this wage increase is granted to wage-earners of these four steel companies (Inland, Bethlehem, Youngstown Sheet and Tube and Republic), an equal increase will have to be granted by all other steel companies. These wage increases will then be a signal for increases in other industries throughout the country."

It estimated that a comparable increase would add to the payroll of Class I railroads $375,000,000 and

add $8,600,000,000 for employes in all industries covered by old-age and survivors' insurance. The total would amount to more than $9,000,000,000.

"The wage increase, as CIO suggested, would come directly out of war taxes.

"In this situation, Inland would pay only $337,000 of the $3,000,000 wage increase demanded of it. The $2,500,000 balance would come directly from the United States Treasury. This condition would hold throughout the country . . .

"A wage increase of such magnitude, would be highly inflationary. It would increase costs of production by some billions of dollars and force business to raise prices in order to cover costs. It would reduce by billions of dollars the war revenues of the government and would force additional inflationary borrowing. If these additional forces of inflation are let loose in the economy it would be practically impossible to maintain price control.

"The inflationary process is a continuous upward spiral. Higher prices caused by a general wage increase would mean a high cost of living and consequent additional demands for further wage increases.

"There is a grave danger that those whose incomes are lowest, and perilously near the bare level of maintenance, may suffer disproportionately if strategically located individuals or strongly organized groups bear less than their equitable share of the sacrifice."

Inland asserts that the cost of living since December, 1940, is still less for steelworkers than their increase in hourly earnings obtained during 1941, and asks the question of whether "war profits should be recaptured for the government or for the CIO."

Could Lay Case Before OPA

"The entire success of present excess tax schedules in recapturing war profits for the government is shown in Inland's 1940 report," it continues. "During 1941, a peak production year, Inland's total sales were increased by $60,000,000 over 1940, but its net profits were increased only $375,000 over 1940.

"If in the opinion of the SWOC the profits of steel companies are too high, they could properly lay their case before the Office of Price Administration and ask that prices be reduced and the benefits therefrom be expended by the government in purchasing steel for the war effort."

The book summarizes the history of the dispute, reviewing that Inland and the SWOC had negotiated a contract between September and late December, agreeing on almost all issues except those now before the board.

In February this year this dispute and similar ones involving SWOC and the Republic Steel Corp., Youngstown Sheet & Tube Co., and the Bethlehem Steel Co., were referred to the board. Fact-finding panel hearings began March 3 and continued almost through April.

Publication came immediately following conclusion of a drawn-out hearing before a fact-finding panel of three men named by the board. The panel now is preparing a summary of the facts, after which the full board will hold hearings for discussion of the issues. It has announced that the coming hearings will be open to the public.

Workers "In Conference"

DOUGLAS Aircraft Co., Santa Monica, Calif., captions this picture "Democracy at Work". "Shown in regular routine conference at this company's plant is the War Production Drive committee of machinists, engineers, assembly line workers and executives," it states. "Symbolic of the spirit and nature of this committee, seated at left center is Henry Guerin, factory manager, while looking over his boss' right shoulder and joining in the discussion is Victor Ferris, youthful worker in the final assembly department."

Rejection of SWOC Demands "Serves Highest Public Interest"

Youngstown Sheet & Tube Co., Youngstown, O., is "convinced it is serving the highest public interest of the nation in time of war" by rejecting demands of the Steel Workers Organizing Committee for closed shop, checkoff, and $1 a day wage increase. Company's attitude was made known through a brief filed with the National War Labor Board.

Brief maintains granting of the closed shop "would increase industrial strife, retard the nation's efforts toward maximum production and would discriminate against soldiers when they return to seek employment."

The wage increase asked, the company contends, would greatly aggravate the dangers of uncontrolled inflation and "would in effect constitute a raid" on the United States Treasury. It is estimated the loss to the government in corporate income tax revenue would total $100,000,000 a year for the steel industry alone.

Employer Group Repudiates Davis Statement on Open Shop

Repudiating the claim that an agreement had been reached on the "closed shop" issue by the President's December Conference on War-Time Labor Relations, Charles R. Hook, chairman of the (conference) employer group, and William P. Witherow, president, National Association of Manufacturers, last week issued individual statements denying the accuracy of earlier allegations by William H. Davis, chairman, War Labor Board.

The statement by Mr. Hook, president, American Rolling Mill Co., was

agreed to and authorized by eight other employer members of the President's Conference; namely, Lawrence D. Bell; W. Gibson Carey, Jr.; Donald Comer; Robert M. Gaylord; Paul G. Hoffman; Reuben B. Robertson; Charles E. Wilson and Mr. Witherow.

The only action of the employer members that could be interpreted as a pledge, the Hook statement maintained, was their "acceptance" of the President's announcement that he would create a War Labor Board with jurisdiction over labor controversies in war industries.

In the "acceptance," however, it was emphasized that such a board should not have jurisdiction over closed shop disputes, and the statement cites the record to show that the employer members have held to this viewpoint consistently.

Mr. Witherow's statement declared that "all the charges are simply red herrings to divert attention from the major issue—of whether the closed shop controversy must continue to impede the nation's all-out war effort."

throughout the country, and not only in shipbuilding industry but in all industries."

U. S. Steel officials withheld comment on whether or not the shipbuilding subsidiary would comply with the directive. The matter was discussed at last Tuesday's directors' meeting but no decision reached. Spokesmen said the problem was so "momentous" as to require more deliberation.

Two-Day Wage Strike at Coke Plant Delays Steel

Strike of about 200 employed at coke ovens in Bethlehem Steel Co.'s Cambria plant, Johnstown, Pa., last week was settled when the local union director and a labor consultant for War Production Board issued a joint statement that their demand for a wage advance of 12½ cents an hour would be taken immediately to the War Labor Board. Their absence for two days caused a shortage of coke oven gas and interfered with open-hearth steel production.

Observers said it was the "most serious" strike in the steel industry since the country entered the war. It was "unauthorized" by union officials. Several smaller incidents involving wages occurred at other steel plants in the week.

"Union Maintenance" Ordered by 8-4 WLB Vote at Federal Shipbuilding

Federal Shipbuilding & Dry Dock Co., United States Steel Corp. subsidiary, has been directed by the National War Labor Board in an 8 to 4 decision to grant a maintenance of membership clause to the CIO Industrial Union of Marine and Shipbuilding Workers.

The directive order virtually reaffirms an old National Defense Mediation Board recommendation, rejection of which led to federal seizure of the yard last fall.

In brief the order requires that all union members in good standing on the day the company signs a contract with the CIO, or workers who voluntarily join the union later, must remain in good standing for the duration of the contract. Union members who do not remain in good standing after the contract is signed will have the option of being discharged or of authorizing the company to deduct from their wages "their financial obligations to the union" for the duration of the contract.

Would Give Workers a Choice

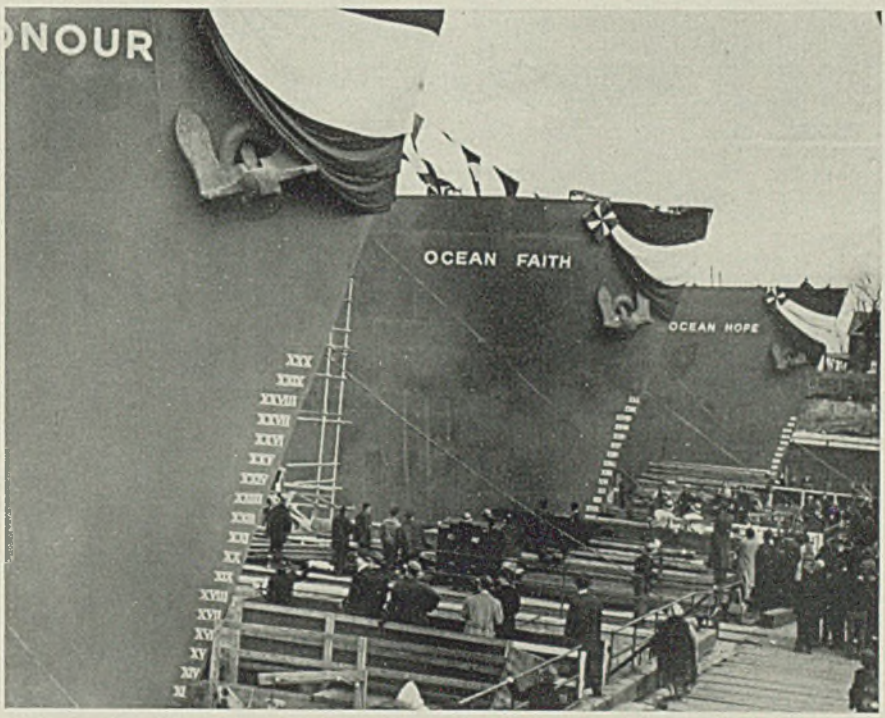
The dissenting opinion, written by the four employer members of the board, also favored a maintenance of membership clause, but only if the individual members had a clear option of accepting or rejecting such a condition in advance of its effectiveness.

The minority said "we cannot subscribe to any national labor policy which compels an unwilling employer to force an unwilling employe either to join or remain a member of a labor union in order to play his part in winning this war."

The minority opinion recognized the policy-forming implications of the decision and refuted the contention of the majority members that each case coming before the board would be decided on its individual merits.

"It is plain that a decision in this case is not one merely affecting the labor relations of this one company. Much has been said about each case being determined on its merits. Any practical person, and especially the members of this board, and those who served on the National Defense Mediation Board, know the fallacy of such statements . . . This pattern, of necessity, will have to be followed not only by this board but by conciliation and mediation services throughout the country, and not only in shipbuilding industry but in all industries."

Grand Slam for Ocean Honour, Faith and Hope



MARITIME precedent was set in Tod Shipbuilding Corp.'s yard in South Portland, Me., recently when these three 10,000-ton ships were launched in rapid succession —"all out" in a few minutes time. They were welded. "A victorious symbol of arc welding achievement," observed W. H. Hobart, vice president, Hobart Bros. Co., Troy, O., manufacturer of welding equipment. "Without question we can consider arc welding the most important 'victory tool' in maritime history"

Strategic, Critical War Materials Listed; Supplies of Many Are Scarce

WASHINGTON

REPORT on strategic and critical materials essential to the war effort has been prepared by government agencies. In the following tabulation are listed the scarce materials, some of their essential war uses, and a statement of their availability, with recommendations pertaining to conservation and substitution.

Metals and Fuels

ALUMINUM: For airplanes; motor vehicles; ships. Acute shortage exists.

ANTIMONY: Storage battery plates; bearing metals; pigments; cable sheathings; lead cores for small arms ammunition. Supply may become more critical dependent upon imports.

ASBESTOS: Brake linings; gaskets; insulating material; building material; fire suits; roving for electrical cable. Low iron content grades necessary for war purposes are imported and scarce; other grades available.

BAUXITE: Manufacture of aluminum. Supply dependent on imports; severe conservation in effect.

BERYL ORES: Alloys for springs, bearings and nonsparking tools; ceramics; alloy with copper improves strength (tests underway now). Uses might suddenly become important for airplane production.

BISMUTH: Used in the manufacture of fusible boiler, sprinkler and other safety plugs; low melting solders; tempering baths for small tools; 75 per cent used in pharmaceuticals; proof casting forging dies.

BRASS: Ship construction; rotating bands; propellers and blades; cartridge belt links; cups and cartridge cases. Copper and zinc shortage.

BRONZE: Bars; rods; castings. Copper, zinc and tin shortages.

CADMIUM: Plating; bearings; substitute for tin in solder. Present deficiency might increase.

CHROMIUM: Alloy in steel; armor plate; projectiles; rifle linings. Stockpile adequate for short time only. Production inadequate but increasing.

COBALT: Ceramics; as a catalyst; as a drier in varnish; and in electroplating; in tool steel as a hardener.

COPPER: Projectiles, cartridge cases; motor vehicles; wire and electrical instruments. Insufficient for defense needs; conservation essential.

CORUNDUM ORE: Optical grinding; wheel grinding. Only source of supply is South Africa; substitutes unsatisfactory for fine lens grinding.

CRYOLITE: Aluminum manufacture. Total supply from Greenland.

DIAMONDS (Industrial): Used in cutting and truing tools; abrasives. Dependent upon imports.

GASOLINE (100 octane): Aviation fuel. Facilities inadequate for lend-lease and Army and Navy requirements.

GRAPHITE: Lubricants; crucibles; dry batteries; paints. Further supply of imported grades (Ceylon and Madagascar) questionable; crucible grade must be conserved.

JEWEL BEARINGS: Precision instruments. Dependent upon imports. Domestic production inadequate. Scarcity exists.

LEAD: Storage batteries; cable coverings; white and red lead; ammunition; paints. Deficiency imminent.

MAGNESIUM: Scavenger and deoxidizer in casting nickel, copper, zinc and aluminum alloys; manufacture of military pyrotechnics; alloys for aircraft. Acute shortage. Additional capacity under construction.

MANGANESE: Manufacture of steel. Dependent upon imports.

MERCURY: Drugs and chemicals; electrical control instruments; used for the manufacture of mercury fulminate for detonators and primers; in silvering searchlight mirrors; in antifouling paint; manufacture of felt; paravene. Dependent upon domestic production and imports from Mexico Situation improving.

MICA: Rubber manufacture (insulation); roofing materials; commutator segments; armatures; airplane motor spark plugs and magnetos; radio condensers and radio tubes; heaters. Dependent upon imports from Africa, India and Brazil. Supply situation growing serious.

MOLYBDENUM: Production of ferroalloys and special steels. Demand increasing rapidly; increased substitute for scarce alloys.

MONEL METAL: Sheet metal, castings; shafting for pumps. A nickel copper alloy; acute shortage.

NICKEL: Armor plate; armor-piercing projectiles; gun tubes and recoil mechanism; ship fittings; electroplating; corrosion resisting alloys; high-strength alloys. Acute shortage; under strict allocation; drastic conservation and substitution essential.

OPTICAL GLASS: Rangefinders; fire control equipment; field glasses; cameras. Dependent upon increased production.

PIG IRON: Used in steelmaking. Inadequate production facilities.

PLATINUM GROUP METALS: Engine ignition systems; in primers and detonators (fuse wire); plating for searchlights; radio frequency control. Supply adequate for time being.

QUARTZ: Radio frequency control. Dependent upon imports from Brazil; conservation necessary.

RUTILE: Dioxide of titanium used in ceramics; welding rod coating; as alloy in iron and steel. In event of shortage, substitutes are available.

STEEL: Ship construction. Shortage of vital types and shapes.

STEEL SCRAP: Used in steelmaking. Supplies inadequate; scarcity growing.

TIN: Tin plate; solder; bearing material; in making bronze. Supply almost wholly from stockpile; conservation and substitution essential.

TUNGSTEN: Tool steel; electrical filaments; bullet alloy. Sources of supply uncertain; a deficiency exists; substitution essential.

VANADIUM: Alloy steels; chemical manufacture; glass manufacture. Acute shortage; essential in tool steel; Not enough for 1942; drastic substitution needed.

ZINC: Galvanizing; paints; bronze and brass; die castings. Scarce; must be reserved for defense needs.

Animal, Vegetable Section

PALM OIL: Tin plating; soap manufacture; vegetable shortening. Dependent upon imports from West Africa.

RUBBER: Tires and tubes; insulating material; shoes and boots; bearings; gas, oil and water hose. Supply critical; facilities for substitutes inadequate; more drastic conservation and substitution essential.

SILK: Powder bags; parachutes; military clothing. All stocks frozen for defense only.

SISAL: Cordage; binder for crops. A substitute for Manila fiber available but may become scarce.

SPERM OIL: Lubrication; used to break in new motors; hot running torpedoes; gyro oil. General curtailment in the fishing industry; supplies adequate for defense only.

AMMONIA: Manufacture of nitric acid, which is necessary for the manufacture of almost all explosives. Insufficient production capacity.

ANIMAL OILS: Sperm oil, neatsfoot oil, fish oils, used as lubricants of special nature and as sources of vitamins. Foreign sources are cut off in part.

CHLORINE: Manufacture of chlorinated solvents, bleaching powder, synthetic phenol, germicide. Insufficient production capacity.

COTTON LINTERS: Smokeless powder (nitrocellulose explosives); lacquers; rayons; plastics; surgical dressings. Supply insufficient; substitutes being considered.

CRESOL: Manufacture of rubber substitutes, plastics, tricresyl phosphate, disinfectants; stripping compounds. Insufficient production capacity; employ substitutes where possible.

DRYING OILS: Tung oil, castor oil, oiticica oil, linseed oil, all used in paints, Foreign sources in part cut off.

Chemical Section

EXPLOSIVES: Trinitroluene, smokeless powder, ammonium picrate, tetryl. Insufficient production capacity and shortage of raw materials (ammonia toluene phenol).

GLYCERIN: Explosives, alkyd resins, medicinals. Insufficient production capacity and shortage of raw materials.

GLYCERIN BEARING OILS: Palm oil, palm kernel oil, cocoanut oil, babassu oil, all used in the manufacture of soap and glycerin. Foreign sources are cut off in part.

METHANOL: Manufacture of formaldehyde used in plastics; denaturant for ethyl alcohol. Insufficient production capacity.

OXYGEN: Welding and cutting; breathing apparatus. Insufficient production capacity.

PHENOL: Manufacture of explosives, plastics and disinfectants. Insufficient production capacity; conserve where possible.

POLYISOBUTYLENE: Insulation for radar coaxial cable; additive for lubricants. Insufficient production capacity; use substitutes where possible.

SULPHURIC ACID: Explosives; manufacture of steel; intermediate for numerous other chemicals. Insufficient production capacity.

SYNTHETIC RUBBERS: Neoprene; buna S; polyvinyl chloride; butyl rubber. Insufficient production capacity until 1943.

TOLUENE: Manufacture of TNT as a solvent; use as diluent prohibited. Insufficient production capacity; substitute where possible.

TRICRESYL PHOSPHATE: Plasticizer for polyvinyl chloride. Insufficient production capacity and shortage of raw materials.

The BUSINESS TREND

Index of Activity

Steady at 130 Level

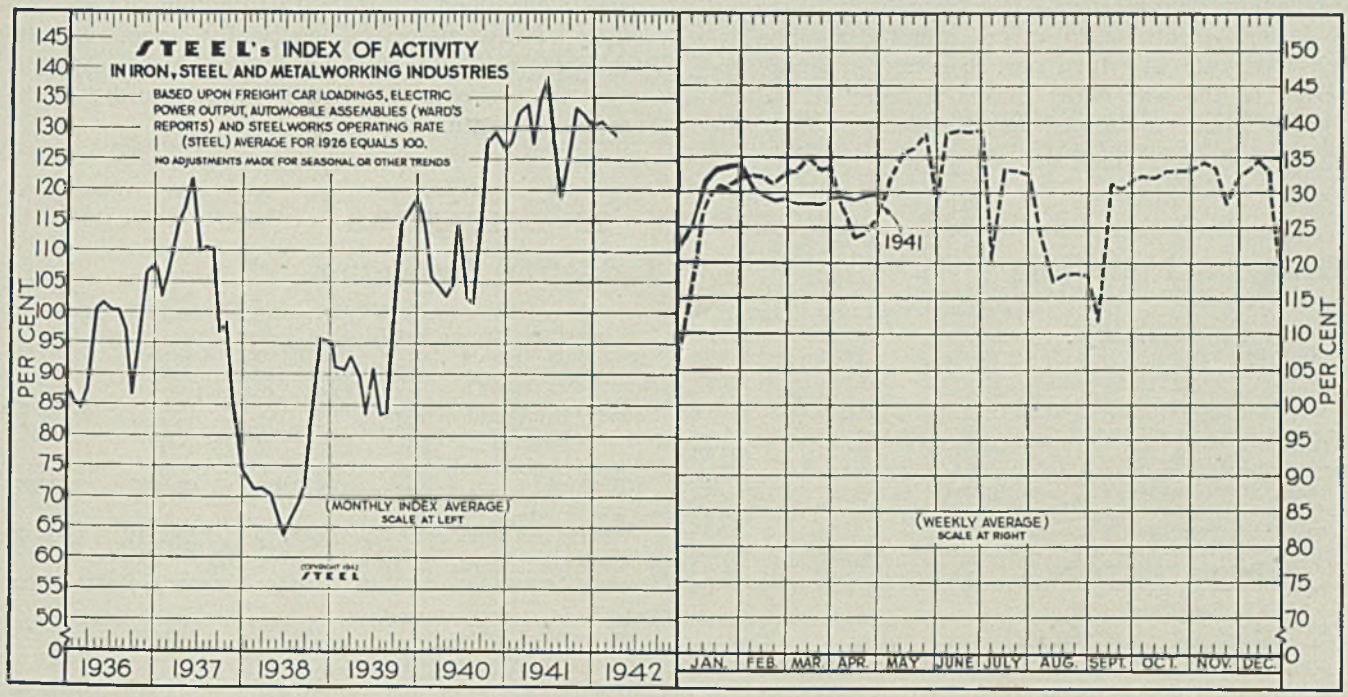
INDUSTRIAL activity in the iron, steel and metalworking industries, as measured by STEEL's index, recorded little change throughout the first four months this year. The indicated average of the weekly index figure for April is 129.5, compared with 128.6 for March. In February and January the averages were 129.6 and 131.3, respectively.

In the week ended April 25 the index edged slightly upward to 129.6. This is a gain of 0.2 point over the preceding week's figure and compares with 126.5 registered in the like period a year ago.

While restrictions on output of civilian goods are becoming more numerous and severe, production of was materials more than offsets the decline in output by these industries supplying civilian needs. The extent of the progress made during the past year in increasing the overall industrial output is illustrated by the Federal Reserve Board's index which takes into account production of military goods. This index during the first quarter this year averaged 20 per cent above the same 1941 period.

Further substantial increase in production of war goods is indicated over the coming months.

Despite anticipated additional curtailment in out-



STEEL'S index of activity advanced 0.2 point to 129.6 in the week ended April 25:

Week Ended	1942	1941
Feb. 14	129.8	132.3
Feb. 21	129.0	131.2
Feb. 28	129.1	133.0
Mar. 7	128.3	133.1
Mar. 14	128.3	135.0
Mar. 21	128.1	133.5
Mar. 28	129.1	133.9
April 4	129.6	128.9
April 11	129.2	123.8
April 18	129.4	124.2
April 25	129.6†	126.5

†Preliminary.

Mo. Data	1942	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931
Jan.	131.3	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1
Feb.	129.6	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5
March	128.6	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2	80.4
April	.....	127.2	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0
May	.....	134.8	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6
June	.....	138.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1
July	.....	128.7	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3
Aug.	.....	118.1	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4
Sept.	.....	126.4	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3
Oct.	.....	133.1	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2
Nov.	.....	132.2	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4
Dec.	.....	130.2	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3

put of consumer goods the overall industrial production is expected to reach a new high during the latter half of this year.

In an effort to ease the tight supply situation in some lines, a careful survey of orders and inventories is being undertaken by the government. Scarcity of materials has forced substitution even in some essential war products.

Rapidly increasing demand for all types of labor tends to emphasize the scarcity of trained workers. Shortages of labor and materials continue to prevent the lengthening of the work week in certain war plants. Layoffs in those lines affected by WPB limitation orders, are easing the labor problem in some war plants.

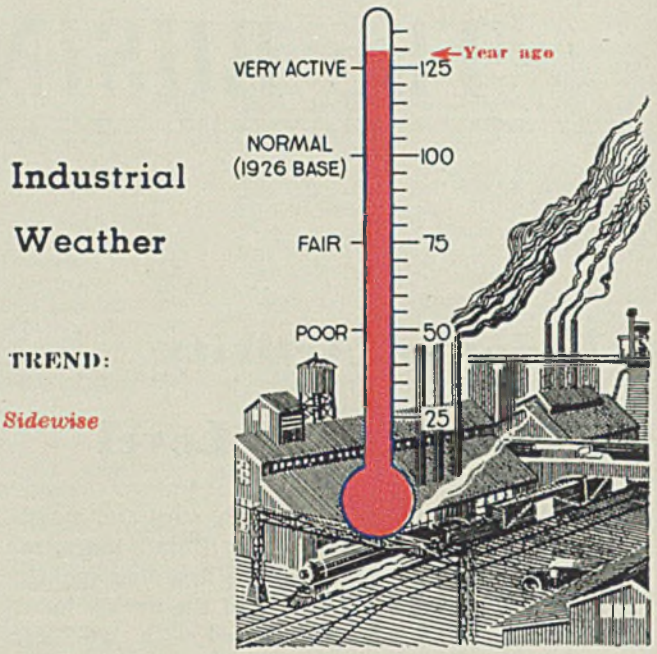
Deliveries have not improved appreciably. On some products incoming orders—even though limited to top A ratings—continue to exceed shipments. The accelerated rate at which our economy is being converted to the war effort makes it more difficult to foresee where materials may be secured, and the tendency is to take whatever is available.

Production of steel ingots and castings climbed to a new peak on a tonnage basis during March, 7,392,911 net tons. Output for the first quarter was nearly 4 per cent more than during comparable 1941 period. However, production for the first three months this year was approximately 800,000 tons below rated capacity; due chiefly to inability to obtain full requirements of raw materials, principally scrap. Despite the shorter month steel production during April is expected to closely match the output recorded in the preceding month.

Where Business Stands

Monthly Averages 1941 = 100

	Mar., 1942	Feb., 1942	Mar., 1941
Steel Ingot Output	104.9	102.6	101.1
Finished Steel Shipments	104.5	94.8	100.9
Freight Carloadings	97.5	96.0	94.1
Freight Car Awards	198.1	40.3	283.9
Structural Steel Bookings	98.5	86.4	90.7
Building Construction	122.0	86.6	95.9



The Barometer of Business

Financial Indicators

	Mar., 1942	Feb., 1942	Mar., 1941
30 Industrial Stocks*	101.62	107.28	122.52
20 Rail Stocks*	26.09	27.85	28.03
15 Utilities*	12.15	13.83	19.56
Cost of Living† (U. S. Dept. of Labor Index)	112.6	111.9	100.8
Average Price of all listed bonds (N. Y. S. E.)	$95.97	$95.13	$93.73
Bank Clear'gs daily average (000 omitted)	$1,161,204	$1,189,233	$1,067,672
Commercial Paper, interest rate (4-6 months)	0.56	0.56	0.56
Com'l loans (000 omitted)‡	$11,394	$11,374	$9,798
Federal Reserve ratio (per cent)	90.9	90.6	91.2
Capital flotations (000 omitted)			
New Capital	$103,551	$122,021	$182,750
Refunding	$87,597	$56,508	$223,386
Federal gross debt, (mil. of dol.)	$62,419	$62,381	$47,176
Railroad earnings†	$66,486,021	$68,966,384	$58,135,957
Stock sales, New York Stock Exchange	8,587,828	7,925,761	10,124,024

*Dow Jones series.
‡Leading member banks Federal Reserve System.
†February, January and February, respectively.

Commodity Prices

	Mar., 1942	Feb., 1942	Mar., 1941
STEEL'S composite finished steel price average	$56.73	$56.73	$56.73
U. S. Bureau of Labor's Index	97.6	96.7	81.5
Wheat, cash (bushel)	$1.25	$1.293	$0.95
Corn, cash (bushel)	$0.996	$0.98	$0.755

Industrial Indicators

	Mar., 1942	Feb., 1942	Mar., 1941
Iron and Steel Scrap consumption (tons)†	4,276,000	4,590,000	4,172,000
Gear Sales Index	455	353	288
Foundry equipment new order index	1122.3	567.9	315.2
Finished steel shipments (Net tons)	1,780,938	1,616,587	1,720,366
Ingot output (average weekly; net tons)	1,668,829	1,630,264	1,608,127
Dodge bldg. awards in 37 states ($ Valuation)	$610,799,000	$433,557,000	$479,903,000
Fabricated structural steel shipments (Tons)	184,715	162,007	170,161
Steel castings output (Net tons)†	179,880	150,551	105,125
Coal output, tons	47,400,000	43,840,000	48,250,000
Business failures; number†	916	962	1,129
Business failures; liabilities†	$70,000	$81,000	$104,000
U. S. Dept. of Labor (90 industries, factory):			
Av. wkly. hrs. per worker†	42.2	41.5	40.0
Av. weekly earnings†	$35.76	$35.15	$28.56
Cement production, bbls.	12,733,000	10,787,000	10,596,000
Cotton consumption, bales	966,631	893,745	854,767
Freight car awards	20,058	4,080	28,741
Car loadings (weekly av.)	792,860	780,692	765,596

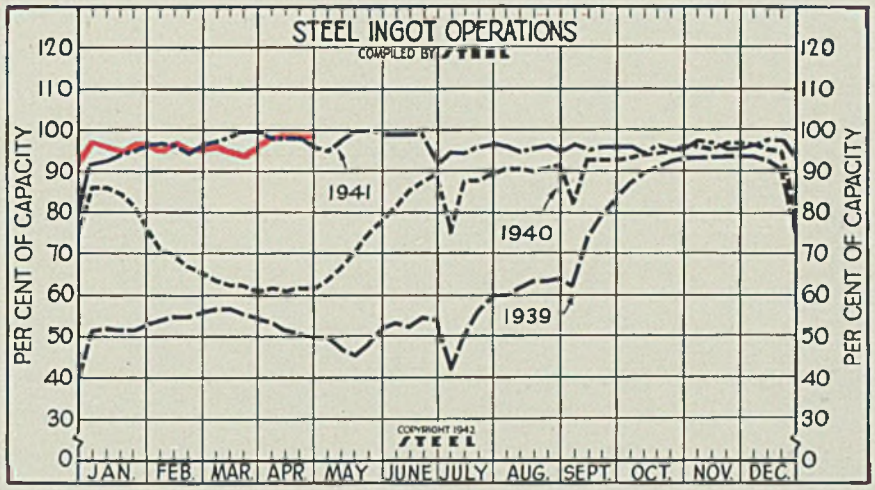
†February, January and February, respectively.

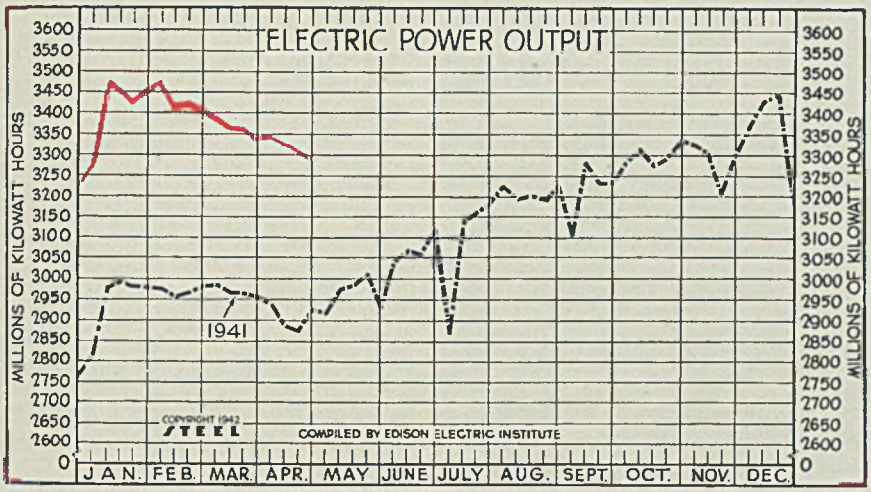
Steel Ingot Operations

(Per Cent)

Week ended	1942	1941	1940	1939
April 25...	98.5	96.0	61.5	49.0
April 18...	98.5	98.0	61.5	50.5
April 11...	98.5	98.0	61.0	51.5
April 4....	98.0	98.0	61.5	53.5
Mar. 28....	97.5	99.5	61.0	54.5
Mar. 21....	95.5	99.5	62.5	55.5
Mar. 14....	95.5	98.5	62.5	56.5
Mar. 7.....	96.5	97.5	63.5	56.5
Feb. 28....	96.0	96.5	65.5	56.0
Feb. 21....	96.0†	94.5	67.0	55.0
Feb. 14....	97.0	96.5	69.0	55.0
Feb. 7....	96.0	97.0	71.0	54.0
Jan. 31....	97.0	97.0	76.5	53.0
Jan. 24....	97.0	95.5	81.5	51.5
Jan. 17....	96.0	94.5	84.5	51.5

†Since Feb. 21 rate is based on new capacity figures as of Dec. 31 last.





Electric Power Output

(Million KWH)

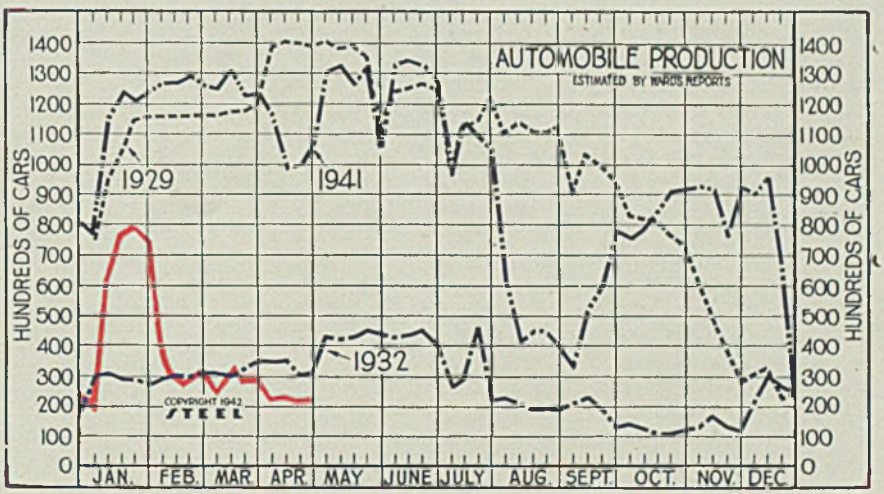
Week ended	1942	1941	1940	1939
April 25.....	3,299	2,926	2,499	2,244
April 18.....	3,308	2,874	2,529	2,265
April 11.....	3,321	2,882	2,530	2,235
April 4	3,349	2,938	2,494	2,244
Mar. 28.....	3,346	2,956	2,524	2,272
Mar. 21.....	3,357	2,964	2,508	2,258
Mar. 14.....	3,357	2,965	2,550	2,276
Mar. 7.....	3,392	2,987	2,553	2,285
Feb. 28.....	3,410	2,982	2,568	2,294
Feb. 21.....	3,424	2,968	2,547	2,269
Feb. 14.....	3,422	2,959	2,565	2,297
Feb. 7.....	3,475	2,973	2,616	2,315
Jan. 31.....	2,468	2,978	2,633	2,327
Jan. 24.....	3,440	2,980	2,661	2,340
Jan. 17.....	3,450	2,996	2,674	2,342
Jan. 10.....	3,473	2,985	2,688	2,329

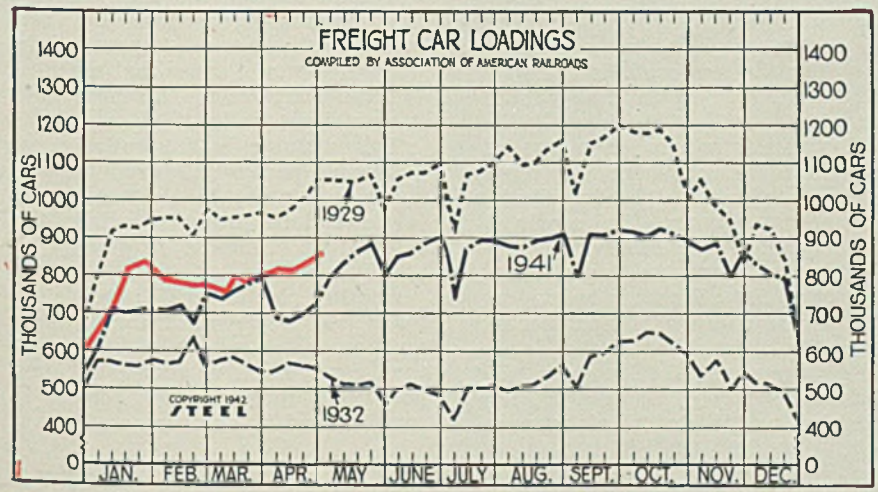
Auto Production

(1000 Units)

Week ended	1942	1941	1940	1939
April 25...	21.9	108.2	101.4	86.6
April 18...	21.7	99.9	103.7	90.3
April 11...	23.0	99.3	101.9	88.1
April 4....	22.3	116.3	101.7	87.0
Mar. 28....	28.9	124.2	103.4	86.0
Mar. 21....	28.9	123.8	103.4	89.4
Mar. 14....	30.6	131.6	105.7	86.7
Mar. 7.....	24.5	125.9	103.6	84.1
Feb. 28....	30.1	126.6	100.9	78.7
Feb. 21....	25.7†	129.2	102.7	75.7
Feb. 14....	29.8	127.5	95.1	79.9
Feb. 7....	37.1	127.7	96.0	84.5
Jan. 31....	73.3	124.4	101.2	79.4
Jan. 24....	79.9	121.9	106.4	89.2
Jan. 17....	75.0	124.0	108.5	90.2

†Canadian trucks and automobiles and United States trucks, since Feb. 21.





Freight Car Loadings

(1000 Cars)

Week ended	1942	1941	1940	1939
April 25.....	855†	722	645	586
April 18.....	847	709	628	559
April 11.....	814	680	619	548
April 4.....	829	683	603	535
Mar. 28.....	805	792	628	604
Mar. 21.....	797	769	620	605
Mar. 14.....	799	759	619	595
Mar. 7.....	771	742	621	592
Feb. 28.....	781	757	634	599
Feb. 21.....	775	678	595	561
Feb. 14.....	783	721	608	580
Feb. 7.....	784	710	627	580
Jan. 31.....	816	714	657	577
Jan. 24.....	818	711	649	594
Jan. 17.....	811	703	646	590

†Preliminary.

A Practical and Efficient Program for . . . .

TRAINING MAINTENANCE

By WALTER J. BROOKING
Director of
Plant Education
R. G. LeTourneau Inc.
Peoria, Ill.

THE "AMERICAN WAY of Living" is inseparably associated with modern machines and the men who maintain them. Even in normal times the effective effort of the great majority of industrial workmen depends upon the skill and training of this group of mechanics, for theirs is the heavy task of keeping machines operating at maximum efficiency and of repairing and maintaining them under pressure of limited time and perhaps lack of needed repair parts. Thus in the battle for production, these men are extremely important. Too with our greatly expanded war production, many new maintenance men must be made available, since continuous 24-hour operation of machines means that proper maintenance is now more important than ever.

As important as this army of mechanics is to the well-being of our industries, it is significant that the training of maintenance men is often left out of formal factory training programs. There may be several reasons, but perhaps the primary ones are: First, maintenance work is often considered to be nonproductive as contrasted with direct production work of machinists, arc welders, flame cutters and similar production workers. In accounting, the cost of maintenance is usually classed as overhead expense and as such may sometimes be under-estimated in importance and in actual cost.

Second, maintenance crews usually are smaller numerically than the total production force of machinists, welders and other groups of skilled craftsmen. But the fact is sometimes overlooked that they are often more numerous as a group than many specialized groups in the plant—for example, specialized heat treaters or tool-and-die makers.

Third, there seem to have been no formal, practical textbooks available to cover the day-to-day work of maintenance mechanics in either the electrical or the mechanical field. There are many books on allied subjects, or on specialized phases of the work which they do, but in most cases they are theoretical, and in no case apparently is there what might be termed an elementary, general textbook covering the fundamental things which maintenance men need from day to day.

Fourth, recognized apprentice training systems, such as are followed for machinists and other production workmen, seem to be few and far between if they exist at all for maintenance mechanics.

Fifth, and perhaps most important, a large majority of the men in mechanical and electrical maintenance crews are men gifted with aptitude for mechanical things, and whose psychological makeup seems to be one of learning by actual doing, rather than learning from reading written textbook material.

Present Training Methods—Their Defense and Their Weakness: How, then, are maintenance men usually trained? Their training most often consists of the accumulation of experience by contact with machines and with other mechanics on the job. A well-trained general maintenance mechanic is a very important part of any industrial plant's personnel. His training is usually specific for that plant in that he knows the special arrangement of machines and special types of machines in that plant and is acquainted with the general layout and function of its machinery. The process of educating such a man must, of necessity, be accomplished at least partly on the job in that particular plant.

He usually starts as a maintenance mechanic where he works with other men in the installation of new machinery, the repair of old machinery, or the servicing of machinery in use in the plant. A part of what he learns is by exploration—tearing down a machine and finding out for himself the details of its mechanical functions. He thus becomes acquainted with that machine and adds to his general knowledge of mechanical principles as well as his specific knowledge of the machine upon which he is working. By working as a helper with more experienced craftsmen, he also "picks up" and correlates other mechanical principles which contribute to his background of experience.

Such a man may, after some experience as maintenance mechanic, take correspondence or night school courses in such related subjects as gasoline engines, diesel engines, theoretical mechanics, electrical engineering, and the like. He may also contribute to his knowledge considerably by reading various trade and technical magazines which come to the department or to which he may subscribe.

By far the most important source of learning for the average workman in the mechanical or electrical maintenance department seems to be from manual contact with the machines involved.

This "chance-experience" form of training, effective as it may be over a period of time, is expensive and has some serious shortcomings. In the first place, it is a slow process. Frequently maintenance supervisors who are themselves somewhat specialized craftsmen in several lines of mechanics in a particular plant would rather do a job of repairing on certain machines themselves than to take the time to do it with some learning workman. If he does it himself he does not take the chance of having an inexperienced workman explore his way through that particular machine and perhaps overlook some important detail which would cause that machine to require service much sooner than it should normally.

This attitude is not entirely undefensible because the maintenance supervisor must know that repair jobs are done properly and, in the interest of economy, as quickly as possible.

Another factor which tends to make this type of training slow and somewhat expensive is the fact that even when a young or inexperienced maintenance helper is working with another craftsman,

MEN

the main objective is to complete the job at hand in the shortest time possible. This means the older skilled craftsman seldom feels justified in taking the time to explain even the more important phases of that particular job to the helper.

The helper, on the other hand, may be reluctant to bother the older, more skilled mechanic by asking questions—perhaps because he is over conscious of how little he knows and does not want to appear ignorant before the more experienced man. Or perhaps he does not feel that it is appropriate to take the time and attention of the skilled workman.

A New and More Effective Training Program: In an effort to overcome some of the weaknesses of the ordinary method of training shop maintenance mechanics, and to supplement the experience of the men in their daily shop work, a strictly practical shop course of training for shop maintenance mechanics and electricians has been set up and is in practice in the R. G. LeTourneau factory at Peoria, Ill. This company manufactures heavy earthmoving equipment and employs about 2000 workmen, about 100 of whom work in the mechani-

(*Please turn to Page* 94)

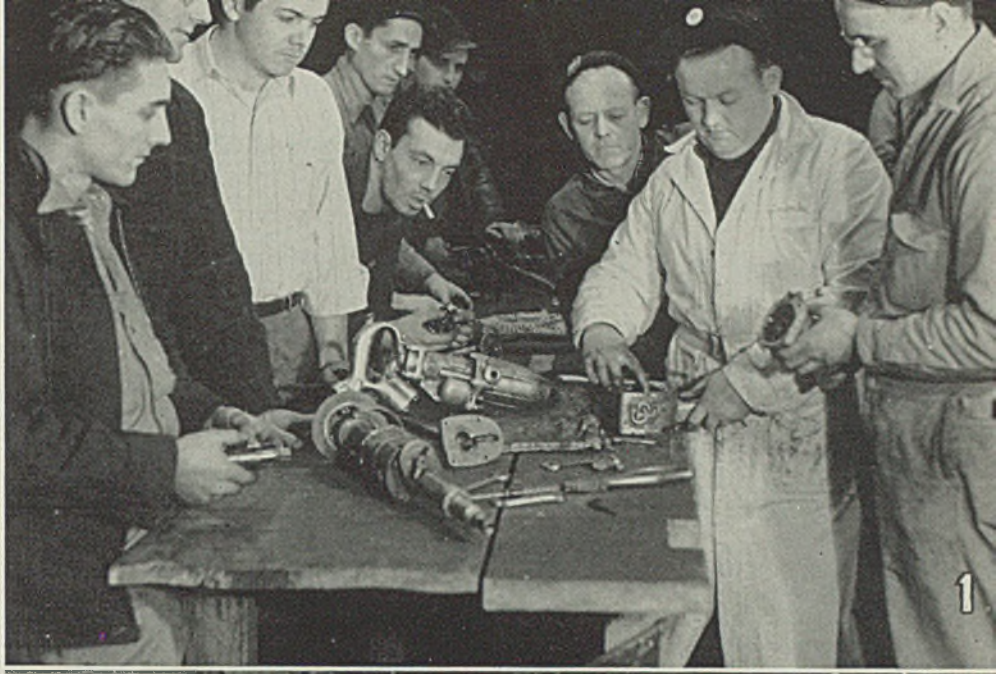


Fig. 1—Part of the maintenance class learning the inside facts about pneumatic wrenches, grinders, hammers and other air-operated tools. Each man does some part of the taking apart and re-assembling. Questions are welcomed and answered by the leader, a specialist (from the crew) on air-driven tools

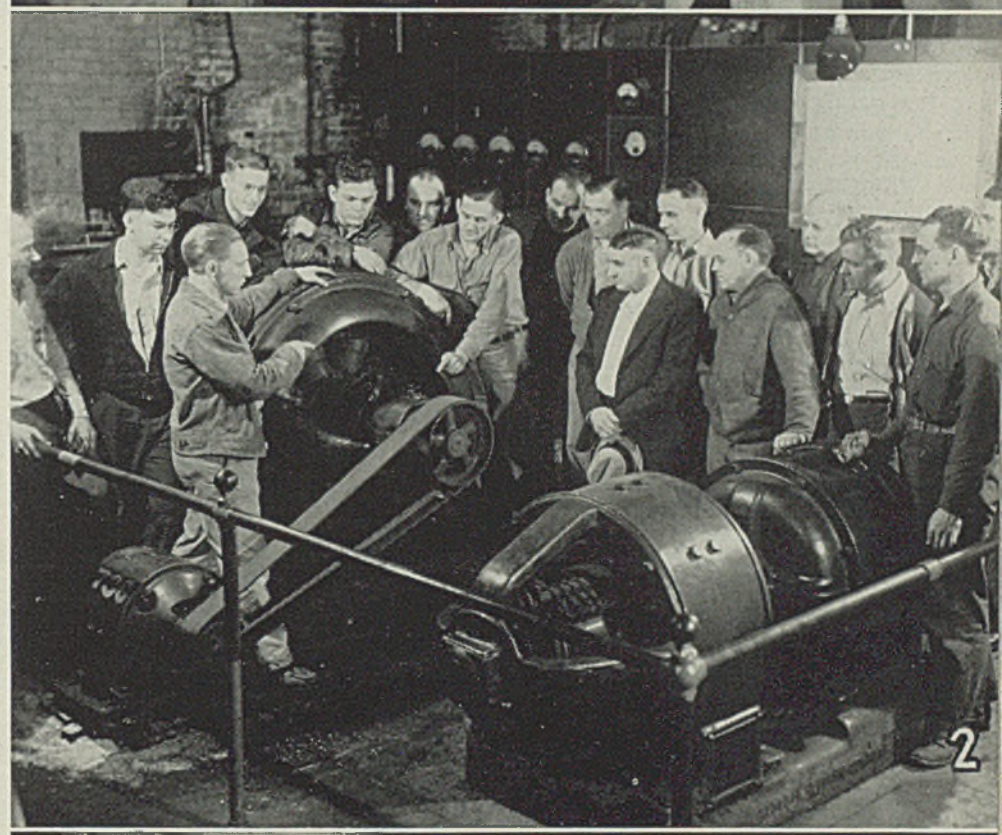


Fig. 2—These motor-generator sets are explained to the maintenance class while in operation. Then they are taken apart and studied in detail when one of the three sets can be spared from service for the 3-hour period required

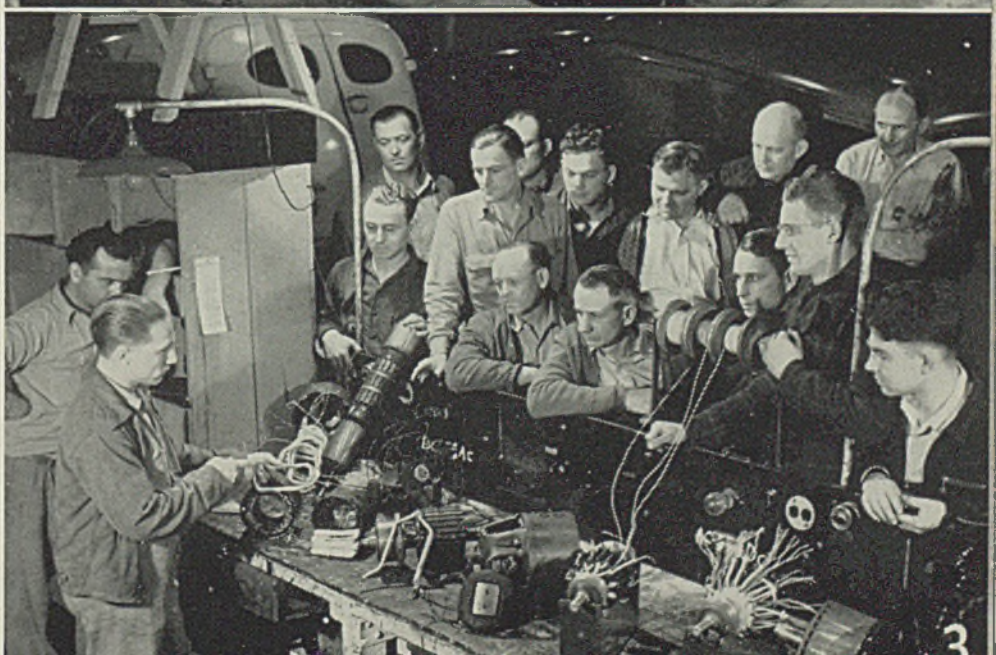


Fig. 3—Here the electrical motor winding specialist in the electrical division explains and demonstrates important points about electric motors—their windings, connections, major parts, facts about their operation and maintenance

How One Company Is Successfully TACK

This is the story of an American industrial firm faced with the loss of one-half or more of its markets—and what that firm is doing about it in order to keep its factories operating and its organization intact. Here is the outline of a conversion program that works

AS THE world crisis loomed steadily larger in the spring and summer months of 1941, it became more and more apparent to the executives of Lyon Metal Products Inc., Aurora, Ill., that every industrial organization of America should accept its share of the burden of national defense. It was obvious that this problem of turning America's industrial plants into an arsenal for defense should not and could not be the sole responsibility of the government. They realized that their company not only should be ready to accept war business but had to seek defense contracts if its doors were to remain open.

This corporation has factories at Aurora and Chicago Heights, Ill., and warehouses and district offices at strategic points from coast to coast—with approximately 400,000 square feet of manufacturing space and a payroll of over 2000 employes. It was evident that unless these facilities could be converted to war production, a difficult time was in store, for early in 1941 the management realized that it was in danger of losing about 50 per cent of its business with the disappearance of markets for store fixtures for retail and chain accounts; steel furniture for homes, business and institutional markets; automotive equipment for car dealers and service shops; institutional equipment for schools, hotels, hospitals, etc.; and miscellaneous products for other nondefense markets. It was also recognized that sheet metal fabrication would not be in as great demand for the manufacture of war products as forgings, steel castings, screw machine products and highly machined items. Proof that these apprehensions were well grounded is the fact that the company was actually face to face with this very problem before the close of 1941.

Prime Contracts: As the first step toward solving these problems, it was realized that prime contracts had to be secured. To this end, every governmental agency was analyzed to determine mandatory future contacts by Lyon field representatives. These latter obtained and recorded the following specific information on each agency:

1—Its requirements—present and future.

2—What it develops, designs, and/or specifies — whether or not purchased at that point.

3—Names and titles of purchasing and procurement officials.

4—Buying for national use (redistributing to other areas).

5—Buying for local use.

This information is constantly being revised for each of these points of contact.

The company set a "must" policy requiring all field representatives to contact regularly each of these governmental offices in their territories. Field representatives report the results of each call to their district manager, who in turn makes a consolidated report to the general offices each month. The district manager is required to accompany the field representative personally on specified monthly calls to a predetermined list of the more important governmental agencies in his district. See diagram, Fig. 1.

Subcontract Inquiries: The company's second major step was to develop a plan which would produce the maximum of defense inquiries

Fig. 1—First step in getting war work is to go after prime war contracts from every government agency which is a possible purchaser of items you can make. This sketch shows how Lyon organizes these contacts

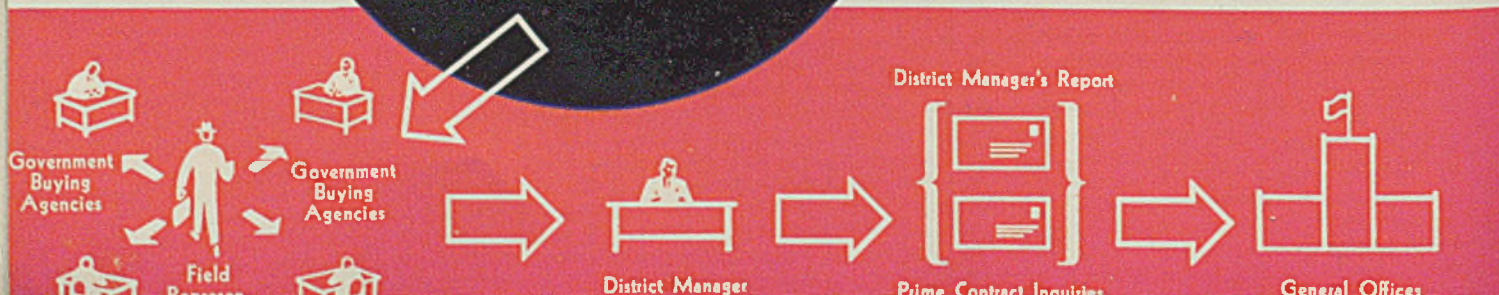


Fig. 2—Second step in getting war work is to go after subcontracts from industrial plants with war orders. This diagram illustrates the effective method Lyon worked out for contacting these many possible sources of war business

from private industries. This called for co-ordination of field contacts, magazine advertising, and direct mail promotion—all aimed at obtaining war subcontracts.

The company recognized the problem of turning a sales organization of specialists into an imaginative group of salesmen who would look behind every war factory door in the search for special products. An educational program was carried on through sales meetings at which the theme "Use Your Imagination—Throw Away Your Slide Rule and 'Climb Into the Tank' " was dramatized by professional actors.

The following procedure for obtaining subcontracts was developed (see diagram Fig. 2):

1—Field representatives concentrate on industries engaged in defense work. Personal calls by these men are directed by district managers. The inquiries are reported to the general offices in routine manner. All names and titles, particularly of industrial officials responsible for subcontracting, are passed along to the sales promotion department for direct-mail treatment.

2—The present, consistent national magazine advertising was started in August 1941 *on the single subject of Lyon's ability to fabricate production-run sheet metal products, parts and subassemblies* in gages from No. 10 to No. 24. The schedule includes 17 selected business publications.

3—The company simultaneously launched an extensive direct-mail promotion plan to industries. It subscribed to several services which offered complete information on who received prime contracts. Industries known to be heavily engaged in defense work were particularly followed for subcontract possibilities. All names secured, plus other pertinent information, were sent to the territory representatives for follow-up.

4—A special publication, *Craftsmen in National Defense,* was prepared by the company's sales promotion department. This booklet tells, with brief copy and pictures, the complete story of Lyon's facilities for handling subcontracts. For the widest possible distribution, this booklet was and still is featured in both magazine and direct-mail advertising. Wide publicity has been given to this book in the trade press because it is a new type of promotional data. Thousands of requests were received for the publication, and requests continue to arrive in the daily mail.

5—One of the quickest ways to get a prime contractor's interest in a company's plant facilities and *its ability to handle a subcontract* was found to be pointing out how to break a bottleneck. Lyon seeks this information in three ways: First, by promotional mailings to and direct calls on all branch offices of the War Production Board, asking for information on local prime contracting bottlenecks; second, by promotional mailings to and direct calls on all large industrial concerns, whether or not Lyon knows they have prime contracts, asking if they are having slow-ups connected with sheet metal fabricating; third, by personally interviewing all Lyon suppliers on their prime contract activities and subcontract possibilities. The interviewing is done by the Lyon purchasing department, which submits this information to the sales department on a form provided for that purpose. The plan outlined in the first two steps results in inquiries for both prime contracts and subcontracts.

The Requirements: In order to sift all inquiries carefully and turn as many as possible into actual requirements—the third step in the master plan—it is necesasry to obtain complete information. Field representatives are charged with establishing all pertinent facts. Customer drawings and specifications must be secured. In every case the field representative is required to send in rough drawings. The information secured is forwarded through the district office to the general offices, where a careful plan of operation assures a thorough and prompt handling of every case.

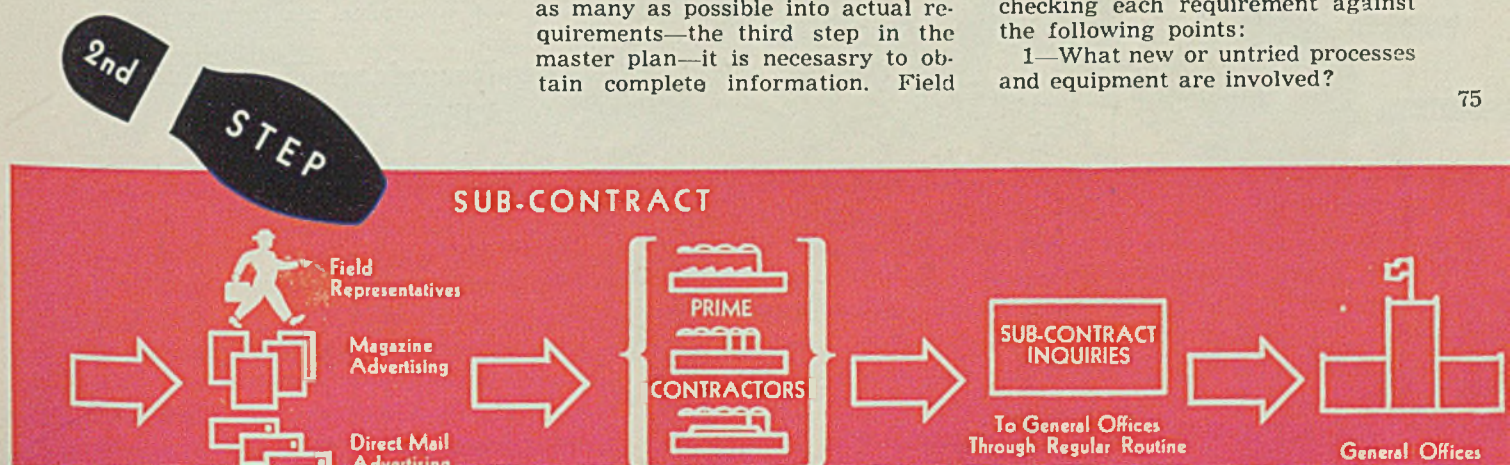
Co-ordinated Action: Due to the nature and quantity of war product inquiries reported by the field representatives and in turn by the district office, regular routines of handling at the general offices were found to be inadequate. To arrive at 100 per cent co-ordination—the fourth step in the plan—and expedite the handling of these inquiries to the maximum, the company set up its own "war production board" and called it the "special defense products committee."

The personnel of this committee is made up of junior executives representing all major departments involved in the problem, including design, sales engineering, engineering and production. A cost estimator as well as purchasing and financial advisors are called in when necessary. Heading the committee is a chairman who has had extensive overall company experience. See diagram, Fig. 3.

