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, Cuba, Mexico and Canada, one year $4, two years $6; European and foreign countries, one year $10. Single copies (current issues) 25c.

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

STEEL

ESTABLISHED 1882

Contents

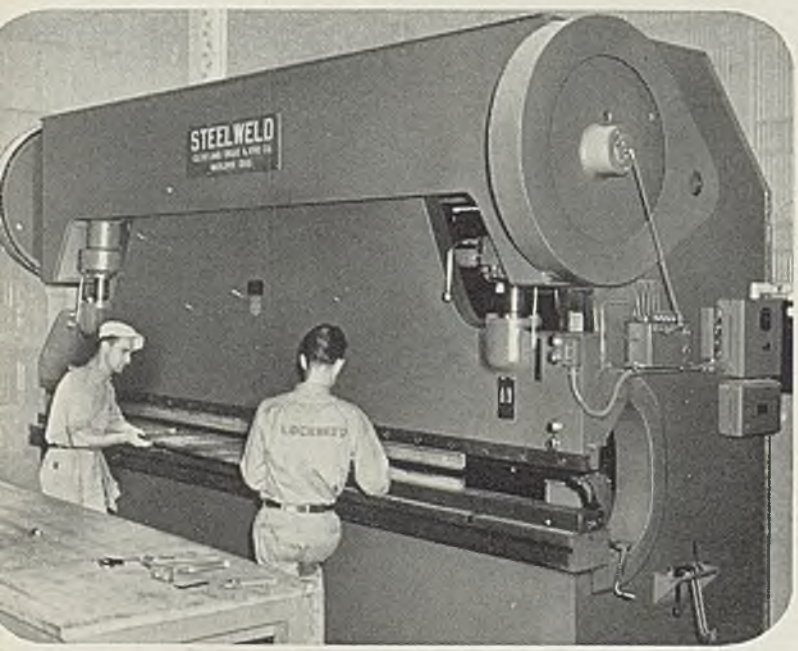
Volume 108—No. 17 **April 28, 1941**

PRODUCTION • PROCESSING • DISTRIBUTION • USE

STEELWELD *Bending Presses*

OCKHEED AIRCRAFT CORPORATION...

.another user of modern metal-forming method



Forming aluminum sheets on one of the Steelwelds at Lockheed.

Steelwelds are a big aid to production at Lockheed Aircraft Corporation, and at many other important aircraft plants. 45 Steelwelds are now serving this great industry.

For bending, forming and multiple-punching operations, modern Steelweld Presses are doing the work better, faster and affecting a sizeable savings.

Mild steel, high tensile stainless steel, Monel nickel, aluminum, duraluminum, and other metals are easily and quickly worked.

A complete line of Steelweld Presses is available for all thicknesses of metal up to 1" x 20'-0".

JUST OFF THE PRESS
30-page catalog. Complete construction and engineering details. Mail request for free copy on your company letterhead.

THE CLEVELAND CRANE & ENGINEERING CO.

STEELWELD MACHINERY DIVISION

WICKLIFFE, OHIO.

CYRIL BATH & CO., GENERAL SALES AGENTS . . . . E. 70TH & MACHINERY AVE., CLEVELAND, OHIO

HIGHLIGHTING
THIS ISSUE OF
STEEL

■ A GLOOMY outlook confronts the steel industry as a result of continuance of the coal strike. Unless the strike is settled immediately general prostration faces steelmaking facilities. Prolongation of the coal strike for another two weeks **(p. 26)** will see steel production cut to 50 to 60 per cent of ingot capacity, with the remainder of the industry slated to become idle shortly thereafter. Already some 20 blast furnaces have been blown out and steel production last week **(p 27)** dropped 2 points to 96 per cent. . . It becomes apparent **(p. 42)** that as armament production increases it soon will become more difficult to obtain steel for civilian purposes; we will not get "guns and butter."

• • •

E. T. Weir **(p. 23)** advises waiting for second quarter earnings statements before deciding on any adjustments in steel prices. On the other hand, the heads of Otis Steel Co., Granite City Steel Co., Follansbee Steel Corp. and Laclede Steel Co., declare their position under Leon Henderson's "frozen" price ruling is intolerable in view of advanced costs. Phoenix Iron Co. asks permission to continue to sell at higher than the usual market prices and OPACS has agreed to examine Phoenix costs with a view to ascertain whether the request should be granted. . . The steel and coal wage increases suggest higher wages in other industries; UAW-CIO requests a 10 cent hourly increase **(p. 35)** from General Motors.

Some Protest Frozen Prices

• • •

Vincent Delport again reports **(p. 21)** on Great Britain's wartime economy; recently the British government control has been extended to employment of labor, closing "redundant" plants and stopping unessential work. The zinc supply **(p. 32)** is to be resurveyed. . . Mr. Henderson **(p. 29)** suggests copper and brass ingot prices, asks that no increases **(p. 33)** be applied to farm implement prices. . . Attorney General Jackson holds **(p. 29)** that allocation agreements affecting steel supplies are legal if intended in the public interest. . . Canadian power is helping American ferroalloy and aluminum production. . . The nation is not yet sufficiently serious about defense manufacture **(p. 46)**, declares E. C. Smith.

Zinc Supply Resurveyed

• • •

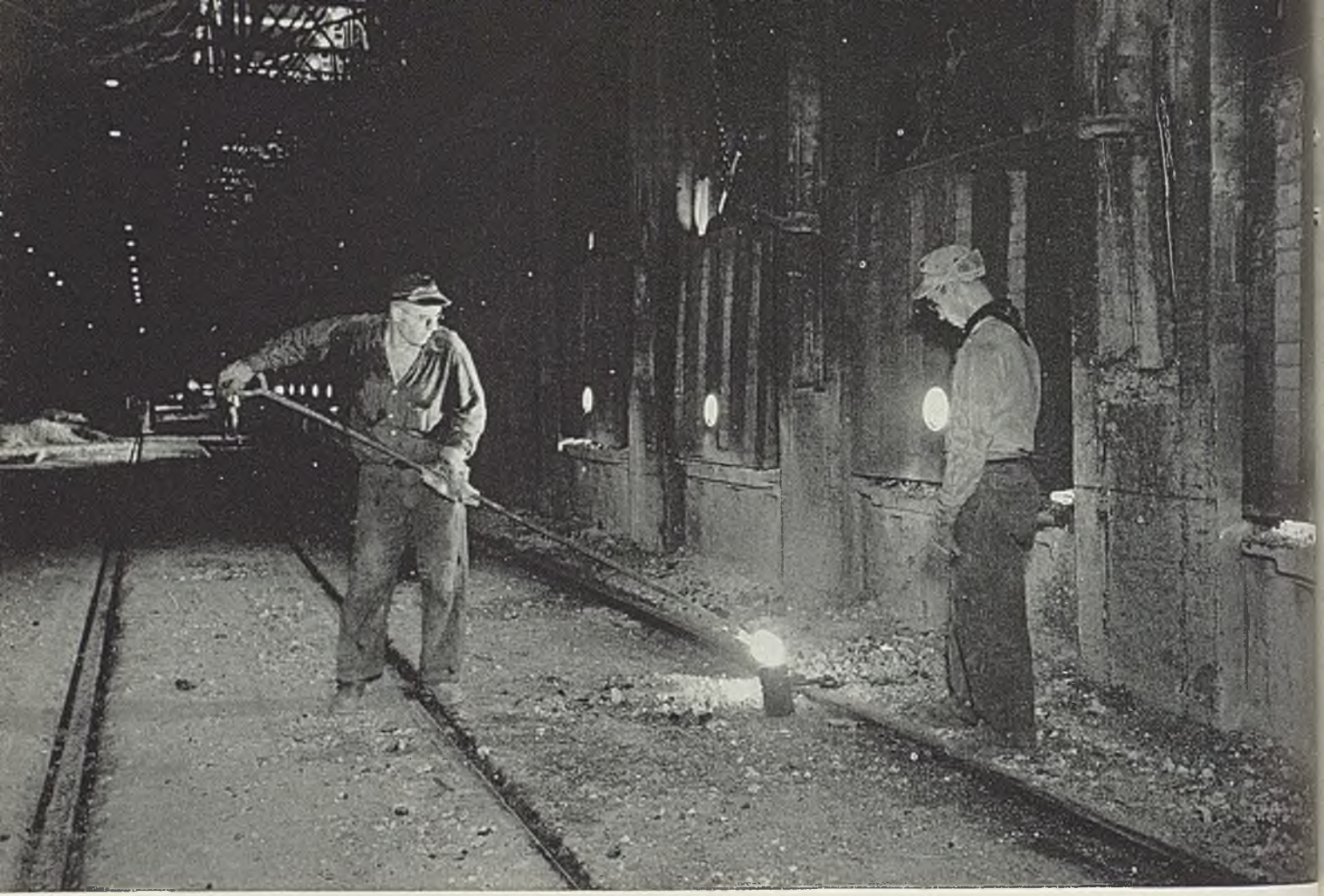
Paul J. McKimm **(p. 74)** finds that oxygenization of strip steel causes cracked edges and slivers, a light scale that is difficult to remove under the high-pressure sprays, and opens up the surface of the steel. He declares that uniform heating of the slab is one of the controlling factors in the manufacture of strip and he tells how to maintain the proper furnace atmosphere. . . . Ralph E. Spaulding **(p. 62)** discusses an arc welding method which prevents residual stresses from shrinkage of weld metal. . . . A structural steel fabricator **(p. 60)** derives important economies by joining sections by spot welding; he uses the resistance forge welding process.

McKimm Writes On Strip Steel

• • •

This week's article by Prof. Arthur F. Macconochie **(p. 52)** covers the production of cartridge cases, telling, incidentally, why brass is the best material in this use. Reprints of Prof. Macconochie's treatise on the production of high-explosive shell now **(p. 58)** are available. . . . Prof. G. B. Carson **(p. 82)** continues his discussion on the use of motion study and methods engineering in developing more efficiency in materials handling. . . . Light case-hardening of a wide variety of small steel parts used in Buick automobiles is being carried out **(p. 70)** in an unusual type of continuous gas furnace. . . . A novel scrap bundling box is in use **(p. 87)** in a Western Pennsylvania steel plant.

Motion Study For Handling



Inland Watches the "Little Things" That Help Make Quality Steel

An important reason why true value is in each pound of Inland Steel is the close attention to every detail of Inland steelmaking. Proof of watchfulness over "little things" is found throughout the Inland plants, and in all service departments.

Take for example, tests at the Inland open hearth furnaces. Repeated tests are made of the molten bath and slag from each furnace to determine the progress of the refining action of each heat. Analyses are made for carbon, manganese, phosphorus and sulphur in the steel, and ferrous oxide in the slag. Each analysis is accurately determined within 30 minutes from the time a sample is taken. Not a single detail of furnace operation and product control is omitted in refining Inland Quality Steel.

There are scores of other examples of Inland attention to details—from careful selection of raw materials to proper loading the finished product for safe transit and fast unloading.

The Inland custom of doing "big things" well, and giving close attention to "little things" is your assurance of high quality steel and cooperative service.

SHEETS · STRIP · TIN PLATE · BARS · PLATES · FLOOR PLATES ·
STRUCTURALS · PILING · RAILS · TRACK ACCESSORIES · REINFORCING BARS

INLAND STEEL CO.

Hello, America: British "Controls" Point to "Shape of Things To Come"

- **Everything, to Paper Clips, Regulated.**
- **"Redundant" Plants Are Ordered Closed.**
- **Nonessential Work Is Suspended.**
- **Labor Brought in Line Through Unions.**

By VINCENT DELPORT
European Editor, STEEL

LONDON

■ HEAVY industries in Great Britain have come completely under government control, which includes priorities and prices, exports and imports. Recently the control has been extended to employment of labor, closing "redundant" plants and stopping nonessential work.

As Mr. Menzies, premier of Australia, said on his arrival in London lately, speaking of his own country: "Trade theories must be left alone, and we will be doing things against our peace time theories."

Readers of STEEL who have followed these quarterly articles know that the transition of the British industry to government control was achieved with relative simplicity at the outset of the war, due to the British Iron and Steel Federation. In years immediately prior to the war this organization was closely related to the Board of Trade through the Imports Advisory Committee. Since its inception, the field covered by the Federation has vastly expanded, and what is now known as the Iron and Steel Control, in conjunction with the Ministry of Supply, covers everything connected with iron and steel, from raw materials down to the finished product, including such items as razor blades and paper clips.

It is impossible to go into details, but a rough outline will afford an idea of what may be "the shape of things to come" in the United States.

The main object of the British government is to provide enough steel to supply all those services directly concerned in the war and civil defense. The demand for this purpose is enormous, and not enough steel can be produced. Therefore, ordinary civilian requirements are sacrificed, outside sources of supply must be found, and imports must fall into the general plan of controlled distribution and use.

To make this complete, the government must also have labor's fullest co-operation, by control of working hours, wages and conditions of employment. The object has been achieved through the Ministry of Labor operating in close contact with the leaders of trades unions.

■ They look like ordinary casks but each of these bombs, made in Britain, could blast a submarine out of the water or crush it like an eggshell. The caps are set off by water pressure. NEA photo

Leading representatives of employers' organizations also have been called upon to contribute their share, to remove all obstacles from supreme effort.

Then again, action is necessary to prevent top-heavy demand from causing an excessive rise in prices. For this purpose, a price control has been firmly established, under which steel, and all its related lines, are completely dominated.

The raw materials situation is, on the whole, satisfactory. Output of domestic iron ore has been considerably increased and is used mainly in making basic pig iron for steel. The situation with respect to hematite pig iron is more difficult because most of the ore used for this purpose came from the Continent and North Africa. Since the war of 1914-18 ore imports from Spain tended to drop, while more came from Algeria, Sweden and France. Now Swedish ore has stopped, North African sources have dried up, arrivals from Spain have continued irregular. These have been supplemented by higher imports from North America.

Hematite pig iron is scarce and its use is restricted to special purposes. Foundries that specialized on products requiring high-grade iron have had to modify their compositions. In Scotland some foundries making light castings are using pig iron from India. Since the beginning of the war, the light-castings industry has suffered from lack of orders and it is only recently that it has been able to adapt itself to making certain items for the government.

No person may buy or sell scrap except under government license, and the price is controlled according to grade, composition, size, etc. Extensive campaigns have been made to collect scrap from households and public utilities. Imports play a more important part, and the bulk comes from the United States. The present rate of these imports may be increased. As an idea of prices now ruling, for heavy steel scrap not less than ¼-inch thick and not exceeding 0.05 per cent sulphur and phosphorus, in furnace sizes, the maximum since December, 1940, is £4 1s 3d per ton ($16.33) delivered at consumer's works. There has been no lack of coal or coke.

Increase in iron and steel imports from the United States has been spectacular. In 1940 they totaled 3,500,000 tons, plus 970,000 tons of scrap. In 1939, the comparable figures were 163,665 and 508,000 tons.

At the beginning of 1941 the imports increased still further, until as noted recently, they were reduced in order to utilize cargo space for other products.

The supply of semifinished steel has been greatly increased, both by domestic output and the expansion of imports. It is to be noted that exports of ingots, blooms, etc., from the United States to all destinations in 1940 totaled 2,520,025 tons, against 215,750 tons in 1939. According to reliable reports, imports of American semifinished steel into Britain at the beginning of 1941 were at the rate of 500,000 tons a month.

However desirable it may be for Britain to hold its foreign trade the tonnage available for export is limited. While tonnages are not disclosed, the total value of its iron and steel exports in 1940 was £31,051,503, against £32,831,605 in 1939, and £41,555,579 in 1938. In comparing these figures account must be taken of price increases in 1940, in some instances fully 25 per cent. Since January heavy restrictions have been placed on exports of tin plate, licenses being granted only for oil plates and plates for canning for requirements of the Ministry of Food.

Owing to the necessity for making steel available for more urgent needs, tin plate mills are operating at a reduced rate. There are, therefore, a number of "redundant" works, and it is proposed to close the smaller mills or those not working economically. Eventually, tin plate output may be cut to about 50 per cent of normal.

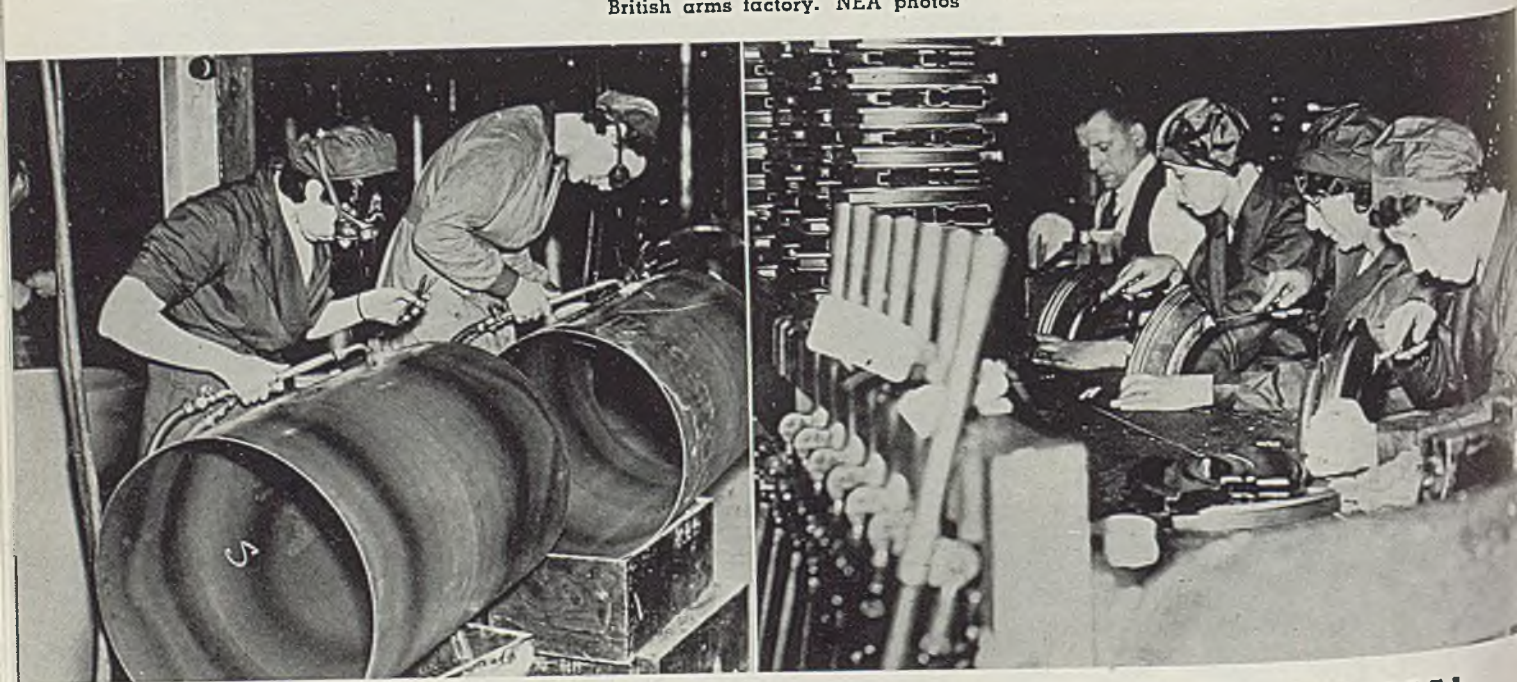
In general, no item of iron or steel can be obtained unless the intending purchaser or contractor has filled a form setting forth all details. In order to make the scheme as watertight as possible a complete census of the steel stocks held by users was undertaken last January by the Iron and Steel Control on instructions from the Ministry of Supply.

One of the industries that has first call for steel is shipbuilding, and it is reliably stated that output from the shipyards in the last six months of 1940 increased by 50 per cent.

The price control appears to function satisfactorily and no change has taken place since the beginning of 1940. Imported American steel costs substantially more than domestic steel. Difference in prices is made up by means of the Central

---

■ **In this man's war, British women do more than keep the home fires burning. Working on the construction of depth bombs, left, they contribute to the ultimate destruction of enemy submarines. At right, women workers file cases for Bren machine gun bullets in British arms factory. NEA photos**



Fund to which a percentage of the fixed home prices is credited, thus allowing for uniform prices.

Iron and steel plants are well supplied with labor. Regulations concerning manpower in nonessential industries do not apply to industries engaged in war work, and iron and steel is exempted. In the heavy industries men work from 55 to 56 hours a week.

Steel workers' earnings have increased substantially since the war started, not only because of wage adjustments, but mainly because of overtime work.

Disputes that may arise over working conditions are settled by arbitration. Only a small number of strikes, of little importance, have occurred. Workers have voluntarily given up some of their privileges after consultation with the trades unions, this applying mainly to hours of work, dilution, settling of disputes, etc. However, the government has pledged to the workers that these privileges will be restored after the war. Considerable impetus has been given to employe training.

There is little authoritative news concerning the iron and steel industries on the Continent. One thing that appears certain is that Germans are using for their own purposes industrial works in occupied territories. If co-operation is not willingly given, German engineers and foremen are sent to take charge.

Special Industries Transferred

It is reliably stated that certain specialized industries important to war production, have been transferred from localities in western Germany, vulnerable to air raids, to Czechoslovakia or Austria.

It is likely that production in the Ruhr district is hampered by aerial warfare, but with all the works at her disposal from eastern France to Poland it is obvious Germany can produce all the steel she needs, notwithstanding many difficulties in respect to labor and transportation. Its position as regards special and alloy steels is less favorable, since Germany must be having difficulty in obtaining ferroalloys, nickel and certain rare metals. It is needless to say export business in the occupied countries is controlled by Germany, with resulting advantages to herself. Prewar selling organizations such as Cosibel in Belgium, Columeta in Luxemburg, the French comptoirs, have been dissolved and replaced by others established on a German pattern.

In brief, the whole structure and functioning of the continental iron and steel industry has been changed drastically.

Small Companies Appeal OPACS Edict Establishing Price Ceiling

■ FIRST company to appeal the edict by Leon Henderson's Office of Price Administration and Civilian Control was the Phoenix Iron Co., Phoenixville, Pa. Several other smaller companies also were reported to have filed similar complaints.

The OPACS agreed to make an inspection of the Phoenix company's books and study its previous price policy, its earnings record, its order backlog and related matters to determine whether an adjustment should be made. Company officials stated that before March 31 they were charging more for structural steel shapes than the prices quoted for such products by larger companies in the field. Adherence to the price-freezing order would mean that Phoenix would have to reduce its price. Company asked that it be permitted to continue its previous price practice although it would thus be charging more than the larger companies.

OPACS men who are studying the case are C. A. Bishop, in charge of steel prices for the administration; Edward France, steel expert; George Heidlebaugh, attorney; and Dr. F. F. Taggart, cost accountant.

A further threat to profits was contained in proposals to reduce exemptions based on invested capital under the excess profits tax law and to increase the income tax rate.

Under the 8 per cent credit for invested capital prevailing in the past year most steel companies escaped the excess profits levy or paid only moderate amounts. Average return for the industry was under 8 per cent, although some individual companies had considerably higher returns and paid heavy excess profits taxes.

Tentative proposals for reducing the exemption call for a sharp downward graduation of the invested capital credit. One proposal would allow only 4 per cent on invested capital for companies with invested capital of $20,000,000. This would adversely affect a dozen of the larger steel producers.

"Won't Hurt To Take Three Months To Produce Facts," Declares Weir

■ FREEZING of steel prices at first quarter levels after wages had been increased 10 cents an hour will work a great hardship on the smaller nonintegrated companies. Many of these now are operating at a loss and their efficiency in co-operating in the national defense program will be impaired by the action.

This was the consensus of executives of small and medium-size steel producers last week.

Another view was taken by Ernest T. Weir, chairman, National Steel Corp., which was the first to offer the wage increase. Said Mr. Weir:

"It is my opinion that the industry should take the second quarter of 1941, when the higher costs will be effective, and let the financial results demonstrate what its position is . . . It won't hurt the industry to take three months to produce facts."

Mr. Weir said there are insufficient cost data available to determine the necessity for a price increase at present. By mid-July, he pointed out, definite information will be available to the industry, the government and the public.

The wage increase, Mr. Weir estimated, will cost $135,000,000, including the coal wage increase.

E. J. Kulas, president, Otis Steel Co., Cleveland, called the price freezing action a threat to the defense program. "Like many other smaller steel companies, Otis is faced with the prospect of operating with a loss or at drastically subnormal profit . . . The recent wage increase of 10 cents an hour will cost the company $1,200,000 annually. Last year the company had a profit of about $700,000. Costs are rising not only because of the wage advance but because of higher prices for coal and most other materials. Also, there is the outlook for sharply higher taxes.

"The Henderson action is a threat to the defense program because steel companies cannot maintain efficiency of operation without a profit, and efficiency is the essence of the defense program."

Hayward Niedringhaus, president, Granite City Steel Co., Granite City, Ill., said that had present wages prevailed during 1940, his company's profit would have been wiped out and a substantial deficit incurred.

Manufacturers operating hot sheet

mills are placed in an "impossible" situation by the price-freezing action, according to John Follansbee, chairman, Follansbee Steel Corp., Pittsburgh.

Thomas R. Akin, president, Laclede Steel Co., St. Louis, commented that "if no relief is given, we will probably have to divert some production to other channels to avoid losses. This is not desirable where it is tied up with the defense program." Laclede depends largely on scrap.

Henderson's Order Sets Pattern for Regimentation, Says Inland Executive

■ LEON HENDERSON had no legal authority in "freezing" steel prices.

This opinion was expressed by Clarence B. Randall, vice president, Inland Steel Co., in speaking to members of the American Institute of Mining and Metallurgical Engineers, in Chicago last week attending meetings of the open-hearth steel and blast furnace and raw materials committees.

Henderson's action may set the pattern for the regimentation of American industry, he said. The greatest peril facing the steel industry, he continued, is that after the war such methods may be the start of a movement toward putting the steel industry in the category of public utilities. Anyone who understands the plight of the railroads in the grip of bureaucracy can realize what this would mean for the steel industry.

Provision in the lend-lease bill for the repayment of loans is fraught with peril for industry, he warned. If the loans are to be paid in essential raw materials, he stated, the government will have a powerful weapon. Tin and other materials will flow from Britain to the federal government and the government will dole them out as it sees fit. The "blacklists" of recent years will be "child's play" to the power that "the government will have over us."

Mr. Randall asserted that if democracy is to be maintained it is essential private enterprise be maintained. He pointed out this cannot be done with government control. Only our system of free enterprise could have placed the steel industry in the position it holds at this time of peril. Only profit incentive made possible the spending of so many millions for expansion during the depression.

The Temporary National Economic Committee called the leaders of the industry to Washington and charged them with having overexpanded, spending millions on unnecessary equipment. Today the nation is thankful for that expansion.

Balanced Economy Now Only Possible Through Government, Declares Grace

■ QUESTIONED concerning Bethlehem Steel Co.'s attitude toward the recent restrictions on prices, E. G. Grace, president, in a press conference last week stated he "assumed it was the government's aim to achieve a properly balanced economy."

Mr. Grace said many factors were involved bearing not only on prices, distribution and other elements within an industry, but also on relationships between industries, and industries and agriculture. He thought the only way such balanced economy could be accomplished in the present emergency was by leadership through the federal government.

"We may be hurt here and there," he said, "but I believe we will be hurt far less if the broad policy of a controlled and balanced economy is adhered to and fairly administered." He added that the first concern these days is production.

His attention was directed to Henry J. Kaiser's proposal to erect steel plants on the Pacific coast (see page 40). He expressed the belief that if the emergency requirements there demanded any such additional amount of steel as indicated by the proposal (1,250,000 tons) it would be far cheaper to get it from other producing centers.

He pointed out that Bethlehem had 428,000 tons of ingot capacity on the Pacific coast and United States Steel Corp., about the same amount. He could not see the need for additional capacity there. The raw materials supply would have to be considered, and remarked that the two present producers, his company and Steel corporation, already consumed practically all the steelworks scrap on the coast.

Progress in shipbuilding throughout the nation, an activity comprising a major portion of Bethlehem Steel Corp.'s current operations, was cited by Mr. Grace as evidence that sufficient steel for shipbuilding is available. Bethlehem plans to lay the first keel on an order of 62 "ugly duckling" ships for the government May 12.

Recently booked in two lots of 50 and 12, the ships are to be constructed at the newly acquired Fairfield, Md., yard, on Chesapeake bay. Twelve ways are being added to the existing four.

Illustrating magnitude of shipbuilding program undertaken by Bethlehem, Mr. Grace declared more than $1,000,000,000 of $1,323,200,000 unfilled orders at the end of March was for ships. Remainder was for regular steel, ordnance and other products. Total of unfilled orders was at a new peak.

Net income after all charges in the first quarter this year was $10,436,028, equal to $2.95 per share on common after provision for dividend requirements on the 7 per cent preferred stock. This compared with reported net income of $10,891,139 or $3.02 per share on common in the quarter a year ago. In last period of 1940, net profit totaled $14,516,779 or $4.32 per common share, and was highest quarterly total on record.

Tax Provision Increased Sharply

Provisions for federal income and excess profits taxes for the three months totaled $7,270,000, based entirely on an estimate of needs under present tax laws, said Mr. Grace. Tax provision in the corresponding period last year was $2,855,000.

Dividend of $1.75 per share on the 7 per cent cumulative preferred stock, payable July 1 to record of June 6 was declared. On common, dividend of $1.50 per share, payable June 2 to record of May 9, was likewise declared.

The number of Bethlehem's employes reached a new high last quarter, 141,321, against 128,417 in the preceding quarter. Average hourly earnings also attained a record, 97.3 cents, against 96.9. Number of working hours per week averaged the same in each of the last two quarters, 38.2. This did not mean, however, that there was not considerable overtime, both in the company's steel plants and shipyards, particularly the latter. Payrolls in the first quarter, another new high, amounted to $68,701,000, against $62,053,000 in the final period of last year.

Although it may be necessary to curtail steel consumption in nondefense products, said Mr. Grace, the industry has three to four times as

much capacity as the defense program now conceived will require. Bethlehem will increase its ingot capacity 870,000 net tons this year.

Coal strike has not affected steel production at Bethlehem plants, asserted Mr. Grace. Currently operating at 102 per cent of capacity, Bethlehem's coal stocks are still sufficient to permit the corporation to continue "for a few weeks more, before we would have to begin to taper off."

Production in the industry as a whole, he declared, is being seriously curtailed by the strike, with the situation becoming progressively worse. Even though mining operations were to resume at once, explained Mr. Grace, the curtailment would continue for some time.

Decline in export business has been pronounced. Export orders booked during the first quarter by Bethlehem amounted to 8.4 per cent of production, as against 18.1 per cent in the preceding quarter and 26.8 per cent for all of last year. Shipments likewise are tapering off, amounting to 15.4 per cent in the last quarter compared with 21.8 per cent in the preceding quarter, and 27.1 per cent for all 1940.

FINANCIAL

Youngstown Sheet & Tube Earned $4,576,197 Net in March Period

■ Youngstown Sheet & Tube Co., Youngstown, O., reports net income earned in first quarter this year was $4,576,197 after federal income taxes and other charges. This was equal to $2.61 per share on common after dividend requirements on the company's 5½ per cent preferred stock.

In the corresponding quarter of 1940, net income totaled $1,253,929 or 63 cents per share on common. Indicated net profit in fourth quarter, 1940, as computed from the nine months' and year's reports, was $5,549,976.

Crucible's First Quarter Alloy, Tool Steel Shipments at New Peak

Net profit earned by Crucible Steel Co. of America, New York, in the quarter ended March 31, was $3,044,270 after all charges, including provision for federal income taxes. This was equal, after dividend requirements on the company's 5 per cent convertible preferred stock, to $5.90 per share on common. In the corresponding period last year, Crucible's net income was $1,193,156 or $1.74 per share on common.

No deduction was made against earnings of the first quarter, 1941, on account of federal excess profits tax. F. B. Hufnagel, chairman, reported the company's estimated federal excess profits tax credit for this year will be about $6,000,000. No excess profits taxes will accrue, he said, until earnings for the year have exceeded that total.

Mr. Hufnagel further reported that in the first quarter Crucible's shipments of alloy, tool and high speed steels surpassed all records.

Allegheny Ludlum's First Period Profit Nearly Treble Last Year's

Net income earned in first quarter by Allegheny Ludlum Steel Corp., Brackenridge, Pa., after depreciation, depletion, provision for federal taxes and other deductions was $2,720,164. It was equal, after dividend requirements on the corporation's preferred stock, to $2.12 per share on common, and was nearly treble profit earned in the period in 1940.

In the quarter last year, net income was $1,000,297 or 75 cents per share on common after preferred dividend requirements.

Jones & Laughlin's March Quarter Profit Above Last 1940 Period

Jones & Laughlin Steel Corp., Pittsburgh, earned $4,160,507 net profit, after federal income taxes, depreciation, depletion and other charges, in the quarter ended March 31. No provision was required, company reports, for excess profits tax.

Net income last quarter was equal, after dividend requirements on 7 per cent preferred stock, to $5.43 per share on common. It compared with $1,134,611 net profit, equal to 18 cents per share on common, in the first quarter last year. In fourth quarter of 1940, net income totaled $4,044,126 or $5.23 per common share.

Rustless Iron & Steel Earned $761,698 Net in First Quarter

Rustless Iron & Steel Corp., Baltimore, reports net profit in quarter ended March 31 was $761,698 after depreciation, federal income and excess profits taxes and other charges. This was equal to 80 cents per share on common after provision for dividend requirements on the corporation's $2.50 preferred stock.

In the corresponding period last year net income, adjusted, was $213,126 or 21 cents per share on common after preferred dividend requirements. In fourth quarter, 1940, Rustless' net profit was $456,609. It was equal to 47 cents per share.

Granite City Steel Co.'s Net In First Quarter $93,195

Granite City Steel Co., Granite City, Ill., reports net income in quarter ended March 31 was $93,195. This was equal to 24 cents per share on the company's capital stock, and compared with $43,152 net profit earned in the corresponding period in 1940. Latter was equal to 11 cents per share.

$438,723 March Quarter Profit Earned by Copperweld Steel Co.

Copperweld Steel Co., Glassport, Pa., earned $438,723 net profit after provision for depreciation, federal income and excess profits taxes and other charges in the first quarter. This was equal, after dividend requirements on the company's 5 per cent preferred stock, to 80 cents per share on common. It compared with net profit of $227,687 or 46 cents per share on common in the first quarter last year.

Federal income taxes for the March quarter of 1941 were calculated at a 30 per cent of normal rate, deduction for federal and state income taxes for the period totaling $327,141, the company reports. Additional provision of $220,110 was made for the excess profits tax, making a total tax deduction for the quarter of $547,251.

Wickwire Spencer Reports $231,172 Income Before Taxes

Wickwire Spencer Steel Co., New York, reported net income before provision for taxes in first quarter was $231,172. This compared with a net deficit of $262,701 incurred in the corresponding period a year ago, and with net profit of $250,651 in the closing quarter of 1940.

Otis Steel's Earnings Below Last 1940 Quarter's Total

Net profit earned in first quarter of 1941 by Otis Steel Co., Cleveland, totaled $594,183. Estimated provision for federal income taxes was $192,438. Preliminary survey, the company reports, indicates no provision for federal excess profits tax was necessary.

In first quarter last year, Otis incurred a deficit of $165,513. Net profit in December period of 1940 was $614,484.

Dividend of $2.75 per share on the company's convertible first preferred stock was declared, payable June 15 to record of May 31.

Interlake Iron Corp.'s Profit $774,855 in March Quarter

Interlake Iron Corp., Chicago, reports net income earned in first quarter, subject to audit and year-end adjustment, was $774,855 after interest, depreciation, amortization, taxes and provision of $75,000 for amortization of investment in Dalton Ore Co. Equal to 38 cents per share on the corporation's capital stock, net income in the period compared with deficit of $108,322 incurred in the March quarter of 1940.

Coal Shortage Cuts Defense Output; Situation One of "Extreme Gravity"

■ EFFECTS of the soft coal shortage caused by the 4-week-old miners' strike widened in defense industries last week as more stocks became exhausted. Approximately 20 blast furnaces were forced to suspend; others were on half blast. Steelworks operations dropped 2 points. Railroads, chemicals and textiles, all essential to the defense effort, likewise were forced to curtail operations.

Retarding influence of the mines' suspension will be felt even more sharply this week, regardless of whether or not the mines are reopened. At least a week, and in some cases two or three weeks, will be required to get back into full operations.

Steelworks operations will drop to between 50 and 60 per cent if the coal strike is not settled in ten days to two weeks, according to informed sources.

The soft coal strike was taken up by Defense Mediation Board last Friday after it had been certified, at long last, by Secretary of Labor Perkins. Only issue to be settled is that of wage differentials between northern and southern mines.

Shortage of coal supplies at week's end was threatening to halt continuous operation of the Great Lakes fleet, which has been operating at top speed to bring down the approximately 75,000,000 tons of ore needed. Fuel supplies are estimated to be large enough for only two round trips of the fleet.

The South Carolina Public Service Commission granted the Southern railway permission to suspend temporarily eight trains running between South Carolina cities. The railway in its application said it had only a 10-day supply of coal.

Three large producers of ammonia, vitally needed for explosives, are preparing to cut production immediately. The major shortage was reported by Solvay Process Co., Hopewell, Va.

Manufacturers of woolen and cotton cloth have reduced production and may be compelled to suspend entirely within a few days if new coal supplies are not forthcoming.

War Department officials asserted the situation is becoming "one of extreme gravity" in industries working on defense orders.

Among steel producers the coal and coke supply situation varies. Bethlehem Steel Co. reports sufficient supply for several weeks due to heavy stocks accumulated before the strike started. Drastic curtailments have been necessary in the Chicago district, Cleveland, Youngstown, O., Birmingham, Ala., Pittsburgh and other points.

Crucible Steel Increases Wages 10 Cents an Hour

Crucible Steel Co. of America, New York, last week concluded negotiations with the Steel Workers Organizing Committee providing an increase of 10 cents an hour in wages, retroactive to April 1. Comparable adjustments were made for salaried employes receiving not more than $400 a month.

Defense Mediation Board Settles Pre-Strike Case

National Defense Mediation Board has settled its first pre-strike case and nine of the 14 strikes that have been certified to it. The pre-strike case involved two plants of the Minneapolis Moline Power Implement Co. in Minneapolis and Hopkins, Minn., and a CIO union. The union had filed intention to strike, as required by Minnesota law, and the case later was given the mediation board. Representatives of both parties were summoned to Washington, started negotiating on the train and reached an agreement soon after their arrival in the capital.

The board also settled the longest defense strike on record at Snoqualmie Falls Lumber Co., Snoqualmie Falls, Wash., where 1060 had been on strike since Oct. 28, 1940.

Other cases are pending with the board investigating the issues in several cases.