The committee meets *every day* at the same hour. All special defense products inquiries are given immediate attention. Attendance is required of all members of the committee. In case of enforced absence, an alternate must attend. *Representation on this committee takes precedence over all other responsibilities.*

The committee determines by majority vote which of the special products should be estimated and which rejected. The decision is made after checking each requirement against the following points:

1—What new or untried processes and equipment are involved?



2—What unusual development and design problems are involved?

3—What major engineering problems are presented?

4—What problems are presented as to sources of necessary raw materials?

5—What are the delivery schedules of raw materials?

6—How much expense can logically be incurred in connection with new tools and dies in view of the potential volume?

7—What about availabilityof plant capacity *at the time* that this product must be manufactured?

8—Which of the company's factories can manufacture this product to the best advantage?

9—What is the estimated rate of production?

10—What should be subcontracted in view of available equipment and to speed deliveries?

11—Would any potential bottlenecks result in the company's plants because of specific commitments of other contracts?

Each committee member is responsible to the chairman for all necessary data for his respective department and for keeping his senior executive informed on major developments. The chairman reports to the senior sales executive because it is the sales department's responsibility to obtain the inquiry, quote, and follow to conclusion.

If, when assembling necessary information on war contracts, the committee runs into a personnel bottleneck any place in the organization, it immediately recommends increased personnel, usually by requesting temporary transfers from one department to another.

When a requirement must be turned down, the committee is careful to list all facts justifying its decision. This information is passed on to the prospect, whether a private industry or governmental agency, through established sales channels. That is done to keep the door open for future special inquiries from the same source.

When the committee approves a special requirement to be estimated and quoted, the work is put into regular channels of company operation. This permits the committee to continue on new assignments. The chairman, however, records and follows each special requirement until the price has been established.

Pricing Contracts: Because every prime contract and subcontract presents a new pricing problem, the company considers this important job with extreme care. It is a manufacturer's patriotic duty to price closely, but consideration should be given to the following points:

1—Potential overhead labor cost to speed production.

2—Indirect labor cost to handle increased volume.

3—The possibility of increased labor and material costs during the life of the contract.

4—The cost of re-arranging production lines per contract.

5—Relatively higher cost on any pilot shipments.

6—Special crating or packing expense—sometimes overlooked.

Whenever possible, every consideration should be given to spreading the original cost of plant layout, tools, dies and equipment over future business of a similar nature.

Sources of Supplies: Many prime contracts and subcontracts call for raw materials not commonly used by the company. One of the big problems is to find sources of such materials quickly. By being represented on the special defense products committee, the purchasing department can get busy on this problem as soon as the job is accepted for figuring.

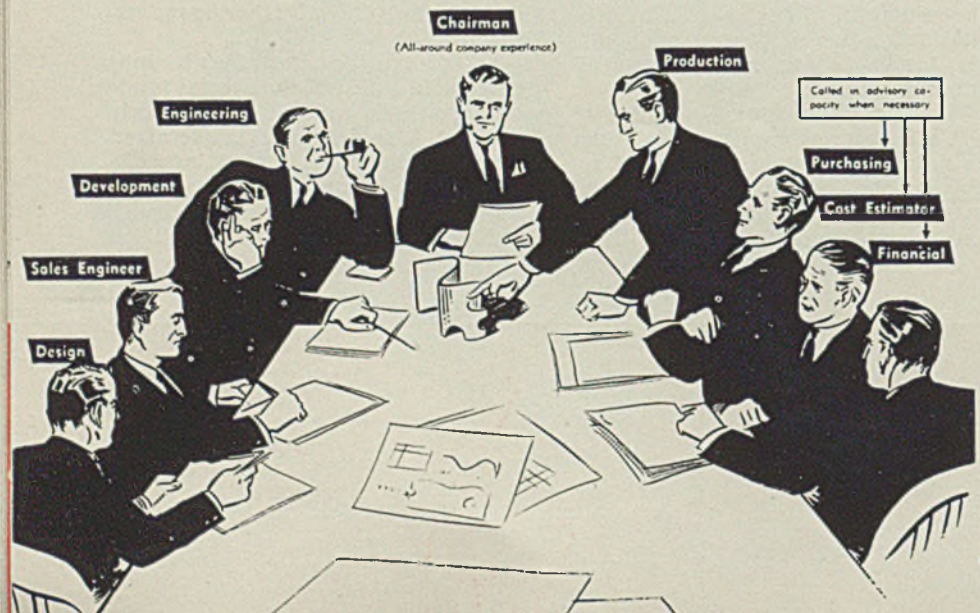
To supplement the company's tool-and-die shops, a large list of tool and die shops in neighboring cities is contacted every 60 days. The information obtained gives the committee an up-to-date list of available tool-and-die production capacity. If necessary to expedite delivery, tool-and-die contracts are distributed to more than one shop.

Another problem is getting new types of machines. In order to utilize available equipment and thereby get into production sooner, used equipment possibilities are always considered. The committee obtained a national list of used machinery dealers. Letters of inquiry are sent to this list, and many of the firms are called on by Lyon representatives. Additional steps in the search for machinery include magazine advertising by Lyon, checking "used machinery" want ads from selected cities, and securing information through news clipping services. As a result of these contacts, the company is usually able to obtain the machinery required.

Lyon Metal Products made most of this plan effective early in 1941 and is at present religiously following it. The plan as outlined is naturally the result of refinement based on experience. *The results have been encouraging.* If the organization keeps on fighting, it is believed that it will not only remain a vital unit in America's all-important industrial war effort, but will be able to protect the company's investment in land, buildings and equipment. It will also provide a continuing source of livelihood for the employes making up its efficient organization family.

What this company has done suggests many possibilities for other plants that may be facing a difficult problem in converting to war production. It certainly appears well worth trying if you are facing loss of your usual markets.

Fig. 3—For co-ordinated and quick action at its own headquarters, Lyon set up its own "War Production Board", members of which are indicated here by the labels. This committee meets daily at the same hour, attendance is mandatory



Resurfacer Fixes Floors While Traffic Rolls

A new ready-to-use resurfacer which is claimed to allow the patching of concrete or wood floors in face of traffic is reported by Flexrock Co., Twenty-third and Manning streets, Philadelphia. It is said to bond to a feather-edge and get smoother under the wheels of constant traffic.

"WAYS AND MEANS MUST BE FOUND NOW TO MAKE EVERY MAN AND EACH MACHINE PRODUCE MORE."

-- say WPB spokesmen

2 Big Jobs

#1

HELPING EVERY MAN PRODUCE MORE

Nowhere is this more important than in the tool room. The vast quantity of new tools needed means that the productive capacity of every skilled worker will be taxed to the limit. Tools that crack in hardening or fail prematurely mean precious time *lost* in "doing jobs over". And that time could be used to yield *more* new tools.

To further step up output from each skilled worker, Carpenter has published a 315-page handbook, "Tool Steel Simplified". Over 22,500 copies of this handbook are at work providing useful on-the-job tips to help produce *better* tools *faster*. It answers questions on size change, warping, grinding checks and the relation of design to heat treatment. Whether or not you have an organized training program, "Tool Steel Simplified" can provide practical information for apprentices and a good "refresher course" for skilled workers.

#2

GETTING MORE OUTPUT FROM MACHINES AND PRESSES

Excessive "down time" caused by tool and die troubles can be converted into extra output—with the right tool steel for each job and proper methods of heat treatment. Here are typical reports from plants that have increased machine output by relying on Carpenter's Matched Set Method for help with the proper selection and heat treatment of steel to do each job: "Output up 52,500 pieces per month" . . . "Production capacity of tools up 20% to 100%."

If you would like to know how "down time" can be reduced and output increased, send for "Tool Steel Simplified." It tells how to select the best tool steel for each job, and how to heat treat it for best results. Let this tool room handbook answer many of the questions that come up in your plant. "Tool Steel Simplified" is available at cost to tool steel users in the U. S. A. — $1.00 ($3.50 elsewhere). After you have read it, you will want more men in your plant to have copies.

THIS IS THE HANDBOOK that is helping apprentices, tool makers and tool engineers produce more and better tools that will keep machines producing steadily. It is part of Carpenter's program of ALL AID TO TOOL STEEL USERS. *"Tool Steel Simplified" is available at cost to tool steel users in the U. S. A.—$1.00 ($3.50 elsewhere.) Order your copy today.*

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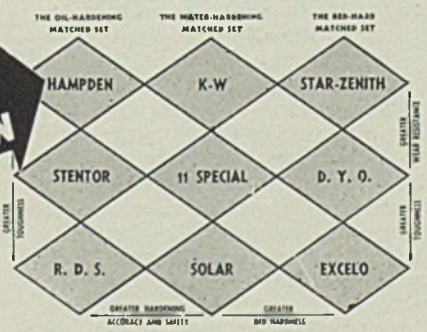


BLOCK OR CASCADE WELDING

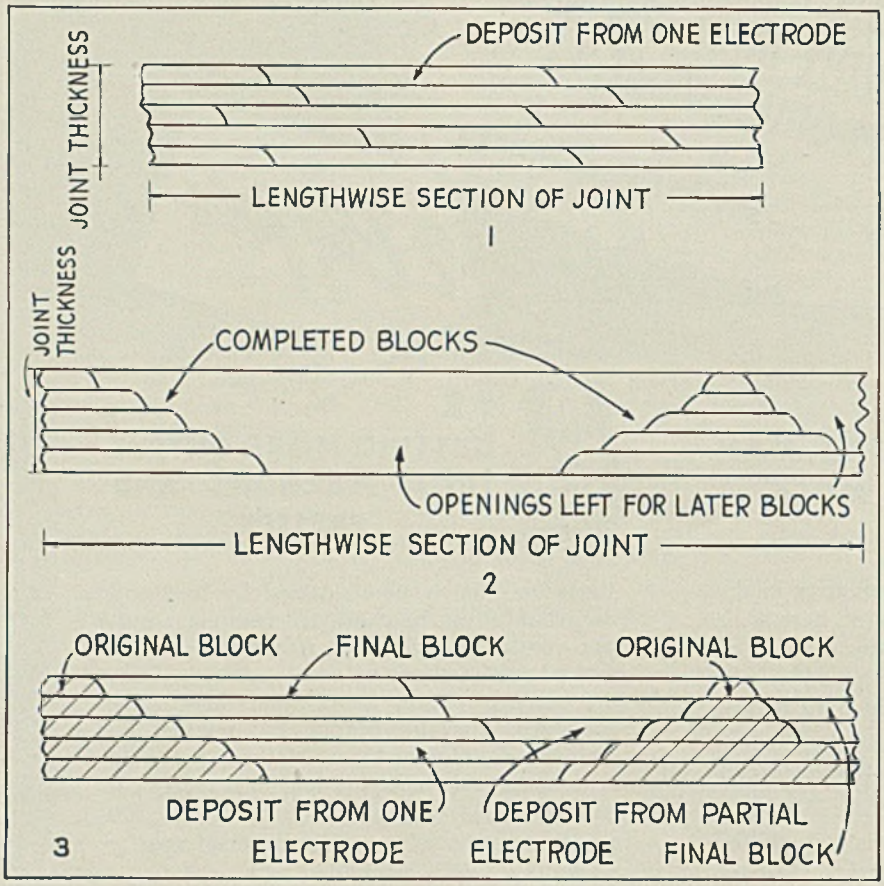


Fig. 1—Normal method of making a 5-layer weld. Fig. 2—Scheme for making a 5-layer block weld. This is starting procedure. Fig. 3—Block weld of Fig. 2 is completed in this manner

. . . . an almost foolproof welding procedure that can be utilized to produce weldments of assured quality even in alloys that usually involve welding difficulties

By HAROLD LAWRENCE
Metallurgist and
Welding Engineer

WELDING today is complicated by a changing availability of alloying elements brought about by war demands and the difficulties of transporting strategic metals over long sea routes. Furthermore the war program calls for increasing amounts of high-strength steel for mobile units while specifying hard, strong and tough steel for armor plate. Usually the high-strength steel for gun carriages and certain tank parts is of a weldable grade low-alloy material while the armor contains ingredients that may involve some welding difficulties.

If the needs of the armed forces were static, a welding procedure for joining specific alloys would be comparatively easy. However, the war production authorities are faced with the problem of conserving vital materials, among which nickel and chromium are outstanding examples. In order to stretch out the stockpiles of essential alloys, steelmakers are automatically forced to change analyses, usually in a direction that makes welding more difficult.

Superimposed on these difficulties is the necessity of welding certain assemblies, regardless of the analysis of the steel. And such assemblies must be produced quickly. Therefore the desire of many welding shops is for a welding method that is close to foolproof. And block or cascade welding is such a welding procedure.

Preheating, maintaining heat in the joint during welding, and postheating have become accepted practices in welding alloy steels. But long, straight sections are prone to cool below the preheating temperature while the welder traverses the length of the seam. For maintaining the heat in the joint, a scheme that does not require the building up of the whole length of the joint a bead at a time is required.

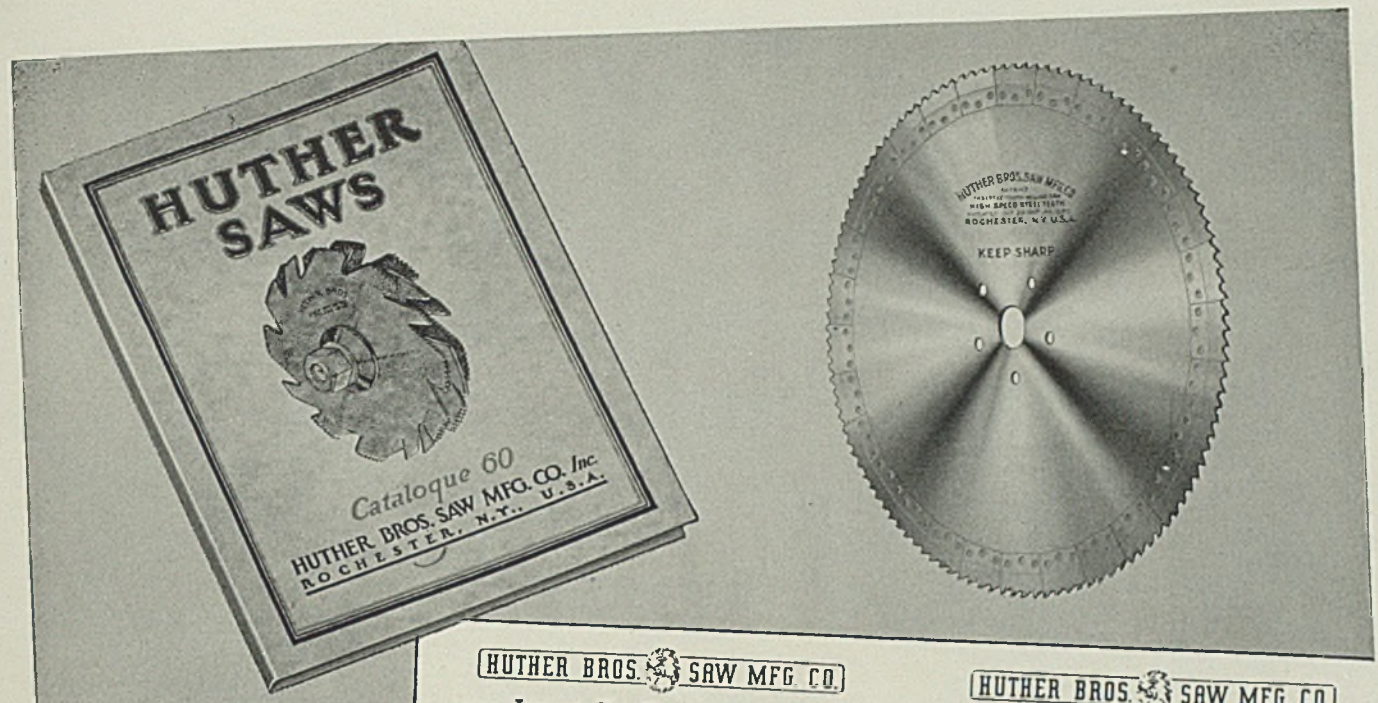
Before analyzing the technique for successful block and cascade welding, definitions for these terms will be attempted. Looking at the longitudinal section of a normal layer weld in Fig. 1, the familiar pattern made by the beads deposited from successive electrodes may be seen. In this drawing all welding is shown in one direction, whereas some plants have adopted the practice of changing direction on starting each new layer. Either method will produce equivalent results with the necessity, when using direct current, of starting from the end of a straight seam and welding toward the middle to avoid or reduce magnetic disturbances.

In Figs. 2 and 3 are depicted the first and second stages of welding the type of seam shown in Fig. 1, but employing block welding. In this discussion the use of the term "block welding" will apply to those seams that naturally occupy a substantially horizontal position, while "cascade welding" as shown in Figs. 4 and 5 will refer to those joints that occupy positions varying from the horizontal to the vertical. Frequently the terms "block welding" and "cascade welding" are used loosely and interchangeably, although a close study of the illustrations will reveal two quite different welding methods. Both are forms of intermittent welding.

The primary reason for the adoption of block and cascade welding under present conditions is to avoid cracks in welding the alloy steels. Even low alloys such as carbon-molybdenum steel containing only 0.50 per cent molybdenum may exhibit cracks under certain common conditions of welding, as has been reported by Dr. W. F. Hess in "Evaluating Welded Joints", The *Welding Journal*, October, 1941. In this same article the identical steel welded with the cascade technique disclosed no cracks.

And the secondary reason for the specification of block or cascade welding is to permit the use of fluid flat-position electrodes for greater freedom from porosity in welds that normally might be welded in the vertical position with a quick-solidifying all-position electrode.

These two special welding techniques prevent the formation of a



Huther circular metal cutting saws, inserted segment type and solid type, Huther metal cutting band saws described in this catalog. Also tungsten carbide tipped saws for cutting copper and aluminum. Catalog No. 60 sent on request.

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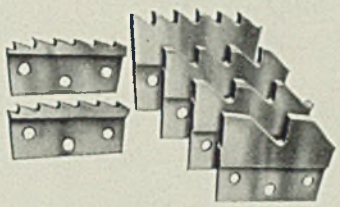
Patented October 25, 1902; January 19, 1915



The view above shows four of the different sizes of teeth used in the fine pitch type of Huther Bros. Patent Milling Saws.

The two inserts at the left were taken from a saw that had been in continuous use for some time without having broken insert.

The wear is equal to about two inches on the diameter and the special heat treatment given these inserts—which are the best quality high speed steel—insures longer runs between sharpenings.

This is a saw that means real economy for the user. May be sharpened on automatic saw sharpener.

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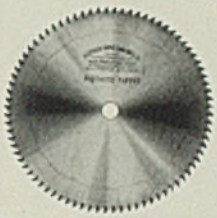

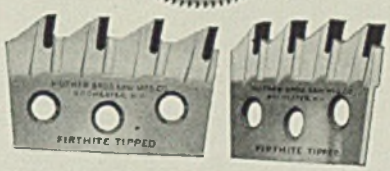

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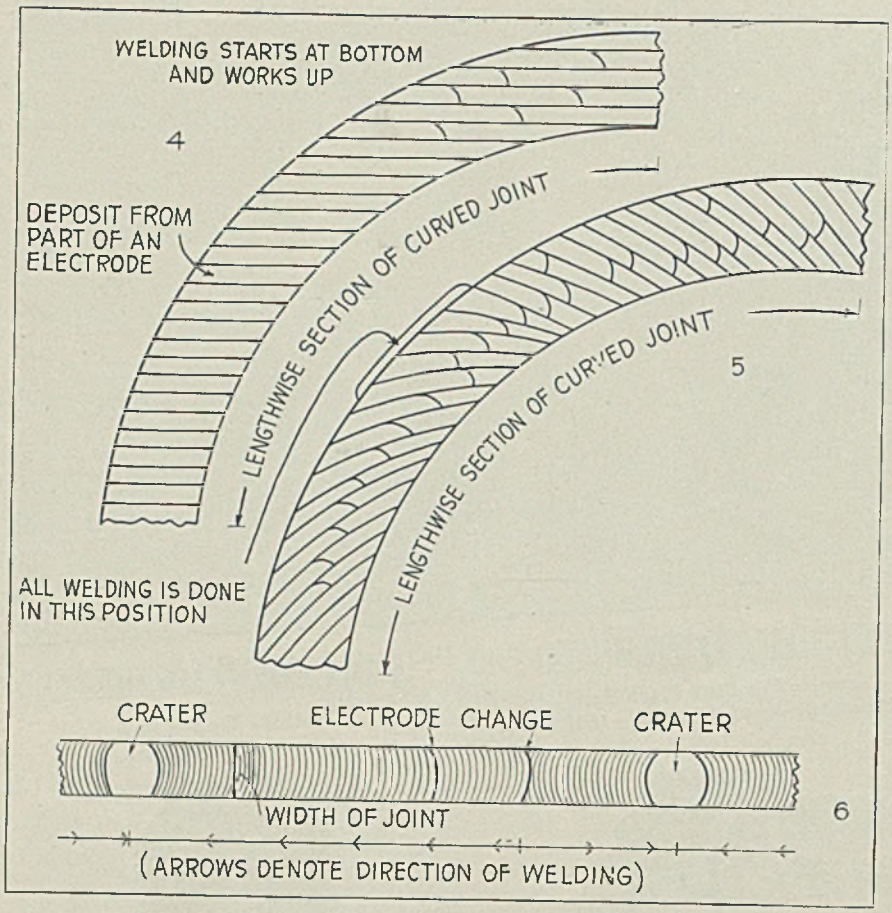


Fig. 4—A cascade weld is made where the joint cannot be positioned for block welding. Fig. 5—Where the work can be positioned, a cascade weld is made in this manner. Fig. 6—This is what you see when looking at the top of a completed block weld

brittle heat-affected zone in the parent steel while contributing to a welded joint with inherent stresses below the danger point. This is accomplished by continued heat input into a weld that has been properly preheated.

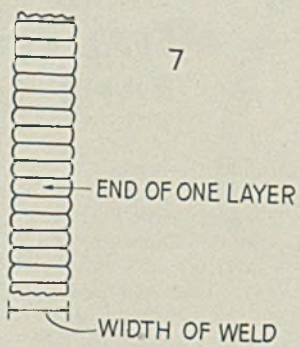
But actual welding practice usually deviates from the theoretical practice enough to make the emphasis on continued heat input quite prononunced. Preheating prepares the seam for the applicaton of weld metal. The block or cascade sequence of applying the beads keeps that portion of the weld and base metal sufficiently hot. However, interruption in the continuity of the welding brought about by lunch hours or the changing of shifts may indicate the need for preheating a block or the last welded portion of a cascade whenever recommencing the work after a short cooling period. "In case of doubt, preheat", is an infallible rule for good welding by these methods.

If the desired preheating temperature and interpass temperature is known, a contact pyrometer or a Tempstik can be assigned to the job. In this manner a check of the temperature may be made before starting each pass. Should the temperature fall below the desired minimum, a brief preheating with a torch will put the weldment back in welding condition. Properly warned about the dangers of welding with insufficient heat in the already deposited metal and parent plate, the welder may be relied upon to keep his welding conditions at the optimum level.

There are several points peculiar to intermittent or interrupted arc welding (as block and cascade welding are sometimes called) that deserve attention if the best results are to follow. With so many short sections of weld involved in either technique, the correct starting and stopping of the arc assumes much more importance than these operations normally deserve.

Of course there is the usual consideration of preventing lack of fusion at the joint where the arc is started. Immediately after establishing the arc, the deposited metal is not fluid enough to cause perfect fusion or to float out the slag deposited with the first steel. To rectify this situation the arc is started back of the previous crater and welding is done in a reverse direction until the crater is filled. Then the arc is about faced with the welding continuing in the normal direction of travel. This maneuver assures adequate heat at the beginning of each portion of a weld.

Fig. 7—This shows the characteristics that distinguish the appearance of the top of a completed cascade weld. Contrast this with Fig. 6



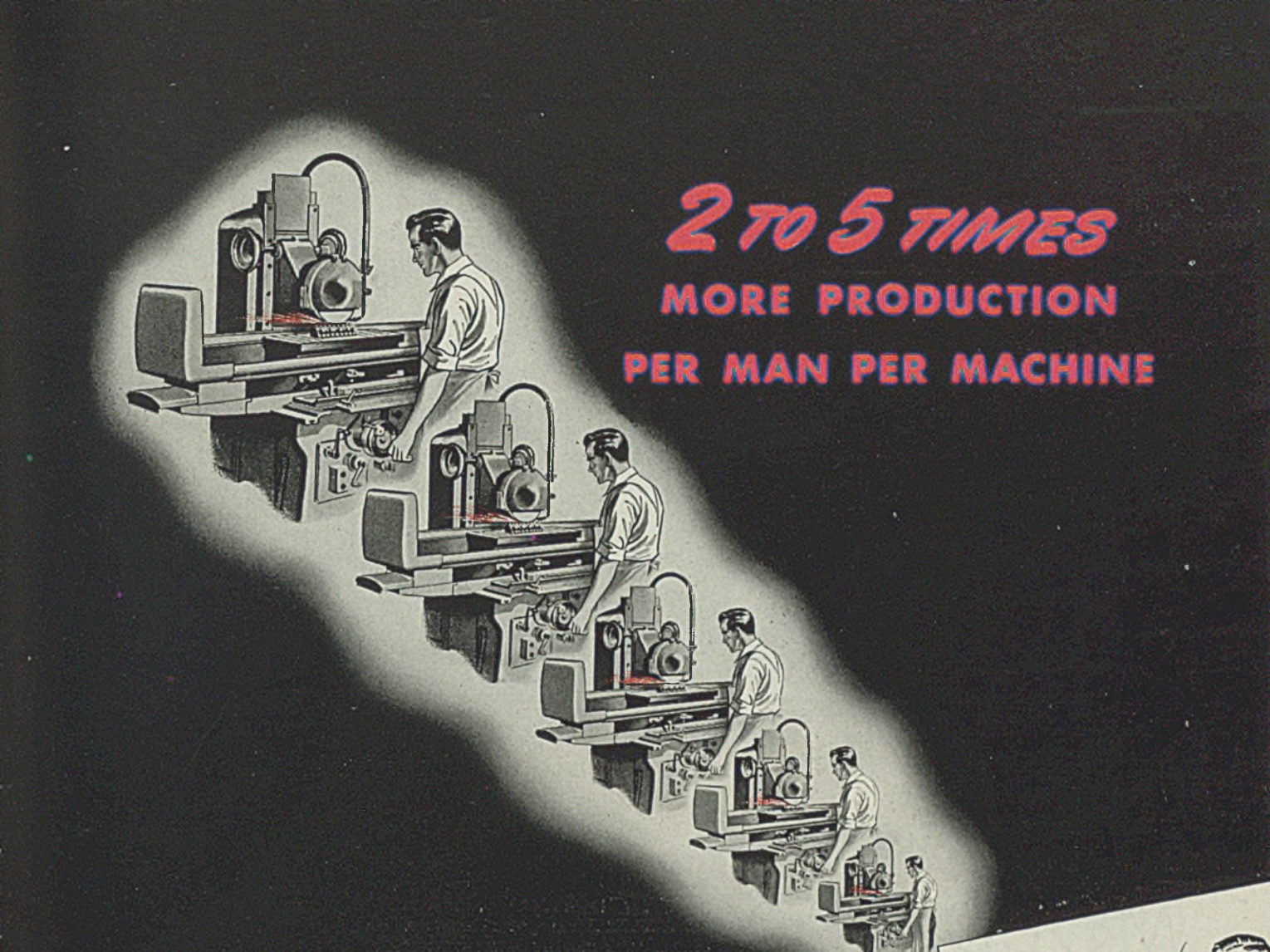
But correct starting procedure is not enough in block and cascade welding. In the former, particularly, there is need for exact placing of the weld metal in the first blocks. In addition to filling the groove with weld metal and providing sufficient heat to prevent cracking, the deposited layers in the blocks must provide sloping ends to accommodate the final blocks that fall between the first ones. To achieve smooth and uniform end tapers requires skilled metal placement. And unless these contours are uniformly established, slag entrapment and expensive cut-outs are likely to result.

All these remarks on intermittent welding techniques are intended to lead to the deposition of metal that is X-ray perfect. Government specifications make good use of X-ray explorations as the sure means of checking weld quality. The execution of work below this standard is not to be countenanced.

Equally as important as the beginning of the bead is the end. Unsound craters and incorrectly situated metal at the end of the bead would not bring about the uniformly fine welds expected. With the flat-position electrodes favored for block or cascade welding, stopping consists in hesitating at the ending point and quickly withdrawing the arc back across the following slag. The welder can ascertain the success of his motion by watching the slag and by inspecting the weld deposit. If the slag continues ahead and covers the crater completely, the time of hesitation was sufficient for the purpose. If the weld crater is full and sound as well, the manipulation was perfect.

Bearing in mind the fact that these procedures were developed to keep the welding region hot, the need for quick and easy slag removal may be appreciated. Definitely the electrode chosen has to be one whose slag comes free of the weld with little effort on the part

(*Please turn to Page* 105)



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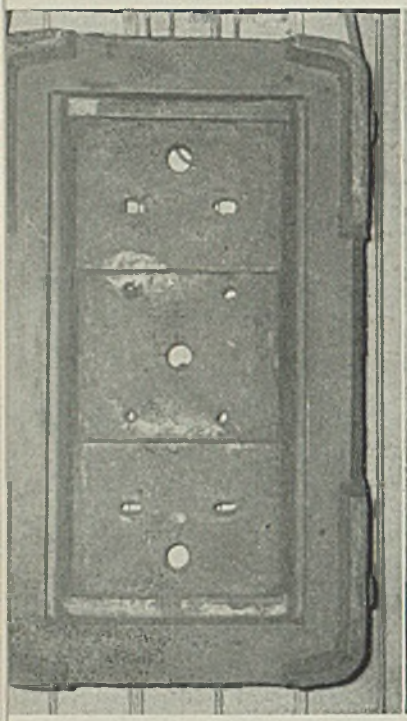

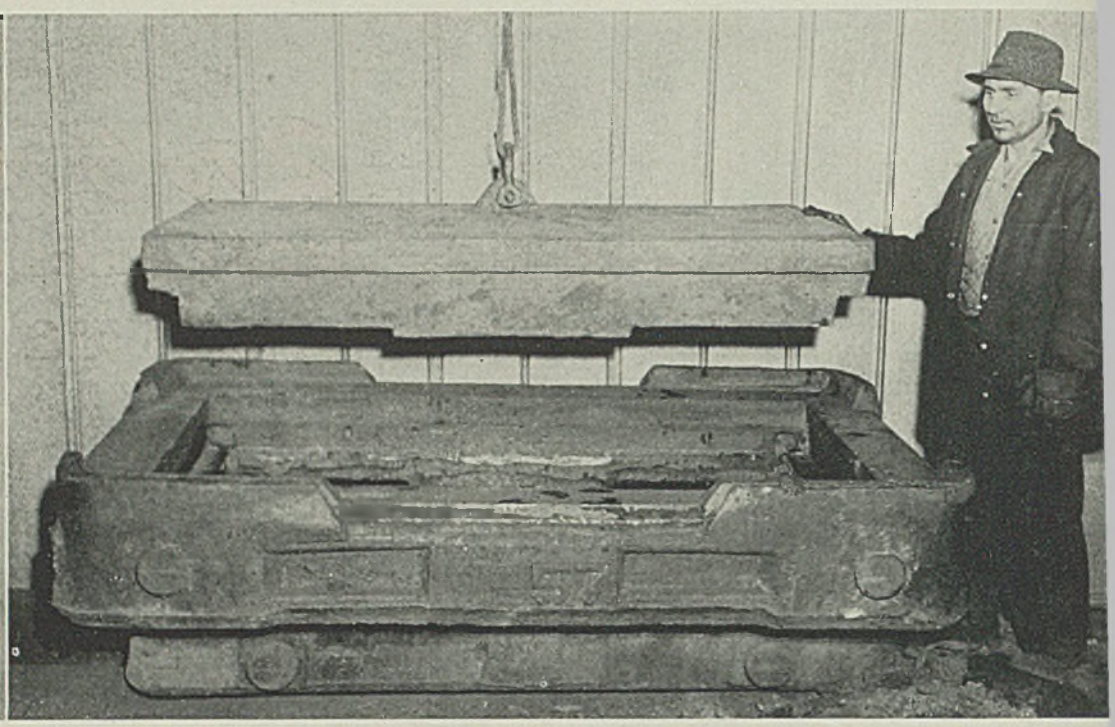

Fig. 1. (Upper left)—Cast-steel mold stool or keeper into which a cast-iron insert is poured. Fig. 2. (Upper right)—Cast-iron insert about to be lowered into the outer mold stool frame

Insert Triples Life of MOLD STOOLS

Simplest form of an ingot mold is essentially a hollow cast-iron sleeve resting on a cast-iron stool. But by providing a separate cast-iron insert supported by a steel frame, temperature differences and stresses are greatly reduced and the stools remain in service longer than those cast in one piece

ALTHOUGH improved types of big-end-up and bottom-cast molds that do not require stools have been adopted for certain grades, a large tonnage of steel, particularly rimmed steel, is poured in big-end-down molds on stools. The advantage of cast iron is that it does not warp and does not weld to the steel ingot.

The following conditions develop in cast-iron mold stools during use:

1. Major cracking.
2. Superficial cracking of the surface, i.e., fire cracking or crazing.
3. Gouging or cutting from the stream.

Major cracking is the chief cause of premature failure. It is reasonably certain that this type of crack is due to large stresses set up in the stool by the difference in temperature between the center and outside.

When an ingot is poured on a flat cast-iron stool of the conventional type the center becomes hot and tends to expand. This expansion puts the still cool outside under tension which is relieved on cooling. Repetition of this stress cycle is thought to be the cause of cracking. Whatever the cause, almost invariably these stools develop a central crack through the thickness of the stool extending from one edge toward the spot which is repeatedly heated first by the stream of molten steel. The median life of these stools is 40 to 50 heats. A few of the stools last as long as 150 heats or more which indicates that considerably longer life is possible if premature cracking can be prevented so that life of the cast iron can be secured. If stool life were the only consideration some improvement could no doubt be secured by alloy additions to the iron. This would result in undesirable contamination, however, if the broken stools are used as cold iron in the open-hearth charge. Thus the best method of lengthening stool life is by improving the design so as to prevent undue temperature differences and thus avoid high thermal stresses.

With this in mind an improved design has been developed at Steubenville works of the Wheeling Steel Corp. (U. S. Patent 2,134,970). The outside of the stool, which is normally the coolest due to the chilling of the air and to the fact that the heating is from the center, is made up of a cast-steel frame or keeper, into which is poured an inner frame of cast iron which thus forms the outer frame proper, Fig. 1, and is separate from the parts in contact with the ingot which normally attain higher temperatures. In a stool of this design the temperature difference and

Fig. 3—Complete stool showing the insert ready to start its initial campaign

Some *kinks* that PIPING POINTERS taught me*

*MAINTENANCE TRAINEE

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. . . THAT INSTALLING VALVES for easy operation is important in controlling speed and quality of production—to safety of processing equipment as well. You can't expect production workers to open valves fully, regulate them properly, or close them tight, if getting at them is difficult and dangerous. Yet, improper operation quickens wear on valves and often slows production.

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hence the stresses in any one part are greatly decreased. This part of the stool is designed for mechanical strength. The center of the stool, or the insert, Fig. 2, is designed not primarily for strength, but to resist the extreme heat of the molten steel. By thus using specialized parts for the two distinct service requirements, the life of the central part is more than tripled and even then only the part which fails needs replacement. Breakage when loosening stool stickers which is the immediate cause of failure of the conventional stool is entirely eliminated. The stool which is now being used, Fig. 3, is the result of several improvements each followed by an actual service trial, so that there is considerable well-founded confidence in the soundness of this design.

The first set of 12 insert stools was put in service at Steubenville works on Oct. 29, 1936, and were used until April 16, 1937 when they were taken off with an average of 245 heats or 1637 gross ton of ingots per stool. New inserts were made and served from June 2, 1937 to Feb. 4, 1938 for an average of 356 heats or 5,052,100 pounds of ingots on the new inserts.

Ten insert stools were put in service the last part of March 1941 and now have over 500 heats on the original inserts. The stool consumption is about ¾-pound of in-

(*Please turn to Page* 110)

Table I—Life of 21 Oldest Stools Up To Jan. 27, 1942

Mold number	Initial pouring	No. ingots poured	Weight, tons	Pounds of insert per ton ingots
21	3/28/41	636	4,781.4	0.59
18	3/28/41	620	4,709.4	0.60
13	3/28/41	613	4,671.2	0.60
24	3/28/41	606	4,615.4	0.61
22	3/28/41	590	4,408.7	0.64
23	3/28/41	583	4,406.4	0.64
20	3/28/41	562	4,257.6	0.66
14	3/29/41	542	4,117.5	0.68
16	3/28/41	476	3,646.5	0.77
26	3/28/41	449	3,402.9	0.82
Sub Total		5,677	43,017.1	0.65
15	4/17/41	560	4,238.1	0.66
17	4/17/41	549	4,162.2	0.67
12	4/17/41	523	3,978.8	0.70
25	4/17/41	512	3,839.1	0.73
19	4/17/41	433	3,241.7	0.86
Sub Total		2,577	19,459.9	0.72
10	7/15/41	420	3,187.8	0.88
7	7/15/41	409	3,053.5	0.91
6	7/15/41	400	3,013.9	0.93
9	7/16/41	393	2,980.7	0.94
8	7/21/41	367	2,735.4	1.02
11	7/15/41	269	2,022.2	1.38
Sub Total		2,258	16,993.5	0.99
TOTAL		13,089	79,470.5	0.74

Weight of Stool

Steel casing	4,000
Cast-iron frame	3,600
Center insert	2,800
Total	10,400

Table II—Record of Slab Stools

	Month	Stools Scrapped	Ingots Produced
1940	Oct.	143	12,397
	Nov.	70	11,855
	Dec.	91	11,453
1941	Jan.	128	12,115
	Feb.	114	11,045
	Mar.	151	11,746
	Apr.	155	12,135
	May	115	11,891
	June	129	11,911
	July	164	12,155
	Aug.	143	11,305
	Sept.	115	11,604
	TOTAL	1,518	141,612
Ingots on patent stool			7,216
On regular stool			134,396

$\frac{134,396}{1,518}$ = 88.5 Ingots per stool

FLAME STRAIGHTENING

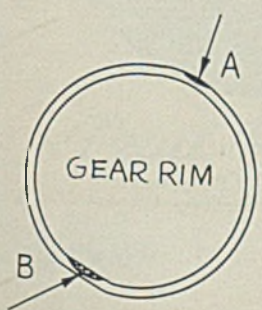
By C. W. HALE

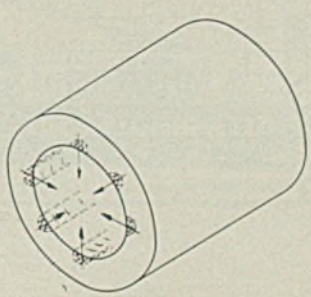
Applied Engineering Department
Air Reduction Sales Co.
New York

WARPS, BENDS or bulges in structural shapes, castings and plates can be removed by the flame straightening and warp control process. This process is based on the principle of permanent contraction or "forging up" of metal to which heat has been applied, and it can be used on parts without their being removed from their assemblies. However, it is not recommended for steel of above 0.25 per cent carbon content. Neither should steel above 0.15 per cent carbon be immediately quenched with water. Water quenching accelerates but does not increase the total effect.

When a flame is applied to a small area or section, the metal attempts to expand. Since this is prevented by the cold surrounding material, the metal in this zone is locally upset. Then when the heated section subsequently cools or is quenched, its contraction distorts the surround-

(*Please turn to Page* 110)





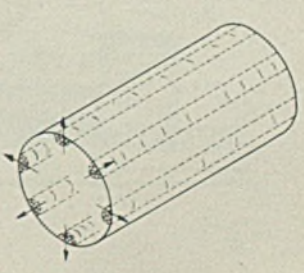


Fig. 1. (Left, below)—Heat applied to gear rim at A will correct a high spot. Applied at B, it can be used to correct a flat or low spot

Fig. 2. (Center, below)—Distortion caused by fillet welds (shown by dotted lines) is removed by applying heat at point indicated by arrow

Fig. 3. (Right, below)—At left, shrinkage is induced to produce a tighter fit by heating as many longitudinal strips on the internal diameter as may be required. At right, a cylindrical piece of metal is expanded to produce a tighter fit by heating as many longitudinal strips on the external diameters as may be required for upsetting action

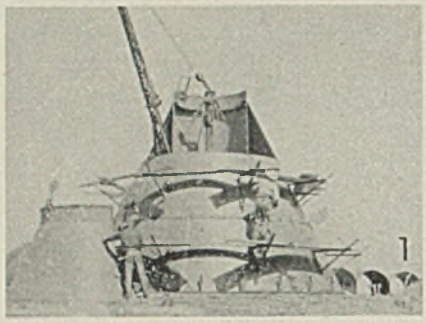


Fig. 1—Derrick is set up inside base cone of Watersphere, top plate of base cone being ready to raise in place. All illustrations furnished by Chicago Bridge & Iron Co., Chicago

"Guyless" Erection Method

. . . . requires no supports outside the structure that is being erected

A DERRICK having no guy lines outside the structure it is erecting was designed by General Engineering Co., Portage, Wis., and used in construction of a 50,000-gallon watersphere at Fall River, Wis. This structure consists of a conical base and cylindrical riser topped by the sphere itself. See Fig. 9.

In erecting it, a 29½-foot boom was first set up and guyed with four ⅜-inch cables to the anchor bolts in the foundation. See Fig. 2. The cribbing was built next, and mast base and sheave bracket were bolted to it. A pipe mast was then raised and set in the mast base, and the boom was attached to it near the base, Fig. 2. Mast and boom were rigged with two ⅜-inch double pulley blocks and ⅜-inch cable. A spur pole was attached to end of boom as seen in Fig. 2 for raising the jump pole. Diagram Fig. 2 illustrates this derrick set up for erecting base cone.

Fig. 1 shows derrick about to raise upper plate of cone into place. Note riser section inside cone. After the base and first cylindrical sections of the riser above it were completed, a jump pole was set up on the riser by means of the spur pole attached to the end of the boom. Jump pole was raised with rope and pulley blocks on the spur pole and secured to riser section. It then was used in turn to raise the derrick to next position on the outside of the first riser section above the cone as shown in Fig. 3. Then jump pole was lowered and lashed to workmen's scaffolding inside of the riser where it would be out of the way until derrick was to be raised again. The large boom was detached and left at the bottom of the structure until the riser was completed. A short jib was attached near the top of the mast to take its place. See Fig. 3. Spur pole was removed from the boom and attached to the top of the mast.

Next ring of the cylinder was now raised and welded in place and the jump pole fastened inside it in order to raise the derrick. Then again jump pole was taken down and fastened out of the way on the scaffold. This procedure of raising jump pole and derrick to erect riser was repeated until the sixteenth section was completed. Fig. 4 shows the derrick raising cylindrical riser section No. 9 into place. Note pipe mast, short jib near its top and spur pole. Fig. 5 is a view of the cylindrical riser nearing completion with a riser section. All round seams below the derrick erecting a riser section. All round seams below the derrick were welded with at least one full pass on the inside before the next ring was raised. Mast was stayed to riser section in two places each time as shown in Fig. 4.

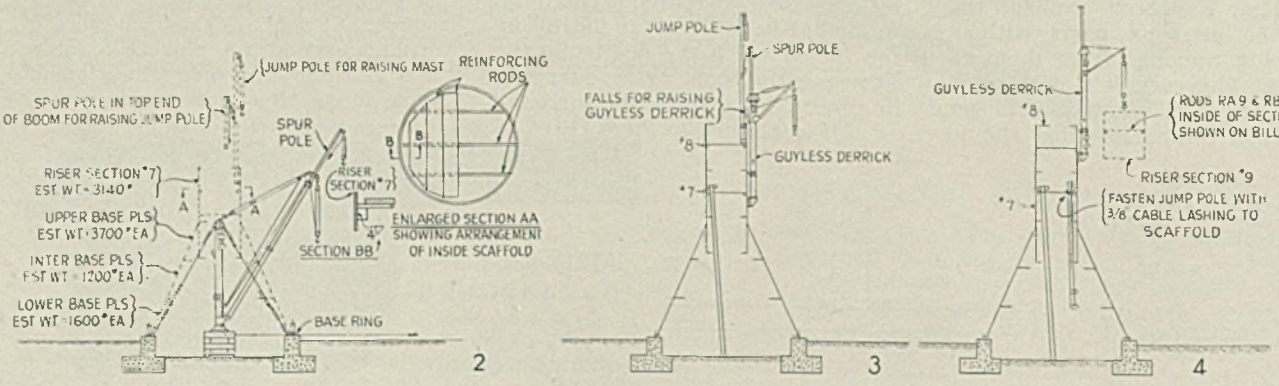
When the sixteenth section of the riser was erected, the derrick was raised and assembled inside it instead of on the outside as previously. See Fig. 6. From that position it raised the seventeenth cylindrical section and the first of the top cone sections forming the base of the sphere. Fig. 6 shows this operation. The long boom was then hoisted from the bottom of the riser and fastened to the inside of the top riser section, Fig. 6. Load falls and booms falls were attached to the top of the boom as it went by.

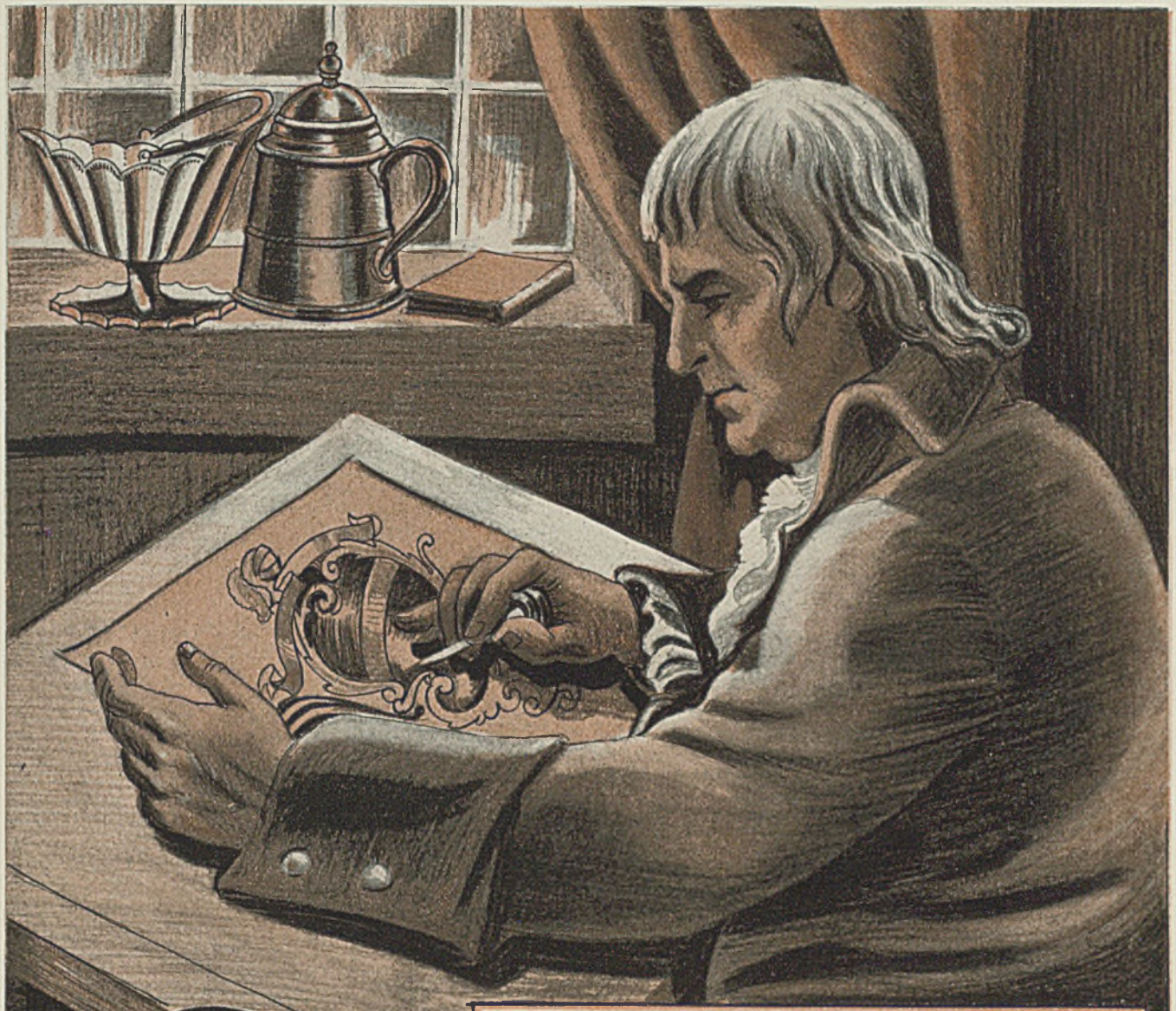
Then the boom tie, pipe jib and mast bottom fitting were removed from the derrick, and timbers, mast base, sheave bracket, etc., were assembled inside of the top cone, as shown in Fig. 7. The mast was raised by means of the boom and set in the mast base. The boom was then connected near the base again and the derrick rigged up.

Fig. 2—Diagram showing start of erection. Upon concrete foundation, base ring and lower base plates are erected, using main mast and boom shown. Next, intermediate base plates, upper base plates and first riser sections are added. Now scaffold is installed in riser No. 7 as shown in section AA. Jump pole is set up on inside of riser No. 7, using spur pole on end of boom. Jump pole then is used to raise mast. See Fig. 3

Fig. 3—Succeeding riser sections after No. 7 are raised into position with guyless derrick fastened on last riser section placed as shown here. To raise derrick to next riser, jump pole is raised with rope and pulley blocks on spur pole and fastened inside last riser section. Then jump pole is used to raise derrick, after which jump pole is lowered and lashed inside scaffolding until needed

Fig. 4—Here jump pole has been lowered and lashed to scaffolding inside risers. Boom of derrick is not used, being left at bottom of risers until needed later. Short jib is employed to position riser sections as shown here





MASTER CRAFTSMEN

Aside from being a national hero of the American Revolutionary war, Paul Revere in business life was a skilled craftsman.

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Paul Revere

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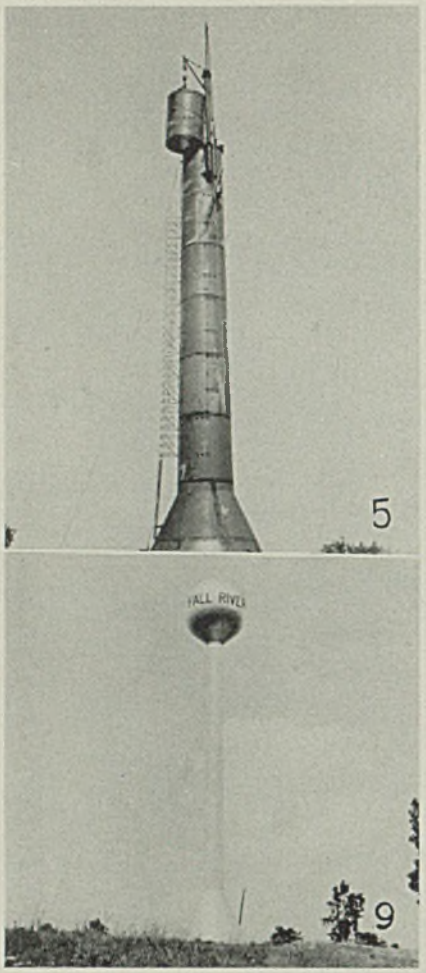

Guy lines to inside of top cone braced the mast, now rigged up as in Fig. 8.

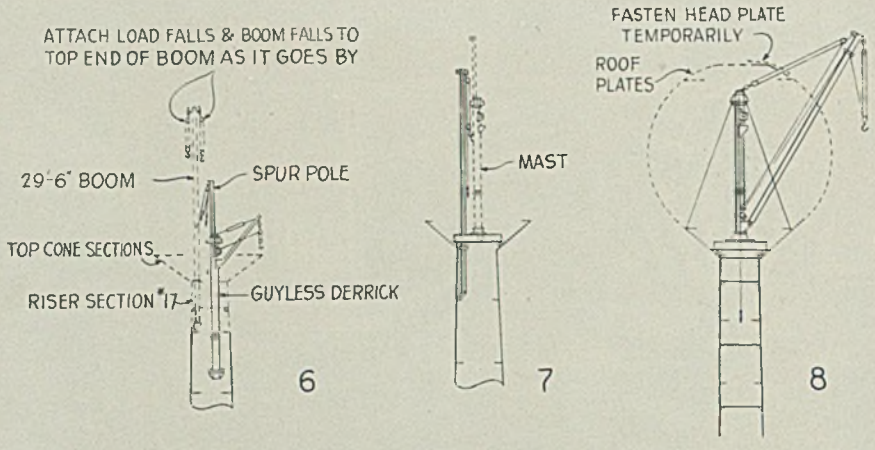

Fig. 5—This view shows cylindrical section of Watersphere nearing completion. Note guyless derrick lifting riser section in place

Fig. 6—With riser section No. 16 secured in place, derrick is attached to inside surface and used to lift last riser section (No. 17) and first ring of top cone sections. Spur pole on derrick then is used to lift boom in position for securing to inside of riser section No. 17

Fig. 7—Now short jib and mast bottom fitting are removed from derrick which is hoisted (using boom) to base formed of timers, which fits inside top cone as shown here

Fig. 8—Next the boom is connected to mast bottom and rigged up for lifting the remainder of the plates into position to complete the Watersphere

Fig. 9—Completed Watersphere erected by means of the guyless derrick is shown

Equator plates for the sphere were welded together on the ground in sets of three and then were raised and set in position to form the midsection of the sphere. Roof plates and head plate were assembled last to complete the structure, which is shown in Fig. 9.

This same assembly method (with certain modifications) is believed applicable to the erection of many other types of structures, especially those welded, for welded joints provide the stiffness needed if a structure is to be erected without guy wires.

Process May Release Acid for Explosives

Quantities of nitric acid, vital ingredient of high explosives, may be released for war use if a new process of treating stainless steel proves commercially successful. This is what Dr. Herbert H. Uhlig, of the General Electric Research Laboratory, told the Electrochemical Society recently in Nashville, Tenn., in describing the process.

To improve the appearance of stainless steel and give it greater resistance to corrosion which might cause a structure to fail, he said, it is usually treated with nitric acid, to which a little hydrofluoric acid has been added.

He explained that the metal surface consists of microscopic peaks and valleys, and the effect of the acid is to eat away the peaks, while only slightly affecting the valleys, making the surface smoother. Hydrochloric acid, by itself, will produce a different effect, he pointed out, for it attacks both peaks and valleys and the appearance and corrosion resistance are not improved.

He found, however, that by adding a chemical "inhibitor" to the hydrochloric acid, the valleys are protected, producing on the stainless steel a surface equal to that of nitric acid.

Since nitric acid is used now in enormous amounts to add necessary nitrogen to cellulose and other compounds in the manufacture of high explosives for shell and aerial bombs, the hydrochloric acid treatment for stainless steel may help prevent any shortage in the explosives industry, he explained.

Issues Tentative Steel Specification

A tentative specification for the design, fabrication and erection of structural steel for buildings by arc and gas welding was recently issued by the American Institute of Steel Construction, 101 Park avenue, New York. It was prepared in order to provide a complete specification in the stated field, comparable, and as similar as possible, to the A.I.S.C. specification for the design, fabrication and erection of structural steel for buildings — riveted construction — which has been in wide use since 1923. Copies of the specifications may be obtained from the institute's headquarters for 25 cents each.

New Rubber Stands Higher Temperatures

Development by its research laboratories of a superior type of hard rubber from Ameripol, the synthetic rubber its chemists created, is announced by B. F. Goodrich Co., Akron, O.

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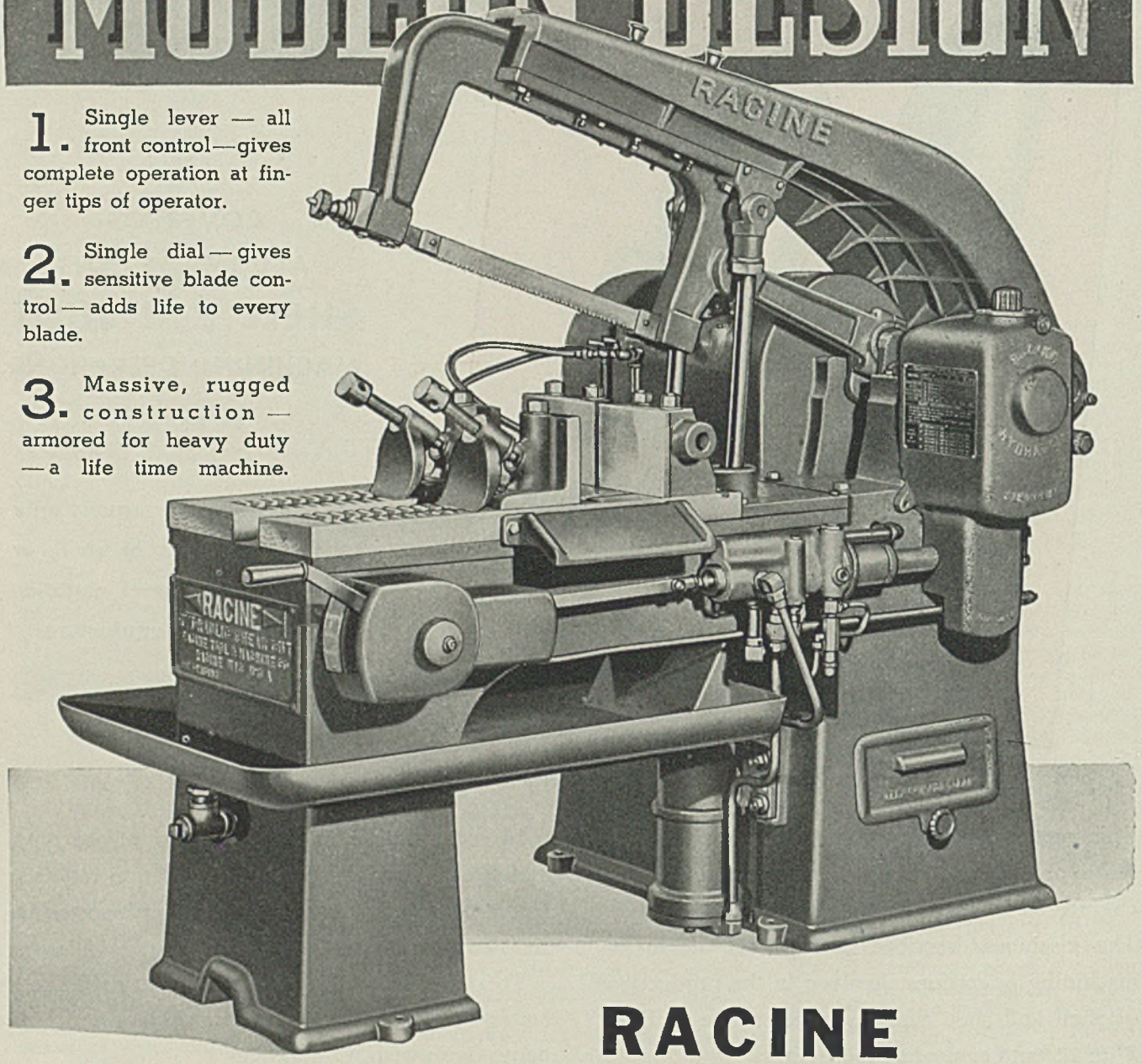

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SILVER PLATING

....as a substitute coating in the present emergency

Electrolytic iron is suggested as an undercoat for a pore-free coating of silver. Electroplating of the silver coating is seen as having important advantages. For explanation of choice of silver as a substitute material and for other data on silver plating, see first part of this presentation, STEEL, April 20, page 94

By DR. C. B. F. YOUNG
Consultant
And
Adjunct Professor
Brooklyn Polytechnic Institute

SEVERAL years ago American silver producers sponsored some research work under the direction of the American Silver Producers Research Project to aid the use of silver in industrial applications. This work has been very thorough and has shown methods of producing pore-free deposits of silver on steel. Dornblatt, Lowe and Simon[5] produced deposits having a thickness of 0.0001-inch up to several thousandths of an inch.

Three problems arose in the investigation. The first was the production of silver deposits free from any porosity whatsoever on a flat steel base up to approximately 5 square feet in area. This deposit could not be thicker than 0.001-inch because silver at $5.10 per avoirdupois pound for this thickness represents a metallic cost of $0.28 per square foot. The second problem was to determine if possible the minimum thickness of silver which could be produced free from any porosity.

A third problem had to do with methods of testing porosity. As the thickness of the coating of silver decreases, it becomes increasingly harder to detect the true number of pores. Three methods investigated were the ferroxyl test, the salt spray test, and the hot water test. The salt spray test proved unsatisfactory on extremely thin deposits due to the widespread attack of the salt on the base metal. The ferrozyl test has some advantages and was used in the modified form. However, the best test was that using hot water. This required a longer period but it seemed to give the best results. A detailed report on this work is given in this paper.

The factors affecting porosity of a given plate seem to be, first, the condition of the base metal; second, the suspended solid matter in the bath. The latter can be brought to a minimum by constant filtration, by bagging the anodes and by having a clean atmosphere over the tanks at all times. The condition of the base metal is affected by mechanical and chemical working. By chemical working is meant pickling, etching, etc., of the surface. By mechanical working is meant polishing, buffing, etc. Pores are caused by etching and rough surfaces. It is a general opinion that smooth bright surfaces reduce the number of pores per unit area. Also, when electroplates were used as a base, a smaller number of pores were produced than with the ordinary mechanical finished steel as a base.

A study of copper and nickel undercoatings as they affect porosity proved to be very enlightening. The copper was found to be superior to the latter. A coating of copper 0.001-inch thick with a 0.0001-inch silver deposit can be produced which is pore free. In Figs. 1 and 2, the effect of copper and nickel undercoatings for silver are shown[5]. The use of such plates in commercial operations such as deep drawing and the like have shown that the material can be used without trouble. This permits the metal to be plated before fabrication if desired.

The conclusions of the paper are important and so are detailed below:

First, pore-free deposits of either silver or copper 0.001-inch thick on deep-drawing steel are readily obtainable. Pore-free nickel deposits of the same thickness are also obtainable, but apparently with more difficulty.

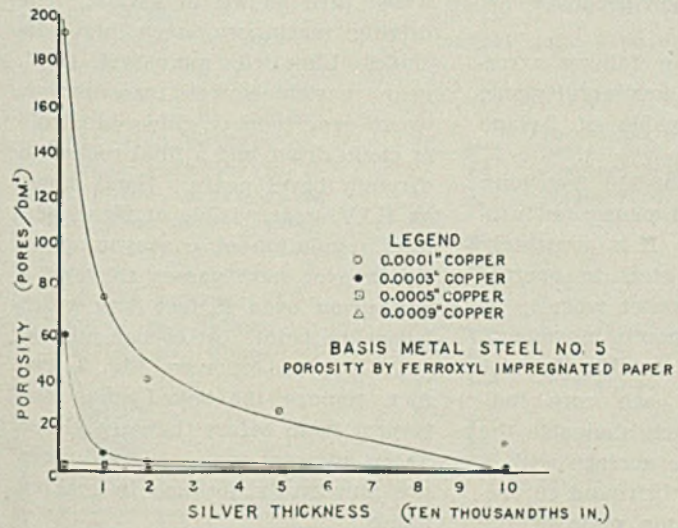
Second, on a suitable basis metal such as electroplated or polished oxygen-free copper, pore-free silver deposits 0.001-inch thick can be produced.

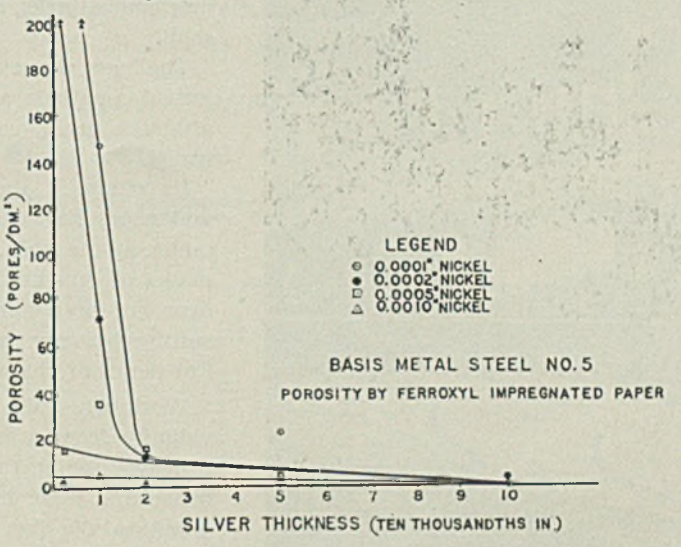
Third, either copper or nickel undercoats 0.001-inch thick are suitable foundations for thin pore-free silver deposits. But for an equal thickness, the copper undercoat offers a greater margin of safety. Undercoats of this nature should preferably be not less than 0.002-inch thick if absolute freedom from porsity is essential.

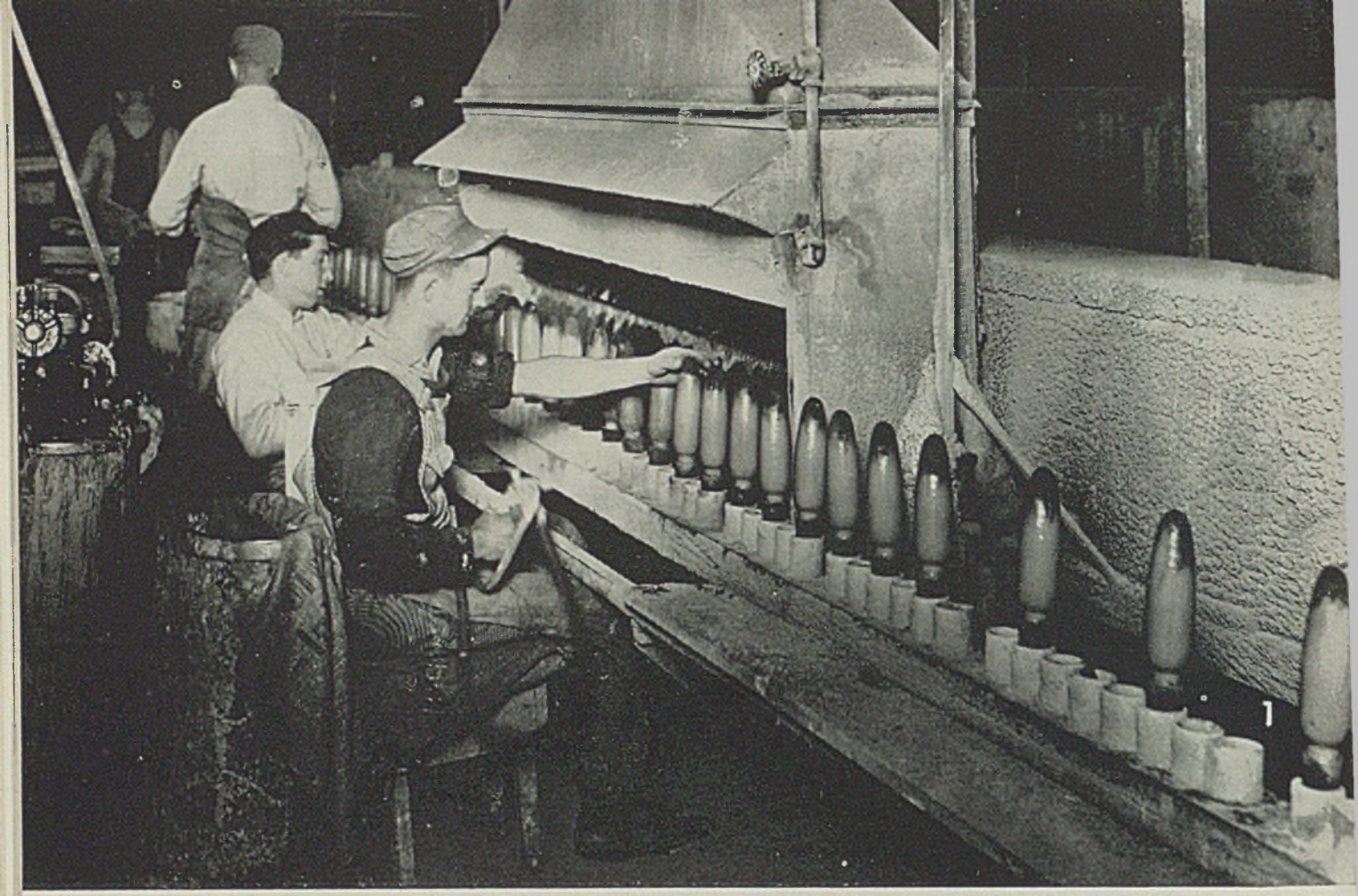
Fourth, deep-drawing steel electroplated with ductile deposits of copper, nickel or silver, or of any

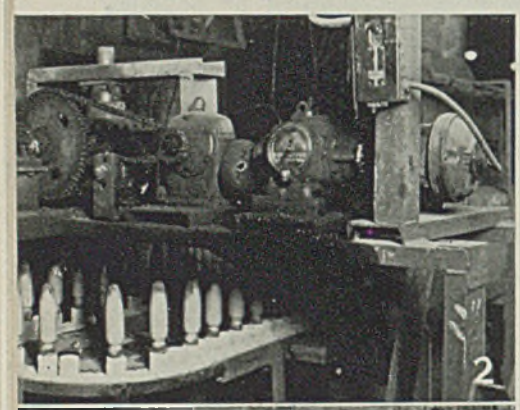
(*Please turn to Page* 107)

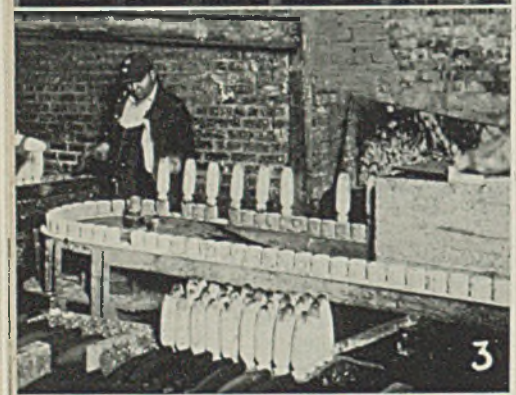
Fig. 1. (Left, below)—Effect of copper undercoat on the porosity of silver deposits
Fig. 2. (Right)—Effect of nickel undercoat on the porosity of silver deposits

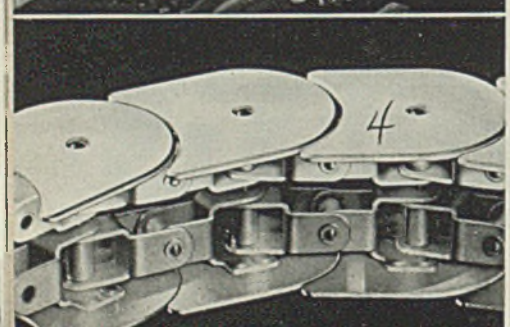












CHAIN CONVEYOR

Speeds Shell Core Production

PAINTING, spraying and baking of sand-cores for molding shell have been facilitated by installation of a Link-Belt Universal Carrier chain conveyor in a St. Joseph, Mich. plant. This company, which formerly manufactured hydraulic and mechanical jacks, now produces cast shell.

The new conveyor follows a rectangular path in a horizontal plane, although it is capable of 2-plane travel.

Its chain is about 110 feet long and needs no dead plates or turntables at the ends. It is accurately made of finished steel to operate over cut-tooth sprocket wheels, resulting in very smooth movement. For detail of chain, see **Fig. 4.**

Workmen take each core individually from a rack alongside the conveyor, paint the surface with a brush and place it in round cup secured to the flat top plate of the chain link, which slowly moves it ahead to the spraying station. Here two men seated beside the conveyor spray the painted surface all around. See **Fig. 1.**

Cores now travel to head end of conveyor and around head sprocket wheel turn shown in **Fig. 2.** The driving machinery, seen here, includes Link-Belt motorized P.I.V. gear variable-speed transmission, worm gear reducer, Silver-link roller chain drive, and a final reduction through bevel gears. Hand wheel on P.I.V. gear, visible at right, permits regulation of conveyor speed.

Conveyor next passes through a gas-burner oven 45 feet long which bakes the paint. At corner just beyond exit end of oven, **Fig. 3,** two men remove the baked cores and inspect them before they are placed on an adjacent rack. Okayed cores are now ready for use in making molds.

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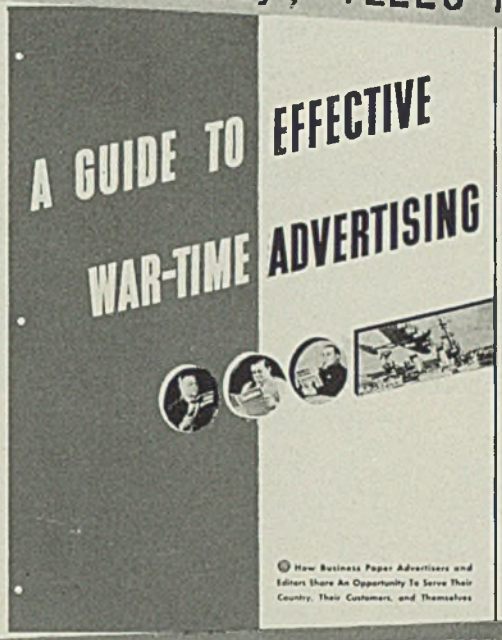

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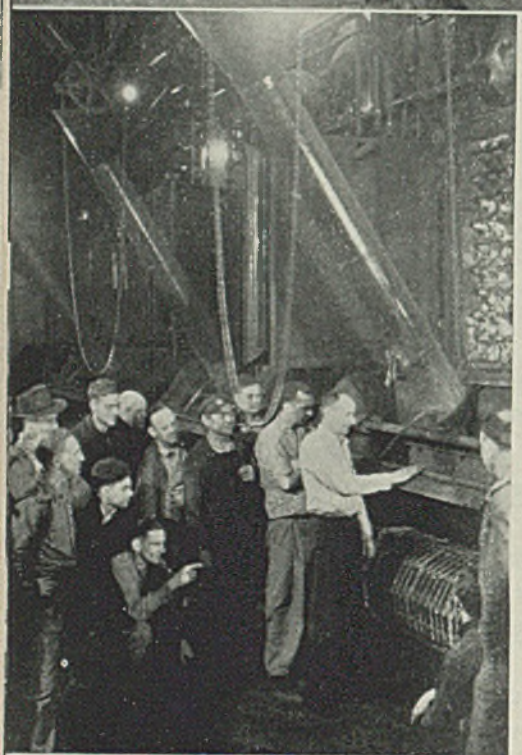
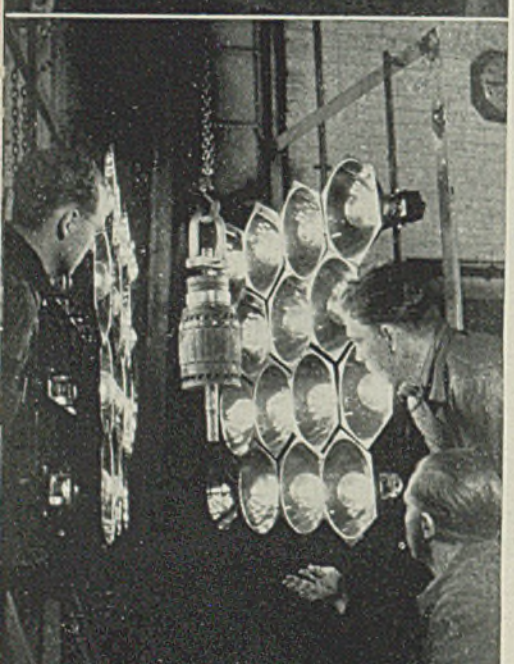




Training Men

(*Continued from Page* 73)

cal maintenance and the electrical maintenance departments.

This course is directed and administered by the supervisor in charge of all electrical and mechanical maintenance in the plant. It consists simply of the members of the maintenance crew who are interested in meeting at the maintenance department after hours for two nights a week for three hours each meeting, at which time some typical machine or some closely related group of machines is studied in detail.

Each specific meeting is under the direction of one or two of the older, more experienced maintenance men in the department who are most familiar with the particular machine or machines being studied. Under their direction the men in the class take the machine apart so that the working parts can be examined and all of the mechanical parts or principles of that machine are carefully explained to every member of the class. Questions are encouraged, and those which arise are answered. Members of the class then put the machine back together again, adjust it and place it in opeartion, taking care to lubricate it, adjust the bearings, and make other mechanical adjustments about it which are important to that machine.

There is no textbook used in the course. No grades are given, but the attendance of the members of the class is recorded. The course

(*Please turn to Page* 104)

Fig. 4—Maintenance crew members especially interested in use of the torch in flame cutting, welding and brazing get a chance to try their hand under the expert guidance of one of the maintenance crew's cutting and welding specialists

Fig. 5—Major layout and important details of one of the factory's steam power and heating plants are explained and demonstrated to the maintenance class. Many of the "mysteries" of operation thus become clear

Fig. 6—This motor armature has been rewound, dipped in insulatng varnsh and is now being baked between two banks of infra-red lamps. Class members get details and reasons why for each step in the process

TABLE I—List of Class Subjects

Mechanical Maintenance

1. D7 "Caterpillar" tractor (all but motor)
2. Engine lathe and milling machine
3. 5-foot radial drill
4. Power motor generator and General Motors Corp. truck
5. "Tournamatic" lathe
6. Maintenance department machining (lathe)
7. Hydraulic pumps, presses and systems
8. Pneumatic tools
9. Fellows gear shaper
10. Clutches—their construction, function, materials and principles
11. Valves and plumbing
12. Air compressor
13. Large power hacksaw
14. Hoisting units—air, electric and chain
15. Maintenance arc welding
16. "Tournapull" tractor transmission
17. Mechanical pumps (except hydraulic)
18. Strength of materials
19. Bearings—types, adjustment, loading, special uses
20. Tolerances and "play" in assemblies
21. Lubricants and lubrication (Standard Oil engineer)
22. An internal combustion engine (gasoline)
23. Factory motor-driven lift truck
24. Hydraulic, semi-automatic multiple drill (National Co.)

Electrical Maintenance

1. Motors and magnetism
2. A.C. control of overhead cranes
3. D.C. control of overhead cranes
4. Welding machines (arc)
5. Automatic control of "Tournamatic" lathes
6. Wiring a Switchboard for A. C. generators
7. Thermocouples and pyrometric recorders
8. Transformers
9. LeTourneau plant power installations
10. Electric lighting (lighting engineer from light company)
11. A.C. motor winding
12. D.C. motor winding
13. Line starters and A.C. control
14. Conduit bending and wire splicing
15. Control of wire rope stranding
16. Electric ignition and starting
17. Internal and external connections of A.C. motors
18. Internal and external connections of D.C. motors
19. "Magnamatic" lathe control
20. Synchronous motor control
21. Electrical control of shop lifting trucks
22. Motor applications (Westinghouse representative)
23. Spot and resistance welding machines
24. Automatic arc welding machines

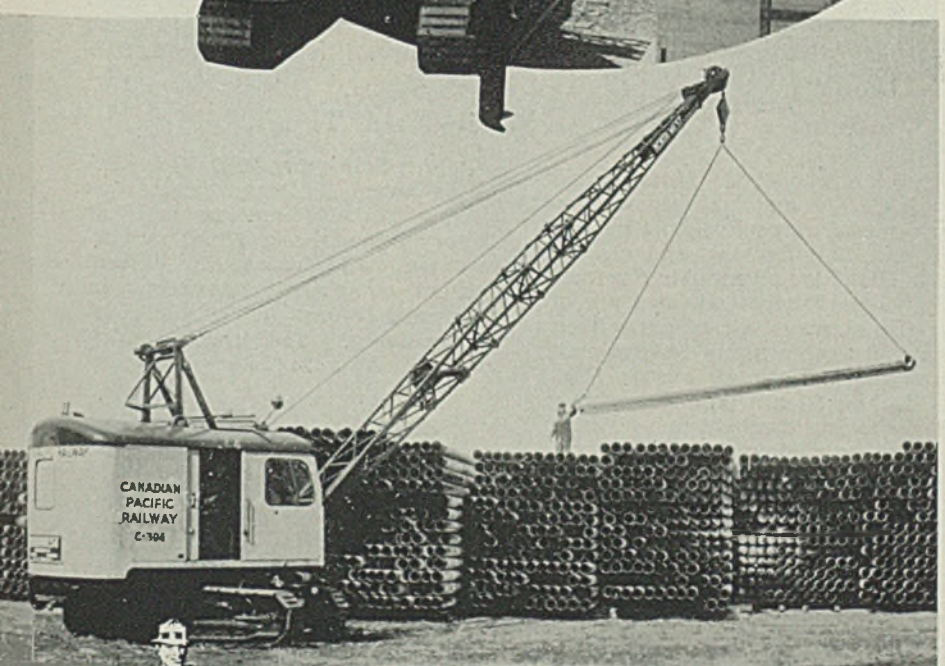
With a Northwest YOU ARE READY FOR ANY LOAD!

NO matter what rolls into the yard or how it arrives, you are always prepared with a Northwest crawler crane. It may be pipe today, and boxed goods tomorrow — by truck today, by rail tomorrow—to be stored here today, there tomorrow—light in weight today—heavy tomorrow. *But you are always ready with a Northwest!*

Northwests get things done. Coal, ashes, borings, turnings, scrap, pipe, boxed goods, steel, castings, drums, reels, billets, rods, structural—handling these and anything else within its rated capacity is all in the day's work. It is quickly converted to clamshell, magnet, hook block, slings, timber tongs or pulp grapple, pile driver or pipe hooks.

It goes anywhere and makes any part of the plant or yard usable for storage or receiving. It can be routed from job to job and speeds up shipping and delivery —there is no other type of material handling equipment that can do what a Northwest crawler crane can do. If your material handling is causing you trouble, it will pay to talk to a Northwest man.

NORTHWEST
ENGINEERING COMPANY
1805 Steger Bldg., 28 E. Jackson Blvd.
Chicago, Illinois



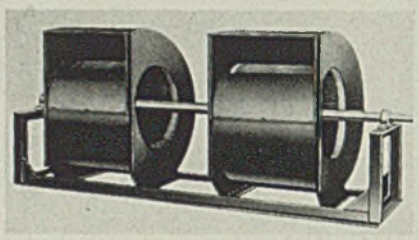
NORTHWEST

Built in a Range of 18 Sizes—4½ to 40 tons capacity

Industrial Equipment

Blower Units

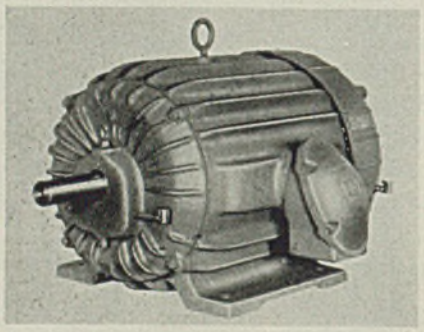
Niagara Blower Co., 6 East Forty-fifth street, New York, announces production of motor blower units in



sizes applicable to many industrial and commercial ventilating, drying, heating, cooling, exhausting, processing and air conditioning requirements. These are available in 16 models, produced in 1, 2 an 3-fan assemblies to meet resistance up to 4 inches static pressure, and in capacities from 880 to 42,600 cubic feet per minute. Fan speeds range from 300 to 1750 revolutions per minute. The blowers are belt-driven or direct connected and are especially designed for simplified application to duct systems.

Air-Cooled Motor

Crocker-Wheeler Electric Mfg. Co., Ampere, N. J., has introduced a new fan-cooled motor called Cowl-Cooled, especially for use in dusty locations. Because the ventilating air is blown over the external ribs, which run lengthwise the frame of



the motor, and is not forced through internal passages, operation is said to be always trouble free, even in atmospheres containing excess amounts of destructive fumes, abrasive dust, oil or dirt. The motor is offered in sizes up to 20 horsepower either ball or sleeve bearing equipped. It features a heavy cast-iron frame and a fan of the same metal designed to distribute cooling air uniformly. Windings of the motor lack soldered joints. The wire used is enameled and cotton covered. The rotor is die cast in one piece.

Dust Collectors

Hammond Machinery Builders Inc., 1611 Douglas avenue, Kalamazoo, Mich., announces a new line of self-contained dust collector units. These have many applications with various types of grinders in plants which do not have central exhaust systems or in plants whose central exhaust system is not available to numerous isolated grinders, being available in three sizes, models 30, 40 and 50. Filtering capacities range from 275 to 1100 cubic feet per minute with air velocities in inlet ducts up to 6000 feet per minute. There are two standard inlets in each unit—3 inches in diameter on model 30, 4 inches on model 40 and

5 inches on model 50. Motor capacity is ¼, ½ and 1-horsepower on each model respectively. The motor, fan, fan housing and electric connections are all fitted in a removable plate. Filters embodied are of the throw-away type of glass fiber. There are three filters in each unit through which the air passes. Models 40 and 50 are supplied with a filter shaking mechanism by which dirt can be shaken down.

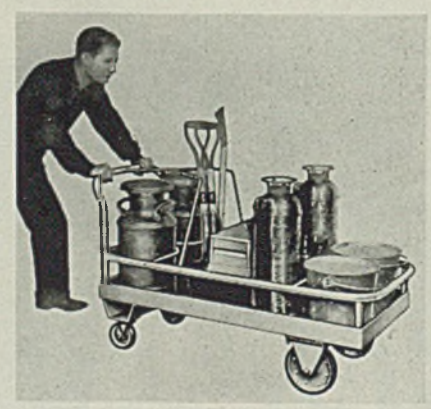
Switching Locomotive

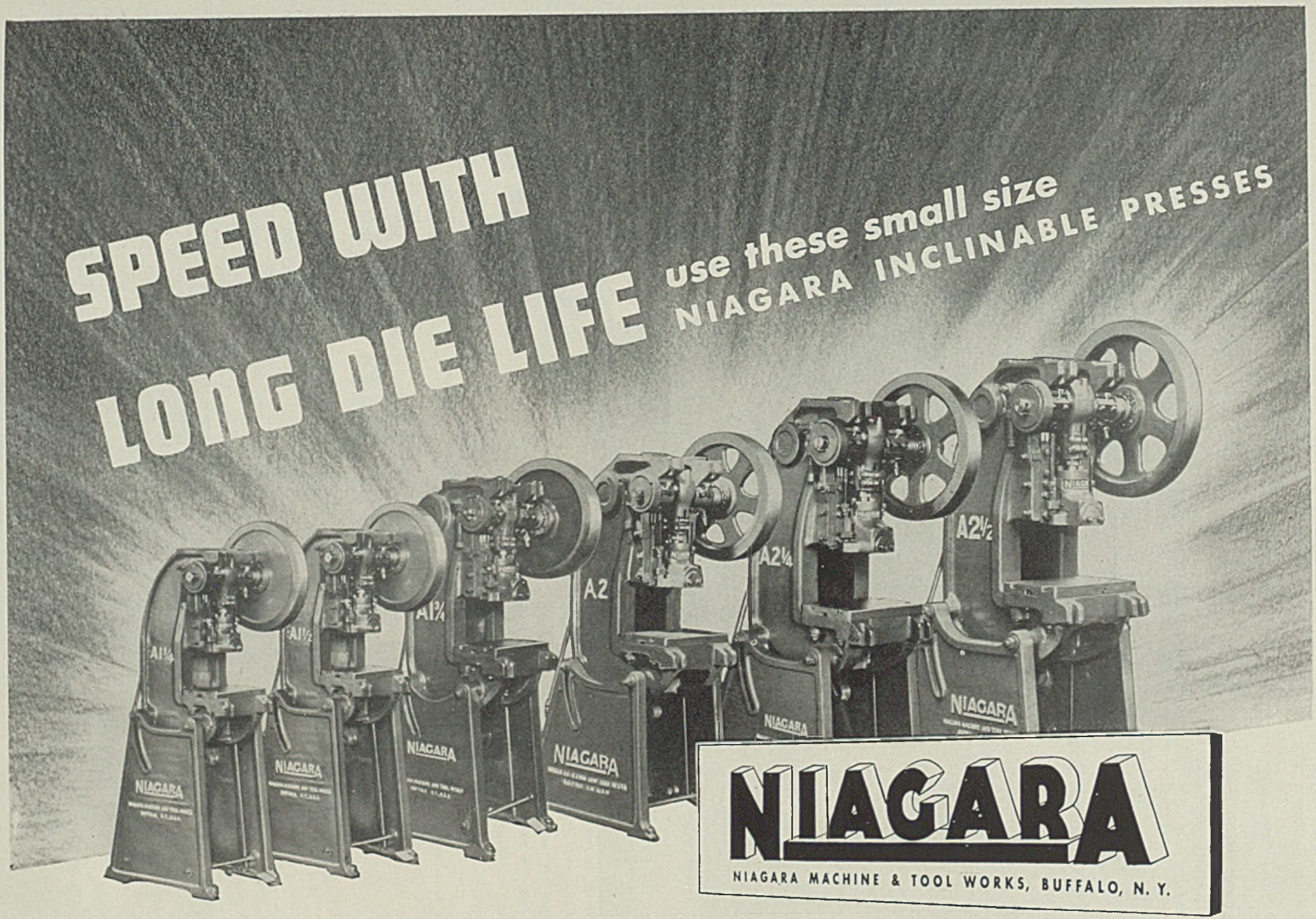
Atlas Car & Mfg. Co., Cleveland, has placed on the market a new 65-ton diesel-electric locomotive for switching operations. Its outstanding feature is the construction of its drives, responsible for its great pulling power. These are of the double-reduction spur-gear type totally enclosed, and arranged so motors are mounted on them as integral parts. They are mounted on the axles with Timken bearings, heavy-duty ball bearings being used to mount countershafts and the armature shaft. A third point of support also is provided, allowing axles to follow track irregularities

without developing twisting or binding strains. Trucks of the locomotive are fabricated of solid rolled steel plates by combination riveting and welding. Each truck represents a complete unit with two driving motors, fully equalized brakes and sander equipment—all integral. The locomotive is powered by two Cummins supercharged 6-cylinder engines rated at 200 horsepower each. It is equipped with two Westinghouse generators rated at 300 amperes, 400 volts. Motors are rated at 300 amperes, 300 volts. The unit also carries storage batteries consisting of 16 cells. These are charged by automotive type battery charging generators. Brakes embodied include both straight and automatic air brakes. The locomotive has a starting tractive effort of 39,000 pounds and a continuous tractive effort of 14,000 pounds, with a speed of 6.1 miles per hour with the latter effort. Its maximum speed is 30 miles per hour. The track gage of the locomotive is 56½ inches.

Air-Raid Truck

Palmer-Shire Co., 7100 West Jefferson avenue, Detroit, announces a new portable holding rack or factory type truck which accommodates all essential air-raid fighters' equipment and which can be rushed to any part of the plant if necessary. The truck, which measures 48 x 24 inches, has par-




SPEED WITH
LONG DIE LIFE
use these small size
NIAGARA INCLINABLE PRESSES
A1¼
A1½
A1¾
A2
A2¼
A2½
NIAGARA
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NIAGARA MACHINE & TOOL WORKS, BUFFALO, N. Y.

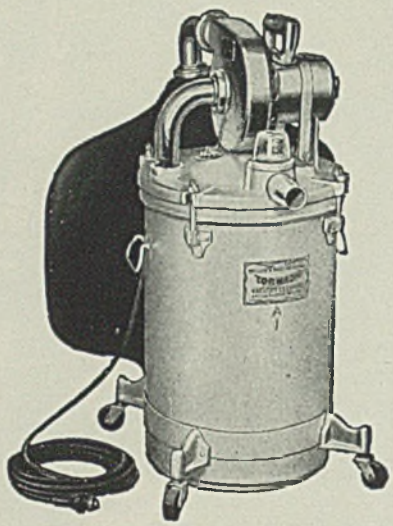
titioned spaces for sand pails, water cans, fire extinguishers, axe, shovel, rake and other necessary equipment. It also is equipped with a strong metal box with hinged lid for holding asbestos gloves, smoked goggles, first-aid kit and similar small supplies. Of welded metal construction, the truck runs on four ball-bearing rubber-tired wheels, and is painted a bright fire department red.

Dynamotor Contactor

Industrial Control Division, General Electric Co., Schenectady, N. Y., announces a new dynamotor contactor to start and stop dynamotors used with aircraft equipment. Available for either 12 or 24-volt direct-current circuits, it also is applicable to tank installations. The unit is approximately 2½ inches wide, 4 inches high, weighs only 2.3 pounds and can be mounted in any position. It is totally enclosed with contacts in the upper compartment and the coil plunger in the lower compartment. Contact tips are of the copper-lead-alloy type. The contactor is good for frequencies of 5 to 55 cycles per second at a maximum of 1/32-inch amplitude (1/16-inch total travel) applied in any direction. The single-pole normally-open contacts are designed to stay open when the coil is not energized, and closed when the coil is energized even when the contactor is subjected to a linear acceleration of 10 times gravity applied in any direction. The contactor is suitable for use in ambient temperature ranging from 60 to minus 40 degrees Cent. The contact rating is 50 amperes on an 8-hour basis. Inrush current rating is 500 amperes at 32 volts direct current. Coil wattage is 9.5.

Vacuum Cleaner

Breuer Electric Mfg. Co., 5100 Ravenswood avenue, Chicago, has developed a new Tornado model 117 Hi-cycle vacuum cleaner for removing waste material coming from production and assembly operations. A portable unit, it is especially suited for picking up welding flux, scrap, heavy particles of dust or dirt, water and other materials. The absence of commutator or carbon



brushes prolongs its operating life, permits it to develop more power and speed, and keeps it operating constantly at high efficiency. The motor operates on 220-volt 180-cycle current only. The cleaner is equipped with 20 feet of 4-conductor cable without socket or attachment plug.

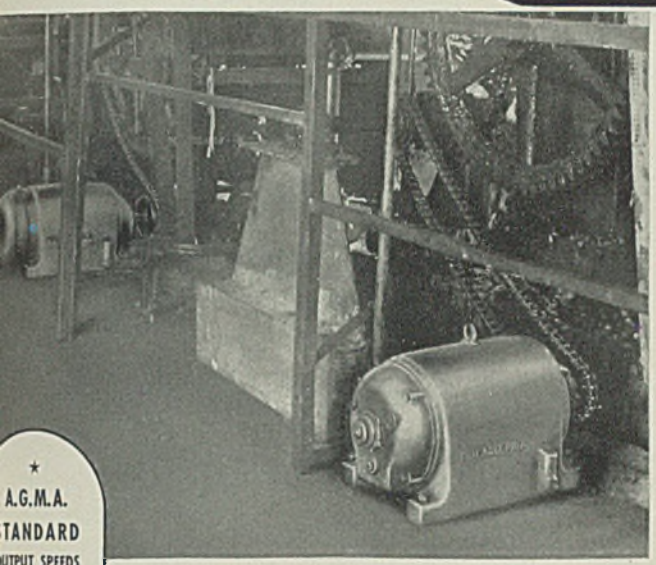
Quenching Oil Cooler

Trane Co., LaCrosse, Wis., announces a new quenching oil cooler for industrial applications using the quenching process of hardening steel. It utilizes the atmospheric evaporative principle, and is applicable under conditions where the use of large quantities of water is uneconomical or insufficient; where water temperature is too high or where it is not necessary to maintain quenching bath temperature below 100 degrees Fahr., or where water has corrosive properties or is dirty. The self-contained unit can be placed inside the area or space in which the quenching oil cooling operation is conducted or

Our manufacturing methods lend assurance of uniformly satisfactory results when Strom Steel Balls are a component part of your bearing assembly • • You are assured of extreme precision and sphericity PLUS what it takes in a physical way to determine maximum life and performance. Other types of balls — Stainless Steel, Monel, Brass and Bronze, are available in all standard sizes. Catalog gladly furnished upon request.

Strom Steel Ball Co.
1850 So. 54th Ave., Cicero, Ill.
The largest independent and exclusive Metal Ball Manufacturer.

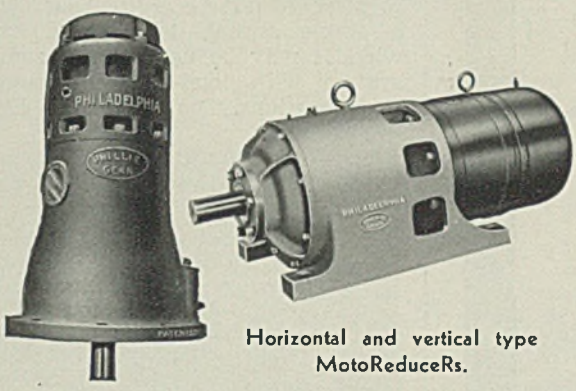
Increased production begins with efficient drives . . . and should I add "Philadelphia"?



2 of a group of MotoReduceRs installed in a wool scouring plant.

★
A.G.M.A.
STANDARD
UTPUT SPEEDS

Philadelphia MOTOREDUCER



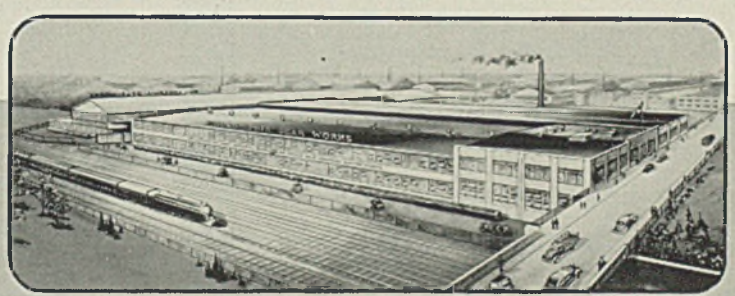
Horizontal and vertical type MotoReduceRs.

With Victory depending largely on America's ability to out-produce ou enemies, the power required for this all out effort has assumed new importance The high efficiencies of Philadelphia MotoReduceRs assures the delivery o a maximum of input power to your machines—operating efficiencies up to 95% are not uncommon. Furthermore, these units are designed and built to stan up under the present extended working hours. Properly selected, they wil operate day and night without trouble, without production delaying breakdowns Our long experience can help you select the unit best suited for your particula needs—write us now.

PHILADELPHIA GEAR WORKS

INDUSTRIAL GEARS
AND SPEED REDUCERS
LIMITORQUE VALVE CONTROLS

ERIE AVENUE & G STREET
PHILADELPHIA, PA.
New York, Pittsburgh, Chicago



Philadelphia **LIMITORQUE CONTROL** operates all types of valves, etc., safely, economically, from convenient stations.

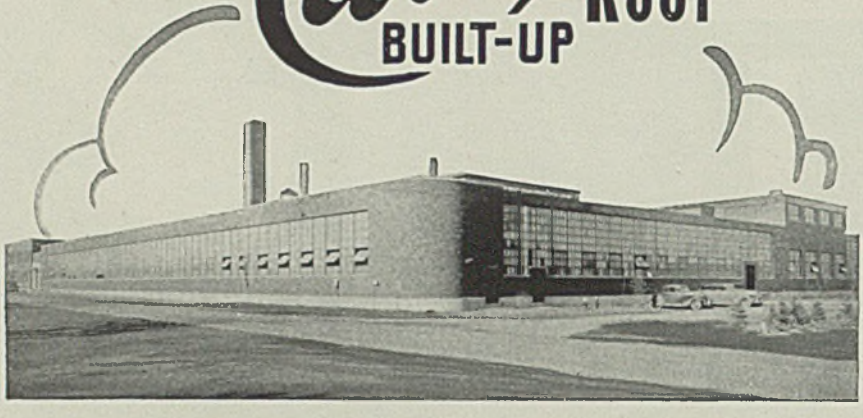
Philadelphia **GEARS** All types and sizes of industrial gears. Can be supplied in all materials.

Philadelphia **WORM GEAR SPEED REDUCER** right angle drives — vertical or horizontal. Wide range of ratios and horsepowers.

Philadelphia **MOTOREDUCER** The economical self-contained drive, Horizontal or Vertical types — various ratios and horsepowers.

Philadelphia **HERRINGBONE SPEED REDUCER** for heavy loads at high speed. Single, Double, Triple Reductions, various ratios and horsepowers.

It's a Carey BUILT-UP Roof



TOPS WESTERN PLANT OF
FLORENCE STOVE COMPANY,
KANKAKEE, ILLINOIS

The Florence Stove Company, pioneer oil stove manufacturer and famous for the fine quality of its ranges and heaters, believes also in the use of quality products for its buildings.

Accordingly, when planning its mammoth Illinois plant, a CAREY Built-Up Roof was selected. Brown & Kerr, roofing contractors, handled the job under the supervision of Campbell - Laurie - Lautermilch Company, general contractors.

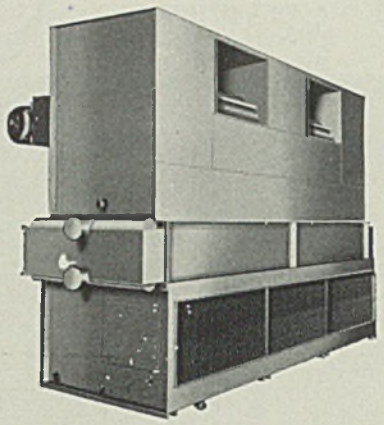
CAREY Roofs have established records of service and economy over the nation in protecting hundreds of millions of dollars invested in plants and equipment.

Regardless of your location or the type of your building, you can bank on CAREY for maximum roof value. A nationwide organization is at your service. Address Dept. 71 for book "Specifications for Bonded Roofs."

The PHILIP CAREY MFG. COMPANY
LOCKLAND, - - CINCINNATI, OHIO
IN CANADA: THE PHILIP CAREY COMPANY, LTD.
Office and Factory: Lennoxville, P. Q.

Dependable Products Since 1873

can be suspended from the truss structure of the building to conserve floor space. Other mechanical features include an angle iron framework with heavy gage side sheets;



a light-weight high-heat transfer cleanable type oil cooling coil; squirrel cage fans mounted on a steel shaft; heavy-gage steel spray water tank and angle supports.

Plug-In Telephone

Selecto-O-Phone Co., 1012 Eddy street, Providence, R. I., is offering a new "plug-in" telephone for Selecto-O-Phone systems which can be plugged in any terminal box that is attached to the switchboard by a single strand, triple conductor wire. It may be used in the same system with loud-speaking name-touch stations. The phone also fea-

tures a digit dial which automatically gets the party whose number is dialed. It includes provisions for secret conferences among three or more persons. The center of the dial has a code ringing button which is pressed to code signal persons served by one telephone, or when using the built-in paging circuit.

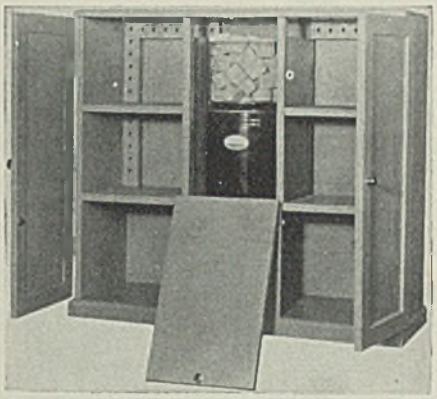
Reset Relay

Struthers Dunn Inc., 1335 Cherry street, Philadelphia, has introduced a new mechanical latch-in electrical reset relay especially designed for aviation purposes. Known as Dunco relay type CX3190, it operates from a brief impulse without necessity of keeping the coils energized. Its double-pole double-throw contacts

are rated at 6 amperes at 12 or 25 volts direct current. All contacts are insulated from the frame for radio frequency. The coils are for operation on direct current only. Dimensions of the unit are 3 5/15 x 1¾ x 1⅜ inches overall.

Dehumidifier

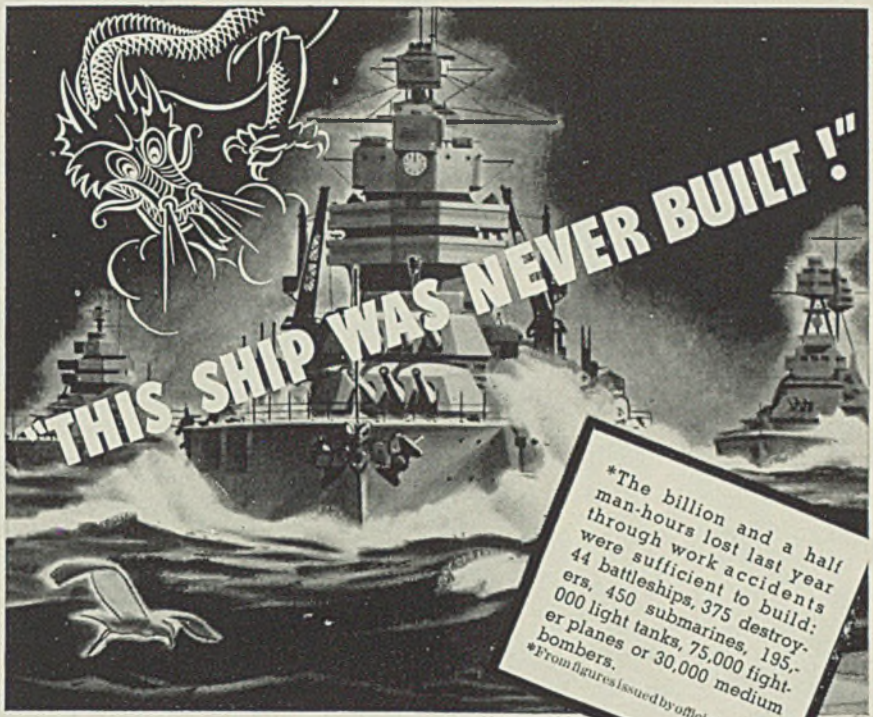
General Air Conditioning Corp., 4423 Appleton street, Cincinnati, is offering a new cabinet type dehumidifier. Known as the Dry-Cabinet, it is said to keep air dry, clean and wholesome, prevents mold, mildew and dampness; and reduces attendant odors. The excess moisture is absorbed from the air by dehydrating chemical cubes. Circulation of dry air throughout the cabinet is provided by a flue which runs up both sides to the top of



the chemical unit. The cabinet is of wood 34 inches high, 38 inches wide and 14 inches deep. Units for use in spaces and buildings where infiltration is at a minimum also are available. These units meet many requirements for low-cost humidity control in tool rooms and research laboratories.

Watthour Meter

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., announces a new type CB switchboard watthour meter for industrial and central station use. It is used for metering all the various combinations of single phase or polyphase power and is offered in three mounting styles—flush, projection and a detachable or plug-in type. The detachable models can be removed readily for overall inspection without interrupting the circuit. Calibration adjustments are accessible from the front when the molded glass covers are removed. The single phase meters have one electromagnet and are applicable to single phase circuits. Meters for the usual 3-wire single-phase circuits have 3-wire current coils. CB-2 meters have two 2-wire elements and may be used on single or 3-phase 3-wire circuits, and one 2-phase, 3 or 4-wire circuits. CB-3 meters consist of three 2-wire ele-



HEAT-FAG is Directly Responsible for Many Accidents . . . STOP THIS COSTLY TOLL!

THE finger of Accident is always beckoning to the fatigued, inalert worker. That's why Heat-Fag, ever-present when men sweat, takes such a staggering toll in man-hours lost to industry. For, body salt lost by sweating must be replaced or Heat-Fag sets in. Lowered efficiency, fatigue and discomfort follow . . . workers become careless . . . accidents happen . . . priceless man-hours are sacrificed.

AVOID HEAT-FAG—USE MORTON'S SALT TABLETS

QUICK DISSOLVING (less than 30 seconds) This is how a Morton Salt Tablet looks when magnified. Examine one—see how soft and porous it is inside. When swallowed whole — with a drink of water, they dissolve in less than 30 seconds.

Wherever workers sweat, Salt Tablets are needed, for they represent the simple, easy way to replace salt that's lost through sweating and hot work.

Case of 9000 10-grain salt tablets, - - - - - - **$2.60**

Salt-Dextrose Tablets, case of 9000 - - - - - **$3.15**

Order from your distributor—or directly from this advertisement.

Place MORTON'S DISPENSERS at all Drinking Fountains

They deliver salt tablets, one at a time, quickly, cleanly — without waste. Sanitary, easily filled, durable. 500-tablet size, **$3.25.** 1000-tablet size **$4.00**

MORTON SALT CO., Chicago, Ill.

FREE Sample Tube Write—on your firm letterhead — for a pocket size sample tube of Morton's Salt Tablets and for the new folder — "Heat-Fag and Accidents Ride Together."

EVERYONE WHO SWEATS NEEDS SALT

Keeps Production Hurrying!

P&H's HONEST DELIVERY DATES WILL BACK YOU

Handle it "thru the air"—the fast and easy way to keep vital production on *the move*. Save time of skilled workers—save energy otherwise wasted in lifting heavy loads—with this outstanding small electric hoist.

At the push of a button, P&H Zip-Lifts put anything in exactly the place you want it. They're designed to handle loads "thru the air" with speed, safety, and economy—and keep doing it year after year!

And you can count on getting your Zip-Lifts on time. P&H hasn't missed a single delivery date in almost a year. Bulletin H-20 tells all about P&H Zip-Lifts—write for a copy today!

P&H ZIP-LIFT HARNISCHFEGER CORP. MILWAUKEE, WIS.

CAPACITIES: 250, 500, 1000 lbs.

General Offices: 4411 W. National Avenue, Milwaukee, Wisconsin

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HOISTS • WELDING ELECTRODES • MOTORS P&H EXCAVATORS • ELECTRIC CRANES • ARC WELDERS

ments. They are used to meter 3-phase 4-wire star-connected circuits and, when used with instrument transformers, to totalize combined 3-phase 3-wire and single-phase, 2-wire or 3-wire loads. The CB-8 meters are of the 2-disk type and have two 3-wire electromagnets interconnected to form a 3-current coil meter. These are used on 3-phase 4-wire star-connected service and are accurate wherever the voltages are not extremely unbalanced. CB-10 meters are of the 2-disk type and have two separate 3-wire elements. They are used on 2-phase 5-wire service.

Victory Clock

M. M. Gottlieb Associates Inc., Allentown, Pa., announces a new Victory electric clock for plants which shows the time in numerals, time-table fashion, as—10:22, rather than by use of the conventional hands and dial. The numerals are white on black background. They are 2 inches high and are visible clearly at a distance. Clock case is

19¾ inches long by 14½ inches high by 3¾ inches deep. The words "WARTIME—MAKE EVERY MINUTE COUNT! Remember Pearl Harbor", and a colorful reproduction of the American flag make up part of the timepiece's decorative scheme. The unit operates on alternating current, powered by a self-starting electric synchronous motor.

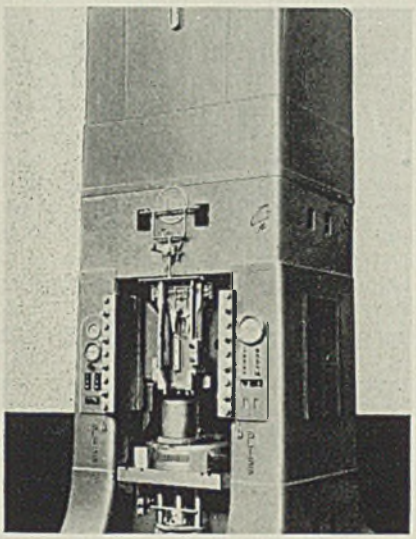
Extrusion Press

Watson-Stillman Co., Roselle, N. J., has developed a new 125-ton press for extruding plastic material. It features two containers mounted on a swinging arm. Thus the operator starts the automatic extrusion cycle by push-button control, then devotes his entire attention to loading the free container. The container arm is provided with lifting cylinders for easy swing and with holddown cylinders to seal container against die during extrusion. The main ram of the press measures 12½ inches in diameter and it has a 12-inch stroke. Advance speed is 54 inches per minute, press-

ing speed, 6.4 inches per minute at 2000 pounds per square inch, and return speed is 150 inches per minute. Power is derived from two Vickers pumps driven by a 5-horsepower motor. Complete unit is 10 feet high and requires floor space of 4 x 3 feet.

Heading Press

E. W. Bliss Co., Fifty-third street and Second avenue, Brooklyn, N. Y., announces a 1500-ton hydraulic heading press for heading 104 millimeter howitzer cases. It is equipped with a 2-station pneumatically-operated dial feed, 2-station punch holder operated pneumatically, a hydraulic ejector driven by a 7½-horsepower motor and a hand-operated air hoist. The main pumping unit has a 75



horsepower capacity. The press has a fully automatic cycle which is protected against misoperation. For die setting operation the functions of the press cycle are separated by a selector switch so that press, dial, ejector and punch holder movements can be independently operated by proper push buttons. The press is capable of producing 250 to 300 cases per hour with two pressings per case. It is one of several sizes available for heading different sizes of cartridge cases.

Aircraft Clamp

Detroit Stamping Co., 350 Midland avenue, Detroit, has added a new model No. 205 De-Sta-Co toggle clamp to their line of clamps to meet aircraft demands for a small size, horizontal unit.

When in locked position the clamp measures only 1 9/16 inches high and 5⅛ inches from tip of handle to tip of arm. It weighs 3⅛ ounces. The handle and arm are in horizontal position when clamp is locked, thus providing clear working space from above.

Air Borne
DESTRUCTION
can come to Industry too!

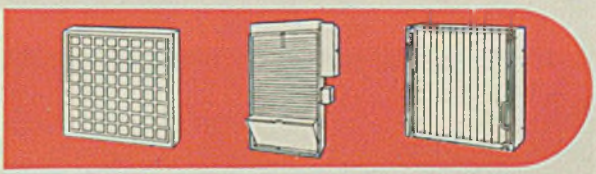
'DUST STORMS' in Industry, like the tragic Dust Bowl disaster of 1938, can cause incalculable losses—destroying materials, finished products and man hours of work. But dust, the air-borne saboteur, is *one industrial menace* we can *effectively fight* within our war production plants.

Today, American Industry is awake to the necessity for *adequate dust control.* Many hundreds of existing and converted plants—and practically all new defense plants—have installed American Air Filters for the elimination of atmospheric dust and AAF Roto-Clones for process dust control.

To meet Industry's expanding need for clean air, the American Air Filter Company is operating 16 to 24 hours a day—supplying practically 100% of its output to war materials manufacturers. Write for booklet "AAF In Industry," the story of industrial dust problems and their solution.

AMERICAN AIR FILTER CO., Inc.
INCORPORATED
443 Central Avenue Louisville, Kentucky
IN CANADA: DARLING BROS., LTD., MONTREAL P. Q.

AMERICAN AAF AIR FILTERS



Training Men

(*Continued from Page* 94)

lasts 12 weeks to correspond with the National Defense Training Program's 12 Week's Course Plan. The shop mechanical maintenance course alternates each 12 weeks with the electrical maintenance course. A list of the machines or subjects studied in these two courses is given in Table I.

Results of New Training Program: This course enjoys a regular and enthusiastic attendance of about 30 members of the mechanical and electrical maintenance crews. This regular attendance and self-application seems to be producing several very important and helpful results in the training of this group of men. First, the class is led and supervised by the head of the maintenance department and his closest assistants, who by leading and conducting such a class demonstrate their interest in the training and welfare of the members of their crew.

Second, the class is organized along the lines and the type of learning which seem most effective for most of the members of the crew: namely, that of actually taking a machine apart and seeing for themselves the parts, mechanical principles, functions of the machine, and not depending upon classroom description or abstract reading methods of learning.

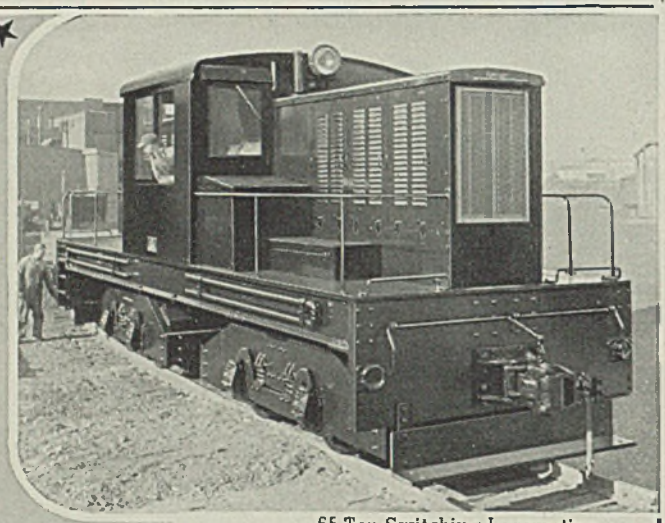
Third, for an intensive study of representative groups of machines and special complicated machines in the plant, years of the "chance experience" type of training are replaced by an orderly and complete study which makes a very important short-cut to the usual method of training such men.

Fourth, by contact with the better-trained mechanics in the crew, the younger men get acquainted with the master mechanics in the group and develop a higher regard for these master mechanics and for the position held by good maintenance mechanics in today's industrial structure. This is really a by-product of the class, but it is a very important factor in building and maintaining the morale of the maintenance crew.

Fifth, the supervisor and more skilled mechanics in the crew get practice and experience in training younger men. They become conscious of the importance of training helpers who become better workmen and more effective on the job.

Undoubtedly the most important result of the training program has been the ability of the different maintenance foreman to have the members of their crew assume more of the repair and daily maintenance tasks and thereby free themselves for planned, routine maintenance work. This tends to eliminate the "continual crisis" type of maintenance which grows out of service failures where both the foremen and men are kept busy repairing machines and doing other "short notice" jobs. The freeing of the supervisors and foremen for planning of routine inspection, personal examination of mechanical layouts, planning improvements in machine installation, study of new methods of repair and investigation of general maintenance problems has brought about a considerable saving in time and greatly improved plant maintenance as a result.

The ability to apply the efforts of the maintenance crews at a time of their own choosing, rather than at a time of crisis when a machine breaks down and needs attention is a great help to any maintenance supervisor. This development toward planned maintenance seems to foster better workmanship on the jobs undertaken as well as less hurried and more orderly accomplishment of maintenance throughout the entire plant. This not only results in less money paid out for repairs over a period of time, but



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also results in better morale and a more progressive outlook on the part of the maintenance men themselves.

An important advantage of training programs during the present national crisis is that men who have had the advantage of training in these classes can use and direct the efforts of new men on the job. The necessary expansion of maintenance crews because of the installation of new machines, changing of processes and the changing of the personnel due to military service may therefore be met more effectively because of this simple, timely and effective means of training new maintenance mechanics and electricians.