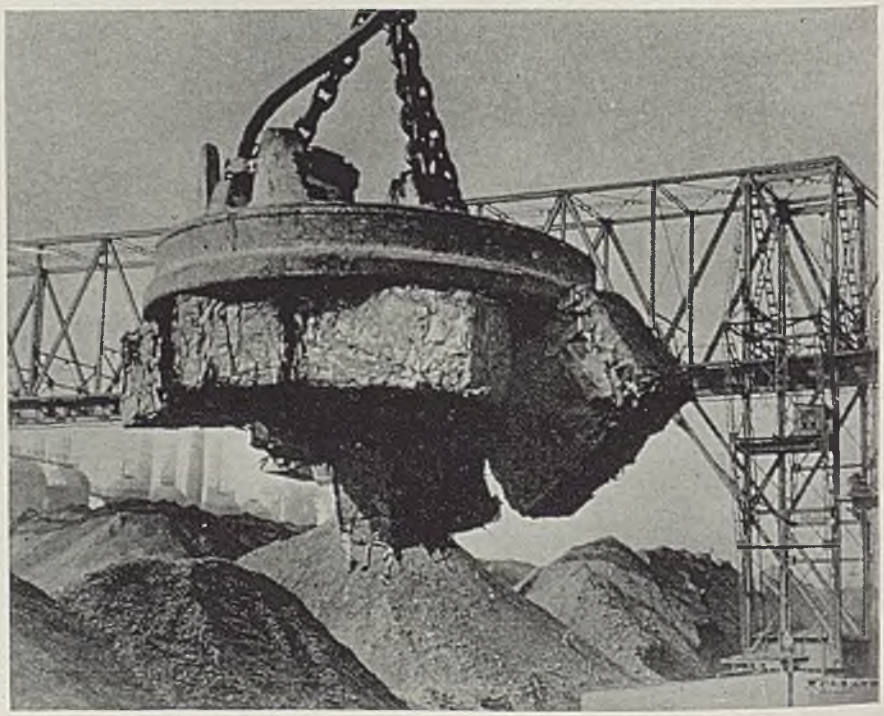
Defense Program Provides Employment for 2,000,000

More than 2,000,000 workers already have been placed in industry as a direct or indirect result of the national defense program, according to Sidney Hillman, associate director general, Office of Production Management.

No serious situation has yet developed in which there has been an urgent need for workers that was not fulfilled, he added. The need for qualified workers will increase during the coming months.

Mr. Hillman estimated the aircraft industry will require 170,000 additional workers within the next seven months; the shipbuilding industry will need 309,000 more within the next 18 months; and the machine tool industry must raise its labor force from 85,000 to 101,000 by December.

Speeds Loading, Unloading of Freighter



■ Recently installed on the O. S. MACFARLAND, a Columbia Transportation Co. freighter, this huge 77-inch lifting magnet, claimed the "largest" in the world, was designed to speed up the loading and unloading of Great Lakes freighters. Manufactured by Cutler-Hammer Inc., Milwaukee, it will lift approximately double the amount of material handled by smaller 65-inch units

46,071,666 Tons Pig Iron Produced in 1940

■ Pig iron production in 1940 was 46,071,666 net tons, against 34,808,682 tons in 1939, according to the American Iron and Steel Institute. Ferroalloy production was 1,326,863 tons, against 868,415 tons the previous year and brought the total of iron and alloys up to 47,398,529 tons.

Of the pig iron total 33,987,734 tons was basic; 7,835,276 bessemer and low phosphorus; 2,292,175 foundry; 1,832,401, malleable; 3590, forge or mill; and 120,490, white and mottled, direct castings and miscellaneous.

Of the ferroalloy total, 746,896 tons was ferromanganese and spiegeleisen; 498,832, ferrosilicon; and 81,135 other ferroalloys.

Pennsylvania continued the largest producer of iron with 14,287,826 tons; Ohio was second with 9,969,704 tons; and the Indiana-Michigan group third with 6,687,707 tons. Illinois went ahead of the Midwest-Virginia-Kentucky-Tennessee group with 4,047,376 against 3,576,981 tons. Alabama produced 3,418,895 tons; Massachusetts-New York, 3,113,002 tons; Minnesota-Iowa-Colorado-Utah, 971,175 tons.

Pennsylvania also was first in ferroalloy output with 515,263 tons. The Ohio-Iowa-Colorado group was second with 345,210 tons; New York and New Jersey produced 323,467 tons, and the Virginia-West Virginia-Alabama-Tennessee group, 142,923.

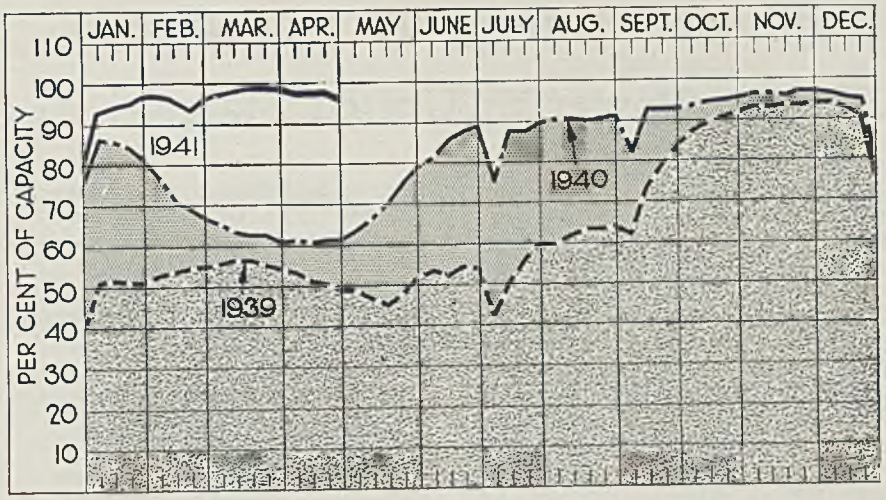
Production of all grades of pig iron showed substantial increases in the last half of the year compared with the first half. Ferroalloy production in the last half was smaller by 36,000 tons.

Chrysler, Baldwin Deliver Army Tanks

■ Medium tanks, weighing 28 or 29 tons, were delivered to the United States Army last week by Chrysler Corp., Detroit, and Baldwin Locomotive Works, Eddystone, Pa. They were the first to be built by these companies.

The Chrysler unit, built in a plant that existed only on blueprints seven months ago and was completed four months ago, was formally presented to the Army as a gift by Chrysler dealers and their employes throughout the country.

Baldwin Locomotive's unit was built nine months ahead of schedule. Other builders of light and medium tanks also have achieved enviable records in rushing production; see page 45.



PRODUCTION . . . . Lower

■ STEELWORKS operations last week declined 2 points to 96 per cent, due to coke shortage and repairs. Three districts made small gains, four reduced and five were unchanged. A year ago the rate was 61½ per cent; two years ago it was 49 per cent.

Youngstown, O.—Down 3 points to 94 per cent as Republic Steel Corp. suspended its bessemer units Thursday. Production continues with two bessemers and 76 open hearths. Six blast furnaces have suspended for lack of coke, 18 continuing production. Republic also has stopped production in three of its four coke batteries. Outlook for this week is about 90 per cent with two bessemers and 75 open hearths active.

Cincinnati—Advance of 1 point to 92½ per cent followed a shift in furnaces for repair purposes.

Birmingham, Ala.—Unchanged at 90 per cent, with 22 of 26 open hearths active.

St. Louis—Steady at 98 per cent for the fourth week. Repair work is expected to reduce operations of one producer during the next two weeks.

Central eastern seaboard—Held at 96 per cent but threat of continued coke shortage indicates some reduction soon.

Detroit—Advanced 9 points to 79 per cent as additional units were lighted at Ford Motor Co. plant. Six open hearths are down in the district, for repair.

Pittsburgh—Off 4 points to 96 per cent, with further reduction indicated. Four blast furnaces have been banked because of coke shortage and others are expected to go down. Operations this week are expected to decline further to 93 per cent or lower, depending on coke supplies. Rate may drop rapidly at close of week if the coal shut-down is not ended in early part of the period. Drop of 3 points in rate would equal production loss of nearly 40,000 tons.

Wheeling—Increased to 88 per cent as an idle open hearth was returned to production.

New England—Continued at 92 per cent, one producer operating at 100 per cent for the eighth week.

Chicago—Down 6 points to 96 per cent, the lowest rate since Feb. 22, when it was 95.5 per cent. Furnace repairs caused the decline, coke shortage being a minor influence. No blast furnace curtailment since Carnegie-Illinois Steel Corp. banked two a fortnight ago.

Buffalo—Production held at 90½ per cent for the third week. Blast furnace operation is expected to be reduced by lack of coke.

Cleveland—Lost 4½ points to 92 per cent as one open hearth was taken off and other adjustments made. Schedule for this week indicates an increase.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended Apr. 26	Change	Same week 1940	Same week 1939
Pittsburgh	96	— 4	55	43
Chicago	96	— 6	57	49.5
Eastern Pa.	96	None	57	37
Youngstown	94	— 3	45	43
Wheeling	88	+ 4	80	63
Cleveland	92	— 4.5	70	39
Buffalo	90.5	None	44	37.5
Birmingham	90	None	83	55
New England	92	None	57	43
Cincinnati	92.5	+ 1	42.5	52
St. Louis	98	None	42.5	42
Detroit	79	+ 9	72	59
Average	96	— 2	61.5	49

Dominion Planning To Sell More Electric Power to United States

BUFFALO

■ WHILE Canada is planning to increase its supply of power to United States plants working on war and defense orders, if demand warrants such action, officials of power generating plants on the American side of the Niagara river have not petitioned the Federal Power Commission to divert additional water to expand their generating capacities.

It was generally conceded by American interests that power being carried into this country from Canada over lines of the Niagara Falls Power Co., which operates on the American side, was being used to pay for war materials made in United States plants for the United Kingdom. The exportation of power helps Canada and Britain to maintain a much needed dollar balance in this country.

William L. Houck, vice chairman of the Ontario Hydro Electric Power Commission, reports 80,000 to 85,000 kilowatts are being exported by Canada to United States plants at present. The Union Carbide Co., at Niagara Falls, is receiving 40,000 kilowatts from the Dominion generating plant on the other side while the Aluminum Co. of America is obtaining 40,000 to 45,000 kilowatts from the hydro plant at Cornwall, Ont. Both these plants are working on armament orders for Canada or England, Mr. Houck said.

Mr. Houck added that "the Aluminum Co. of America has asked for another 50,000 kilowatts which we are ready to supply from the Beauharnois, Que., hydro development as soon as the necessary permit is obtained from the Dominion government. Then, too, if we obtain a permit for the diversion of another 5000-cubic-second feet of water from the Niagara river at Niagara Falls, we will proceed with an expansion of our hydro facilities at Niagara Falls involving an expenditure of $50,000,000 to $75,000,000."

Also slated to be constructed by the Canadian government is a 50,000-horsepower generating plant at De-Cew Falls on the Welland Canal near Thorold, Ont., at a cost of $5,000,000.

Mr. Houck explained that the Canadian government is "anxious to co-operate in every way with the United States government and with United States industries engaged in the production of materials and supplies for Britain and the United States.

"At present we are exporting all the power that our licenses authorize but are willing to provide an additional 50,000 kilowatts as soon as the permits are received," he said.

Meanwhile, the Adams station of the Niagara Falls Power Co. is idle, except for occasional work when the Schoellkopf station is forced to shut down a unit for repairs. The Adams plant is in good condition and its 21 generating units with a total capacity of 105,000 horsepower, or 80,000 kilowatts, can be put into action on short notice.

Treaty Governs Diversion

According to a joint treaty dating back to 1909, the United States can divert 20,000 cubic feet of water a second while Canada is allowed to divert 36,000. Canada, during the present crisis is diverting an extra 5000-cubic-second feet, making its total 41,000-cubic-second feet.

Officials of the Niagara Falls Power Co. point out that the Federal Power Commission knows all about the Adams station and if the commission figures the power is needed the water grant will be made. Furthermore, of the 20,000-cubic-second feet of water being used by the company on the American side 275 cubic feet is still of a temporary character having been granted during the World war.

Opponents of the St. Lawrence seaway cite these additional power producing proposals on both sides of the border to show that generating capacity could be made to meet almost any man-made emergency.

Measures Sheets When One Side Only Is Accessible

■ Not only is this magnetic gage accurate to 0.001-inch, but it measures the thickness of sheet steel when only one side is accessible. Invented by W. E. Abbott and B. M. Smith of General Electric Engineering Laboratory, it consists of a 7-pound portable indicating unit, which is connected to an electric outlet, and a small cylindrical head containing a magnet. When the gage head is placed against the material, the amount of magnetic flux that passes through the gage head magnetic circuit indicates the thickness of the material. Any magnetic sheet or plate material may be measured by the gage as long as the material is not backed by other magnetic material

Stainless Shortage Curtails Operations

■ Inability to obtain stainless steel is forcing Tuttle & Kift Inc., 2626 West Washington boulevard, Chicago, manufacturer of parts for the range industry, to curtail operations sharply. Present production is about 60 per cent of capacity, despite an order backlog which would keep the plant at full operations for eight months.

Stainless steel is the principal raw material used and steps now are being taken to find a substitute. Among products made by the company are controls and switches for heating units, which are used in heating equipment.

Attorney General Clarifies Legal Question on Steel Allocations

WASHINGTON

■ A MEETING with representatives of the steel industry was called last Friday by Samuel R. Fuller, head of the raw materials section of the production division, OPM. Present were Benjamin F. Fairless, T. M. Girdler, E. G. Grace, Ernest T. Weir, and John F. Tower of the production division.

The purpose was "more to get acquainted than anything else," since it was the first time Mr. Fuller had taken over the work of the materials branch from W. Averill Harriman.

Conferees discussed several ways in which the steel industry could co-operate to assure a maximum output of steel. It was reported they also discussed ways in which steel could be allocated among several companies without violating the antitrust laws.

"This department has made no commitment of any character to refrain from protecting the steel companies on anti-trust law violations and has not been asked to make any such commitment," Attorney General Robert H. Jackson stated last Friday.

"So far as I know, no industry or group of industries has sought exemptions from the anti-trust laws.

"The national defense production program requires establishment of some priorities, allocation and unification to achieve efficient production. Some such acts, if undertaken by private agreement among industries for the purpose of enlarging their control of commodities or enhancing prices, would be violations of law.

"For example, if any industry should agree that they would reduce production in order to hold up prices to the consumer, it would be viewed by this department as a violation of the anti-trust law and prosecution could be expected.

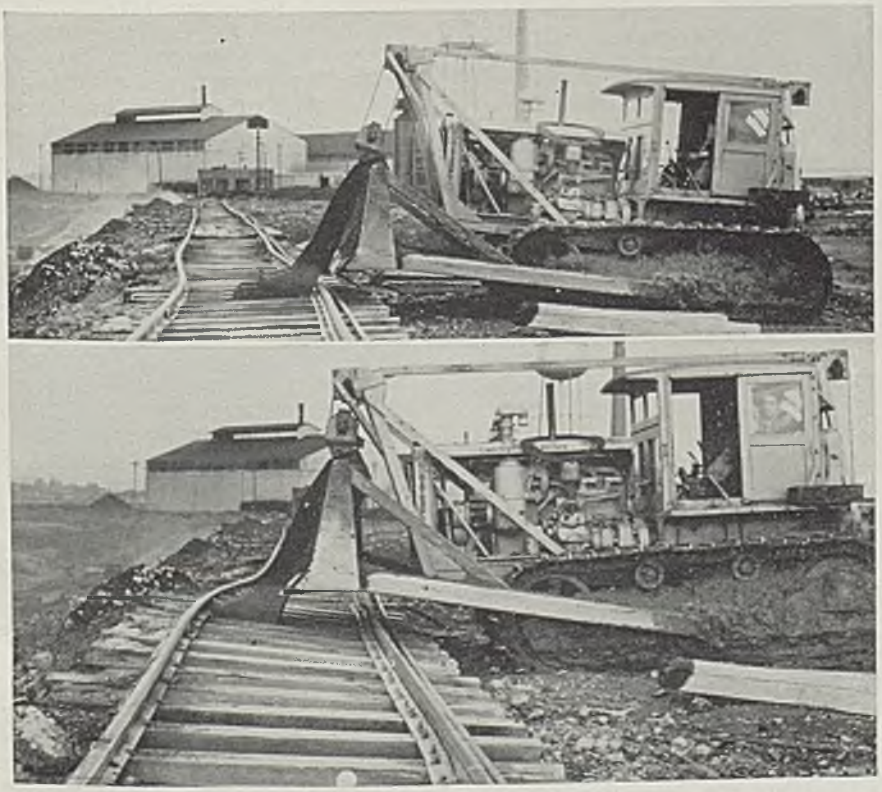
"If, however, in order to step up production of defense materials, the industries are asked by the government to reduce production of non-defense material, this does not constitute a conspiracy against the public interest and, of course, is not a violation.

"I believe that business men are justified in expecting so far as possible uncertainties as to the application of anti-trust law will be eliminated, when they are asked by the government to join a co-operative effort. This is not for the purpose of sanctioning violation but for the purpose of seeing that violations do not take place and at the same time that the defense effort is served.

"John Lord O'Brian, counsel for OPM, and this department have agreed upon a plan of procedure by which questions of this character will be defined by OPM and by industries involved and may be presented to this department.

"No question relating to the steel industry has been submitted to this department under this plan of procedure. It is a general procedure for exchange of information and requests between the two departments and is applicable to all industries engaged in defense work."

Moves Railroad Tracks Quickly



■ How to move a railroad track in one easy lesson: Timken Roller Bearing Co. engineers at Canton, O., recently, by applying an overhead frame and hinged arm to a Caterpillar diesel D8 tractor, made quick work of moving track at the company's steel mill dump

Henderson "Suggests" Copper, Brass Ingot Prices

WASHINGTON

■ Giving public expression to statements he has made in private recently, Leon Henderson last week declared a price ceiling will not be placed on copper and brass ingot "at present." Producers who are selling above 12 cents are advised to reduce gradually to that level in order that a uniform price for primary and secondary copper may be established. He suggested the following maximum prices effective immediately:

"Primary producers who are now selling or offering to sell at 12 cents should continue to do so. Primary producers selling or offering to sell at more than 12½ cents should reduce selling price so as not to exceed 12½ cents. All custom smelters should sell not in excess of 12½ cents.

"Casting copper producers should sell at prices not exceeding 12¼ cents. 85-5-5-5 ingot should sell at prices not exceeding 13 cents and other ingot at usual differential."

Mr. Henderson said he was ready to take "other steps to maintain price stability" if individual producers are unable to carry out his suggestion. Although the amount of copper selling over 12 cents is not a large percentage of the total, its price and that of copper and brass scrap and ingot seem to move together, he continued.

"At meetings in Washington members of the industry expressed the opinion that the situation is not out of hand to such an extent as to require formal ceiling prices."

Windows of WASHINGTON

By L. M. LAMM
Washington Editor, STEEL

Hearings open on new tax program to raise three and a half billions for defense and aid to Britain . . . New examination of zinc supply to be made and control possibly extended . . . Domestic bauxite production can be increased . . . Measures to speed steel deliveries to West coast studied by OPM consultant

WASHINGTON

■ NEW TAXES to raise $3,500,000,000 to finance this country's defense and aid to Britain program became the subject of hearings before the Ways and Means Committee of the House of Representatives last week.

First witness was Secretary of Treasury Morgenthau, who outlined the general revenue situation. Mentioning the necessity for raising an additional three and a half billions, Mr. Morgenthau said: "Such an increase is without precedent, but the situation today is also without parallel." He said the increase asked amounted to about 4 per cent of a rapidly rising national income.

Two rather definite programs for raising the additional revenue were proposed. One by the Treasury proposed to raise $1,520,000,000 by sharply increased taxes on individual incomes; $934,000,000 from higher corporation taxes; $1,233,000,000 from new nuisance taxes; and $347,000,000 from estates.

Individual surtaxes would start at 11 per cent on the first taxable dollar after personal exemption and deductions and would fall hardest in the income brackets between $5000 and $25,000. The $4000 surtax exemption would be eliminated.

Increase in corporation taxes would be affected by lowering the earnings credit under the excess profits tax and by imposing a surtax at a rate of 5 per cent for the first $25,000 of net income and 6 per cent on net income above $25,000.

Nuisance taxes would be imposed on a wide variety of items.

These proposals may be greatly changed before the new tax law is enacted. After the hearings before the Ways and Means Committee are concluded, the committee will draft a bill, and report it to the House. It then goes to the Senate Finance Committee for hearings and is reported to the Senate. After approval by that body it will be sent to conference, with both houses represented, and finally approved by both houses. All along this course changes may be made.

Alternate Plan Offered

Before the Treasury's recommendations were formally made to the Ways and Means Committee, a staff of the joint congressional committee on taxation offered an alternative program. This differed from the Treasury's program in that less drastic individual income tax increases were proposed. Instead of a corporation surtax, the joint committee recommended a rise in corporate income tax from 24 to 30 per cent.

Assistant Secretary of the Treasury Sullivan said the revision of excess profits tax could be made to raise an additional $400,000,000 by reducing credits. While he did not specify exactly how these would be reduced, it was reported one change contemplated was the lowering of the present 8 per cent credit on invested capital to 6 or 4 per cent or both, graduated downward according to size of company. Such a change would be especially severe on large companies in the heavy goods industries.

Steel prodcers who last year escaped heavy excess profits taxes by virtue of the 8 per cent credit may have to pay heavily if the credit is reduced to 6 or 4 per cent. Rail equipment builders would be similarly affected.

Credits based on average earnings for the four year 1936-39 would be reduced from 95 per cent to 75 per cent, it was suggested.

A third suggestion, not favorably considered by the administration, was for a sales tax.

Mr. Morgenthau estimated that $1,000,000,000 could be saved in nondefense expenditures.

The Treasury head told the committee that "we now have a program of about $39,000,000,000 for national defense expenditures, including lease-lend appropriations." Not much more than $12,000,000,000 will be spent for defense purposes in the fiscal year ending June 30, 1942. The Treasury estimates that at the start of the new fiscal year July 1 the United States will be spending not more than $1,000,000,000 a month.

"The problem of building our defense," Mr. Morgenthau said, "is fundamentally a problem of production. We cannot build planes and tanks, ships and guns, merely by voting money. We build them with labor and management, with raw materials and machinery. The resources now employed in the defense industries are not enough to produce the guns and tanks and ships and planes that we need to carry out the program to which we are committed.

"We simply cannot carry on business as usual and government as usual from now on and still take adequate care of our defense needs."

Defense Price Control, Purchasing Units in "Complete Agreement"

Declaring "complete agreement" exists between their respective agencies, Leon Henderson, administrator of the Office of Price Administration and Civilian Supply,

From stock to dock!

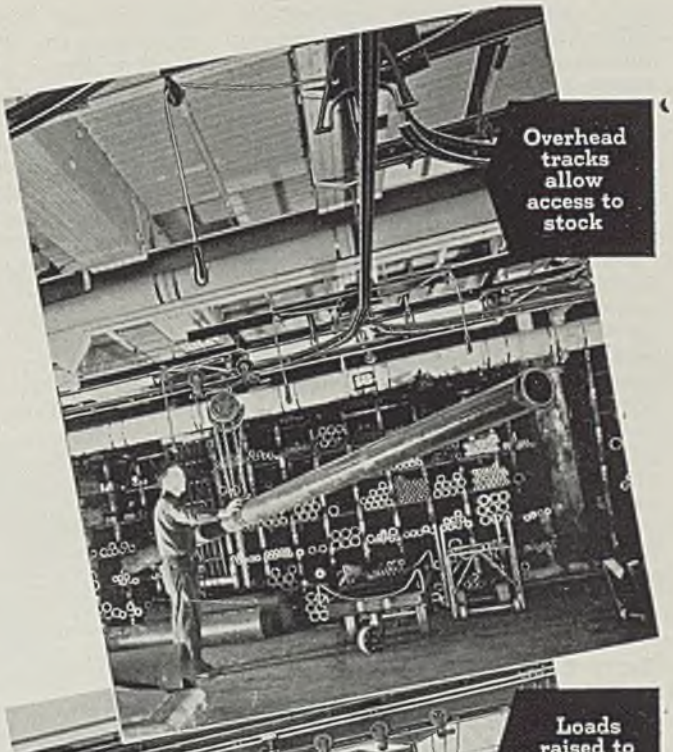
When it comes to bottlenecks these days our experience proves that the shipping department is the place that takes a real beating. Pictures here show how stock can move quickly from storage to trucks without congestion.

The extreme flexibility of American Mono-Rail equipment enables engineers to design such a system, related throughout the plant yet providing constant individual service at each process.

American MonoRail engineers, located in every industrial center, will gladly suggest from their wide experience a solution to your particular problem.

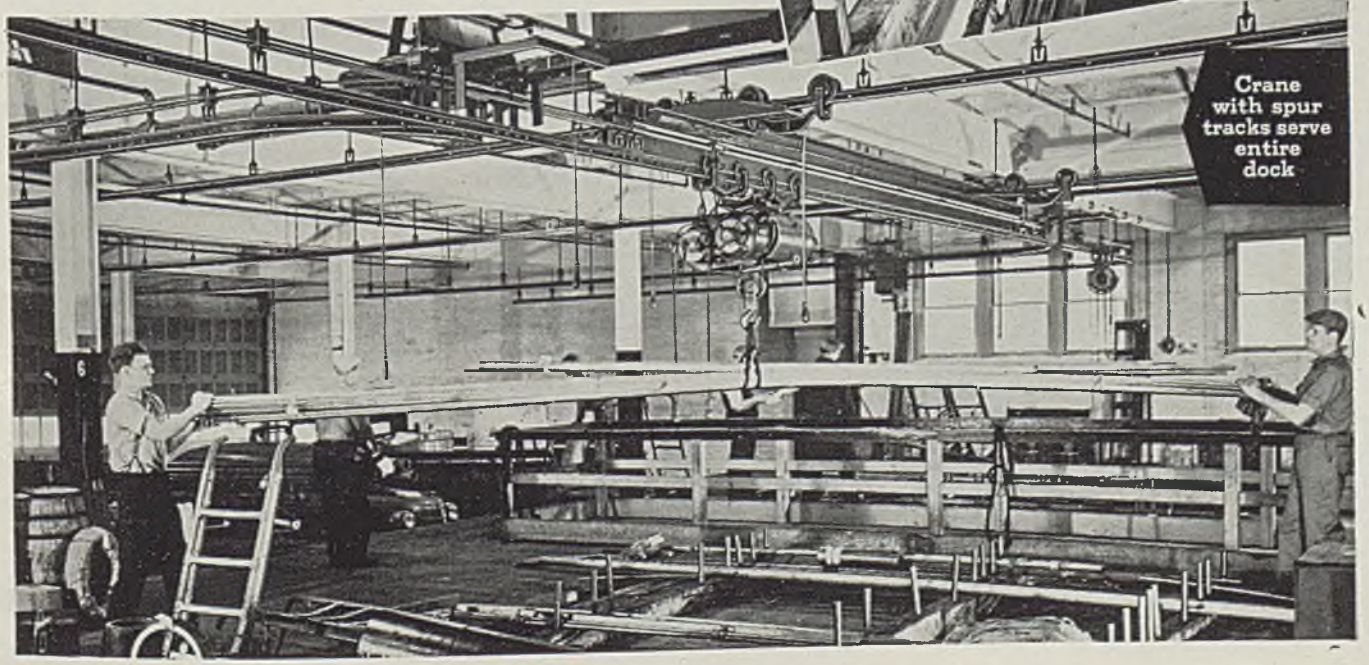
Write for copy of Blue Book illustrating hundreds of overhead monorail installations.

The American MonoRail Co.
13102 Athens Ave. Cleveland, Ohio



Overhead tracks allow access to stock

Loads raised to dock through hatchway



Crane with spur tracks serve entire dock

and Donald M. Nelson, head of the Office of Production Management purchasing division, last week adopted a working agreement to avoid duplication of effort and activities.

Under the agreement, purchases division will not clear proposed contracts in which prices do not conform to regulations set by OPACS, unless latter approves the contracts.

OPACS will keep the purchases division informed of all price investigations and proposed regulations which may affect procurement for defense. In turn, Nelson organization will inform OPACS of government procurement plans and proposals which might influence price stability or affect supply of goods of civilians.

Facilities and information of each agency will be made available to the other. Each will appoint a liaison officer.

Army Tests New Steel Helmet Designed for Added Protection

New steel helmet of sufficient toughness to withstand impact of spent rifle and machine gun bullets and most shrapnel and shell splinters is being tested by the War department.

Added durability of the steel is not the only desirable feature of the helmet, Army officials said. Design follows that of the German army helmet, and is said to give more protection to sides and back of the head.

Weight of the new headgear, being tested at Ft. Benning, Georgia, is about two and one-half pounds, or three ounces more than the present type.

Government Agencies Provide Defense Manufacturing Facilities

Lease arrangement by which Defense Plant Corp. will provide machinery and equipment valued at $185,548 to the Watson-Stillman Co., Roselle, N. J., was announced last week by Federal Loan Administrator Jesse Jones. Title to facilities will remain with the government. Company manufactures hydraulic equipment.

Mr. Jones reported also that Metallurgical Products Inc., Shreveport, La., manufacturer of powdered carbonyl iron, will obtain $56,000 for additional land and buildings and $69,000 for new equipment. Property will be leased to the company and Defense Plant Corp. will retain title.

Loan of $300,000 to Rademaker Chemical Corp., Eastlake, Mich., for construction and equipment of a plant for manufacture of dead-burned magnesite, was reported by the Reconstruction Finance Corp. last week.

RFC likewise will underwrite 75 per cent of a $150,000 loan to be made by the Ft. Worth National Bank to Texas Steel Co., Ft. Worth, Tex. Mr. Jones, announcing RFC's participation, said the loan would be used for working capital and to purchase raw materials in connection with a War department contract for shells.

Mr. Jones further declared the RFC has authorized an additional $15,000 loan to Horni Signal Mfg. Co., New York, which is making tuning units for the signal corps. Columbia Aircraft Products Inc., Dunellen, N. J., will receive a $9500 loan for working capital on a contract to supply hose connections to Wright Aeronautical Corp., Paterson, N. J., said Mr. Jones.

Studies Measures To Expedite Steel Deliveries to West Coast

To develop measures that may be necessary to expedite steel deliveries to the Pacific Coast, especially to shipbuilding yards, W. A. Hauck, steel consultant, OPM, started last week a tour of steel plants in the Los Angeles, San Francisco, Seattle and Utah areas.

Mr. Hauck will also visit plants making heavy steel forgings, and steel warehouses and shipbuilding plants, according to the OPM. Increasing steel requirements of the defense program on the Pacific coast made necessary a first-hand survey, it was said.

Alloy Metals Demand Increases Argentine Mine Supplies' Imports

Argentina's mining activity has been spurred by the great demand for tungsten, beryllium and manganese, with the increase reflected in greater imports of mining machinery, according to the American commercial attache at Buenos Aires. In calendar year 1940, imports totaled 979,000 kilos, compared with 138,000 kilos in the preceding year.

Machinery imports as a whole, however, declined from 35,000,000 kilos in 1939 to 26,000,000 kilos last year. Principal drops were in pumps and all types of motors. Gains made by domestic manufacturers in 1940 were believed considerable, although no statistics are available.

"Generally speaking," the attache reported, "1940 was a fairly successful period for the Argentine machinery trade, although results obtained by American companies were less encouraging."

Townsend Heads New Unit in Defense Contract Service

Clifford Townsend, former governor of Indiana, who has been serving on Sidney Hillman's staff in the Office of Production Management, has been assigned to the Defense Contract Service. He will establish a new group resources unit to deal with local groups of factory and machine tool owners that are participating jointly in defense orders.

The new unit will advise such groups on labor, machine facilities, management, and production planning required to obtain contracts or subcontracts.

OPM Offers Information on Materials, Conservation

Robert E. McConnell, chief of the Office of Production Management's conservation unit, has offered to make available to manufacturers information and reports which he has accumulated on the materials situation and methods of conservation. Upon request, he will send reports by the metals producers, data compiled by OPM, and suggestions made by the National Academy of Sciences committees which are investigating substitutions and conservation of defense materials.

Foreign Bauxite Used To Conserve Domestic Supply

Imported bauxite will be used for aluminum production as long as shipping facilities are available, although in an emergency the industry could draw more heavily on domestic sources than at present, the Mineral and Metals Section, Office of Production Management, reported last week. At present about 40 per cent domestic ore is used, and 60 per cent is imported.

The OPM policy will be to continue to use domestic and imported ores in about the present 40-60 ratio.

"This is done to conserve the very limited domestic supply and to hold that supply for possible use in an emergency when shipping facilities might be wholly unavailable. It does not mean domestic production is being held back for the sake of the more cheaply available foreign ores. Domestic production in 1941 is running 50 per cent higher than in 1940."

Zinc Supply Situation Will Be Re-examined

A new examination of the zinc supply situation will be undertaken by the Minerals and Metals Group of the Priorities Division, E. R. Stettinius Jr., director, announced last week.

Decision to explore all aspects of the situation was made following a meeting between members of the Mineral and Metals Group and zinc industry representatives. At this meeting the present supply and demand picture in zinc was reviewed with special emphasis on the continuing demand that may be im-

posed by the national defense program.

Possibility of changes in the present method of control was among the matters discussed. Each producer of slab zinc is now required to set aside, for the month of May, an amount of zinc equal to 17 per cent of March production. Out of the pool thus created, the Priorities Division can allocate to meet special needs.

Among questions to be considered during the investigation are the possibility of increasing the size of the pool, the possibility of a general priorities system for zinc supplies, or other changes in the present controls.

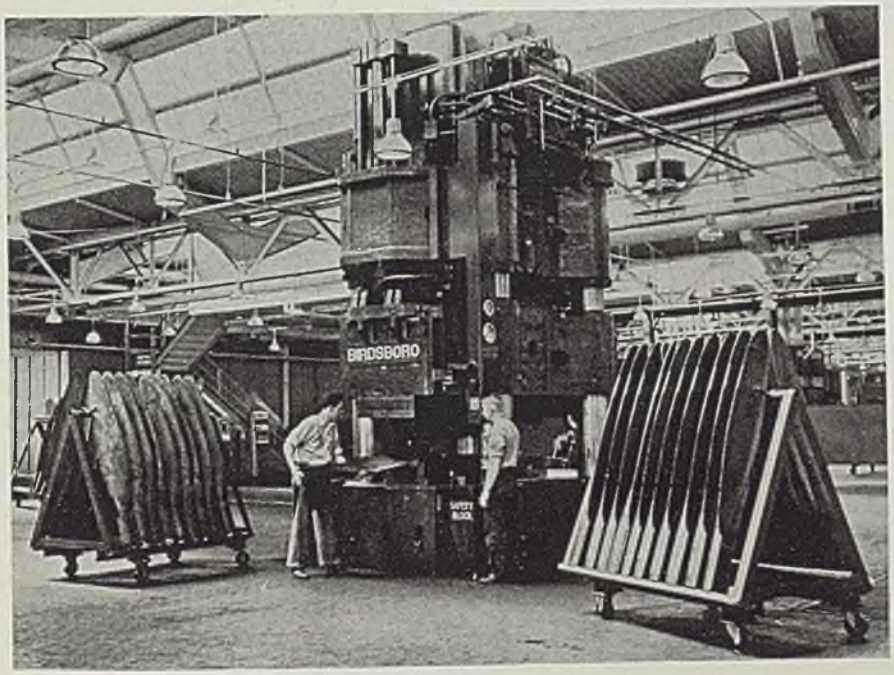
Demand for zinc for all purposes is now running ahead of production. As a result, cuts have had to be made in the quantity of the metal going to nondefense channels. Total production of slab zinc in March approximated 73,000 tons.

Henderson Asks Farm Implement Makers Not To Raise Prices

Farm implement manufacturers last week were asked by Leon Henderson, Office of Price Administration and Civilian Supply administrator, to not raise farm machinery prices. Voluntary co-operation was requested "that other steps may be avoided."

In letters to several hundred manufacturers Mr. Henderson pointed out that in announcing the steel price schedule recently he had stressed "the wide range of finished products into which steel enters as a raw material and the importance of maintaining stable prices in these finished products."

Among these products, the letter stated, was farm machinery and equipment because of their importance in the cost of farm production and their relation to prices of domestic food supplies.



Handbook on Priorities Available for Distribution

Handbook on the operation of the priorities system is available for distribution through the Division of Information, Office for Emergency Management, New Social- Security building, Washington.

Titled *Priorities and Defense*, booklet includes a general statement on the theory and administration of the priorities system, a question and answer section, a copy of the priorities critical list, official instructions on priorities to supply the Army and Navy, reproductions of preference rating forms, and other materials.

Handbook can be made available in quantities to trade associations or other agencies which want to distribute the material to members.

New Curtiss Propeller Plant Doubles Capacity

■ New Caldwell, N. J., plant of Curtiss Propeller Division, Curtiss-Wright Corp., more than doubles the division's manufacturing floor space. Recently dedicated, the unit comprises 370,000 square feet and incorporates many features in modern industrial design, including actinic type of glass for assuring maximum daylight illumination.

The Caldwell unit is typical of the division's unusually rapid expansion. From a small organization with only 17,000 square feet of manufacturing space it has developed into a full-fledged division with 590,000 square feet of space and employs 5500 persons.

It manufactures the Curtiss electric "full-feathering" propellers and the Curtiss fixed-pitch propellers. Equipment is of the most modern types and includes the 135,000-pound hydraulic cold press using 2000-ton pressure, illustrated in photo above. At right is a general view of the interior of plant. NEA photos.

High stresses and severe weight limitations make material specifications for airplane structural parts and fittings exceedingly strict — which explains the wide use of Chromium-Molybdenum (SAE X4130) steel.

This steel has an excellent strength-weight ratio and good fatigue strength. It is weldable by any process and welded parts can be used without subsequent heat treatment if necessary.

Write for our free publication, "Molybdenum in Steel" for complete technical information.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.
MOLYBDIC OXIDE—BRIQUETTED OR CANNED • FERROMOLYBDENUM • CALCIUM MOLYBDATE

Climax Mo-lyb-den-um Company
500 Fifth Avenue · New York City

MOLY

Mirrors of MOTORDOM

By A. H. ALLEN
Detroit Editor, STEEL

No curtailment of parts and materials buying for 1942 models noted yet . . . General Motors saves forty million dollar tool bill and releases fifteen million man-hours of production by calling off 1943 models . . . Steel wage increases bringing demands for boosts in auto plants . . . Chrysler spending two million in equipping gun arsenal. Will spread work over six plants . . . Minor engine changes being planned

DETROIT

■ ACCEPTANCE by the motor industry of a 20 per cent reduction in assemblies starting Aug. 1 did not cause much excitement around here and, as far as is known, there has been no commensurate reduction in buying of parts and materials for 1942 models. As one purchasing agent put it, "I am placing orders for a specified number of cars on our July, August and September schedules; all I know about curtailment is what I read in the papers."

Chances are the announcement was made more for its publicity value, to re-emphasize the industry's support of the defense program, than as any forecast of future plans. Charges have been made that the defense program is not being taken seriously and that auto plants have been boosting current production to record heights to the neglect of defense manufacturing. They are not true, of course, but the public is always quick to believe such reports. Hence the "surprise" announcement that production would be whittled down this summer to release men and materials for defense work.

How the reduction is to be apportioned is not yet known. If it is to be on a monthly basis then August output would be limited to 71,892, September to 227,666, October to 411,499, November to 408,778, December to 405,545, January to 419,300, February to 407,386 and so on. Each company likely would deduct 20 per cent from its total output, permitting manufacturers like GM and Chrysler to apply the reduction to varying degree in different divisions, depending upon how the different makes were selling. For example, it might prove wise to reduce Buick 30 per cent and Pontiac only 10 per cent, or to cut all divisions 30 per cent except Chevrolet which could be reduced only 10 per cent because of a "hot" market.

It still appears more reasonable, however, to expect reductions growing out of materials shortages and an oversold market, making unnecessary any arbitrary scaling down of assemblies.

In Great Britain the shutting off of new car production since July, 1940, has had the effect of giving used cars a tremendous boost in value. Good used cars there are now bringing prices in excess of the list prices of the same cars when new. Restriction of production in the face of good demand here would exert a similar effect and would prove a boon in helping dealers to clean up stocks of used cars.

Announcement by General Motors that it is eliminating work in connection with development and tooling of 1943 models brought mixed reactions from other motor companies. One executive said his company was too busy on defense work to give any thought to matters as far away as 1943 models. Another said his company's chief concern was 1942 models right now.

Alfred P. Sloan Jr., chairman of GM, indicated that an average model change costs from $35,000,000 to $40,000,000, devoted almost entirely to tooling and requiring 15,000,000 man-hours of production. He said 90 per cent of this capacity could be diverted to defense purposes. So the engineers, designers and draftsmen who ordinarily would start making up sketches for 1943 models at about this time will be turned over to defense activities, and the tooling capacity which normally would come into the picture about next February likewise will be released for the emergency. Look for some more important defense awards to be made to General Motors as a result of this change in policy.

Taxes and Wages Going Up: Prices Have To Follow

Excise taxes on motor cars appear headed for a sharp increase, probably from the present 3.5 per cent to 7 per cent. The motor industry has indicated its willingness to accept the higher tax, which is, of course, passed along to the buyer, but also has registered its sentiments at Washington that taxes be distributed equitably over other consumer goods and not applied solely to automobiles.

When Mr. Weir "brought down the house" with his 10 cents an hour increase in wages for steelworkers he gave a powerful nudge to the inflation snowball. Already the UAW-CIO has asked for a 10-cent increase for General Motors workmen on the reasoning that "if steel can do it, so can you." Hundreds of other industries are going to be faced with the same situation and most of them likely will have to meet the same increase. The only result will be higher costs and higher prices, in spite of Mr. Henderson's restraining hand.

The motor companies may be able to work out wage agreements which will call for increases somewhat under 10 cents an hour, be-

cause their basic rates are higher than in the steel industry. In any event, though, some increase looks to be certain.

Will Produce 300 Ack-Ack Guns Monthly in 1942

Chrysler last week set up a new gun arsenal division, headed by Frank J. Morisette, general staff master mechanic, who will supervise building and equipping the necessary plants to manufacture 40-millimeter rapid firing antiaircraft guns for the navy department. Production of the guns will be started by the early part of next year, at a rate of 300 a month. Parts will be made in the Highland Park, Dodge, Plymouth, New Castle, Ind., and Airtemp, Dayton, O., plants of Chrysler. Some machining and final assembly operations will be centered at the Lynch road plant here, formerly the Dodge truck plant. Orders for more than $2,000,000 worth of machinery have been placed.

Kelsey-Hayes Wheel Co. here is busy on a number of defense contracts, one interesting phase being production of oxygen bottles for installation in airplanes. These bottles are about 15 inches long and 8 inches in diameter, are of alloy steel with about ⅛-inch wall thickness. Production sequence is novel. Flat disks of steel are drawn out into deep "cans" and two of them are flash welded together at the open ends. The joint is heated by the electric induction method and then is rolled down to form the necks of the bottles. They are next cut apart at the center and the necks finish machined.

Several of these bottles are mounted in planes to furnish oxygen when flying at high altitudes. Most of them are going to the British now. Reports are heard from abroad of the occasional disastrous results of one of these bottles being hit with an armor-piercing shell. Friction of the shell going through the wall of the bottle generates heat which, in conjunction with the release of the oxygen, is sufficient actually to ignite the steel of the bottle and thereby cause a terrific explosion.

Speaking in Lansing, Mich., the other day, C. C. Carlton, vice president of Motor Wheel Corp., and former chairman of the automotive committee for air defense, predicted this country would be at war within 60 days. He explained that Washington has had to move faster than public opinion and that after June 1 there will be defense production which will make all that has been achieved before look like child's play.

He also forecast that the motor industry would have to go beyond the 20 per cent curtailment previously mentioned.

Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

	1939	1940	1941
Jan.	356,962	449,492	524,126
Feb.	317,520	422,225	509,233
2 mos.	674,482	871,717	1,033,359
March	389,499	440,232	.....
April	354,266	452,433	.....
May	313,248	412,492	.....
June	324,253	362,566	.....
July	218,600	246,171	.....
Aug.	103,343	89,866	.....
Sept.	192,679	284,583	.....
Oct.	324,689	514,374	.....
Nov.	368,541	510,973	.....
Dec.	469,118	506,931	.....
Year	3,732,718	4,692,338	.....

Estimated by Ward's Reports

Week ended:	1941	1940†
March 29	124,405	103,370
April 5	120,055	101,655
April 12	99,260	101,940
April 19	99,945	103,725
April 26	108,165	101,405

†Comparable week.

GM's Weekly Wages $6.25 Higher Than a Year Ago

Average weekly wage of all General Motors Corp.'s hourly employes for the first quarter was $41.24, an increase of $6.25 per week over a year ago. Average workweek was 41.9 hours, against 37.4 a year ago, and average hourly earnings increased from 93.6 to 98.3 cents. Total employment during the first quarter was 299,549, compared with 247,678 a year ago.

Machine Builders Over Hump?

Because virtually all machine tools now are sold according to strict priority ratings it is impossible for auto companies to acquire new machinery except for defense manufacturing. Machinery suppliers report their shipments have just about caught up with the rate of incoming orders, but it will be at least a year before machines in any number will be available for nondefense industries.

A watchful eye is being kept on the European scene by the machinery interests. Some of them believe a further crippling of Britain might mean diversion of British machinery orders to American plants. This would relieve the pressure on tool builders considerably since some are sending as high as 25 per cent of their output to Britain.

Mechanical changes in automobiles naturally have had to be subdued because of the machinery situation. However, some minor changes can be made by retooling present machines, redesigning fixtures, etc. Plymouth is understood to be increasing cylinder bore ⅛-inch for 1942 models in the interest of stepping up horsepower. Present engine has bore and stroke of 3⅛ by 4⅜ inches, providing 87 brake horsepower at 3800 r.p.m. Increasing the bore would add about 5 horsepower.

This would bring the Plymouth engine to about the same specifications as the Dodge power plant, which would lend credence to reports that Dodge plans to increase the stroke of its engine as a means of adding further power. Engine changes of this nature can be effected without requiring much additional machinery.

Chevrolet is training about 1000 commissioned army officers in the repair and maintenance of 4x4 trucks which the division has been building for the army since last fall. The first group of 15 officers are now enrolled in the training school. Others will be added over the next eight months.

Sales of Kelvinator refrigerators in the first three months of the year broke all existing records of Nash-Kelvinator Corp. and equaled one-half the total volume during all of 1940.

Statistically minded readers may be interested in the fact that the Dodge plant in Detroit, comprises buildings with 4,710,959 square feet of floor space, on 65 acres of grounds, employing 30,000 and consuming daily 8,750,000 gallons of water, 720 tons of coal and 5,250,000 cubic feet of gas.

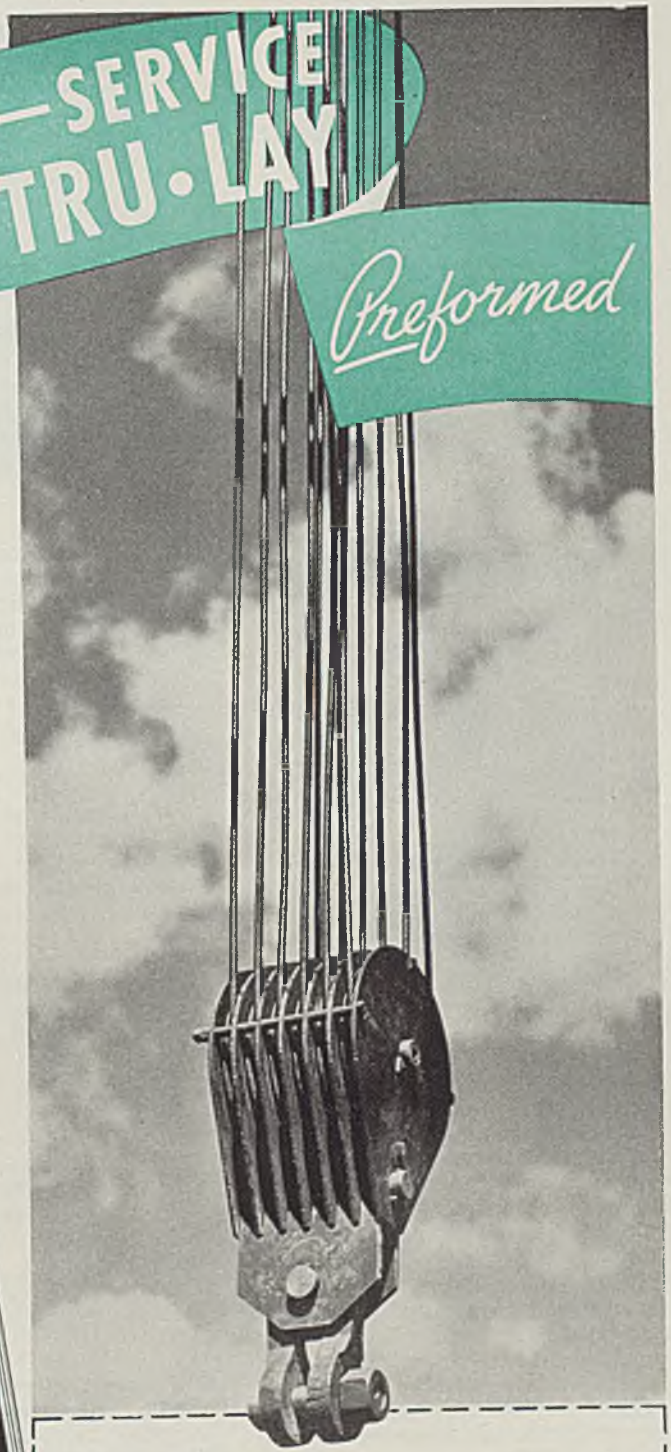
Reclaims Waste Metals

Waste metals salvaged in Buick plants last year totaled approximately 244,000,000 pounds and included 70 different classifications of materials ranging from mill scale to defective forging hammer bases. Regular ferrous scrap items included 45,000,000 pounds of compressed sheet bundles, 27,000,000 pounds of loose clippings, 34,500,000 pounds of cast iron borings, 50,000,000 pounds of forge flashings and 36,000,000 pounds of short shoveling turnings. Terne plate scrap, produced in fabrication of gasoline tanks, amounted to 1,900,000 pounds. Exclusive of inter-factory shipments, a total of 280 carloads and 65 truckloads of salvage material are shipped each month from the Buick plants.

One unusual salvage item was 773,920 pounds of broken or defective forge hammer bases. These were shipped to special sources for breaking up with nitroglycerine into pieces which can be handled easily.

■ Independent Pneumatic Tool Co., Chicago, is completing a $613,000 expansion program at its plant in Los Angeles, which will double present capacity. Part of plant will be used to manufacture tools for aircraft companies on the coast.

LONGER—SAFER—SERVICE with AMERICAN CABLE TRU-LAY Preformed



★ Industrial operators everywhere have found that American Cable TRU-LAY Preformed Wire Rope will do more and better work—*for a much longer time*. That means fewer machine shutdowns, steadier production, reduced loss of man-hours.

American Cable TRU-LAY gives longer service because it is preformed. It is a relaxed, flexible, limber rope—free of internal torsional stresses which shorten rope life. It resists kinking, handles easier, requires no seizing when cut. Being preformed, TRU-LAY possesses high resistance to bending fatigue. It spools better and resists rotating in sheave grooves.

Equally important to long life, TRU-LAY Preformed is a safer rope. Broken crown wires lie flat and in place—refusing to wicker out and become chisel-sharp jaggers to tear workmen's hands or clothing. Specify American Cable TRU-LAY Preformed for your next line. Return the coupon today for your free copy of the instructive book "GREATER DOLLAR VALUE." All American Cable Ropes made of Improved Plow Steel are Identified by the Emerald Strand.

AMERICAN CABLE DIVISION
WILKES-BARRE, PENNSYLVANIA

District Offices: Atlanta, Chicago, Detroit, Denver, Los Angeles, New York, Philadelphia, Pittsburgh, Houston, San Francisco

American Cable Division
American Chain & Cable Company, Inc.
Wilkes-Barre, Pennsylvania

Send me ..... copies of the free book "Greater Dollar Value with TRU-LAY Preformed."

Name.....

Firm.....

Address.....

Town.....*State*.....

AMERICAN CHAIN & CABLE COMPANY, Inc.

ESSENTIAL PRODUCTS . . . AMERICAN CABLE Wire Rope, TRU-STOP Emergency Brakes, TRU-LAY Control Cables, AMERICAN Chain, WEED Tire Chains, ACCO Malleable Iron Castings, CAMPBELL Cutting Machines, FORD Hoists and Trolleys, HAZARD Wire Rope, Yacht Rigging, Aircraft Control Cables, MANLEY Auto Service Equipment, OWEN Springs, PAGE Fence, Shaped Wire, Welding Wire, READING-PRATT & CADY Valves, READING Electric Steel Castings, WRIGHT Hoists, Cranes, Presses . . . *In Business for Your Safety*

MEN of

Donald S. Walker

William H. Lynn

F. J. Morisette

■ **DONALD S. WALKER,** the past several years general sales manager, Combustion Engineering Co. Inc., New York, has been named vice president in charge of sales. He joined the company in December, 1934, as manager of the Philadelphia district.

H. G. Ebdon, heretofore assistant general sales manager, has been advanced to general sales manager to succeed Mr. Walker. Mr. Ebdon has been associated with the company since 1917, serving in various capacities in the engineering, test and sales divisions.

♦

William H. Lynn has been appointed export sales manager, Wickwire Spencer Steel Co., New York. He joined Wickwire two years ago, after having spent six years as general manager of Meddo Steamship Corp. He also was employed at one time in the shipping and purchasing departments of International Railways of Central America.

♦

Frank J. Morisette, general staff master mechanic of Chrysler Corp., Detroit, since last November, has been named operating manager of the Chrysler gun arsenal, now engaged in tooling up for production of 40-millimeter rapid-firing anti-aircraft guns for the Navy Department. Mr. Morisette has been associated with automobile and machine tool industries 35 years, specializing in design and operation of machinery.

♦

H. Oliver West, formerly assistant to the president, has been elected executive vice president, Boeing Airplane Co. and its subsidiary, Boeing Aircraft Co., Seattle.

♦

Lou R. O'Connor, 2108 Boyer avenue, Seattle, has been appointed representative of Ampco Metal Inc., Milwaukee. He will cover Washington, Oregon, Idaho and western Montana.

♦

George C. Paterson, since 1937 manager of the No. 1 plant of Fisher Body at Flint, Mich., has been made general manager of all Fisher Body assembly plants, with headquarters at Detroit. He has been succeeded at Flint by **James E. Goodman.**

♦

Barney Castor has been appointed direct factory representative in Los Angeles by National Engineering Co., Chicago, with headquarters at 1957 Fletcher avenue, South Pasadena, Calif. Associated with the company 28 years, Mr. Castor will be responsible for the sale and service of Simpson mixers and other equipment.

♦

D. G. Sisterson has been elected a director, Pittsburgh Steel Co., Pittsburgh, succeeding the late George P. Rhodes. Mr. Sisterson is associated with D. G. Sisterson & Co., accountants, Pittsburgh.

♦

J. Preston Edwards, formerly located at the Kansas City office of Granite City Steel Co., Granite City, Ill., has been named district manager of sales at Houston, Tex., in charge of the office at 2210 Park street, recently opened by the company.

♦

Anthony J. Chenis has joined the Bullard-Dunn Process Division of Bullard Co., Bridgeport, Conn., and will be in charge of the Bullard-Dunn Process laboratory. He formerly was in charge of finishing and plating, Blacher Bros., Providence, R. I.

♦

Wallace H. Anderson has been appointed director of personnel, South works, Carnegie-Illinois Steel Corp. Mr. Anderson has been employed at South works continuously since 1917, when he began as clerk in the auditing department. Since 1937 he had been assistant to superintendent of industrial relations. **Polly Fisher** succeeds Mr. Anderson as assistant to superintendent of industrial relations. She has had wide experience in this field, having been employed as a case worker for the Good Fellow club since 1938.

♦

Don A. Luscombe has been named head of the aircraft parts division, Louisville, Ky., plant of Reynolds Metals Co. Inc., Richmond, Va. Long identified with the aviation industry, Mr. Luscombe organized the Monocoupe Corp., later sold to Velie Corp., Moline, Ill., and also founded Luscombe Airplane Corp., West Trenton, N. J.

♦

George H. Zirker has been appointed superintendent and metallurgist, Taylor & Co. Inc., Brooklyn, N. Y., jobbing gray iron foundry. Mr. Zirker was recently associated with Armour Research Foundation, Chicago, and Carnegie-Illinois Steel Corp., Lorain division, Johnstown, Pa.

♦

S. M. Rogers, associated with the Elgin, Joliet & Eastern railroad, Chicago, 40 years, and president since 1931, will retire May 1 un-

INDUSTRY

Roy E. Greenwood

Who has been transferred to San Francisco as assistant Pacific coast manager, American Chain & Cable Co. Inc., Bridgeport, Conn., as reported in STEEL, April 14, page 29. Since February, 1939, he had been district sales manager at Chicago for American Chain Division

E. J. Flood

Who has been appointed district sales manager, Chicago territory, American Chain Division, American Chain & Cable Co. Inc., Bridgeport, Conn., in addition to continuing as district sales manager in that territory for Page Steel & Wire Division, STEEL, April 14, page 29

der the company's pension plan. **T. E. Bond,** vice president, has been elected president to succeed Mr. Rogers, while **T. D. Beven** has been named vice president and will continue his present duties as general manager.

♦

Frank Purnell, president, Youngstow Sheet & Tube Co., Youngstown, O., was re-elected president, Mahoning Valley Industrial Council at its annual meeting; **George C. Brainard,** president, General Fireproofing Co., and **Roy L. Leventry,** Republic Steel Corp., vice presidents; and **Kenneth Lloyd,** secretary-treasurer.

♦

George W. Veale, former manager, bumper division, and more recently with the axle division, Eaton Mfg. Co., Cleveland, has been named a vice president of the company. **Daniel Dewey,** manager, stamping division; **Charles C. Bradford,** manager, heater division; and **Joseph L. Dostal,** manager, foundry division, have also been named vice presidents.

♦

Claude W. Cartwright has been appointed representative in Chicago and the mid-west by United States Sanitary Mfg. Co., Pittsburgh.

♦

R. E. Spencer Geare is now associated with the Thermoid Rubber division of Thermoid Co., Trenton, N. J. He will concentrate on improvement of Thermoid's multiple-V belt and F.H.P. belt programs and expansion of V-belt sales.

♦

William L. Batt, president, SKF Industries Inc., and deputy director, Production Division, Office of Production Management, Washington, has been awarded the 1940 Henry Laurence Gantt memorial gold medal for "distinguished and liberal-minded leadership in the art, science, and philosophy of industrial management in both private and public affairs." The medal is awarded annually by a board comprised of representatives of the American Society of Mechanical Engineers and the Institute of Management.

♦

Harvey Saul has been named director of employment relations department, National Association of Manufacturers, New York, and secretary of the association's employment relations committee. The past two years he had been director of labor of Rhode Island, and before that had been personnel director, United States Finishing Co., Providence, R. I. He also held a similar position with Taylor-Wharton Iron & Steel Co., Easton, Pa., and Lorraine Mfg. Co., Pawtucket, R. I.

♦

Joseph Joslin Strachan has been appointed assistant to president, Carnegie-Illinois Steel Corp., Pittsburgh. Mr. Strachan joined Carnegie-Illinois as assistant chief engineer, Pittsburgh district, April 1, 1940. Before that he held executive posts with Congoleum Nairn Inc., Kearny, N. J., and Sanderson & Porter, New York.

♦

James D. Redding, former assistant chief, Aircraft Airworthiness section, Civil Aeronautics Administration, has been added to the headquarters' staff of the Society of Automotive Engineers Inc., New York. He succeeds **Carleton E. Stryker,** who has been released by the society to serve in the Office of Production Management as co-ordinator of aeronautical standards for national defense.

♦

Edwin H. Price, Los Angeles representative of Manning, Maxwell & Moore Inc., Bridgeport, Conn., has been granted leave of absence to serve as assistant supervisor of shipbuilding at the Union Iron Works plant of Bethlehem Shipbuilding Corp., San Francisco.

Leo W. Dillon has joined Manning, Maxwell & Moore and will cover the Kansas City territory. **Herman M. Munson** will work in the Chicago district, while **Frederick W. Chadwick** will make his headquarters at Syracuse, N. Y.

♦

A. L. Patrick, heretofore executive vice president and treasurer, Cleveland Automatic Machine Co., Cleveland, has been elected president. He succeeds **Walter F. Brown. Col. James Hammond,** formerly publisher, *The Memphis Commercial Appeal,* has been elected treasurer and a director of the Cleveland firm. **Gerard Patrick** has been named vice president, succeeding **Herbert E. Nunn.** Officers re-elected include **J. C. Wattleworth,** vice president; **David L. Johnson,** secretary; **D. C. Shepard,** assistant secretary.

♦

W. Haywood, freight traffic manager, Illinois Central railroad, was elected president of the Traffic Club of Chicago at the organization's annual meeting. **A. H. Schweitert,** traffic director, Chicago Association of Commerce, was made first vice president; **E. B. Finegan,** chief traffic officer, Chicago, Milwaukee, St. Paul & Pacific railroad, second vice president; and **S. L. Felton,** general traffic manager, Acme Steel Co., third vice president.

D. W. C. Becker, director of traffic management department, LaSalle Extension University, was named secretary, and **R. J. Wallace,** traffic manager, Jaques Mfg. Co., treasurer.

Proposes Steel Plants For Pacific Coast

■ Henry J. Kaiser, president, Henry J. Kaiser Co., Oakland, Calif., last week applied to the government for a certificate of necessity for a $150,000,000 steel plant construction program on the West coast.

Proposed program includes a pig iron plant at Mt. Pleasant, Utah, a finishing plant for high-grade steels in the Pacific Northwest, using Bonneville power, and the main steel mills in southern California.

Annual ingot capacity would be 1,250,000 tons, according to Mr. Kaiser.

How the program is to be financed was not disclosed. Mr. Kaiser conferred with President Roosevelt on the project but would not say whether or not he would ask government financial aid.

"If we get a green light," he said, "we would be under production from scrap in eight months and from ore in twelve."

Mr. Kaiser, a construction engineer, has headed companies which engineered the Boulder, Grand Coulee and Bonneville dams projects.

Foundry Equipment Index Higher in March

■ Foundry Equipment Manufacturers' Association, Cleveland, reports index of net orders closed for new equipment in March was 329.3, compared with 295.9 in February. Index for repairs was 272.7 in March and 236.6 in February. Total sales index was 315.2 in March and 281.1 in February.

Indexes are per cent of monthly averages of sales to metalworking industries, 1937-39. Practical comparison on the old base, 1922-24, can be determined by multiplying the new base figures by 1.328.

New Howitzer Plant To Begin Deliveries Soon

■ United Engineering & Foundry Co., Pittsburgh, is scheduled to begin delivery of 105-mm. howitzers to the government in the near future, according to George T. Ladd, president. Howitzers are being manufactured at the new plant recently completed at Youngstown, O.

Addressing the annual meeting of stockholders last week, Mr. Ladd reported the company's present order backlog is largest on record and consists principally of equipment for defense. In addition to the howitzers, the company is building two of the largest armor plate presses ever constructed, plus many smaller units.

Volume of present backlog is unusual in that the company's foreign business, usually substantial, has been reduced by the war. The company has recently completed and shipped a number of so-called "one-shot" shell presses.

Excluding compensation paid to executive officers, the company's 1940 payroll averaged $2371 per employe, compared with $2148 in 1939. Wages were increased 5 per cent in December, 1940, and 10 cents per hour April 1, 1941.

DIED:

■ ALEXANDER GLASS, chairman, Wheeling Steel Corp., Wheeling, W. Va., at Lake Wales, Fla., April 18, following a long illness. One of the pioneers in the Ohio Valley steel industry, Mr. Glass was born in

Alexander Glass

Wheeling July 24, 1859. His father was Andrew Glass, founder of the LaBelle Iron Works, which later became a part of Wheeling Steel.

Mr. Glass attended Iron City college, Pittsburgh, and entered the steel industry as bookkeeper and secretary of Laughlin Junction Steel Co., Mingo Junction, O. He later was secretary of the Wheeling Corrugating Co., and in 1902 became vice president of the Portsmouth Steel Co., Portsmouth, O., a company controlled by his father-in-law, Nelson E. Whitaker.

In 1910, Mr. Glass was elected president of Portsmouth Steel and ten years later merged this company with LaBelle Iron Works and the Wheeling Steel & Iron Co. to form Wheeling Steel Corp. He became chairman of the board and continued in that office until his death.

He served as a director, American Iron and Steel Institute, from 1922 to 1925.

Surviving are his widow, and two daughters, Mrs. W. W. Holloway, wife of the president of Wheeling Steel, and Mrs. Eleanor Caldwell.

General Electric Seeks More Subcontractors

■ Hundreds of subcontractors are being employed by General Electric Co., Schenectady, N. Y., in an effort to expedite its defense contracts, Charles E. Wilson, president, declared last week. Additional concerns capable of handling precision work such as that required by Army and Navy specifications are being sought.

"In order to speed our own defense work and advance our schedules, we are endeavoring to locate more and more manufacturers willing to co-operate on this program. Such plants may have suitable facilities not now fully employed, or may be capable of expanding to handle work of the type demanded by defense specifications," said Mr. Wilson.

"The types of work we are anxious to subcontract include: Designing and making tools, dies, jigs, fixtures; making screw machine parts, metal stampings, wood and metal patterns, forgings castings (cast iron, steel, aluminum and other nonferrous metals) and gears of all types.

"We also have miscellaneous machine work such as shaft turning, horizontal and vertical boring, planing, broaching, milling, grinding, drilling and tapping; electroplating; medium and heavy sheet metal fabricating by the arc, atomic hydrogen or resistance welding processes; and subassembly work."

Month's Machine Tool Total $57,400,000

■ Machine tool shipments in March totaled about $57,400,000, according to the National Machine Tool Builders' Association, Cleveland. This, the Association reported last week, compared with shipments aggregating about $29,000,000 in March, 1940.

Shipments last month were more than 6 per cent greater than total in February, $54,000,000.

Steel River Shipments Set Record in March

■ Record tonnages of steel products were shipped on the Ohio and Monongahela rivers during March, although total shipments were less than in some previous months. Shipments on the three rivers in the Pittsburgh district for the year to date:

1941	Ohio	Monongahela	Allegheny
TOTAL SHIPMENTS			
January	1,581,300	2,809,800	214,500
February	1,424,100	2,532,300	187,300
March	1,587,400	2,906,800	212,900
STEEL SHIPMENTS			
January	227,000	160,000	9,200
February	193,000	135,200	4,900
March	252,900	168,500	6,600

EXPANSIONS

Completes $1,000,000 Plan, Starts on $3,000,000 Order

■ RHEEM Mfg. Co., Chicago, has completed a $1,000,000 expansion program and has started production on a $3,051,657 order from the government for bomb practice bodies. By end of the month, 25,000 of the bombs, which are of the 100-pound type made of light sheet steel, will be shipped.

Until the present, the company has maintained only one plant in Chicago, at 3425 South Kedzie avenue, but since early in the year has been constructing a new one-story, 150 x 500-foot factory on South Kedzie avenue, between Seventy-fifth and Seventy-seventh streets. This was erected at a cost of $350,000 with an additional $500,000 spent for equipment. These facilities will be used for the company's general line of sheet steel products, which include pails, barrels, drums and tanks.

The old plant, which affords 53,000 square feet, was equipped with $250,000 worth of new machinery, including punch presses and welding equipment, and will be used solely for defense production.

National Bronze Installs Heat Treating Furnaces

National Bronze & Aluminum Foundry Co., Cleveland, has purchased three new heat treating furnaces. Their installation, which ordinarily would require a year, will be completed in four months. With the new equipment the company will have capacity for 1,000,000 pounds of heat-treated castings a month.

Company plans to erect a new office building and turn the present building into a large drafting and engineering department. Recently an addition was built to the cleaning room and another to the molding floor.

New Instrument Building Contains No Ferrous Metals

Kollsman Instrument Division, Square D Co., has erected a building at 80-08 Forty-fifth avenue, Elmhurst, Queens, N. Y., which contains no iron or steel. To be used for the assembly and adjustment of magnetic compasses and precision aircraft instruments, the building had to be a nonmagnetic structure.

Brass, copper, aluminum and wood were used for conduits, pipe, nails, bolts and girders. Terra cotta pipe was used in place of cast iron.

For the exterior, brick was used instead of reinforced concrete. Beams are wood tied in the joints with copper shoes. Brass bolts replaced nails.

Steps Up Shell Production With Heavy Duty Presses

R. G. LeTourneau Inc., Peoria, Ill., has stepped up production of 1,000,000 shells under a national defense contract by installation of two large presses in its plant at Toccoa, Ga. These presses are capable of exerting a pressure of 1,000,000 pounds per square inch and form the shells in 3 minutes.

Designed by R. G. LeTourneau, they differ from the ordinary type in that cable tension is substituted for hydraulic pressure.

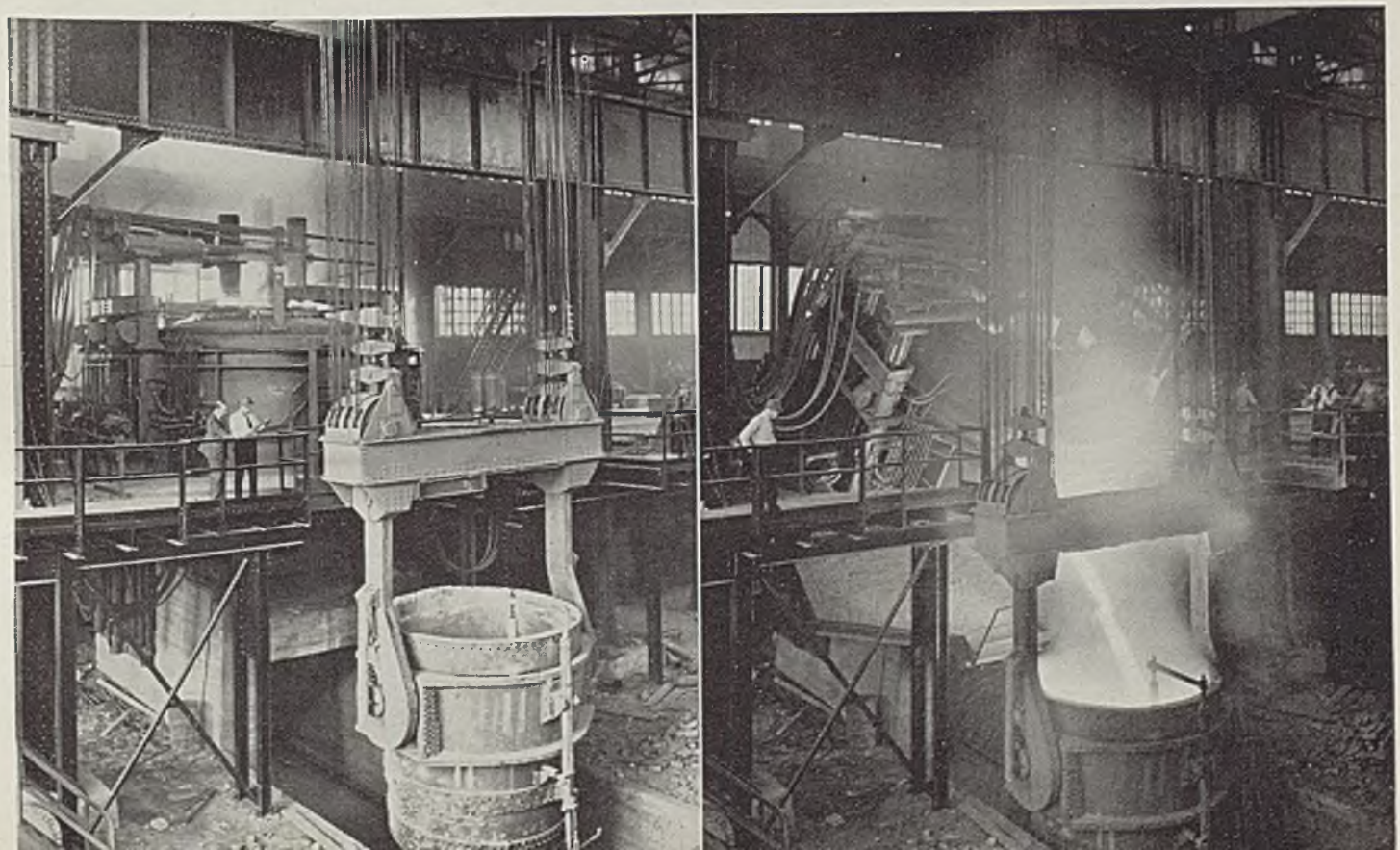
Shells are heated to 1000 degrees Fahr., which is considered comparatively cool for shellmaking and the pressing operation makes machining unnecessary. Production in the Toccoa plant is expected to reach the peak in August.

Shell production is concentrated in the Georgia plant, the company's plants at Peoria and Stockton, Calif., devoting their facilities to the regular lines, which include heavy grading machinery.

■ Amsler-Morton Co., Pittsburgh, has on order or under construction a total of 36 soaking pits. Since March, 1936, the company has installed or received orders for 107 pit furnaces with a total estimated heating capacity of over 8,000,000 ingot tons per year.

Over It Goes, for More Electric Steel

■ Timken Roller Bearing Co.'s new 65-ton electric poured 80 tons on its first heat April 16 at Canton, O. The unit supplements a battery of six other furnaces and raises company's electric steel capacity to 360,000 tons a year. Below, the new furnace just before first heat was poured, left, and pouring



Construction Awards Fewer, Week's Defense Contracts Total $105,942,676

■ TOTAL of defense awards reported last week was $105,942,676. Most contracts were small, with the Navy's total about twice that of the Army. Construction awards were fewer than in the past several weeks. Bureau of supplies, for the Navy, and Army's ordnance, engineers, quartermaster and medical corps were principal contractors. Awards reported by the War department:

Atmospheric Nitrogen Corp., New York, $1,100,001 supplemental contract for construction of an electric generating plant at Ohio River Ordnance Plant, West Henderson, Ky.

Mack Mfg. Corp., Long Island City, N. Y., transmission control differentials and final drive assemblies for use in tanks, $9,907,427. Also secondary emergency plant facility agreement for plant expansion and acquisition of machinery for production of contracted tank parts, $282,000.

Ordnance Department Awards

Abel, Robert, Inc., Boston, monorail tracks, $1957.98.

Ajax Auto Parts Co., Racine, Wis., tire pumps, $3074.

Allis-Chalmers Mfg. Co., Springfield, Ill., heavy tractors, brake controls, $11,-421.28.

American Locomotive Co., New York, casting machine parts, $12,394.50.

Aresto Mfg. Co., Baltimore, flame arresters, $5100.

Armstrong, G. R., Manufacturers Supply Inc., Boston, end mills, hand taps and dies, $1499.10.

Arrow Tool & Reamer Co., Detroit, mills, $3875.

Barber-Colman Co., Rockford, Ill., milling cutters, shank mills, $4678.

Bay State Tool & Machine Co., Springfield, Mass., shears, $10,756.90.

Blackwell Zinc Co., Blackwell, Okla., slab zinc, $1797.75.

Breeze Corps. Inc., Newark, N. J., starters, $5440.

Brown & Sharpe Mfg. Co., Providence, R. I., parts for holder, $1042.20.

Buda Co., Harvey, Ill., parts for diesel engines, $6481.78.

Bulova Watch Co., New York, escape pinions, $6480.

Burgess-Norton Mfg. Co., Geneva, Ill., bodies, $8820.

Carboloy Co., Philadelphia, tools, $3320.50.

Carborundum Co., Philadelphia, grinding wheels, $1701.82.

Carpenter Steel Co., Reading, Pa., tool steel, $1095.

Chase Brass & Copper Co. Inc., Waterbury, Conn., brass discs, brass and bronze, $1,065,496.71.

Chrysler Corp., Detroit, forgings, $1109.68.

Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., small arms materiel, $41,-053.38.

Continental Motors Corp., Detroit, light tank parts, $6789.70.

Crucible Steel Co. of America, Pittsburgh, tool steel, steel tubing, $29,259.35.

Derbyshire Machine & Tool Co., Philadelphia, dies, $39,420.

Detroit Broach Co. Inc., Detroit, broaches, $1042.75.

Electric Wheel Co., Quincy, Ill., trailers, $1176.

Elwell-Parker Electric Co., Cleveland, industrial trucks, $2425.

Ever-Tite Mfg. Co., Davenport, Iowa, form and cut tubing, $3060.

Ex-Cell-O Corp., Continental Tool Works Division, Detroit, cutting tools, $11,-313.50.

Finkel, A., Inc., Chicago, steel, $1056.

Fox Munitions Corp., Philadelphia, gages, $19,524.90.

General Electric Supply Corp., Springfield, Mass., fluorescent lamps, $1310.

General Motors Corp., Inland Mfg. Division, Dayton, O., brackets, $1688.03.

Geometric Tool Co., New Haven, Conn., chasers, $1341.75.

Gilmore Wire Rope Co., Muncy, Pa., steel cables, $11,814.42.

Gould-Mersereau Co. Inc., Long Island, N. Y., head assemblies, $115,462.20.

Hanson-Whitney Machine Co., Hartford, Conn., gages, $8768.41.

International Nickel Co. Inc., Huntington, W. Va., forgings, $6190.38.

JCH Automatic Machine Works, Philadelphia, rods and leaves, $1544.

Johnson Claflin Corp., Marlboro, Mass., gages, $2558.50.

Jones & Laughlin Steel Co., Pittsburgh, cold drawn steel, $21,997.57.

Landis, A. B., Sons Inc., Philadelphia, grinding punches, $1450.

Lincoln Park Tool & Gage Co., Lincoln Park, Mich., gages, $27,494.10.

Logansport Machine Inc., Logansport, Ind., parts for hydraulic machines, $1325.79.

Madison-Kipp Corp., Madison, Wis., die castings, $15,780.

Magnus Tool & Die Co., Newark, N. J., punches, guides, bases and anvils, $77,-773.

Mattison Machine Works, Rockford, Ill., sawing machines, $2348.

Mercury Mfg. Co., Chicago, industrial trucks, $7446.

Midwest Tool Co., Philadelphia, tool bits, $1025.

Monroe Rubber & Packing Corp., Rochester, N. Y., artillery ammunition materiel, $4005.

Multigraph Sales Agency, Washington, duplicating machines, $1598.50.

National Enameling Stamping Co., Milwaukee, water buckets, $1628.80.

Niles-Bement-Pond Co., Pratt & Whitney Division, Hartford, Conn., cutters, gages, drill points, $15,206.38.