NOTICE: For details on the important and highly valuable job instructor training program developed and sponsored by the Training Within Industry Branch of the War Production Board's Labor Division, see STEEL, March 9, 1942, p. 62. This program is one of the most practical yet developed for getting new or old hands quickly into production on war work. The principles explained there are equally applicable to all types of jobs. Its use helps men to "get the hang" of the job, builds worker morale, gives the man a keener interest in his work. If you have not seen that article, by all means get a copy of that issue and study it, for it contains the meat of the WPB program for *training workers by training the job instructors.*

Block Welding

(*Continued from Page* 80)

of the wleder. And for his part the welder must not dally over cleaning. Where more than one electrode is used for the pass, as in the final blocks shown in Fig. 3, a good operator will change electrodes and continue welding without stopping to remove the slag. Most fluid electrodes have a hot, liquid slag that can be manipulated by a skilled welder in this way. Welding output is increased without the slightest sacrifice in quality. Here, too, an examination of the weld metal will disclose the quality of the operation. If it is difficult to judge where the first electrode was consumed and the second started, the electrode change was accomplished well.

Peening and chipping may or may not be specified. With some steels peening is likely to be advantageous. With other steels the operation will not be required. And chipping should not be overdone. Unless the supervisory personnel is diligent, the welders are quite likely to place too much reliance upon their chipping tools to rectify mistakes in welding. Even with the short runs necessitated by these welding techniques, the better welders are those who have the least recourse to chipping equipment.

Block welds are suited to straight runs of joint which are in the horizontal plane. The first blocks may be relatively short while the filler blocks are longer. The first blocks call for the greatest care in locating the beginning and ending of each pass. For this reason they are usually shorter and more time consuming than the filler blocks. These latter afford the welder clearly defined locations for starting and stopping each layer. Careful puddling at the junction of the filler block pass and the previously deposited metal at each end of the run is the only part of the weld that differs from ordinary straight-run welding.

Cascade welding, the type of intermittent welding for curved and slanting surfaces, may be done on joints that are immobile or on joints that cannot be revolved into position by means of positioning equipment. As with straight welding, the positioned welds will be the quickest and the least expensive as they allow longer runs for each pass. The difference can be seen in an examination of Figs. 4 and 5.

In starting a weld on a stationary

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curved joint such as that in Fig. 1, a piece of steel may be used as an insert to fill the groove and to provide a shelf on which to deposit the first weld metal. Later this insert piece is chipped or burned away.

Generally, however, a whole circumferential joint is welded a half at a setting and requires two settings to complete the entire seam. The welding is done from the bottom to the top in each of the two top quarters.

Notice that cascade welding usually requires one preheating for each quarter (assuming continuous welding) as there are no blocks which necessitate a preheating treatment before each is started. The heat distribution is excellent so such cascade welds possess good physical properties.

Where positioning is practiced, as in Fig. 5, the insert piece for starting the weld is left in place until the weld is almost wholly completed. Then the insert piece and the ending portion of the weld that has gone round the shell are positioned at the top. Chipping or gouging prepares a block at this point for the final weld metal addition. Otherwise the point of weld completion would present an impossible joint preparation.

In all cascade welding, the work is done from the outside in to the center. Or stated another way, the welding goes from the top of the finished joint to the bottom. This practice has proved to be the best because the heat capacity of the top of the groove with its two unsupported edges is less than that of the bottom of the groove with its closer spacing.

Positioned cascade welds are executed with the horizontal weld portion as long as possible. The higher the arc of the curve, the greater is the length of each layer that is added. Therefore the angle of welding contributes appreciably to the ease with which the work may be accomplished.

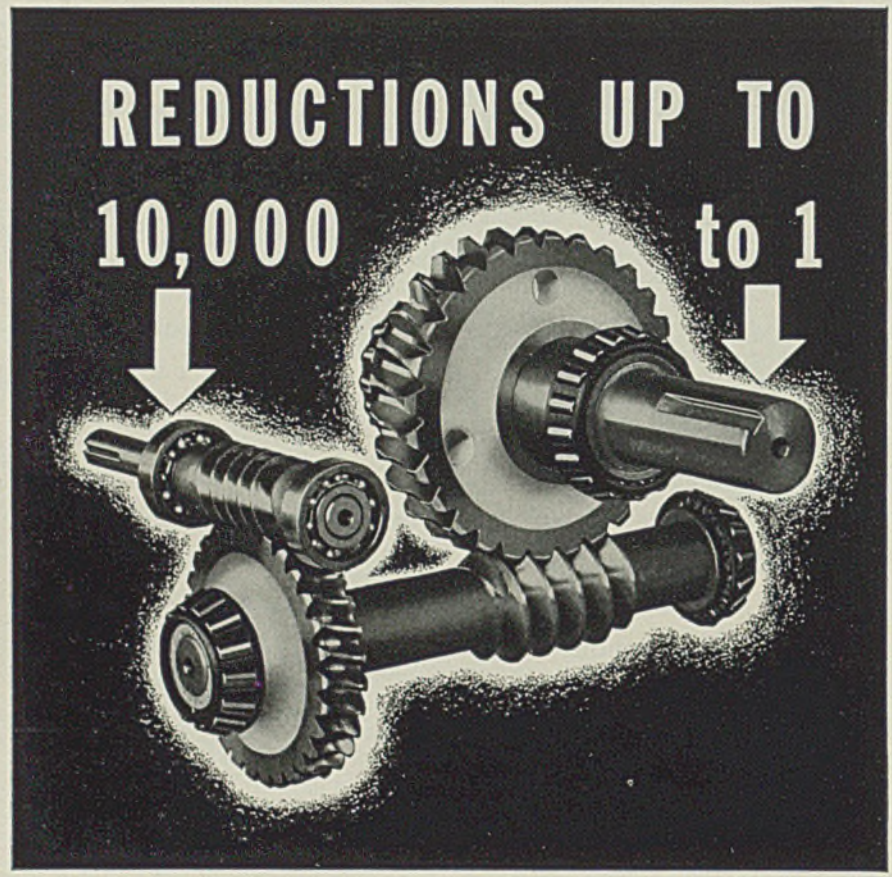
An examination of a finished weld will reveal much about the welding method. In Fig. 6 is shown the surface of a block weld. Craters always indicate the end of at least one and possibly two beads. Those shown in the illustration are both the endings of two beads with the crater belonging to the second bead deposited. Changes in the direction of the ripples indicate reversals of welding direction. Slight humps and differences in the angularity of the ripples point out electrode changes when the welding proceeds in the same direction as in the two electrode changes in Fig. 6, the first of which denotes a change in direction of welding while the second (to the left of the first) reveals a continuation of welding in the same direction.

Usually an observing welding engineer can tell much about the welding from a simple visual examination of the beads.

Since cascade welding is accomplished by means of a series of slanting beads with the starting ends exposed, a quite different surface appearance is presented. Fig. 7 reveals the finished surface of a cascade weld. In a seam that was positioned during welding, only one ending point with a changing pattern will be found. In the seams welded without continuous positioning, two ending points with dimishing bead ends and one short straight run will be found.

Both block welds and cascade welds are time consuming and expensive.

They, however, are not recommended for general application to all welding work. But they are of the utmost value where welding cannot be used without such special techniques. More critical alloys will demand an expanding selection of block and cascade welding methods. Sometimes design changes such as those mentioned in newspaper accounts of the dangers attendant upon flying rivets in tanks will make welding imperative even if the over-



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all cost should be increased appreciably. Proved and recognized, albeit sometimes expensive, the special welding sequences may well prove a sorely needed "ace in the hole."

Silver Plating

(*Continued from Page* 91)

combinaation of these three metals, can be subjected to severe plastic deformation, as in press-forming, without perforating initially pore-free deposits that have a total thickness of at least 0.002-inch.

Fifth, no entirely satisfactory method has been found for determining the porosity of silver deposits less than 0.0001-inch thick.

Sixth, the hot water test is probably more dependable than any of the other porosity checks when the silver deposit is both thin and porous. For relatively thick silver deposits with low porosity, it does not make much difference which method is used.

Seventh, the minimum thickness of deposit of silver, nickel or copper that is required for pore-free coatings is dependent, other factors being constant, on the surface quality of the basis metal. The most homogeneous and the smoothest surface requires the thinnest deposit. For the basis metals investigated, difference of this nature are of relatively little importance when the deposit is as thick as is necessary for industrial purposes.

Eighth, the minimum thickness of deposit of silver, nickel or copper that is required for pore-free coatings depends on the freedom of the plating bath from suspended matter.

It has been mentioned that the current density of silver plating baths varies from 2 to 15 amperes per square foot. This is rather a slow rate of deposition compared to the standard nickel or copper baths of today, which use 10 to 75 amperes per square foot. In order to overcome this, Simon and Lumley[6] investigated the possibilities of plating containers at high current densities. It was found possible to produce pore-free deposits of copper 0.0005-inch thick upon which 0.00001-inch of silver could be deposited without any pores that extended to the copper.

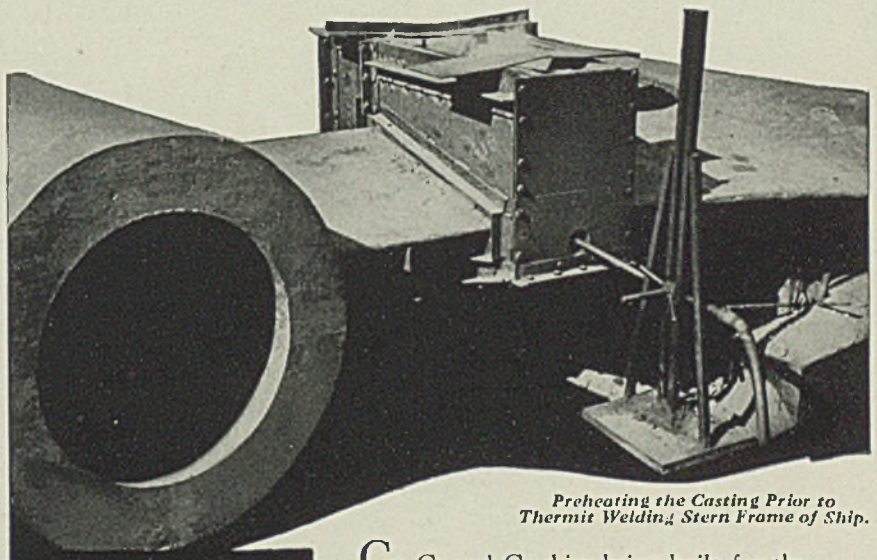
In this work advantage of Bancroft's third and fifth axioms[7] was taken. These axioms state that at high current densities smaller crystals are produced and a solution that gives a satisfactory deposit at a given current density will give a satisfactory deposit at a higher current density provided the conditions at the cathode surface are kept constant. The work to be plated is treated as follows: Vapor degrease, cathode clean, acid dip, copper strike and silver strike. The summary of the paper is as follows:

First, the permissible current density to produce smooth adherent deposits may be increased by increasing the silver content of the bath, the content of the free cyanide, the temperature or the agitation.

Under favorable conditions, with good agitation, current densities of at least 200 amperes per square foot (21.5 amperes per square decimeter) may be used, at which over 0.0003-inch (0.0076-millimeter) thickness of silver may be deposited in one minute.

Second, the cell voltage in these tests ranged from 4.5 to 7.5 volts. The current density produced by a given voltage was slightly decreased by raising the silver content and was increased by raising the free cyanide or by raising the temperature. The principal cause of these effects was the change in conductivity of the solution.

Third, cathode polarization apparently had only a small effect on the current density. If silver anodes were used, with necessarily a smaller area and a higher current density than on the cathodes, a black film formed on the anodes and the polarization was very high. In the experiments reported, steel anodes of the



Preheating the Casting Prior to Thermit Welding Stern Frame of Ship.

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The use of the Thermit process to weld simple forgings, small castings or flame-cut shapes substantially speeds up production, as many of the delays inherent in all-cast construction are avoided.

Thermit welding reduces the cost of heavy units to a fraction of that incurred when large, intricate castings are employed, and the difficulties of obtaining sound metal in these large castings are eliminated.

The Thermit process has also been standard practice for many years in repairing axles, crankshafts, machine frames, housings and other large units.

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same size as the silver anodes were therefore used.

Fourth, an increase in free cyanide generally decreased the porosity.

Fifth, the porosity of silver applied over pore-free copper coatings is much less than when applied directly to steel or over a copper strike.

Sixth, the cathode efficiencies under favorable conditions are from 60 to 70 per cent.

From the above it can be seen that steel can be plated with a pore-free deposit of either copper or nickel which in turn is covered with a pore-free silver plate. At present nickel is hard to obtain, and this condition is going to get worse. Obtaining copper is easier, but the condition is still acute.

What can be substituted for copper and nickel? The substitute should be cheap, easy to plate and a material which will take a silver plate. The material that will be recommended by the writer fulfills all the above, but has a tendency to corrode faster than either copper or nickel. The metal is *electrolytic iron*. It is the opinion of the author that iron deposited upon steel will produce a pore-free deposit suitable for an undercoating of silver. It is further believed that such a pore-free deposit will substitute for nickel and produce a protective coating with silver even if the latter is only 0.0001-inch thick.

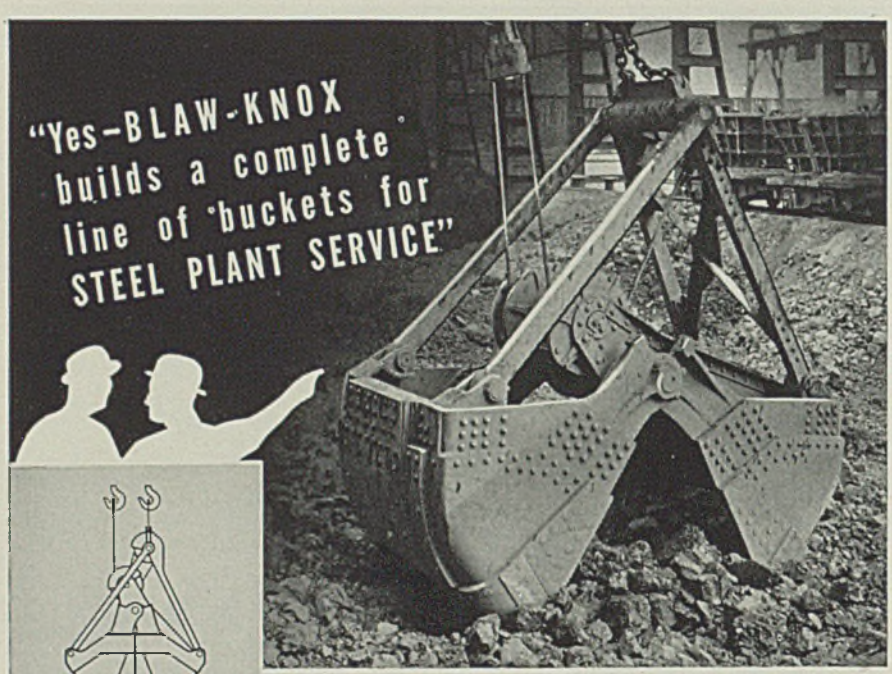
Why Iron? One may ask why should a plate of iron be applied to steel. The answer is simple. An electroplated deposit presents a better base than does mechanical cold rolled steel. Pore-free deposits can be produced over electroplated deposits easier than over mechanical surfaces of steel. It is a proved fact that electrolytic iron is more inert than ordinary steel. Therefore, if a pore-free electrolytic deposit of iron is placed over steel and this in turn is covered by a pore-free deposit of silver, it is the belief of the writer that a *pore-free plate will be obtained which will give good corrosion protection.* It is further believed that the deposit of iron should be around 0.001-inch and the deposit of silver should be from 0.0001-inch to 0.0003-inch.

There are no laboratory experiments known to the writer to substantiate this, but such tests should be made by some interested party as soon as possible. If this is the case it will be possible to produce corrosion protection for steel consisting of a layer of electrolytic iron and silver. Savage[8] has pointed this out in a recent article. It has also been mentioned by Dornblatt, Lowe and Simon[5].

There is one other factor which should be mentioned in connection with silver plate and that concerns the appearance of the deposits obtained. In all cases the plate obtained from a solution is white. In order to get the buffed or polished silver, the coating must be polished on an ordinary buffing wheel. Many attempts have been made to obtain bright deposits from the plating baths. In the true sense this has been unsuccessful.

However, it is possible to obtain deposits which are approaching bright plates. The old reliable method consists of introducing small amounts of carbon disulphide in the electrolyte. The deposit has a slight bluish haze instead of the characteristic milky appearance. There have been many investigations into the problem as shown by a literature study[9]. However, there is none better than the old carbon disulphide brightener.

One fact about the brighteners seems to be that the material should be added to the bath in extremely small amounts, and the resulting solutions should be agitated thoroughly. It is best to make a stock solution of this material by adding approximately 0.25 fluid ounces to a solution containing 4 ounces per gallon of potassium cyanide. A definite amount of this material should be added from time to time. It is best to add this material to the bath, using a pipette for introducing the brightening solu-



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tion. This helps to disperse the brightener throughout the bath.

Electrolytic Polishing of Silver: In spite of the above brightener the silver plate deposited must be buffed in order to produce a highly lustrous finish. This is expensive and time consuming. For thick deposits of silver there is another method just announced which might prove helpful. This consists of electropolishing the silver deposit and producing thereby an attractive reflective finish. At the Institute of Electrochemistry and Metallurgy in New York, the author had a student working on a method of polishing silver using a cyanide bath. The student was taken into the Army about a year ago so this work has not been completed.

In a preprint issued during the first part of March, 1942, Gilbertson and Fortner[10] found that silver can be electropolished using a bath containing silver cyanide, 4.3 troy ounces per gallon; potassium cyanide, 5.0 ounces per gallon (avoirdupois); potassium carbonate, 5.0 ounces per gallon (avoirdupois). The bath is used at room temperature with slight agitation. Current density is approximately 20 amperes per square foot. Silver can be used as the cathode. Approximately 9 minutes are required to produce a polished surface from an electroplating bath. Perhaps this type bath can be substituted for mechanical polishing which would reduce the cost of the article.

Preventing Tarnish: The subject of silver alloy plating is one that has intrigued the researcher for many years due to the fact that many investigators have had the idea that a silver alloy could be produced which would not tarnish. The best known is the silver-cadmium alloy. This is usually made by adding a cadmium alloy to a silver bath. The details of this subject will be omitted here. Suffice it to say that the silver-cadmium alloy does not tarnish as readily as the silver alone.

Silver when exposed to the atmosphere will tarnish provided silphides or silphites are present. The material can be protected by a clear lacquer coating. It can also be protected for a time by producing a colorless thin chromate film over the surface. Another method consists of making the silver the cathode in a solution of beryllium sulphate and after passing a current through for a predetermined time, it is removed. This produces a thin film of hydrated BeO about 4 millionths of an inch in thickness. The film is transparent and should be heated to between 275 and 300 degrees Cent. for a few minutes. This dehydrates the film and makes it more resistant to wear.

Ewing and Jernstedt[11] have given a very good paper on this technique when applied to copper. Price and Thomas[12] have written a paper on the "Protection of Silver by Electrolytic Deposition of Beryllium." This will give the reader data if interested.

From the above it is apparent that silver has important possibilities in the protection of steel. It can also be seen that research is needed in order to obtain answers to the proposal offered here to use a combined coating of electrolytic iron and silver over ordinary steel.

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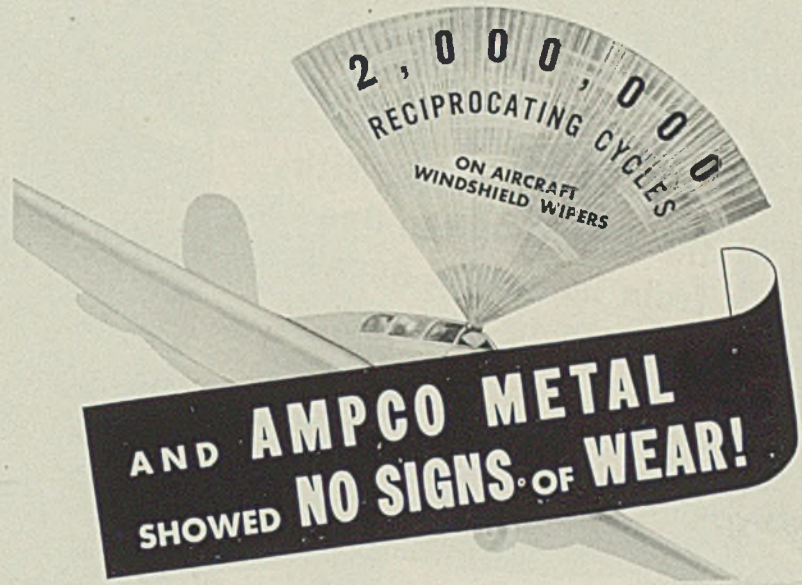
AMPCO CASE HISTORIES



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Mold Stools

(*Continued from Page 85*)

sert per ton of ingots. The detailed record of the 21 oldest composite stools is shown in Table I. A comparison with our practice on regular slab stools for the 12-month period ending October 1941 is given in Table II. The stool consumption during this period was 11.8 pounds of stools per ton of ingots. At $35.00 per ton for the stools this is an initial cost of 20.7c per ton of ingots. The net figure would be less than this but is not given here because of different practices in allowing credit for the iron in scrapped stools.

This comparison refers to the grades and sizes of ingots made at Steubenville works. The greatest part of the production is low-carbon rimmed steel. The ingots are all 24 inches thick and from 30 to 60 inches wide, with one ingot poured on each stool.

Though certain types of alloy steel are susceptible to sticking there is reason to believe that the insert stool will give improved length of service though perhaps not as long a life as on ordinary grades. Sticking will probably not be greatly changed but the advantage is expected to result from less breakage during loosening the stickers. The steel frame is strong enough to withstand severe treatment that would break the conventional cast-iron stool. No difficulty has been experienced in loosening the inserts.

Pouring several ingots on one stool is accomplished by providing a separate insert for each of the ingots. The inserts may be renewed individually as their condition requires.

Principal features of this development are:

1. Many stool failures are due to breakage either because of rough handling or cracking from thermal stresses or a combination of the two. Such failures have been prevented by use of a supporting steel frame.
2. Detailed records of several stools of this type indicate great improvement in their life.
3. The stool can be renewed by replacement of the worn insert resulting in a saving in cast iron as well as foundry labor, and in the release of foundry capacity for other uses.

Flame Straightening

(*Continued from Page 85*)

ing material, resulting in bending of the part.

In practice, the operator applies the heating flame to the surface of the metal, working an area or strip about 1 inch wide and constantly moving the flame with a zigzag motion. The surface should never be heated above a cherry red and usually only to a depth of about 3/16-inch to prevent oxidation or internal fractures. The main object is to apply the maximum amount of heat in the shortest possible time to secure a powerful local expansion at the surface of the metal.

Work fabricated by welding lends itself particularly to this method of straightening. Distortion caused by gas or electric welding of I-beams, angles, channels or plates is easily eliminated. In fabricated gears, the band or rim in which the teeth are cut is often found to be out of round after it is welded to the disk. These high spots can be removed before the teeth are cut and the gear carburized by the proper application of heat to the rim. In Fig. 1, heat can be applied at A to correct a high spot, at B to correct a low spot. The fillet welds on both sides of a member forming a T-shaped assembly often cause warpage of the section forming the top of the T. Fig. 2 shows how heat applied to the center of this warped section at the arrow brings the ends flat without the use of any force.

Errors in turning, machining and

boring of machine parts can be corrected and worn parts rehabilitated by this method. Fits on outside diameters of shafts and interior diameters of sleeves and collars can be tightened by local upsetting along longitudinal paths as shown in Fig. 3. Bent shafts can be straightened without being removed from the machine.

It is possible to bring a flat plate into a perfectly cylindrical form by use of this process, and sections which have been incorrectly shaped can be brought into proper alignment or have bulges removed without being disassembled and without any hammering. Since heavy sections respond best, thick slabs or plates from the mills can be brought flat enough for planing or machining without furnace reheating or pressing. Deseaming torch can be used for such work.

This process is particularly useful in shipyard operations as it can be used to introduce bends or curved areas in hull plates, turrets and stacks; to straighten or control warping of hull, bulkhead and superstructure plates; to remove bulges or buckles from deck plates; and to contract or expand parts in the propelling, auxiliary or maintenance equipment.

Castings also respond well to the process. For example, warpage which takes place when crusher jaw teeth have been rebuilt can be straightened by heating the ribs or webbing at the back.

The process can be used to great advantage in repair and fabrication of such equipment as tanks, trucks and other war material; roadbuilding and agricultural machinery including cranes, tractors, bulldozers, scrapers; railroad cars, locomotive boilers and fireboxes; dredging and mining machinery; molds and dies for rubber, metal and plastics; oil well rigs and equipment; paper and pulp mill rolls and machinery.

Electrical Methods in Examination of Metals

Physical Examination of Metals, Vol. II, Electrical Methods, by Bruce Chalmers and A. G. Quarrell; cloth, 280 pages, 5½ x 8½ inches, published by Longmans, Green & Co., New York, for $6.

In presenting in one volume an account of techniques which may be broadly classified as electrical, the authors have attempted to indicate the scope and limitations of each of the methods described, doing so, where possible, by reference to successful applications.

A result of rapid development in application of physical methods to examination of metals is that many investigators have tended to regard the particular method with which they are most familiar as of universal application. Although the various methods sometimes may overlap they are to a large extent complementary, not only to each other, but also to the more generally used metallurgical methods.

This volume is directed to those concerned with development of new or more specialized tests for metals and metallic components and also to those who, through lack of readily available information, are forced either to accept without discrimination the results of tests they do not fully understand.

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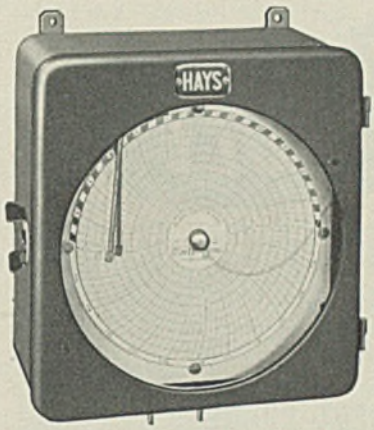
Patches of this cement, known as 7B, harden over night, permitting traffic to flow the following morning. The cement also is dust, oil and waterproof.

BETTER RESULTS IN FURNACE OPERATION with HAYS INSTRUMENTS



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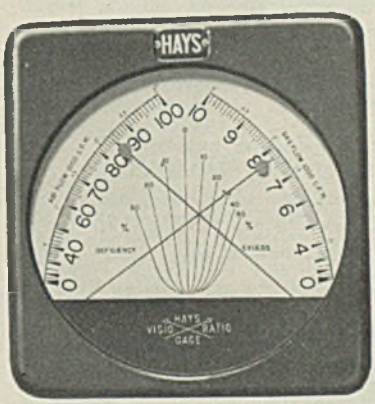
These instruments give a correct indication of furnace atmospheres and a permanent record of pressures and drafts at vital points as guides for most effective operation.

Write for descriptive bulletin.



PATENTS PENDING. This gage is calibrated in terms of air and gas flow—but may be used for any two flows for which the instrument is calibrated.

HAYS VISIO-RATIO GAGE

3 INSTRUMENTS IN 1 . . . 1. Air-Flow Indicator . . . 2. Fuel-Flow Indicator . . . 3. Ratio Indicator. Shows at a glance the exact ratio existing between flow of gas or flow of oil or other measurable fluid: pressure, draft, suction, temperature (up to 1000° F.) speed in R.P.M. or inches per minute, position, level and others.

This newest Hays instrument is a guide to higher manufacturing efficiency, increased production, better products and lower costs. It shows relations at a glance and eliminates the necessity of making calculations to determine excess or deficiency.

If you will write us, stating the conditions, we will tell you exactly how the Hays Visio-Ratio Gage can be applied to your problem.

The HAYS CORPORATION
SINCE 1903 COMBUSTION INSTRUMENTS AND CONTROL
MICHIGAN CITY, INDIANA, U.S.A.

War Supply of Tin Below Prewar Demand

Publication of bulletin No. 12, "Tin and Its Uses", is announced by Tin Research Institute, Battelle Memorial Institute, Columbus, O. Among the articles it features is one on tin and the war in the Pacific which states that the present annual supply of tin is about 78,000 tons against a prewar consumption of 110,000 tons.

War requirements and buying for private stocks have brought the total demand of tin recently up to a rate equal to 175,000 tons per annum. These figures make it clear that restriction of consumption must be applied swiftly.

According to the article, all tin stocks must be utilized with the utmost discretion, and the less necessary uses must be suspended in favor of those indispensable to the war effort.

Other articles in the publication deal with the second interim report on research for improved solder fluxes; improvements in the smoothness of tin coatings on tinplate effected by the use of an experimental tinning machine; an interesting and novel use of tinplate in iron foundries; the new canned foods available in Britain under the "Points" rationing scheme; and a recent official statement on the safety of canned foods.

BLOOM ENGINEERING
CAN HELP YOU
CONSERVE FUEL
through 1. CORRECTLY ENGINEERED APPLICATIONS

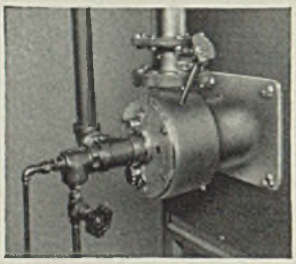
Good application engineering is the basis for worthwhile fuel savings. Bloom experience guarantees correctly engineered jobs.

2. MODERN EFFICIENT BURNERS

The modern design of Bloom Long Flame Burners provides most efficient combustion and uniform heating.

3. QUICK CHANGE-OVER

Protect your production against fuel shortages by installing Bloom Combination Burners, and switch from gas to oil—or from oil to gas INSTANTLY! No delay, no shutdowns, same heating results.



Bloom Long Flame Combination Burner.

WRITE *for information, giving full data on your present equipment and work handled.*

BLOOM ENGINEERING COMPANY
916 BEHAN STREET PITTSBURGH, PA.

Westinghouse Develops New Insulating Varnish

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., is offering a new insulating varnish capable of withstanding high temperatures. It is especially suitable for coil insulation requirements of generators.

Known as Thermoset, the varnish is a synthetic resin cured by heat-induced chemical polymerization. It sets to an infusable flexible inert film of clear amber color, and is high in dielectric and bonding strengths.

Of low viscosity, the varnish will not skin over or gum up equipment.

Both water and oilproof, it is not affected by acids or alkalis in ordinary concentrations. When cured, the material protects enamel coating on magnet wire, will not corrode uncoated metals and guards against rust.

Reclaimed Rubber Only Used for Sponge Rubber

Blown sponge rubber products are being made entirely of reclaimed rubber instead of natural crude rubber, according to B. F. Goodrich Co., Akron, O. This was brought about by producing practically the same properties in the reclaim-type sponge as were present in that made from crude rubber, particularly in the compression ability of the material.

Blowing agents and methods of manufacture are the same, sodium bicarbonate being used as the agent, the company's announcement reveals.

Offers New Line of Anti-Corrosive Wrappings

To do its part in the war effort, Riegel Paper Corp., 342 Madison avenue, New York, has extended its line of anti-corrosive wrappings to meet various requirements brought about by the war. The company now is offering wrappings to inhibit corrosion on all types of equipment, protecting it from all kinds of climate.

Available in such forms as rolls, sheets or bags, the papers are combinations of highly greaseproof, antiacid glassine, laminated with a special agent to a newly developed Fourdrinier anti-corrosive Kraft stock.

Advertisement

MAY, 1942

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*

Bridgeport Rods Give Outstanding Results

For the fabrication of shapes as well as repair and maintenance work, Bridgeport Bronze Welding Rods are equal to any job. They build up strong, dense and tough on all cast iron, steel or bronze work. The distinctive quality characteristics of these rods —purity, reliability, uniformity and workability—show up as outstanding results in the work to be done, because Bridgeport incorporates top quality into every inch of Bridgeport Bronze Welding Rod.

The ways and means to get the best results in bronze welding of Bridgeport rod are clearly presented and illustrated in Bridgeport's new Manual on Bronze Welding Alloys. A free copy can be had by writing to the Bridgeport Brass Company.

Memos on Brass—No. 28

Because it is probably the most economical way of making strong, precise, intricate articles at high speed with little waste, the cold heading process is playing an important part in the nation's war production of bolts, compression nuts, screws, and many other similar parts. Although it is an unusually severe operation, brass is admirably adapted to cold heading because it is malleable before cold working and acquires high strength without becoming brittle. However, each heading job requires the right alloy, correct stiffness, proper grain structure, uniformity, and freedom from minute imperfections. Close cooperation between the laboratory and the mill has enabled Bridgeport to supply brass wire with marked advantages.

Typical of Bridgeport's constant efforts to find clues to higher quality brass mill products is the operation of the modern tensile testing machine shown above. Capable of exerting many thousands of pounds of tension, this machine is used in testing Phono-Electric* Wire, brass pipe and tube, Duronze* and similar rods which are made to definite physical specifications.

Directional Properties Important In Bending Cold Worked Material

Cracks or Fractures in Copper Alloys Can Be Avoided By Making Sharp Bends in the Direction of Rolling

Springiness, stiffness and strength of copper alloys are controlled largely by the amount of cold working or per cent reduction by rolling or drawing which the material receives after the last annealing treatment at the mill. Cold worked material, however, possesses directional properties which must be taken into account when articles such as electrical spring contacts, spring washers, brackets and other angle sections which require sharp bending are made from it.

Spring temper sheet shows much more decided directional properties than metal rolled half hard (2 B & S numbers), as is clearly indicated by the fact that bends made across

Rolled metal magnified 75 X. Note that crystals have been elongated in the direction of rolling.

the grain (90 degrees to the direction of rolling) are less apt to crack than bends made parallel to the direction of rolling.

Temper Affects Bending

Alloys that are inherently ductile are less apt to crack when bent sharply than those which are less ductile, which explains why Phosphor Bronze and Silicon Bronze have a greater tendency to fracture than yellow brass of equal gauge and temper. The temper or degree of hardness of the material, as determined by the amount of cold rolling after the last anneal, has a great deal of effect on the ability of the material to take certain bends.

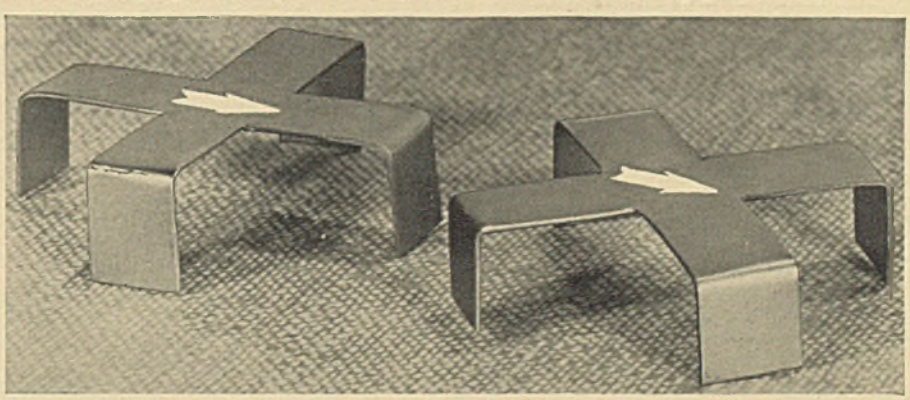
In general, material which has been rolled one or two numbers B & S hard, 20 per cent reduction in cross-sectional area, will take any reasonable bend. However, for severe sharp radius bends, in particular where further cold working is necessary, the use of soft metal is recommended. On cold working reductions over number 2 B & S hard, the effect of thickness or gauge, radii of the bends, and the direction of the bend in respect to the direction of the cold rolling of the material, as supplied by the mill, are definite factors.

Thickness Important

It has been found as the thickness of the material increases that there is more danger of fracture for any certain bend without changing the temper or radius of that bend. This may be explained by the fact that, because of the heavier metal, the outside section has to stand a greater elongation as it has a greater distance to move in order to reach the required degree of bend.

The radius of a bend is a decided factor in determining whether a given degree of bend will fracture. In this connection it could be said that *the smaller or sharper the radius for any given temper, the more likelihood there is that fracture may occur.* It is important, therefore, that the design of the part to be made should be such as to allow as liberal a radius as possible.

(Continued on page 2, column 2)



Phosphor Bronze samples bent parallel (left) and at 45 degrees (right) to the grain. Note the absence of cracks in the latter. White arrows indicate the direction of rolling.

COPPER ALLOY BULLETIN

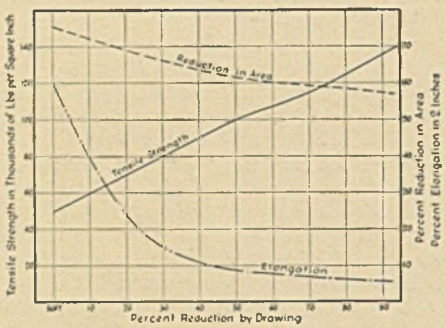
ALLOYS OF COPPER

This is the thirty-third of a series of articles on the properties and uses of the copper alloys.

COPPER-ALUMINUM SILICON ALLOYS

As was mentioned in this column last month, copper-aluminum alloys are often modified by the addition of silicon to increase their strength and hardness.

One such alloy that is used commercially contains approximately 96½% copper, 3% aluminum and ½% silicon. It is a ductile alloy with a moderate tensile strength in the annealed condition, but one which develops a very high tensile strength when reduced severely by cold drawing. This alloy is used as catenary wire and cable for electrified railroads where high strength, low creep and

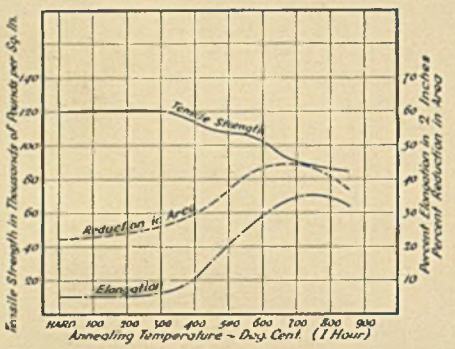


Effect of cold drawing on alloy containing 96½% copper, 3% aluminum and ½% silicon.

good corrosion resistance are more important than high electrical conductivity.

Another modified copper-aluminum alloy that is used commercially contains approximately 91% copper, 7% aluminum and 2% silicon. It is essentially a hot working alloy which is characterized by great strength and hardness but comparatively low cold workability. It can be forged readily and is supplied in rod form only. Although it does not

(*Continued in column 2*)



Effect of annealing on alloy containing 91% copper, 7% aluminum and 2% silicon.

Bending Suggestions

(*Continued from page 1, column 3*)

Direction of Rolling

Another very important factor is the *direction* of the bend in relation to the direction the material was rolled. As mentioned earlier in this article, there is more danger of cracking when the bend is parallel to the direction of rolling than across the grain. It has been found, however, that some position, such as 45 degrees to the direction of cold rolling, may give the best results on hard rolled metal, which must be springy and at the same time must take sharp bends.

It is important that the tool designer should give careful consideration to all of these factors in laying out a set of tools in order to get maximum spring properties, the greatest ease in bending without fracture, and economy in the width and gauge of the material desired. Bridgeport's laboratory service is available to help customers with their metal problems.

300 Pieces of Copper Form Miss Liberty

The Statue of Liberty, a symbol of freedom that stands out as a shining ray of hope to the world today, was constructed of 300 separate pieces of 3/32-inch thick sheet copper. When the pieces arrived in this country in 1885, they were fitted together like a huge jig-saw puzzle and riveted. The 152-foot high figure is said to weigh about 25 tons. Its green color is caused by patina, a protective coating formed on copper which preserves the metal against time and the elements.

ALLOYS OF COPPER

(*Continued from column 1*)

contain lead, this alloy machines freely. Annealed rod averages about 90,000 lbs. per square inch in tensile strength, while commercial drawn rod is nearer 100,000 lbs. When annealing hard drawn rod, softening begins at about 350° C. Its maximum ductility is reached between 700 and 750° C., when the tensile strength drops to about 85,000 lbs. per square inch—a remarkably high figure for an annealed material. Stated differently, the high strength of this alloy is inherent rather than artificially produced by cold working.

Commercially known as Duronze III, this patented alloy is made by Bridgeport. It is used for the manufacture of high strength screw machine products and hot forgings where greater strength than that of brass or ordinary silicon bronze is required.

NEW DEVELOPMENTS

A paste cutting compound has been put on the market for use on hand milling, threading, drilling, tapping and automatic machines. It is said to leave no grease, be clean to use, and to leave a protective film that prevents rust. The compound is mixed with water to form a thick solution which the maker claims will flow readily and not separate or congeal. **(No. 320)**

A semi-automatic cut-off saw has been designed for accurate high speed cutting of tubes, rods or shapes up to 3" O.D. It is said to handle either steel or non-ferrous metals. The saw is equipped with an air-operated cam action chuck which is claimed to hold material with sufficient pressure to avoid slippage or rotation while the saw is passing through. **(No. 321)**

Dual ram broaching machines have been designed for fast production ranging from three tons and 36" stroke up to 25 tons and 66" stroke. The maker says an operator can handle feeding and removing a part from one ram while the other is on its down stroke, thus doubling the output per man. **(No. 322)**

A double end boring bar has been designed for use with saddle type turret lathes. It fits into the standard flanged tool holder on the turret, then through the turret, and is held on the opposite side by a short holder having four screws to firmly grip the bar. It is described as making an extremely rigid bar with large single point cutters for use with a cross feeding turret. **(No. 323)**

A brake for bench use has been put on the market which is said to accurately form non-stock size angles, channels, and Vees in sizes ranging from 1.8" dimension width of each member and upwards to 110 degrees of radii without change of the original contact surfaces. It is designed to handle work in the range between that done on heavy floor type brakes and a bench vise or pliers. **(No. 324)**

A three point pitch diameter gage which uses ball locating points and is said to equal the results obtained by the 3-wire method of checking threads has been introduced. Two lower ball locating points can be adjusted laterally, so as to check different thread sizes. Different sets of points are used for various thread pitches. Pitch diameters up to 2" can be accommodated and inspection within 0.0002" is said to be possible. **(No. 325)**

An adjustable hand tool holder has been developed to hold square or octagon shaped tools such as steel hand stamps and chisels in sizes from ¼" to ¾". Other sizes, each with ½" range, up to 1¼". **(No. 326)**

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.

PRODUCTS OF THE BRIDGEPORT BRASS COMPANY

Executive Offices: BRIDGEPORT, CONN.— Branch Offices and Warehouses in Principal Cities

SHEETS, ROLLS, STRIPS— *Brass, bronze, copper, Duronze**, for stamping, deep drawing, forming and spinning.

CONDENSER, HEAT EXCHANGER, SUGAR TUBES— For steam surface condensers, heat exchangers, oil refineries, and process industries.

PHONO-ELECTRIC* ALLOYS— High-strength bronze trolley, messenger wire and cable.

WELDING ROD— For repairing cast iron and steel, fabricating silicon bronze tanks.

LEDRITE* ROD— For making automatic screw machine products.

COPPER WATER TUBE— For plumbing, heating, underground piping.

DURONZE ALLOYS— High-strength silicon bronzes for corrosion-resistant connectors, marine hardware; *hot rolled sheets* for tanks, boilers, heaters, flues, ducts, flashings.

BRASS, BRONZE, DURONZE WIRE— For cap and machine screws, wood screws, rivets, bolts, nuts.

FABRICATING SERVICE DEPT.—Engineering staff, special equipment for making parts or complete items.

BRASS AND COPPER PIPE— "Plumrite"* for plumbing, underground and industrial services.

*Trade-name.

"Bridgeport" Brass Co.

Established 1865

BRIDGEPORT BRASS

Sweeping Price Order Ceils Consumer Goods

(*Concluded from Page* 47)

ate price regulations. These include:

BITUMINOUS COAL: Effective May 18, producers will be governed by prices prevailing Oct. 1-15, 1941.

MISCELLANEOUS SOLID FUELS: Effective May 18, producers will be governed by prices prevailing Dec. 15-31, 1941.

ALL SOLID FUELS: Effective May 18, dealers other than producers will be governed by prices prevailing Dec. 15-31, 1941.

ROLLED ZINC PRODUCTS: Effective May 11, producers will observe prices of Nov. 29, 1941 (see also page 129).

NONFERROUS CASTINGS: Effective May 11, manufacturers will be governed by prices prevailing Oct. 1-15, 1941.

FLUORSPAR: Effective May 11, producers will be governed by prices prevailing Jan. 2, 1942.

FARM EQUIPMENT: Effective May 11, retail dealers will be governed by prices of Oct. 1-15, 1941.

STANDARD FERROMANGANESE: Producers will be governed by Oct. 1.15 prices.

Ceiling Prices Established For Sales for Export

Shortly before issuance of the General Maximum Price Regulation, OPA established ceiling prices for all commodities and products sold for export. The export price order became effective April 30.

Its provisions apply to all export sales, regardless of whether or not the commodity is under an OPA schedule, and over-ride all provisions of previous OPA orders that are in conflict with its terms.

Briefly, the order provides that the export price of any commodity shall be the cost of acquisition by the exporter plus the average premium charged in the export trade on a similar transaction during July 1-Dec. 31, 1940, or March 1-April 15, 1942, whichever period yields the lower average premium. In addition the exporter may add an amount sufficient to compensate him for expenses, such as war risk insurance, consular fees, demurrage charges and shipping charges.

Manufacturers or producers who export directly may add the lower of the two average premiums and the export expenses to their domestic price.

While the new regulation cuts across all outstanding contracts of sale or purchase it does not disturb prices involved in any export made under a validly outstanding export license issued by the Board of Economic Warfare before April 20. However, provisions are applicable to any export license issued after that date.

Effects of the regulation, as outlined by OPA:

1. To provide United States exporters with a fair margin for their services in line with existing trade practices with respect to all commodities and products exported.

2. To protect foreign purchasers against speculative practices and profiteering.

3. To remove the threat to maintenance of domestic price ceilings that excessive export prices engender.

4. To prevent the diversion of domestic supplies to foreign markets that results when price differentials make exporting a more profitable operation than sales at home.

5. To eliminate the danger of loss of foreign markets for American products (and consequent distress in friendly foreign countries) because export margins are insufficient to encourage sales abroad.

LARGE FACILITIES AVAILABLE FOR IMMEDIATE VOLUME PRODUCTION

OF ANY OR ALL OF THESE ITEMS ➡

★ WELDED STEEL TUBES AND TUBING in diameters from 3/4" to 5" and in gauges up to 1/4".

★ FABRICATED STEEL TUBULAR PARTS AND WELDED ASSEMBLIES.

★ LARGE AND SMALL STEEL STAMPINGS.

★ FORGED AND UPSET PARTS FROM 2", 3", 4", 5" upsetters.

For 24 years the American Metal Products Company has been a volume producer of parts and equipment for the automobile, truck and allied industries.

During this period our expansion and growth have been such that we now occupy a completely modern 5-acre plant erected only 4 years ago. At peak volume our force of engineers, production men and craftsmen totals 800—all men who have been trained for years in meeting the exacting demands and volume requirements of the automobile industry.

Because of curtailed production of automobiles and trucks, the plant, facilities and manpower of American Metal Products Company are available for immediate volume production, on a sub-contract or co-contract basis, on any or all of the items listed at the right.

For further details as to how we can fit into your production requirements write, wire or phone

AMERICAN METAL PRODUCTS COMPANY
5959 Lindsdale Avenue · TYler 6-3200
DETROIT, MICHIGAN

How Great Britain Met Conversion Problems

(*Concluded from Page* 41)

& Sons, Harrisonburg, Va.; and J. H. Wilbarger & Sons, Harrisonburg, Va. As more work is obtained by the co-operative, more of the member shops are being called into production. Some of the work being done is shown in Figs. 3, 4, 5, 7, 8, 9.

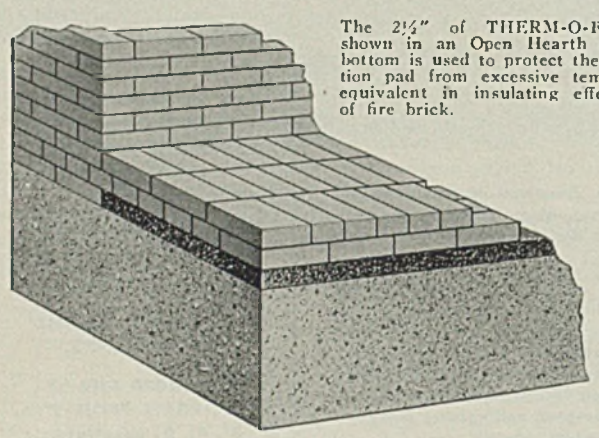
Now that the ice is broken, there is no doubt that other prime contractors will allot work to the Shenandoah Valley Defense Co-operative. The Jorss company has indicated its first contract was admittedly a "feeler" and that as a result of its successful completion more work will be given to the co-operative. Company executives who made an inspection tour through the valley are convinced that there are sufficient high-grade production facilities in the co-operative's plants to handle future orders many times larger than the first.

The A. F. Jorss Iron Works Inc., incidentally, has been a medium-sized factory in Washington for some 50 years, but to handle its recent war orders, it has just enlarged its plant facilities by converting a part of the old Heurich brewery to help fill the contract for transportation units.

How About Your Community? What the men of the Shenandoah are doing to obtain war work for their small shops can be done by any small industrial community. Are you in a small community that could benefit by such a co-operative effort? *If so, why not get the ball rolling, organize your own co-operative and go after war work to keep your plants going and to help your country in its hour of need?* See your local War Production Board Contract Field Office (list on page 26, Section Two, STEEL, April 20, 1942).

Therm-O-flake
INSULATING CONCRETE

A Light Weight High Temperature Concrete with Double Insulating Value



The 2½" of THERM-O-FLAKE Concrete shown in an Open Hearth checker chamber bottom is used to protect the concrete foundation pad from excessive temperatures. It is equivalent in insulating effect to about 15" of fire brick.

Reduces usual insulating concrete thickness by about half.

Increases effective depths of flues and checkers in Open Hearth furnace construction.

Protects concrete foundation pads from excessive heat.

Allows increased magnesite thickness in Open Hearth bottoms.

Smooths surface irregularities on Open Hearth bottom pans.

Write for Information and Prices

Other Therm-O-flake Products

Made from Exfoliated Vermiculite

Granules - Coating - Brick - Block

Illinois Clay Products Company

JOLIET, ILL.

Metals Reserve Co. To Buy Nickel at Premium Prices

Metals Reserve Co.'s metallic nickel purchases have been excepted from the nickel scrap price schedule by OPA. This action is similar to that taken in February for the purchase of idle or excessive aluminum inventories. Purpose of the nickel exception is to acquire for immediate war use metallic nickel frozen by M-6-b, including nickel anodes containing up to 90 or more nickel in the hands of nickel platers.

Regardless of purchase price, Metals Reserve Co. will sell the materials for remelting at not more than the maximums for nickel scrap in schedule 8, in order that the secondary nickel price structure not be disturbed.

Alternate Cast Tin Bronze Specifications To Save Copper

New emergency alternate cast tin bronze specifications have been approved by the committee on standards of the A.S.T.M., War Production Board announced last week. The specifications were developed by the copper and copper alloys committee of the society and permit substantial tin savings for war use through use of secondary metals.

Higher Ratings To Be Given On Warehouse Purchases

New warehouse steel order will be issued shortly by WPB, granting higher ratings on purchased steel from mills. Two groups of products are set up, first of which will get A-1-K rating and second A-3. It is believed a smaller volume of steel will be handled through jobbers, due in part to limitation orders already issued, and a new group to be announced shortly.

WPB has placed heavy compressors, urgently needed in the war production program, under a system of complete allocations.

Welding Wire Output Nearly Doubled in 1941

Production of steel welding wire in 1941 was approximately 453,120,000 pounds, a new high record, according to the American Iron and Steel Institute. This was nearly 90 per cent greater than 238,795,000 pounds made in 1940 and 147 per cent greater than 183,436,000 pounds in 1939.

From 1932 to 1941 production of welding wire rose 1776 per cent, a gain nearly four times as great as the increase in steel ingot production in the same period. For each ton of finished steel produced last year more than seven pounds of welding wire was made, compared with nearly five pounds in 1940 and approximately the same amount in 1939. In 1932 about 2.6 pounds of welding wire was produced for every ton of finished steel.

Peru's Iron Ore Reserves Estimated at 180,000,000 Tons

Studies of Peruvian ore resources assure that country of the foundations for an iron and steel industry for at least 50 years, according to official reports received in Washington.

Exploration, sampling and ore estimates by engineers in that country, were made at the site of the Maroona iron deposits, near the Bay San Nicholas, and only a few miles from the Pan American trunk line highway.

In drilling only three mineralized lenses out of 103 which had been identified by previous geological examination, 30,000,000 tons of iron ore, containing 56 to 67 per cent natural iron were stated to have been proved up. An estimate of 180,000,000 tons was made for the entire field.

Other studies were made on coal deposits adjacent to the prospective industrial operations. Coal was found that can be used in natural form in blast furnaces, without necessity of producing coke.

Manufacture of Hairpins, Bobpins To Be Restricted

WPB has restricted the amount of metal to be incorporated in hairpins and bobpins and regulated their length and thickness to obtain the maximum number of such articles from the amount of metal that may be used.

Order L-104 provides that during the 90-day period beginning April 25, a manufacturer may use one-eighth as much metal in hairpins and bobpins as he used during the entire year 1941. This means a 50 per cent cut in the use of metal.

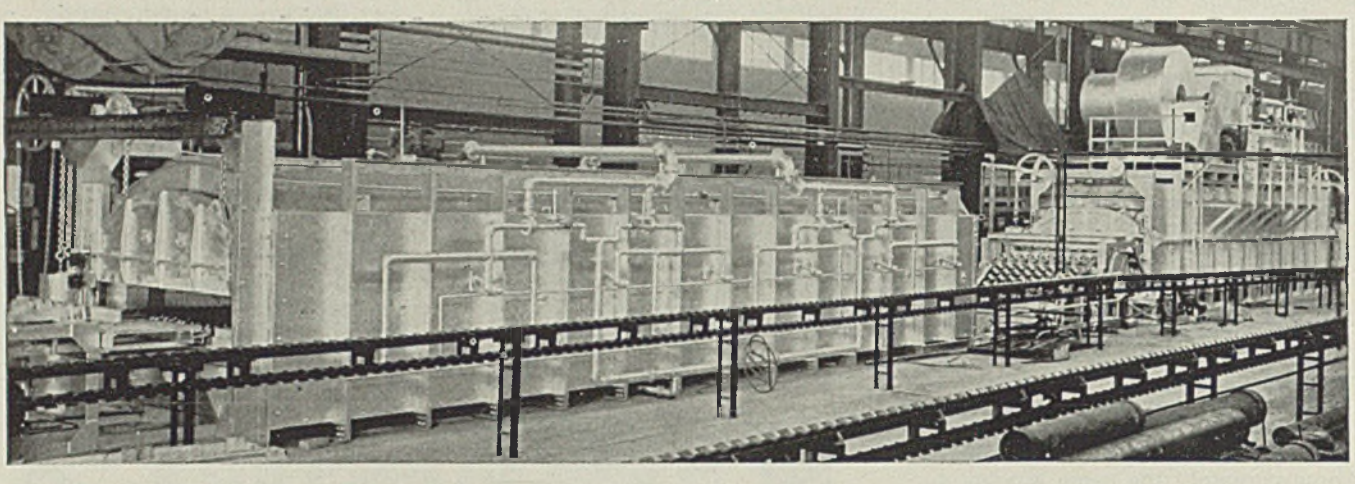
Effective at once, no manufacturer may acquire any wire for use in hairpins and bobpins except low-carbon steel wire of a gage less than 0.035 inches. Metal hairpins are now made of low-carbon steel wire and thus will not be affected by this part of the order. But bobpins are now made of high-carbon steel wire, and the restriction means that after a manufacturer has used up his present supply of high-carbon steel wire he can get no more. The gage restriction will eliminate future production of heavy wire hairpins which run as thick as 0.055 inches. Most hairpins in use will not be affected by the gage restriction.

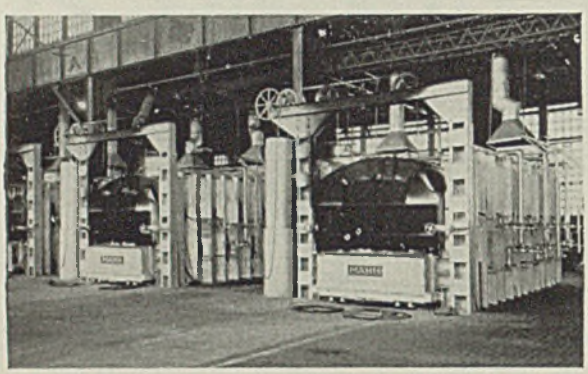
Beginning May 6, no manufacturer may produce a metal hairpin or bobpin longer than two inches. Metal hairpins now range from 1½ to four inches, with most of them approximately 1¾ inches long. Bobpins now average 1⅞ inches.

Effective at once, metal hairpins may not be sold by a manufacturer in packages containing more than 99 hairpins.

Manufacturers are prohibited under the order from acquiring more inventory than they need to maintain permitted production.

Heat Treating HIGH EXPLOSIVE SHELLS!



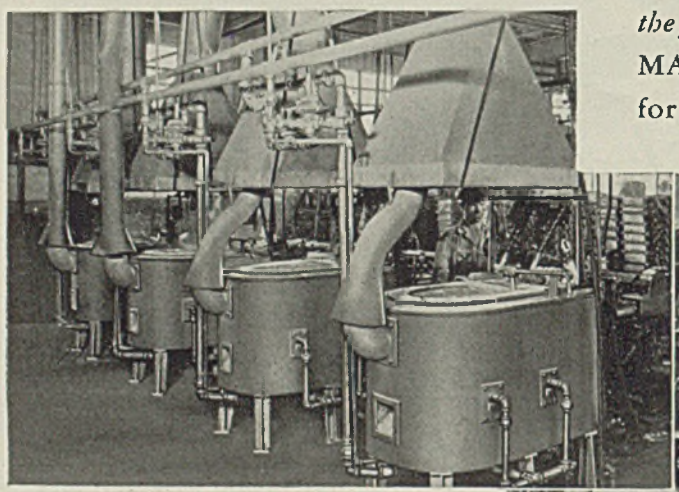


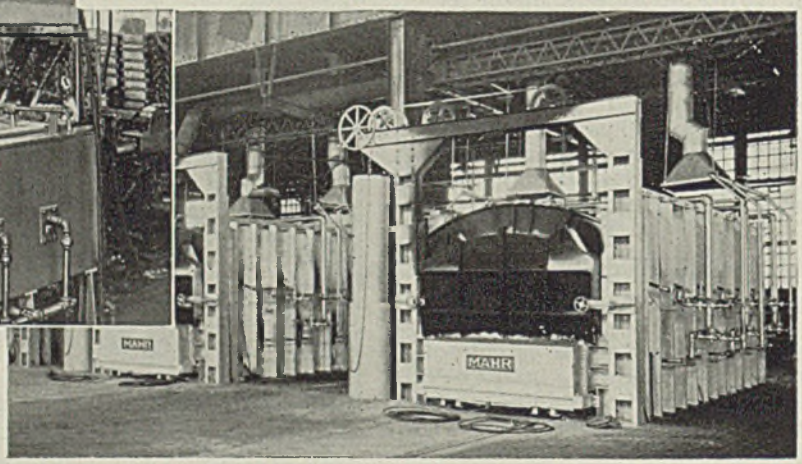
Or Carburizing Armor Plate
Or Annealing Small Pieces

Or for doing *any* of the innumerable jobs of heat treating of metals and castings that are a *must* in today's production of the tools of war or the tools of peace— there's a MAHR furnace or oven designed, tested in use and proven, ready for application to YOUR need.