Norco Metal Products Co., Philadelphia, punches, $20,676.

Oliver Iron & Steel Corp., Pittsburgh, carriage bolts, $12,234.10.

Otis Elevator Co., Buffalo, steel castings, $1327.42.

Pangborn Corp., Hagerstown, Md., renovating equipment, angular steel grit, $5217.

Philadelphia Hardware & Malleable Iron Works Inc., Philadelphia, thumb nuts, $4462.50.

Pipe Machinery Co., Cleveland, gages, $1938.30.

Poor & Co., Canton Forge & Axle Works, Canton, O., forgings, $2196.90.

Porter, H. R., & Co. Inc., Manville, N. J., pipe covering, $13,941.50.

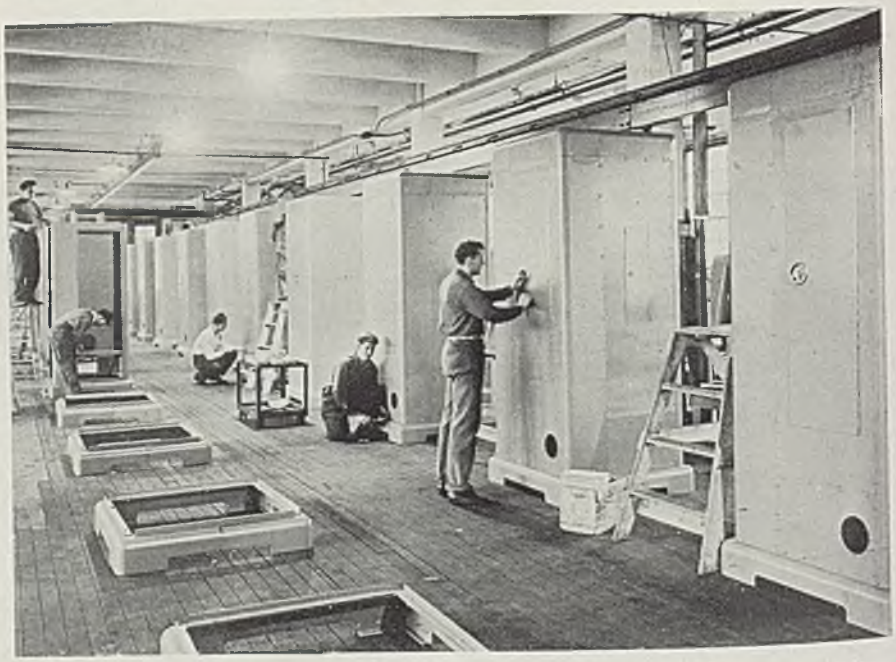
Pressed Steel Car Co. Inc., Pittsburgh, cars, $5778.

Quality Hardware & Machine Corp., Chicago, motor drives, $1665.

Ramsey Chain Co. Inc., Albany, N. Y., castings, $1323.90.

Reliable Tool Co., Irvington, N. J., load-

264 Steel Cubicles To Protect Vital Plant Controls



■ A defense plant now under construction in the United States—name and location undisclosed—has 264 supporting columns, which figured on a basis of generous spacing would indicate a floor area of 20 to 25 acres. In contrast, one of the latest aircraft manufacturing plants has a floor area of 42 acres.

A point of special interest in the 264-column plant, however, is that each column will be surrounded by a steel cubicle, to house wiring, switches, piping and other fixtures for power, light, compressed air and telephone lines. The purpose is to facilitate inspection and repairs and to prevent tampering with equipment. Illustrated is the assembly line in the plant of the Kirk & Blum Mfg. Co., Cincinnati, where a rush order for the cubicles recently was completed. This order was one of the largest of its type.

ing punches, $72,000.
Republic Steel Corp., Buffalo, bar steel, $2122.89.
Revere Copper & Brass Inc., Rome, N. Y., time train rings, $307,500.
Rockwell, Stanley P., Inc., Hartford, Conn., furnaces, $4636.
Ryerson, J. T., & Son Inc., Chicago, rings, $3816.
Scovill Mfg. Co., Waterbury, Conn., brass strip, $47,160.
Seamless Products Co., New York, oil cans, $14,072.50.
Skinner Chuck Co., New Britain, Conn., chucks, $2500.
Smith's, Albert, Sons, Irvington, N. J., structural steel, $1131.
Standard Conveyor Co., Philadelphia, conveyors, $1195.
Taft-Peirce Mfg. Co., Woonsocket, R. I., gages, $20,871.17.
Talon Inc., Meadville, Pa., gages, $21,-512.25.
Thurston Mfg. Co., Providence, R. I., mills, $1780.
Tinius Olsen Testing Machine Co., Philadelphia, testing machines, $1465.
Tungsten Electric Corp., Union City, N. J., tools, $48,450.
Union Spring & Mfg. Co., New Kensington, Pa., springs, $4939.20.
Union Twist Drill Co., Athol, Mass., cutting tools, $8851.50.
Universal Cyclops Steel Corp., Titusville, Pa., tool bits, $1778.
Universal Wheel & Abrasive Corp., Chicago, grinding wheels, $1346.66.
Veit & Young, Philadelphia, dies, $9960.
Warner & Swasey Co., Cleveland, parts for lathes, tools, $3000.
Wellman, S. K., Co., Cleveland, clutch rivets, $2056.17.
Whitman & Barnes, Philadelphia, drills, $6312.
Wright Aeronautical Corp., Paterson, N. J., parts, $27,941.95.
Yale & Towne Mfg. Co., Philadelphia, industrial trucks, lifting trucks, $9415.
Zamax Mfg. Co., Brooklyn, N. Y., packing cans, $17,850.
Zimmerman Steel Co., Bettendorf, Iowa, steel castings, $1082.88.

Quartermaster Corps Awards

Arlington Construction Co., Boston, cold storage warehouse, Ft. Ethan Allen, Vermont, $31,695.
Briddell, Charles D., Inc., Crisfield, Md., butchers' cleavers, $10,200.
Chatillon, John, & Sons, Fulton, N. Y., butchers' cleavers and steels, $8900.
Continental Can Co. Inc., St. Louis, cans and containers, $7446.
Griswold Mfg. Co., Erie, Pa., meat choppers, $4025.
Hoopes Bros. & Darlington Inc., West Chester, Pa., potato mashers, $1850.
Jeffersonville Quartermaster Depot, Jeffersonville, Ind., scabbards, $541.81.
Katzinger, Edward, Co., Chicago, ladles and pans, $9316.
Larose, Charles A. E., West Brookfield, Mass., bridge at Springfield armory, Massachusetts, $35,800.
National Enameling & Stamping Co., Milwaukee, nutmeg graters, $570.
Shepherd, W. C., Atlanta, Ga., railroad track at Atlanta general depot, Conley, Ga., $315,000.
Wallace, R., & Sons Mfg. Co., Wallingford, Conn., paring knives, $3340.
Winter-Weiss Co., Denver, semi-trailers, $49,618.50.

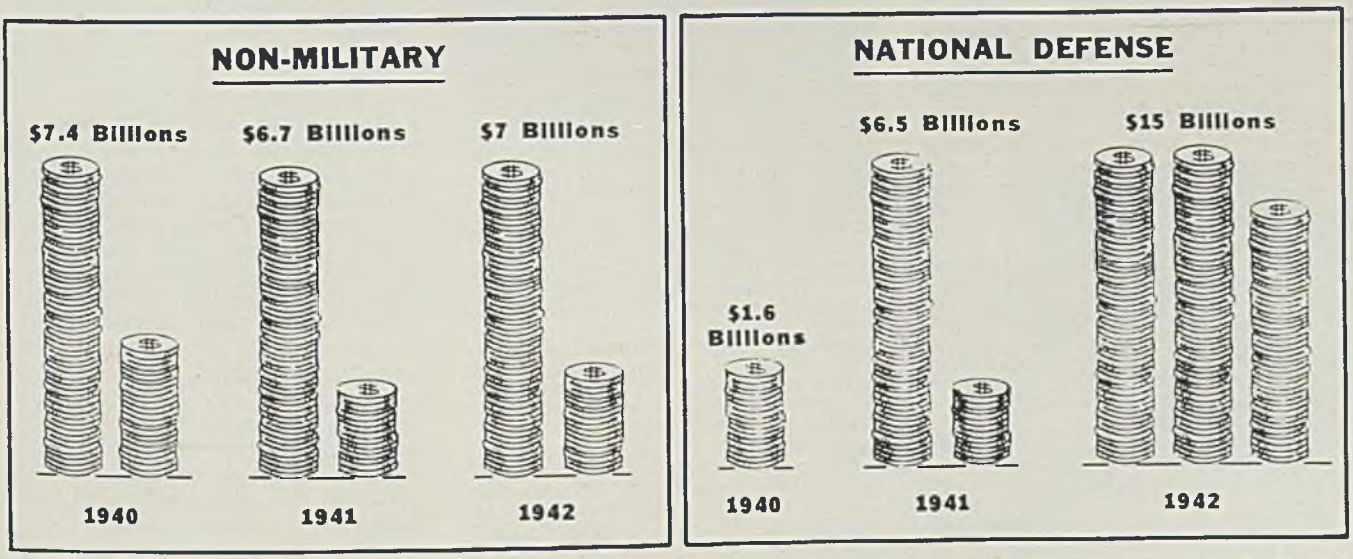
Air Corps Awards

Aircraft Appliance Corp., Chicago, cover assemblies, $51,972.93.
Brown & Sharpe Mfg. Co., Providence, R. I., milling machines, $37,920.
Elgin National Watch Co., Elgin, Ill., navigation watches, $113,928.60.
Ford Motor Co., Dearborn, Mich., educational order for airframes, $3,418,500.
General Motors Corp., Delco Products Division, Dayton, O., strut assemblies, $992,389.91.
Morton Mfg. Co., Chicago, cover assemblies, $67,649.40.
North American Aviation Inc., Inglewood, Calif., leak-proof fuel tanks, $78,920.
Seifreat-Elstad Machinery Co., Dayton, O., honing machines, $54,584.31.
Sperry Gyroscope Co., Brooklyn, N. Y., indicator and controller assemblies, automatic pilots, $2,634,425.
Square D Co., Kollsman Instrument Division, Elmhurst, N. Y., indicators, generators, tube assemblies, and altimeters, $302,260.50.
Standard Steel Works, North Kansas City, Mo., trailers and dollies, $624,332.24.
Wright Aeronautical Corp., Paterson, N. J., aeronautical engines and parts, $810,560.70.

Signal Corps Awards

American Automatic Electric Sales Co., Chicago, telephone parts, $18,635.45.
American Petrometal Corp., Long Island City, N. Y., washers, $6650.
Brunswick Balke Collender Co., Muskegon, Mich., cases, $8648.
Bunnell, J. H., & Co., Brooklyn, N. Y., keys, $640.
Camillus Cutlery Co., Camillus, N. Y., knives, $1791.70.
Duffy, J. P., Co., Haydenville, O., conduits, $695.80.
Electrical Mfg. Co., Battle Creek, Mich., anchors, $23,677.42.
General Dry Batteries Inc., Cleveland, batteries, $11,823.43.
General Electric Supply Corp., New York, clamps and steps, $6957.50.
Goulds Pumps Inc., Seneca Falls, N. Y., fuel pumps, $819.
Graybar Electric Co. Inc., Point Breeze, Md., plates, holders, protectors, $1365.
National Carbon Co. Inc., New York, batteries, $38,176.21.
Radio Receptor Co. Inc., New York, radio

Federal Expenditures—Fiscal Years Ending June 30



■ Relative amounts of spending for nonmilitary and national defense purposes for the fiscal years ending June 30, 1940, 1941 and 1942, are shown in the accompanying charts. Figures for 1940 and 1941 were taken from the President's budget message and those for 1942 were estimated by the National Association of Manufacturers on the basis of latest available facts.

All indications point to a rise of civil expenditures in the next fiscal year, the association says.

Continued high level of nonmilitary spending despite the tremendous costs of national armament and the very substantial improvement in business conditions throughout the nation, has raised the question of possible economies in the civil expenditures. A recent factual study of nonmilitary federal spending over the period 1932-42, made by the manufacturers' group, showed that the amounts budgeted under 114 separate categories of civil expenditures in the fiscal year 1942 represented an aggregate growth of $3,665,197,000.

Against the $22,000,000,000 total of combined outlays for civil and military purposes, next year's official estimate of offsetting revenue is somewhat over $12,000,000,000. On this basis nonmilitary spending will absorb 60 per cent of federal revenues.

transmitters, $1175.09.
Ray-O-Vac Co., Madison, Wis., batteries, $32,637.53.
Roebling's, John A., Sons Co., Trenton, N. J., switchboard cable, $4666.55.
Seyler Mfg. Co., Pittsburgh, washers, $1100.
Signal Electric Mfg. Co., Menominee, Mich., keys, $485.
Westinghouse Electric & Mfg. Co., Chicago, protectors, $6455.29.
Westinghouse Electric Supply Co., New York, test clips, $323.40.

Medical Corps Awards

Hobart Mfg. Co., Troy, O., electric dishwashers, $1185.
Howe Scale Co., Rutland, Vt., platform trucks, $3997.50.

Corps of Engineers Awards

Allis Chalmers Mfg. Co., Boston, oil circuit breakers, $17,520.
Anstice, Josiah & Co. Inc., Rochester, N. Y., dishwashing machines, $2020.
Aqua Systems Inc., New York, gasoline fueling system, Ellington field, Texas, $116,381.
Bates Chevrolet Corp., New York, pickup trucks, $2810.70.
Bethlehem Steel Co., Bethlehem, Pa., reinforcing steel, $28,521.55.
Blickman, S., Inc., Weehawken, N. J., cafeteria counters, $2076.
Boone & Co., Seattle, parts for trucks, $2469.57.
Broderick & Bascom Rope Co., Seattle, wire ropes, $2704.
Cardoze & Lindo, Cedar Rapids, Iowa, parts for trailbuilder, $2136.25.
Carrington, Glenn, & Co., Seattle, parts for excavator, $2487.43.
Clyde Equipment Co., Milwaukee, parts for sand drag, $2792.73.
Columbia Construction Co., Oakland, Calif., construction of breakwaters, Long Beach and Los Angeles harbors, California, $10,321,300.
Coolerator Co., Duluth, refrigerators, $6823.92.
Daily, Arthur A., Chicago, clothes dryers, $2710.
Dohrmann Hotel Supply Co., Troy, O., kitchen equipment, $8772.20.
Friedrich, Edward, Sales Corp., San Antonio, Tex., refrigerators, $3497.
General Electric Supply Corp., Portland, Oreg., electrical supplies, $2870.92.
Gladding-McBean & Co., Seattle, sewer pipe, $7953.60.
Graham, James, Mfg. Co., Portland, Oreg., gas ranges, $4640.50.
Hart Mfg. Co., Louisville, Ky., army ranges, $2930.88.
Hussmann-Ligonier Co., St. Louis, refrigerators, ice boxes, $18,553.
Majestic Mfg. Co., St. Louis, kitchen equipment, $4165.75.
Parrott, Frank, Dallas, Tex., construction of temporary field office, Ft. Worth bomber assembly plant, Texas, $26,877.
Pittsburgh Water Heater Co., Pittsburgh, gas water heaters, $7171.80.
Reinier Equipment Co., Seattle, parts for trench excavator, $2858.15.
Richmond Sanitary Co., San Francisco, drains and traps, $4113.40.
Sawtooth Co., Boise, Idaho, smoke stacks, $2223.25.
Seattle Steel Co., Seattle, wire, $10,575.15.
Star Machinery Co., Seattle, centrifugal pumps, $1374.85.
Tacoma Millwork Supply Co., Tacoma, Wash., screens, $3507.60.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., corrugated metal pipe, $11,937.89.
Tissier Hardware Co., Selma, Ala., steel fencing, $9077.16.
United Pipe & Supply Co., Holt, Ala., cast iron pipe, $2526.10.
U. S. Pipe & Foundry Co., Birmingham, Ala., cast iron water pipe, $4940.
Wallace & Tiernan Co., Belleville, N. J., chlorinators, $2020.
Watts, Charles R., & Co., Seattle, steel road forms, $3300.
Wellner Motors Inc., New York, station wagons, $3014.72.

•

Following contracts were reported last week by the Navy department:

Goode Construction Corp., Blythe Bros. Co., and Harrison-Wright Co., Charlotte, N. C., construction of marine corps training facilities at marine barracks, New River, N. C., on a cost plus fixed fee basis, $13,000,000.

Bureau of Supplies and Accounts Awards

Aldrich Pump Co., Allentown, Pa., centrifugal pumps, $53,772.
American Brass Co., Waterbury, Conn., brass discs, $287,625.
American Steel & Wire Co., Cleveland, copper cable, $12,227.23.
Anaconda Wire & Cable Co., New York, copper cable, $8360.85.
Carlton Machine Tool Co., Cincinnati, Carlton radial drilling machines, $570,-410.
Chapman Valve Mfg. Co., Indian Orchard, Mass., bronze gate valves, $107,159.75.
Chase Brass & Copper Co. Inc., Waterbury, Conn., type A condenser tubes, $91,471.97.
Cincinnati Bickford Tool Co., Cincinnati, drilling machines, $778,342.
Cramp Shipbuilding Co., Philadelphia, floating workshops, $960,000.
Crane Co., Chicago, cocks and valves, $658,369.14.
Dietzgen, Eugene, Co., New York, protractors, $6250.
Gisholt Machine Co., Madison, Wis., turret lathe, $5888.40.
Hajoca Corp., Philadelphia, air and drainage cocks, composition valves, $11,-213.87.
Heald Machine Co., Worcester, Mass., internal grinders, $9130.
Hudson Air Conditioning Corp., Washington, air conditioners, $19,729.
Hughes-Keenan Co., Mansfield, O., gasoline cranes, $11,478.
Keckley, O. C., Co., Chicago, composition valves, $14,939.50.
Kidde, Walter, & Co. Inc., New York, parts for "Lux" portable fire extinguishers, $15,435.80.
Kitson Co., Philadelphia, steam and water and oil-barrel cocks, $8824.56.
Lietz, A., Co., San Francisco, three-arm metal protractors, $8800.
Lynd-Farquhar Co., Boston, milling machines, $17,409.
Maine Steel Inc., South Portland, Me., shackles, $95,435.01.
Mine Safety Appliances Co., Pittsburgh, stainless steel containers, $13,180.
Palmer Scott & Co. Inc., New Bedford, Mass., motor launches, $64,080.
Pittsburgh Steel Co., Pittsburgh, boiler tubes, $9192.
Pittsburgh Valve & Fittings Corp., Barberton, O., bronze valves, $106,257.95.
Revere Copper & Brass Inc., Baltimore, copper, nickel-alloy condenser tubes, naval brass, $179,096.70.
Rockford Brass Works, Rockford, Ill., bronze faucets, $6978.92.
Somerville, Thomas, Co., Washington, steam and water gage cocks, $5194.16.
Vickers Inc., Waterbury Tool Division, Waterbury, Conn., spare parts for motors and pumps, $686,634.50.
Walworth Co., New York, composition valves, $97,448.70.

Bureau of Yards and Docks Awards

Blalock, Robert L., Co., Hyattsville, Md., water supply and sewage disposal systems at naval radio receiving station, Cheltenham, Md., $10,519.
Browning Crane & Shovel Co., Cleveland, three 40-ton locomotive cranes at navy yard, Charleston, S. C., and one 40-ton crane at Boston navy yard, $117,543: seven locomotive cranes for navy yard, Philadelphia, $208,825.
Harnischfeger Corp., Milwaukee, one 20-ton crane for navy yard, Washington, $18,565.
Ingersoll-Rand Co., New York, two air compressors for navy yard, Mare Island, California, $78,794.
MacDougald Construction Co., Charleston, S. C., shipbuilding drydock at Charleston navy yard, $2,465,000 on a cost plus fixed fee basis.
Newman-Loeb Building Corp., New York, alterations and equipment for paint and dope spray shop at naval reserve aviation base, Washington, $16,419.
O'Connor, Thomas, & Co. Inc., Cambridge, Mass., storehouse for shipbuilding materials at navy yard, Boston, $700,000 on a cost plus fixed fee basis.
Orton Crane & Shovel Co., Chicago, five 30-ton locomotive cranes at navy yard, Boston, $118,776; four locomotive cranes for navy yard, Philadelphia, $80,347.
Shaw-Box Crane & Hoist Division, Muskegon, Mich., one 50-ton crane for navy yard, Washington, $32,336.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y., 12 bridge cranes for navy yard, Washington, $90,861.
Star Iron & Steel Co., Tacoma, Wash., one 50-ton dry dock crane at navy yard, Pearl Harbor, T. H., $212,500.
Steel Sash Service Corp., New York, renewal of sash at heating plant of naval clothing depot, Brooklyn, N. Y., $1296.
Steffgen, Fred W., steel sheet pile protection for pier at the naval operating base (fuel depot), San Diego, Calif., $29,200.
Thompson-Starrett Co. Inc., New York, foundry and extension to structural shop at New York navy yard, $1,650,-000 on a cost plus fixed fee basis.

Aluminum Restricted to War Needs in Canada

TORONTO, ONT.

■ Drastic restrictions placed upon civil use of aluminum in Canada has reduced nonwar consumption from about 1000 tons per month to less than 25 tons, according to C. D. Howe, minister of munitions and supply. Use of aluminum for hollow ware, electrical conductors, foil and other domestic purposes has been banned. Imports are strictly controlled to divert maximum supplies of the metal to manufacture of aircraft and other war needs.

Supplies of all metals essential to the war effort are being safeguarded by the Munitions and Supply Department. No individual licenses for export of nickel to the United States are being granted, and export of virgin zinc in any form is permitted only under exceptional circumstances. No licenses are issued for export of zinc dross, zinc scrap or remelted zinc, and a minimum price has been set for the dross. Export of aluminum nickel scrap is also prohibited.

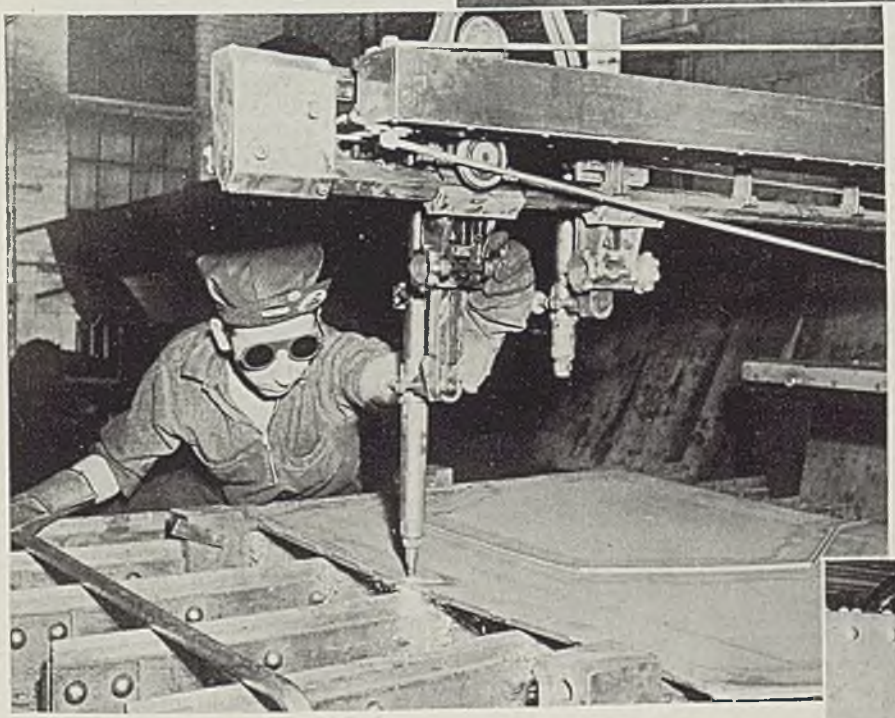
Personnel and resources of the Canadian Founders' and Metal Trades' Association have been placed at the government's disposal to facilitate the war program. To assist in relieving shortage of skilled labor in war industries, Grey Iron Foundries of Toronto, through the association, have undertaken training of young men. Association is also lending assistance toward sta-

(*Please turn to Page* 119)

U. S. Approaches Mass Production Of Combat Tanks

■ LARGE-SCALE production of light and medium tanks soon will be achieved by American industries which have diverted large portions of their facilities from the manufacture of peace-time transportation units in the interests of national defense.

Many leading tank builders are far ahead of contract schedule, which, considering that many virtually "started from scratch," has drawn high praise from United States Army officials. In the words of Under Secretary of War Robert P. Patterson, it "again demonstrates the genius of American industry."



Accompanying photographs are scenes in the American Car & Foundry Co.'s Berwick, Pa., shops where light tanks are being built. An initial order for 329 units was completed last December, earlier than required. The initial order was built at a rate of three a day. By fall, the company has estimated production will be increased to 15 per day.

First Medium Tank Made in Private Plant Delivered

The first medium-sized tank to come off the assembly line of a private industrial plant was delivered to the Army April 19 by the American Locomotive Co., Schenectady, N. Y. It was eight months ahead of schedule.

Although designated a medium tank, the unit weighs 28 tons and is the largest being built today in this country. Larger ones are contemplated. It is reported the 28-ton tank has as heavy firing power as any in use in Europe. Armament includes a 75-millimeter field gun, a 37-millimeter antiaircraft, antitank gun and four machine guns, two of 0.50-caliber and two of 0.30-caliber.

American Locomotive plans to be producing three medium tanks a day "very soon."

■ Light tanks roll out of the American Car & Foundry Co.'s Berwick, Pa., plant, top of page, for tests. Center photo shows oxy-acetylene pantograph cutter, 6000 degrees Fahr., cutting through ⅜-inch armor plate. Right, C. J. Hardy, ACF president, and Brig. Gen. B. O. Lewis, assistant chief of the industrial service in Washington, inspect some of the units in ACF's works. NEA and Acme photos

Guns Instead of Glitter; Today's Trends as Metallurgists View Them

DETROIT

■ EXPLAINING that the nation was not yet serious about defense manufacturing, E. C. Smith, chief metallurgist, Republic Steel Corp., Cleveland, told 200 members and guests of the Detroit section, American Society for Testing Materials, meeting in Detroit, April 18, that the steel industry already had suffered a 7 per cent drop in production because of the coal strike, that further reductions were imminent.

Examining defense needs for steel, he pointed out that the industry is operating at a level of about 85,000,000 tons a year, well above the normal level of the past few years which was about 60,000,000 tons. Defense authorities would like to see the steel industry produce 91,000,000 tons of steel this year, and a new program now being shaped up would call for 104,000,000 tons per year.

The steel industry is confronted with "tight" situations in a number of alloy metals, Mr. Smith noted. Nickel looks to be critical for at least 18 months, he said. His company now receives only 60 per cent of nickel needed for actual defense steel. Chromium also is a critical metal and likely will continue to be for at least three months. Shutting off supplies from Norway, plus an "accident" in the plant of a domestic producer of ferrochrome have contributed to this bottleneck.

Requirements Increased

Molybdenum, available in amounts up to 20,000 tons a year, appears ample now, but no one can foresee what needs of the immediate future may be. For example, production of a certain type of 0.50-caliber bullet core, displayed by Mr. Smith, might take 10 per cent of all the molybdenum available, as well as appreciable amounts of tungsten.

As an example of how unpredictable defense needs are coming to be, Mr. Smith noted that his company was told it would be called upon to supply 4000 tons of tank armor plate in a year. More than this tonnage was shipped by Republic in March alone.

The Detroit meeting was the annual assemblage of the Detroit section of the A.S.T.M. and took the form of a symposium on changes in materials resulting from defense requirements. Introductory remarks were presented by Robert Painter, assistant secretary. Reviewing standards work, he said the society now had seven times the number of standards which were on record in 1917, and currently is pushing standardization with all possible speed. In the present emergency, it is felt that it may become necessary to develop temporary or contingent standards where the delay in waiting for approved standards would prove too costly.

Introduced by J. L. McCloud, Ford Motor Co., Dr. J. S. Laird, also with Ford, spoke on the outlook in the nonferrous metals field, particularly as it affected the automobile industry. Generally, the problem facing the industry is one of accepting "guns instead of glitter," because of defense demands on chromimum, nickel, zinc, aluminum and magnesium.

Will Use Less Zinc

With regard to nickel, Dr. Laird pointed out that the auto industry requires only 0.25 per cent of the total supply of nickel and could manage nicely on this amount, despite the necessary reduction it would call for in plating for decorative purposes. Various applications for nickel are difficult to replace, such as in spark plug wires, distributor wires, heating element wires, bimetal strips for electrical indicators, compensating shunts for voltage regulators, etc., all high-nickel alloys.

Dr. Laird recommended that steps be taken to assure supplies of zinc for certain functional parts in autos such as carburetors. At the moment, he said, difficulty is being experienced at Ford in obtaining as little as two tons of zinc a week to keep electroplating operations going. The average 1941 model uses approximately 35 pounds of zinc die castings, which no doubt will have to be scaled down appreciably, he said.

One explanation for the apparent enormous appetite of defense projects for critical materials is that from 3 to 10 tons of material must be piled up before the first ton begins to be processed. Just now we are in the piling up stage.

Outlook in chemicals and plastics is particularly bright, according to Dr. J. K. Hunt, technical adviser, E. I. du Pont de Nemours & Co. Inc., Wilmington, Del., who stated that the chemicals industries in the past 25 years had made themselves virtually 100 per cent independent of all imports for production of commercial chemicals, finishes and plastics. At present there are no apparent shortages in these materials, although some tightness has developed because of injudicious heavy stocking on the part of consumers and lack of sufficient transportation equipment.

Potential shortages are seen in the lack of sufficient processing equipment to meet inordinately heavy demand for certain products, an example being American-process zinc oxide, now made from zinc ore, to replace French-process oxide, made from zinc metal, for use in pigments.

In the field of finishes, a number of substitutions have already been effected without difficulty, imported oils such as Chinawood and tung oils being succeeded by domestic or South American oils. Synthetic and alkyd resins are replacing imported resins. Supply of nitrocellulose appears adequate despite heavy demands of ordnance, in view of the fact that ample supplies of cotton are in storage and that wood pulp can be nitrated successfully.

Two thirds of the nation's supply of linseed oil comes from imports from the Argentine, still an open source. Any change in this market could be met by substituting soya bean oil, of which 500,000,000 pounds were produced last year, but only 5 per cent found its way into finishes. Solvents and thinners require toluol. However, petroleum solvents already are in use and can replace toluol solvents.

Enough Rubber for Two Years

As far as miscellaneous chemicals are concerned, there are no acute spots, with the possible exception of sodium cyanide, used in the hardening of steel by the salt bath method. Dr. Hunt pointed out interestingly that the current emergency finds only 14 strategic materials in which shortages are possible, against 42 such materials in 1917.

Stocking of crude rubber has relieved danger of shortages in this commodity, according to Dr. S. M. Cadwell, United States Rubber Co., Detroit, who added that even though 600,000 tons of crude rubber are required annually by this country, there is now ample supply on hand and enroute to fill needs for at least two years. Meanwhile, if supplies from the East Indies should be cut off, the industry is prepared to take immediate advantage of the 1500 man-years of work already done in development of synthetic rubbers in this country, and in a couple of years could have synthetic plants in production. It is further possible to grow guayule rubber in this country, but would require about 4 years to perfect a crop. Reclaiming of old rubber can now be done successfully and presents a vast untapped reservoir of supply.

© Carl McDow

Another "Tight Little Island" Fights for Democracy

■ WHISKEY Island district in Cleveland last week was one of the busiest spots on the Great Lakes.

The island was named Whiskey in the days of sailors, schooners and grog shops, and "island" because the narrow nubbin of lowland on the lake front is flanked by a channel leading in from the Cuyahoga river.

Modern requirements compelled its regeneration; today it is sober and industrious.

The residential "suburb" for Whiskey Island is nearby Shantytown, where the government replaced shanties with green sod and respectable apartments.

In a few hours last week more than 300 freight cars (see cut) were pushed across the bridge over the inlet, to the Pennsylvania railroad docks, filled with ore from vessels, and dispatched to Mahoning valley steel plants.

The district steaming with action was important because it was typical of lake ports, a symbol of their awakening to gigantic effort. The ore season had opened with a bang, as though all that America holds sacred depended upon it.

The Pennsylvania docks there can unload six to seven boats in one day. Three hundred and twenty freight cars are needed to unload one boat with "direct ore." Many of the cars come back from "the interior" filled with coal, but the coal strike has not interfered with the ore movement. Instead, cars have been returned more rapidly, though at greater expense, just as some ore boats return to the head of the lakes without coal.

New April Record

Scanning tonnage reports, it appears ore shipments this month will amount to more than 5,000,000 tons; possibly over 6,000,000. Largest April shipments heretofore totaled 3,770,555 tons, in 1937. Ordinarily the April movement is light; for example, 464,669 tons in 1940; 56,798 tons in 1939. Until the bulge in 1937, the record April tonnage was 2,516,241, in 1929.

The ore schedule this season now is set up as follows: At least 5,000,000 tons this month, 10,000,000 in each month for the next six months; and a minimum 10,000,000 tons total in November and December; grand total 75,000,000. The industry can do more than it promises.

Some years ago mining and shipping interests were lamenting the fact capacities for extracting and handling ore were overbuilt. This resulted originally from World war No. 1, and it has persisted through alternating periods of feasts and famines.

Mines which were developed for the first great emergency could only be shut down; vessels that cost millions of dollars to build lay idle against mudbanks. Except for the boom in the late 20's that was the picture for many years. And now, the nation has suddenly become aware of the tremendous advantage it has in all these surplus facilities.

A question bothering some shippers is: Will the railroad docks at lower lake ports have enough capacity to store the necessary amount of ore this fall and winter? That capacity now is 10,000,000 tons. Adjacent to many docks are large tracts of land. A few railroad spurs, and storage may be greatly increased.

The bulk of the ore now is shipped direct, to avoid a charge for putting it on railroad dock and later lifting it from there into freight cars. Hence, furnaces are taking and storing all they can get. For furnacemen too must put away something for winter—and war.

"Cracker Barrel" Guff And Drum-Head Action

■ IN A recent press conference President Roosevelt told newspapermen that the situation now confronting the United States is more serious than the public realizes. He added that he was relying upon "cracker-barrel conversation" to develop a consciousness among citizens of the grave dangers which threaten the nation.

The President does well to recognize the American institution which he calls "cracker-barrel conversation." In affirming his faith in it, he pays a compliment to the intelligence of the man-in-the-street and to his initiative in thinking for himself, expressing his own views and comparing them with the ideas of his neighbors.

• • •

In short, he recognizes the importance of individual thought and action. We can assume that he would like to preserve this individual freedom, which today is so rare throughout the world.

But unfortunately, a great majority of the policies which Mr. Roosevelt's administration has fostered and is fostering today tend to destroy initiative and individuality.

For instance, consider the ultimate outcome of the union movement identified with C. I. O., which always has been higher in the President's favor than the ideals of A. F. of L.

The union concept of C. I. O. disregards craft classifications. Admittedly C. I. O. offers more to the unskilled laborer than A. F. of L. A. F. of L. recognizes craftsmanship, and consequently provides for graduations in rank according to skill and ability. C. I. O. tends to regiment employes and to ignore differences in individual ability.

C. I. O., to a greater extent than A. F. of L., condemns the individual to the pace of the herd. Under C. I. O., a young man finds it difficult to make his way up the ladder, as his father and grandfather did in earlier days. He is actually discouraged from doing the very things which would lead to advancement.

• • •

In a similar way, the present government administration is destroying initiative and individuality in the management of business. Its recent action on wages and prices is typical of its bent for regimentation.

Through its tacit encouragement of favored unions, it cajoled a number of the largest employers to increase wages by a substantial margin. This action, combined with the steadily increased demand for labor in defense industries, is causing hundreds of thousands of wage earners to leave their present jobs to go into plants where the wages are higher.

To combat this serious exodus, smaller employers are forced to raise wages. Also they are compelled to hire inferior help to replace those who have gone to greener pastures. Eventually thousands of smaller businesses will have to raise prices or go out of business.

• • •

Once our economic system had safeguards which protected individual initiative and freedom. Today, apparently, citizens and companies are supposed to sink their individualities—to become units of the common herd.

Is this progress?

E. L. Shaner

EDITOR-IN-CHIEF

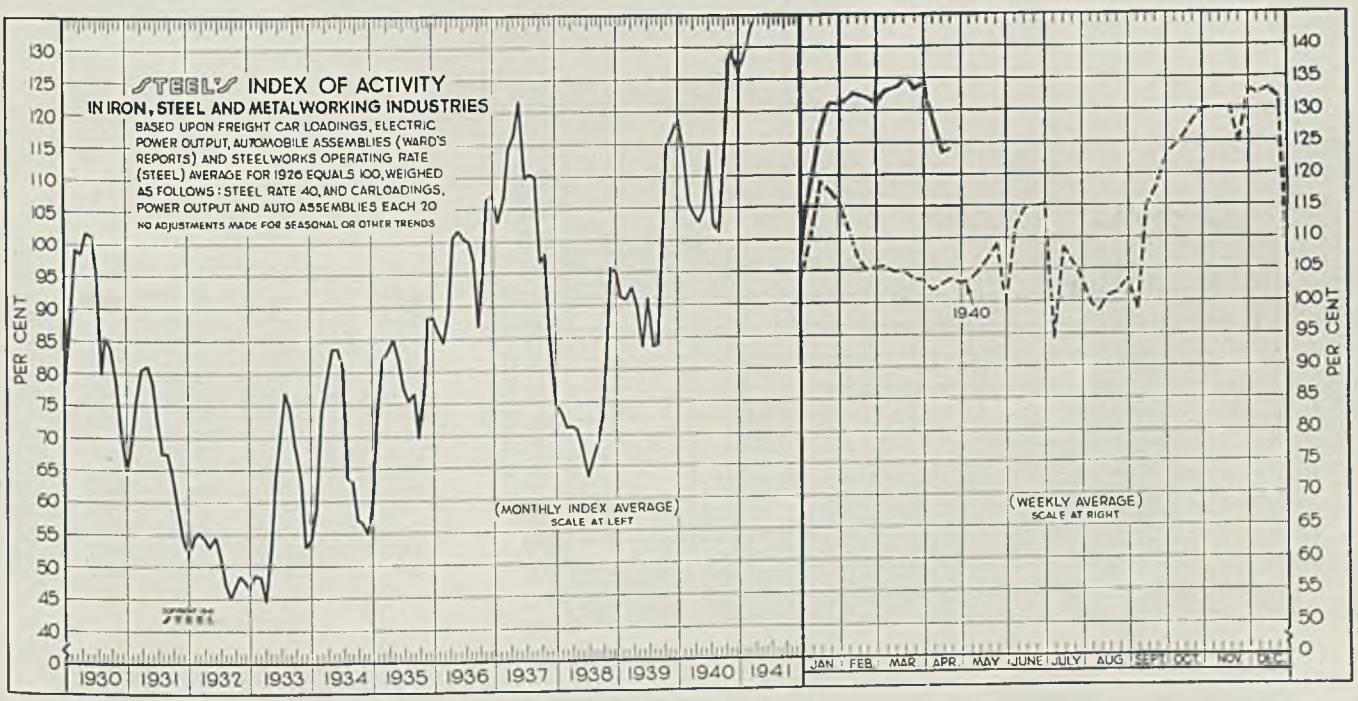
The BUSINESS TREND

Activity Index Records Slight Increase

■ STOPPAGE of work resulting from labor disputes still impedes production in a number of industrial lines. Automobile assemblies have not yet fully recovered to the level preceding the Ford Motor Co.'s strike now settled, while further trouble threatens at General Motors. Shortage of coke as a result of the bituminous coal strike has forced the steel industry to curtail blast furnace, steelmaking and rolling mill operations. Freight traffic also has declined as a result of the sharp reduction in the movement of coal, although this has been offset to some extent by steady increase in iron ore shipments.