We're in a war we've got to win! The tools for winning must be made NOW—FAST! They must be *right the first time.* So, for your heat treating jobs, specify MAHR furnaces—for over a quarter century known for highest quality, efficiency and DEPENDABILITY.

TRAINED ENGINEERS TO HELP
Our large corps of skilled furnace engineers are at your service to help you QUICKLY determine the simplest but most efficient furnace for your needs.





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DIAMAHR

MAHR MANUFACTURING CO.
DIVISION OF DIAMOND IRON WORKS, INC.
MINNEAPOLIS, MINNESOTA, U. S. A.

Pressure for Steel Is Growing Heavier

New record plate production expected in May. Bar and sheet orders grow topheavy. Scrap supply continues at better rate

MARKET IN TABLOID ★

Demand
Exceeds production and shipments.

Prices
Slight revisions announced.

Production
Gained ½-point to 99 per cent.

PLATES hold first place in steel demand, supported by increasing shipbuilding requirements, both the Maritime Commission and the Navy pressing for delivery. To meet these needs platemakers have set new production records. Output in May is expected to reach a new high, close to 1,000,000 tons, which will be 100,000 to 125,000 tons above the April estimate.

In general no plates are available under A-1 unless covered by special directives. Bars and sheets are close to plates in volume of requirements for war purposes and top priorities have accumulated to an extent that general allocation seems likely to be applied soon. In carbon bars little assurance of delivery can be offered on orders below A-1-b and many mills can handle only A-1-a ratings. Alloy bars can be delivered in little less than six to eight months at top priorities, except on directives.

Sheetmakers generally can deliver hot and cold-rolled material in six to seven weeks on priorities down to A-1-j but increasing demand for war purposes is pushing this margin up steadily.

Office of Price Administration has issued an amendment to Order M-21, designed to correct inconsistencies in the steel price schedule arising from the recent freight rate increase of 6 per cent. Effective April 30 delivered prices applicable to Toledo, O., Detroit and eastern Michigan and base prices at Gulf coast basing points may be increased 25 cents per gross ton on ingots, blooms and slabs and two cents per 100 pounds on all other iron and steel products. The increases apply to carloads and less-carloads.

Office of Price Administration has announced a new ceiling on ferromanganese at $135, Atlantic seaboard, duty paid. The previous ceiling was $120. Southern furnaces, previously allowed to charge $140, were put under the $135 ceiling.

Although effective date of amendment No. 3 to order M-21 has been postponed to June 1, sellers are advising customers to use the new affidavit instead of form PD-73, which it is to supplant, on all new orders, as there is little chance of delivery before June 1. They also ask buyers to follow the new procedure by supplying signed affidavits for such orders as are already booked but have little likelihood of being shipped before June 1.

Steady flow of scrap at the increased volume of the past few weeks is maintaining steel production at high rate in practically all centers and the situation seems likely to continue through the summer. Efforts to accumulate reserves for next winter have not been successful as most current receipts are melted at once. Intensive collection programs are obtaining increasingly good results and automobile wrecking contributes a steady tonnage.

Steelmaking operations last week advanced ½-point to 99 per cent, the highest mark since June, 1941. However, with increased capacity this represents a much larger tonnage. Chicago advanced ½-point to equal its all-time record of 105 per cent. Cincinnati gained 1½ points to 89 per cent, Detroit 5 points to 92, Cleveland 6 points to 93½ and New England 8 points to 93 per cent. Cincinnati declined 5 points to 88 per cent. Unchanged rates were as follows: Buffalo, 93; Birmingham, 95; eastern Pennsylvania, 94; Pittsburgh, 95½; Wheeling, 82½; Youngstown, 94.

Wire and nail supply is restricted by diversion of semifinished steel to other uses, shortage being such that even integrated producers have difficulty in providing their own needs in wire rods. Wiremakers dependent on orders for rods are greatly hampered. Demand for wire and nails is heavy and supply is far from adequate. Government needs for nails are heavy for cantonment construction and crating of war supplies for shipment abroad requires large quantities.

Orders for fabricated structural steel continue to increase despite limitations set on private construction. American Institute of Steel Construction reports booking of 236,791 net tons in March, the largest monthly total since June, 1941, compared with 226,978 tons in February. March shipments were 184,715 tons, against 162,007 tons in February. Fabricators have 777,674 tons on books for fabrication.

Composite prices on steel and iron products are steady at prescribed ceilings. Finished steel composite is $56.73, semifinished steel $36.00, steelmaking pig iron $23.05 and steelmaking scrap $19.17.

COMPOSITE MARKET AVERAGES

	May 2	Apr. 25	Apr. 18	One Month Ago Apr., 1942	Three Months Ago Feb., 1942	One Year Ago May, 1941	Five Years Ago May, 1937
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$62.18
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	40.00
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	23.05	22.84
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	18.50

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania.

COMPARISON OF PRICES

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

Finished Material

	May 2, 1942	Apr. 1942	Feb. 1942	May 1941
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	2.49	2.47	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.22	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	2.10
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	2.10
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	2.55

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 ½-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron

	May 2, 1942	Apr. 1942	Feb. 1942	May 1941
Bessemer, del. Pittsburgh	$25.34	$25.34	$25.34	$25.34
Basic, Valley	23.50	23.50	23.50	23.50
Basic, eastern, del. Philadelphia	25.34	25.39	25.34	25.34
No. 2 fdry., del. Pgh., N.&S. Sides	24.69	24.69	24.69	24.69
No. 2 foundry, Chicago	24.00	24.00	24.00	24.00
Southern No. 2, Birmingham	20.38	20.38	20.38	20.38
Southern No. 2, del. Cincinnati	24.06	24.06	24.06	24.06
No. 2X, del. Phila. (differ. av.)	26.215	26.265	26.215	26.215
Malleable, Valley	24.00	24.00	24.00	24.00
Malleable, Chicago	24.00	24.00	24.00	24.00
Lake Sup., charcoal, del. Chicago	31.54	31.54	31.34	31.09
Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.19
Ferromanganese, del. Pittsburgh	140.65	125.63	125.33	125.33

Scrap

Heavy melting steel, Pitts.	$20.00	$20.00	$20.00	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.75	17.75
Heavy melting steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	21.50

Coke

Connellsville, furnace, ovens	$6.25	$6.25	$6.25	$5.70
Connellsville, foundry, ovens	7.25	7.25	7.25	6.30
Chicago, by-product fdry., del.	12.25	12.25	12.25	12.25

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. All seconds and off-grade products also are covered. Exceptions applying to invidividual companies are noted in the table.

Semifinished Steel

Gross ton basis except wire rods, skelp

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill.)

Alloy Steel Ingots: Pittsburgh base, uncropped, $45.00.

Rerolling Billets, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34.00; Detroit, del. $36.25; Duluth (bll.) $36.00.
(Wheeling Steel Corp. allocated 21,000 tons 2" square, base grade rerolling billets under lease-lend during first quarter 1942 at $37, f.o.b. Portsmouth, O.; Andrews Steel Co. may quote carbon steel slabs $41 gross ton at established basing points.)

Forging Quality Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40.00; Detroit, del. $42.25; Duluth, $42.00.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points.)

Open Hearth Shell Steel: Pittsburgh, Chicago, base 1000 tons one size and section: 3-12 in., $52.00; 12-18 in., $54.00; 18 in. and over, $56.00.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54.00.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel sheet bars at $39 gross ton, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Pt., Youngstown, Coatesville, lb., $1.90.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—9/32 in., inclusive, per 100 lbs., $2.00.
Do., over 9/32—47/64-in., incl., $2.15. Worcester add $0.10 Galveston, $0.25. Pacific Coast $0.50 on water shipment.

Bars

Hot-Rolled Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Detroit, del. 2.27c; New York del. 2.51c; Phila. del. 2.49c; Gulf Ports, dock 2.52c, all-rail 2.59c Pac. ports, dock 2.50c; all rail 3.25c.
(Phoenix Iron Co., Phoenixville, Pa., may quote 2.35c at established basing points.) Joslyn Mfg. Co. may quote 2.35c, Chicago base.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c Detroit 2.80c.

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.35	5100 Spr. flats	0.15
2100	0.75	5100 80-1.10 Cr	0.45
2300	1.70	6100 Bars	1.20
2500	2.35	6100 Spr. flats	0.85
3100	0.70	Carb., Van.	0.85
3200	1.35	9200 Spr. flats	0.15
3300	3.80	9200 Spr. rounds, squares	0.40
3400	3.20	T 1300, Mn. mean 1.51-2.00	0.10
4100 .15-25 Mo.	0.55	Do., carbon under 0.20 max.	0.35
46.00 .20-.30 Mo. 1.50-2.00; Ni.	1.20		

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.47c; Galveston, add $0.25, Pacific Coast $0.50.

Turned, Ground Shafting: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base (not including turning, grinding, polishing extras) 2.65c; Detroit 2.72c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.27c; Gulf ports, dock 2.50c, all-rail 2.59c; Pacific ports, dock 2.80c, all-rail 3.27c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, base 2.15c; Detroit, del. 2.27c; Gulf ports, dock 2.52c, all-rail 2.61c; Pacific ports, dock 2.80c, all-rail 3.25c.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill.

Iron Bars: Single refined, Pitts. 4.40c, double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, common, 2.15c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.10c; Granite City, base 2.20c; Detroit del. 2.22c; Phila. del. 2.28c; New York del., 2.35c Pacific ports 2.65c.
(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.17c; New York del. 3.41c; Phila. del. 3.39c; Pacific ports, 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c; Granite City, base 3.60c; New York del. 3.74c Phila. del. 3.68c; Pacific ports 4.05c.
(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh 4.25c.

Enameling Sheets: Pittsburgh, Chicago, Gary,

Cleveland, Youngstown, Middletown, 10 gage, base 2.75c; Granite City, base 2.85c; Pacific ports 3.40c.
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c; Granite City, base 3.45c; Pacific ports 4.00c.

Electrical Sheets, No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	.....
65	7.15c	7.90c	.....
58	7.65c	8.40c	.....
52	8.45c	9.20c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.22c; Pacific ports 2.75c. (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.92c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Worcester base 3.35c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c.

Manufacturing Ternes: Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets, 20 x 28 in., coating I.C., 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16.00; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.10c; New York, del., 2.30-2.55c; Phila., del., 2.15c; St. Louis, 2.34c; Boston, del., 2.42-67c; Pacific ports, 2.65c; Gulf Ports, 2.47c.
(Central Iron & Steel Co. may quote carbon steel plates at 2.35c at established basing points; Granite City Steel Co. may quote ship plates 2.25c, f.o.b. mill.)

Floor Plates: Pittsburgh, Chicago, 3.35c; Gulf ports, 3.72c; Pacific ports, 4.00c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c.

Wrought Iron Plates: Pittsburgh, 3.80c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del., 2.28c; Phila., del., 2.22c; Gulf ports, 2.47c; Pacific ports, 2.75c.
(Phoenix Iron Co., Phoenixville, Pa. may quote carbon steel shapes at 2.30c at established basing points.)

Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester):

Bright basic, bessemer wire	2.60c
Galvanized wire	2.60c
Spring wire	3.20c

Wire Products to the Trade:

Standard and cement-coated wire nails, polished and staples, 100-lb. keg	$2.55
Annealed fence wire, 100 lb.	3.05
Galvanized fence wire, 100 lb.	3.40
Woven fence, 12½ gage and lighter, per base column	67
Do., 11 gage and heavier	70
Barbed wire, 80-rod spool, col.	70
Twisted barbless wire, col.	70
Single loop bale ties, col.	59
Fence posts, carloads, col.	69
Cut nails, Pittsburgh, carloads	$3.85

Pipe, Tubes

Welded Pipe: Base price in carloads to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
⅛	56	33	½	24	3½
¼ & ⅜	59	40½	¾	30	10
½	63½	51	1-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
2	61	49½	1¼	23	3½
2½-3	64	52½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-10	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet, f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O. D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	.....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $40.00.
Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $40.00.
*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $28-$30.
Supplies: Angle bars, 2.70c; tie plates, 2.15c; track spikes, 3.00c; track bolts, 4.75c; do. heat treated, 5.00c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.: Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

High Speed Tool Steels:

Tung.	Chr.	Van.	Moly.	Pitts. base, per lb.
18.00	4	1		67.00c
18.00	4	2	1	77.00c
18.00	4	3	1	87.00c
1.5	4	1	8.5	54.00c
.....	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
311	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
*317	50.00	54.00	58.00	50.00	58.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
442	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	.....	§§18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price. **Emergency basing point** is the basing point at or near the place of production or origin of shipment.

Dislocated tonnage: Producers shipping material outside their usual marketing areas because of the war emergency may charge the basing point price nearest place of production plus actual cost of transportation to destination.

Seconds or off-grade iron or steel products cannot be sold at delivered prices exceeding those applying to material of prime quality.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941. Domestic or export extras may be used in case of Lease-Lend tonnage.

Bolts, 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	65½ off
Do., ⅝ and ⅝ x 6-in. and shorter	63½ off
Do., ¾ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts	56 off
Plow bolts	65 off

Nuts

Semifinished hex.	U.S.S.	S.A.E.
½-inch and less	62	64
⅝-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	..

Hexagon Cap Screws

Upset 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	68 off
Headless, ¼-in., larger	53 off
No. 10, smaller	60 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural	3.75c
⅞-inch and under	65-5 off
Wrought washers, Pittsburgh, Chicago Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	$6.00
Connellsville, foundry	7.00- 7.50
Connellsville prem. fdry.	7.25- 7.60
New River, foundry	8.00- 8.25
Wise county, foundry	7.50
Wise county, furnace	6.50

By-Product Foundry

Kearny, N. J., ovens	12.15
Chicago, outside delivered	11.50
Chicago, delivered	12.25
Terre Haute, delivered	12.00
Milwaukee, ovens	12.25
New England, delivered	13.75
St. Louis, delivered	12.25
Birmingham, ovens	8.50
Indianapolis, delivered	12.00
Cincinnati, delivered	11.75
Cleveland, delivered	12.30
Buffalo, delivered	12.50
Detroit, delivered	12.25
Philadelphia, delivered	12.38

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do. less than car lots	13.25c
Do. tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls. to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.00

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941. Exceptions indicated in footnotes. Allocation regulations from WPB Order M-17, expiring Dec. 31, 1942. Base prices bold face, delivered light face.

	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$25.00	$24.50	$26.00	$25.50
Newark, N. J., del.	26.62	26.12	27.62	27.12
Brooklyn, N. Y., del.	27.65	....	....	28.15
Birdsboro, Pa., del.	25.00	24.50	26.00	25.50
Birmingham, base	†20.38	†19.00	....	....
Baltimore, del.	25.67	....	....	....
Boston, del.	25.12	....	....	....
Chicago, del.	‡24.47	....	....	....
Cincinnati, del.	24.30	22.92	....	....
Cleveland, del.	24.12	23.24	....	....
Newark, N. J., del	26.24	....	....	....
Philadelphia, del.	25.51	25.01	....	....
St. Louis, del.	‡24.12	23.24	....	....
Buffalo, base	24.00	23.00	25.00	24.50
Boston, del.	25.50	25.00	26.50	26.00
Rochester, del.	25.53	....	26.53	26.03
Syracuse, del.	26.08	....	27.08	26.58
Chicago, base	24.00	23.50	24.50	24.00
Milwaukee, del.	25.17	24.67	25.67	25.17
Muskegon, Mich., del.	27.38	....	....	27.38
Cleveland, base	24.00	23.50	24.50	24.00
Akron, Canton, O., del.	25.47	24.97	25.97	25.47
Detroit, base	24.00	23.50	24.50	24.00
Saginaw, Mich., del.	26.45	25.95	26.95	26.45
Duluth, base	24.50	....	25.00	24.50
St. Paul, del.	26.76	....	27.26	26.76
Erie, Pa., base	24.00	23.50	25.00	24.50
Everett, Mass., base	25.00	24.50	26.00	25.50
Boston	25.50	25.00	26.50	26.00
Granite City, Ill., base	24.00	23.50	24.50	24.00
St. Louis, del.	24.50	24.00	....	24.50
Hamilton, O., base	24.00	23.50	....	24.00
Cincinnati, del.	24.68	24.68	....	25.35
Neville Island, Pa., base	24.00	23.50	24.50	24.00
§Pittsburgh, del., No. & So. sides	24.69	24.19	25.19	24.69
Provo, Utah, base	22.00	....	....	....
Sharpsville, Pa., base	24.00	23.50	24.50	24.00
Sparrows Point, Md., base	25.00	24.50	....	....
Baltimore, del.	26.05	....	....	....
Steelton, Pa., base	....	24.50	....	25.50
Swedeland, Pa., base	25.00	24.50	26.00	25.50
Philadelphia, del.	25.89	25.39	....	26.39
Toledo, O., base	24.00	23.50	24.50	24.00
Mansfield, O., del.	26.06	25.56	26.56	26.06
Youngstown, O., base	24.00	23.50	24.50	24.00

•Basic silicon grade (1.75-2.25%), add 50c for each 0.25%. †For phosphorous 0.70 and over deduct 38c. ‡Over 0.70 phos. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

High Silicon, Silvery

6.00-6.50 per cent (base)	$29.50		
6.51-7.00	$30.50	9.01- 9.50	$35.50
7.01-7.50	31.50	9.51-10.00	36.50
7.51-8.00	32.50	10.01-10.50	37.50
8.01-8.50	33.50	10.51-11.00	38.50
8.51-9.00	34.50	11.01-11.50	39.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling irons, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn.	$28.00
Chicago, del.	31.54

Southern

Semi-cold blast, high phos, f.o.b. furnace, Lyles, Tenn.	$28.50
Semi-cold blast, low phos., f.o.b furnace, Lyles, Tenn.	33.00

Gray Forge

Neville Island, Pa.	$23.50
Valley, base	23.50

Low Phosphorus

Basing points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50 base; $30.81, delivered, Philadelphia.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorous Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorous content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Ceiling prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Pittsburgh Coke & Iron Co. (Sharpsville, Pa. furnace only) and Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic, Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton, effective April 20, 1942.

Export Prices: In case of exports only, the governing basing point nearest point of production may be used, plus differentials and export transportation charges.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick	
Super Quality	
Pa., Mo., Ky.	$64.60
First Quality	
Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00
Ohio	43.00
Second Quality	
Pa., Ill., Ky., Md., Mo.	46.55
Georgia, Alabama	38.00
New Jersey	49.00
Ohio	36.00
Malleable Bung Brick	
All bases	$59.85
Silica Brick	
Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30
Ladle Brick (Pa., O., W. Va., Mo.)	
Dry press	$31.00
Wire cut	29.00
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	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Washed gravel, duty pd., tide, net ton	nominal
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	$25.00
Do., barge	25.00
No. 2 lump	25.00

Ferroalloy Prices

Ferromanganese: 78-82%, carlots, gross ton, duty paid, Atlantic ports, $120; Del. Pittsburgh $140.65; f.o.b. Southern furnaces $135; Add $6 per gross ton for packed carloads $10 for ton, $13.50 for less-ton and $18 for less than 200-lb. lots, packed.

Spiegeleisen: 19-21%, carlots per gross ton, Palmerton, Pa. $36.

Manganese Briquets: Contract basis in carloads per pound, bulk freight allowed 5.50c; packed 5.75c; ton lots 6.00c; less-ton lots 6.25c; less 200-lb. lots 6.50c. Spot prices ¼-cent higher.

Electrolytic manganese: 99.9% plus, less carlots, per lb. 42.00c.

Chromium Metal: Per lb. contained chromium in gross ton lots, contract basis, freight allowed, 98% 80.00c, 88% 79.00c. Spot prices 5 cents per lb. higher.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, f.o.b. Niagara Falls, N. Y. $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: 66-70%, per lb. contained chromium in carloads, freight allowed, 4-6% carbon 13.00c; ton lots 13.75c; less-ton lots 14.00c; less than 200-lb. lots 14.25c. 66-72%, low carbon grades:

	Car loads	Ton lots	Less ton	Less 200 lbs.
2% C.	19.50c	20.25c	20.75c	21.00c
1% C.	20.50c	21.25c	21.75c	22.00c
0.20% C.	21.50c	22.25c	22.75c	23.00c
0.10% C.	22.50c	23.25c	23.75c	24.00c

Spot is ¼c higher.

Chromium briquets: Contract basis in carloads per lb., freight allowed 8.25c; packed 8.50c; gross ton lots 8.75c; less-ton lots 9.00c; less 200-lb. lots 9.25c. Spot prices ¼-cent higher.

Ferromolybdenum: 55-75%, per lb. contained molybdenum, f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Calcium Molybdate (Molyte): 40-45%, per lb. contained molybdenum, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, 80.00c.

Molybdic Oxide Briquets: 48-52%, per lb. contained molybdenum, f.o.b. Langeloth, Pa., any quantity 80.00c.

Molybdenum Oxide: 53-63%, per lb. contained molybdenum in 5 and 20 lb. molybdenum contained cans, f.o.b. Langeloth and Washington, Pa., any quantity 80.00c.

Molybdenum Powder: 99% per lb. in 200-lb. kegs, f.o.b. York, Pa. $2.60; 100-200 lb. lots $2.75; under 100-lb. lots $3.00.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrophosphorus: 23-26%, based on 24% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Mt. Pleasant, Tenn.; contract price $75, spot $80.

Ferrosilicon: Contract basis in gross tons per carload, bulk, freight allowed; unitage applies to each 1% silicon above or below base.

	Carloads	Ton lots
50%	$ 74.50	$ 87.00
Unitage	1.50	1.75
75%	135.00	151.00
Unitage	1.80	2.00
85%	170.00	188.00
Unitage	2.00	2.20
90-95%	10.25c	11.25c

Spot prices ¼-cent higher.

Silicon Metal: Contract basis per lb., f.o.b. producers' plants, freight allowed; 1% iron; carlots 14.50c, ton lots 15.00c, less-ton lots 15.25c, less 200 lbs. 15.50c.

Silicon Metal: Contract basis per lb.; 2% iron; carlots 13.00c, ton lots 13.50c, less-ton lots 13.75c, less 200 lbs. 14.00c. Spot prices ¼-cent higher.

Silicon Briquets: Contract basis; in carloads, bulk freight allowed, per ton $74.50; packed $80.50; ton lots $84.50; less-ton lots per lb. 4.00c; less 200-lb. lots per lb. 4.25c. Spot ¼-cent per lb. higher on less-ton lots; $5 per ton higher on ton lots and over.

Silicomanganese: Contract basis freight allowed, 1½% carbon; in carloads per gross ton $128; ton lots $140.50. Spot $5 per ton higher.

Ferrotungsten: Carlots, per lb. contained tungsten, $1.90.

Tungsten Metal Powder: 98-99%, per lb. any quantity $2.55-2.65.

Ferrotitanium: 40-45%, f.o.b. Niagara Falls, N. Y., per lb. contained titanium; ton lots $1.23; less-ton lots $1.25. Spot 5 cents per lb. higher.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20%, Contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Ferrovanadium: 35-40%, contract basis, per lb. contained vanadium, f.o.b. producer's plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Vanadium Pentoxide: Contract basis, per lb. contained vanadium pentoxide, any quantity $1.10. Spot 5 cents per lb. higher.

Zirconium Alloys: 12-15%, contract basis, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot $5 per ton higher.

Zirconium alloy: 35-40%, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼-cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) Contract basis, f.o.b. Niagara Falls, N. Y., per lb. 7.50c; ton lots 8.00c. Spot ½-cent higher.

Simanal: (Approx. 20% each silicon, manganese, aluminum) Contract basis, freight allowed, per lb. of alloy; carlots 10.50c; ton lots

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials. As of April 16, 1941

	Soft Bars	Hot-rolled Strip Bands	Hot-rolled Strip 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 S.A.E. 2300	Cold Drawn Bars S.A.E. 3100
Boston	3.98	4.06	5.06	3.85	3.85	5.66	3.71	4.68	5.11	3.46	4.13	8.88	7.23
New York (Met.)	3.84	3.96	3.96	3.76	3.75	5.56	3.58	4.60	5.00	3.51	4.09	8.84	7.19
Philadelphia	3.85	3.95	4.45	3.55	3.55	5.25	3.55	4.05	4.65	3.31	4.06	8.56	7.16
Baltimore	3.85	4.00	4.35	3.70	3.70	5.25	3.50	....	5.05	....	4.04	....	....
Norfolk, Va.	4.00	4.10	....	4.05	4.05	5.45	3.85	....	5.40	....	4.15	....	....
Buffalo	3.35	3.82	3.82	3.62	3.40	5.25	3.25	4.30	4.75	3.52	3.75	8.40	6.75
Pittsburgh	3.35	3.60	3.60	3.40	3.40	5.00	3.35	....	4.65	....	3.65	8.40	6.75
Cleveland	3.25	3.50	3.50	3.40	3.58	5.18	3.35	4.05	4.62	3.20	3.75	8.40	6.75
Detroit	3.43	3.43	3.68	3.60	3.65	5.27	3.43	4.30	4.84	3.40	3.80	8.70	7.05
Omaha	4.10	4.20	4.20	4.15	4.15	5.75	3.85	5.32	5.50	....	4.42	....	....
Cincinnati	3.60	3.67	3.67	3.65	3.68	5.28	3.42	4.37	4.92	3.45	4.00	8.75	7.10
Chicago	3.50	3.60	3.60	3.55	3.55	5.15	3.25	4.10	4.85	3.50	3.75	8.40	6.75
Twin Cities	3.75	3.85	3.85	3.80	3.80	5.40	3.50	4.35	5.00	3.83	4.34	9.09	7.44
Milwaukee	3.63	3.53	3.53	3.68	3.68	5.28	3.38	4.23	4.98	3.54	3.88	8.38	6.98
St. Louis	3.64	3.74	3.74	3.69	3.69	5.29	3.39	4.24	4.99	3.61	4.02	8.77	7.12
Indianapolis	3.60	3.75	3.75	3.70	3.70	5.30	3.45	....	5.01	....	3.97	....	....
Chattanooga*	3.80	4.00	4.00	3.85	3.85	5.80	3.75	....	4.50	....	4.39	....	....
Memphis	3.90	4.10	4.10	3.95	3.95	5.71	3.85	....	5.25	....	4.31	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.93	3.45	....	4.75	....	4.43	....	....
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	5.25	5.00	4.60	....	....
Houston, Tex.	3.75	4.30	4.30	4.05	4.05	5.50	4.00	....	5.25	....	6.90	....	....
Seattle	4.20	4.25	5.45	4.75	4.45	6.50	4.65	7.60	5.70	....	5.75	....	....
Los Angeles	4.50	4.95	6.80	4.50	4.50	6.75	4.65	6.50	5.85	....	6.10	10.55	9.55
San Francisco	3.95	4.50	6.25	4.65	4.35	6.35	4.55	6.40	6.10	....	6.80	10.80	9.80

*Not named in OPA price order.

	S.A.E. Hot-rolled Bars (Unannealed) 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.28	7.75	6.05	5.80	7.90
New York (Met.)	4.04	7.60	5.90	5.65	....
Philadelphia	4.10	7.56	5.86	5.61	8.56
Baltimore	4.45	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.35	5.65	5.40	7.50
Pittsburgh	3.40	7.45	5.75	5.50	7.60
Cleveland	3.30	7.55	5.85	5.85	7.70
Detroit	3.48	7.67	5.97	5.72	7.19
Cincinnati	3.65	7.69	5.99	5.74	7.84
Chicago	3.70	7.35	5.65	5.40	7.50
Twin Cities	3.95	7.70	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.84	7.72	6.02	5.77	7.87
Seattle	6.25	....	8.00	7.85	8.65
Los Angeles	4.80	9.55	8.55	8.40	8.80
San Francisco	5.45	9.80	8.80	8.65	9.05

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; 300-9999 Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in B'ham., Memphis.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Omaha, Kansas City, St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 750-4999 in San Francisco; 300-4999 in Portland, Seattle; any quantity in Twin Cities, New Orleans; 300-1999 Los Angeles.

Galvanized Sheets: Base, 150-1499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 150-1049 in Los Angeles; 300-10,000 in Portland, Seattle; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis, Tulsa; 3500 and over in Chattanooga; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; 25 to 49 bundles in Philadelphia; 750-4999 in San Francisco.

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, 500-999, Los Angeles, 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.

EUROPEAN IRON, STEEL PRICES

Dollars at $4.02½ per Pound Sterling

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	BRITISH Gross Tons f.o.b. U.K. Ports	£	s	d
Merchant bars, 3-inch and over	$66.50	16	10	0
Merchant bars, small, under 3-inch, re-rolled	3.60c	20	0	0
Structural shapes	2.95c	15	10	0
Ship plates	2.90c	16	2	6
Boiler plates	3.17c	17	12	6
Sheets, black, 24 gage	4.00c	22	5	0
Sheets, galvanized, corrugated, 24 gage	4.61c	25	12	6
Tin plate, base box, 20 x 14, 108 pounds	$ 6.20	1	10	9

British ferromanganese $120.00 delivered Atlantic seaboard duty-paid.

Domestic Prices Delivered at Works or Furnace—

	£	s	d
Foundry No. 3 Pig Iron, Silicon 2.50—3.00	$25.79	6	8 0(a)
Basic pig iron	24.28	6	0 6(a)
Furnace coke, f.o.t. ovens	7.56	1	17 6
Billets, basic soft, 100-ton lots and over	49.37	12	5 0
Standard rails, 60 lbs. per yard, 500-ton lots & over	2.61c	14	10 6
Merchant bars, rounds and squares, under 3-inch	3.17c	17	12 0††
Shapes	2.77c	15	8 0††
Ship plates	2.91c	16	3 0††
Boiler plates	3.06c	17	0 6††
Sheets, black, 24 gage, 4-ton lots and over	4.10c	22	15 0
Sheets, galvanized 24 gage, corrugated, 4-ton lots & over	4.70c	26	2 6
Plain wire, mild drawn, catch weight coils, 2-ton lots and over	4.28c	23	15 0
Bands and strips, hot-rolled	3.30c	18	7 0

(a) del. Middlesbrough 5s rebate to approved customers. ††Rebate 15s on certain conditions.

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	12.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	8.00c

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

Gross ton c.i.f. Baltimore; dry basis; subject to penalties for guarantees

Indian and African, 2.8:1 lump, 48%	$39.00
South African (excluding war risk)	
No ratio lump, 44%	28.00
Do. 45%	29.00
Do. 48%	34.00
Do. concentrates, 48%	33.00
Do. 50%	34.00
Brazilian (nominal)	
2.5:1 lump, 44%	31.00
2.8:1 lump, 44%	32.50
3:1 lump, 48%	41.00
No ratio lump, 48%	35.00-35.50
Do. concentrate, 48%	33.00-33.50

Manganese Ore

Including war risk but not duty, cents per unit cargo lots

Caucasian, 50-52%	
S. African, 48%	65.00
Indian, 50%	68.00-70.00
Brazilian, 48%	
Chilean, 48%	68.00-69.00
Cuban, 51%, duty free	83.00-85.00

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

PRICES FOR OTHER THAN RAILROAD SCRAP

				ELECTRIC FURNACE AND FOUNDRY GRADES										
				Low Phos. Grades										
	OPEN HEARTH GRADES*	Machine Shop Turnings	BLAST FURNACE GRADES*	Billet, Bloom Forge Crops	Bar Crops and smaller; Punchings, Plate	Heavy Structural, Plate 3 ft. and less	Heavy Structural, Plate 2 ft. and less	Heavy Structural, Plate 1 ft. and less	Cut Auto Scrap 3 ft. and less	Cut Auto Scrap 2 ft. and less	Cut Auto Scrap 1 ft. and less	Alloy-Free Low Phos. & Sulphur Turnings	First Cut Heavy Axle & Forge Turnings	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Johnstown, Midland, Monessen, Sharon, Steubenville, Weirton, Canton, Youngstown, Warren	$20.00	$16.00	$16.00	$25.00	$22.50	$21.00	$21.50	$22.00	$20.00	$20.50	$21.00	$18.00	$19.50	$21.00
Claymont, Coatesville, Harrisburg, Conshohocken, Phoenixville	18.75	14.75	14.75	23.75	21.25	19.75	20.25	20.75	18.75	19.25	19.75	16.75	18.25	19.75
Bethlehem	18.25	14.25	14.25	23.25	20.75	19.25	19.75	20.25	18.25	18.75	19.25	16.25	17.75	19.25
Buffalo	19.25	15.25	15.25	24.25	21.75	20.25	20.75	21.25	19.25	19.75	20.25	17.25	18.75	20.25
Cleveland, Middletown, Cincinnati, Portsmouth, Ashland	19.50	15.50	15.50	24.50	22.00	20.50	21.00	21.50	19.50	20.00	20.50	17.50	19.00	20.50
Detroit	17.85	13.85	13.85	22.85	20.35	18.85	19.35	19.85	17.85	18.35	18.85	15.85	17.35	18.85
Toledo	...	13.85	13.85	...	...	...	...	...	...	...	...	...	...	...
Chicago	18.75	14.75	14.75	23.75	21.25	19.75	20.25	20.75	18.75	19.25	19.75	16.75	18.25	19.75
Kokomo	18.25	14.25	14.25	23.25	20.75	19.25	19.75	20.25	18.25	18.75	19.25	16.25	17.75	19.25
Duluth	18.00	14.00	14.00	23.00	20.50	19.00	19.50	20.00	18.00	18.50	19.00	16.00	17.50	19.00
St. Louis	17.50	13.50	13.50	22.50	20.00	18.50	19.00	19.50	17.50	18.00	18.50	15.50	17.00	18.50
Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburg, Calif.	17.00	13.00	13.00	22.00	19.50	18.00	18.50	19.00	17.00	17.50	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	12.50	12.50	21.50	19.00	17.50	18.00	18.50	16.50	17.00	17.50	14.50	16.00	17.50
Seattle	14.50	10.50	10.50	19.50	17.00	15.50	16.00	16.50	14.50	15.00	15.50	12.50	14.00	15.50
Portland, Oreg.	...	...	...	...	15.50	14.00	14.50	15.00	13.00	13.50	14.00	11.00	12.50	14.00

RAILROAD SCRAP

	Heavy Melting Steel	Scrap Rails	Rails for Rolling	Scrap Rails 3 ft. and under	Scrap Rails 2 ft. and under	Scrap Rails 18 in. and under
Pittsburgh, Wheeling, Steubenville, Sharon, Youngstown, Canton	21.00	22.00	23.50	24.00	24.25	24.50
Philadelphia, Wilmington, Sparrows Point	19.75	20.75	22.25	22.75	23.00	23.25
Cleveland, Cincinnati, Middletown, Ashland, Portsmouth	20.50	21.50	23.00	23.50	23.75	24.00
Chicago	19.75	20.75	22.25	22.75	23.00	23.25
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Kokomo	19.25	20.25	21.75	22.25	22.50	22.75
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00
Birmingham	18.00	19.00	20.50	21.00	21.25	21.50
Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Seattle	15.50	16.50	18.00	18.50	18.75	19.00

CAST IRON SCRAP OTHER THAN RAILROAD

(Shipping point prices in gross tons)

	Group A	Group B	Group C
No. 1 Cupola Cast	$18.00	$19.00	$20.00
No. 1 Machinery Cast, Drop Broken, 150 lbs. & Under	18.00	19.00	20.00
Clean Auto Cast	18.00	19.00	20.00
Stove Plate	17.00	18.00	19.00
Unstripped Motor Blocks	17.50	18.50	19.50
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Miscellaneous Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C includes states not named in groups A and B, plus Kansas City, Kans.-Mo.

*Open Hearth Grades refer to No. 1 heavy melting steel, No. 1 hydraulic compressed black sheet scrap, No. 2 heavy melting steel, dealers' No. 1 bundles, dealers' No. 2 bundles and No. 1 busheling. Blast Furnace Grades refer to mixed borings and turnings, shoveling turnings, No. 2 busheling and cast iron borings. Add $5 per ton for chemical borings containing not over 0.5 per cent oil content.

A basing point includes the switching district of the city named. The Pittsburgh basing point includes the switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Pa. Cincinnati basing point includes the switching district of Newport, Ky. St. Louis basing point includes the switching districts of Granite City, East St. Louis and Madison, Ill. San Francisco basing point includes the switching districts of South San Francisco, Niles and Oakland, Calif.

Inferior Grades: Maximum prices of inferior grades shall continue to bear the same differential below the corresponding listed grades as existed from Sept. 1, 1940, to Jan. 31, 1941. No premium allowed on grades considered superior, unless approved by OPA. Addition of special preparation charges prohibited. Purchase of electric furnace or foundry grades for open hearth or blast furnace use permitted only at no more than price for corresponding open hearth grade. Exceptions: Low phos. billet, bloom and forge crops and electric furnace bundles may exceed open hearth price, and electric furnace bundles may exceed blast furnace price, if material is delivered to the consumer direct from the original industrial producer.

Commissions: No commission is payable except by a consumer to a broker for services rendered, the commission not to exceed 50 cents per gross ton. No commission is payable unless: The broker guarantees the quality and delivery of an agreed tonnage the scrap is purchased at a price no higher than the maximum allowed; the broker sells the scrap to the consumer at the same price at which he purchased it; the broker does not split the commission with the seller of the scrap, with another broker or sub-broker, or with the consumer. Commissions must be shown as separate item on invoice.

Maximum Shipping Point Price: Where shipment to consumer is by rail, vessel or combination of both, scrap is at its shipping point when it has been placed f.o.b. railroad car or f.a.s. vessel. In such cases, maximum shipping point prices are: (1) For shipping points located within a basing point, the price listed in the above table for scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point; and (2) for shipping points located outside a basing point, the price in the above table for scrap at the most favorable basing point, minus the lowest transportation charge by rail, water or combination thereof. When vessel movement is involved, dock charges shall be 50 cents at Memphis, $1 at Great Lakes ports, $1.25 at New England ports, 75 cents elsewhere. New England shipping point prices computed on most favorable basing point prices; maximum transportation charge on scrap from New England, $6.65 per ton.

Scrap shipped by motor vehicle is at its shipping point when loaded. For shipping points within basing points, maximum is price listed in table minus lowest switching charge. When outside basing point, maximum is price at most favorable basing point minus lowest established charge when hauled by common carrier. When hauled by seller charges are based on carload rate for rail shipment, minimum $1.00 per ton.

Maximum Delivered Prices: Determined by adding established transportation charges to shipping point price, not to exceed by more than $1 (plus freight rate increase March 18, 1942) the prices listed in the table for the nearest basing point. Certain exceptions specified in Revised Price Schedule No. 4 (Amendment 1) apply to St. Louis district consumers, to WPB allocations, to water shipments from Duluth or Superior, Wis., to shipments of billets, blooms and forge crops from Pittsburgh and to shipments of electric and foundry grades from Michigan; to shipments of turnings to ferroalloy producers and of borings to chemical users. Delivered prices of scrap shipped under WPB allocations may exceed prices at nearest basing point by more than $1, provided most economical transportation is used.

Unprepared Scrap: Above prices are for prepared scrap. Maximum prices for unprepared scrap are $2.50 less (railroad grades $3.50 less) than for the corresponding grades of prepared scrap, except for heavy breakable cast. In no case shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Graveyard autos not considered unprepared scrap.

Remote Scrap: Consists of all grades, except railroad scrap, located in Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas, Oklahoma, Oregon, Washington and Utah. Delivered price may exceed by not more than $5 the price at the basing point nearest consumer's plant, provided sworn details furnished OPA. Permission required to exceed by more than $5 the nearest basing point price. Colorado scrap is remote scrap for Colorado consumers only.

LOGEMANN
Presses for Sheet Scrap

THE NATION NEEDS YOUR SHEET SCRAP!

In mills, industrial plants and scrap yards, LOGEMANN SCRAP PRESSES are working day and night to prepare sheet scrap for the furnaces.

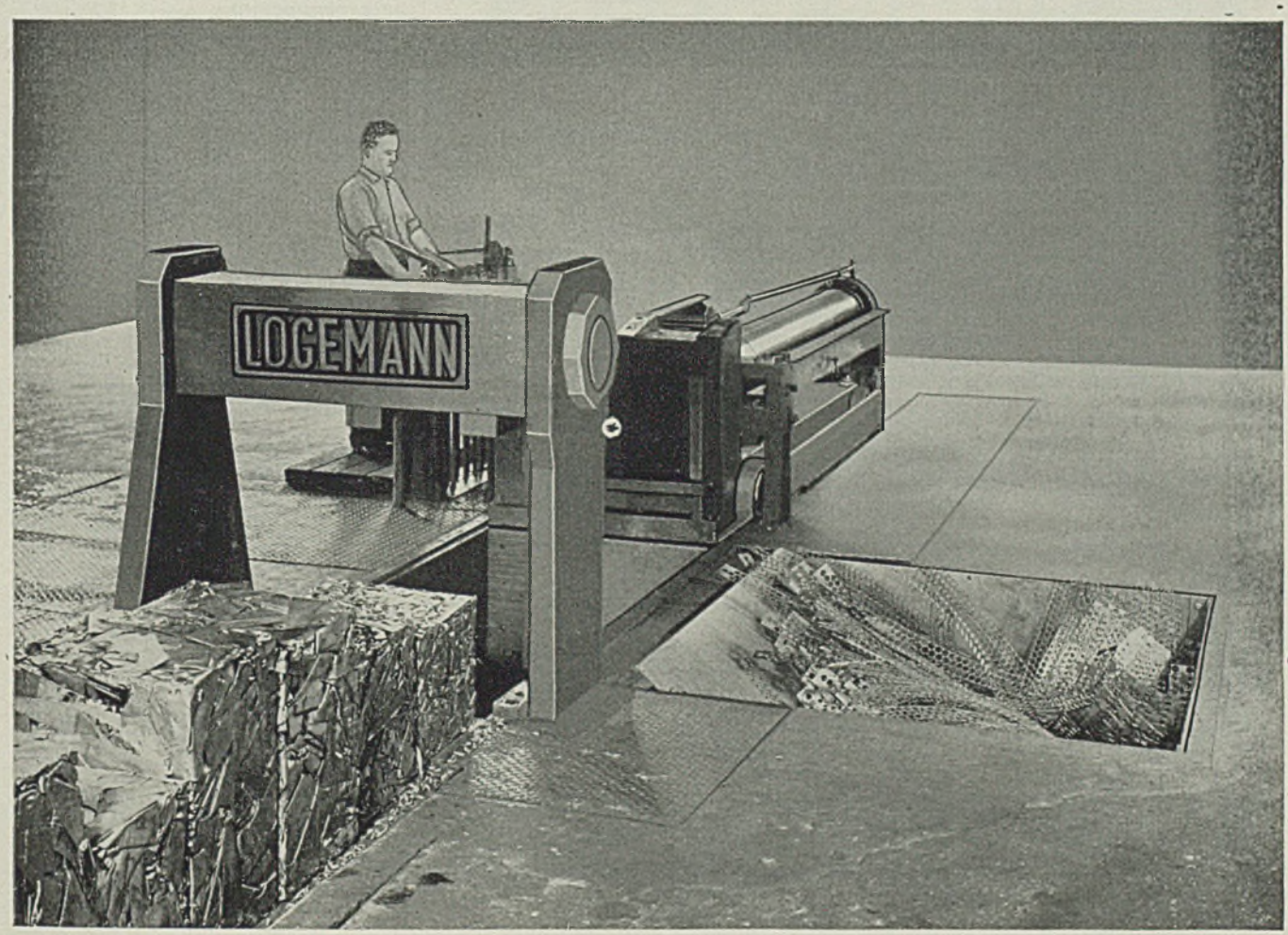
Sheet mills particularly recognize the value of the years of experience and the performance records which back up LOGEMANN designs and workmanship.

The line includes scrap presses *designed for mill service,* presses *designed for automobile plant conditions,* presses *designed for general plant applications.*

Write for details.

The scrap press illustrated operates in one of the largest industrial plants. Compresses scrap from three directions to produce high-density mill size bundles. Built in various capacities.

LOGEMANN BROTHERS COMPANY
3126 W. Burleigh St., Milwaukee, Wisconsin



Sheets, Strip

Sheet & Strip Prices, Page 120

Some sheetmakers find themselves in almost as tight a position as producers of plates and bars, and in general can give little promise of delivery on orders under A-1-b. However, these are the exception and most mills can handle hot and cold-rolled tonnage within six or seven weeks on ratings down to A-1-j. War demands are increasing and recently have included fairly heavy tonnage for blitz cans, taking sheets of about 20 gage.

Stocks of unused automobile sheets are being brought out, with an accessory manufacturer in the East offering a substantial tonnage of hot-rolled sheets and cold-rolled strip, principally the latter.

Total sheet consumption tends downward, war requirements in the aggregate not filling the gap resulting from elimination of nonessential consumer goods. Some industries are an exception, notably shipbuilding and shops converted to war production. In converting some fabricators are using heavier materials. Mill backlogs have been reduced by dropping orders for civilian uses and wherever possible schedules have been shortened to allow early rolling on rush allocations.

Market for steel sheet seconds, rejects and other grades failing to pass inspection for prime quality has been greatly restricted by limitations on output of durable consumer goods, in which much of this grade of sheets had been used. Much of the imperfections have been such as to cause no impairment. Sheetmakers find a problem to distribute these sheets under present conditions.

Narrow cold strip bookings in April were heavier and in excess of shipments, but the gains are partially offset by substantial cancelling of low or unrated volume. New orders are largely in the A-1-a category and accumulating, setting back deliveries, especially on high carbon, to July and August. Buying by new consumers of cold strip engaged in the manufacture of war products is heavy with specification changes frequent. Alloy material is practically under allocation, geared to controls of alloys and an increase in direct allotment of carbon strip volume is considered probable.

Plates

Plate Prices, Page 121

Plate allocations for May point to increased emphasis on shipbuilding requirements. Some producers of sheared plates say they have less of this tonnage than in April but that ratings continue high, with some sheared plate producers having been allocated no tonnage under A-1-a and others nothing under A-1-c. Few plates of any description are available below A-1 classification, unless covered by special directives. Some exceptions are to be noted under universal plates and occasional overages are available, which jobbers are quick to take when given an opportunity. Such material is in small total.

It is believed plate production in May will reach a peak of about 1,000,000 tons, an increase of 100,000 to 125.000 tons over the estimate for April.

Maritime Commission leads in plate requirements with the Navy a close second. Part of the success in meeting plate delivery schedules is due to consumers' acceptance of plates rolled on continuous mills with mill edges instead of insisting on sheared edges. Continuous mill plates are being rolled with a minimum of oversize, shearing in consumers' plants being expedited.

Pipe

Pipe Prices, Page 121

Merchant pipe is increasingly difficult to obtain, especially that made from open-hearth steel. Some producers are advising their distributors they cannot promise definite shipments on much under A-1-a. The situation is easier in pipe made from Bessemer steel. Some producers with stocks can offer good delivery on A-9 rating and where the pipe has to be produced can ship fairly early on A-3 rating.

With tighter control on pig iron allocations, as a result of the new PD-69 form, it appears probable this will be reflected in bessemer steel, with the likelihood of deliveries on bessemer products being extended.

Bars

Bar Prices, Page 120

Bar demand continues to increase, pressing plates closely for first place. High priorities, capped by directives, form a topheavy situation, with deliveries impossible on lower ratings.

Deliveries on most alloy bars now extend six to eight months on top ratings, with direct allocations frequent, further delaying high priority tonnage. Material on lower priorities frequently is given higher rating. Most drill rod steel is moving on A-1-a, replacements being difficult below that. Little high-speed steel is available below A-1-b.

Forging plants, which have been heavily booked for many months and are operating close to capacity, soon will have sufficient backlogs for the remainder of the year.

A recent WPB ruling allowing A-1-a rating on some types of agricultural implements gives these manufacturers a better position. Bars form a large part of the raw material for these implements. In view of this assistance the industry is setting up schedules for the next two months. Change in the rating of army trucks from A-1-f to A-1-a carries requirements of truck builders into the congested area of mill books but will assist in meeting truck deliveries.

Wire

Wire Prices, Page 121

Wire rod supply continues to limit ware production, much steel being diverted to other uses. Even integrated wiremakers have difficulty in supplying their finishing departments. Orders for wire and specialties exceed production and shipments. Most bookings take ratings of A-1-c or higher and include heat treating and processing requirements involving four to eight weeks. Ratio of high carbon bars, notably in rounds, is substantial. Music and spring wire are strong and war requirements large. Substantial supplemental orders for wire rope have been placed recently.

Need for wire fencing and nails are heavy and stocks of distributors are light. Merchant wire supply has been reasonably adequate but limitations are expected which would restrict further the supply for agricultural purposes.

Rails, Cars

Track Material Prices, Page 121

Opinion grows that restrictions on freight car building under WPB rulings will practically stop construction of steel box cars and most new equipment will be flats, hoppers and gondolas. Use of wood in these types seems unlikely in view of the hard use to which they are put in carrying ore, coal and other bulk commodities.

Reports that most of the limited car construction will be in railroad shops rather than by commercial builders indicate an effort by WPB to force conversion of the latter to war production. Much of this has been done already but change to the new lines is a difficult process and will require much time.

Inquiry for new cars has slowed to practically nothing and WPB approval is necessary before orders can be placed. The latter is obtainable only after careful consideration of the situation.

Structural Shapes

Structural Shape Prices, Page 121

Disposition to conserve steel in building construction is demontsrated by decision to use timber construction in a huge plant originally designed to take 12,000 tons of steel. This plant is to be operated by the Edward G. Budd Mfg. Co., Philadelphia. Other buildings being redesigned for wood include a plant for SKF Industries Inc., which would have required 1600 tons of steel, and a Marine Corps warehouse, 600 tons.

First contracts for approximately 57,820 tons of structural steel for engineering projects, locks and gates for export are being awarded, the outstanding pending inquiry being placed by three contractors. In addition close to 115,000 tons of concrete reinforcing bars are needed; also 5675 tons of steel forgings and castings with miscellaneous steel. Part of this

tonnage is likely to be allocated, notably bars, and there is considerable difference among fabricators and buyers as to fabricated structural steel prices.

Larger structural fabricators are operating at capacity on war contracts but smaller plants are not so heavily booked with this type of work and, faced by restrictions on private building, are running light. Some have been able to take on subcontract work. Principal problem of fabricators is to obtain mill deliveries promptly to meet schedules.

Bookings of fabricated structural steel in March were the largest since June, 1941, according to reports to the American Institute of Steel Construction. March bookings totaled 236,791 net tons, compared with 226,978 tons in February and 206,072 tons in March, 1941. Shipments in March were 184,715 tons, in February 162,007 tons and in March last year 170,161 tons. Bookings for first quarter were 98 per cent of the total for first quarter last year, while first quarter shipments were 3 per cent larger than for the comparable period in 1941. Tonnage available for future fabrication at the end of March was 777,674 tons.

Reinforcing Bars

Reinforcing Bar Prices, Page 121

Reinforcing bar requirements are heavier and material is difficult to obtain except on highest priorities. Office of Price Administration is working on a price schedule for reinforcing bars. Proposed ceilings are said to be $2.40 per 100 pounds, plus freight charges, for fabricators and $2.15 f.o.b. nearest basing point for mills. Fabricators qualifying as such may charge $2.40 plus freight from mill to shop and freight from shop to point of delivery. If a contractor does the cutting and bending on the job the suggested price will be $2.15, nearest basing point, whether shipped by mill or jobber. Mills would be allowed to give a functional discount of 25 cents to jobbers, making the net to jobber $1.90, if shipped to warehouse, in quantities over 20 tons, in lengths of 30 feet or more, at one time.

Of principal producers of reinforcing bars one is booking nothing under A-1-a, another A-1-c, two at A-1-e and a fifth at A-1-h. Heavy new tonnage is likely to change this situation at any time.

Pig Iron

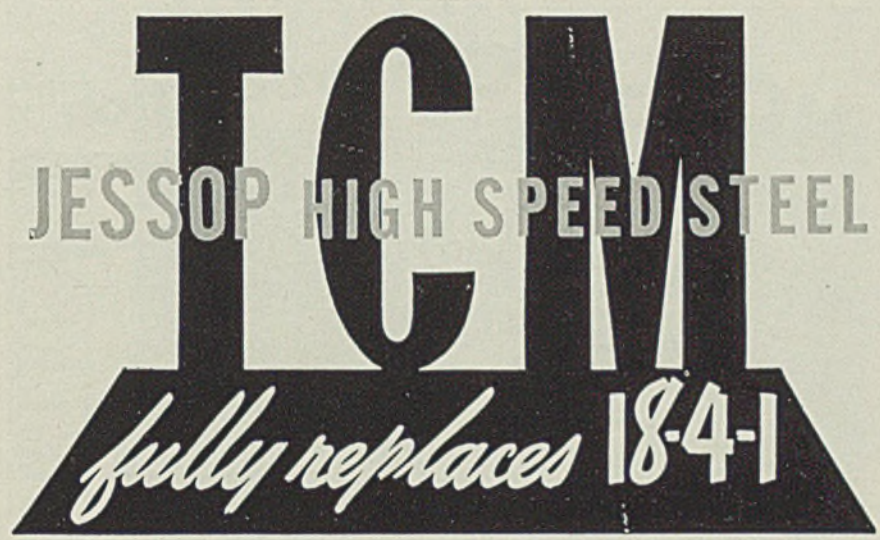
Pig Iron Prices, Page 122

A revised PD-69 form has been issued for consumers of pig iron, which is expected to tighten distribution and direct it into most needed channels. In the new form requests will be regrouped, one group including A-1-a to A-1-k, another A-2 and A-3, a third A-4 to to A-8, another A-9 and the last covering A-10. More detailed information is required relative to the ultimate use of the iron in connection with requests in the lower ratings. Many applications for June supply already have been filed and these may not be revised to conform to the new schedule.

Under the recent amendment to order M-21 foundries will not be allowed to supply castings for work taking less than A-10 rating and the effect of this curtailment is being studied. A survey by an eastern pig iron producer indicates that not more than 20 to 25 per cent of foundry bookings in his district are for work lower than A-10. It is believed this percentage will be reduced sharply as castings consumers make special effort to obtain higher ratings. Until recently they have been able to get along comfortably and thus were not aggressive in obtaining preferences. Under changed conditions it will be necessary to establish ratings in line with requirements of their orders.

Pig iron supply in May for New England melters will be from a broader range of producers as total tonnage for that district increases. Shipments from the district producer's reserve will be about the same as in April. The larger allocation reflects smaller inventories of large consumers. Mystic furnace, Everett, Mass., will be blown in late in May after relining.

Pig iron supply has been increased materially by new production records made by numerous



Jessop TCM High Speed Steel is the answer to restrictions on tungsten high speed steels. TCM is a low tungsten-molybdenum steel that cuts as well or better than 18-4-1.

There is no change in operating equipment necessary in using TCM High Speed Steel, because it is heat treated in the same furnace and the same atmosphere as 18-4-1 High Speed Steel. TCM Steel has a lower hardening temperature which contributes to a lower cost in heat treating.

Jessop TCM is lighter in weight than 18-4-1 which means more steel per dollar and more tools per pound of steel.

Jessop TCM conserves strategic alloys and meets demands for high speed steels required in the war production effort. Write for new literature.

There is a Jessop steel for every tool and die requirement.

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General Offices
WASHINGTON, PENNA., U. S. A.

JESSOP STEEL CO. MADE IN AMERICA FINE JESSOP STEELS WASHINGTON, PA.

JESSOP STEELS FOR AMERICA AND HER ALLIES

CARBON · HIGH SPEED · SPECIAL ALLOY · STAINLESS · COMPOSITE STEELS

furnaces under hard driving. Daily and monthly output marks have been exceeded in numerous instances and it is expected new 12-month records will appear soon. New stacks are being completed but full effect may not be felt until late next year. Tennessee Coal, Iron & Railroad Co. blew in its new stack at Birmingham, Ala., last week.

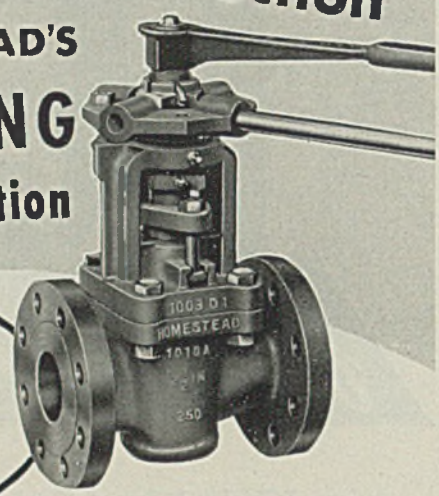
Scrap

Scrap Prices, Page 124

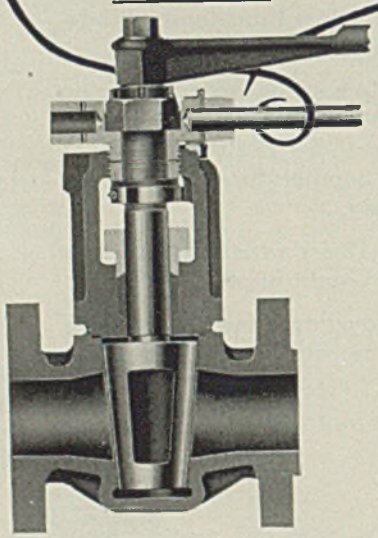
While increased scrap supply points to relatively better conditions through the summer the matter of reserves for winter is engaging attention. Increased flow of pig iron has contributed to the current situation but cold weather, with slowing of collections and preparation threatens another shortage unless stocks can be accumulated to tide over. Under present conditions this must be done by melters as dealers have no incentive to hold scrap under frozen prices and would be open to criticism as hoarders.

Pittsburgh consumers are receiving supplies close to adequate and some rejections have been made on open-hearth grades; orders to hold back shipments have been issued on some blast-furnace scrap.

NON-STOP production needs HOMESTEAD'S NEVER-FAILING Lever-Seald Operation



This Powerful Leverage Makes 'em ALWAYS Work!



Non-stop, 24-hour-a-day production requires valves that always work! Here's why Homestead Lever-Seald Plug Valves never fail to operate under conditions that cause ordinary valves to stick.

The powerful lever and screw action of the lower handle both frees the plug for quick, easy turning and provides a positive leakless seal without lubrication. A quarter-turn of the upper handle fully opens or closes the valve. Seating surfaces are protected in *all* positions. Straight-line fluid flow results in negligible pressure drop. A choice of metals and alloys to suit every operating condition further provides long, low-cost, trouble-free service!

The principle of the "lever and screw" is applied to Homestead LEVER-SEALD Valves. Built in—a part of the valve at all times—this powerful leverage multiplies a small hand operating force many times. Thus instant, never-failing operation results.

Specify "Homesteads" for never-failing operation. Get engineering facts about Homestead Lever-Seald Valves in Reference Book No. 38. Write for it!

HOMESTEAD VALVE MFG. CO.

MAKERS OF "PEAK PERFORMANCE" VALVES FOR 50 Years 1892 1942

P. O. BOX 22 • • • CORAOPOLIS • • • PENNSYLVANIA

In the Buffalo area supplies are sufficient for a high rate of steel production but have not yet reached the point where scrap can be laid down for use next winter. Cast scrap is in much better supply and in some cases melters are able to obtain double the tonnage available a month ago. Some tin-bearing bundles, rejected by steel mills in this country, is said to be moving to Canada.

St. Louis melters find supply continuing to increase and some accumulation is possible. Allocation has been given Laclede Steel Co. for 15,000 tons and Granite City Steel Co. for 20,000 tons, for delivery in 45 days.

Rails and track material from the 60-mile Susquehanna & New York railroad, Williamsport to Towanda, Pa., have been sold to the War Department by Dulien Steel Products Inc., New York, which recently bought the road. After being in existence more than 100 years the road will cease service May 10 and dismantling will follow immediately.