STEEL's index of activity edged slightly upward during the week ended April 19 to 124.2. This is a gain of 0.4 point over the preceding week's level of 123.8. In the comparable periods of 1940, 1937 and 1929 the index stood at 103.4, 119.6 and 123.4 respectively.

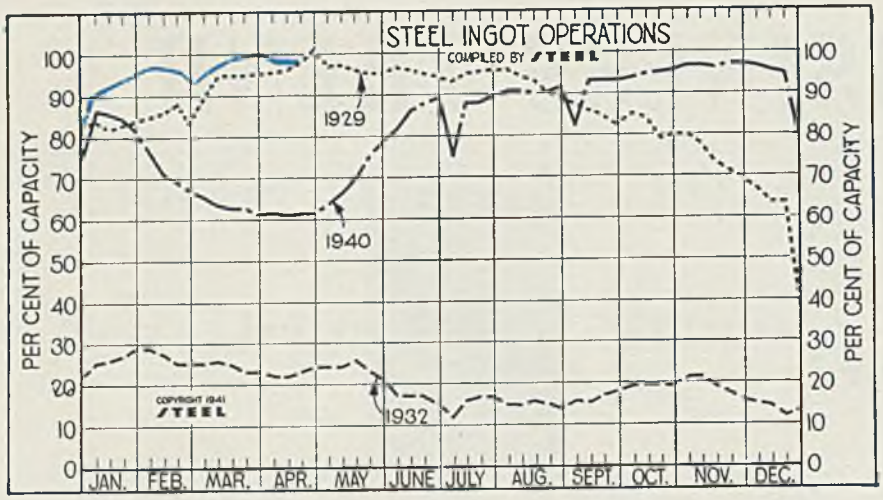
Steelmaking operations held unchanged during the week ended April 19, but have declined during the past week as a result of the coal shortage. New orders continue to exceed output in some instances.



STEEL'S index of activity gained 0.4 point to 124.2 in the week ended April 19:

Week Ended	1941	1940
Feb. 8	132.7	107.2
Feb. 15	132.3	105.1
Feb. 22	131.2	105.4
March 1	133.0	105.6
March 8	133.1	104.7
March 15	135.0	104.9
March 22	133.5	103.7
March 29	133.9	103.2
April 5	128.9	101.8
April 12	123.8	102.7
April 19	124.2	103.4

Mo. Data	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930
Jan.	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6
Feb.	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2
March	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2	80.4	98.6
April	.....	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0	101.7
May	.....	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6	101.2
June	.....	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1	95.8
July	.....	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3	79.9
Aug.	.....	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4	85.4
Sept.	.....	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3	83.7
Oct.	.....	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2	78.8
Nov.	.....	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4	71.0
Dec.	.....	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3	64.3



Steel Ingot Operations

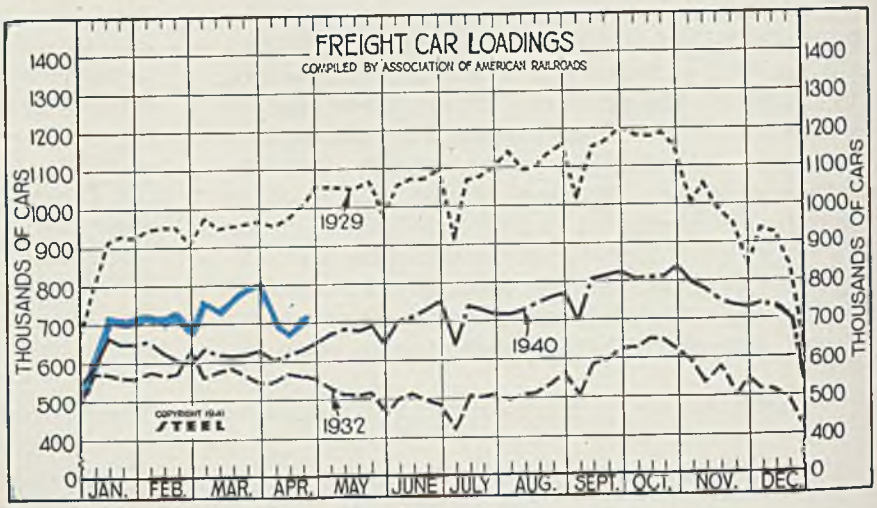
(Per Cent)

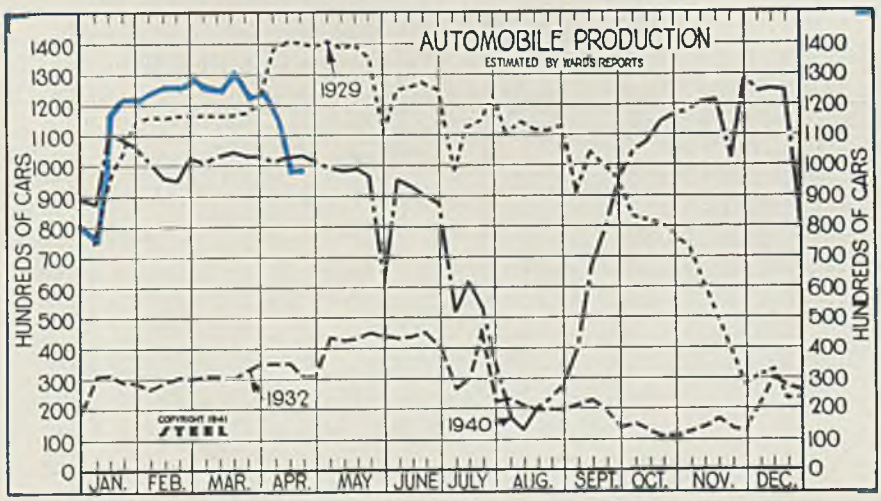
Week ended	1941	1940	1939	1938
April 19...	98.0	61.5	50.5	32.5
April 12...	98.0	61.0	51.5	32.0
April 5...	98.0	61.5	53.5	32.0
March 29..	99.5	61.0	54.5	36.0
March 22..	99.5	62.5	55.5	35.0
March 15..	98.5	62.5	56.5	32.0
March 8...	97.5	63.5	56.5	30.0
March 1...	96.5	65.5	56.0	29.5
Feb. 22....	94.5	67.0	55.0	30.5
Feb. 15....	96.5	69.0	55.0	31.0
Feb. 8....	97.0	71.0	54.0	30.0
Feb. 1....	97.0	76.5	53.0	31.0
Jan. 25....	95.5	81.5	51.5	33.0
Jan. 18....	94.5	84.5	51.5	30.5
Jan. 11....	93.0	86.0	52.0	29.0

Freight Car Loadings

(1000 Cars)

Week ended	1941	1940	1939	1938
April 19.....	698	628	559	524
April 12.....	680	619	548	538
April 5.....	682	603	535	522
March 29....	792	628	604	523
March 22....	769	619	605	573
March 15....	759	619	595	540
March 8.....	742	620	592	557
March 1.....	757	634	599	553
Feb. 22.....	678	595	561	512
Feb. 15.....	721	608	580	536
Feb. 8.....	710	627	580	543
Feb. 1.....	714	657	577	565
Jan. 25.....	711	649	594	553
Jan. 18.....	703	646	590	570
Jan. 11.....	712	668	587	581





Auto Production

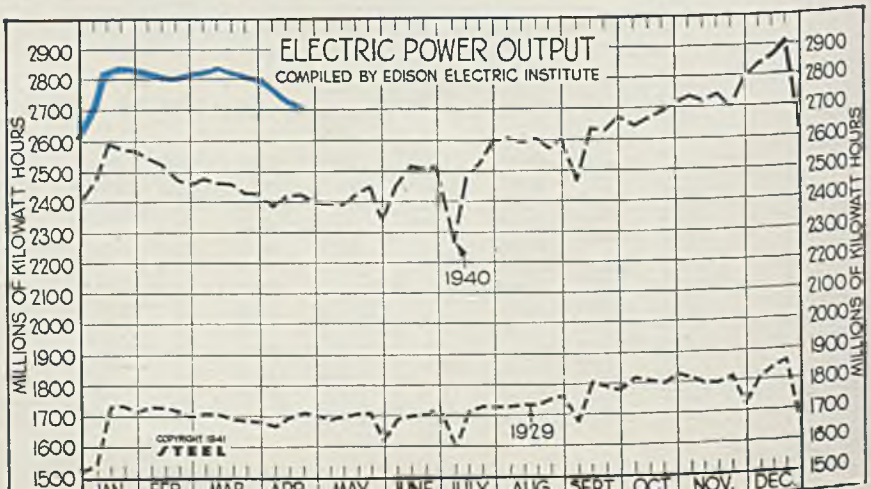
(1000 Units)

Week ended	1941	1940	1939	1938
April 19...	99.9	103.7	90.3	60.6
April 12...	99.3	101.9	88.1	62.0
April 5....	116.3	101.7	87.0	61.0
March 29..	124.2	103.4	86.0	57.5
March 22..	123.8	103.4	89.4	56.8
March 15..	131.6	105.7	86.7	57.6
March 8...	125.9	103.6	84.1	57.4
March 1...	126.6	100.9	78.7	54.4
Feb. 22....	129.2	102.7	75.7	57.0
Feb. 15....	127.5	95.1	79.9	59.1
Feb. 8....	127.7	96.0	84.5	57.8
Feb. 1....	124.4	101.2	79.4	51.4
Jan. 25....	121.9	106.4	89.2	59.4
Jan. 18....	124.0	108.5	90.2	65.4
Jan. 11....	115.9	111.3	86.9	65.7

Electric Power Output

(Million KWH)

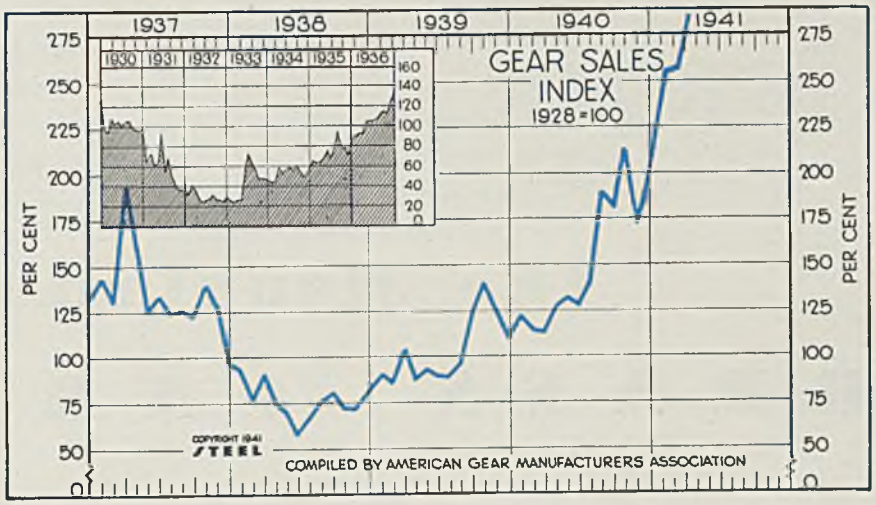
Week ended	1941	1940	1939	1938
April 19..	2,702	2,422	2,199	1,951
April 12..	2,721	2,418	2,171	1,958
April 5 .	2,779	2,381	2,174	1,990
March 29.	2,802	2,422	2,210	1,979
March 22.	2,809	2,424	2,199	1,975
March 15.	2,818	2,460	2,225	2,018
March 8..	2,835	2,464	2,238	2,015
March 1..	2,826	2,479	2,244	2,036
Feb. 22...	2,820	2,455	2,226	2,031
Feb. 15...	2,810	2,476	2,249	2,059
Feb. 8...	2,824	2,523	2,268	2,052
Feb. 1. .	2,830	2,541	2,287	2,082
Jan. 25...	2,830	2,566	2,293	2,099
Jan. 18...	2,844	2,572	2,290	2,109
Jan. 11...	2,835	2,593	2,270	2,115

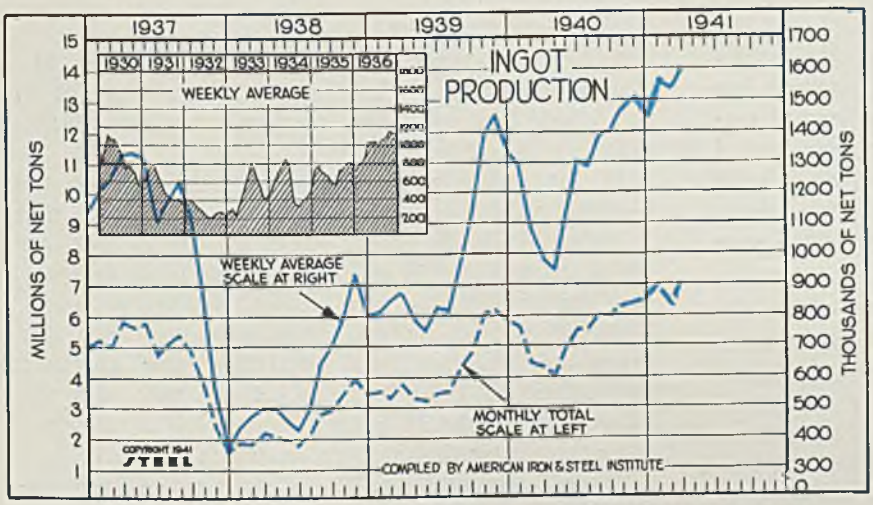


Gear Sales Index

(1928 = 100)

	1941	1940	1939	1938	1937
Jan.	259	123	91.0	93.0	144.0
Feb.	262	116	86.0	77.0	130.5
Mar.	288	114	104.0	91.0	195.0
April	...	128	88.0	74.0	164.0
May	...	133	93.0	70.0	125.5
June	...	129	90.0	58.0	134.0
July	...	141	89.0	67.0	124.0
Aug.	...	191	96.0	76.5	125.0
Sept.	...	183	126.0	80.5	123.0
Oct.	...	216	141.0	72.5	139.5
Nov.	...	173	126.0	72.0	127.5
Dec.	...	208	111.0	81.0	97.0
Ave.	...	155.0	103.0	76.0	135.5





Steel Ingot Production

(Unit 100 Net Tons)

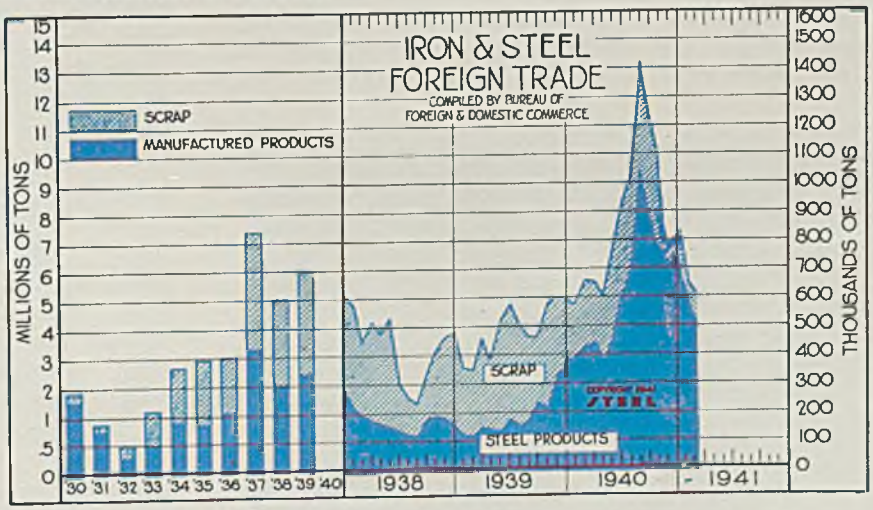
	Monthly Total		Weekly Average	
	1941	1939	1941	1940
Jan.	6,943.1	5,768.7	1,567.3	1,302.2
Feb.	6,250.4	4,527.1	1,562.6	1,093.5
Mar.	7,146.4	4,390.1	1,613.2	991.0
Apr.	.....	4,100.7	.....	955.9
May	.....	4,967.0	.....	1,121.2
June	.....	5,659.7	.....	1,319.3
July	.....	5,727.5	.....	1,295.8
Aug.	.....	6,187.3	.....	1,396.7
Sept.	.....	6,051.9	.....	1,415.2
Oct.	.....	6,644.0	.....	1,499.8
Nov.	.....	6,470.2	.....	1,508.2
Dec.	.....	6,493.8	.....	1,469.2
Total	.....	66,993.2	.....	1,281.4†

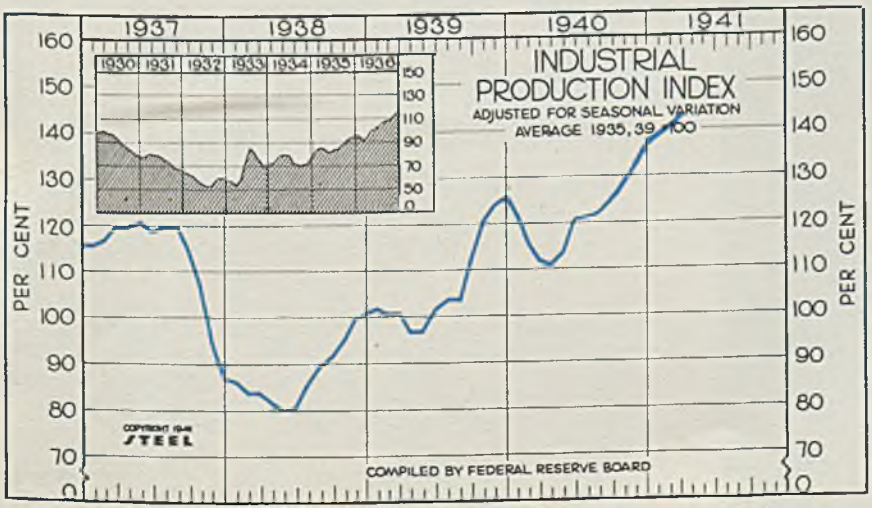
†Weekly average.

Iron and Steel Exports

(Thousands of Gross Tons)

	Steel Products		Scrap		Total
	1941	1940	1941	1940	1941
Jan.	653.8	396.1	45.1	187.5	698.9
Feb.	525.9	436.6	74.4	234.7	600.2
Mar.	.....	457.1	.....	206.9	.....
April	.....	391.8	.....	221.2	.....
May	.....	471.5	.....	312.5	.....
June	.....	617.7	.....	318.4	.....
July	.....	707.8	.....	327.1	.....
Aug.	.....	1046.1	.....	346.1	.....
Sept.	.....	965.4	.....	251.1	.....
Oct.	.....	846.6	.....	258.5	.....
Nov.	.....	713.8	.....	74.3	.....
Dec.	.....	735.2	.....	70.0	.....
Total	.....	7,785.5	.....	2,823.1	.....





Industrial Production
Federal Reserve Board's Index

(1935-39 = 100)

	1941	1940	1939	1938	1937
Jan.	139	122	102	86	116
Feb.	141	116	101	84	117
March ...	143	112	101	84	120
April	...	111	97	82	120
May	...	115	97	80	121
June	...	121	102	81	119
July	...	121	104	86	120
Aug.	...	121	104	90	120
Sept.	...	125	113	92	115
Oct.	...	129	121	95	107
Nov.	...	133	124	100	95
Dec.	...	138	126	101	87
Year Ave. ...		122	108	88	113

By ARTHUR F. MACCONOCHIE
Head, Department of Mechanical Engineering
University of Virginia
Virginia Station, Virginia

The Manufacture of BRASS CARTRIDGE

■ **Here Professor Macconochie extends his series of articles on manufacture of high-explosive shell which heretofore has dealt exclusively with the shell body. Metallurgical considerations and typical manufacturing sequence are detailed for the cartridge case, that portion of the shell which holds the charge propelling the shell body from the gun. Later information will be presented on manufacture of small arms cartridges and bullets**

■ A HUNDRED years ago when the propellant used in cannon consisted of nitrate of "potassa," sulphur and charcoal, the charge was familiarly contained in a bag whose mouth was closed by tying into a groove on the "sabot." The sabot was a disk-shaped piece of wood, formed with a hemispherical depression on one side to receive the round shot and serving as a sort of "wad" between the gunpowder and the shell. When shot, sabot and powder bag had been assembled by tying on the bag and fastening the shot to the sabot by means of tin straps tacked to the wood, the result was termed a "stand" of ammunition, see Fig. 9.

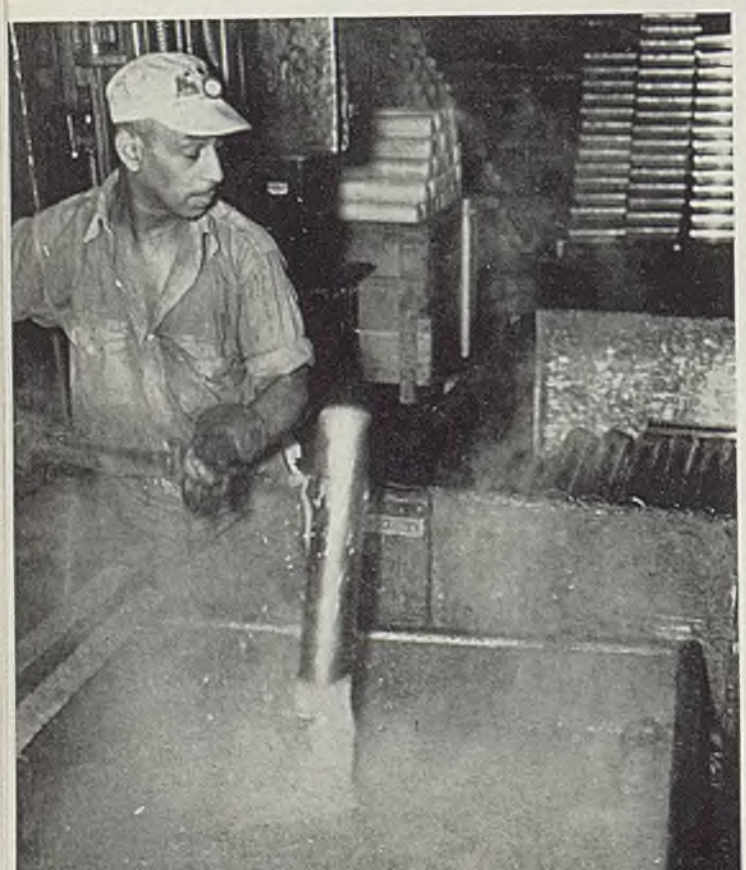


Fig. 1—After each anneal, work is pickled to clean it and then the pickle liquor must be washed off as is being done here. Figs. 6, 7, 8, 9 and 10, by Palmer, represent practice at Frankford Arsenal and are shown here by permission of National Defense Advisory Commission

In this primitive arrangement was observed the beginnings of our modern "fixed" ammunition, that is ammunition in which shell and propellant are contained together in one assembly as in an ordinary small-arms cartridge case or a 75-millimeter round. However, not all modern ammunition is fixed. For army ordnance purposes, cartridge cases are used in shell up to 105-millimeter. Above that size, the propellant charge is placed separately in the gun after the projectile has been seated in the bore.

"Fixed" Ammunition: The advantages of fixed ammunition include easier handling, greater safety from sparks and flarebacks, increased rapidity of fire, lesser chances of errors in loading and the provision of a better seal against gas leakage at the breech. On the other hand, deformed cases sometimes cause trouble by jamming in the gun, thus preventing its being fired. Then, too, what to do with the spent cases? All naval guns of 4-inch caliber or less, and the 5-inch 25-caliber anti-aircraft gun use fixed ammunition, the latter being close to the maximum weight a man can handle. The 5-inch 38-caliber anti-aircraft gun and the modern 6-inch guns use semi-fixed ammunition in which the primer and propelling charge are firmly fixed in the case, the projectile being separate.

It is interesting to note that these distinctions had already appeared before the middle of last century, the same necessities determining the use of fixed ammunition for the pieces of smaller bore; while the larger field howitzers were not so served on account of the difficulty of packing the stands in the ammunition chests and because of their greater weight.

Brass Is Better: Nowadays instead of fabrics of wool and silk (used because they were not so liable to leave fire in the gun as fabrics of cotton and flax)

Here in one article you will find a brief history of cartridge cases, a discussion of why brass is employed and its characteristics for this work, how annealing and work hardening enter into the picture. Professor Macconochie also follows through all steps of a typical sequence for cartridge case manufacture from melting the charge to checking the completed case

CASES

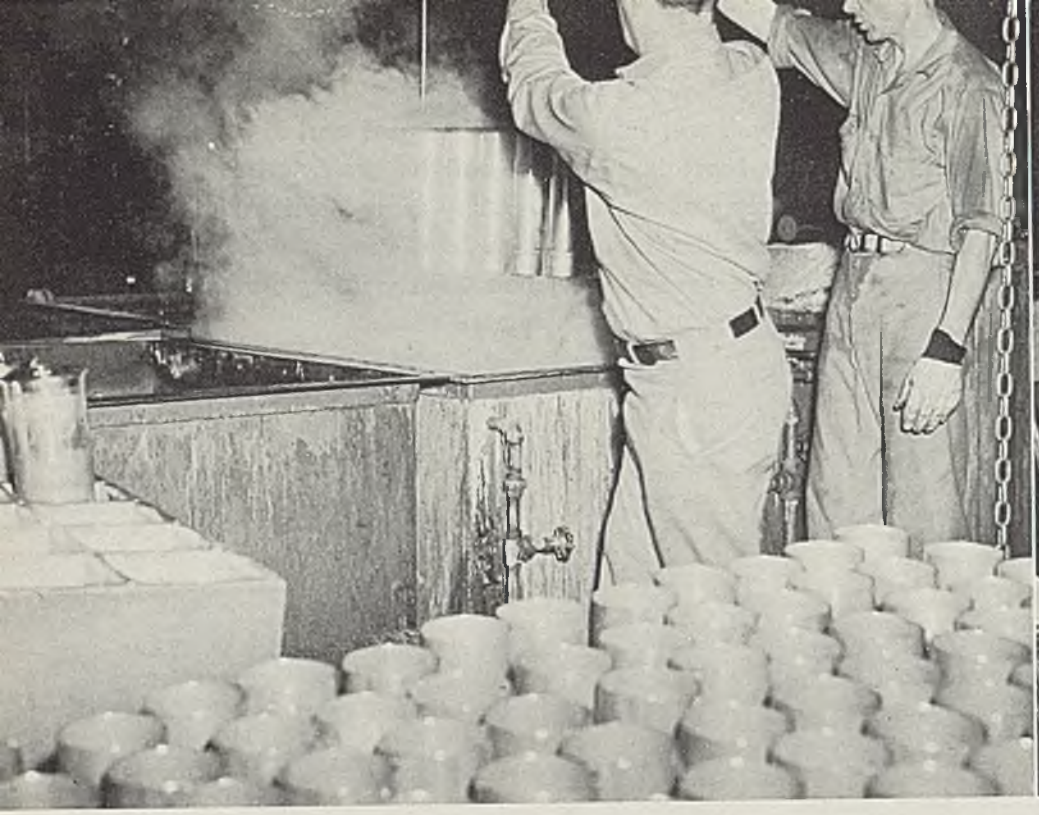
brass is used for cartridge cases. This usually analyzes 70 per cent copper and 30 per cent zinc. This material is selected because of the excellent protection which it affords the explosive charge against deteriorating influences; its high strength coupled with sufficient elasticity to enable the case to spring back after being pressed against the walls of the powder chamber, to secure its easy withdrawal; the ease with which it may be pressed and drawn to the size and shape desired; its resistance to corrosion. By no means of least importance is the presence of copper and zinc in sufficient quantities in this hemisphere to make us independent of other sources of supply.

There is another characteristic of brass to which reference should be made since it greatly affects the annealing processes—that is "work hardening." While the metal should be in the softest possible condition for working, after the work is done it should be in a much harder and springier condition. Brass responds to cold working much in the same way as steel and possibly for a similar reason. According to the "amorphous-cement" theory, films of atoms in a noncrystalline or amorphous state are left between each of the grains of a casting upon solidification. These atoms are attracted equally by neighboring lattices but join neither of them, this amorphous material retaining the properties of the liquid before solidification inasmuch as it possesses the characteristics of a supercooled liquid like glass, being high in viscosity, hard, and so tending to increase the hardness of the entire metal. Now when a metal is deformed, the suggestion is that the quantity of this amorphous material increases both as a result of thickening the intercrystalline films and because of the formation of such films along the slip planes of the crystals.

If, now, the temperature of the cold-worked brass be raised gradually, the first change to take place is a relief of internal stresses, the displaced atoms in the elastically distorted space lattices returning to their normal or equilibrium positions. Thus a "light anneal" will relieve these stresses almost completely as in the case of cartridge brass when heated to from 400 to 500 degrees Fahr. while at the same time the strength and hardness may not only be preserved but slightly increased. This heating at comparatively low temperature is quite important as a means of conditioning the metal for service; and is not to be confused with those annealing processes which are undertaken with the object of softening the metal for further work.

Temperature Characteristic: As the temperature is increased, see Fig. 6, softening begins and proceeds rapidly between temperatures of 500 and 750 degrees Fahr., the hardness dropping during this period from around 173 to perhaps 80 brinell; other properties such as hardness, strength and yield point (upon which resistance to deformation depends) de-

Fig. 2—Here the disk has been cupped and the cups are being annealed to permit further drawing operations at Frankford Arsenal. These will be 75-millimeter cartridge cases eventually. A 75-millimeter gun in action needs 166 per hour. That's almost three each minute



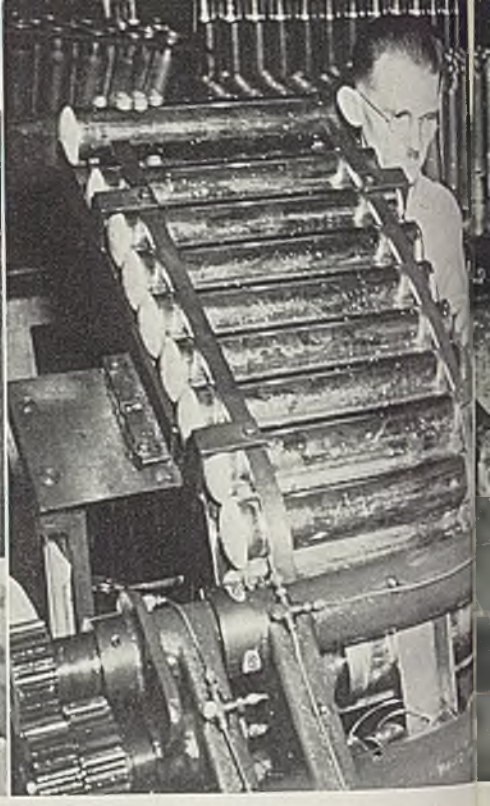


Fig. 3—To permit tapering the upper portion of the case, they are given a semi-anneal by dipping them mouth down in a salt bath to within 4 inches of the closed or base end —and not one at a time either. See view at left

Fig. 4—After several draws, cases are trimmed to exact length in this special high-prodution layout (center view)

Fig. 5—For complete identification, each case receives a coded series of numbers and letters which tell where it was made, when and in what lot. (Note view at extreme right)

clining the while in similar proportion. Beyond 750 degrees, the softening effect is less rapid but continues up to 1600 degrees Fahr. (But brass should not be heated above 1400 degrees Fahr. When so treated, it is said to be burnt.)

Meanwhile, the grain size increases, the rate of increase rising with higher temperatures. Along with these changes or perhaps we should say, lagging a little behind them, certain recrystallizations of the amorphous material take place. These are centered at innumerable points within the noncrystalline films and may arise from true nuclei or from crystalline fragments which have lost their crystalline character on being torn from their original grains. These few references may serve to interpret the treatment to which cartridge brass is subjected in process of manufacture into the cartridge case.

Belting: In making a case, the first task is to melt the metal so it may be cast into ingots suitable for rolling down into "strip." From such strip, round disks are blanked out and formed into cups, the start of the long sequence of drawing and forming operations ending in a case.

Cartridge brass is conveniently melted in induc-

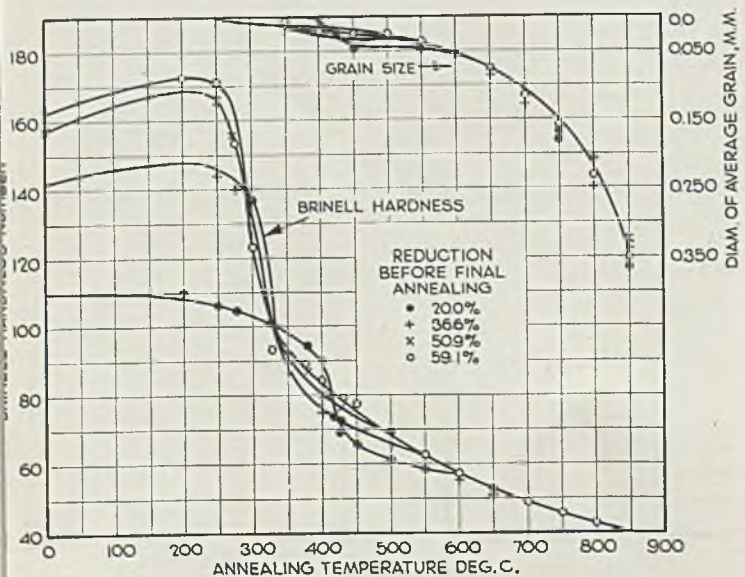
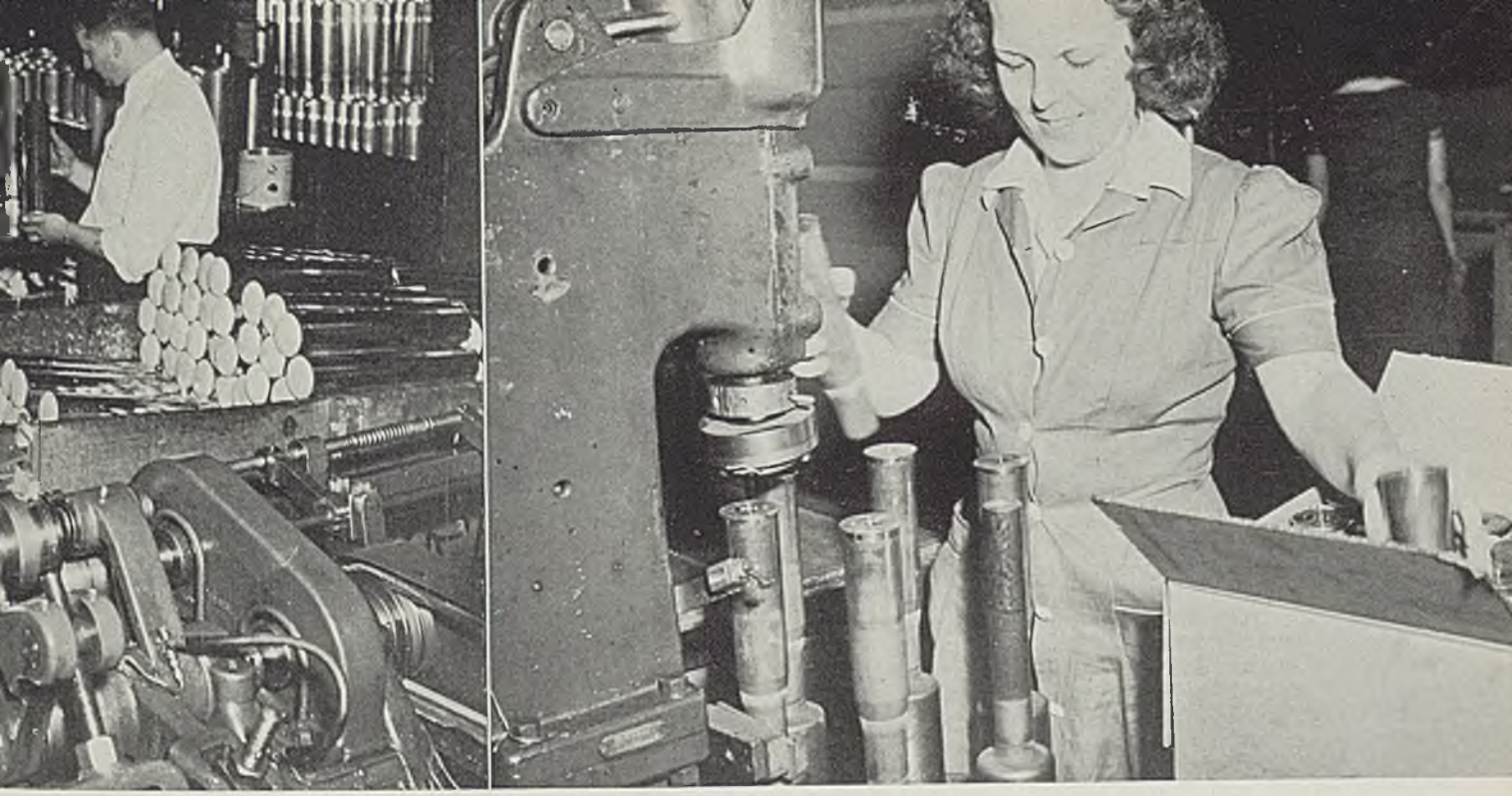


Fig. 6—Curves showing effect of heating on hardness of cold-worked brass (Bassett and Davis)

TABLE I—Sequence of Operations for
(Production based on 3750 car

Oper. No.	Operation	Machine	Machines Required	Operators Required	Helpers Required	Weight per Unit Machine (Pounds)*	Weight of Machines Required (Pounds)*	Cost per Unit Machine†	
1	Cup	Bliss crank	0.61	0.61	0.61	52,000	31,720	$9,000	
2	1st anneal and cool	Tate-Jones	1.9	1.9	5.7	50,000	95,000	8,500	
3	1st pickle and wash	Baskets	0.62	0.62	....	150	93	107	
		Wooden tanks	2.48	....	....	350	875	90	
4	1st draw	Bliss hydro-dynamic	0.72	0.72	0.72	25,400	18,300	15,500	
5	2nd anneal and cool	Tate-Jones	2.2	2.2	6.6	50,000	111,000	8,500	
6	2nd pickle and wash	Baskets	0.72	0.72	....	150	108	107	
		Wooden tanks	2.88	....	....	350	1,000	90	
7	2nd draw and wash	Bliss hydro-dynamic	0.94	0.94	0.94	25,100	23,600	16,000	
8	3rd anneal and cool	Tate-Jones	2.8	2.8	8.4	50,000	140,000	8,500	
9	3rd pickle and wash	Baskets	0.87	0.87	....	150	130	107	
		Wooden tanks	3.48	....	....	350	1,220	90	

*Weight includes weight of motor and all equipment excluding weight of dies and
clusive of inspection and packing—10,500 square feet.



tion furnaces. Such furnaces depend for their heating effect on the eddy currents induced in the metallic charge by a primary alternating current circulating in an "inductor" coil external to the charge itself. To all intents and purposes the charge acts as the secondary of what is virtually a transformer.