Direct buying by the government of scrap in automobile wrecking yards in western Pennsylvania is seen as a possibility. J. C. Harris, field representative for the automobile wrecking section, BIC, in that area has sent a warning letter to all scrap dealers and auto wreckers. In this he states that unless all scrap in 457 wrecking yards is purchased by dealers before May 4 and prepared for sale to consumers before July 4, government action may follow.

Bundled scrap consisting exclusively of tin-coated material has been advanced $4 per ton by OPA in an amendment effective April 28. The differential of $8 per ton below No. 2 dealer bundles has been reduced to $4. Inclusion of more than one grade of scrap in a vehicle is ruled to make the shipment unprepared scrap, at $2.50 below the price of the lowest grade in the shipment. No tin-coated material shall be deemed to be detinned until after it has been subjected to a process whose primary purpose is recovery of the tin. This provision is to exclude tin cans which have been subjected to "burning", which does not remove the tin.

Warehouse

Warehouse Prices, Page 123

While steel warehouses may sell 3 per cent of carbon steel without ratings, for certified maintenance and repairs, replacement can be made only on priorities. On most such products inventories are being steadily reduced. For replenishment of stock with extended ratings the trend is steadily toward higher brackets.

Shape and plate stocks are low and broken, but warehouses which received no plates in April will get partial allocations against high extended priorities in May. Demand for steel bars in all finishes is unabated, with new and supplementary orders appearing steadily. An increasing ratio of orders is

going direct to mills, especially direct government shop purchases, as distributor stocks lack volume and sizes.

Curtailment in private construction is expected to ease demand for nails and butt-weld pipe, both of which may be sold without ratings.

Ferroalloys

Ferroalloy Prices, Page 122

Office of Price Administration has made maximum price for carload lots of 78-82 per cent ferromanganese $135 per gross ton, f.o.b. Atlantic seaboard, effective May 1. The market recently has been $120, duty paid, Atlantic and Gulf ports. The same price, $135 per ton, is made the ceiling for southern furnaces, which previously had been allowed to charge $140.

Those who convert manganese ore into ferromanganese for account of another must submit to OPA a certified copy of the contracts and a sworn statement setting forth the amount of such fee and other charges for conversion of such ore on May 1.

Iron Ore

Iron Ore Prices, Page 123

Lake Carriers' Association has appointed Karl H. Suder, chief traffic officer of the Akron, Canton & Youngstown railroad, to a newly created position, to police lake ports, expedite release of ore cars and keep railroad movement of ore at peak. Mr. Suder has been granted leave of absence from his regular duties.

Creation of the new position and choice of Mr. Suder follow certification by War Production Board to Office of Defense Transportation that priorities and preferences be given for lake iron ore shipments, particularly at lower lake ports. It is understood Ore and Coal Exchange will continue correlation of lake coal movement.
than for many months.

Steel in Europe

Foreign Steel Prices, Page 123

London — (*By Cable*) — Demand for special alloy steels continues to expand in Great Britain, largely for war uses. Heavy structurals are in lighter demand for the time being. The situation in scrap has improved and is satisfactory.

Rolled Zinc Ceiling Established by OPA

WASHINGTON

MAXIMUM prices for rolled zinc products were announced last week by OPA.

Prices established are those published by OPA Nov. 29, 1941, with slight changes in the prices of zinc, boiler, hull, and engravers' plates based upon the receipt of additional information.

Maximum prices are contained in Maximum Price Regulation No. 124, which becomes effective May 11.

The present action, OPA said, was deemed necessary to prevent further price increases and to limit the prices of those producers who did not comply with the request of the price administrator to sign an agreement dated Dec. 10, 1941, not to exceed the published prices.

Among important war uses of rolled zinc products are as linings of boxes for explosives, as filaments in cartridge fuses, and as corrosive-resistant protection to the boilers, hulls and propellers of warships and merchant ships. They are also used in dry cell battery containers, brake linings, and radio condensers and tubes.

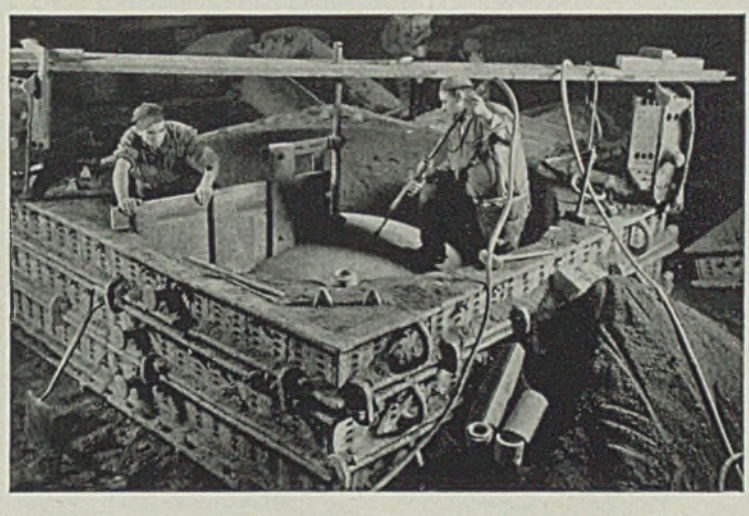
The following prices, f.o.b. mill, are effective May 11:

Sheet zinc, l.c.l., 13.15c, carloads, 7% discount.

Ribbon and strip zinc: Up to 3000 lb., 12.25c. Discount—3000 lb. to 6000 lb. 1%; 6000 lb. to 9000 lb. 2%; 9000 lb. to 18,000 lb. 3%; 18,000 lb. to carload, 4%; carload and larger 7%.

Zinc plates, small (boiler, not over 12 in. in any dimension) 3 tons and over, 11.00c; 1 ton to 3 tons, 12.00c; 500 lb. to 2000 lbs., 12.50c; 100 lb. to 500 lb., 13.00c;

STRONG-MOLD



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You can put it all up to Strong, if you have a steel casting from 30 ounces to 30,000 pounds—or a size range of almost any conceivable shape or proportion. The sweep method shown above —typical of Strong's versatility—saves the customer the costly pattern making otherwise needed for this unusually shaped, 33,000 pound casting.

Strong molding facilities range from small snap flasks to steel flasks 16 feet square. This size range is governed only by the size of Strong's largest drying oven (24 x 20 feet). Be sure you know the modern art of steel casting, as Strong has developed it!

STRONG STEEL FOUNDRY COMPANY, BUFFALO, N. Y.

STRONG

TENSILE STRENGTH • ELONGATION

under 100 lb., 14.00c.

Zinc plates, large (Hull, over 12 in. in any dimension): Add 1 cent per pound to prices for small plates.

Zinc engravers: Raw, 14.25c; Finished, delivered, 21.50c. Freight in excess of 2 cents a pound may be charged to the buyer. For finished plate produced in California, Oregon, and Washington the maximum price is 23.00c a pound, delivered.

Zinc lithographers' plates, ungrained: Less than carlot, 15.00; carload and larger, 7% discount.

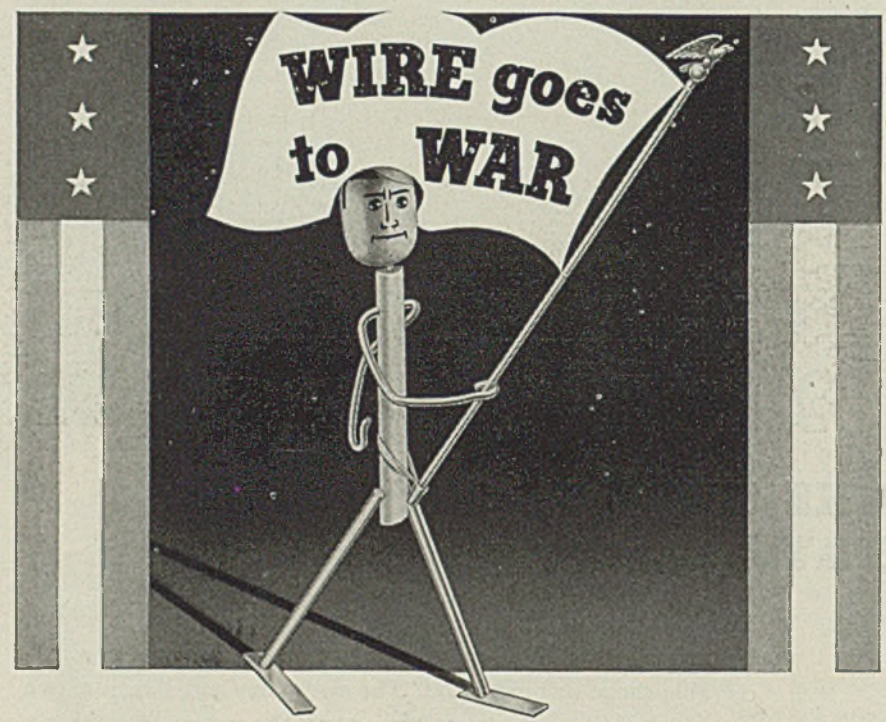
The foregoing prices for sheet zinc, ribbon and strip zinc, lithographers' plates are maximum base prices for products listed. Extra charges may be made for gauge, length, and width. Other items for which extras usually are charged are not to exceed those charged by the respective producer on Oct. 1, 1941.

Minimum carload lot shall be the lowest minimum weight, as in established tariffs on railroad carriers, upon which railroad carload lot rate from point of shipment to point of destination is based.

Rolled zinc produced and the quantity available for consumption in the United States in 1940 and 1941 were as follows:

	1940		1941	
	Short Tons	Value	Short Tons	Value
Sheet zinc not over 0.1 inch thick	21,415	$5,016,000	18,823	$4,933,138
Boiler plate and sheets over 0.1 inch thick	1,904	363,000	3,610	774,837
Strip and ribbon zinc	34,080	6,256,000	41,977	8,880,577
Total rolled zinc	57,399	11,635,000	64,410	14,588,552
Rolled zinc products as percentage of total slab zinc products	7.9%	.....	7.3%	.....
Total slab zinc produced in U. S. (excluding remelted)	724,192	.....	883,000	.....

Figures represent net production. In addition, 10,183 tons of strip and ribbon zinc in 1940 and an estimated 12,000 tons in 1941 were rolled from scrap originating in fabricating plants operated in connection with zinc rolling mills.



★ Deliveries of wire are controlled by the fact that, with America at war, there is one course to follow. That course is to place at the disposal of America—and those producing for the armed forces—every bit of knowledge of wire and all our production facilities needed to help win this war.

We commend the thought to other manufacturing organizations that less than this 100% all-out war effort right now might well be responsible for serious setbacks, needless prolongation of war and lamentable loss of men.

To you who use SHAPED WIRE we suggest, also, the immediate adoption of wires of standard diameters, shapes and analyses. Special runs cause further delays in deliveries. Analyze methods with the object of reducing waste.

It is recommended that users of WELDING ELECTRODES make certain that they use rods of the most efficient size and of correct analysis; instruct their men to cease bending electrodes and to use them down to the holder.

To other users of wire we also recommend adherence to policies of standardization and conservation.

Collect every fragment of scrap, bale it and get it on its way back to the mill.

PAGE STEEL AND WIRE DIVISION
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Pacific Coast

Seattle—Vast defense projects are being handled by United States Engineers Corps in both Seattle and Portland, details of which are not made public. Large contracts have been placed and additional work is up for figures. The Seattle office has awarded contracts to Clyde M. Ludberg, Spokane, Chisholm & Elford, Bellingham, J. F. Graham, Tacoma, Western Construction Co., Seattle and Steirs & Hanson, Tacoma, all for various buildings in this area. Airport contracts have gone to E. W. Elliott, Seattle and J. H. Collins, Colville, Wash., for Oregon projects and John A. Schrag, Portland, is low for a shipping structure in Oregon. Seattle office will receive bids May 1 and May 7 for storage and warehouse buildings. Portland opened tenders April 24 for cantonment and facilities and April 27 for a storage structure. For the Vancouver, Wash., defense housing project Leonard & Slate, Portland, are low on one unit at $1,179,043, and J. C. Compton, McMinnville, Oreg., is low at $224,400, figures including water and sewers and other facilities. Bonnell Construction Co., Tacoma, has an award at "less than $1,000,000" for army shops and warehouse in the Puget Sound area. Johnson Construction Co. and James Tuk Co. Minneapolis, have a contract for an engine repair plant in Oregon. Low joint bid of $425,867 was submitted by Dan J. Cavanah and Hoops Construction Co., Twin Falls, Idaho, for the Burns, Oreg., airport.

Demand for cast iron pipe is stimulated by various large housing and airport projects in Oregon and Washington, particularly at Vancouver, Wash., and Hermiston, Oreg.

Canada

Toronto, Ont.—Demand for steel and iron is expanding as new war industries go into production and former civilian manufacturing concerns are swung into war work. Primary steel producers are slipping farther behind in meeting demands despite the fact that practically all output is going directly to the war effort and no supplies are available for nonessential manufacturers.

Apparently the chief concern is supplying steel for shipbuilding. The government is calling more extensively for plates and it is only by robbing other departments that sufficient tonnage is being obtained for plate mills, all of which now are producing well above rated capacity.

Structural steel lettings, practically all directly associated with the war effort, developed renewed action during last week, and totaled about 15,000 tons. Announcements of industrial plant expansions to be started immediately indicate pending tonnage close to 20,000 tons including 5000 tons for a new aircraft plant at Montreal.

Nonferrous Metal Prices

April	Copper, Electro, del. Conn.	Copper, 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. smelter	Nickel Cathodes
1-30	12.00	12.12½	11.75	52.00	52.00	6.50	6.35	8.25	15.00	14.50	35.00

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 12.00c Conn. copper

Sheets

Yellow brass (high)	19.48
Copper, hot rolled	20.87
Lead, cut to jobbers	9.75
Zinc, 100 lb. base	13.15

Tubes

High yellow brass	22.23
Seamless copper	21.37

Rods

High yellow brass	15.01
Copper, hot rolled	17.37

Anodes

Copper, untrimmed	18.12

Wire

Yellow brass (high)	19.73

OLD METALS

Dealers' Buying Prices

(In cents per pound, carlots.)

Copper

No. 1 heavy	9.50-10.00
Light	7.50- 8.00

Brass

No. 1 composition	9.00- 9.50
Light	6.00- 6.50
Heavy yellow	6.50- 7.00
Auto radiators	7.25- 7.75
Composition turnings	7.75- 8.25

Zinc

Old	5.25- 5.75
New clippings	6.75- 7.25

Aluminum

Clippings	10.50-11.00
Cast	10.00-10.50
Pistons	10.00-10.50
Sheet	10.00-10.50

Lead

Heavy	5.12½-5.62½
Mixed babbitt	6.00- 7.00
Electrotype shells	5.00- 5.75
Stereotype, Linotype	6.50- 7.50

Tin and Alloys

Block tin pipe	45.00-47.00
No. 1 pewter	37.00-39.00
Solder joints	9.50-10.00

SECONDARY METALS

Brass ingot, 85-5-5-5, l.c.l.	13.25
Standard No. 12 aluminum	14.50

Nonferrous Metals

New York—OPA is following its policy of designing price orders to bring out peak production at minimum cost. The recent ½ to 2-cent cut in the price of ammunition material is an excellent example.

Copper—All copper and copper alloy products are now under legal price control as a result of the OPA overall price ceiling. Shortage of copper is holding back the ordnance production program but large tonnages are being prepared for a still greater output of war material.

Lead—WPB set the quota for the May pool at 15 per cent of March production. The pool will include 8002 tons of domestic lead against 7206 tons in March. The lead industry is seeking additional business since supplies, generally speaking, are plentiful.

Zinc—OPA issued Regulation 124, establishing maximum prices for rolled zinc products while WPB issued order M-11, providing for complete allocation as of June 1. The rates for the May pool were raised to 75 per cent of January high grade and special high grade production, 50 per cent of all other grades, and 10 per cent of zinc oxide output.

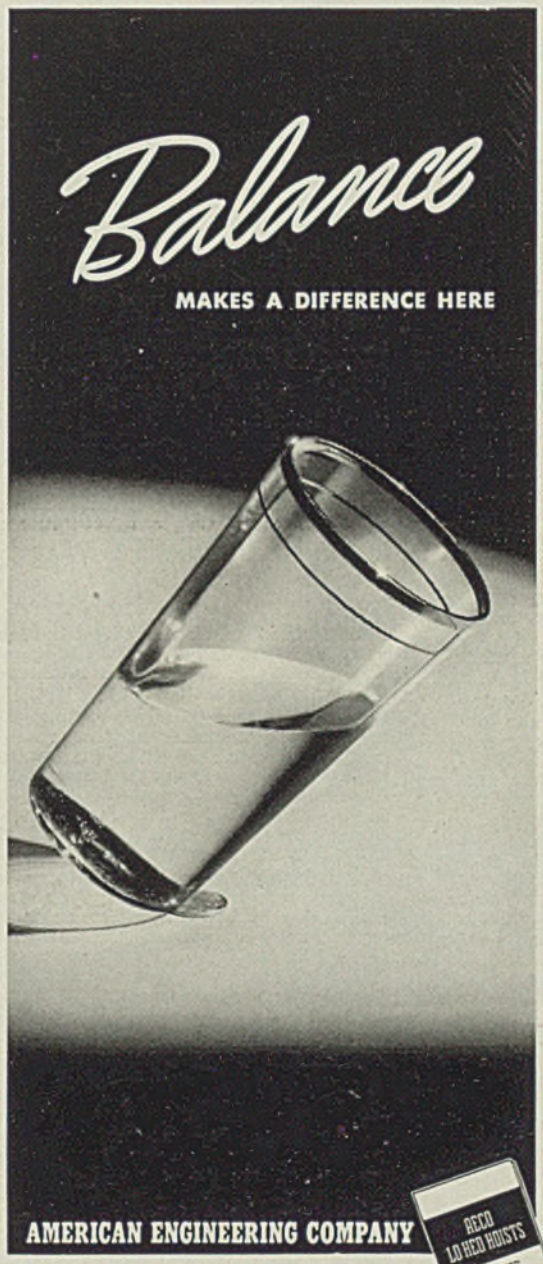
Tin—WPB officials are satisfied with solder substitutes which have reduced the use of tin for this purpose nearly 50 per cent.

Metallurgical Coke

Coke Prices, Page 121

Coke supply continues a factor in the pig iron market, not so much on quantity as quality. Poorer coal has caused high sulphur but some producers are hopeful OPA will allow higher prices so better grade coal can be used.

Beehive coke output is likely to expand. H. C. Frick Coke Co., will supply fuel for two new 1200-ton blast furnaces to be built by Carnegie-Illinois Steel Corp. in the Pittsburgh district, which probably will result in rehabilitation of ovens. Some of these will be at Leisenring, Pa., where 500 units are idle.



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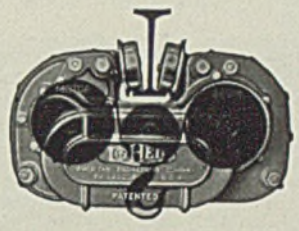
Look in your Classified Telephone Directory under "A-E-CO LO-HED HOISTS" for your nearest representative.

OTHER A-E-CO PRODUCTS:
TAYLOR STOKERS, MARINE DECK AUXILIARIES, HELE-SHAW FLUID POWER

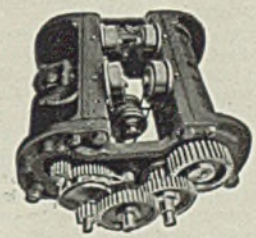


BALANCE makes a difference in electric hoists

It is a fact that balance makes a startling difference in electric hoist design.

The Lo-Hed hoist is unusual in that its motor and drum are balanced around the beam. Take a look with us and you'll see what this does. It means that the hook can be pulled up close to the beam—a desirable plus feature for which you pay no premium. It means that since motor and drum are parallel they can be connected through a train of efficient spur gears. The drum, motor and gearing are housed by easily removable covers.

Lo-Hed hoists have many other service and safety features, shown in the 28-page Lo-Hed catalog. No point of manufacture is more vital to you today than the precision with which Lo-Heds are built. Although production has been stepped up, Lo-Heds are as painstakingly made now as they were before the war. On past experience that means good service from a Lo-Hed years after we win. So get a Lo-Hed. Send for that catalog we mentioned.



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Plant Expansion, Construction and Enterprise, Government Inquiries, Sub-Contract Opportunities, Contracts Placed and Pending

SUB-CONTRACT OPPORTUNITIES . . .

Data on subcontract work are issued by local offices of the Contract Distribution Branch, WPB. Contact either the office issuing the data or your nearest district office. Data on prime contracts also are issued by Contract Distribution offices, which usually have drawings and specifications, but bids should be submitted directly to contracting officers as indicated.

Boston office, Contract Distribution Branch of WPB, 17 Court street, is seeking contractors for the following:

SC-14: Concern desires facilities to produce between 300 and 400 automatic wire feeders. Facilities needed, arc welder, milling machine, planer, lathe and gear cutter. All inquiries should be made to the Fall River, Mass., office of War Production Board.

SC-15: Concern requires bidders on hardware for shipping case, 500 required. Requirements cover special forgings, flat strap, bolts and nuts. Dies by prime contractor. Inquiries to Fall River, Mass., office of War Production Board.

SC-16: Multiple-spindle screw machines for 1¼-inch stock and larger. Inquiries to Boston office.

SC-17: Facilities for fabrication and production of special precision dies and punches in quantities. Inquiries to Boston office.

SC-18: Massachusetts concern has considerable planer work to let out. Work requires planers 48 x 48 inches and 60 x 60 inches.

SC-19: Machines needed 2½-inch single or multiple-spindle automatic screw machines to make any portion of 100,000 units. Blueprints available at Boston office.

SC-20: Facilities wanted for machining complete parts of machine tools in lots of 300 per month of five different items. Equipment required, or equivalent, one Warner & Swasey bar machine up to 3⅝-inch, Jones & Lamson chucking machine up to 6¼-inches, internal, external and ring grinding machines, drill presses, Whitten gear cutter, keyway cutter, precision lathes and heat-treating facilities. Three parts from bar stock and two from forgings. Material to be supplied by prime contractor.

SC-21: Facilities for fabrication and production of special precision dies and punches in quantities. All small pieces require some milling. Can be done on hand screw machines or lathes, internal, external and face grinding and lapping.

SC-22: Concern requires subcontracting facilities for production of 75-mm adapters. Material, to be furnished by subcontractor, is WDX-1314. Tolerances .010. Quantities 80,000 to 100,000 per month for six to nine months, commencing as soon as possible. Priority rating A-1-c or better. Tools necessary are multiple-spindle automatic screw machines, capacity 2¾ to 3 inches and turret lathes for secondary operation.

SC-23: Subcontractor wanted with slotted set screw equipment, cyanide hardening for large volume screws.

SC-27: Facilities needed for small universal, vertical and horizontal milling, surface grinding and drilling. Four different items in quantities from 500 to 1000 per week for an indefinite period. Specifications at present only in Boston office.

SC-28: Miscellaneous items in multiples of 300 per week for the following work: Lathes, gear cutting, drills, milling No. 2, automatic screw machines up to 1 inch, turret lathes and cutting of splines up to 7 inches, internal grinding, boring 3-inch and side milling. Specifications at Boston office only.

SC-29: Wire drawing facilities to produce steel galvanized wire, .0095-inch in diameter and .0126-inch diameter, minimum tensile strength 50,000 pounds per square inch, elongation not less than 12% in 8-inch length, on 10-pound spools, quantities to 1,000,000 pounds. Inquiry should be made to Providence, R. I., office of War Production Board.

SC-30: Facilities for centerless shoulder grinding. Sizes run from $\frac{3}{16}$ x 2 inches to $\frac{5}{8}$ x 5 inches. Inquiries should be made to Providence, R. I., office of WPB.

New York office, Contract Distribution Branch of WPB, 122 East Forty-Second street, New York, reports the following subcontract opportunities:

S-115: A New Jersey aircraft radio manufacturer is in urgent need of a subcontractor having open capacity on automatic screw machines for large quantity production to close tolerances of small brass and aluminum parts. Machines needed, No. 0, B & S, 00 B & S and No. 2 B & S or equivalent.

S-116: A New Jersey manufacturer is seeking subcontracting facilities for machining of steel forgings on four items in large quantities. Machines needed, turret lathes, two or more spindles, with chucks for items of 2½-inch diameter by 1¾-inch length.

S-117: A New York City manufacturer of aircraft hardware is seeking automatic and hand screw machine facilities for the manufacture of 31 items of aircraft hardware from stainless steel SAE 2330, 28 items ¾ to ½-inch diameter. Tolerances, plus .0 to minus .0054, with 20,000 of each item. One item ½-inch in diameter; to commercial tolerances; 3000 pieces. Drawings and specifications available.

S-118: A Long Island instrument manufacturer is seeking jeweler's thread milling facilities for threading parts of 3-inch shaft, of SAE 6150. Dimensions, 10/32-inch thread, length .060. Quantity, 250 to 5000 per week.

S-97: A number of New York surgical instrument makers are seeking expert cutlery diemaking and forging facilities (1000 to 2000-pound drop hammers) for manufacture of stainless steel surgical instruments.

S-98: Pennsylvania concern requires subcontracting facilities for production of 75-mm adapters. Material, to be furnished by subcontractor, is steel WD x 1314. Tolerances .010. Quantity, 80,000 to 100,000 per month for six to nine months, commencing as soon as possible. Machines needed, multiple-spindle automatic screw machines, capacity 2¾ to 3 inches, and turret lathes for secondary operation. Blueprints available.

S-99: A Brooklyn instrument builder has a considerable amount of work to offer subcontractors with turret lathes capable of working to tolerances of .0005 on items of steel and brass from ½-inch to 2 inches in diameter.

S-100: Chicago manufacturer of fuzes requires a subcontractor having 1¾-inch automatic screw machines, 4 or 6 spindles, for manufacture of medium steel fuze parts. Tolerances, plus or minus .005. Drawings available.

S-101: A New Jersey manufacturer has many months work for turret lathes similar to Gisholt No. 2L, Warner & Swasey No. 2A, 3A or 4A, Libby type H or any turret lathe having 6-inch hole through spindle for chucking work 5½-inches in diameter by 20 inches long. Tolerance .005. Manufacturer will supply boring tool.

S-102: A New Jersey manufacturer wants power press facilities for blanking discs 24 inches in diameter by .187-inch thick. Material, chrome moly steel sheets. Quantity, 25,000 pieces per month for eight months. Sheet-strip and dies will be furnished by manufacturer.

S-103: A New Jersey manufacturer wants subcontracting facilities for machining cast iron pots. Machines needed, seven-inch vertical or horizontal boring mills with fixtures.

S-104: A New Jersey manufacturer is seeking facilities for making 16,335 drop forgings, five different parts. Material, steel, approximately 5, 8, 10 and 25 pounds. Quantity, 200 of each in May and 500 of each per month thereafter. Prompt delivery desired. Manufacturer will furnish steel for these pieces. Machine needed, 10,000-pound drop-hammer.

S-106: New York city manufacturer of radio antenna mounts is seeking six or eight spindle automatic screw machine facilities for manufacture of several antenna parts. Material, manganese bronze, hard brass. Dimensions, diameters from ¾ to 1¾-inch. Quantity, 50,000 of each, continuous production probable.

Cleveland office Division of Contract Distribution, WPB, Union Commerce building, is seeking contractors for the following:

S-143: Ohio contractor requires subcontracting facilities to machine complete 500 each of six items made from aluminum castings, which is to be furnished by prime contractor. Equipment needed, horizontal boring mills up to 2¾ inches, No. 2 and 3 milling

machines, small planers, drill press and small drills. Blueprints on file in Cleveland office.

S-144: Contractor required with automatic screw machine and turret lathe of 2 to 2½-inch bar capacity, to machine metal parts consisting of nose plugs, fuze seat liners and adapters. Initial order 250,000. Delivery requirements at rate of 57,000 per month. Material consists of 2-inch steel tubing, WD 1035, 2½-inch steel bar WD x-1135, 2¼-inch steel bar WD-1112, with alternative of cast iron. Tolerances close. A-1-a priority. Blueprints on file at Cleveland office.

D-56: Subcontractor required who has open facilities on four or six-spindle automatics, 2⅞-inch bar size. Material consisting of 2⅞-inch bar, WD X-1314 to be furnished by prime contractor. Parts to be cadmium plated and lacquered. Quantity, 25,000 to 50,000 per week. Tolerance close. Blueprints and samples on file at Cleveland office.

Chicago office, Contract Distribution Branch of WPB, 20 North Wacker Drive, is seeking contractors for the following:

4-N-302: Chicago area prime contractor is arranging to subcontract work for 50 parts, of miscellaneous shape, both simple and intricate. Drawings in this office for reference. Nominal sizes from ⅝ to 5 inches O.D., comprising sleeves, plugs, outer and inner bearing races and cages, spacers, bell cranks, impellers, etc. Material mostly steel, some cast iron and some bronze. Machine tools required will include hand and automatic screw machines, turret lathes, horizontal and vertical milling, surface grinding. Rotary external and internal grind very essential on some parts. Some centerless and thread grinding. Lapping also indicated and heat treatment. Tolerances close to commercial. All material, tools, jigs, and fixtures must be furnished by subcontractor. Yearly requirements run from 250 to 16,000 pieces. Monthly requirements 40 to 2500 pieces. Priority A-3 and A-1-a.

57-A-417: A Chicago prime contractor has urgent need for machine hours on a 36 or 42-inch Bullard vertical turret lathe with side head and coolant system. Boring, turning and facing of steel forgings. Large quantities, long runs and high priority. Drawings available at this office.

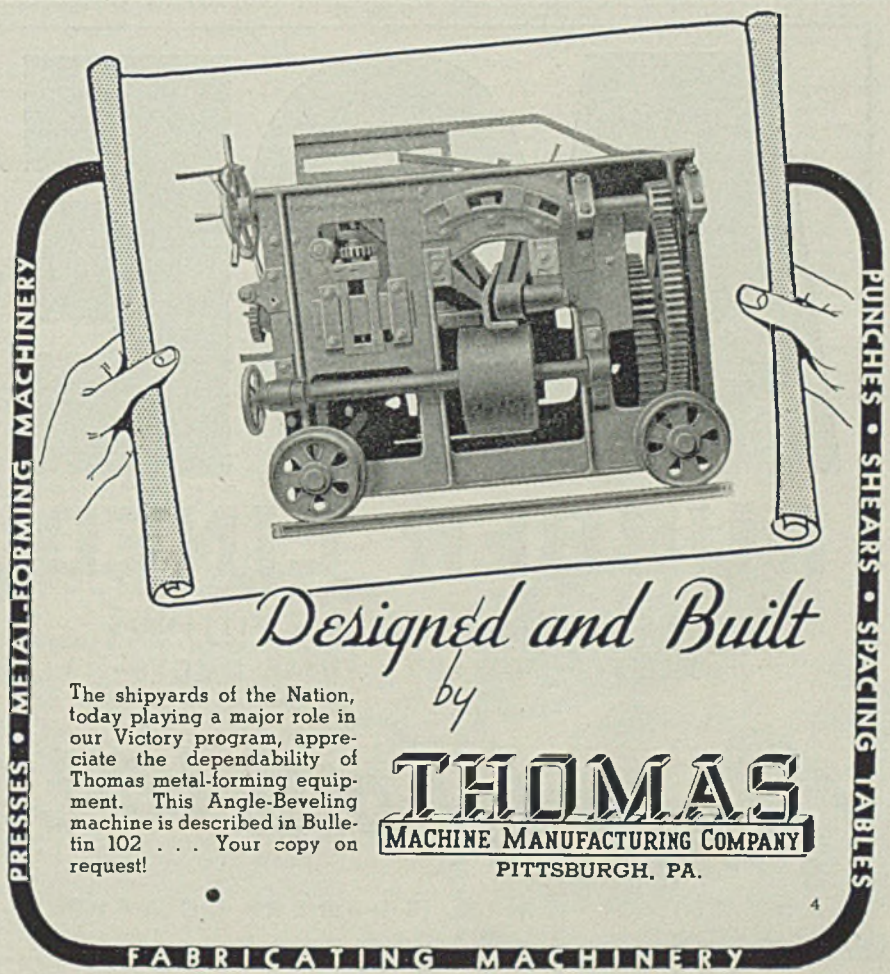
17-A-N-314: A Chicago firm is preparing to sublet work on fabricated steel bases. Machine tool requirement is horizontal boring mill with 3¼-inch bar, similar to Giddings & Lewis size 350 with outriggers. Mills of such capacity within radius of 50 miles will be considered. Production of four pieces a week or single units. Material furnished. A-1-a priority.

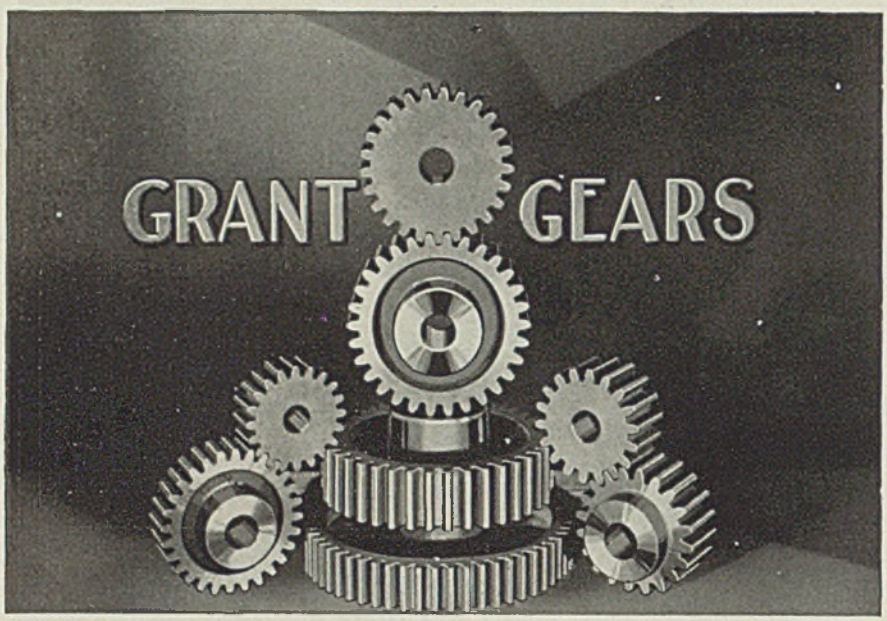
19-A-414: A Pennsylvania prime contractor is looking for facilities for production of 75-mm adapters. WDX-1314 steel will be furnished, tolerance to .010. Priority A-1-c. Requirements 80,000 to 100,000 per month. Machine tools required, multiple spindle, automatic and turret lathes up to 3-inch capacity for subsequent operations. Two-inch 12-NS-1 thread outside, 1.714NS-1 tap. Drawing in this office.

O-119-K: Materials furnished by prime contractor, aluminum airplane parts requiring machine work only, limits close, machines required No. 3, 4 and 5 horizontal milling machines. Contact Indianapolis office.

62-A-418: Prime contractor in Chicago wants WDS-3 steel forgings for 75-mmM48 H.E. shell. Weight about 19 pounds. Can be made on Ajax or Na-

NEW YORK — AKRON — DETROIT — CHICAGO — LOS ANGELES — TORONTO





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GRANT GEAR WORKS COR. SECOND & B STS. BOSTON, MASSACHUSETTS

tional upsetter. Starting August, 100,000 per month.

2-A-404: 3000-pound board hammer open capacity required for small forgings in Chicago area. Dies and materials to be furnished.

37-AN-411: Machine hours wanted at once for aircraft production on either bar or chucking machine. If bar, must take 6-inch steel through spindle. Large quantity. Material SAE 1040, furnished. Blueprint available at this office.

1-546-LB: Facilities wanted, furnaces located in Indiana for preheating aluminum ingots, 24-inch x 6-inch diameter. Ingots are placed on rack, total weight 10,000 pounds. Size of door required 5 x 5 feet. Temperature range 890 to 920 Fahr., eight hours to bring to temperature of 890 degrees, four hours to soak. Take out of furnace and let cool naturally. Contact Indianapolis office.

60-AN-417: Miscellaneous cutting tools such as form cutters, special shapes, etc., are needed at once by Chicago firm expanding its program. Can be made in shops having had experience in such work and equipped with universal milling machines, lathes with backoff attachment, jig borer, universal grinders. A-1-a priority. Blueprints available at this office.

22-W-409: For subcontracting purposes a Cincinnati No. 2 centerless grinder with capacity of 3-inch diameter x 24 inches long is available for 16 hours a day. Machine is complete with cam attachment for contours, located near West Side of city of Chicago.

27-AN-410: Machine tool manufacturer in adjoining state requires subcontractor who can build special lathes, single-purpose, base 92 inches long and gross weight 10,000 pounds. Equipment needed, planer 48 x 48 x 10 feet, horizontal boring capacity 3 or 4-inch bar, internal and external grinders, radial drill, shapers, milling machines and lathes of suitable capacity. Heaviest casting is 2300 pounds. Minimum requirements 10 lathes per month. Patterns and drawings ready. Submit facilities in writing, to be forwarded to prime contractor.

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Cents per pound, to consumers f.o.b. shipping point

Tungsten Types

(For each 1% tungsten contained)

Solid scrap containing over 12%	1.80c
Solid scrap containing 5 to 12%	1.60
Turnings, millings containing over 12%	1.60
Do., 5 to 12%	1.40
Turnings, millings, solids under 5%	1.25

Molybdenum Types

Solid scrap, not less than 7% molybdenum, 0.50 vanadium	12.50
Turnings, millings, same basis	10.50
Solid scrap, not less than 3% molybdenum, 4% tungsten, 1% vanadium	13.50
Turnings, millings, same basis	11.50

Mixed Scrap

(Molybdenum and Tungsten Types)

Solid scrap, each 1% contained tungsten	1.60
Solid scrap, each 1% molybdenum	.80
Millings, turnings, each 1% tungsten	1.40
Millings, turnings, each 1% molybdenum	.70

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● Use BISCO Tool Steel Tubing and stop the waste of costly steel. At 40c a pound, this company had $17.20 worth of turnings to sweep up. Defense needs the time, labor and materials which are unnecessarily lost through milling a solid bar.

BISCO Non-shrinkable, Oil-hardening Tubes are stocked in exact sizes. When cut to your specifications, they are ready for use as ring dies, bushings, spacers, etc.

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Equipment

New York—The proposed "stamp" plan for machine tool allocation is apparently out, for the time being at least. Policy of priorities and allocations operative for some months, with refinements, will be given further trial. Orders are naturally lower following heavy buying in March, but some large lists continue to come out. Delays in fixtures, cutting tools, and in several cases ball bearings, are delaying some assembly shops and tools are being shipped frequently without fixtures, the latter to be installed later. Specifications for high-speed tool steels are being revised to conserve some alloys, notably tungsten and vanadium, where feasible. Increased facilities for assembly are steadily influencing total output; one shop producing milling machines will have increased capacity ten fold by July. Some lines of metal cutting not heavily needed for war production are being dropped temporarily.

Boston—Clarification and segregation of the mass of machine tool orders placed previous to the pre-April 1 priority deadline occupies builders and sellers. Specification details are being refined and considerable paring of original estimated requirements is being done. Confusion is gradually being eliminated from a situation in which some shops booked a year's volume within a month, many orders lacking concrete specifications and with scores subject to change for specific requirements. New orders are lower, but substantial inquiry continues with supplemental war program indicated, including large additional purchases for aircraft. Expanding shipbuilding capacity also calls for considerable new equipment. Sub-contracting has reached a high peak, entire units being let out by some shops.

Seattle—Demand continues strong for all types of machinery, dealers' inventories being low and replacements uncertain. Bonneville Power Administration reports Westinghouse Electric & Mfg. Co. low at $18,318 for furnishing two circuit breakers for West Salem, Oreg., substation. Bids are called May 1 for disconnecting switches, and three distribution transformers for Bremerton and Ampere.

STRUCTURAL SHAPES .

SHAPE CONTRACTS PLACED

45,000 tons, new steel plant, Utah, Defense Plant Corp., for Columbia Steel Co., to American Bridge Co., Pittsburgh.

13,000 tons, engineering project, export, to Bethlehem Steel Co., Bethlehem, Pa.

10,000 tons, Phelps-Dodge Corp., Morenci, Tex., to Kansas City Structural Steel Co., Kansas City, Kans.

10,000 tons, aircraft plant, Texas, to Tulsa Boiler & Machinery Co., Tulsa, Okla.

4000 tons, addition to aluminum extrusion plant, Bohn Aluminum & Brass

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Built under extreme emergency and with amazing speed, thousands of Layne Wells and Pumps are providing billions of gallons of water for war needs—Army Camps, Flying Fields, Naval Stations, Ordnance Works, Chemical Plants, Munition Plants and numerous fortified outposts. Though built with utmost speed, those Layne Water Systems have the strength and ruggedness which will last for years and years.

Layne Well Water Systems, regardless of when, where or how speedily built, are the finest that can be constructed. They will faithfully fulfill their mission until victory comes, whether this year, next year or years from now.

Those men of the Army, Navy and Marine Corps who some day will return to civilian life may well remember that it was Layne who built the well water systems which helped to win the war.

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Layne-Northern Company.....Mishawaka, Ind.
Layne-Louisiana Company.....Lake Charles, La.
Layne-New York Co.....New York City.
Layne-Northwest Company.....Milwaukee, Wis.
Layne-Ohio Company.....Columbus, Ohio
Layne-Texas Company.....Houston, Texas.
Layne-Western Company.....Kansas City, Mo.
Layne-Western Co. of Minn.....Minneapolis, Minn.
Layne-Bowler New England Corp.....Boston, Mass.
International Water Supply, Ltd.....London, Ont.

WORLD'S LARGEST WATER DEVELOPERS

Corp., to Midland Structural Steel Co., Cicero, Ill. (to be fabricated by Four V Structural Steel Companies, Chicago); Krieghoff Co., Detroit, contractor.

3000 tons, magnesium plant, to Tulsa Boiler & Machinery Co., Tulsa, Okla.

2600 tons, stiffening trusses, Whitestone bridge, New York, to Harris Structural Steel Co., New York.

2500 tons, addition to airplane engine plant, Buick Motor Division, General Motors Corp., to Mississippi Valley Structural Steel Co., Decatur, Ill.

1500 tons, Phelps-Dodge Corp., El Paso, Tex., to Kansas City Structural Steel Co., Kansas City, Kans.

1500 tons, new facilities, war department, in Iowa, to Bethlehem Steel Co., Bethlehem, Pa., and St. Joseph Steel Co., St. Joseph, Mo.; Buell & Winter Engineering Co. & Associates, Sioux City, Iowa, contractors; 150 tons, concrete reinforcing bars awarded to several distributors.

1340 tons, truss bridge, Northern Pacific railroad, St. Paul, to American Bridge Co., Pittsburgh.

1200 tons, addition to aluminum extrusion plant, Bohn Aluminum & Brass Corp., to Midland Structural Steel Co., Cicero, Ill. (to be fabricated by Four V Structural Steel Companies, Chicago).

100 tons or more, Seattle, Wash., United States engineer Inv. 459, to Patterson Steel Co., Tulsa, Okla.

100 tons, bridge girders, Northern Pacific railroad, St. Paul, to American Bridge Co., Pittsburgh.

SHAPE AWARDS COMPARED

	Tons
Week ended May 2	95,840
Week ended April 18	80,040
Week ended April 18	57,966
This week, 1941	49,393
Weekly average, 1942	33,293
Weekly average, 1941	27,373
Weekly average, April, 1942	64,510
Total, 1941	555,447
Total, 1942	565,981

Includes awards of 100 tons or more.

SHAPES CONTRACTS PENDING

6400 tons, ordnance works in Minnesota; bids April 30.

6000 tons, building at Birdsboro, Pa.; Turner Construction Co., New York, contractor; bids in.

1800 tons, plant addition, Henry Disston & Sons, Philadelphia, Barclay White Co., engineer; in addition to 150 tons previously placed with Morris Wheeler & Co., Philadelphia.

1600 tons, building for Harrisburg Steel Corp., Harrisburg, Pa.; Lehigh Structural Steel Co., Allentown, Pa., low.

REINFORCING BARS . .

REINFORCING STEEL AWARDS

45,000 tons, engineering project, export, larger part to Bethlehem Steel Co., Bethlehem, Pa.

1800 tons, Phelps-Dodge Corp., Clifton, Ariz., to Bethlehem Steel Co., Bethlehem, Pa.

776 tons, Norfolk, Va., United States engineer, Inv. 273, to Carroll & McCreary Co., Brooklyn, N. Y.

700 tons, eastern navy yard, to Bethlehem Steel Co., Bethlehem, Pa., through Golder Construction Co.

REINFORCING STEEL PENDING

100 tons or more, two power substations, Seattle; Henrik Vallee, Seattle, low, $59,782.

Unstated, $125,000 concrete bridge, $100,000 concrete overhead pass and $50,000 concrete pass, Spokane, Wash., to serve new aluminum rolling mill; city has applied for federal funds.

CONCRETE BARS COMPARED

	Tons
Week ended May 2	48,276
Week ended April 25	16,562
Week ended April 18	4,741
This week, 1941	5,534
Weekly average, 1942	11,282
Weekly average, 1941	13,609
Weekly average, April, 1942	22,105
Total, 1941	211,184
Total, 1942	191,804

Includes awards of 100 tons or more.

S. A. COCHRAN, *President* — E. A. SAMUEL, *Vice-Pres.* — W. F. KRIEGER, *Sec.-Treas.*

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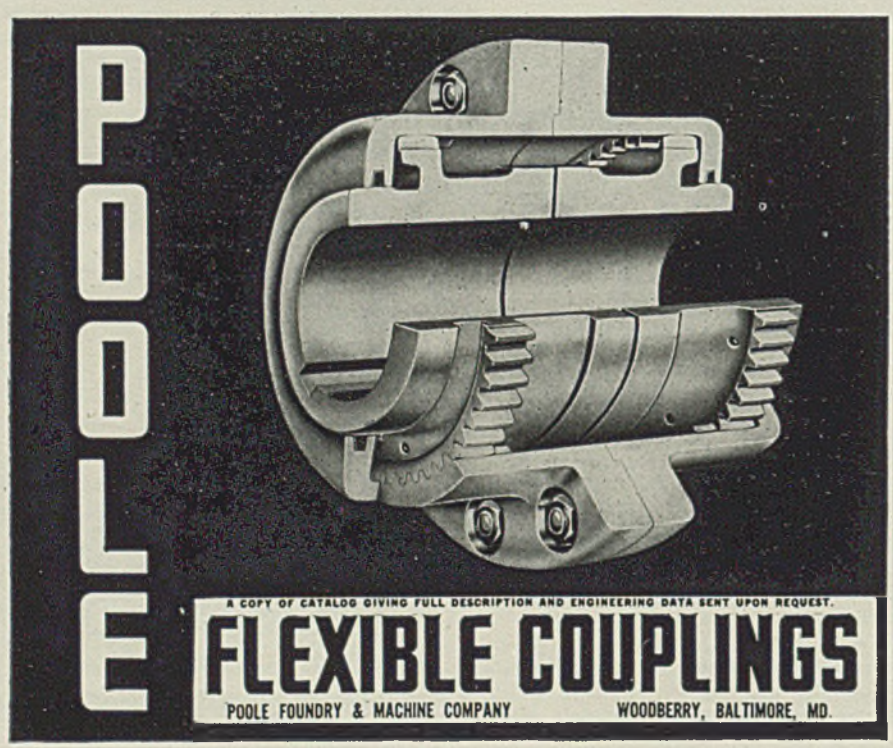

RAILS, CARS . . .

CAR ORDERS PLACED

Bethlehem Steel Co., twelve 100-ton flat cars, to own shops.

LOCOMOTIVES PLACED

Patapsco & Back Rivers, four diesel-electric switchers, two of 1000 horsepower, two of 600 horsepower, to Baldwin Locomotive Works, Philadelphia.

Philadelphia, Bethlehem & New England, four diesel-electric switchers, two of 1000 horsepower, two of 600 horsepower, to Electro-Motive Corp., La Grange, Ill.

Wabash, two 660-horsepower and one 1000-horsepower locomotives, to American Locomotive Co., New York.

LOCOMOTIVES PENDING

St. Louis & San Francisco, one 44-ton diesel locomotive; court permission asked.

PIPE . . .

CAST PIPE PLACED

550 tons, San Francisco, United States engineer Inv. 332, to United States Pipe & Foundry Co., San Francisco.

CAST PIPE PENDING

1000 tons, 11,495 feet 8 to 30 inch, Airport Way improvement, Seattle; H. G. Purcell, Seattle, low $123,395, for U. S. Pipe & Foundry Co., Burlington, N. J.

250 tons, 6 and 8 inch, Hermiston, Oreg., J. M. DeBlasio, Yakima, Wash., contractor, low at $31,570.

Unstated, 22,000 feet 4 to 8 inch, Paulsbo, Wash., bids May 1, with alternates; Parker & Hill, Seattle, engineers.

Unstated, fire protection and water system at unstated center; bids in to United States engineer, Portland, Oreg., April 24.

Unstated, defense housing project, Vancouver, Wash.; Leonard & Slate, Portland, contractor.

PLATES . . .

PLATE CONTRACTS PENDING

Unstated tonnage, elevated tank, defense housing, Hatboro, Pa., W. E. Caldwell Co., Louisville, Pa., $21,200, low; same fabricator awarded four elevated water tanks, Texas, United States engineer, Marshall, Tex.

CONSTRUCTION and ENTERPRISE

Illinois

CHICAGO—Galvin Mfg. Corp., 4545 West Augusta boulevard, will soon let contract for two-story 120 x 140-foot research laboratory. V. L. Charn, 141 West Jackson boulevard, architect.

CHICAGO—Continental Construction Co., 340 North Central street, Chicago, has contract for two buildings in Pennsylvania estimated to cost $1,000,000 and $5,000,000. C. W. Cinsman, 227 Broadhead hotel, Beaver Falls, Pa., engineer.

CHICAGO—Bell & Howell Co., 1801 West Larchmont avenue, will operate a $2,000,000 lens manufacturing plant to be built in a Chicago suburb by Defense Plant Corp. Mundie, Jensen,

Continental's policy is specialized service to all its customers. From Continental's plants at Kokomo, Canton and Indianapolis come steel wire and sheets in wide variety, made to specifications that cut production costs and make more salable products.

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(The Superior Sheet Steel Co., Canton, Ohio—a subsidiary)

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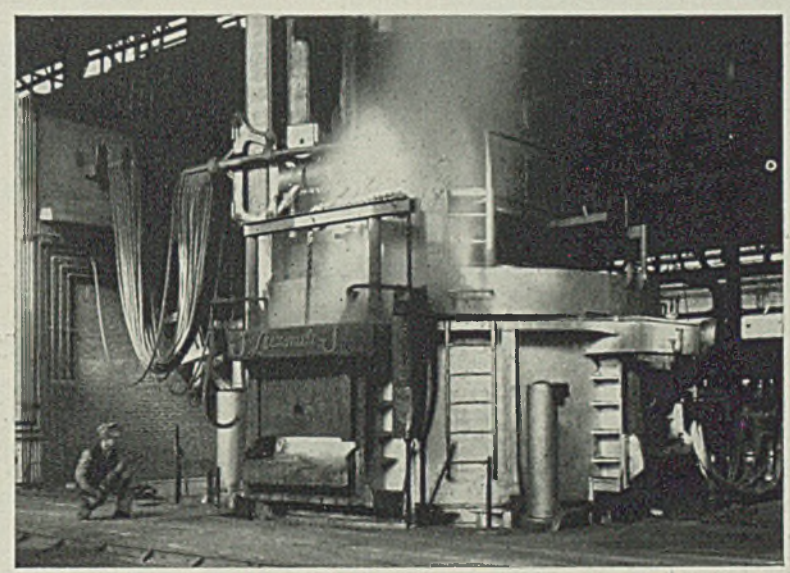
WIRE: Bright Basic, KONIK, Coppered, Tinned, Specials, etc., also CHAIN LINK FENCE

88 *Lectromelts* SOLD IN 1941



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LECTROMELT furnaces are built in sizes ranging from 100 tons to 25 pounds. Both door charge and top charge types are available. Rugged and durable construction. Rapid and economic operation.

PITTSBURGH LECTROMELT FURNACE CORP.

PITTSBURGH, PA.

Bourke & Havens, Chicago, architects, and Dahl-Stedman Co., Chicago, contractor.

ROCKFORD, ILL.—W. F. & John Barnes Co., 301 South Water street, has awarded general contract for three factory additions to E. W. Schmeling & Son, 1031 School street. Hubbard & Hyland, Gas & Electric building, architects.

Pennsylvania

ERIE, PA.—Blyley Mfg. Co., 200 Union Station building, Erie, has awarded contract to Henry Shenk Co., 1115 Sassafras street, Erie, for two factory buildings in Pennsylvania. Meyers & Johnson, Commerce building, Erie, architects.

GETTYSBURG, PA.—Central Chemical Corp. of Pennsylvania. S. G. Spangler, manager, plans to rebuild two and three-story, 55 x 250-foot plant recently destroyed by fire. Estimated cost over $40,000.

OIL CITY, PA.—Wolverine Empire Refining Co., 51 Madison avenue, New York, plans an oil refinery here, estimated to cost $3,000,000, with equipment.

PITTSBURGH—Aluminum Co. of America, Gulf building, Pittsburgh, will erect $4,000,000 addition to its alumina plant in Arkansas.

WILKES-BARRE, PA. — Empire Corp., South Franklin street, has let contract for one-story plant addition to Chatham Construction Co. Estimated cost $100,000, including equipment.

Michigan

ADRIAN, MICH.—American Chain & Cable Co. will erect factory addition to its plant here. William Wisner is general manager.

DETROIT—Budd Induction Heating Co., 12141 Charlevoix avenue, has plans nearing completion by Smith, Hinchman & Grylls, 800 Marquette building, for factory.

SAGINAW, MICH.—Lufkin Rule Co. has permit for construction of three-story addition to its plant. Estimated cost $40,000.

New York

BROOKLYN, N. Y.—Atlantic Basin Iron Works, 166 Van Brunt street, plans two story 80 x 101-foot loft and storage building. Estimated cost $55,000.

PORT BYRON, N. Y.—Cayuga Foundry Co. Inc., Port Byron, has been incorporated to engage in foundry business. Correspondent, Herbert T. Anderson, Flint building, Auburn, N. Y.

ROME, N. Y.—Rome Strip Steel Co. recently sustained damage by fire to the building housing its annealing furnaces.

Ohio

ASHTABULA, O.—Vanadium Corp. of America, 420 Lexington avenue, New York, will be lessee-operator of Defense Plant Corp. ferrosilicon plant to be built on a 55-acre site here. Rust Engineering Corp., Clark building, Pittsburgh, will start construction this summer.

CINCINNATI—Cincinnati Gear Co. will construct a plant containing 50,000 square feet of space in the industrial section of Mariemont.

CLEVELAND—Union Tank & Car Co., L. J. Drake, president, 228 North LaSalle street, Chicago, will build 1680-square foot facilities building at 3083 Broadway avenue here.

CLEVELAND—Marquette Metal Products Co., Herbert Gleitz, president, is preparing plans to erect 4320-square foot office building and 15,840-square foot addition to factory. Estimated cost is $40,000.

CLEVELAND—Cleveland Pneumatic Aerol Inc., newly formed subsidiary of Cleveland Pneumatic Tool Co., 3734 East Seventy-eighth street, will establish plant here. John DeMooy, president, and Daniel C. Green, chairman of the board of the parent company, will fill the same offices in the new corporation.

CLEVELAND—Monarch Aero Products Co. will soon start erection of airplane assembly plant. Fred H. Hise, Cleveland Pneumatic Tool Co., 3734 East Seventy-eighth street, is head of the new corporation, and J. I. Barron, 4074 Detroit avenue, Toledo, O., is secretary-treasurer. Harry C. Gahn, 1230 Williamson building, Cleveland, is attorney for the new firm.

LORAIN, O.—White-Roth Machine Corp., George A. White and George L. Roth, 947 Broadway, is considering expansion of assembly space by 15,000 square-foot addition to plant.

LORAIN, O.—American Shipbuilding Co., 400 Colorado avenue, Joseph B. Conley,

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Without Dies

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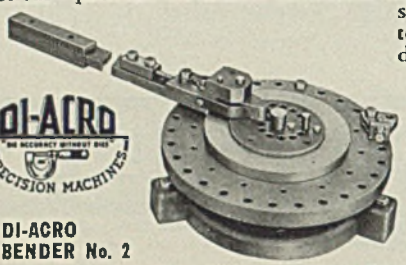

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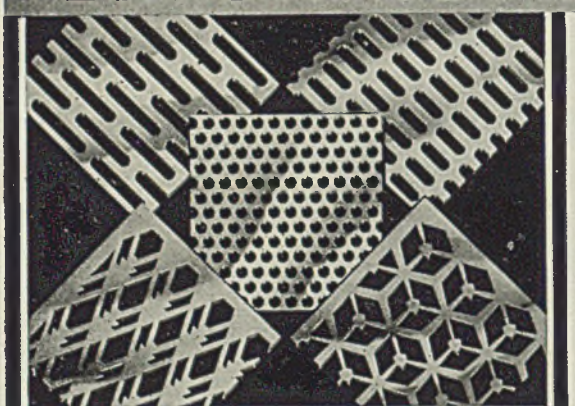

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superintendent, is adding 7700 square feet to plant here.

NEW PHILADELPHIA, O.—Ohio Axle Co. is being formed by G. F. Beaber, 763 Second avenue Southeast; Franklin A. Esterly, of East Sparta, O., and Percey A. Housley, to hold exclusive license to manufacture axles under three patents. Mr. Limbach, of Fisher, Limbach, Smith & Renner, 119 West High avenue, is handling legal details.

New Jersey

NEWARK, N. J.—Weber & Scher Mfg. Co., 263 Sussex avenue, has let contract to Anthony Lewis & Co., 40 Clinton street, for two-story 50 x 89-foot machine shop addition. Estimated cost $40,000. E. H. Schmeider, 263 Sussex avenue, architect.

JERSEY CITY, N. J.—Western Electric Co., 195 Broadway, New York, is converting one-story 85 x 800-foot building into manufacturing plant. Contract has been awarded to Hugh Montague & Sons Inc., 880 Bergen avenue. A. R. Math, 195 Broadway, New York, architect.

WEST NEW YORK, N. J.—Dalesta Mfg. Co., 520 Palisade avenue, will build steel manufacturing plant.

Connecticut

BRIDGEPORT, CONN.—Andover Kent Inc., Johnson street, Middletown, Conn., has plans by Fletcher-Thompson Inc., 1336 Fairfield avenue, for factory alteration. Cost estimated at $40,000.

DEEP RIVER, CONN.—Pratt Read & Co. plans one-story 200 x 300-foot factory costing $50,000.

STONINGTON, CONN.—Atwood Machine Co., Water street, will soon let contract for one-story 80 x 160-foot factory estimated to cost $45,000. L. F. Caproni, 1221 Chapel street, New Haven, Conn., engineer. (Noted April 20).

STRATFORD, CONN.—Baird Machine Co., 1700 Stratford avenue, plans factory addition costing $45,000. Fletcher-Thompson Inc., 1336 Fairfield avenue, Bridgeport, Conn., architect.

Maryland

BALTIMORE—W. E. Bickerton Construction Co., 101 West Twenty-second street, has contract for factory building at Cleveland and Chesapeake avenues, for Reid-Avery Co.

Missouri

ST. LOUIS — Jackes-Evans Mfg. Co., Stanley F. Jackes, president, 4400 Union boulevard, is building a one-story addition to its factory, increasing floor space 32,000 square feet. Estimated cost $100,000.

ST. LOUIS—Massman Construction Co., Mermec Bottom road, has contract for shipbuilding yard and plant for Missouri Shipbuilding Co.

Indiana

FORT WAYNE, IND.—Bass Foundry & Machine Division, National Industries Inc., T. W. Simmons, manager, 1602 South Hanna street, plans one-story 100 x 350-foot factory addition. Cost about $100,000.

Wisconsin

KENOSHA, WIS.—Snap-On Tools Inc., Twenty-eighth avenue, will build factory addition.

Texas

BROWNSVILLE, TEX. — Woburn Industries, care of M. D. L. Van Over, president, Brownsville, plans addition to castor bean oil manufacturing plant. Cost estimated at $100,000.

CORPUS CHRISTI, TEX. — Gulf Plains Corp. will construct and equip a refinery. Estimated cost $3,000,000.

Mississippi

FLORA, MISS.—City plans addition to waterworks system, costing $56,000. J. W. Williams, Yazoo City, Miss., consulting engineer.

District of Columbia

WASHINGTON—War Department is negotiating with Charles H. Tompkins Co., 907 Sixteenth street Northwest, Washington, and Mauran-Russell, Crowell & Mullgardt, 1620 Chemical building, St. Louis, for an architect-engineer-management contract in connection with a manufacturing plant in Maryland, to cost in excess of $5,000,000, and to be supervised by Baltimore district office of Corps of Engineers.

North Carolina

WILMINGTON, N. C.—City will spend $1,600,000 for enlargement and improvement of water and sewer system.

Tennessee

CHATTANOOGA, TENN. — Chattanooga Boiler & Tank Co., 1011 East Main street, has permit for addition to building. John Martin Construction Co., general contractor.

CHATTANOOGA, TENN. — Combustion Engineering Co. has permit for machine shop. Mark K. Wilson, general contractor, Loveman building. Estimated cost $39,000.

Louisiana

PATTERSON, LA.—Town will spend approximately $50,000 for improvements to waterworks system.

West Virginia

POINT PLEASANT, W. VA. — Marietta Mfg. Co. has applied for permit for expansion of boat yard, to include launching ways, outfitting dock, dredging, etc.

SOUTH CHARLESTON, W. VA.—Westvaco Chlorine Products Corp., Eastern avenue, has awarded contracts for manufacturing plant.

California

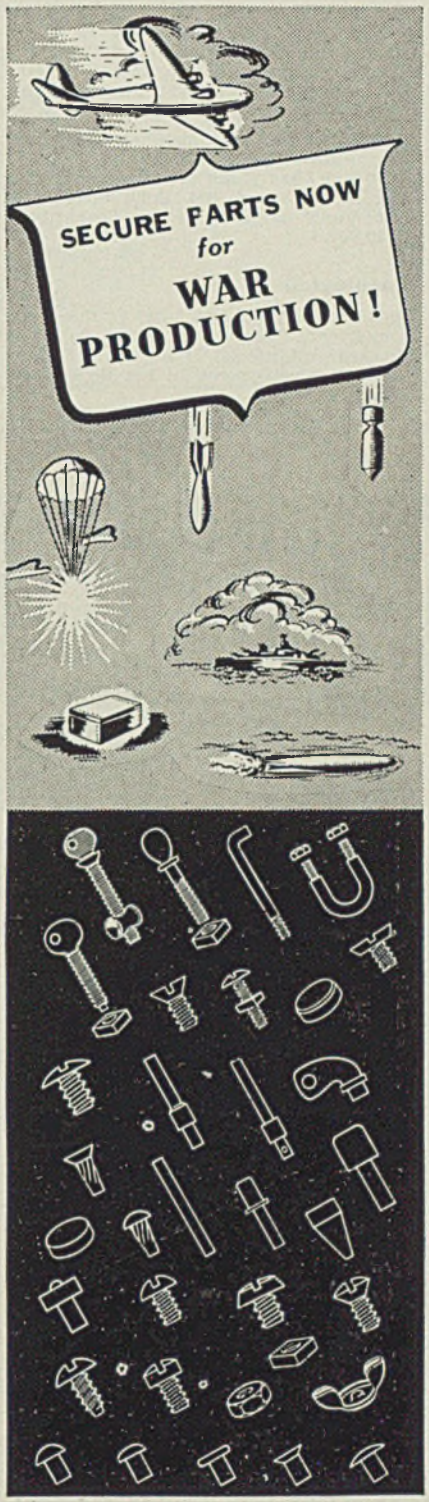
BERKELEY, CALIF.—Moore Machinery Co., Van Ness and Sacramento streets, San Francisco, has let contract for one-story machine shop to MacDonald & Kahn, Financial Security building. Estimated cost $80,000. L. H. Nishikian, 155 Sansome street, San Francisco, engineer.

LOS ANGELES—Earle M. Jorgensen Co., 10510 South Alameda street, has let contract for 100 x 240-foot forge press plant to Myers Bros., 3407 San Fernando road. Estimated cost $250,000. Webster & Wilson, 816 West Fifth street, architects.

OAKLAND, CALIF.—Earle M. Jorgensen Co., 10510 South Alameda street, Los Angeles, plans steel plant addition here. W. G. Merchant, Russ building, San Francisco, architect.

RICHMOND, CALIF.—General Chemical Corp., 400 Sansone street, San Francisco, plans erection of plant of 40-acre site.

SANTA CLARA, CALIF.—Higgins & Root,



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architects, Security building, San Jose, Calif., have drawn plans for 80 x 150-foot forge plant for San Jose Mfg. Co. Contract has been awarded to Pasetta Construction Co., 2390 Park avenue. Estimated cost $45,000.

SAN FRANCISCO—Oppenheimer Casing Co., 1016 West Thirty-sixth street, Chicago, has plans nearing completion by D. D. Stone, 381 Bush street, for one-story factory here. Cost about $40,000.

Washington

BELLINGHAM, WASH.—R. L. Stephens, president, Northwest Mfg. Co., has leased additional space and plans doubling equipment to handle defense contracts.

SEATTLE—Buyken Machinery Co., 1519 Rainier avenue, will build plant addition.

Oregon

HERMISTON, OREG.—City has awarded contract to J. M. DeBlasio, Yakima, Wash., for construction of $75,000 water and sewer system, and will call bids soon for disposal plant. Plans by R. H. Corey, Portland, Oreg.

PORTLAND, OREG.—Gilpin Construction Co. has contract to build $460,000 outfitting pier and repair dock at plant of Commercial Iron Works, 100 x 1450 feet. Contract for equipment will be placed soon.

LEBANON, OREG.—City plans disposal plant. R. H. Corey, Portland, Oreg., engineer.

Canada

BRANTFORD, ONT.—Cockshutt Plow Co. Ltd., 66 Mohawk street, will start work at once on addition to foundry to cost $15,000, equipment extra.

FORT WILLIAM, ONT.—Canadian Car & Foundry Co. Ltd., has given general contract to Claydon Co. Ltd., Graham-Horne Block, for plant addition to cost about $125,000. Plans prepared by C. D. Howe Co. Ltd., Port Arthur, Ont.

HAMILTON, ONT.—Ontario Forgings Ltd. has given general contract to W. H. Cooper Construction Co. Ltd., Medical Arts building, for addition to plant on Queen Street North. Plans by Hutton & Souter, Pigott building.

OSHAWA, ONT.—General Motors of Canada Ltd., W. R. Roberts, general manager, has begun work on addition to engineering building, with W. B. Sullivan Construction Co., 30 Bloor street West, Toronto, general contractor. Estimated cost, with equipment, $225,000.

SMITH'S FALLS, ONT.—Justus Electric Co., Victoria avenue, William Justus, manager, plans two-story plant addition to cost about $50,000, with equipment.

SOUTH RIVER, ONT.—Standard Chemical Co. Ltd., 67 Yonge street, Toronto, Robert M. Sedgewick, vice president, has plans and will let contracts soon for plant here to cost about $60,000.

TORONTO, ONT.—Shaw Machine & Tool Co., 34 St. Patrick street, has let general contract to James Reidford, 25 Brookside avenue, for machine shop to cost $15,000, equipment extra.

TORONTO, ONT.—Canada Wire & Cable Co. Ltd., Laird drive, Leaside, plans addition to plant costing $30,000.

TORONTO, ONT.—Massey-Harris Co. Ltd., 915 King street West, has given general contract to Walter Davidson & Co., 188 Duke street, for plant addition costing $21,000.

WELLAND, ONT.—Volta Mfg. Co. Ltd., Alexander street, has given general contract to Gardner Construction Co. Ltd., 7 Riverbank street, for plant addition to cost about $25,000.

WINDSOR, ONT.—Canadian Traction Ltd., 1989 Wyandotte avenue West, has acquired site and plans erection of two-story plant addition to cost about $50,000, with equipment.

WINDSOR, ONT.—Standard Tool & Machine Co. Ltd., 870 Ottawa street, has had plans prepared by J. C. Pennington, architect, Bank of Commerce building, for plant addition to cost about $70,000, including equipment.

BEAUHARNOIS, QUE.—St. Lawrence Metals & Alloys Ltd., Canal road is having plans prepared by Ross & MacDonald, 1010 St. Catharine street West, Montreal, and will let contracts soon for $50,000 plant addition.

LACHINE, QUE.—Dominion Engineering Works Ltd., First avenue, has let general contract to Hyde & Miller Ltd., 1500 Guy street, for machine shop addition to cost $35,000, and is considering plans for erection of boiler shop at estimated cost of $100,000, including equipment.

MONTREAL, QUE.—Engine Works & Trading Inc., 318 Anne street, has received bids through Edward J. Turcotte, architect, 1010 St. Catharine street West, for addition to assembly shop on Shannon street. Estimated cost $70,000, including equipment.

MONTREAL, QUE.—Canadian Vickers Ltd., 5136 Notre Dame street East is receiving bids through T. Pringle & Son Ltd., engineer, 485 McGill street, for aircraft plant to cost between $2,500,000 and $3,000,000, with equipment.

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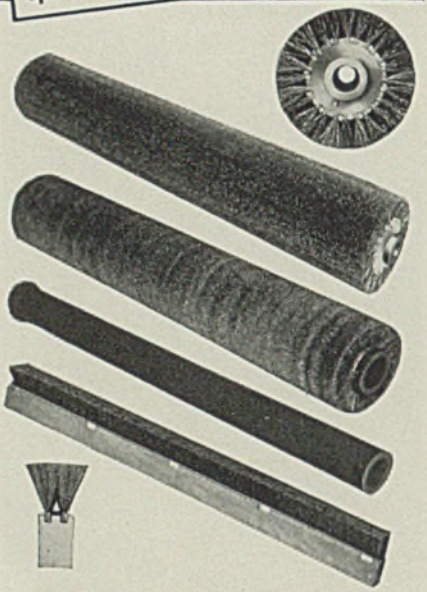

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BLOCKS (Chain)
Reading Chain & Block Co., Dept. D-4, Reading, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

BLOWERS
General Electric Co., Schenectady, N. Y.
Mahr Mfg. Co., Div. of Diamond Iron Works, Inc., Minneapolis, Minn.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

BLOWPIPES (Oxy-Acetylene)
Linde Air Products Co., The, 30 E. 42nd St., New York City.

BLUE PRINTING MACHINES
Wickes Brothers, Saginaw, Mich.

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

WHERE-TO-BUY

BOLT AND NUT MACHINERY
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., The, Tiffin, O.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

BOLTS
(*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland Cap Screw Co., 2917 E. 79th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Oliver Iron & Steel Corp., So. 10th & Muriel Sts., Pittsburgh, Pa.
*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.
Triplex Screw Co., The, 5317 Grant Ave., Cleveland, O.

BOLTS (Carriage and Machine)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2917 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.
Triplex Screw Co., The, 5317 Grant Ave., Cleveland, O.

BOLTS (Non-Ferrous and Stainless)
Harper, H. M., Co., The, 2646 Fletcher St., Chicago, Ill.

BOLTS (Special)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2917 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 Co., 3517 Shields Ave., Chicago, Ill.
Cleveland Cap Screw Co., 2917 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.

BOLTS (Stove, Recessed Head)
American Screw Co., Providence, R. I.
Bristol Co., Waterbury, Conn.
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.

BOLTS (Track)—See TRACK BOLTS

BORING MACHINES (Precision)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Heald Machine Co., Worcester, Mass.
National Automatic Tool Co., The, Richmond, Ind.
Ohio Machine Tool Co., The, Kenton, O.
William Sellers & Co., Inc., 16th & Callowhill St., Philadelphia, Pa.

BORING MILLS (Automatic Controls for)
Detroit Universal Duplicator Co., 218 St. Aubin, Detroit, Mich.

BORING TOOLS (Carbide Tipped)
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

BOXES (Annealing)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
General American Transportation Corp., 135 So. LaSalle St., Chicago, Ill.
National-Erie Corp., Erie, Pa.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.
Union Steel Casting Div. of Blaw-Knox Co., 62nd & Butler Sts., Pittsburgh, Pa.
United Engineering & Foundry Co., First National Bank Bldg., Pittsburgh, Pa.
Wilson, Lee, Engineering Co., 1368 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.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.

BRAKE LININGS
Johns-Manville Corp., 22 E. 40th St., New York City.

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., The, 2698 E. 79th St., Cleveland, O.

BRAKES (Hand)
O'Neil-Irwin Mfg. Co., 304 8th Ave. So., Minneapolis, Minn.

BRAKES (Press)
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Crane & Engineering Co., The, Steelweld Machinery Div., 1125 E. 283rd St., Wickliffe, O.
Elmes, Chas. F., Engineering Works, 245 N. Morgan St., Chicago, Ill.

BRICK (Acid Resisting)
Keagler Brick Co., 1443 W. Market St., Steubenville, O.
Nukem Products Corp., 70 Niagara St., Buffalo, N. Y.

BRICK (Chrome)
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.

BRICK—(Insulating)—See INSULATING BRICK

BRICK (Ladle)
Globe Brick Co., The, East Liverpool, O.

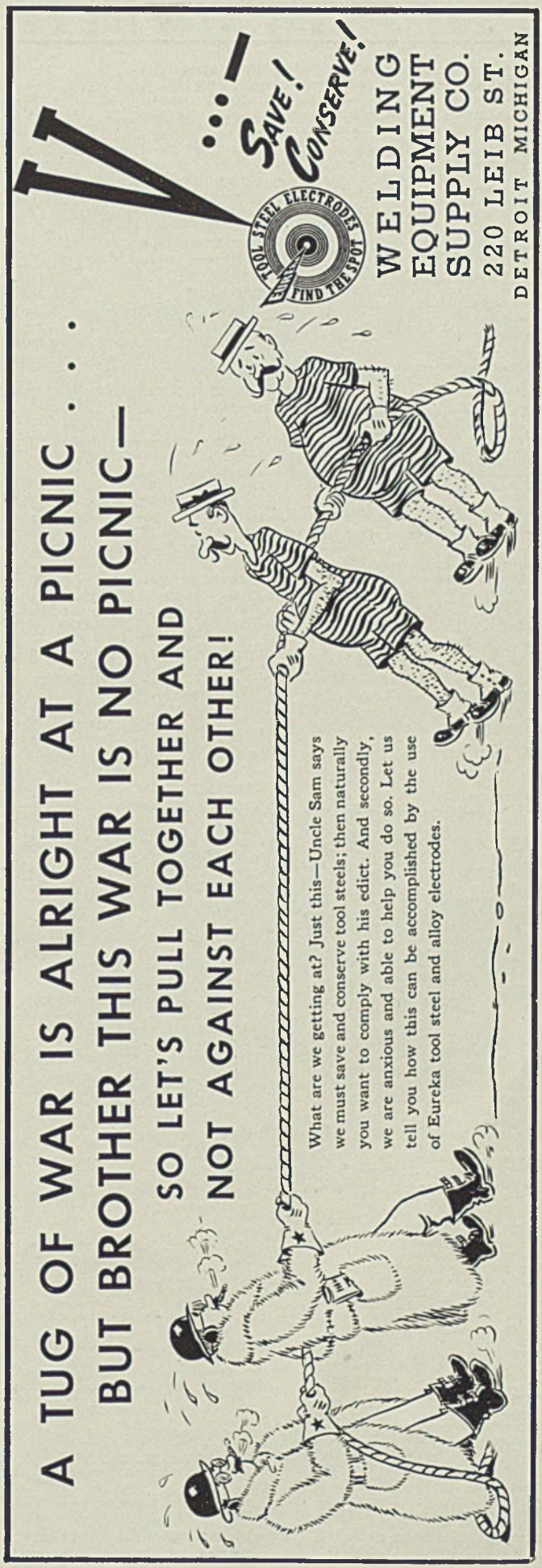
BRICK (Refractory)—See REFRACTORIES, CEMENT, ETC.

BRICK (Silica)
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.

BRICK (Silicon Carbide)
Bay State Abrasive Products Co., Westboro, Mass.
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.
General American Transportation Corp., 135 So. LaSalle St., Chicago, Ill.
Levinson Steel Co., 33 Pride St., Pittsburgh, Pa.
Robertson, H. H., Co., Farmers Bank Bldg., Pittsburgh, Pa.
Uhl Construction Co., 6001 Butler St., Pittsburgh, Pa



BROACHING CUTTERS
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

BROACHING MACHINES
American Broach & Machine Co., Ann Arbor, Mich.
Bullard Co., The, Bridgeport, Conn.
Cincinnati Milling Machine & Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Colonial Broach Co., 147 Jos. Campau, Detroit, Mich.

BRUSHES
Fuller Brush Co., The, Hartford, Conn.

BRUSHES (Carbon)
United States Graphite Co., The, Saginaw, Mich.

BRUSHES (Industrial)
Fuller Brush Co., The, Hartford, Conn.

BRUSHES (Steelgrip)
Fuller Brush Co., The, Hartford, Conn.

BUCKETS (Clam Shell, Dragline Grab, Single Line)
Atlas Car & Mfg. Co., The, Blaw-Knox Co., Blawnox, Pa.
Cullen-Friestedt Co., 1308 So. Kilbourn St., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

BUCKETS (Single Hook, Automatic Dump, Automatic Single Line)
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

BUILDINGS (Industrial)
Austin Co., The, 16112 Euclid Ave., Cleveland, O.

BUILDINGS (Steel)—See BRIDGES, BUILDINGS, ETC.

BULLDOZERS
Beatty Machine & Mfg. Co., 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.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Bloom Engineering Co., 916 Behan St., Pittsburgh, Pa.
Peabody Engineering Corp., 580 Fifth Ave., New York City.
Surface Combustion Div., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1368 Blount St., Cleveland, O.

BURNERS (Fuel, Oil, Gas, Combination)
American Gas Furnace Co., Elizabeth, N. J.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Bloom Engineering Co., 916 Behan St., Pittsburgh, Pa.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Maehler, Paul, Co., The, 2208 W. Lake St., Chicago, Ill.
Mahr Mfg. Co., Div. of Diamond Iron Works, Inc., Minneapolis, Minn.
Peabody Engineering Corp., 580 Fifth Ave., New York City.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Surface Combustion Div., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1368 Blount St., Cleveland, O.

BUSHINGS (Bronze)
Ampco Metal, Inc., Dept. S-2, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., 402 W. Third St., Dover, O.

BUSHINGS (Jig)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

BUSHINGS (Oilless)
Rhoades, R. W., Metaline Co., 43 Third St., Long Island City, N. Y.

BY-PRODUCT PLANTS
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

CABINETS (Steel)
Dahlstrom Metallic Door Co., Jamestown, N. Y.

CADMIUM
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

CADMIUM PLATING PROCESS
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

CALCIUM METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.

CAP SCREWS—See SCREWS (Cap, Set, Safety-Set)

CAISSONS (Pneumatic)
Dravo Corp., (Contracting Div.), Neville Island, Pittsburgh, Pa.

CAPSTANS (Electric, Gasoline, Diesel)
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

CAR DUMPERS
Alliance Machine Co., The, Alliance, Ohio.
Industrial Brownhoist Corp., Bay City, Mich.

CAR PULLERS and SPOTTERS
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
Cullen-Friestedt Co., 1308 So. Kilbourn St., Chicago, Ill.
Link-Belt Co., 2410 W. 18th St., Chicago, Ill.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

CARBIDE
Linde Air Products Co., The, 30 E. 42nd St., New York City.
National Carbide Corp., 60 E. 42nd St., New York City.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago, Ill.

CARBIDE (Special Parts)
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

CARBIDE TOOLS (Steel Cutting)
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

CARBON SPECIALTIES
United States Graphite Co., The, Saginaw, Mich.

CARBURIZING COMPOUNDS
Park Chemical Co., 8076 Military Ave., Detroit, Mich.

CARBURIZING (Pack or Gas)
Lakeside Steel Improvement Co., The, 5418 Lakeside Ave., Cleveland, O.

CARS (Charging)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.

CARS (Dump)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Easton Car & Construction Co., Easton, Pa.

CARS (Industrial and Mining)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Easton Car & Construction Co., Easton, Pa.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.

CARS (Scale)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.

CASTING WASHER EQUIPMENT
Pangborn Corp., Hagerstown, Md.

CASTINGS (Acid Resisting)
Ampco Metal, Inc., Dept. S-2, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
International Nickel Co., Inc., The, 67 Wall St., New York City.
Lebanon Steel Foundry, Lebanon, Pa.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., 402 W. Third St., Dover, O.

CASTINGS (Alloy Iron)
Erie Forge Co., W. 15th & Cascade Sts., Erie, Pa.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.

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.
Electro Alloys Co., The, Elyria, O.
Erie Forge Co., W. 15th & Cascade Sts., Erie, Pa.
Lebanon Steel Foundry, Lebanon, Pa.
Michiana Products Co., Michigan City, Ind.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
National-Erie Corp., Erie, Pa.
Ohio Steel Foundry Co., Lima, O.-Springfield, O.

CASTINGS (Brass, Bronze, Copper, Aluminum)
Ampco Metal, Inc., Dept. S-2, 3830 W. Burnham St., Milwaukee, Wis.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Homestead Valve Mfg. Co., P. O. Box 20, Coraopolis, Pa.
Morgan Engineering Co., The, Alliance, O.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., 402 W. Third St., Dover, O.

CASTINGS (Corrosion Resisting)
Lebanon Steel Foundry, Lebanon, Pa.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
Wall-Colmonoy Corp., 637 Buhl Bldg., Detroit, Mich.

CASTINGS (Die)—See DIE CASTINGS

CASTINGS (Electric Steel)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Erie Forge Co., W. 15th & Cascade Sts., Erie, Pa.
Lebanon Steel Foundry, Lebanon, Pa.
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 Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Brown & Brown, Inc., 456 So. Main St., Lima, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Erie Foundry Co., Erie, Pa.
Etna Machine Co., The, 3400 Maplewood Ave., Toledo, O.
Ferracute Machine Co., Bridgeton, N. J.
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., 402 W. Third St., Dover, O.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

CASTINGS (Heat Resisting)
Electro Alloys Co., The, Elyria, O.
International Nickel Co. Inc., The, 67 Wall Street, New York City.
Lebanon Steel Foundry, Lebanon, Pa.
Michiana Products Co., Michigan City, Ind.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
Shenango-Penn Mold Co., 402 W. Third St., Dover, O.

CASTINGS (Malleable)
American Chain & Cable Co. Inc., Bridgeport, Conn.
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.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Ferracute Machine Co., Bridgeton, N. J.
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 Div. of Baldwin Locomotive Works, The 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 Div. of Blaw-Knox 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 (Steel) (*Also Stainless)
*Allegheny Ludlum Steel Corp., Dept. S-229, Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehm, Pa.
Birdsboro Stel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Erie Forge Co., W. 15th & Cascade Sts., Erie, Pa.
*Lebanon Steel Foundry, Lebanon, Pa.
*Michiana Products Co., Michigan City, Ind.
Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh, Pa.
Union Steel Casting Div. of Blaw-Knox 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 (Wear Resisting)
Hagan, George J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Lebanon Steel Foundry, Lebanon, Pa.
Shenango-Penn Mold Co., 402 W. Third St., Dover, O.
Wall-Colmonoy Corp., 637 Buhl Bldg., Detroit, Mich.

WHERE-TO-BUY

CASTINGS (Worm and Gear Bronze)
Ampco Metal, Inc., Dept. S-2, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.

CEMENT (Acid Proof)
Nukem Products Corp., 70 Niagara St., Buffalo, N. Y.
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.

CEMENT (High Temperature)
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., The, Perth Amboy, N. J.
Eagle-Picher Lead Co., The, Cincinnati, O.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.
Johns-Manville Corp., 22 E. 40th St., New York City.
Norton Company, Worcester, Mass.

CEMENT (High Temperature Hydraulic)
Atlas Lumnite Cement Co., Dept. S, Chrysler Bldg., New York City.

CENTRAL STATION EQUIPMENT
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

CHAIN (Conveyor and Elevator)
Jeffrey Mfg. Co., 956 N. Fourth St., Columbus, O.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Draw Bench)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Malleable)
Lake City Malleable Co., 5026 Lakeside Ave., Cleveland, O.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Power Transmission)
Jeffrey Mfg. Co., 956 N. Fourth St., Columbus, O.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Roller)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Sling)
American Chain & Cable Co. Inc., Bridgeport, Conn.

CHAIN (Sprocket)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Steel-Finished Roller)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Welded or Weldless)
American Chain & Cable Co. Inc., Bridgeport, Conn.

CHARGING MACHINES (Cupola)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.

CHARGING MACHINES (Open Hearth)
Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

CHARGING MACHINES AND MANIPULATORS (Autofloor Type)
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

CHECKER BRICK
Loftus Engineering Corp., 747 Oliver Bldg., Pittsburgh, Pa.

CHECKS (Metal)
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.
Matthews, James H., & Co., 3978 Forbes St., Pittsburgh, Pa.

CHEMICALS (Industrial)
Metal & Thermit Corp., 120 Broadway, New York City.
Park Chemical Co., 8076 Military Ave., Detroit, Mich.
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.

CHROME ORE
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

CHROMIUM METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Metal & Thermit Corp., 120 Broadway, New York City.
Vanadium Corp. of America, 420 Lexington Ave., 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.
Oster Mfg. Co., The, 2057 E. 61st St., Cleveland, O.

CHUCKS (Automatic Closing)
Tomkins-Johnson Co., The, Dept. S, 611 N. Mechanic St., Jackson, Mich.

CLAMPS (Drop Forged)
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

CLEANERS (Steam)
Homestead Valve Mfg. Co., P. O. Box 20, Coraopolis, Pa.

CLEANING SPECIALTIES
American Chemical Paint Co., Dept. 310, Ambler, Pa.
MacDermid, Inc., Waterbury, Conn.
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.

CLUTCHES (Friction)
Jones, W. A. Fdry. & Mach. Co., 4437 Roosevelt Rd., Chicago, Ill.

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.
Pickands Mather & Co., Union Commerce Bldg., Cleveland, O.
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.
Youngstown Sheet & Tube Co., The, Youngstown, O.

COAL, COKE, ORE AND ASH HANDLING MACHINERY
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Easton Car & Construction Co., Easton, Pa.
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.

COKE—See COAL OR COKE

COKE OVEN MACHINERY
Alliance Machine Co., The, Alliance, Ohio.
Atlas Car & Mfg. Co., The, 1100 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.

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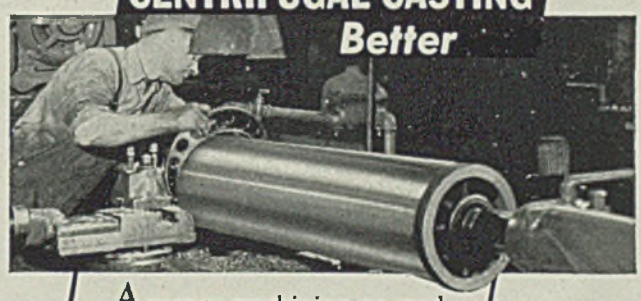

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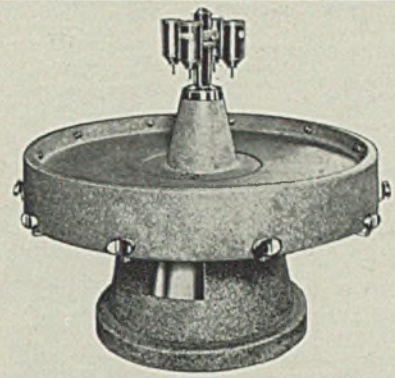

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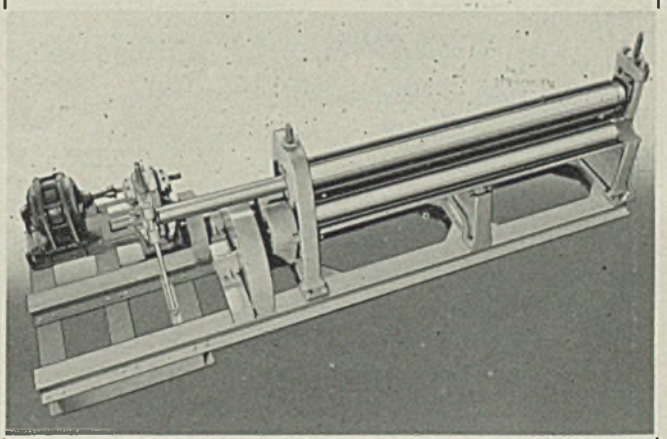

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FENCING (Wire)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

FERROALLOY (Briquets)
Electro Metallurgical Co., 30 E. 42nd St., New York City.

FERROALLOYS
Cleveland-Cliffs Iron Co., The, Union Commerce Bldg., Cleveland, O.
Electro Metallurgical Co., 30 E. 42nd St., New York City.
International Nickel Co., Inc., The, 67 Wall St., New York City.
Metal & Thermit Corp., 120 Broadway, New York City.
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROCHROME
Electro Metallurgical Co., 30 E. 42nd St., New York City.
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 Co., 30 E. 42nd St., New York City.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FERROPHOSPHORUS
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FERROSILICON
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Southern Ferro Alloys Co., 2108 Chestnut St., Chattanooga, Tenn.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROSILICON ALUMINUM
Vanadium Corp. of America,

FERROTITANIUM
Metal & Thermit Corp., 120 Broadway, New York City.
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.
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.,

FILES AND RASPS
Atkins, E. C., & Co., 427 So. Illinois St., Indianapolis, Ind.
Disston, Henry, & Sons, Inc., 526 Tacony, Philadelphia, Pa.
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.

FILTER CLOTH (Asbestos)
Johns-Manville Corp., 22 E. 40th St., New York City.

FIRE CLAY—See REFRACTORIES

FIRE DOORS & SHUTTERS—See DOORS & SHUTTERS

FIRE EXTINGUISHERS
C-O-Two Fire Equipment Co., 10 Empire St., Newark, N. J.
Kidde, Walter, & Co., Inc., 459 West St., Bloomfield, N. J.

FIRE EXTINGUISHING SYSTEMS
C-O-Two Fire Equipment Co., 10 Empire St., Newark, N. J.

FIRE PROTECTION EQUIPMENT
C-O-Two Fire Equipment Co., 10 Empire St., Newark, N. J.
Walter Kidde & Co., Inc., 459 West St., New York, N. Y.

FITTINGS (Electric Steel)
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.

FITTINGS (Rubber Lined)
American Hard Rubber Co., 11 Mercer St., New York City.

FLAME HARDENING
Air Reduction, 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., 2915 No. Second St., Philadelphia, Pa.

FLOORING (Monolithic)
Carey, Philip, Co., The, 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.
Robertson, H. H. Co., Farmers Bank Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

FLUE DUST CONDITIONERS
Brosius, Edgar E., Co., Sharpsburg, Branch, Pittsburgh, Pa.

FLUE GAS ANALYZERS
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

FLUORSPAR
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FLUXES (Soldering, Welding & Tinning)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Kester Solder Co., 4222 Wrightwood Ave., Chicago, Ill.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

FORGING BILLETS—See BILLETS

FORGING MACHINERY
Alliance Machine Co., The, Alliance, Ohio.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
National Machinery Co., The, Tiffin, O.

FORGINGS (Aluminum, Brass, Bronze, Copper)
American Brass Co., The, Waterbury, Conn.
Ampco Metal, Inc., Dept. S-2, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

FORGINGS (Drop) (*Also Stainless)
*Atlas Drop Forge Co., Lansing, Mich.
*Bethlehem Steel Co., Bethlehem, Pa.
Oil Well Supply Co., Dallas, Texas.
Oliver Iron & Steel Corp., So. 10th & Muriel Sts., Pittsburgh, Pa.

FORGINGS (Hollow Bored)
American Hollow Boring Co., 1054 W. 20th St., Erie, Pa.
Atlas Drop Forge Co., Lansing, Mich.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Erie Forge Co., W. 15th & Cascade Sts., Erie, Pa.

FORGINGS (Iron and Steel) (*Also Stainless)
*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.
Erie Forge Co., W. 15th & Cascade Sts., Erie, Pa.
Heppenstall Co., Box S-5, 4620 Hatfield St., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
Oil Well Supply Co., Dallas, Texas.
Standard Steel Works Div. of The Baldwin Locomotive Works, 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 (Small)
Oliver Iron & Steel Corp., So. 10th & Muriel Sts., Pittsburgh, Pa.

FORGINGS (Upset)
Atlas Drop Forge Co., Lansing, Mich.
Bethlehem Steel Co., Bethlehem, Pa.
Oliver Iron & Steel Corp., So. 10th & Muriel Sts., Pittsburgh, Pa.

FOUNDRY EQUIPMENT
American Foundry Equipment Co., The, Mishawaka, Ind.

FROGS AND SWITCHES
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.

FURNACE INSULATION—See INSULATION

FURNACES (Blast)
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.

FURNACES (Brazing)
Bellis Heat Treating Co., Branford, Conn.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.

FURNACES (Electric Heating)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Bellis Heat Treating Co., Branford, Conn.
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.
Mahr Mfg. Co., Div. of Diamond Iron Works, Inc., Minneapolis, Minn.
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., Dept. 7-N, East Pittsburgh, Pa.

WHERE-TO-BUY

FURNACES (Electric Melting)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Detroit Electric Furnace Div., Kuhlman Electric Co., Bay City, Mich.
General Electric Co., Schenectady, N. Y.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1257, Pittsburgh, Pa.

FURNACES (Enameling)
Hagan, George J., Co., 2400 E. Carson St., Pittsburgh, Pa.

FURNACES (Forging)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Bellis Heat Treating Co., Branford, Conn.
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.
Surface Combustion Div., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.

FURNACES (Galvanizing)
Salem Engineering Co., 714 So. Broadway, Salem, O.

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.
Surface Combustion Div., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.

FURNACES (Heat Treating, Annealing, Carburizing, Hardening, Tempering)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
American Gas Furnace Co., Elizabeth, N. J.
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Bellis Heat Treating Co., Branford, Conn.
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.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.
A. F. Holden Co., The, 200 Winchester Ave., New Haven, Conn.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Mahr Mfg. Co., Div. of Diamond Iron Works, Inc., Minneapolis, Minn.
Ohio Crankshaft Co., The, 6600 Clement Ave., Cleveland, O.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Div., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Wean Engineering Co., Warren, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

FURNACES (Laboratory)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Dietert, Harry W., Co., 9330J Roselawn Ave., Detroit, Mich.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.

FURNACES (Non-Ferrous Melting)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Detroit Electric Furnace Div., Kuhlman Electric Co., Bay City, Mich.

FURNACES (Open Hearth)
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.

FURNACES (Portable)
Hagan, George J., Co., 2400 E. Carson St., Pittsburgh, Pa.

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 Div., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.

FURNACES (Rivet Heating)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Div., 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 Div., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1368 Blount St., Cleveland, O.

FURNACES (Steel Mill)
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.
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 Div., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.
Wilson, Lee, Engineering Co., 1368 Blount St., Cleveland, O.

FURNACES (Welding)
Hagan, George J., Co., 2400 E. Carson St., Pittsburgh, Pa.

GAGE BLOCKS
Dearborn Gage Co., 22036 Beech St., Dearborn, Mich.

GAGES
Brown & Sharpe Mfg. Co., Providence, R. I.
Federal Products Corp., 1144 Eddy St., Providence, R. I.
Greenfield Tap & Die Corp., Greenfield, Mass.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.
Sheffield Corp., The, Gage Div., Dayton, O.

GAGES (Automatic Control & Recording)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.

GAGES (Indicating and Recording)
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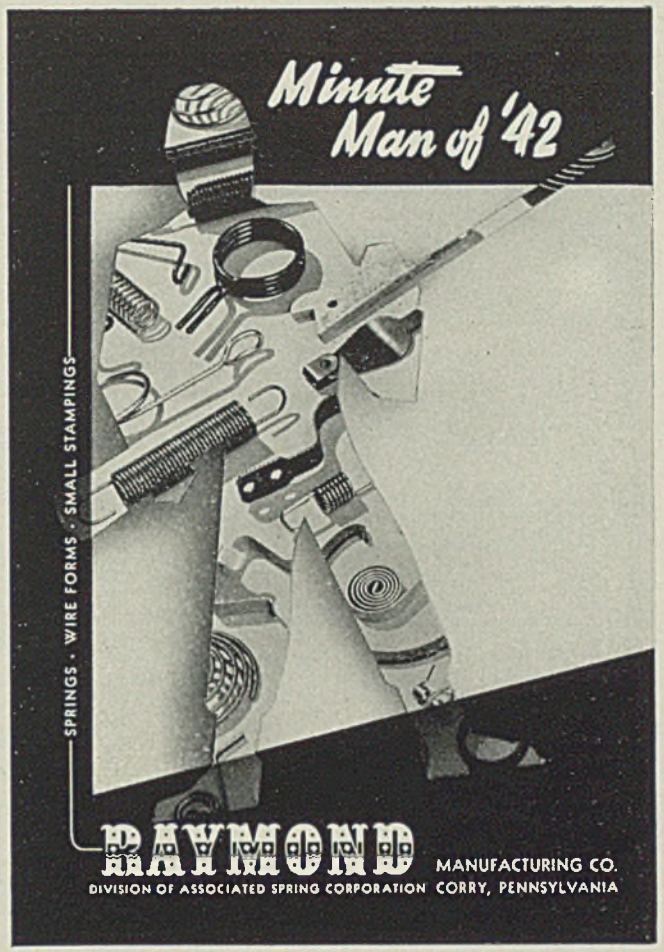
General Electric Co., Schenectady, N. Y.
Sheffield Corp., The, Gage Div., Dayton, O.

GAGES (Pressure & Vacuum Recording)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.



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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.,
Equipment Steel Products Div., of Union Asbestos & Rubber Co., Blue Island, Ill.
Galvanizers Incorporated, Portland, Ore.
Funner Mfg. Co., The, Cleveland, O.
Finn, John, Metal Works, San Francisco, Calif.
Gregory, Thomas, Galvanizing Works, Maspeth, N. Y.
Hanlon-Gregory Galvanizing Co., 5515 Butler St., Pittsburgh, Pa.
Hill, James, Mfg. Co., Providence, R. I.
Hubbard & Co., Oakland, Calif.
Independent Galvanizing Co., Newark, N. J.
International-Stacey Corp., Columbus, O.
Isaacson Iron Works, Seattle, Wash.
Joslyn Co. of California, Los Angeles, Calif.
Joslyn Mfg. & Supply Co., Chicago, Ill.
Keyes, 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.
Penn Galvanizing Co., Philadelphia, Pa.
Riverside Foundry & Galvanizing Co., Kalamazoo, Mich.
San Francisco Galvanizing Works San Francisco, Calif.
Sanitary Tinning Co., The, Cleveland, O.
Scaife Co., Ames St., Oakmont, Pa.
Standard Galvanizing Co., Chicago, Ill.
Wilcox, Crittenden & Co., Inc., Middletown, Conn.
Witt Cornice Co., The, Cincinnati, O.

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Wean Engineering Co., Warren, O

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Western Gas Div., Koppers Co., Fort Wayne, Ind.

GAS PRODUCER PLANTS

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Morgan Construction Co., Worcester, Mass.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

GAS RECOVERY COKE OVEN AND GAS PLANTS

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Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

GAS SCRUBBERS

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Peabody Engineering Corp., 580 Fifth Ave., New York City.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

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Johns-Manville Corp., 22 E. 40th St., New York City.

GEAR BLANKS

Ampco Metal, Inc., Dept. S-2, 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., 2915 No. Second St., Philadelphia, Pa.
National-Erie Corp., Erie, Pa.
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Waldron, John, Corp., New Brunswick, N. J.

GEAR MACHINERY (Generating)

National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.

GEAR MACHINERY (Lapping, Finishing, Checking)

Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

GEARS (Non-Metallic)

Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

GEARS (Steel Laminated)

Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.
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
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

GEARS AND GEAR CUTTING

General Electric Co., Schenectady, N. Y.
Grant Gear Works, 2nd & B Sts., Boston, Mass.
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 Roosevelt Rd., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1467 Pittsburgh, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
National-Erie Corp., Erie, Pa.
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, 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

Cooper-Bessemer Corp., The, Mt. Vernon, Ohio.
Fairbanks, Morse & Co., Dept. E75, 600 So. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Reliance Electric & Eng. Co., 1088 Ivanhoe Rd., Cleveland, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, 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.
Fairbanks, Morse & Co., Dept. E75, 600 S. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O.
Reliance Electric & Eng. Co., 1088 Ivanhoe Rd., Cleveland, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

GENERATORS (Plating)

Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

GRABS—FOR SHEETS, COILS, INGOTS

J-B Engineering Sales Co., 1743 Orange St., New Haven, Conn.

GRAPHITE

United States Graphite Co., The, Saginaw, Mich.

GRATING

Blaw-Knox Co., Blawnox, Pa.
Bravo 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.

GRINDER CENTERS

McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

GRINDER HEADS

Fitchburg Grinding Machine Corp., Fitchburg, Mass.

GRINDERS (Circular Saw)

Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.

GRINDERS (Foundry Core)

Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

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 (Shear Knife)

American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.

GRINDING COMPOUNDS

Stuart, D. A., Oil Co., Ltd., 2733 S. Troy St., Chicago, Ill.
Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia, Pa.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

GRINDING MACHINE ATTACHMENTS

Fitchburg Grinding Machine Corp., Fitchburg, Mass.

GRINDING MACHINES (Automotive Reconditioning)

Heald Machine Co., Worcester, Mass.

GRINDING MACHINES (Bench & Floor Type)

Walker-Turner Co., Inc., 5012 Berckman St., Plainfield, N. J.

GRINDING MACHINES (Centerless, Internal and External)

Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES (Chucking)

Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Fitchburg Grinding Machine Corp., Fitchburg, Mass.
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES (Crank Pin, Cam, Piston & Valve Face)

Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Norton Company, Worcester, Mass

GRINDING MACHINES (Die)

Fitchburg Grinding Machine Corp., Fitchburg, Mass.

GRINDING MACHINES (Gear)

Fitchburg Grinding Machine Corp., Fitchburg, Mass.

GRINDING MACHINES (Oscillating)

Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.

GRINDING MACHINES (Plain and Universal)

Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Fitchburg Grinding Machine Corp., Fitchburg, Mass.
Norton Co., Worcester, Mass.

GRINDING MACHINES (Roll)

Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
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 (Segmental)

Norton Company, Worcester, Mass.

GRINDING MACHINES (Spline)

Fitchburg Grinding Machine Corp., Fitchburg, Mass.

GRINDING MACHINES (Tool and Cutter)

Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Fitchburg Grinding Machine Corp., Fitchburg, Mass.
Kearney & Trecker Corp., 5926 National Ave., Milwaukee, Wis.
Norton Co., Worcester, Mass.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.
Walker-Turner Co., Inc., 5042 Berckman St., Plainfield, N. J.
William Sellers & Co., Inc., 16th & Callowhill St., Philadelphia, Pa.

GRINDING WHEELS

Abrasive Co., Tacony & Fraley Sts., Philadelphia, Pa.
Atkins, E. C., & Co., 427 So. Illinois St., Indianapolis, Ind.
Bay State Abrasive Products Co. Westboro, Mass.
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
DeSanno, A. P., & Son Inc., 436 Wheatland St., Phoenixville, Pa.
Macklin Co., Jackson, Mich.
Norton Co., Worcester, Mass.
Sterling Grinding Wheel Div. Cleveland Quarries Co., Tiffin, O.

GRINDING WHEELS (Segmental)

Abrasive Co., Tacony & Fraley Sts., Philadelphia, Pa.
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Macklin Co., Jackson, Mich.
Norton Company, Worcester, Mass.
Sterling Grinding Wheel Div. Cleveland Quarries Co., Tiffin, O.

GUIDE SHOES

Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

» » » WHERE-TO-BUY « « «

GUIDES (Mill)
Ampco Metal, Inc., Dept. S-2, 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., Co., Sharpsburg Branch, Pittsburgh, Pa.

GUNS (Steam, Hydraulic, Electric)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

HAMMERS (Drop)
Alliance Machine Co., The, Alliance, Ohio.
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.

HAMMERS (Power)
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

HAMMERS (Steam)
Alliance Machine Co., The, Alliance, Ohio.
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.

HANGERS
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
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 Corp., Harrison, N. J.
New Departure Div., General Motors Corp., Bristol, Conn.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

HEADING MACHINERY
National Machinery Co., Tiffin, O.

HEAT TREATING
Lakeside Steel Improvement Co., The, 5418 Lakeside Ave., Cleveland, O.
Van Dorn Iron Works, 2685 E. 79th St., Cleveland, O.

HEAT TREATING MATERIALS
Houghton, E. F., & Co., Third, American & Somerset Sts., Philadelphia, Pa.
Park Chemical Co., 8076 Military Ave., Detroit, Mich.

HEATERS (Air)
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

HEATERS (Electric Space)
Cutler-Hammer, Inc., 1211 St. Paul Ave., 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.

HOBS
Brown & Sharpe Mfg. Co., Providence, R. I.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

HOISTS (Chain)
Cleveland Tramrail Div., of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Ford Chain Block Div. of American Chain & Cable Co., Inc., 2nd & Diamond Sts., Philadelphia, Pa
Reading Chain & Block Co., Dept. D-4, Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 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 E. 283rd St., Wickliffe, O
Economy Engineering Co., 2657 W. Van Buren St., Chicago, Ill.
Euclid Crane & Hoist Co., The, Chardon Rd., Euclid, Ohio.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Reading Chain & Block Corp., Dept. D-4, Reading, Pa.
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.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.
Wright Mfg. Div. of American Chain & Cable Co. Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

HOISTS (Hand)
Economy Engineering Co., 2657 W. Van Buren St., Chicago, Ill.

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 E. 283rd St., Wickliffe, O.
Euclid Crane & Hoist Co., The, Chardon Rd., Euclid, Ohio.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Reading Chain & Block Corp., Dept. D-4, Reading, Pa.
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., 4530 Tacony St., Philadelphia, Pa.

HOISTS (Pneumatic)
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Klenlen Ave., St. Louis, Mo.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.

HONING MACHINES
Micromatic Hone Corp., 1345 E. Milwaukee Ave., 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 REINFORCEMENT MACHINES
Fidelity Machine Co., 3908-18 Frankford Ave., Philadelphia, Pa.

HOSE (Flexible Metal)
American Metal Hose Branch of The American Brass Co., Waterbury, Conn.
Chicago Metal Hose Corp., 1315 S. Third St., Maywood, Ill.

HUMIDIFIERS (Industrial)
Grinnell Co., Inc., Providence, R. I.

HYDRAULIC MACHINERY
Alliance Machine Co., The, Alliance, Ohio.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Elmes, Chas. F., Engineering Works, 245 N. Morgan St., Chicago, Ill.
Farquhar, A. B., Co., Ltd., 195 Duke St., York, Pa.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Morgan Engineering Co., The, Alliance, O.
National-Erie Corp., Erie, Pa.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Weinman Pump & Supply Co., The, 210 Boulevard of the Allies, Pittsburgh, Pa.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

HYDRAULIC PRESSES—See PRESSES (Hydraulic)

HYDRAULIC UNITS
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Racine Tool & Machine Co., Racine, Wis.
Weinman Pump & Supply Co., The, 210 Boulevard of the Allies, Pittsburgh, Pa.

INDICATORS (Blast Furnace Stock Line)
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

INDICATORS (Temperature)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
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.

INGOT MOLD WASH (Graphite)
United States Graphite Co., The, Saginaw, Mich.

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.

INSTRUMENTS (Electric-Indicating and Recording)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
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., Dept. 7-N, East Pittsburgh, Pa.

INSULATING BLOCK
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.
Ramtite Co., The, Div. of the S. Obermayer Co., 2557 W. 18th St., Chicago, Ill.

INSULATING BRICK
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.
Ramtite Co., The, Div. of the S. Obermayer Co., 2557 W. 18th St., Chicago, Ill.

INSULATING CONCRETE
Atlas Lumnite Cement Co., Dept. S, Chrysler Bldg. New York City.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATING POWDER AND CEMENT
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.
Ramtite Co., The, Div. of the S. Obermayer Co., 2557 W. 18th St., Chicago, Ill.

INSULATION (Building)
Carey, Philip, Co., The, Lockland, Cincinnati, O.
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATION (Furnace, Boiler Settings, Ovens, Steam Pipe, Etc.)
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.
Pickands Mather & Co., Union Commerce Bldg., Cleveland, O.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The Youngstown, O.

JIG BORERS
Bryant Machinery & Engineering Co., 400 W. Madison St., Chicago, Ill.
Cleereman Machine Tool Co., Green Bay, Wis.

JIGS AND FIXTURES
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.

KETTLES (Galvanizing)
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.

KEYS (Machine or Woodruff)
Moltrup Steel Products Co., Beaver Falls, Pa.

KNIVES
American Shear Knife Co., 3rd and Ann Sts., Homestead, Pa.
Atkins, E. C., & Co., 427 So. Illinois St., Indianapolis, Ind.
Cowles Tool Co., 2086 W. 110th St., Cleveland, O.
Disston, Henry, & Sons, Inc., 526 Tacony, Philadelphia, Pa.
Ohio Knife Co., Dreman Ave. & B. & O. R.R., Cincinnati, O.

LABORATORY EQUIPMENT
Dietert, Harry W., Co., 9330J Roselawn Ave., Detroit, Mich.

LABORATORY WARE
Bay State Abrasive Products Co., Westboro, Mass.
Norton Company, Worcester, Mass.

LADLES
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.

LAPPING MACHINES
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.
Norton Company, Worcester, Mass.

LARRIES (Coal)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.

LATHE CENTERS
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

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-2, Cincinnati, O.
Monarch Machine Tool Co., Sidney, O.
Morey Machinery Co., Inc., 410 Broome St., New York City.
South Bend Lathe Works, 861 E. Madison St., South Bend, Ind.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LATHES (Automatic)
Brown & Sharpe Mfg. Co., Providence, R. I.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vt.
Monarch Machine Tool Co., Sidney, O.

LATHES (Automatic Controls for)
Detroit Universal Duplicator Co., 218 St. Aubin, Detroit, Mich.
LATHES (Crankshaft)
Wickes Brothers, Saginaw, Mich.
LATHES (Burring & Polishing)
Walker-Turner Co., Inc., 5042 Berckman St., Plainfield, N. J.
LATHES (Chucking)
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.
LATHES (Engine)
Monarch Machine Tool Co., Sidney, O.
South Bend Lathe Works, 861 E. Madison St., South Bend, Ind.
Wickes Brothers, Saginaw, Mich.
LATHES (Railroad Car & Driving Wheel)
William Sellers & Co., Inc., 16th & Callowhill St., Philadelphia, Pa.
LATHES (Roll Turning)
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., 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.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vt.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.
LEAD (Tellurium)
National Lead Co., 111 Broadway, New York City.
LENSES (Illuminated)
Pike, E. W., & Co., 492 North Ave., Elizabeth, N. J.
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.
Wean Engineering Co., Warren, O.
LIFTERS (Hand & Electric)
Economy Engineering Co., 2657 W. Van Buren St., Chicago, Ill.
LIFTERS (Machine Shop)
Economy Engineering Co., 2657 W. Van Buren St., Chicago, Ill.
LIFT TRUCKS—See TRUCKS (Lift)
LIFTING MAGNETS—See MAGNETS (Lifting)
LIGHTING (Industrial)
Graybar Electric Co., 420 Lexington Ave., New York City.
LINERS (Pump and Cylinder)
Shenango-Penn Mold Co., 402 W. Third St., Dover, O.
LOCOMOTIVE CRANES—See CRANES (Locomotive)
LOCOMOTIVES (Diesel-Electric)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Plymouth Locomotive Works, Div., Fate-Root-Heath Co., Plymouth, O.
Porter, H. K., Co., Inc., 49th & Harrison Sts., Pittsburgh, Pa.
Whitcomb Locomotive Co., Rochelle, Ill.
LOCOMOTIVES (Diesel Mechanical)
Plymouth Locomotive Works, Div., Fate-Root-Heath Co., Plymouth, O.
Porter, H. K., Co., Inc., 49th & Harrison Sts., Pittsburgh, Pa.
Whitcomb Locomotive Co., Rochelle, Ill.
LOCOMOTIVES (Electric)
Porter, H. K., Co. Inc., 49th & Harrison Sts., Pittsburgh, Pa.
LOCOMOTIVES (Electric Trolley)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.
LOCOMOTIVES (Fireless)
Porter, H. K., Co. Inc., 49th & Harrison Sts., Pittsburgh, Pa.
LOCOMOTIVES (Gasoline-Electric)
Atlas Car & Mfg. Co., The, 1100 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, 1100 Ivanhoe Rd., Cleveland, O.
LOCOMOTIVES (Steam)
Porter, H. K., Co., Inc., 49th & Harrison Sts., Pittsburgh, Pa.
LOCOMOTIVES (Storage Battery)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.
LOCOMOTIVES (Switching and Transfer)
Cooper-Bessemer Corp., The, Mt. Vernon, O.
LUBRICANTS (Graphite)
Acheson Colloids Corp., Port Huron, Mich.
United States Graphite Co., The, Saginaw, Mich.
LUBRICANTS (Industrial)
Acheson Colloids Corp., Port Huron, Mich.
American Lanolin Corp., Railroad St., Lawrence, Mass.
Houghton, E. F., & Co., Third, American & Somerset Sts., Philadelphia, Pa.
Lubriplate Div., Fiske Bros. Refining Co., 129 Lockwood St., Newark, N. J.
New York & New Jersey Lubricant Co., 292 Madison Ave., New York City.
Penola, Inc., 34th & Smallman Sts., Pittsburgh, Pa.
Shell Oil Co., Inc., 50 W. 50th St., New York City.
Socony-Vacuum Oil Co., Inc., 26 Broadway, New York City.
Stuart, D. A., Oil Co., Ltd., 2733 So. Troy St., Chicago, Ill.
Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia, Pa.
Tide Water Associated Oil Co., 17 Battery Place, New York City.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.
LUBRICATING SYSTEMS
Farval Corp., The, 3270 E. 80th St., Cleveland, O.
MACHINE WORK
American Metal Products Co., 5959 Linsdale Ave., Detroit, Mich.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Fidelity Machine Co. 3908-18 Frankford Ave., Philadelphia, Pa.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.
Scaife Co., Ames St., Oakmont, Pa.
MACHINERY (Flexible Shaft)
Walker-Turner Co., Inc., 5042 Berckman St., Plainfield, N. J.
MACHINERY (Special)
Alliance Machine Co., The, Alliance, Ohio.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Bayard, M. L., & Co., 20th & Indiana Ave., Philadelphia, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.
Cleveland Automatic Machine Co., 2269 Ashland Ave., Cleveland, O.
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, 245 N. Morgan St., Chicago, Ill.
Etna Machine Co., The, 3400 Maplewood Ave., Toledo, O.
Farquhar, A. B., Co., Ltd., 195 Duke St., York, Pa.
Fidelity Machine Co., 3908-18 Frankford Ave., Philadelphia, Pa.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.
National-Erie Corp., Erie, Pa.
National Roll & Fdry. Co., The, Avonmore, Pa.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Oil Well Supply Co., Dallas, Texas.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.
Shuster, F. B., Co., The, New Haven, Conn.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
William Sellers & Co., Inc., 16th & Callowhill St., Philadelphia, Pa.
MACHINERY (Used & Rebuilt)
Albert, L., & Son, Whitehead Rd., Trenton, N. J.
Crawbuck, John D., Co., Empire Bldg., Pittsburgh, Pa.
Galbreath Machinery Co., Empire Bldg., Pittsburgh, Pa.
General Blower Co., 404 No. Peoria St., Chicago, Ill.
Iron & Steel Products, Inc., Hegewisch Sta., Chicago, Ill.
Lang Machinery Co., 28th & A.V.R.R., Pittsburgh, Pa.
Motor Repair & Mfg. Co., 1558 Hamilton Ave., Cleveland, O.
West Penn Machinery Co., 1208 House Bldg., Pittsburgh, Pa.
MAGNESIA (Electrically Fused)
Norton Co., Worcester, Mass.
MAGNESIUM
Dow Chemical Co., Midland, Mich.
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.
MANDRELS (Expanding)
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.
MANGANESE METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.
MANGANESE ORE
Cuban-American Manganese Corp., 122 E. 42nd St., New York, N. Y.
Samuel, Frank, & Co., Inc., 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, Ohio.
MARKING DEVICES
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.
Matthews, James H., & Co., 3978 Forbes St., Pittsburgh, Pa.
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., 4839 Harrison St., Pittsburgh, Pa
METAL CLEANERS
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Houghton, E. F., & Co., Third, American & Somerset Sts., Philadelphia, Pa.
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.
METAL CLEANING MACHINES
Ransohoff, N., Inc., Elmwood Place, Cincinnati, O.
METAL DUPLICATION (Without Dies)
O'Neil-Irwin Mfg. Co., 304 8th Ave. So., Minneapolis, Minn.
METAL FINISHES
American Nickeloid Co., 1310 N. Second St., Peru, Ill
METAL FORMING MACHINERY
O'Neil-Irwin Mfg. Co., 304 8th Ave. So., Minneapolis, Minn.
METAL SPECIALTIES AND PARTS—See STAMPINGS
METAL STAMPINGS—See STAMPINGS
METALS (Nonferrous)
American Brass Co., The, Waterbury, Conn.
International Nickel Co., Inc., The, 67 Wall St., New York City.
MICROMETERS
Brown & Sharpe Mfg. Co., Providence, R. I.
MILL BUILDINGS
Uhl Construction Co., 6001 Butler St., Pittsburgh, Pa.
MILLING CUTTERS
Atkins, E. C., & Co., 427 So. Illinois St., Indianapolis, Ind.
Brown & Sharpe Mfg. Co., Providence, R. I.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.
MILLING MACHINES
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Kearney & Trecker Corp., 5926 National Ave., Milwaukee, Wis.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.
William Sellers & Co., Inc., 16th & Callowhill St., Philadelphia, Pa.
MILLING MACHINES (Automatic Controls for)
Detroit Universal Duplicator Co., 218 St. Aubin, Detroit, Mich.
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
MOLDING MACHINERY (Foundry)
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.
MOLDINGS (Metal)
Dahlstrom Metallic Door Co., Jamestown, N. Y.
MOLDS (Ingot)—See INGOT MOLDS
MOLYBDENUM
Climax Molybdenum Co., 500 Fifth Ave., New York City.
Molybdenum Corp. of America, Grant Bldg., Pittsburgh, Pa.
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 E. 283rd St., Wickliffe, O.
Reading Chain & Block Corp., Dept. D-4, Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
MOTOR-ROLLERS
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
MOTORS (Electric)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Fairbanks, Morse & Co., Dept. E75, 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.
Reliance Electric & Eng. Co., 1088 Ivanhoe Rd., Cleveland, O.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

WHERE-TO-BUY

MOTORS (Electric)—Con.
Walker-Turner Co., Inc., 5042 Berckman St., Plainfield, N. J.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

MUCK BAR
Samuel, Frank, & Co., Inc., 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.
Continental Steel Corp., Kokomo, Ind.
Hassall, John, Inc., 402 Oakland St., Brooklyn, N. Y.
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.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

NAILS (Coated and Galvanized)
Wickwire Brothers, 189 Main St., Cortland, N. Y.