Thus the alternating current embodied in the primary produces an alternating magnetic field in its neighborhood, this field inducing eddy currents within any conductor (the brass here) within its influence. A magnetic field of sufficient intensity will generate enough heat to melt the metal.

Metallurgically, furnaces of this type are much superior to the older crucible type set in a coke furnace below the floor of the foundry, many of which were used during 1914-18. Outstanding feature of the induction furnace, of course, is that the metal is only in contact with the refractory lining and the atmosphere above so no contamination other than oxidation can occur. The resulting product thus is very apt to be the sum total of the initial contents of the crucible. Further the alternating magnetic field is responsible for a stirring action of the molten bath, the degree of agitation being more violent at low than at high frequencies. This motor effect produces good circulation and ensures homogeneity of the charge. The stirring action should not be overdone as violent agitation may result in excessive oxidation of the metal.

The capacity of furnaces of this type suited to brass melting may be in the neighborhood of 600 to 900 pounds, the Ajax-Wyatt designs dominating the brass melting business in this country. In fact some 90 per cent or more of the total output of the brass rolling mills is electrically melted; and of this amount Ajax-Wyatt units are responsible for

75-Millimeter Field Gun Cartridge Case
ridge cases per 8-hour day)

Oper. No.	Operation	Machine	Machines Required	Operators Required	Helpers Required	Weight per Unit Machine (Pounds)*	Weight of Machines Required (Pounds)*	Cost per Unit Machine†	Cost of Machines Required†
10	3rd draw and wash	Bliss hydro-dynamic	1.0	1.0	1.0	27,800	27,800	16,500	16,500
11	Trim	V. & O.	0.37	0.37	0.37	3,000	1,100	5,530	2,050
12	Head and indent	Hydraulic press	1.0	1.0	2.0	88,500	88,500	28,870	28,870
13	Anneal for taper	R. S. products	1.0	1.0	2.0	4,300	4,300	1,000	1,000
14	Taper	Ferracute	1.0	1.0	1.0	6,500	6,500	7,400	7,400
15	Finish head	Bullard	1.56	1.56	....	24,000	37,440	23,800	37,130
16	Final trim	2-spindle drill press	1.56	1.56	....	400	624	1,500	2,320
17	Wash	Wooden tanks	3.75	1.25	....	300	1,100	75	281
18	Mouth anneal and wash	R. S. products Wooden tanks	1.48	1.48	....	4,300	6,364	1,000	1,480
			4.44	....	2.96	300	1,330	75	333
19	Low temperature anneal	Surface combustion	1.88	1.88	....	25,000	47,000	9,650	18,142
20	Stamp	Ferracute	0.60	0.60	....	6,100	3,660	6,300	3,780
		Total	39.86	24.08	32.30	444,500	648,764	$168,291	$210,708

punches. †Prices as of 1938. Floor space required: (3750 shells per 8-hour day) ex-

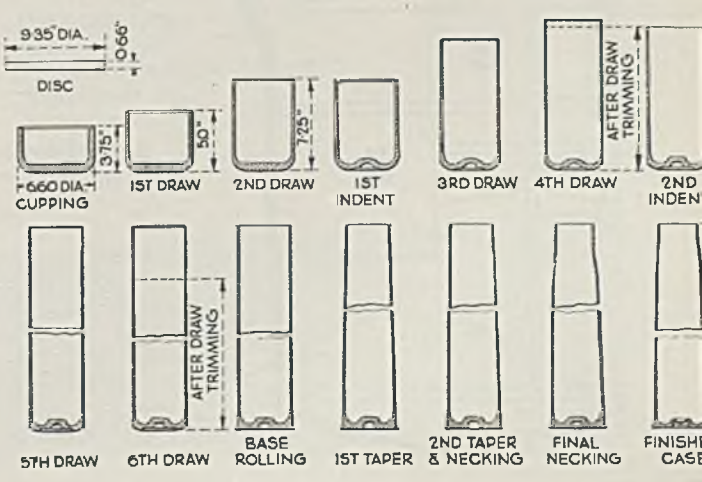


Fig. 7—Typical sequence of operations in manufacture of 3.7-inch anti-aircraft cartridge cases

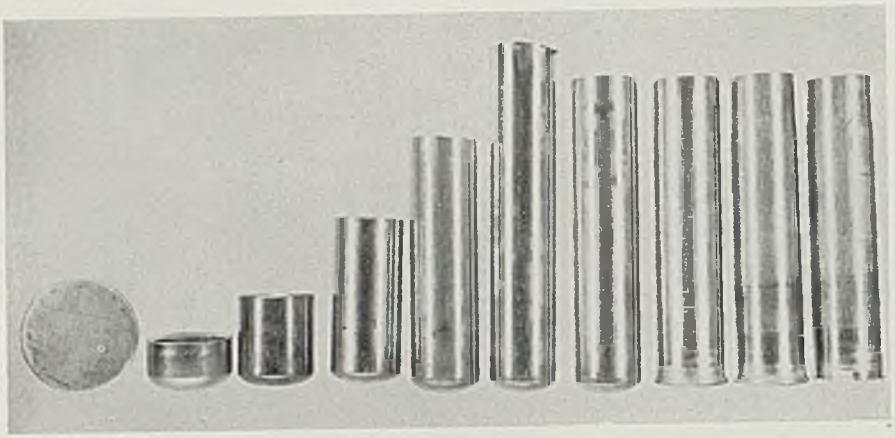


Fig. 8—These pieces represent successive stages in manufacture of 75-millimeter cartridge cases at Frankford Arsenal. Note that in comparison with the sequence in Fig. 4, a good many operations have been eliminated or combined

the greater part. This particular type consists of a cylindrical crucible, Fig. 10, from the bottom of which two narrow channels extend downwards to meet in a V, through which the central leg of the transformer core passes. Circulation of the molten metal may be said to be the combination of convection, "motor effect" and "pinch effect" (the tendency toward contraction of the cross-section of a conductor through which a current of high density is passed).

After being melted (1725 degrees Fahr. for 70-30 brass), the metal is poured at 2140 to 2150 degrees Fahr., the brass being cast in slabs or "ingots" in a series of molds mounted on a revolving table. To prevent sticking and to give some protection to the cast iron mold, a mixture of lard oil and graphite is used. Even so, the molds suffer, hence the castings are removed as soon as possible. Thereafter the riser is sheared off and the slab is ready for the rolls if the laboratory analysis proves satisfactory. Specifications may call for 68 to 74 per cent copper; not more than 0.07 per cent lead; and a maximum of 0.10 per cent iron. Impurities such as iron, nickel, etc., tend to retard grain growth and render a higher temperature necessary to secure a grain of a given size. The addition of lead to brass (sometimes deliberately as in the leaded brasses) facilitates machining, but the lead being mechanically mixed, breaks up the continuity of the structure.

Rolling: Since our principal interest is manufacture of the case itself, we need pause here no longer than to offer a few brief details of the rolling process. By way of illustration, ingots for 3.7-inch anti-aircraft shells are cast 1.71 inches thick and are rolled down in nine passes under chilled rolls to 0.66-inch, the slab increasing in length meantime from 2 feet 11½ inches to 7 feet 9 inches. Thereafter, the worked metal is given a thorough anneal at a temperature in the neighborhood of 1200 degrees Fahr. for 75 minutes following the heating up period.

The chart, Fig. 6, showing the relationship between annealing temperature, brinell hardness and grain size indicates this temperature approaches the maximum softness possible with annealing and yet is not high enough to cause excessive grain growth. This anneal is followed by a "pickle" in a 5 to 7 per cent sulphuric acid bath held at 175 degrees Fahr. to remove the oxide formed during annealing. The acid is subsequently washed off in hot water.

Typical Sequence: Fig. 7, kindly lent by *Machinery*, shows the various stages in the manufacture of the cartridge case for a 3.7-inch anti-aircraft shell. The action starts with the flat round disk at the upper left and proceeds by way of the cup and a series of drawing, indenting, heading and tapering operations to the final result. As far as the draws are concerned, the process consists in causing metal flow along the surface of a punch as it descends through a die and so constricts the metal in its passage.

Indenting: The indenting operation is performed by threading the case on a bolster and pushing it to position through a supporting die. At this point the indenting tools are brought up under the action of a powerful toggle; presses for this particular operation being built to stand a load of 2000 tons.

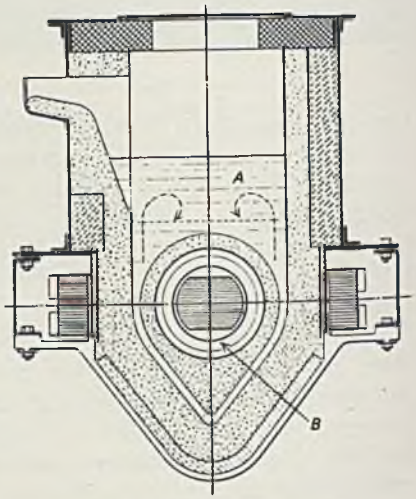


Fig. 10—Section through Ajax-Wyatt electric induction furnace used to melt brass which is later cast in slabs

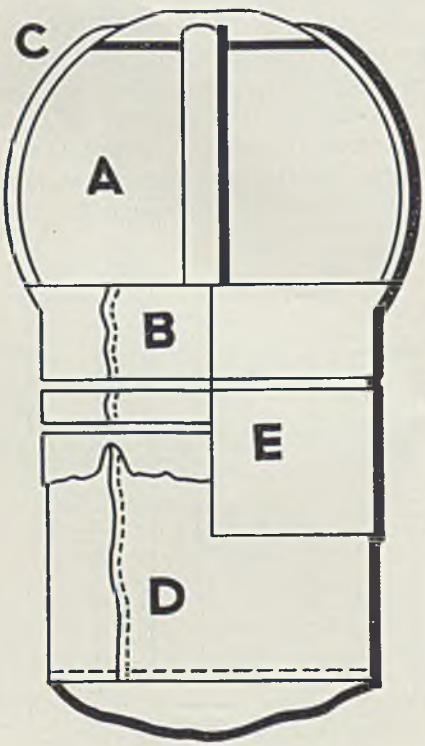


Fig. 9—This is a "stand" of ammunition as used in 1867. Here "a" is the round projectile, "b", the wood sabot, "c" the straps securing the projectile to the sabot, "d" the cartridge bag holding the powder, "e" the stout paper cylinder and cap giving stiffness to the cartridge at the junction of sabot and the bag itself

Annealing: Whenever necessary—and this means between all operations where any considerable amount of cold work is being done—the case is either wholly or partly annealed and then carefully cleaned in an acid bath and washed. The last anneal is a "low-temperature" anneal such as described above for the purpose of relieving stress and minimizing the risk of "season cracking." This season cracking possibly is associated *both* with corrosion and internal stress. Cartridge cases exposed to the action of sea water and sometimes to the industrial atmospheres are peculiarly liable to this ailment. Commercial brass is susceptible to selective cor-

Revere Copper and Brass Incorporated

Executive Offices
230 Park Avenue
New York

C. Donald Dallas
President

To American Industry:

Virtually the whole production of Revere Copper and Brass today is directed toward arming the nation and the allies of democracy beyond its borders.

We do not make tanks or ships, fighting planes or machine guns. But without the products we do make, these would be useless. Every bullet, every shell and every cartridge needs copper or brass or the other copper base alloys——so do torpedo heads and army field kitchens——condensers of battleships and oil coolers of fighting planes.

It is our first task to insure an unfailing supply of metal products vital to defense.

In addition to this grave new responsibility, we recognize our long established responsibility to our old customers. And so we are gearing our defense tasks to allow the best possible production for non-defense too. But there are many cases where it is not possible to do both.

Revere, however, has always rendered service to its customers beyond the mere supplying of metal. And, even though we may not be able, in some cases, to supply the metal you ask for, we would still like you to call for these services——to use, at no cost or obligation, our vast file of data on copper and its alloys and our Technical Advisory staff. It may be that we can cooperate with you in suggesting ways for you to replace metals or alloys needed for defense by other metals or alloys, equally efficient and immediately available.

Sincerely yours,

C. Donald Dallas

C. Donald Dallas

rosion of the zinc by dilute acids and salt solutions.

Can Only "Cut And Try": In laying out the sequence of operations on a cartridge case, there are virtually no analytical guideposts. Techniques adapted to different sizes are worked out on a basis of trial and error, the principal aim, of course, being to secure the desired result with a minimum of operations. Compare, for example, the procedures outlined above with the sequence developed at Frankford Arsenal and illustrated by Fig. 8. This is a 75-millimeter case—smaller, of course, than the 3.7-inch, but the reduction in the number of individual operations is noteworthy.

Colonel Campbell, in commenting on the policies pursued at Frankford Arsenal (see *Army Ordnance*, January-February 1940) observes that the production problem has been attacked from two aspects. The first of these, of course, is concerned with securing a product which is acceptable in every way. Of equal importance is the prime necessity of doing the job with the minimum number of operations and employing at the same time the fastest equipment available for the purpose. Merely to say that in time of emergency the question of cost is of little moment neglects the principal consideration, namely that of turning out the requirements of the army in the shortest possible space of time. Table I shows the operation sequence, the types of machines required, numbers thereof, etc., reproduced here by kind permission of the editor of *Army Ordnance*.

Cupping: As in the previous case we start with a disk blanked from strip. This weighs approximately 3 pounds 2 ounces, has a diameter of 5.415 (+ zero, —0.01) inches, and is 0.45 (+ zero, —0.01)-inch thick. After a careful inspection to make certain that each component is free of cracks, seams or other flaws, the disks pass to the cupping operation, which is done by pushing the disk through a die with a punch on a 225-ton Bliss press, the actual pressure required being about 125 tons. Immediately thereafter the cups are annealed as shown in Fig. 2 at a temperature of 1150 degrees Fahr. and subsequently are cooled by water sprays to improve the grain.

Drawing: During the first draw, which requires a 75-ton pressure, the thickness of the wall of the cup is reduced from 0.2 to 0.093-inch and the length increased from 2.5 to 4.75 inches. Another anneal and wash follows. Then we come to second draw, requiring only about 35 tons and reducing the wall thickness to 0.043-inch. The case is now 8.875 inches long. Again we must anneal before the third and final draw which reduces the wall thickness to 0.032-inch and increases the length to approximately 16 inches. This last draw needs only 20 tons. Fig. 1 shows the third draw being washed after annealing and pickling.

Trimming: Fig. 4 shows the trimmer at work. Trimming may be a familiar cutting operation or the result can be secured by the use of a circular knife. The necessity for this trimming operation arises in part from the difficulty of drawing cases to any exact length and on account of the tendency of the metal near the mouth of the case to warp and generally suffer from the drawing operations. It is, in any event, a convenient point at which to determine the length. Usually, a second trim is necessary to bring the total length of the case to close limits after all operations have been performed.

For cartridge cases of this size, the forming of the head and the indenting operation, designed to provide a socket for the primer in the case of artillery components and for the cap in the case of small arms ammunition, may be done by a squeeze on a powerful press of the toggle type. This job requires a very heavy pressure. As noted above, in the case of the 3.7-inch, a press with a capacity of 2000 tons is provided merely for the indenting operation, head forming on a case of this size being done by rolling with a hardened steel ball. The Frankford Arsenal accomplishes both heading and indenting in a single operation on the 75-millimeter case with a pressure of about 675 tons.

Head Rolling: This head rolling operation is of some interest. Instead of trying to squeeze the head of the case to shape, two cases are mounted on bolsters and pushed through supporting dies with their ends facing one another and the ball centrally disposed between them. The cases are then rotated in opposite directions and the ball drawn radially outward by means of a cage while pressure is applied. Thus the head is formed with its projecting rim by which the case is withdrawn from the gun. A recess is provided in the die for the projecting rim. It would doubtless be possible to roll the entire case in this way, but the action would probably be slower than drawing and since existing methods produce satisfactory results, there is little argument in favor of pursuing the matter.

Primer: References have been made to indenting the depression in the head. The action of the indenting tools is to form what we might term a boss projecting inwardly in the head. This is bored and recessed to receive the primer assembled with a force fit, or in some cases of large caliber, the primer may be screwed in. A primer is not unlike a small arms cartridge but is without the bullet. Instead of having a charge of propellant, black powder may be used to ignite the main propellant in the cartridge case, the powder (in the case of percussion primers) being fired by a cap after the usual manner. In some forms, the flame from the burning powder escapes from the mouth of the primer, while in others the walls of the primer are perforated to secure more efficient ignition. The primer in this instance is of somewhat greater length to start the action nearer to the center of the charge.

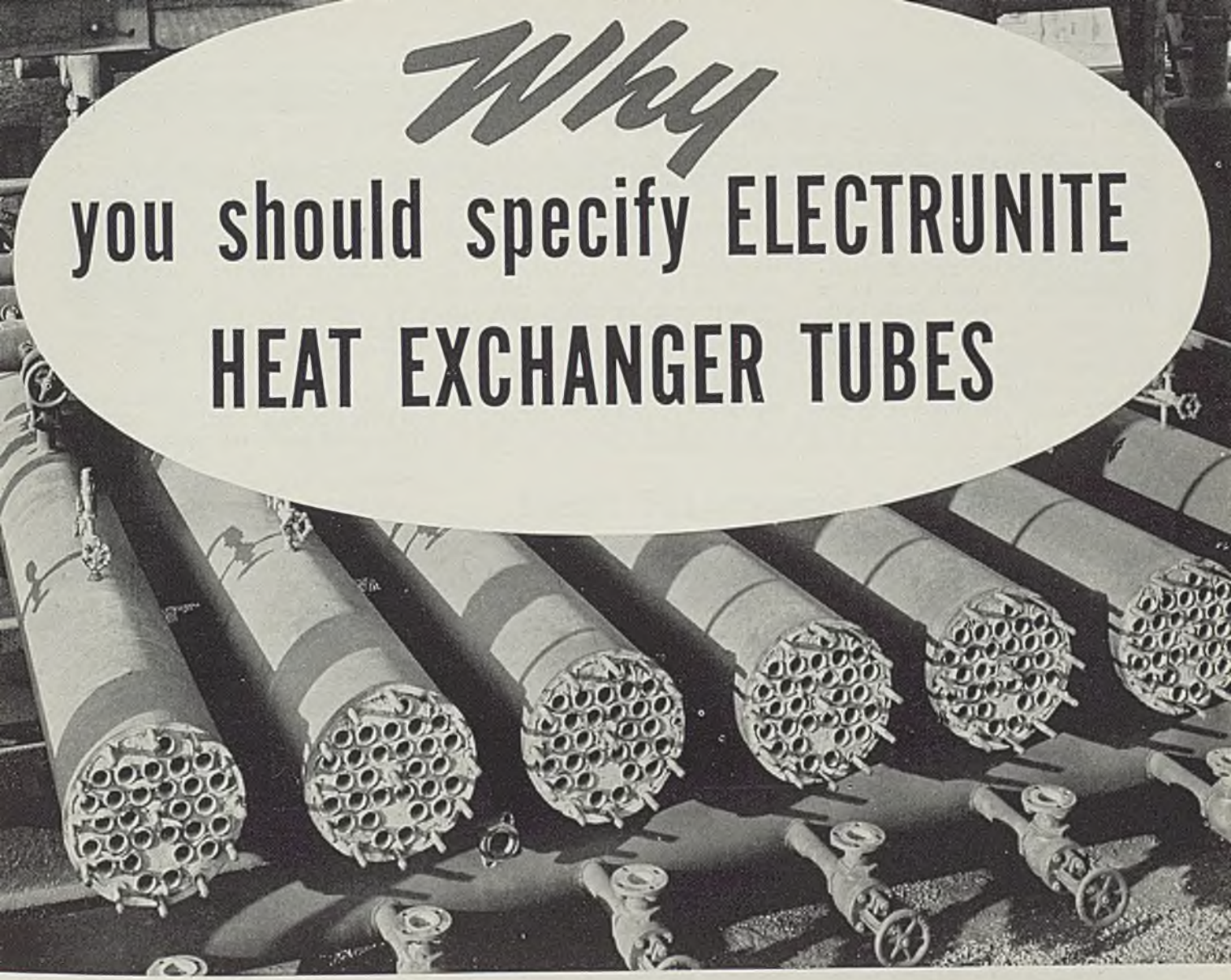
Semi-Anneal: The large amount of cold work done on the head of the case including the metal in the neighborhood of the primer seat has for its object the hardening and strengthening of the case where strength is most needed if blowbacks are to be avoided. We have still to put a taper on the case, however, in order that it may be readily withdrawn from the gun after fir-

Other Articles on Production of Ordnance

■ For other articles in addition to the series by Professor Macconochie, see issue of March 11, 1940, p. 38, for Design and Modern Methods of Making Shrapnel Shell; Dec. 2, 1940, p. 50, for Operation and Construction of Bofors Anti-aircraft Guns; Oct. 14, 1940, p. 160, and Jan. 6, 1941, p. 219, for How Technical Progress Aids Defense; Jan. 13, 1941, p. 48, for Some Typical Shell-Forging Methods; Jan. 20, 1941, p. 54, for Recommendations on Heating Billets for Shell Forging; Jan. 20, 1941, p. 74, for Making Cylinders for Packard V-12 Torpedo-Boat Engines; Feb. 10, 1941, p. 67, for New Method of Checking Gun Bores

Reprints Available

Because of the unusual interest displayed in the series of articles by Arthur F. Macconochie on the manufacture of high-explosive shell, STEEL is now preparing a 72-page reprint handbook of the entire series. These will be available at $1.00 per copy as soon as published early in May. Advance reservations, which will help determine the quantity to be run, should be addressed to STEEL, Readers' Service Department, Penton Building, Cleveland.



Why you should specify ELECTRUNITE HEAT EXCHANGER TUBES

● Electric resistance welding, as employed in the manufacture of Republic ELECTRUNITE Heat Exchanger Tubes, is the only process today which consistently produces tubes with these advantages: (1) uniform roundness; (2) uniform diameter; (3) uniform wall thickness; (4) uniform high ductility; (5) fine surface uniformly free from scale; (6) uniform freedom from concealed defects.

ELECTRUNITE Heat Exchanger Tubes are made from flat-rolled strip steel which is closely inspected on both sides. It then is cold formed into a round butted shape and electric resistance welded into a sound, strong tube homogenous in structure and with a weld as strong as the wall. Controlled atmosphere annealing produces uniform high ductility and a smooth, scale-free surface. Rigid tests, regularly made after each step in the manufacturing process, insure safety in every tube.

Because of these advantages, ELECTRUNITE Heat Exchanger Tubes slide through sheet holes without difficulty, expand and roll in to tight fits easily and quickly, make positive joints, reduce installation costs, retard corrosion, assure safe service and low maintenance cost. Millions of feet in service prove these statements.

These tubes are available in carbon and stainless steel — in sizes from ⅜ to 5-inch — and in various gauges. Write for further information and literature. Steel and Tubes Division, Republic Steel Corporation, Cleveland, Ohio.

REPUBLIC

REG. U. S. PAT. OFF.

ELECTRUNITE

ing. Before this can be done we must give the case a "semi-anneal." For this purpose the Frankford Arsenal uses a bath of saltpeter held at a temperature of 950 degrees Fahr., the heat being applied up to a point about 4 inches from the head for 2 minutes.

This treatment is found to relieve strain and soften the mouth and neck of the case to permit the tapering and necking operations to be carried out successfully. In the large case sizes, a preliminary tapering operation followed by a second semi-anneal may be necessary before attempting the final taper and necking operation. However, in the case of the 75-millimeter case, Frankford accomplishes both in one operation in a suitably formed die, with one semi-anneal. See Fig. 3.

The final operations on the case consist of machining operations on the primer hole, to which reference has already been made; and in machining the head to the required diameter and thickness of the extraction rim. A final trim brings the case to exact length and a thorough wash removes all oil and other adhering substances. All necessary information relating to size, model, lot number and so forth are stamped on the base as shown in Fig. 5 and the case is ready for final inspection.

Spot Welding Structural Steel Reduces Costs by 30 Per Cent

■ FABRICATING 20 tons of structural steel per day with spot welding through the use of the resistance forge welding process recently introduced is showing savings amounting to 30 per cent, according to Taylor & Gaskin Inc., Detroit. In making this saving, the company uses a Progressive pedestal-type welder, which not only eliminates all assembly punching and riveting from the work it handles but also the necessity for specially skilled help, since the welder's operation is almost entirely automatic. Because approximately 80 per cent of steel and iron fabrication for the average job is done entirely in the shop, the new process is expected to make many changes in the conventional methods of shop practice.

In using the equipment shown in the accompanying illustration, the operator merely feeds the work along and presses the foot-operated pilot for each spot weld.

Under regular operating conditions a conveyor feed can be used in conjunction with the machine. At present, however, because of the variety of work, hand loading is being employed.

Fabrication of struts, for instance, is handled by the welder and one helper. An entire strut assembly is 20 feet long, and consists of one 8-inch channel section to which are welded two 4 x 3 x ⅜-inch angles. The assembly is tack-welded to position the three parts, and then is delivered to the welding station. Using a hoist, the helper lifts the assembly to proper height and then steadies it while the operator positions the work—largely a matter of permitting it to rest on the lower electrode while he closes the foot-operated pilot switch for the initial weld.

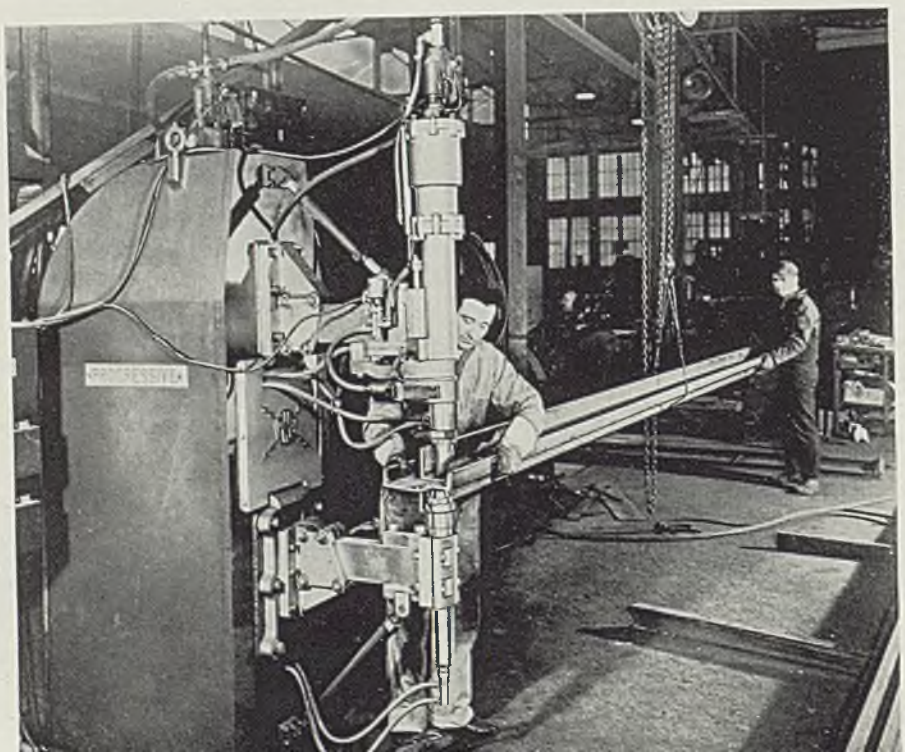
Welds are made at approximately 4-inch intervals near both ends of the work. Along the middle portion, the spot welds are made at about 6-inch centers.

Sequence of operation of the welding process is automatic and consists of the electrodes first closing on the work with initial pressure, welding current being applied, hammering the work with the initial pressure still on, and changing welding current from low to high in exact synchronization with each blow. The hammering then ceases and the initial weld pressure is resumed. Finally, the completed weld is cooled while still under pressure.

The timing control, an electronic-type timer which controls every sequence, is mounted alongside the welder. Control knobs permit "dialing" for the proper intervals.

Work is welded just as it comes from the mill, surface cleaning being unnecessary. The only inspection required is that of "sampling" the work occasionally. In "sampling," the operator merely welds some scrap which is of identical section as the work and then pulls it apart to examine the condition of the "button."

Welding a strut assembly: Here the helper is steadying the work for the operator near the machine. Note the hoist used to keep the work just at the proper level



Revision on Core Drill Fittings To Be Approved

■ On recommendation of the Diamond Core Drill Manufacturers' Association, United States Department of Commerce, National Bureau of Standards, Washington, is circulating to the industry for written acceptance before publication a recommended revision of diamond core drill fittings, commercial standard CS17-32.

While details of the revision are too numerous to relate, their chief purpose is to reduce the area of the kerf cut by the two smaller sizes of core barrel bits, thereby decreasing drilling costs and recovering a slightly larger core. The revision also provides new, thin-wall core barrels, core barrel bits and reaming shells designated EXT and AXT, as well as new flush joint casings in these two sizes.

ARC WELDS

without residual shrinkage stresses

New method is claimed to eliminate completely all residual stresses from shrinkage of weld metal. Instead of adding another set of locked-in stresses as is done with heat-balancing methods of counteracting warpage, this method is said to eliminate completely all stresses and to result in a weld stronger than an equivalent untreated weld

■ AS ORDINARILY done, arc welding sets up in the work certain shrinkage stresses, sometimes referred to as locked-in stresses. These tend to cause bending or warpage of the welded assembly. In fact, this is one of the difficulties involved in arc welding many structures.

To prevent the occurrence of shrinkage stresses, it is necessary to know exactly what physical process causes the shrinkage.

In welding, the application of intense heat to a localized area causes that highly heated area to expand, but this area cannot expand in all directions since it is restrained by the large areas of relatively cold metal surrounding the smaller area of hot metal, and therefore elastic deformation or plastic deformation takes place in the highly heated area along the line of least resistance. The fact that the modulus of elasticity as well as the yield strength of highly heated metal is relatively low makes this deformation comparatively easy.

As an illustration of this, assume a bar, as in Fig. 1, and lay a welding bead throughout its length along its center line y-y.

Then at any cross section of the bar at the moment the weld bead has just been laid we have the condition described above, with an elongated spot of highly heated metal which has undergone plastic deformation, its high temperature having caused it to expand. Because of the vastly greater strength of the whole bar at normal temperature as against the relative softness and weakness of the hot spot, this highly heated spot cannot expand along the axis of the bar y-y but can and does expand and deform outwardly and away from the mass of the bar. Thus the entire bead in its highly heated state has a length along the axis y-y which is the same as the actual length of the bar itself at its relatively colder temperature.

Then as the weld deposit cools, it undertakes to contract in all directions in accordance with its coefficient of thermal contraction. While relatively free to contract inwardly—that is, from the face toward the root of the weld—the superior bulk of the surrounding cooler metal prevents its contracting along the axis y-y, thus subjecting the weld bead plus the adjacent highly heated parent metal to tension along the axis y-y.

Fig. 2 is a graph of temperature change and internal pressure of the spot undergoing welding and subsequent cooling as outlined above. The horizontal line in Fig. 2 running through A-D represents temperature; A being room temperature, D maximum temperature of the molten metal. Vertical distances above the horizontal temperature line represent internal pressure, while distances below the horizontal line represent tension.

Now let us trace what happens. Starting at room temperature A, as heat is applied to the spot, the metal expands in all directions where it is free to do so. But the expansion is restrained along the axis y-y, so an internal pressure is built up and the curve rises from A as it goes to the right. Plastic deformation does not take place until the internal stress equals the yield strength of the metal—the point denoted by B. At B, no plastic deformation has as yet taken place, but the internal stress is just equal to the yield strength.

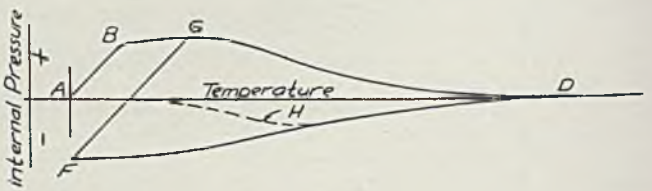
If the spot then be allowed to cool again to room temperature without further heating, the internal pressure would decrease back down to zero at A and there would remain no locked-in stress.

If, however, heat continues to be added beyond point B, plastic deformation will take place and continue so long as heat is added, the internal stress always being equal to the yield strength and decreasing to zero as the metal reaches the melting point at D.

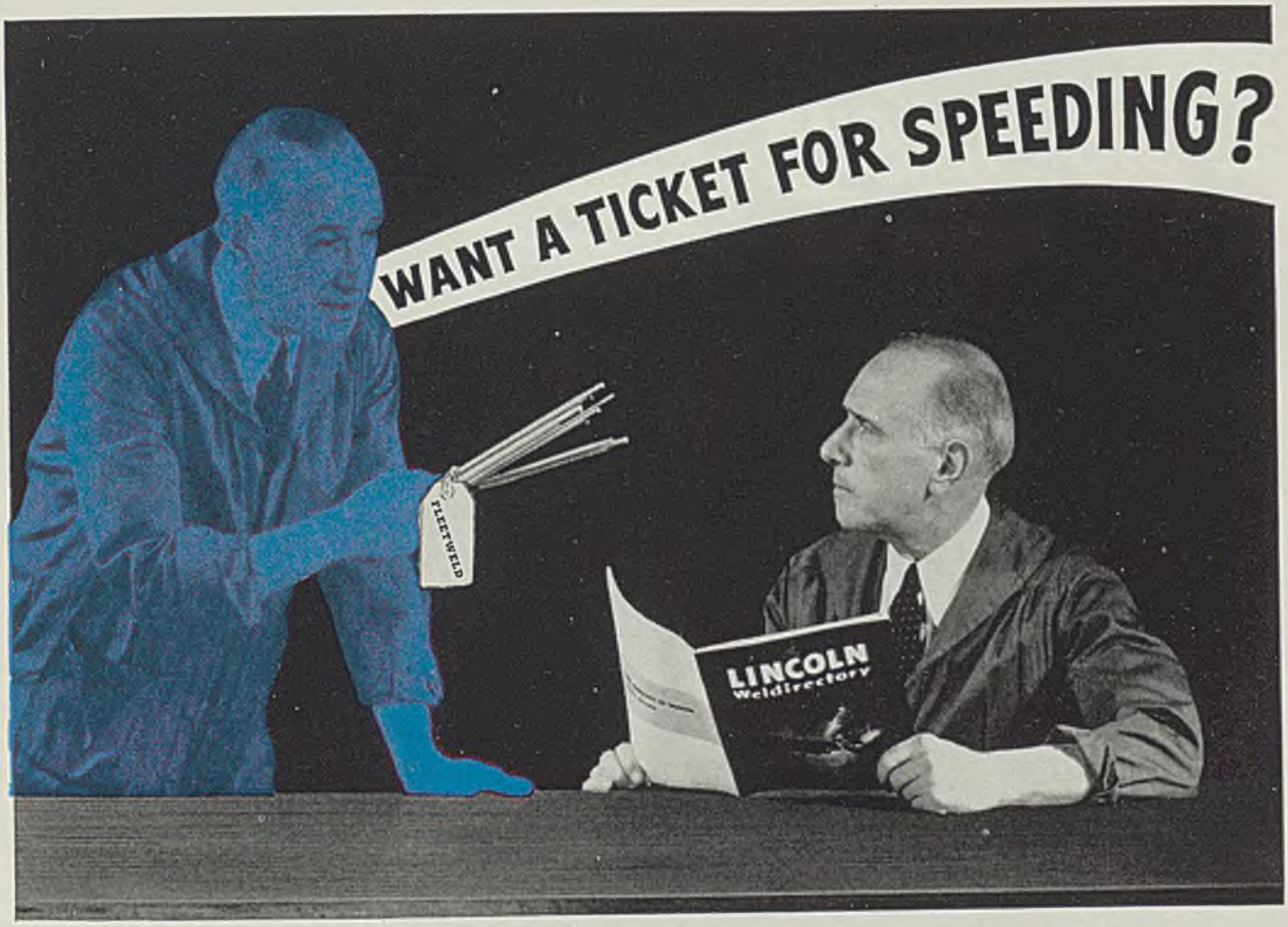
With the weld completed at the spot, the temperature decreases and the curve starts to the left. But now a reverse of the above action takes place, the metal becoming subjected to tension in accordance with the laws of thermal contraction. This tension increases until it equals the yield strength of the metal at the temperature at that instant, whereupon plastic deforma-

Fig. 1—Shrinkage along y-y causes distortion

Fig. 2—Effect of temperature on internal pressure



From an article by Ralph E. Spaulding, the Aetna Steel Construction Co., Jacksonville, Fla., published in the *Welding Journal*.



ALTER EGO: Literally "one's other self"—the still, small voice that questions, inspires and corrects our conscious action.

ALTER EGO: Certainly the Whizz Electrode demonstrator showed you speed *almost* as good as with "Fleetweld."

But the speed really was good, and the weld looks OK.

ALTER EGO: Yes, but, most of all, the *demonstrator* was good. How about the *conditions* of the show?

Come to think about it—it was just a show.

ALTER EGO: Right. 'Twas the work of a good, biased demonstrator. What counts are the results of our own men—the SPEED and QUALITY *they* can attain and maintain under *production* conditions—hour after hour—day in and day out.

Well, isn't "Fleetweld" just the ticket for that? What are we waiting for?

* *

LINCOLN SUGGESTS: Study of welding production methods often increases speeds as much as 50% through the use of work positioning, revised technique or better types of electrodes. The "Procedure Handbook" ($1.50 postpaid) on page 210 contains valuable information on this subject. Or perhaps the Lincoln man nearby can be of service to you. No obligation, of course.

LINCOLN "SHIELD-ARC" WELDING

THE LINCOLN ELECTRIC COMPANY
Cleveland, Ohio

Authoritative Information on Design • Production • Welding Equipment

. . . and made by Pittsburgh!

The name *Pittsburgh* has been associated with *better* Seamless Steel Tubing for 38 years!

Stainless Seamless Steel Tubing, manufactured by Pittsburgh Steel Company, combines the advantages of *seamless* with the characteristics of *stainless steel* analysis.

The accumulation of almost four decades of specialized experience in seamless tubing research and development has enabled our organization to obtain in *stainless* new conceptions of workability and reliability. You can count on it—to meet today's most urgent and exacting requirements!

Qualified engineers will gladly discuss problems involving the application of *Pittsburgh Stainless* Steel Tubing. Your inquiries are invited.

Pittsburgh — *A Great Name in Steel*

Trade Name for Pittsburgh Steel Company Products

Pittsburgh Steel Co. is a completely integrated steel company with ingot capacity exceeding 1,070,000 net tons. Products include: Steel Ingots—Blooms—Billets—Tube Rounds—Shell Steel—Shell Forgings—Wire Rods—Carbon and Stainless Steel Wire—many Finished Wire Products—wide range of Carbon, Alloy and Stainless Seamless Steel Tubes. Inquiries invited.

PITTSBURGH STEEL COMPANY

1653 GRANT BUILDING PITTSBURGH, PA.

Pittsburgh Seamless STEEL TUBING

tion again begins to take place. The plastic deformation continues along as the temperature continues to drop, the internal tension always being equal to the instantaneous yield strength until the point is reached where the metal has cooled back to its original starting temperature, F. At this point, the internal tension, particularly along the axis y-y, is equal to the full yield strength of the metal.