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 Div. Republic Steel Corp., Massillon, O.

NOZZLES (Blasting)
American Foundry Equipment Co., The, Mishawaka, Ind.
Pangborn Corporation, Hagerstown, Md.

NUTS (*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2917 E. 79th St., Cleveland, O.
Elastic Stop Nut Corp., 2367 Vauxhall Rd., Union, N. J.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Oliver Iron & Steel Corp., So. 10th & Muriel Sts., Pittsburgh, Pa.
*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.
Triplex Screw Co., The, 5317 Grant Ave., Cleveland, O.

NUTS (Castellated)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2917 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 (Non-Ferrous and Stainless)
Harper, H. M., Co., The, 2646 Fletcher St., Chicago, Ill.

NUTS (Self Locking)
Elastic Stop Nut Corp., 2367 Vauxhall Rd., Union, N. J.

NUTS (Semi-Finished)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2917 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.

OILS (Cutting)
Fiske Bros. Refining Co., 129 Lockwood St., Newark, N. J.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.
Penola, Inc., 34th & Smallman Sts., Pittsburgh, Pa.
Shell Oil Co., Inc., 50 W. 50th St., New York City.
Socony-Vacuum Oil Co., Inc., 26 Broadway, New York City.
Stuart, D. A., Oil Co. Ltd., 2733 So. Troy St., Chicago, Ill.
Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia, Pa.
Tide Water Associated Oil Co., 17 Battery Place, New York City.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

OILS (Lubricating)—See LUBRICANTS (Industrial)

OILS (Quenching)
Park Chemical Co., 8076 Military Ave., Detroit, Mich

OILS (Rust Preventive)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich

OPEN-HEARTH FURNACES—See FURNACES (Open-Hearth)

OVENS (Annealing, Japanning, Tempering)
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Maehler, Paul, Co., The, 2208 W. Lake St., 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.

OVENS (Gas or Oil Heat)
Maehler, Paul, Co., The, 2208 W. Lake St., Chicago, Ill.

OXY-ACETYLENE WELDING AND CUTTING—See WELDING

OXYGEN IN CYLINDERS
Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill

PACKING (Asbestos or Rubber)
Carey, Philip, Co., The, Lockland, Cincinnati, O.
Johns-Manville Corp., 22 E. 40th St., New York City.

PACKINGS—MECHANICAL LEATHER (Cup, U-Cup, Flange and Vees)
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.

PAINT (Alkali Resisting)
Pennsylvania Salt Mfg. Co., Dept S, 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, Lockland, Cincinnati, O.

PAINT (Marking)
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. 300 Koppers Bldg., Pittsburgh, Pa.

PARTS (Precision)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

PATTERNS (Wood or Metal)
Wellman Bronze & Aluminum Co., The, 6011 Superior Ave., Cleveland, O.

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.

PHENOL RECOVERY PLANTS
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

PICKLING COMPOUNDS
American Chemical Paint Co., Dept. 310, Ambler, Pa
American Hard Rubber Co., 11 Mercer St., New York City.
Houghton, E. F., & Co., Third, American & Somerset Sts., Philadelphia, Pa.
Parkin, Wm. M., Co., The, 1005 Highland Bldg., Pittsburgh, Pa.

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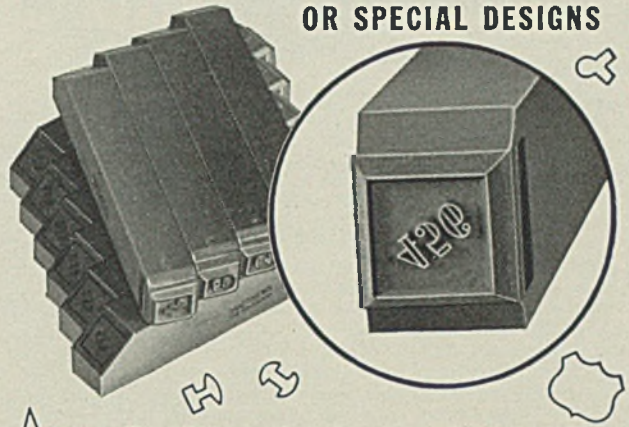

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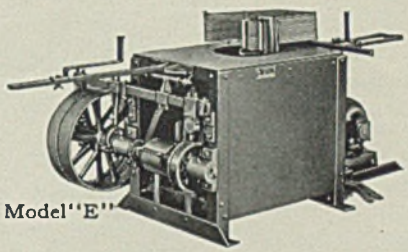

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PICKLING COMPOUNDS—Con.
Pennsylvania Salt Mfg. Co., Dept. S. Pennsalt Cleaner Div., Philadelphia, Pa.

PICKLING EQUIPMENT
International Nickel Co., The, 67 Wall St., New York City.

PICKLING MACHINERY
Erie Foundry Co., Erie, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

PICKLING TANK LININGS
Cellcote Co., 750 Rockefeller Bldg., Cleveland, O.
Keagler Brick Co., 1443 W. Market St., Steubenville, O.
Pennsylvania Salt Mfg. Co., Dept. S. 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.
Pickands Mather & Co., Union Commerce Bldg., Cleveland, O.
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.

PIG IRON (Charcoal)
Tennessee Products Corp., Nashville, Tenn.

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 Corp., Dept. ST. Cleveland, O.

PILING (Pressure-Treated Wood)
Wood Preserving Corp., The, 300 Koppers Bldg., Pittsburgh, Pa.

PILLOW BLOCKS (Ball)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.

PILLOW BLOCKS (Roller Bearing)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.

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

PINIONS (Mill)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
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.
Lewin-Mathes Co., E. St. Louis, Ill.
Shenango-Penn Mold Co., 402 W. Third St., Dover, O.

PIPE (Rubber Lined)
American Hard Rubber Co., 11 Mercer St., New York City.

PIPE (Square and Rectangular)
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PIPE (Steel)
Allegheny Ludlum Steel Corp., Dept. S-229. Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 1511 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.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.
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.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.

PIPE CUTTING AND THREADING MACHINERY
Landis Machine Co., Waynesboro, Pa.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

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.
Oil Well Supply Co., Dallas, Texas
Worthington Pump & Machinery Corp., Harrison, N. J.

PIPE LINES (Riveted and Welded)
Bethlehem Steel Co., Bethlehem, Pa.

PIPE MILL MACHINERY
Taylor-Wilson Mfg. Co., 1200 Thomson Ave., McKees Rocks, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

PIPE STRAIGHTENING MACHINERY
Elmes, Chas. F., Engineering Works, 245 N. Morgan St., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Taylor-Wilson Mfg. Co., 1200 Thomson Ave., McKees Rocks, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PIPE TOOLS
Greenfield Tap & Die Corp., Greenfield, Mass.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

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.

PISTON RODS
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Heppenstall Co., Box S-5, 4620 Hatfield St., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST. Cleveland, O.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Union Drawn Steel Div., Republic Steel Corp., Massillon, O.

PLANERS (Automatic Controls for)
Detroit Universal Duplicator Co., 218 St. Aubin, Detroit, Mich.

PLANERS AND SHAPERS
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
William Sellers & Co., Inc., 16th & Callowhill St., Philadelphia, Pa.

PLANT DISMANTLERS
Hetz Construction Co., Warren, O.

PLATE CASTORS
Hyatt Bearings Div., General Motors Corp., Harrison, N. J.

PLATE LIFTING GRIPS
Downs Crane & Hoist Co., 540 West Vernon Ave., Los Angeles, Cal.

PLATES (Sheared or Universal) (*Also Stainless)
*Alan Wood Steel Co., Conshohocken, Pa.
*Allegheny Ludlum Steel Corp., Dept. S-229. Oliver Bldg., Pittsburgh, Pa.
*American Rolling Mill Co., The 1511 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.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Levinson Steel Co., 33 Pride St., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Worth Steel Co., Claymont, Del.
Youngstown Sheet & Tube Co., The Youngstown, O.

PLATES (Stainless Clad)
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.

PLATES (Steel—Floor)—See FLOORING (Steel)

PLATES (Terne and Tin)—See TIN PLATE

PLATING EQUIPMENT
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

PLUGS (Expansion)
Hubbard, M. D., Spring Co., 443 Central Ave., Pontiac, Mich.

PLUGS (Rolling Mill)
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

POLE LINE MATERIAL
Oliver Iron & Steel Corp., So. 10th & Muriel Sts., Pittsburgh, Pa.

POLES (Tubular Steel)
National Tube Co., Frick Bldg., Pittsburgh, Pa.

POTENTIOMETERS
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn

POTS (Case Hardening)
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

POTS (Lead)
Pollock, Wm. B. Co., The, 101 Andrews Ave., Youngstown, O.

POTS (Melting)
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md

POWER UNITS (Gasoline, Electric for Industrial Trucks)
Ready-Power Co., The, 3842 Grand River Ave., Detroit, Mich.

PREHEATERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

PRESSED METAL PARTS
Dahlstrom Metallic Door Co., Jamestown, N. Y.
Stanley Works, The, Pressed Metal Div., New Britain, Conn.

PRESSES
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 245 N. Morgan St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Farquhar, A. B., Co., Ltd., 195 Duke St., York, Pa.
Galland-Henning Manufacturing Co., 2747 So. 31st St., Milwaukee, Wis.
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., The, (Dept. S) 611 N. Mechanic St., Jackson, Mich.
Watson-Stillman Co., Roselle, N. J

PRESSES (Bending)
Cleveland Crane & Engineering Co., Steelweld Machinery Div., The, 1125 E. 283rd St., Wickliffe, O.
Watson-Stillman Co., Roselle, N. J.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES, BRIQUETTING (Turnings & Borings)
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

PRESSES (Extrusion)
Elmes, Chas. F., Engineering Works, 245 N. Morgan St., Chicago, Ill.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Watson-Stillman Co., Roselle, N. J.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

PRESSES (Forging)
Erie Foundry Co., Erie, Pa.
Farquhar, A. B., Co., Ltd., 195 Duke St., York, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National Machinery Co., The, Tiffin, O.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Watson-Stillman Co., Roselle, N. J.

PRESSES (Forming and Braking)
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Crane & Engineering Co., The, Steelweld Machinery Div., 1125 E. 283rd St., Wickliffe, O.
Farquhar, A. B., Co., Ltd., 195 Duke St., York, Pa.
Watson-Stillman Co., Roselle, N. J.
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.
Chambersburg Engineering Co., Chambersburg, Pa.
Denison Engineering Co., The, 113 W. Chestnut St., Columbus, O.
Elmes, Chas. F., Engineering Works, 245 N. Morgan St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Farquhar, A. B., Co., Ltd., 195 Duke St., York, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Galland-Henning Manufacturing Co., 2747 So. 31st St., Milwaukee, Wis.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
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.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Watson-Stillman Co., Roselle, N. J.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, 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., Ltd., 195 Duke St., York, Pa.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.

WHERE-TO-BUY

PRESSES (Punching, Drawing, Coining, Blanking, etc.)
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Riveting)
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hanniſin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

PRESSES (Scrap Bundling and Baling)
Galland-Henning Manufacturing Co., 2747 So. 31st St., Milwaukee, Wis.
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.
Scaife Co., Ames St., Oakmont, Pa.

PRODUCER GAS SYSTEMS—See GAS PRODUCER PLANTS

PROJECTILE BANDS
Lewin-Mathes Co., E. St. Louis, Ill.

PUG MILLS (For Blast Furnaces and Sintering Plants)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.

PULLEYS (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

PULVERIZERS
American Pulverizer Co., 1539 Macklind Ave., St. Louis, Mo.
Gruendler Crusher & Pulverizer Co., 2920-28 N. Market St., St. Louis, Mo.

PUMP HOUSES
Dravo Corp. (Contracting Div.), Neville Island, Pittsburgh, Pa.

PUMPS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Fairbanks, Morse & Co., Dept. E75, 600 S. Michigan Ave., Chicago, Ill.
Hydropress, Inc., 570 Lexington Ave., New York City.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Oil Well Supply Co., Dallas, Texas.
Roper, The Geo. D., Corp., Rockford, Ill.
Weinman Pump & Suply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Boiler Feed)
Fairbanks, Morse & Co., Dept. E75, 600 S. Michigan Ave., Chicago, Ill.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Centrifugal)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Brown & Sharpe Mfg. Co., Providence, R. I.
Fairbanks, Morse & Co., Dept. E75, 600 So. Michigan Ave., Chicago, Ill.
Tomkins-Johnson Co., The, 611 N. Mechanic St., Dept. S, 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)
Brown & Sharpe Mfg. Co., Providence, R. I.
Elmes, Chas. F., Engineering Works, 245 N. Morgan St., Chicago, Ill.
Galland-Henning Manufacturing Co., 2747 So. 31st St., Milwaukee, Wis.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
National-Erie Corp., Erie, Pa.
Racine Tool & Machine Co., Racine, Wis.
Roper, The Geo. D., Corp., Rockford, Ill.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Reciprocating)
Fairbanks, Morse & Co., Dept. E75, 600 S. Michigan Ave., Chicago, Ill.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Rotary)
Brown & Sharpe Mfg. Co., Providence, R. I.
Fairbanks, Morse & Co., Dept. E75, 600 S. Michigan Ave., Chicago, Ill.
Roper, The Geo. D., Corp., Rockford, Ill.
Fairbanks, Morse & Co., Dept. D75,
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Vacuum)
Fairbanks, Morse & Co., Dept. E75, 600 S. Michigan Ave., Chicago, Ill.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Vertical Turbine)
Layne & Bowler, Inc., Memphis, Tenn.

PUNCHES (Multiple)
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Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Hanniſin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

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Beatty Machine & Mfg. Co., 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.
Hanniſin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PYROMETER TUBES
Norton Company, Worcester, Mass.

PYROMETERS
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn
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.

RACKS (Portable)
Union Steel Products Co., 437 Pine St., Albion, Mich.

RACKS (Steel, for Drums & Barrels)
Economy Engineering Co., 2657 W. Van Buren St., Chicago, Ill.

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)
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Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
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.

REAMERS
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.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Greenfield Tap & Die Corp., Greenfield, Mass.

REBUILT EQUIPMENT
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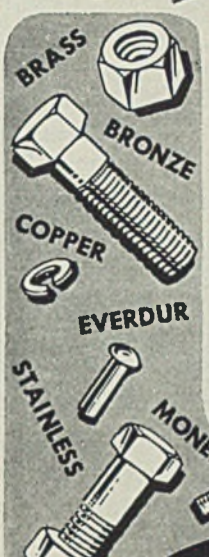

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Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

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National-Erie Corp., Erie, Pa.
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.
Sturtevant, B. F., Co. Hyde Park, Boston, Mass.

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Basic Refractories, Inc., Hanna Bldg., Cleveland, O.

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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.
Harbison-Walker Refractories Co., 1800 Farmers Bank Bldg., Pittsburgh, Pa.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Keagler Brick Co., 1443 W. Market St., Steubenville, O.
Ramtite Co., The, Div. of the S. Obermayer Co., 2557 W. 18th St., Chicago, Ill.

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REGULATORS (Temperature)
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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.

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American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.

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., The, 2698 E. 79th St., Cleveland, O.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

RINGS (Steel)
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Heppenstall Co., Box S-5, 4620 Hatfield St., Pittsburgh, Pa.
King Fifth Wheel Co., 2915 No. Second St., Philadelphia, Pa.
Multrup Steel Products Co., Beaver Falls, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

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*Midvale Co., The, Nicetown, Philadelphia, Pa.

RIVET SETS
Pittsburgh Saw & Tool Co., 7[illegible] Sycamore St., Etna P. O., Pittsburgh, Pa.

RIVETERS (Hydraulic—Portable and Stationary)
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

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Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

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Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Shuster, F. B., Co., The, New Haven, Conn.
Tomkins-Johnson Co., (Dept. S), 611 N. Mechanic St., Jackson, Mich.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

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Bethlehem Steel Co., Bethlehem, Pa.
Hassall, John, Inc., 402 Oakland St., Brooklyn, N. Y.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Oliver Iron & Steel Corp., So. 10th & Muriel Sts., Pittsburgh, Pa.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
*Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Triplex Screw Co., The, 5317 Grant Ave., Cleveland, O.

RIVETS (Non-Ferrous and Stainless)
Harper, H. M., Co., The 2646 Fletcher St., Chicago, Ill.

RODS (Alloy)
Ampco Metal, Inc., Dept. S-2, 3330 W. Burnham St., Milwaukee, Wis.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Copperweld Steel Co., Warren, O.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Dept. ST. Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.

RODS (Brass, Bronze, Copper, Nickel Silver, Silicon-Bronze)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Roebling's, John A., Sons Co., Trenton, N. J.
Seymour Manufacturing Co., The, Seymour, Conn.

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Allegheny Ludlum Steel Corp., Dept. S-229, Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc. 17 Grand St., New York City
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Pittsburgh Tool Steel Wire Co., Monaca, Pa.

RODS (Phosphor Bronze)
Seymour Manufacturing Co., The, Seymour, Conn.

RODS (Rounds, Flats and Shapes) (*Also Stainless)
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*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.
Roebling's, John A., Sons Co., Trenton, N. J.
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.
Roebling's, John A., Sons Co., Trenton, N. J.

RODS (Welding)—See WELDING RODS

RODS (Wire)—See WIRE PRODUCTS

ROLL FORMING MACHINES
Etna Machine Co., The, 3400 Maplewood Ave., Toledo, O.

ROLLING DOORS & SHUTTERS—See DOORS AND SHUTTERS

ROLLING MILL BEARINGS—See BEARINGS (Rolling Mill)

ROLLING MILL EQUIPMENT
Alliance Machine Co., The Alliance, Ohio
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Cold Metal Products Co., The, 2131 Wilson Ave., Youngstown, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Hydropress, Inc., 570 Lexington Ave., New York City.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Monessen Foundry & Machine Co., Monessen, 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., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.
Yoder Co., The, 55 Walworth Ave., Cleveland, O.

ROLLING MILLS (Consulting, Contracting Engineers)
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.

ROLLING MILL MACHINERY (Used)
Frank B. Foster, Oliver Bldg., Pittsburgh, Pa.

ROLLING MILL TABLES
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.

ROLLS (Bending and Straightening)
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Webb City & Carterville Foundry & Machine Works, Webb City, Mo.

ROLLS (Sand and Chilled)
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Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., 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.

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Birdsboro Steel Fdry. & Mach. Co. Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Fdry. and Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., 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.
United Engineering & Fdry Co., First National Bank Bldg., Pittsburgh, Pa.

ROLLS (Tinning Machine)
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Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carey, Philip, Co., The, Lockland, Cincinnati, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
New Jersey Zinc Co., 160 Front St., New York City.
Republic Steel Corp., Dept. ST, Cleveland, O.
Robertson, H. H., Co., Farmers Bank Bldg., Pittsburgh, Pa.
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.

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Carey, Philip, Co., The, Lockland, Cincinnati, O.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

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American Lanolin Corp., Railroad St., Lawrence, Mass.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.
Smith Oil & Refining Co., Rockford, Ill.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

RUST PROOFING PROCESS
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

SAFE ENDS (Boiler Tube)
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.

SAFETY DEVICES (Electric)
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland, O.

SALT TABLETS
Morton Salt Co., 310 So. Michigan Ave., Chicago, Ill.

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Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

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Racine Tool & Machine Co., Racine, Wis.

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Racine Tool & Machine Co., Racine, Wis.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

SAWING MACHINES (Contour)
Continental Machines, Inc., 1324 So. Washington Ave., Minneapolis, Minn.

SAWS (Band—Metal Cutting)
Atkins, E. C., & Co., 427 So. Illinois St., Indianapolis, Ind.
Disston, Henry, & Sons, Inc., 526 Tacony, Philadelphia, Pa.
Huther Bros. Saw & Mfg. Co., 1290 University Ave., Rochester, N. Y.
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.

SAWS (Gang)
Wickes Brothers, Saginaw, Mich.

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Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.

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Youngstown Sheet & Tube Co., The, Youngstown, O.

SAWS (Segmental)
Atkins, E. C., & Co., 427 So. Illinois St., Indianapolis, Ind.
Disston, Henry, & Sons, Inc., 526 Tacony, Philadelphia, Pa.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.
Pittsburgh Saw & Tool Co., 78-80 Sycamore St., Etna P. O., Pittsburgh, Pa.

SCAFFOLDING (Tubular)
Dravo Corp. (Machinery Div.) 300 Penn Ave., Pittsburgh, Pa.

SCALES
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Fairbanks, Morse & Co., Dept. E75, 600 So. Michigan Ave., Chicago, Ill.
Kron Co., The, Bridgeport, Conn.

SCALES (Dial & Recording)
Fairbanks, Morse & Co., Dept. E75, 600 S. Michigan Ave., Chicago, Ill.

SCALES (Laboratory)
Fairbanks, Morse & Co., Dept. E75, 600 South Michigan Ave., Chicago, Ill.

SCALES (Monorail)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Fairbanks, Morse & Co., Dept. E75, 600 So. Michigan Ave., Chicago, Ill.
Kron Co., The, Bridgeport, Conn.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

SCRAP BALING PRESSES—See BALING PRESSES

SCRAP (Iron & Steel)
Hyman-Michaels Co., 122 S. Michigan Ave., Chicago, Ill.

SCREENS AND SIEVES
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.

SCREW EXTRACTORS
Greenfield Tap & Die Corp., Greenfield, Mass.

SCREW MACHINE PRODUCTS
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Hindley Mfg. Co., Valley Falls, R. I.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Oliver Iron & Steel Corp. So. 10th & Muriel Sts., Pittsburgh, Pa.

SCREW MACHINES (Automatic, Single and Multiple Spindle)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Automatic Machine Co., 2269 Ashland Ave., Cleveland, O.
Cone Automatic Machine Co., Inc., Windsor, Vt.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

SCREW PLATES
Greenfield Tap & Die Corp., Greenfield, Mass.

SCREW STOCK—See STEEL (Screw Stock)

SCREWS
Cleveland Cap Screw Co., 2917 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.

SCREWS (Cap, Set, Safety-Set)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Cleveland Cap Screw Co., 2917 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.
Parker-Kalon Corp., 194-200 Varick St., New York City
Triplex Screw Co., The, 5317 Grant St., Cleveland, O.

SCREWS (Cold Headed)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Cleveland Cap Screw Co., 2917 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.

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.

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.
Triplex Screw Co., The, 5317 Grant Ave., Cleveland, O.

SCREWS (Machine, Recessed Head)
American Screw Co., Providence, R. I.
Bristol Co., Waterbury, Conn.
Central Screw Co., Chicago, Ill.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
International Screw Co., Detroit, Mich.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
New England Screw Co., Keene, N. H.

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Parker-Kalon Corp., 194-200 Varick St., New York City.
Pawtucket Screw Co., Pawtucket, R. I.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., Waterbury, Conn.

SCREWS (Non-Ferrous and Stainless)
Harper, H. M., Co., The 2646 Fletcher St., Chicago, Ill.

SCREWS (Sheet Metal, Recessed Head)
American Screw Co., Providence, R. I.
Bristol Co., Waterbury, Conn.
Central Screw Co., Chicago, Ill.
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.
Shakeproof Lock Washer Co., Chicago, Ill.

SCREWS (Socket, Cold Forged)
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Thread-Cutting)
Parker-Kalon Corp., 194-200 Varick St., New York City

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.
Bristol Co., Waterbury, Conn.
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, Charles, Co., The, Meriden, Conn.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Southington Hdwe. Mfg. Co., Pawtucket, R. I.
Whitney Screw Co., Nashua, N. H.

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.
Frantz, S. G., Co., Inc., 221-5 Centre St., New York City.
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., Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

SHAFTING (Flexible)
Walker-Turner Co., Inc., 5042 Berckman St., Plainfield, N. J.

SHAPERS
Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.
Ohio Machine Tool Co., The, Kent, O.

SHAPERS (Automatic Controls for)
Detroit Universal Duplicator Co., 218 St. Aubin, Detroit, Mich.

SHAPES (Brass, Bronze, Nickel, Silver)
Dahlstrom Metallic Door Co., Jamestown, N. Y.

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.
Dahlstrom Metallic Door Co., Jamestown, N. Y.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.
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.
Disston, Henry, & Sons, Inc., 526 Tacony, Philadelphia, Pa.
Heppenstall Co., Box S-5, 4620 Hatfield St., Pittsburgh, Pa.
Ohio Knife Co., Dreman Ave. & B. & O. R.R., Cincinnati, O.

SHEARS
Beatty Machine & Mfg. Co., Hammond, Ind.
Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hallden Machine Co., The, Thomaston, Conn.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Fdry. & Mach. Div. of Blaw-Knox Co., 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.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

SHEARS, ROTARY (Slitting, Beveling, Circling, Flanging)
Yoder Co., 55 Walworth Ave., Cleveland, O.

SHELL BANDS (Rotating)
Lewin-Mathes Co., E. St. Louis, Ill.

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.
Continental Steel Corp., Kokomo, Ind.
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.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEET LIFTERS AND CARRIERS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago, Ill.
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.
Yoder Co., The, 55 Walworth Ave., Cleveland, 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.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.

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.
Continental Steel Corp., Kokomo, Ind.
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.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

SHEETS (Brass, Bronze, Copper, Nickel Silver, Silicon-Bronze)
American Brass Co., The, Waterbury, Conn.
Ampco Metal, Inc., Dept. S-2, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.

SHEETS (Corrugated)
American Rolling Mill Co., The, 1511 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
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.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.
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, 1511 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 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.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Electrical)
Allegheny Ludlum Steel Corp., Dept. S-229, Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 1511 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc. Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, 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.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Galvanized)
American Rolling Mill Co., The, 1511 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.
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, 1511 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Disston, Henry, & Sons, Inc., 526 Tacony, Philadelphia, Pa.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Levinson Steel Co., 33 Pride St., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Worth Steel Co., Claymont, Del.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Lead Coated)
Continental Steel Corp., Kokomo, Ind.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.

WHERE-TO-BUY

SHEETS (Long Terne)
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Steel Corp., Kokomo, Ind.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Superior Sheet Steel Div., Continental Steel Corp.,
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Nickel Silver)
Seymour Manufacturing Co., The, Seymour, Conn.

SHEETS (Perforated)
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.

SHEETS (Phosphor Bronze)
Seymour Manufacturing Co., The, Seymour, Conn.

SHEETS (Reinforced)
Erdle Perforating Co., 171 York St., Rochester, N. Y.

SHEETS (Roofing)—See ROOFING AND SIDING

SHEETS (Stainless)
Allegheny Ludlum Steel Corp., Dept. S-229, Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 1511 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 and Rockwell Sts., Chicago, Ill.

SHEETS (Stainless Clad)
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, 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, 1511 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 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.

SHELL BANDS (Rotating)
Lewin-Mathes Co., East St. Louis, Mo.

SHELLS (Seamless Drawn)
Crosby Co., The, 183 Pratt St., Buffalo, N. Y.

SHOVELS (Power)
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

SIEVES—See SCREENS AND SIEVES

SIGNALING & INTER-COMMUNICATION EQUIPMENT
Graybar Electric Co., 420 Lexington Ave., New York City.

SIGNS (Metal)
Webb City & Carterville Foundry & Machine Works, Webb City, Mo.

SILICO-MANGANESE
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

SILICON METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Vanadium Corp. of America, 420 Lexington 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.

SLAG GRANULATING MACHINES (Blast Furnace and Open Hearth)
Broslus, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

SLITTERS
Cowles Tool Co., 2086 W. 110th St., Cleveland, O.
Ohio Knife Co., Dreman Ave. & B. & O. R.R., Cincinnati, O.

SMALL TOOLS
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.

SOAKING PITS
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Div., 2375 Dorr St., Toledo, O.

SOLDER
Kester Solder Co., 4222 Wrightwood Ave., Chicago, Ill.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

SOLENOIDS (Electric)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

SOLVENT (Degreasing)
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.

SPACING TABLES
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.

SPECIAL MACHINERY—See MACHINERY (Special)

SPEED REDUCERS
Cleveland Worm & Gear Co., 3270 E. 80th St., Cleveland, O.
Grant Gear Works, 2nd & B. Sts., Boston, Mass.
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 Roosevelt Rd., Chicago, Ill.
Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
New Departure Div., General Motors Corp., Bristol, Conn.
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.

SPIEGELEISEN
Electro Metallurgical Co., 30 E. 42nd St., New York City.
New Jersey Zinc Co., 160 Front St., New York City.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

SPIKES (Screw)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.

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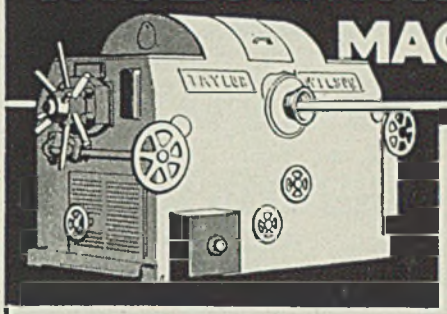

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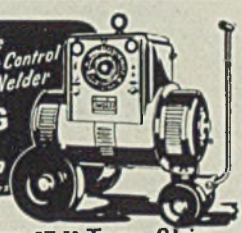

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SPIKES (Screw)—Con.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SPINDLE SHAPERS (For Non-Ferrous Metal, Plastics & Wood)
Walker-Turner Co., Inc., 5042 Berckman St., Plainfield, N. J.

SPINDLES (Grinding)
Bryant Chucking Grinder Co., Springfield, Vt.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Heald Machine Co., Worcester, Mass.

SPINDLES (Lathe)
American Hollow Boring Co., 1054 W. 20th St., Erie, Pa.

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)
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
*Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Hubbard, M. D., Spring Co., 443 Central Ave., Pontiac, Mich.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
*Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Washburn Wire Co., 118th St. & Harlem River, New York City.

SPRINGS (Alloy)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Coil & Elliptic)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Compression)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Oil Tempered—Flat)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Davis Brake Beam Co., Laurel Ave., & P. R. R., Johnstown, Pa.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Torsion)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Valve)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINKLERS (Automatic)
Grinnell Co., Inc., Providence, R. I.

SPRUE CUTTERS
Shuster, F. B., Co., The, New Haven, Conn.

STACKS (Steel)—See BRIDGES, ETC.

STAINLESS STEEL—See BARS, SHEETS, STRIP, PLATES, ETC.

STACKING MACHINES (Hand & Electric)
Economy Engineering Co., 2657 W. Van Buren St., Chicago, Ill.

STAMPINGS
American Tube & Stamping Plant, (Stanley Wks.), Bridgeport, Conn.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Crosby Co., The, 183 Pratt St, Buffalo, N. Y.
Dahlstrom Metallic Door Co., Jamestown, N. Y.
Davis Brake Beam Co., Laurel Ave., & P. R. R., Johnstown, Pa.
Dayton Rogers Co., Minneapolis, Minn.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Homestead Valve Mfg. Co., P. O. Box 20, Coraopolis, Pa.
Hubbard, M. D., Spring Co., 443 Central Ave., Pontiac, Mich.
Lyon Metal Products, Inc., 7205 Madison Ave., Aurora, Ill.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.
Scaife Co., Ames St., Oakmont, Pa.
Stanley Works, The, Bridgeport, Conn. New Britain, Conn.
Toledo Stamping & Mfg. Co., 90 Fearing Blvd., Toledo, O.
Whitehead Stamping Co., 1667 W. Lafayette Blvd., Detroit, Mich.

STAMPS (Steel)
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.
Matthews, James H., & Co., 3978 Forbes St., Pittsburgh, Pa.

STAPLES (Wire)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
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., The 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., Dept. 51, Reading, Pa.
Columbia Steel Co., San Francisco, Calif.
Copperweld Steel Co., Warren, O.
Disston, Henry, & Sons, Inc., 526 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc. 17 Grand St., New York City
Harrisburg Steel Corp., Harrisburg, Pa.
Heppenstall Co., Box S-5, 4620 Hatfield St., Pittsburgh, Pa.
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.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Simonds Saw & Steel Co., 470 Main St., 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.

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., Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Pittsburgh Tool Steel Wire Co., Monaca, Pa.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Ball—Corrosion Resisting) (*Also Stainless)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., Dept. 51, Reading, Pa.
*Copperweld Steel Co., Warren, O. Room 117—405 Lexington Ave., New York City.
*Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.
Sharon Steel Corp., Sharon, 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.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Pittsburgh Tool Steel Wire Co., Monaca, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
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., Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Pittsburgh Tool Steel Wire Co., Monaca, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Corrosion Resisting)
Allegheny Ludlum Steel Corp., Dept. S-229, Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The 1511 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, 943 E. 67th St., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., Dept. 51, Reading, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc. 17 Grand St., New York City
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, 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 Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
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)
Disston, Henry, & Sons, Inc., 526 Tacony, Philadelphia, Pa.
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 (Electric)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Copperweld Steel Co., Warren, O.
Disston, Henry, & Sons, Inc., 526 Tacony, Philadelphia, Pa.
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.
Latrobe Electric Steel Co., Latrobe, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

STEEL (High Speed)
Allegheny Ludlum Steel Corp., Dept. S-229, Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., Dept. 51, Reading, Pa.
Disston, Henry, & Sons, Inc., 526 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop, Wm., & Sons Co., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL (High Tensile, Low Alloy)
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cold Metal Products Co., The, 2131 Wilson Ave., Youngstown, O.
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)
Allegheny Ludlum Steel Corp., Dept. S-229, Oliver Bldg., Pittsburgh, Pa.
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.

WHERE-TO-BUY

STEEL (Screw Stock)—Con.
LaSalle Steel Co., Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
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.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Cold Metal Products Co., The, Wilson Ave., Youngstown, O.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Washburn Wire Co., 118th St. & Harlem River, New York City. Phillipsdale, R. I.

STEEL (Stainless)—See STEEL (Corrosion Resisting)

STEEL (Strapping)
Atkins, E. C., & Co., 427 So. Illinois St., Indianapolis, Ind.

STEEL (Strip, Copper Coated)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Thomas Steel Co., The, Warren, O. Rockefeller Bldg., Cleveland, O.

STEEL (Strip, Hot and Cold Rolled) (*Also Stainless)
*Allegheny Ludlum Steel Corp., Dept. S-229, Oliver Bldg., Pittsburgh, Pa.
*American Rolling Mill Co., The, 1511 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.
Cold Metal Products Co., The, 2131 Wilson Ave., Youngstown, O.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
*Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc. 17 Grand St., New York City
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, 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.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
*Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
*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., The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City. Phillipsdale, R. I.
Weirton Steel Co., Weirton, W. Va.

STEEL (Strip, Tin Coated)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
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.
Roebling's, John A., Sons Co., Trenton, N. J.
Thomas Steel Co., The, 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.
Clinton Bridge Works, Clinton, Ia.
Columbia Steel Co., San Francisco, Calif.
Duffin Iron Co., 37 W. Van Buren St., Chicago, Ill.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Gage Structural Steel Co., Chicago, Ill.
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.
Levinson Steel Co., 33 Pride St., Pittsburgh, Pa.
Midland Structural Steel Co., Cicero, Ill.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Uhl Construction Co., 6001 Butler St., Pittsburgh, Pa.
Weirton Steel Co., Weirton, W. Va
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Tool)
Allegheny Ludlum Steel Corp., Dept. S-229, Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Carpenter Steel Co., Dept. 51, Reading, Pa.
Copperweld Steel Co., Warren, O.
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland, O.
Disston, Henry, & Sons, Inc., 526 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc. 17 Grand St., New York City
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop, Wm., & Sons Co., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Broach & Mach. Co., 5600 St. Jean, Detroit, Mich.
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.

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General American Transportation Corp., 135 So. LaSalle St., Chicago, Ill.
Graver Tank & Mfg. Co., Inc., 4409-40 Tod Ave., E. Chicago, Ind.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

STELLITE
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.

STENCILS (Spray and Sand Blast)
Matthews, James H., & Co., 3978 Forbes St., Pittsburgh, Pa.

STOKERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

STONES (Honing)
Bay State Abrasive Products Co., Westboro, Mass.

STOPPERS (Cinder Notch)
Bailey, Wm. M. Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

STOPPERS (Rubber)
Rhoades, R. W., Metalline Co., 43 Third St., Long Island City, N. Y.

STORAGE EQUIPMENT
Graver Tank & Mfg. Co., Inc., 4409-40 Tod Ave., E. Chicago, Ind.
Lyon Metal Products, Inc., 7205 Madison Ave., Aurora, Ill.

STORAGE BATTERIES—See BATTERIES (Storage)

STRAIGHTENING MACHINERY
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 245 N. Morgan St., Chicago, Ill.
Farquhar, A. B., Co., Ltd., 195 Duke St., York, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Lewis Machine Co., 3450 E. 76th St., Cleveland, O.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Shuster, F. B., Co., The, New Haven, Conn.
Sutton Engineering Co., Park Bldg., 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. S, Pennsalt Cleaner Div., Philadelphia, Pa.

SURFACE WELDING
Wall-Colmonoy Corp., 637 Buhl Bldg., Detroit, Mich.

SWAGING MACHINES
Etna Machine Co., The, 3400 Maplewood Ave., Toledo, O.

SWITCHES (Electric)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

TACHOMETERS
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.

TANK LININGS
Cellcote Co., 750 Rockefeller Bldg., Cleveland, O.
National Carbon Co., W. 117th St. and Madison Ave., Cleveland, O.
Nukem Products Corp., 70 Niagara St., Buffalo, N. Y.

TANKS (Gas Auxiliary)
Webb City & Carterville Foundry & Machine Works, Webb City, Mo.

TANKS (Pickling)
National Carbon Co., W. 117th St. and Madison Ave., Cleveland, O.
Nukem Products Corp., 70 Niagara St., Buffalo, N. Y.

TANKS (Storage, Pressure, Riveted, Welded)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
General American Transportation Corp., 135 So. LaSalle St., Chicago, Ill.
Graver Tank & Mfg. Co., Inc., 4409-40 Tod Ave., E. Chicago, Ind.
Pollock, Wm. B., Co., The, 101 Andrews Ave., Youngstown, O.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Scaife Co., Ames St., Oakmont, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

TANKS (Wood or Steel, Rubber or Lead Lined)
American Hard Rubber Co., 11 Mercer St., New York City.

TAPPING MACHINES
National Automatic Tool Co., The, Richmond, Ind.

TAPS AND DIES
Greenfield Tap & Die Corp., Greenfield, Mass.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

TERMINALS (Locking)
Thompson-Bremer & Co., 1644 W. Hubbard St., Chicago, Ill.

TERNE PLATE—See TIN PLATE

TESTING MACHINERY (Materials)
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.

THERMIT WELDING
Metal & Thermit Corp., 120 Broadway, New York City.

THERMOMETERS
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
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 Stanton Ave., Philadelphia, Pa.

THREAD CUTTING TOOLS
Landis Machine Co., Waynesboro, Pa.
Oster Mfg. Co., The, 2037 E. 61st St., Cleveland, O.

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
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

TONGS (Chain Pipe)
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

TONGS (Rail Handling)
Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago, Ill.

TOOL BITS (High Speed)
Allegheny Ludlum Steel Corp., Dept. S-229, Oliver Bldg., Pittsburgh, Pa.
Disston, Henry, & Sons, Inc., 526 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.
Jessop Steel Co., 584 Green St., Washington, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

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.

TOOLS (Precision, Lathe, Metal Cutting, etc.)
Brown & Sharpe Mfg. Co., Providence, R. I.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TOOLS (Steel-Cutting)
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.

TOOLS (Turning, Boring and Facing)
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TORCHES & BURNERS (Acetylene, Blow, Oxy-Acetylene)
Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.

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.

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.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Oliver Iron & Steel Corp., So. 10th & Muriel Sts., 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
Mercury Manufacturing Co., 4140 S. Halsted St., Chicago, Ill.
Ohio Galvanizing & Mfg. Co., Penn St., Niles, O.

TRAILERS (Arch-Girder)
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRAMRAILS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRANSMISSIONS—VARIABLE SPEED
Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.

TRAPS (Compressed Air)
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

TRAPS (High Pressure Steam)
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

TRAPS (Steam)
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

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., 3515 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.
Reading Chain & Block Co., Dept. D-4, Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRUCK CRANES
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

TRUCKS AND TRACTORS (Electric Industrial)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Easton Car & Construction Co., Easton, Pa.
Elwell-Parker Electric Co., The, 4501 St. Clair Ave., Cleveland, O.
Mercury Manufacturing Co., 4140 S. Halsted St., Chicago, Ill.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRUCKS AND TRACTORS (Gasoline Diesel)
Silent Hoist Winch & Crane Co. 849 63rd St., Brooklyn, N. Y.

TRUCKS AND TRACTORS (Gasoline Industrial)
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Clark Tructractor Div., Clark Equipment Co., Battle Creek, Mich.
Elwell-Parker Electric Co., The, 4501 St. Clair Ave., Cleveland, O.
Mercury Manufacturing Co., 4140 S. Halsted St., Chicago, Ill.

TRUCKS (Dump-Industrial)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Easton Car & Construction Co., Easton, Pa.

TRUCKS (Hydraulic Lift)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.

TRUCKS (Industrial)
Easton Car & Construction Co., Easton, Pa.
Mercury Manufacturing Co., 4044-4140 S. Halsted St., Chicago, Ill.
Ohio Galvanizing & Mfg. Co., Penn St., Niles, O.

TRUCKS (Lift)
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.

WHERE-TO-BUY

TRUCKS (Lift)—Con.
Clark Tructractor Div., Clark Equipment Co., Battle Creek, Mich.
Easton Car & Construction Co., Easton, Pa.
Elwell-Parker Electric Co., The, 4501 St. Clair Ave., Cleveland, O.
Mercury Manufacturing Co., 4140 S. Halsted St., Chicago, Ill.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TUBE MILL EQUIPMENT
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Taylor-Wilson Mfg. Co., 1200 Thomson Ave., McKees Rocks, Pa.

TUBE WELDING MACHINES
Etna Machine Co., The, 3400 Maplewood Ave., Toledo, O.

TUBES (Boiler)
Allegheny Ludlum Steel Corp., Dept. S-229, Oliver Bldg., Pittsburgh, Pa.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 943 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.
Ohio Seamless Tube Co., Shelby, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBES (Brass, Bronze, Copper, Nickel Silver)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.

TUBES (High Carbon)
Ohio Seamless Tube Co., Shelby, O.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.

TUBING (Alloy Steel) (*Also Stainless)
*Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bissett Steel Co., The, 943 E. 67th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
*National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.

TUBING (Copper, Brass, Aluminum)
American Brass Co., The, Waterbury, Conn.
Lewin-Mathes Co., E. St. Louis, Ill.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Shenango-Penn Mold Co., 402 W. Third St., Dover, O.

TUBING (Flexible Metal)
Chicago Metal Hose Corp., 1315 S. Third St., Maywood, Ill.

TUBING (Monel)
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.

TUBING (Seamless Flexible Metal)
American Metal Hose Branch of The American Brass Co., Waterbury, Conn.

TUBING (Seamless Steel)
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Columbia Steel Co., San Francisco, Calif.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York City
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Pipe & Tube Products, Inc., 445 Communipaw Ave., Jersey City, N. J.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBING (Square, Rectangular)
Ohio Seamless Tube Co., Shelby, O
Steel & Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.

TUBING (Welded Steel)
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.
Frasse, Peter A., & Co. Inc., 17 Grand St., New York City
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Ohio Seamless Tube Co., Shelby, O
Republic Steel Corp., Dept. ST, Cleveland, O.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBULAR PRODUCTS
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.
Ohio Seamless Tube Co., Shelby, O.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Tubular Service Corp., 120 44th St., Brooklyn, N. Y.

TUMBLING BARRELS (Coke Testing)
Broslus, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

TUNGSTEN CARBIDE
Bissett Steel Co., The, 943 E. 67th St., Cleveland, O.
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

TUNGSTEN CARBIDE (Tools and Dies)
Firth-Sterling Steel Co., McKeesport, Pa.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TUNGSTEN METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.

TURBINES (Steam)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

TURBO BLOWERS—See BLOWERS

TURNTABLES
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Atlas Car & Mfg. Co., The, 1100 Ivanhoe Rd., Cleveland, O.

TURRET LATHES—See LATHES (Turret)

TURRET LATHE CUTTERS (Carbide Tipped)
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TWIST DRILLS
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, O.
Greenfield Tap & Die Corp., Greenfield, Mass.

UNIT HEATERS
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.

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- Machinery Castings
- Acid Resisting Castings
- Phosphorized Copper
- Babbitt Metals
- Locomotive and Car Journal Bearings

NATIONAL BEARING METALS CORP.
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CLEARING, ILL. (Chicago District) — MEADVILLE, PA.

VACUUM CLEANERS
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

VALVE CONTROL (Motor Operated Units)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

VALVE CONTROLS
Philadelphia Gear Works, Erie Ave. & G St., Philadelphia, Pa.

VALVES (Blast Furnace)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Broslus, Edgar E., Co., Sharpsburg Branch, Pittsburgh, Pa.

VALVES (Blow-off)
Homestead Valve Mfg. Co., P. O. Box 20, Coraopolis, Pa.

VALVES (Brass, Iron and Steel)
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Galland-Henning Mfg. Co., 2747 So. 31st St., Milwaukee, Wis.
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)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Galland-Henning Mfg. Co., 2747 So. 31st St., Milwaukee, Wis.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Homestead Valve Mfg. Co., P. O. Box 22, Coraopolis, Pa.
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.
Racine Tool & Machine Co., Racine, Wis.

VALVES (Electrically Operated)
Atkins, E. C., & Co., 427 So. Illinois St., Indianapolis, Ind.
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

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)
Bayard, M. L., & Co., 20th & Indiana Ave., Philadelphia, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Elmes, Chas. F., Engineering Works, 245 N. Morgan St., Chicago, Ill.
Homestead Valve Mfg. Co., P. O. Box 20, Coraopolis, Pa.
Racine Tool & Machine Co., Racine, Wis.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

VALVES (Iron & Steel)
Galland-Henning Mfg. Co., 2747 So. 31st St., Milwaukee, Wis.

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

VALVES (Open Hearth Control—Oil, Tar, Steam & Air)
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

VALVES (Plug)
Homestead Valve Mfg. Co., P. O. Box 20, Coraopolis, Pa.

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 Co., 30 E. 42nd St., New York City.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

VIADUCTS (Steel)—See BRIDGES, ETC.

WALKWAYS—See FLOORING—(Steel)

WASHERS (Iron and Steel)
Hubbard, M. D., Spring Co., 443 Central Ave., Pontiac, Mich.
Oliver Iron & Steel Corp., So. 10th & Muriel Sts., Pittsburgh, Pa.
Thompson-Bremer & Co., 1644 W. Hubbard St., Chicago, Ill.

WASHERS (Lock)
Garrett, George K., Co., 1421 Chestnut St., Philadelphia, Pa.
Thompson-Bremer & Co., 1644 W. Hubbard St., Chicago, Ill.

WASHERS (Non-ferrous and Stainless)
Garrett, Geo. K., Co., 1421 Chestnut St., Philadelphia, Pa.
Harper, H. M., Co., The, 2646 Fletcher St., Chicago, Ill.

WASHERS (Spring)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Garrett, Geo. K., Co., 1421 Chestnut St., Philadelphia, Pa.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.
Thompson-Bremer & Co., 1644 W. Hubbard St., Chicago, Ill.

WASHROOM EQUIPMENT
Sugar Beet Products Co., Saginaw, Mich.

WATER FILTRATION & SOFTENING
Graver Tank & Mfg. Co., Inc., 4409-40 Tod Ave., E. Chicago, Ind.

WELDED STEEL CONSTRUCTION
Pollock, Wm. B., Co., The 101 Andrews Ave., Youngstown, O.

WELDERS (Electric—Arc)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Hobart Bros., Box ST—42, Troy, O.
Lincoln Electric Co., The. Cleveland, O.
Welding Equipment & Supply Co., 220 Leib St., Detroit, Mich.

WELDING
Bartlett-Hayward Div. Koppers Co., Baltimore, Md.
Bayard, M. L., & Co., 20th & Indiana Ave., Philadelphia, Pa.
Lincoln Electric Co., The, Cleveland, O.
Metal & Thermit Corp., 120 Broadway, New York City.
Scaife Co., Ames St., Oakmont, Pa.
Van Dorn Iron Works, 2685 E. 79th St., Cleveland, O.
Western Gas Div., Koppers Co., Ft. Wayne, Ind.

WELDING (Thermit)
Metal & Thermit Corp., 120 Broadway, New York City.

WELDING (Welded Machine Steel Bases)
Van Dorn Iron Works, 2685 E. 79th St., Cleveland, O.

WELDING DIES (Flash)
Mallory, P. R., & Co., 3029 E. Washington Ave., Indianapolis, Ind.

WELDING RODS (Alloys)
Alloy Rods Co., York, Pa.
American Agile Corp., 5806 Hough Ave., Cleveland, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
International Nickel Co. Inc., The. 67 Wall Street, New York City.
Lincoln Electric Co., The, Cleveland, O.
McKay Co., The, York, Pa.
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., 220 Leib St., Detroit, Mich.

WELDING RODS (Bronze)
American Brass Co., The, Waterbury, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Welding Equipment & Supply Co., 220 Leib St., Detroit, Mich.

WELDING RODS (Hard Surfacing)
Lincoln Electric Co., The, Cleveland, O., Dept. Y-25.
Wall-Colmonoy Corp., 637 Buhl Bldg., Detroit, Mich. Dept. AC, Peoria, Ill.

WELDING RODS (Stainless)
Alloy Rods Co., York, Pa.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-25.
McKay Co., The, York, Pa.

WELDING RODS OR WIRE
Air Reduction, 60 E. 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.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Hobart Bros., Box ST—42, Troy, O.
Lincoln Electric Co., The, Cleveland, O.
Linde Air Products Co., The. 30 E. 42nd St., New York City.
McKay Co., The, York, Pa.
Maurath, Inc., 7311 Union Ave., Cleveland, O.
Metal & Thermit Corp., 120 Broadway, New York City
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Washburn Wire Co., Phillipsdale, R. I.
Welding Equipment & Supply Co., 220 Leib St., Detroit, Mich.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wilson Welder & Metals Co., 60 East 42nd St., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WELDING TIPS (Spot)
Mallory, P. R., & Co., 3029 E. Washington Ave., Indianapolis, Ind.

WELDING WHEELS (Seam)
Mallory, P. R., & Co., 3029 E. Washington Ave., Indianapolis, Ind.

WELDING AND CUTTING APPARATUS AND SUPPLIES (Electric)
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Hobart Bros., Box ST—42, Troy, O.
Lincoln Electric Co., The. Cleveland, O.
McKay Co., The, York, Pa.
Mallory & Co., P. R., 3029 E. Washington Ave., Indianapolis, Ind.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.
Welding Equipment & Supply Co., 220 Leib St., Detroit, Mich.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.
Wilson Welder & Metals Co., 60 E. 42nd St., New York City.

WELDING AND CUTTING APPARATUS AND SUPPLIES (Oxy-Acetylene)
Air Reduction, 60 E. 42nd St., New York City,
Linde Air Products Co., The. 30 E. 42nd St., New York City.
Mallory, P. R., & Co., 3029 E. Washington Ave., Indianapolis, Ind.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.
Welding Equipment & Supply Co., 220 Leib St., Detroit, Mich.

WELL WATER SUPPLY SYSTEMS
Layne & Bowler, Inc., Memphis, Tenn.

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 Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

WHEELS (Track)
National-Erie Corp., Erie, Pa.

WHEELS (Trolley)
Crosby Co., The, 183 Pratt St., Buffalo, N. Y.

WINCHES (Electric)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

WINCHES (Electric, Gasoline, Diesel)
Silent Hoist Winch & Crane Co. 849 63rd St., Brooklyn, 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.
*Republic Steel Corp., Dept. ST Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.

WIRE (Annealed, Bright, Galvanized)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco. Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Worcester, Mass.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The. Youngstown, O.

WIRE (Barb)
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The. Youngstown, O.

WIRE (Cold Drawn)
Johnson Steel & Wire Co., Worcester, Mass.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Washburn Wire Co., 118th St. & Harlem River, New York City.

WIRE (High Carbon)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Washburn Wire Co., 118th St. and Harlem River, New York City.

WIRE (Music)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Frasse, Peter A., & Co., Inc. 17 Grand St., New York City
Johnson Steel & Wire Co., Worcester, Mass.
Roebling's, John A., Sons Co., Trenton, N. J.
Washburn Wire Co., 118th St. and Harlem River, New York City.

WIRE (Nickel Silver)
Seymour Manufacturing Co., The. Seymour, Conn.

WIRE (Phosphor Bronze)
Seymour Manufacturing Co., The, Seymour, Conn.

WHERE-TO-BUY

WIRE (Round, Flat, Square, Special Shapes)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., Los Angeles, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Worcester, Mass.
Page Steel & Wire Div., of American Chain & Cable Co., Inc., Monessen, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Washburn Wire Co., 118th St. and Harlem River, New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE (Spring)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Washburn Wire Co., 118th St. & Harlem River, New York City.

WIRE (Stapling)
Continental Steel Corp., Kokomo, Ind.

WIRE (Stainless)
Allegheny Ludlum Steel Corp., Dept. S-229, Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.

WIRE (Welding)—See WELDING RODS OR WIRE

WIRE AND CABLE (Electric)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
General Electric Co., Sec. G-2903, Appliance & Merchandise Dept., Bridgeport, Conn.
Graybar Electric Co., 420 Lexington Ave., New York City.
Roebling's, John A., Sons Co., Trenton, N. J.

WIRE CLOTH
Cyclone Fence Co., Waukegan, Ill.
Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Brothers, 189 Main St., Cortland, N. Y.

WIRE COILING TOOLS (Cemented Carbide)
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

WIRE COVERING MACHINES
Fidelity Machine Co., 3908-18 Frankford Ave., Philadelphia, Pa.

WIRE FORMS, SHAPES AND SPECIALTIES
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Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Columbia Steel Co., San Francisco, Calif.
Firth-Sterling Steel Co., McKeesport, Pa.
Hubbard, M. D., Spring Co., 443 Central Ave., Pontiac, Mich.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.

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Nilson, A. H., Machine Co., The, Bridgeport, Conn.

WIRE MILL EQUIPMENT
Fidelity Machine Co., 3908-18 Frankford Ave., Philadelphia, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Lewis Machine Co., 3450 E. 76th St., Cleveland, O.
Morgan Construction Co., Worcester, Mass.
Shuster, F. B., Co., The, New Haven, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

WIRE NAILS—See NAILS

WIRE PRODUCTS (*Also Stainless)
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Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
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WIRE ROPE AND FITTINGS (*Also Stainless)
American Cable Div. of American Chain & Cable Co., Inc., Wilkes-Barre, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
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Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
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Macwhyte Co., 2912 14th Ave., Kenosha, Wis.
Roebling's, John A., Sons Co., Trenton, N. J.

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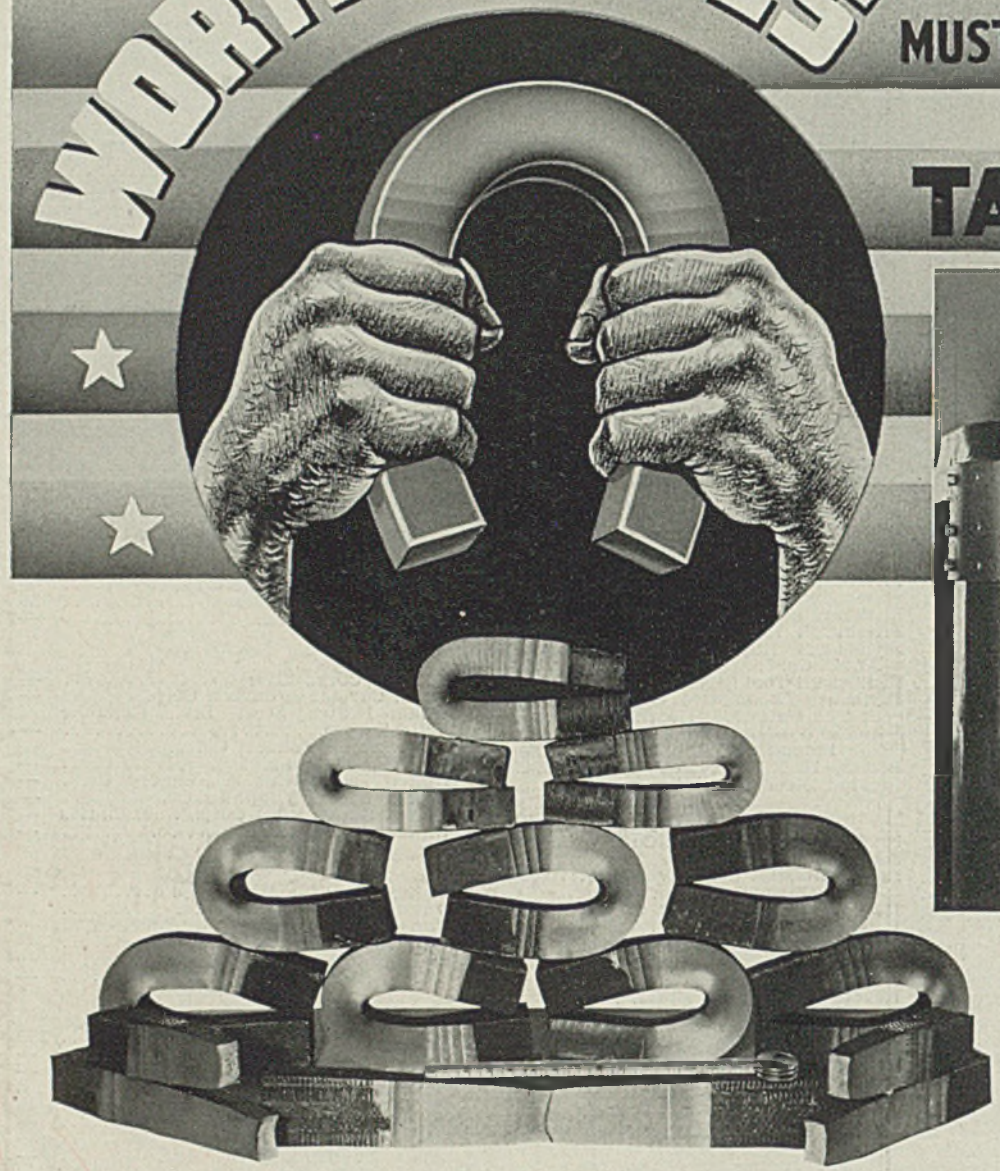

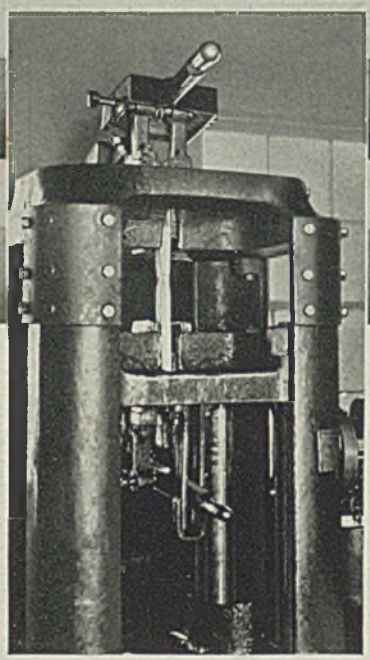

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