The temperature change necessary in most structural steels to produce an internal pressure equal to the yield strength is approximately 200 degrees Fahr. All metal adjacent to the weld but not subjected to an increased temperature of more than approximately 200 degrees Fahr. returns to its normal state upon cooling without locked-in stresses, its temperature-pressure curve being A to B and from B back to A.

Counteracting the Warpage

But if a spot be heated to a maximum of twice 200 or approximately 400 degrees Fahr. as represented by point G on the curve, its temperature-pressure curve during the complete cycle of heating and cooling is: A to B, at which point plastic deformation starts; B to G, during which period plastic deformation is taking place; and cooling period of G to F, during which no plastic deformation takes place, but the internal stress changes from full yield strength in compression at G to full yield strength in tension at F, where the temperature is again normal.

Therefore all metal of the weld area in which the change in temperature has not exceeded approximately 200 degrees Fahr. has no locked in stresses.

Similarly, metal in which the temperature rise has ranged from approximately 200 to 400 degrees Fahr. contains locked in stresses varying from zero to full yield strength.

All metal in which the temperature rise has exceeded approximately 400 degrees Fahr. contains locked in stresses equal to the full yield strength of the metal after the weld has cooled. This tension must be balanced by compression in the remainder of the metal, with consequent resultant shrinkage and warpage.

All welding shops are familiar with this shrinkage, and many have developed their own methods of counteracting the warpage. One method often used is to apply heat on the opposite side of the center of gravity of the piece to produce another zone of shrinkage to counteract the effect of the first zone. However, this leaves two sets of locked-in stresses in the assembly instead of one.

Another widely employed method is to relieve the locked-in stresses by annealing in an oven. This, however, is expensive and usually does not restore the warped assembly to its original shape. Furthermore, it is practically impossible to apply this method in structural work.

However, it is possible and comparatively easy and simple to prevent the initial development of this shrinkage stress in the weld area.

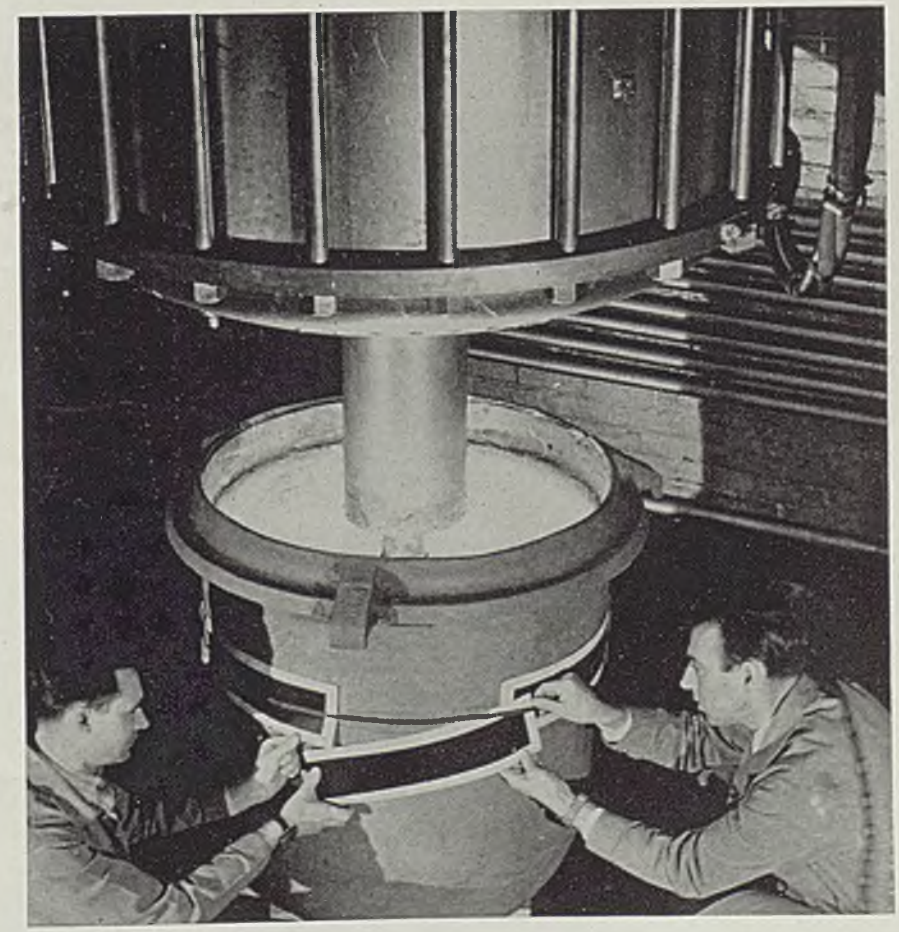
As has been described, the weld area consisting of deposited weld metal plus the adjacent original metal which was heated above 400 degrees Fahr. from its original temperature tries to adapt its normal axial length to that of the surrounding original metal during cooling. It cannot do this by itself. But if only a little assistance is given during this period of cooling, the axial length of the weld area can readily adapt itself to the normal axial length of the original metal. Obviously, however, this assistance must take place during the initial cooling of the area surrounding the weld.

This can be accomplished by pressing or lightly hammering the weld area while it is cooling. Vibratory pressure is best, or pressure only where the welding process is continuing. This added pressure, applied at right angles to the axis of the weld, can usually be accomplished best by the application of a light pneumatic or electric hammer having a tool face adapted to the desired size and contour of the weld.

If this is used at the right time —that is, while yield strength of the hot weld is relatively low—only a small amount of effort is needed, and all shrinkage tendency is found to have been eliminated. The temperature-pressure curve during this operation is illustrated by the dotted line H in Fig. 2.

The Aetna Iron & Steel Co. has patents covering this method, which it has used on certain welded assemblies for over a year with perfect results. A test made under the

Looking Into Welds



■ Unlimited information as to the soundness of weld metal is being obtained at the General Electric X-ray laboratory, Schenectady, N. Y., where this 1,000,000-volt X-ray unit is handling an ever increasing volume of industrial work. Here, engineers are placing an X-ray film holder over the welded joint of a fabricated lead pot casting preliminary to "looking into" the weld

supervision of the Pittsburgh Testing Laboratories shows that the tendency to shrink is eliminated completely. Also, the weld when thus treated was found to be stronger than an equivalent untreated weld.

This method must not be confused with so called "peening" or hammering of the weld area after it has cooled to such an extent that the elastic limits or yield strength of the area has again approximated that of the original metal.

Nor should it be compared to reheating of the weld area with or without treatment while heated since no heat produced by a flame can even approximate the same relative heat penetration and corresponding surface intensity that results from an electric arc.

In both these latter methods, counterbalancing locked-in stresses may be introduced. While they will overcome warpage, nevertheless they still subject the assembly to high internal stresses which may weaken the physical structure of the metal.

The entire success of the operation to prevent internal stresses depends upon pressing or hammering the weld area while it is hot and while the yield strength of the hot weld is relatively low. Remember this.

Introduces Patching Compound for Floors

■ Floor-Patch, a new nonshrinking patching compound for holes and ruts in any cementitious surface is reported by Truscon Laboratories, Detroit. Quick-setting, it is said to be adaptable to quick, overnight repairs, and floors upon which it is applied may be used for light traffic the next morning.

The material is not a tar, asphalt nor a portland cement product. It is shipped ready for use, the addition of water being the only requirement necessary before it can be applied. It works either indoors or outdoors and eventually sets harder than the concrete itself.

Buys Patent Rights on Millholland Unit

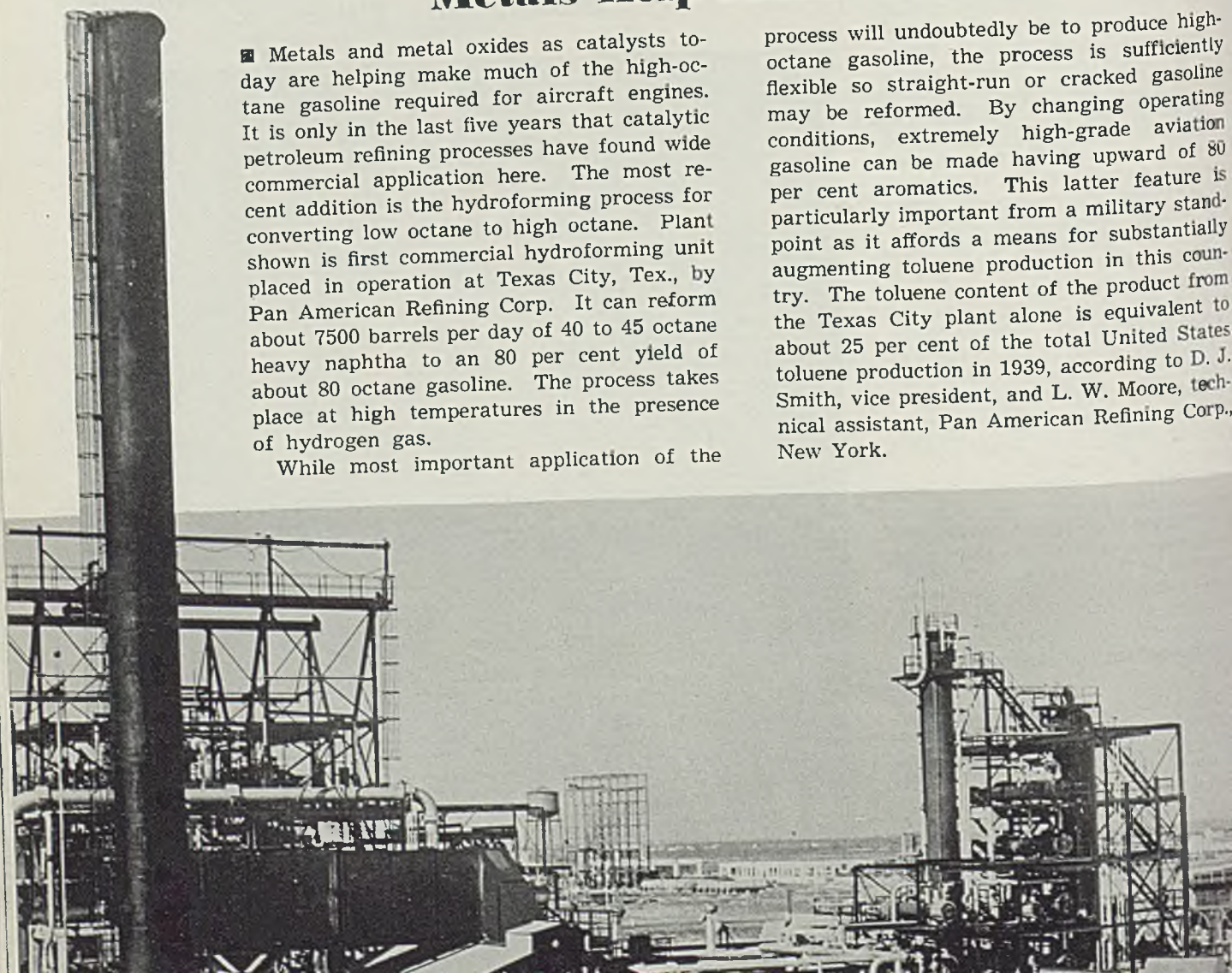
■ Enterprise Machine Parts Corp., Detroit, reports the purchase of the Millholland patent rights and the subsequent manufacturing of these unit mechanisms under their name, "Empco." According to the company, many improvements have been incorporated with the consequent stepping up of efficiency.

At present these units are designed especially for heavy work such as for drilling, milling, tapping, reaming and spotfacing (either singly or in multiples)—and are used to form machines for speedy production. The great speed with which they perform is attributed to a specially designed cam having a chip cutting efficiency of 80 to 38 per cent.

Metals Help Make Gasoline

■ Metals and metal oxides as catalysts today are helping make much of the high-octane gasoline required for aircraft engines. It is only in the last five years that catalytic petroleum refining processes have found wide commercial application here. The most recent addition is the hydroforming process for converting low octane to high octane. Plant shown is first commercial hydroforming unit placed in operation at Texas City, Tex., by Pan American Refining Corp. It can reform about 7500 barrels per day of 40 to 45 octane heavy naphtha to an 80 per cent yield of about 80 octane gasoline. The process takes place at high temperatures in the presence of hydrogen gas.

While most important application of the process will undoubtedly be to produce high-octane gasoline, the process is sufficiently flexible so straight-run or cracked gasoline may be reformed. By changing operating conditions, extremely high-grade aviation gasoline can be made having upward of 80 per cent aromatics. This latter feature is particularly important from a military standpoint as it affords a means for substantially augmenting toluene production in this country. The toluene content of the product from the Texas City plant alone is equivalent to about 25 per cent of the total United States toluene production in 1939, according to D. J. Smith, vice president, and L. W. Moore, technical assistant, Pan American Refining Corp., New York.



THE TEST
that upset the Turbine Oil applecart

. . . PROVES NEW SHELL TURBO OIL PREVENTS RUST

THE 4 steel test strips shown prove that Shell Turbo Oil positively prevents rusting. All 4 strips were immersed for 48 hours at 167° F. in 4 well-known turbine oils, mixed with 10% of distilled water, and continuously agitated at 1200 R.P.M. Top strip, immersed in Shell Turbo Oil under these severe test conditions, shows no rust. All other strips were badly rusted.

GET THE DETAILS TODAY!

SHELL

SHELL TURBO OIL

BETWEEN HEATS

WITH Shorty

■ Say Fellers:

Comin' through the strip mill the other day I overheard one of the fellers in the combustion gang talkin' to the Hoopie Mason, the heater on the 84-inch mill.

"Hoopie," he sez, "We've found the burner that's makin' the pits on the underside of the strip 'n we're changin' 'er. Okay with you?"

"Sure thing, old topper. Get goin'. 'N don't make any more dirt than y' kin help cuz we gotta bunch of fellers comin' through the mill today to give 'er the once-over."

Wrenches began to clank on the gas line 'n 'fore y' know it, the gang had the deficient burner off 'n a new one in its place 'n the B.t.u.'s dancin' 'round all over the hearth 'long with the rest of 'em. Then pickin' up the ol' burner 'n their tools, the gang made their way back to the gas meter house.

Setup Is Mighty Handy

I'll tellya, fellers, we think we've gotta pretty nice setup in our plant for dishin' out the gas to the various departments over in the plant. Fac' is the fellers going through the plant the other day thought so too. We gotta feller by the name of George Coughlin runnin' the combustion department. We call 'im "The Banker" cuz he pays out B.t.u.'s to all the furnaces over in the plant 'n all reports have gotta balance with George's or he'll sic the "Dics" on 'em. Y' know —jus' like the federal reserve does.

Say, if y' gotta a banker that really wants to learn the bankin' business, send 'im down to the plant 'n let 'em talk to George awhile 'n when your banker gets onto the ropes, he'll know more 'bout pilin' up the shekels than he ever knew before. Say when George gets through with a cubic foot of gas there's no need for a smoke stack cuz there ain't nothin' left to dirty the atmosphere.

Y' see, we use three kinds of gas at the plant —blast furnace, coke oven and natural. All three mains pass through the gas meter house 'n then out into the plant. George has meters on every blamed furnace in the mill from the open hearths to the annealing department 'n these click off the B.t.u.'s jus' like the cash registers in the 5 and 10c stores. The furnace tender has a big dial which indicates how much gas he's usin', 'n if the amount don't tally with the figgers in George's budget—well I'm not sayin' 'zactly what'd happen but I'll betcha the furnace tender 'd be dustin' off his gage 'fore he finishes his turn so as he could get a better squint at the indicator hand. I'm tellin' y', fellers, George is a banker 'n the B.t.u.'s passin' through 'is hands are really payin' interest.

It's Not Much Trouble

Here's how he does it. He's gotta a recorder and integrator on each gas line—all centralized in 'is gas meter house. One of 'is gang determines the B.t.u.'s in the gas comin' from the coke ovens as well as those in the bought natural gas so as to tell how many heat units are being dished out to each furnace in the plant.

Then every 8 hours within one hour of the end of the turn, the foreman in each department is given a report showing the B.t.u.'s that were used to heat a ton of steel for the turn before on that furnace. 'N that's not all cuz the super'ntendent gets the same information daily in addition to the B.t.u. consumption for 24 hours besides the B.t.u. consumption per ton to date used.

Yeah, y' see, George has 'em by the 'spenders now cuz if any furnace goes off the straight path, he knows it 'n he sez to the guy operatin' the furnace, "Whatsa matter, big boy? Tryin' to heat those slabs up in the smoke stack? Make those little hot bouncing thermal babies dance their jig down on the hearth, will ya?"

'N then when they tap a heat over at the open hearths, the gas meter is read 'n the total B.t.u.'s determined 'n when the heat of steel is weighed, y' can betcher life the fellers know the B.t.u. consumption per ton from tap to tap. I'm tellin' y' George handles B.t.u.'s jus' like a banker handles those 59-cent dollar bills.

There's a gas dispatcher on duty 24 hours in the meter house and if the coke oven gas gets on the low side he switches the furnaces in the plant onto natural gas. The dispatcher in 'is spare time does the book keeping that is necessary.

Then the foreman of each department calls up the gas meter house 'n reports the tons handled by each furnace in 'is department per turn, 'n 'fore long he gets a report back of the B.t.u. consumption per ton. This is then posted on a board near each furnace for comparison. N' in the morning a copy of the report is mailed to each superintendent.

Not Many Heat Units Lost

I'll tellya, fellers, there's only one way for a B.t.u. to get outta the plant 'n that's in the trunk compartment of George's Mercury car. Even then he'd probably find it when he got home 'n give it to the Mrs. to help the supper along.

But, I'll let y' in on a secret, fellers. The B.t.u.'s nearly got George down. On March 31 one of the new men in George's gang sez to 'im, "Boss, suppose somethin' happens to the natural gas line. Whadda y' do?"

"Here's how ya handle 'er," sez George. 'N he drew up a rough draft of the procedure to follow.

Next day 'bout 5:30 p. m. George gets a telephone call. "Boss, you'd better come down to the plant cuz we've only got a few ounces pressure on the natural gas line," the voice at the other end sez. 'N that exactly what happened. Excessive rains 'n landslide had caused a break in the main.

But George remembering that it was April fool's day sez, "Go jump in the lake," 'n then he hung up the receiver.

His telephone rang again and the voice sez, "No foolin', Boss, I got everything switched onto coke oven gas. Better come down." I won't tell any more of the conversation but can betcher life George's pipe threw off more products of combustion on April fool's day than all of our blast stoves over at the blast furnace put together. He sure did some puffin' that day.

So long, fellers, I'll be seein' ya.

"Shorty" Long

MORE SPEED!

McKee can help you meet the demand for more steel with MORE SPEED in iron and steel plant construction . . .

The iron and steel estimating department in the new air-conditioned McKee Building. The long experience of the McKee staff of estimating engineers enables us to give you complete and accurate estimates of your job in record time.

TO meet today's urgent demands, steel plant management is faced with the necessity of rebuilding and enlarging many units which have operated to the point where efficiency is rapidly decreasing.

The McKee organization can help in two ways to complete this job in the shortest possible time.

FIRST, *McKee can get the necessary material on the job earlier.* Much of the design for modern successful plants completed by us in the past few years can be quickly adapted to your project. By duplicating designs we can order material far in advance of completion of detailed engineering. This minimizes delivery delays and permits us to start construction at the earliest possible date.

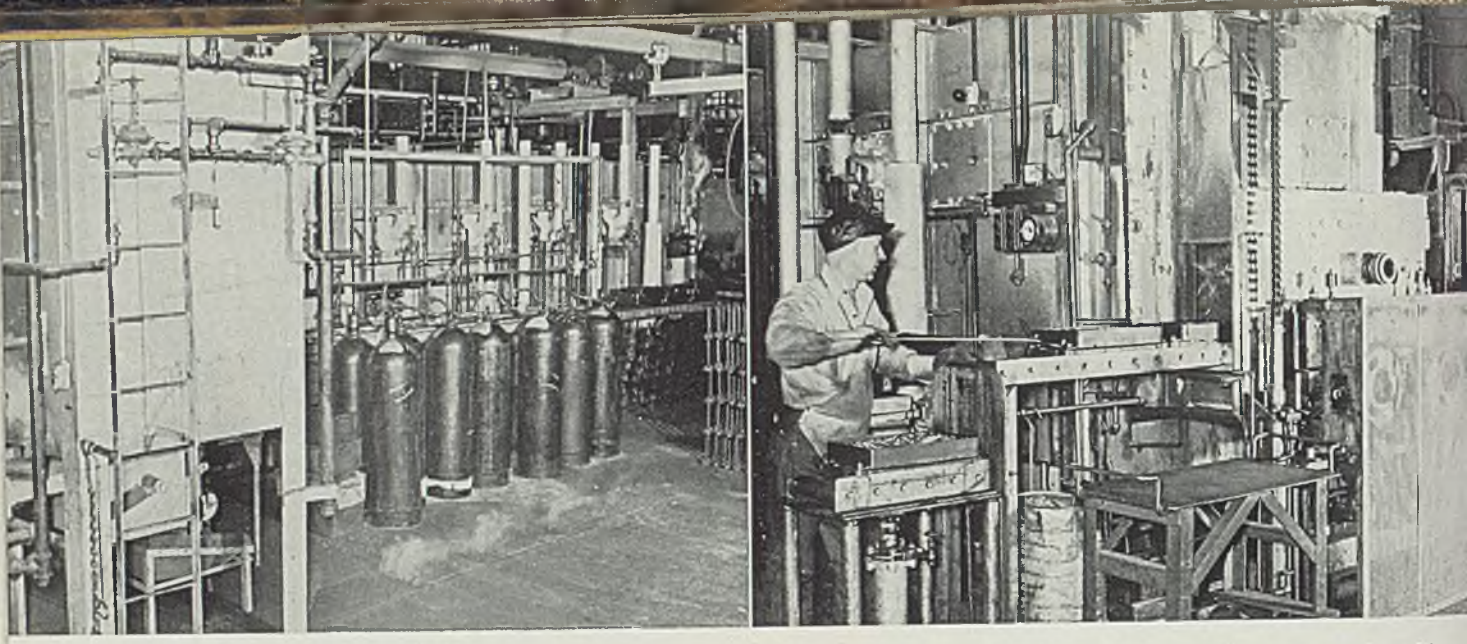
SECOND, *McKee can reduce the time during which the unit is out of production.* The long experience of McKee men in working together as an organization has produced a close coordination and efficiency which speeds up construction and reduces your loss of production to a minimum.

By the McKee method your project is handled entirely within our own organization and you are protected by a *single lump sum contract* which places complete responsibility on this company.

Arthur G. McKee & Company

★ *Engineers and Contractors* ★

2300 CHESTER AVENUE · CLEVELAND, OHIO



Carburizing gas generator, at left, with manifolded ammonia tanks alongside furnace in background. Charging end of furnace from generator side, right, showing two trays entering vestibule

Hardening Small Parts Aided by Unusual Furnace

Wide variety of small parts are given various types of hardening treatments automatically in special unit which employs radiant-tube heating. A mixture of prepared gas, city gas, propane and ammonia is cracked for case-hardening work. Cycle of screw-type pusher is only variable utilized to produce different types of case, other factors being kept constant

■ LIGHT case hardening of a wide variety of small steel parts used in Buick automobiles for 1941 is being carried out in a new type of continuous gas furnace boasting a number of constructional and operating innovations. Table I shows parts processed in the furnace, the steel from which they are made and details of the heat treatment.

Parts are pushed through the furnace in trays, two rows of which ride side by side on alloy steel rails resting on structural cross members. Each row includes 28 trays, 12 x 18 inches in size. They are moved by a pusher mechanism at the charging end which exerts pressure on the two trays being charged and thus moves the entire row of trays and discharges a pair onto the quenching fixture at the discharge end. No conveyor chains or dogs are required inside the furnace.

The furnace case is sealed tight. It is fired through 20 return-bend U-tubes heated through low-pressure gas burners. Seven burners fire on each side over the charge; three fire below on one side and two below on the opposite side, these at the front or charging end of the furnace; one burner fires below the charge near the discharge end. Temperatures are controlled in three zones of the furnace, operating temperature being in the range 1500 to 1525 degrees Fahr.

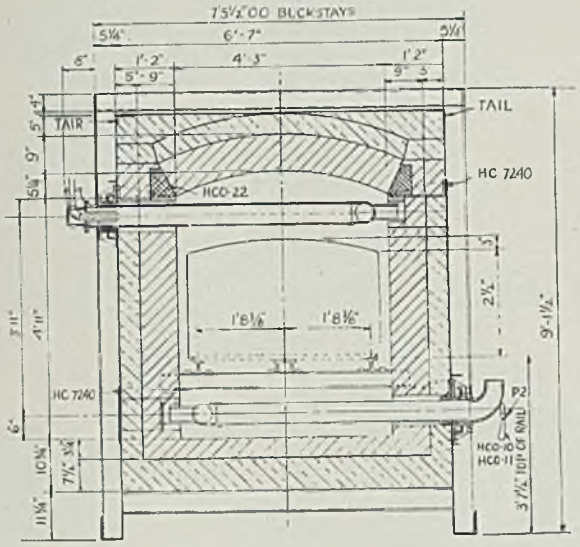
Radiant tubes are 5 inches in diameter and exhaust into short vertical stacks outside the furnace on either side.

Trays are of special design, made either to hold a loose charge of small parts, or a racked charge of parts, the latter supported in an alloy grid placed over the top of the tray. Bottoms are open mesh and sides are perforated to permit ready passage of the carburizing gas. The trays are kept lined up inside the furnace by means of lips on the two outside rails on which they travel. Center rail has a double web and is flat on top. Each tray carries an average load of about 40 pounds. Furnace capacity is 1500 pounds per hour, allowing 1½ hours in the furnace at 1500 degrees Fahr.

Hardening gas is a mixture of prepared gas, city gas, propane and ammonia, in the following typical

TABLE I—Typical Parts Handled

Part	Steel	Type of Case
Clutch release yokes	SAE 1010 with 1112 pins	0.007-min.
Selector shafts	SAE 1112	0.007-min.
Shifter rails	SAE X1315	0.007-min.
Shifter control levers	SAE 1010	File hard
Pushrod lower ends	SAE 1112	0.007-min.
Pushrod upper ends	SAE 1112	0.007-min.
Valve adjusting ball studs	SAE 1112	0.007-min.
Brake pedal pins	SAE 1115	File hard
Propeller shaft couplings	SAE X1345	Harden, no case
Flywheel ring gears	SAE 1045	Rockwell C37-40 on teeth
Oil pump shafts	SAE X1015	0.010-min.
Knuckle spindle nuts	SAE 1112	File hard
Clutch release lever pins	SAE 1112	File hard
Steering knuckle support nuts	SAE 1112	File hard
Oil pump idler gear pins—first carburized with 0.020 to 0.030 case	SAE X1015	File hard
Oil pressure valves	SAE X1335	Rockwell C40 min.



Section through gas-fired carburizing furnace used by Buick at Flint, Mich. Case and vestibule are welded gas tight. Radiant tubes are return-bend type

proportions, the figures being hourly consumption:

Prepared gas	700 cubic feet
City gas	200 cubic feet
Propane	14 cubic feet
Ammonia	180 cubic feet

Gas is prepared in a patented type of generator in which city gas and air in proportions of 1.7 parts of air to 1 of gas are partially cracked inside an alloy bottle, heated externally. After cracking the gas, the mixture is passed through a dehydrator and then through charcoal which builds up the ratio of carbon dioxide to carbon monoxide. Gas is admitted to the furnace through three sealed inlets at the side, just above the level of the tops of the trays. Circulation is provided by three power driven fans set in circular openings in the refractory bottom of the furnace, about 18 inches below the rails. Motors for the fans are outside the furnace and drive shafts are sealed with bushings to prevent gas leaks. A Selas "flo-scope" is attached to the generator to indicate flow rates of the various gases.

Ammonia tanks are manifolded, six in a bank, with three in use at one time. It was found necessary to use three tanks because with only one supplying gas, it would tend to freeze up because of too rapid flow. Gas passes through a pressure regulator, with flow gaged from a manometer.

Pressure of the carburizing gas is regulated at from 0.15 to 0.30-inch of water, the pressure recording outlet pipe being located about at the center of the furnace, halfway up the side wall.

A vestibule is provided at the charging end to prevent loss of gas inside the furnace. An outer door is opened and two trays are placed in position on the rails in the vestibule. The door is closed and an inner door opened, following which the pusher mechanism starts its cycle and moves the line of trays ahead one position. A screw-type pusher is used, controlled through electric timeclock. Pushing cycle may be varied from 3 to 7 minutes, depending upon the type of case desired on the parts. Where specifications call for file-hard case, the cycle usually is set at 3 minutes; where a heavier case, such as 0.010-inch, is required, the cycle is lengthened to 7 minutes. Thus the only variable is the pushing cycle, temperature and carburizing gas mixture being held fairly constant.

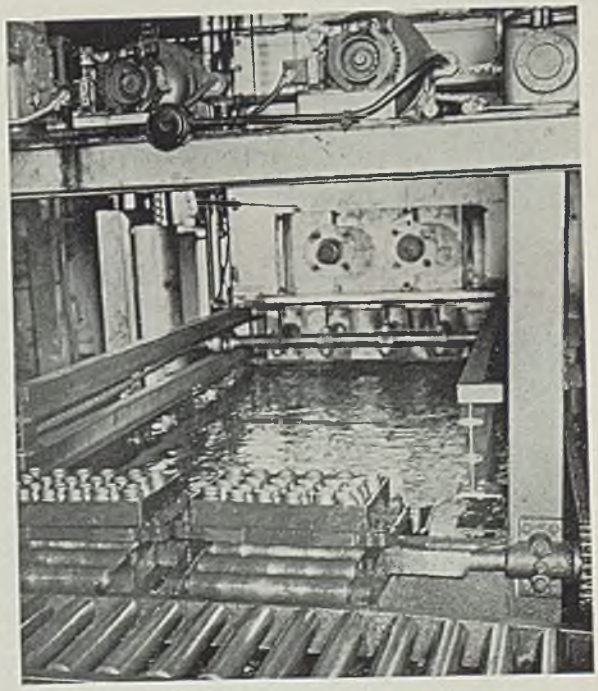
Double doors also are provided at the discharge end. As two trays emerge into the discharge vestibule, a set of arms pulls them out onto an elevator which lowers them into the oil quench tank. Cycle of this elevator also is controlled by electric timeclock, on the same basis as the pusher. In the oil the trays rest on an inclined chain conveyor which moves them up and out of the oil to permit an operator to unload. As parts are unloaded from the trays, the latter are placed on an inclined roller conveyor which returns them to the charging end of the furnace for the next load. Unusual feature of the quench tank is that it is not set in the customary pit in the floor, but instead is above floor level, easily accessible for maintenance and inspection.

This is possible because the rails on which the trays ride inside the furnace are 43½ inches above floor level. Other dimensions of the furnace are: Overall height, 9 feet 1½ inches; inside width, 4 feet 3 inches; inside length, 27 feet 6 inches; available height inside, 2 feet 2 inches; width to outside of buckstays is 7 feet 5½ inches; sidewall thickness, 14 inches; distance between centers of top and bottom radiant tubes, 4 feet 11 inches. Design of furnace and generator was developed by Holcroft & Co., Detroit.

It is always possible to vary operation of the furnace for special purpose. For example, propeller shaft couplings require no case, merely a clean hardening, so the ammonia is shut off when these parts are being processed and they are given a straight heating at 1525 degrees Fahr. and an oil quench.

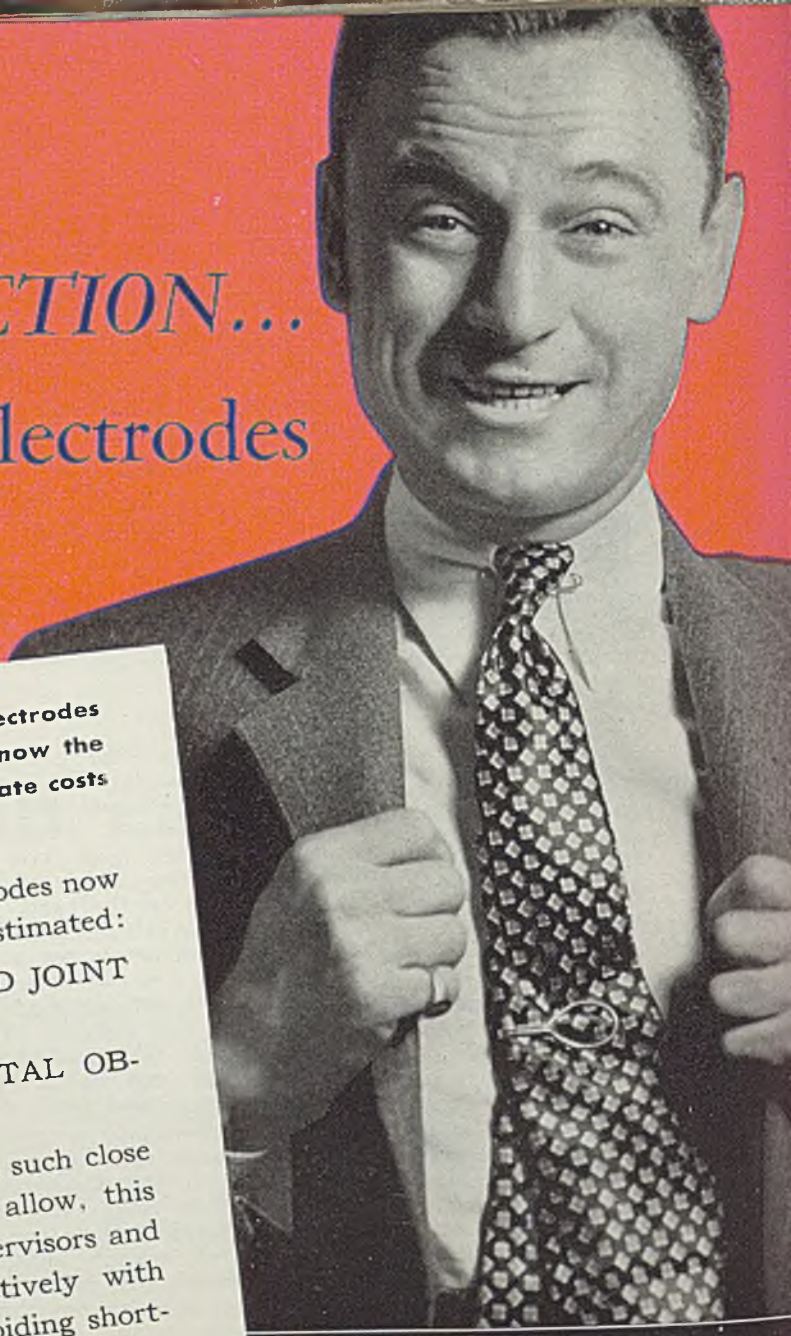
Offers New Publication

■ "The Wheelabrator Digest" is the title of a new house organ recently published by American Foundry Equipment Co., Mishawaka, Ind. Covering a wide range of subjects related to the advancement of cleaning methods, it is available free to anyone interested in receiving it.



From furnace, work is discharged onto elevator which lowers parts into quench tank automatically, working on same cycle as the pusher. Here trays are emerging from the oil quench

"I buy *PRODUCTION*... when I buy electrodes



—and G.E.'s new production-labeled electrodes help me buy production. They help me to know the pounds of electrodes required and to estimate costs more closely than ever before."

Each 50-lb box of G-E mild-steel electrodes now bears a label that gives you the estimated:

—LINEAR FOOTAGE OF WELDED JOINT OBTAINABLE

—WEIGHT OF DEPOSITED METAL OBTAINABLE

With maximum profits depending on such close margins as present-day operations allow, this new engineering service enables supervisors and foremen to co-operate more effectively with their purchasing department in avoiding shortages and top-heavy inventories.

G-E electrodes further save you money on your welding by their wide range of application and easy "usability." Samples free—from your nearest G-E welding distributor or G-E office.

Production data is available on heavily-coated, mild-steel electrodes, "all-position" types, W-20, -22, -25, -30 (⅛- to ¼-in. dia.) and "flat-position" types, W-23 and W-24 (¼-in. to ⅜-in. dia.). Data on other sizes on request.

Don't Forget....

It's not the pounds you buy in the box that make welding profits--it's the footage you get in the joint that counts!

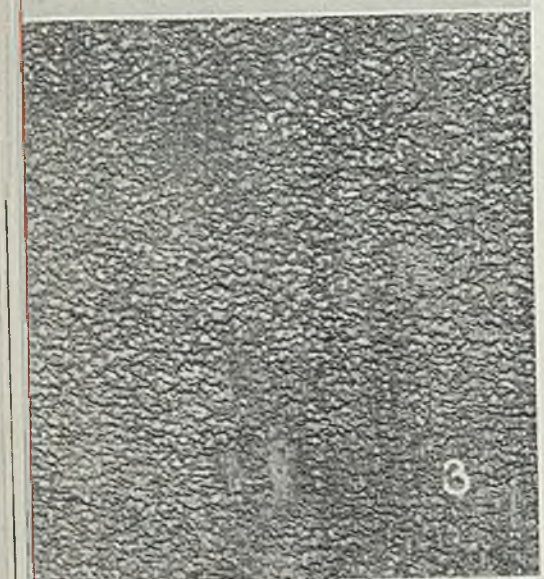
(whether you buy 'em by the box or by the car-load)

That's why G-E "production-labeled" electrodes deliver extra value all along the line—from supervisors to skilled welding operators. These rods "take the heat" right down to the holder end. At the same time, practically all the molten weld-metal is deposited in the joint where it is needed, not spattered over surfaces adjacent to the joint. As a result, welding costs are reduced and operators turn out better work—faster and easier.

A complete demonstration of these profit-building elec trodes—on *your* work—is available from any G-E ar welding distributor. His stocks are fresh and offer you dependable source of supply.

There's no obligation in sampling these G-E rods or i having a free demonstration. Why not phone or writ today? Or, if you prefer, write to General Electric Co Schenectady, New York.

GENERAL ELECTRIC



Improving the Quality of Hot Rolled Strip

Uniform heating of the slab is one of the controlling factors in the manufacturing of strip steel. Oxygenization causes cracked edges and slivers, a tight scale formation that is difficult to remove under the high-pressure sprays, and opens up the surface of the steel. The author discusses the principle of heating and stresses the importance of the proper furnace atmosphere

By PAUL J. McKIMM
Cleveland

■ PRINCIPAL requirements for quality hot strip are a smooth and open surface, free from scale pits; a uniform oxide or scale, free from redness or discoloration; uniformity of gage over an individual strip, that is, edge to edge, from end to end, and from strip to strip or band to band; a good flatness; freedom from all mechanical defects such as scratches, digs, guide rubs, reel marks, etc.; and physical properties and grain structure meeting specifications and performing successfully in fabrication.

The rolling of hot strip is only one of a number of processes employed in producing a good commercial product. Therefore, it is necessary that it be co-ordinated with other subsequent manufacturing operations. Hot strip operation is not a method of curing any inherent or existing imperfections or defectiveness but is apt to add some thereto. It is absolutely necessary to have suitable and high-quality steel from the steelmaking units, whether it is of the bessemer, open-hearth, or electric furnace processes. This requirement for steel quality may be regularly and consistently met.

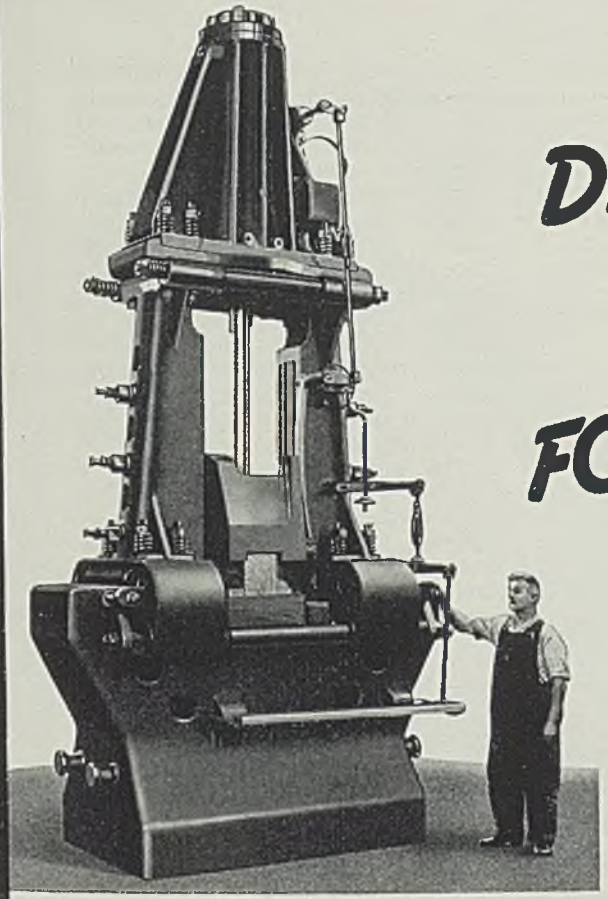
Soaking pit heating is of vital importance although more or less generally considered as a means to get the ingots in a condition to roll ignoring the fundamentals of the process, that is, heating as it affects quality. The blooming or slabbing process can damage the material excessively. Then there is the question of conditioning the resultant slab preparatory to hot strip mill processing. This can be accomplished by one of several methods such as chipping or torch scarfing which is the most rapid and by far the cheapest. It is desirable, however, to manufacture steel of such a quality and to process it up to this stage in such manner as to require no conditioning.

Where the strip mill is adjacent to or in alignment with a modern slabbing mill, steel not requiring conditioning can be rolled with the initial heat of the ingot and yield the desired strip finishing temperature.

If and where such system of alignment does not exist, the slabs can be fed direct to the reheating furnaces for a slight increase in temperature. Either feature offers considerable savings over the conditioning cost.

Steel impaired by improper heating is not of the desired quality even after conditioning. For example, slabs rolled from ingots that

Fig. 1—Photomicrograph of hot strip at 15 diameters showing burned edges as result of poor heating. Fig. 2—Photomicrograph (100X) showing edge of extremely overoxidized steel. Fig. 3—Surface of strip with minute fissures as a result of an overoxidized condition. Fig. 4—Normally heated slab free of fissures and minute tears



DROP HAMMERS

1,000 LBS. TO 16,000 LBS. CAPACITY

FORGING HAMMERS

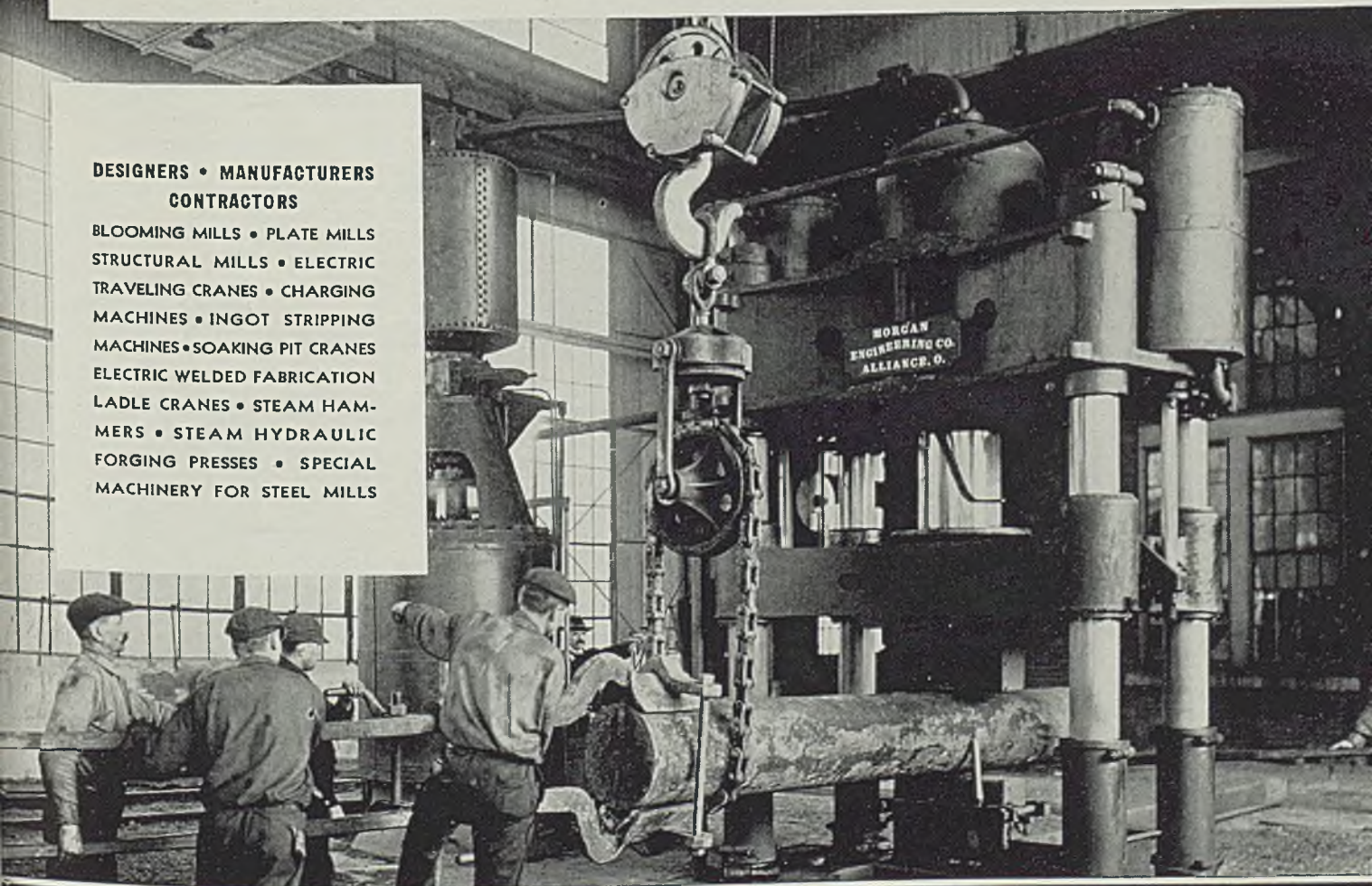
150 LBS. TO 40,000 LBS. CAPACITY

FORGING PRESSES

300 TONS TO 6,000 TONS CAPACITY

DESIGNERS • MANUFACTURERS
CONTRACTORS

BLOOMING MILLS • PLATE MILLS
STRUCTURAL MILLS • ELECTRIC
TRAVELING CRANES • CHARGING
MACHINES • INGOT STRIPPING
MACHINES • SOAKING PIT CRANES
ELECTRIC WELDED FABRICATION
LADLE CRANES • STEAM HAM-
MERS • STEAM HYDRAULIC
FORGING PRESSES • SPECIAL
MACHINERY FOR STEEL MILLS



THE MORGAN *Engineering Co*

have been damaged by oxygenized heating, commonly known as overheating or burned, cease to possess the full requirements of prime quality and generally offer a loss in yield because of surface imperfections as well as failure in physical values. In a given plant where the processes are not suitably controlled and a wide variance exists in quality, it is necessary to condition the surface in which event the utmost care should be exercised to avoid rejection of the final product.

For the present it is assumed that the slab for hot strip processing, possesses normality in all respects and is of the most practical quality.

The controlling factor in the manufacture of hot strip is the heating of the slabs. It is essential that the proper degree of heat units be applied and that the slabs be properly soaked to possess uniform temperature throughout the section and from slab to slab. These conditions must be attained with a suitable furnace atmosphere because all effects of hot or mechanical working, which reflect in the ultimate quality of the strip, are hereby controlled.

The type of heating furnace may vary, as well as the kind of fuel utilized and the method of firing. But the quality of heating is dependent upon the proper application of a given fuel with the design of the furnace, the burning mechanism, and the proper human control.

It is irrelevant whether the slabs are charged hot or cold into the heating furnaces. However, the advantage of charging them hot is the saving in fuel. Moreover, quality heating is easier to attain especially where a shortage of capacity exists.

The furnaces and their capacity should be such that the desired quality of heating can be maintained over a wide range of production in order to hold the maximum average hourly rate constant.

A good policy is to establish a maximum hourly tonnage average for given equipment and chart the slab weight, and the number of slabs per hour and minute with the time interval between slabs as a standard, and then to align all other features so as to maintain a constant quality with the highest possible production.

The fundamental principle of heating is to have the steel thor-

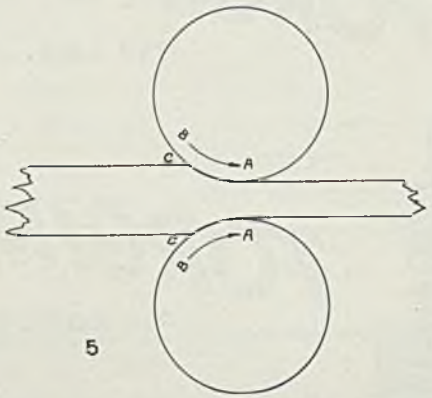


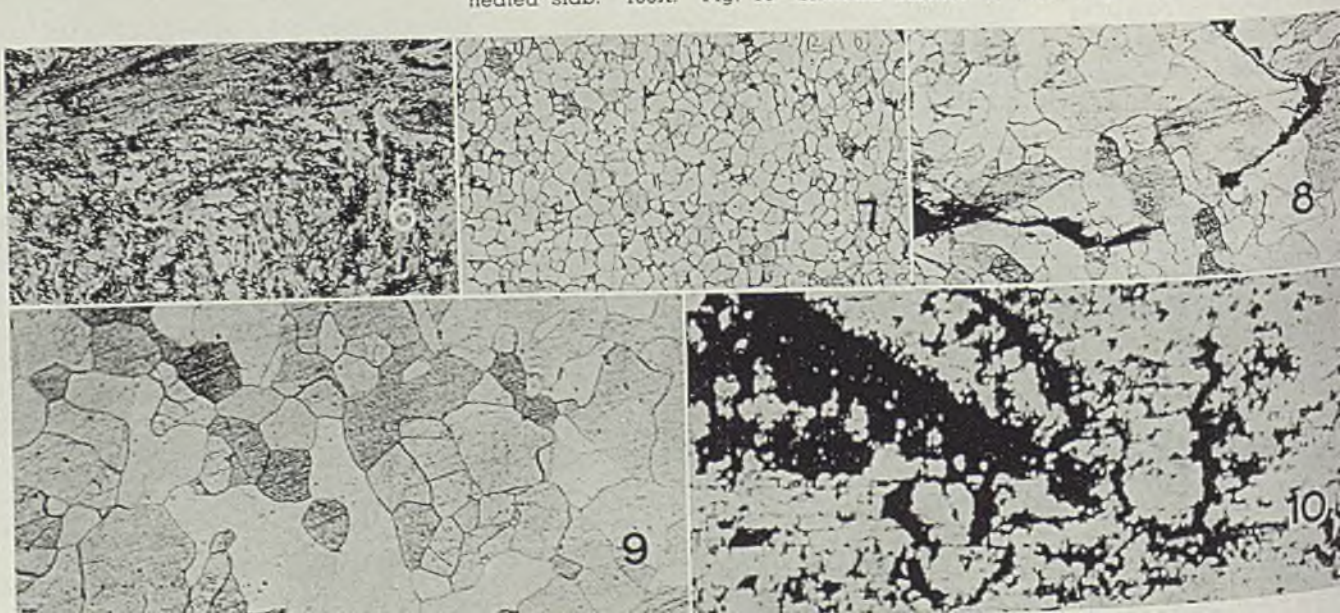
Fig. 5—Sketch which indicates stressing of steel in tension

oughly soaked or saturated with heat at a predetermined rolling temperature. In hot strip practice this is always established so that mechanical working can be completed while the steel is still above the upper critical range. For low-carbon steels this temperature is generally over 2200 degrees Fahr. and the furnace atmosphere is controlled so that a scale or jacket completely covers the slab. This scale should be of such chemical and physical characteristics that it is readily cleaned and eliminated at the first high-pressure spray. The furnace atmosphere is usually maintained slightly reducing until shortly before discharging where it is slightly oxidizing so that scale will easily clean. This feature is simple in all modern reheating furnaces designed with several heating and soaking zones. Sweating or washing, however, should be avoided because this later results in rejections.

The most detrimental effect of heating is that of oxygenization. This leads to cracked edges due to "burning"; creates a scale that will not readily clean and, hence, will be rolled into the surface of the steel and result in streaks of varying degree and scale specks; and promotes open surface. The quality of the furnace atmosphere controls secondary scale formation thereby influencing the scale cleaning conditions at the various spray units along the mill train. It also controls the adhesiveness or looseness of scaling after rolling. The most commonly encountered defectiveness due to improper heating especially as effected by furnace atmospheres are cracked edges, slivers, rolled-in scale, hair line seams, gage, shape, physical properties and grain structure.

The effect of burned edges is shown in Fig. 1, a photomicrograph at 15 diameters of hot strip (63 inches wide x 0.109 gage) etched slightly greater than necessary for scale removal. This shows the effects of poor heating and the extent

Fig. 6—Grain characteristics of strip with objectionable edges. Fig. 7—Grain characteristics of steel shown in Fig. 1 after changing furnace atmosphere but using same temperature (2250 degrees Fahr.) ahead of scale breaker. Fig. 8—Cross section of steel shown in Fig. 3. 100X. Fig. 9—Microstructure of normally heated slab. 100X. Fig. 10—Slivered surface of cold strip. 25X enlarged 100X



CONTINENTAL'S
Men, Machines and Facilities
MEET TODAY'S DEMANDS

These resources meet today's challenge for increased production to complete America's program of defense—with steel.

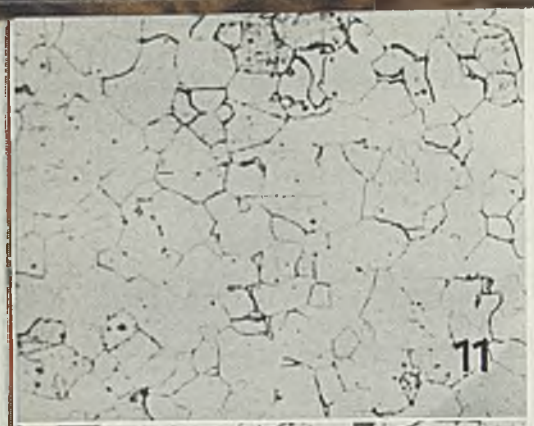
Steel mills specify equipment that's built to take it, stand the load of high speed production—equipment that will enable them to keep schedules. That is why there are more Cromonite Rolls and other Continental Steel rolls on the job today than ever before.

In addition to rolls, Continental also manufactures rolling mill and heavy defense equipment. Their foundries produce castings weighing from 1 pound to 250,000 pounds, which include Carbon Steel, Alloy Steel and Cast Armor. Also complete facilities for Heat Treating.

4 Strategically located plants are operating 24 hours a day to meet delivery dates on schedule.

CONTINENTAL
ROLL & STEEL FOUNDRY COMPANY
CHICAGO · PITTSBURGH

CROMONITE ROLLS
PIONEERED BY CONTINENTAL FOR HIGH SPEED STRIP MILL OPERATION



of defectiveness from edge toward center. A slitting operation is required though this frequently does not eliminate the defect because the surface has been damaged which usually is evidenced by hair-line seams and open surface. The grain structure is also damaged being dependent on the extent of time that the steel had been subjected to temperature and the amount of oxygen present in the furnace atmosphere. Fig. 2 shows a photomicrograph (100X) of an edge of extremely overoxidized steel and depicts how the oxygen cuts into the body of the steel by the extensive fissure of larger size and the minute pin-point cavities at the extreme top and bottom, and the top being most severe.

Fig. 6 is a photomicrograph at 100 diameters showing the grain characteristics of strip indicated in the bad edged samples. Fig. 7 is a photomicrograph at 100 diameters of the steel shown in Fig. 1, after changing the furnace atmosphere but following the same temperature, i. e., 2250 degrees Fahr., ahead of scale breaker.

Slivers Are Costly

There are no reasons whatsoever for not having a perfectly solid, clean edge without slitting or side shearing by normal practical heating procedure.

The next most detrimental effects of poor heating practice are slivers which are most evident in hot strip after cold reduction in which event either cause rejection or a costly buffing or polishing operation after forming. It also affects the surface of hot strip especially where excellent surface requirements are essential.

Slivers most generally are caused by extremely oxidizing furnace atmospheres and atmospheres that are too reducing. However, some trace them to steel quality but this is not usually the cause unless steelmaking practice is faulty and the steel is badly oxidized on account of the refining of the melt or imperfect deoxidation. When steel is heated under extremely oxidizing atmospheric conditions it becomes oxidized to the point where the metal absorbs oxygen which causes it to become dry and bony; hence, greatly decreasing its elasticity. As is well known, steel when under the rolls is stressed in both compression and tension, and while compression has little or no ill effects, it is evident that when steel of this condition is strained in tension it will not flow and the surfaces are violently torn apart.

Fig. 5 is a sketch which indicates stressing in tension where the steel delivering from a point slightly past the roll center line is pushed forward while that near the center of the arc or radius is pushed backward; and also a metal flow which creates the tensional stress. Steel with a dry, bony or overoxidized condition will rupture resulting in many minute fissures, as shown in Fig. 3. This steel was reduced ¾-inch, passing through the first roughing rolls. The surface condition of a normally heated slab also reduced ¾-inch and free of fissure and minute tears is shown in Fig. 4.

Fig. 8 is a photomicrograph at 100 magnifications of the cross section of steel represented in Fig. 3 which clearly shows the effects of rupture; Fig. 9 shows the microstructure of a normally heated slab also reduced ¾-inch. The ultimate defectiveness of the minute tears in cold strip produced from such affected hot bands, are slivers.

Fig. 10 shows the surface of a slivered condition which by visual inspection of the cold strip surface were so minute that they could only be detected by stretching a strip in a patented leveler or by rubbing the strip crosswise with emery cloth. These illustrations were produced at 25 diameters, the negative being enlarged 100 times.

Fig. 11 is a photomicrograph (100X) which shows the grain structure of normally heated slabs while Fig. 12 shows the effects on the microstructure of extreme oxidizing heating atmospheres. The grains are much larger and a great number of void areas are present. The latter, represented by the black, were thoroughly researched up to 1800X magnification and nothing could be found except in one which was pearlitic (indicated by arrow).

Several types of slivers are caused from varying scale conditions. Often these are so minute and similar in the cold reduced strip that the definite cause is difficult to determine. Slivers attributed to scale generally occur in more or less patches or streaks of irregular location and are fully dependent on the scale condition existent in the hot band caused by pre-existant conditions. Either furnace atmosphere accounts for rolled-in initial scale or causes the scale to be of such physical condition that sprays are ineffective, or a furnace temperature gradient causes scale to loosen at the point

Fig. 11—Grain structure of normally heated slabs. 100X. Fig. 12—Effects of extreme oxidizing atmospheres. 100X. Fig. 13—Photograph of slab after first scale-breaking pass showing effect of scale. Fig. 14—Slab which has been subjected to a wash heat. Arrows indicate a hard, stony scale; areas indicated by "A," yielded a suitable surface upon rolling. Fig. 15—Heavy rolled-in scale and small rolled-in slivers which were further developed on cold rolling

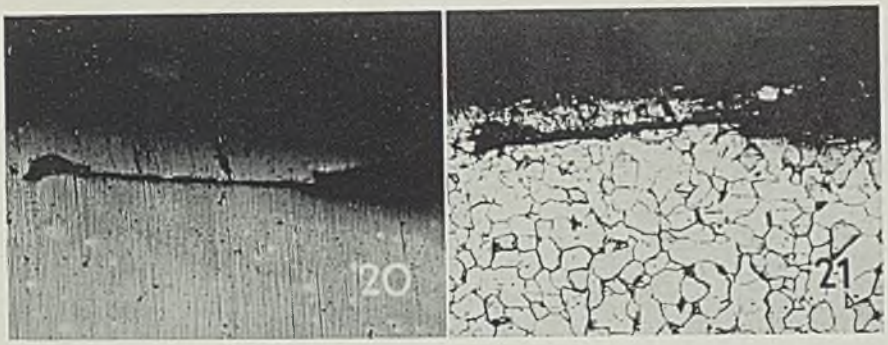


Fig. 16—Cold streaks, indicated by arrows, which were concealed during cold reduction. Fig. 17—Surface of hot-rolled strip slightly etched (15X) showing hair line seams. Fig. 18—Cold reduced strip which has had edge seams removed by slitting. Fig. 19—Extensive edge seams and laps and tears shown along directional length of strip. Fig. 20—Unetched 100X, and Fig. 21—Etched 100X. These photomacrographs show an indentation of such magnitude as to roll back over the normal surface

unaffected by the spray and also the points most advantageous for secondary scale cleaning. The effects of scale are shown in Fig. 13 which is a photograph of a slab taken after the first scale-breaker pass showing a heavy pattern mark through the center. The heavy indented portion marks an area where the scale was much heavier than the total surface area.

Fig. 14 is an example of an extreme case of scaling due to furnace atmosphere, one which washed the slab excessively, thereby cutting deeply into the surface under such oxidizing to create at the several areas, marked with arrows, a hard "stony" scale. Indented areas marked "A", yielded a suitable surface on rolling while the areas marked with arrows caused rejection of the final product on account of heavy rolled-in primary scale. The furnace atmosphere which caused this defect in the slab is indicative of poor operations and to a lesser degree is damaging to the furnace bottom.

Fig. 15 shows heavy rolled-in scale in hot strip of 0.090 to 0.100-gage which causes the strip to be unfit for many purposes. Fig. 16 shows a scale streak covered over in some areas during cold reduction. This would readily break open in stamping causing rejection of the section. Minute seams or defects having seam formation are attributable to the hot strip unit and these are generally considered as "hair-line" seams.

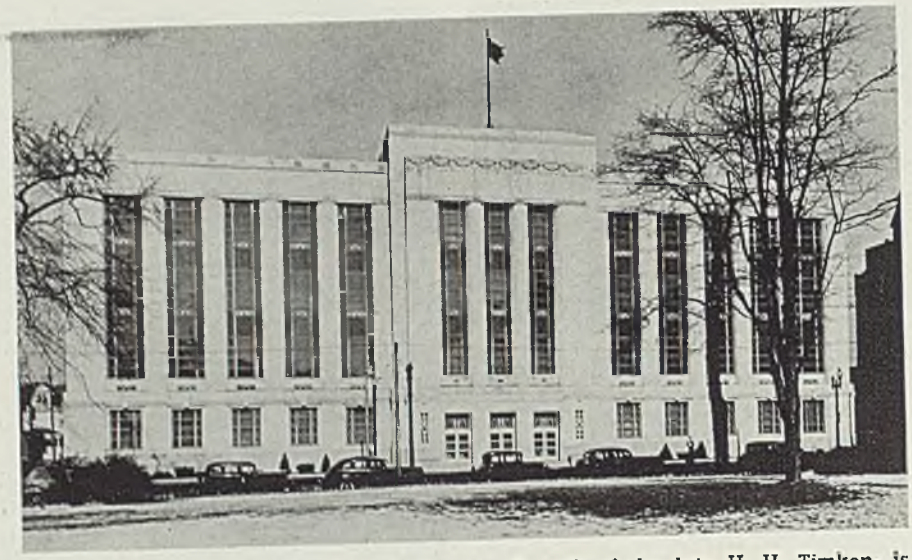
Fig. 17, magnified 15X, depicts the surface of hot strip slightly etched. The numerous hair-line seams and the heavier indented lines are formed by the etchant attacking the strain lines thus causing differential etching. The main cause in this instance is faulty heating. Edge seams often are due to an oxygenized steel that has been pinched by the edging rolls in the roughing unit and sort of folds over just short of being lapped. At some plants where edge seams are encountered the strip is run through a slitting machine but this increases the cost of production because of the scrap loss and broken edges, especially when the material is further processed by roller-leveling, cold reducing or hot coating.

Fig. 18 is a photomacrograph (35X) of a cold reduced strip which has had the edges slit out because of edge seams previous to cold reduction. Slitting was not sufficient to eliminate the edge and hair-line seams which extend in approximately 2 inches. Furthermore, the added defect of a broken edge is clearly seen which in itself would necessitate another slitting operation usually to a smaller size for commercial usage.

Often, terms applied to defects are common at one plant and misunderstood at another. Take as an example the term "arrow-heads" which some call "fish-hooks". These are sometimes in a V-form or a slight break transverse to the rolling direction and are characterized by a shallowness and fineness. The cracks frequently are difficult to see by the naked eye and only become visible when stretched in forming, drawing, bending, etc. Photomicrographs in Figs. 20 and 21 show an indentation of such a magnitude as to roll back over the normal surface. The "arrow-head" measures approximately 2 inches at 100 magnifications which is about 0.02-inch in the actual hot strip. The cause in this case was inherent in the slab which showed two separate and vastly different types of indentations.

Extensive edge seams and laps and tears along the direction length of strip are depicted in Fig. 19. The heavy defect in from the edge is due to a lap caused by a heavy over-filling of the edging pass at the blooming mill.

(Continued next week)



■ Timken Vocational High School, Canton, O., gift of the late H. H. Timken, is considered one of the best-equipped training schools in the United States. It cost $1,250,000, exclusive of site

Canton, O., Vocational School Open 24 Hours a Day To Train Defense Workers

■ TIMKEN Vocational High School, Canton, O., the gift of the late H. H. Timken to the community, is playing an important part in training high school students for defense occupations, and affording adult craftsmen an opportunity to "brush up" on mechanical operations. The school has 147 metalworking tools, including those in shops devoted to sheet metal work, welding and machine tools.

The school cost $1,250,000, exclusive of site. Approximately $325,000 was used for equipment and machine tools. The Timken Foundation recently made an additional grant of $25,000 for another machine shop.

Enrollment of regular high school pupils in the Timken school is approximately 800, for two-year vocational courses, and 700 for prevocational courses. Moreover, the McKinley high school shops in Canton now are used for defense classes, offering training in general metalworking to those enrolled through the National Youth Administration.

In the Timken school 340 adults are receiving instructions in metalworking. Part-time building trades extension classes include 48 apprentices. Evening trade extension classes have an additional enrollment of 480.

The two machine shops and the welding shop in the Timken school operate 24 hours a day, five days per week.

G. F. Malick is vocational director, and Jesse H. Mason, superintendent of Canton public schools.

Develops New Spark Plug for Bombers

■ A new type spark plug for aviation engines is announced by AC Spark Plug Division, General Motors Corp., Flint, Mich. It features a new design embodying new material. Its ceramic insulator is reported to be next to diamond in hardness.

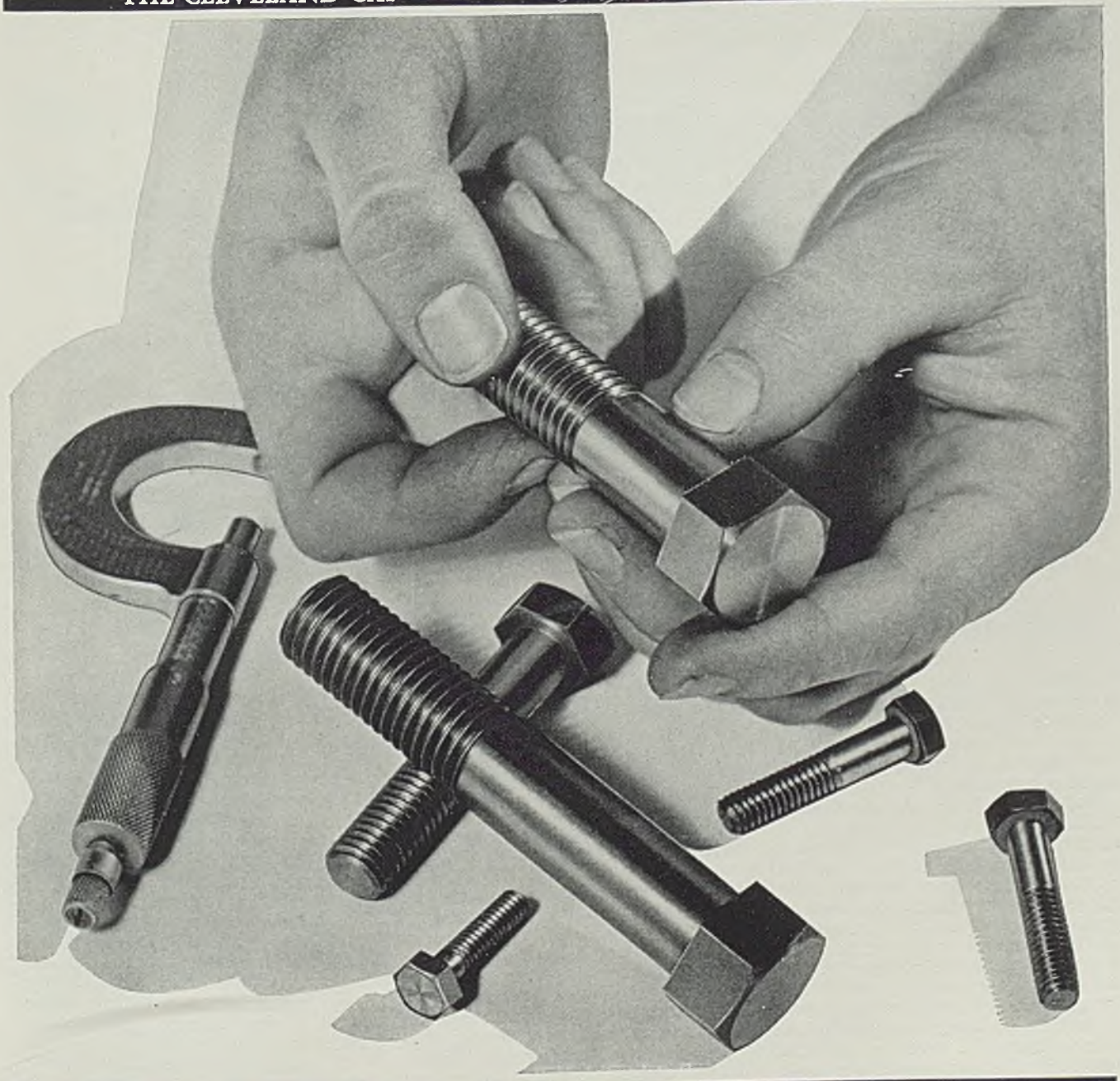
Tin Research Institute Issues Quarterly Review

■ Bulletin No. 8, entitled "Tin and its Uses," containing subjects o hot tinning, protective tinning i the nitriding process, streaky ti coatings on steel, tinplate and th march of time, renovating tinne ware, etc., is announced by th Tin Research Institute and Ba telle Memorial Institute, Columbu O. It may be obtained free charge on application to either.

■ The Timken sch was built in 1939-40 a its equipment, includ machine tools, is n and modern. Boys intensely interested their work

BE AS PARTICULAR AS YOU LIKE

● Get out the gauge that you know always tells the truth and check dimensions on Cleveland Cap Screws. Try a thread gauge—you'll get no other result than a Class 3 fit, for that's our standard. Try the dimensions across flats—and that is accurate too, you'll notice. Examine chamfers, points, washer faces. The reason for this high uniformity of quality is our manufacturing method, the Kaufman Process, *patented,* our own plant development.
THE CLEVELAND CAP SCREW COMPANY, 2930 E. 79th St., Cleveland, O.



CLEVELAND CAP SCREWS

SET SCREWS • BOLTS AND NUTS

Address the Factory or our Nearest Warehouse: Chicago, 726 W. Washington Blvd. • Philadelphia, 12th & Olive Streets
New York, 47 Murray Street • Los Angeles, 1015 E. 16th Street

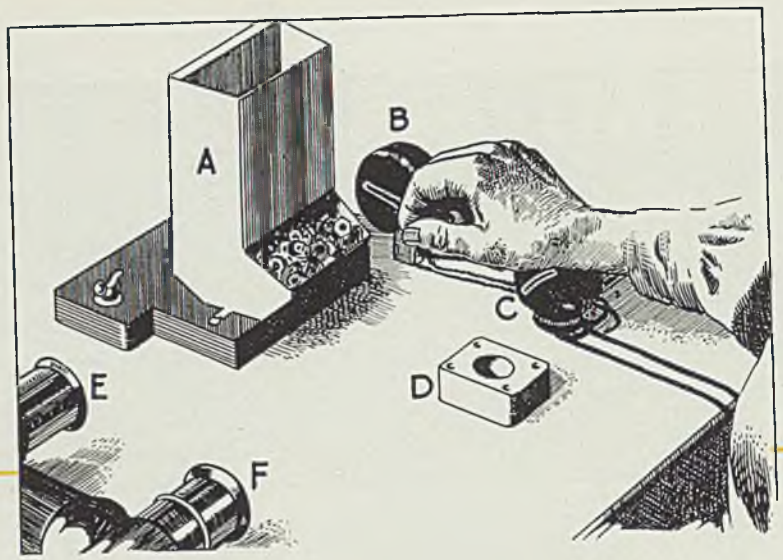


Fig. 1 — This sketch shows arrangement of workplace for the study of bins. Key: A, bin containing parts to be grasped; B, photo cell to measure time of grasp; C, photo cell to measure time for release of load; D, hole in table top for disposal of parts; E and F, light sources for photo cells

More Efficient MATERIALS HANDLING Through Motion Study and Methods Engineering

Compensation for usable suggestions, 25 per cent of the first year's savings, runs into sizable sums and gets complete co-operation and interest of every employe in the plant. Fundamental work in motion study already done shows way to set up assembly operations for greatest materials handling efficiency

By G. B. CARSON
Associate Professor
Industrial Engineering
Case School of Applied Science
Cleveland

(Continued from Last Week)

■ TYPICAL examples of the workability of the Cleveland Graphite Bronze suggestion program outlined last week, as submitted by Mr. Sadler, are as follows:

Suggestion 2343: A change in tooling was suggested, reducing a machining operation from four cuts to three cuts. There was a saving of $1286.40 the first year and the suggestor was paid 25 per cent of that, an award of $321.60. The suggestion resulted in saving approximately 26 per cent of time in the machining operation.

Suggestion 3138: An improved method of handling stock on a machining operation saved in one year $693.04, and the suggestor was paid an award of $173.26.

Suggestion 6030: It was recommended that processing material be reclaimed. The adoption of this idea resulted in the re-use of the processing material. There was a savings of $1125.60 the first year, and the award paid amounted to $281.40.

Suggestion 2355: Two parts in process were very similar, but one required an extra operation. These parts were constantly mixed and the extra operation was performed on many parts which did not require that operation. A method of automatically marking those parts not requiring the extra operation was suggested. Now this marking is being done automatically in the previous operation, thereby providing a better method of identification and eliminating chances of doing work not needed. The savings were $449.44 the first year, and the suggestor was paid an award of $122.36.

Suggestion 2008: A slight change in design of equipment was suggested. As a result, a hand operation was replaced by an automatic operation on a production machin The savings the first year amount to $3153.32 and the suggestor w paid an award of $788.33.

The Cleveland Graphite Bron Co. receives hundreds of suggestio each year. Of these, the surprisi ly large proportion of about 25 p cent are usable. For those sugg tions which cannot be adopted, ea suggestor is given a clear und standing of the reasons for reje ing his suggestion. Such a procedu encourages suggestors to contin sending in plans, and both the co pany and its employes benefit the from as shown by the case stud mentioned.

A third development is the creasing activity in fundamental search being conducted in mot study. No article covering this ph of the work would be complete wi out the mention of Dr. Ralph Barnes and his colleagues at University of Iowa Engineering periment Station.

Typical of the work done by

When the world's biggest buyer says "RUSH!"

...you can rely on Exide-Ironclads for faster materials handling

AS the manufacturing plants, steel mills, railroads and shipping lines intensify their operations in response to Uncle Sam, they rely more and more on materials handling equipment to widen out bottlenecks. When powered by Exide-Ironclad Batteries, electric industrial trucks are able to do their utmost in speeding up production and transportation.

For transportation they speed up the handling of cargo, baggage and freight. For steel mills they permit the quicker, more efficient handling of steel coils up to 15 tons and more in weight. For manufacturing plants they shorten the distance and time between receiving and shipping platforms.

They can do this under today's production pressure because "Exide-Ironclads" are built with great power. They have it in abundance for the heaviest loads and the steepest grades. And with it they deliver the consistently good battery voltage that insures good vehicle speeds.

Your trucks will have more pep, power and pick-up, and the ability to handle more tonnage *faster*, when equipped with dependable "Exide-Ironclads." Write for free booklet, "The Exide System for Better Material Handling."

Exide IRONCLAD BATTERIES

THE ELECTRIC STORAGE BATTERY CO., Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto

Barnes are the studies which follow.

An investigation reported under the heading of "Studies of Hand Motions and Rhythm Appearing in Factory Work" had for its object the determination of operator time required to position a pin into a metal brushing.

In this study various hole entrances ranging from a square edge hole to one having an entrance cone four times the pin diameter were tested, and the time required to position the pin was accurately measured by photoelectric cells and electric trip timers.

Such an investigation was made to reveal methods whereby, for example, a "go" gage for accurate assembly work could be used more rapidly. It also furnished information of value to manufacturers confronted with the necessity of assembling shafts into bearings or bushings.

Conclusions of the study were as follows: In Part A where clearance between the holes and the ¼-inch diameter pins was only 0.002-inch showed that total time required to carry a pin to the bushing, position, insert and remove it, increased as the amount of bevel surrounding the hole in the bushing was decreased from 45 to 0 degrees. Likewise, the sum of the time for the "transport loaded" (ref. 5) and "positioning" operations (moving work to the hole and positioning it in the hole) increased as the amount of bevel surrounding the bushing hole decreased from 45 to 0 degrees. The sum of the time for "assemble" and "disassemble" decreased as the bevel decreased from 45 to 0 degrees even though the length of the bearing surface (the ¼-inch bore) was not increased except with the hole which had no bevel. It appeared as though the times for the therbligs, "transport loaded," "position," "assemble" and "disassemble" were interrelated, the last two named being affected by the speed of performance of the therblig (that portion of the work cycle) preceding it. Thus a standard time for certain therbligs cannot be given as independent values since they may be influenced by other therbligs in the cycle.

Results of Part B where the clearance between pins and holes in the bushing was 0.010-inch—five times the clearance in Part A showed that total time required to carry a pin to the bushing, position, insert and remove it, decreased as the amount of bevel surrounding the hole in the bushing decreased from 45 degrees to 34 degrees but increased as the bevel decreased from 34 to 0 degrees. Likewise the sum of the time for the "transport load" and "positioning" decreased as the amount of bevel surrounding the bushing hole decreased from 45 degrees to 34 degrees and increased as the bevel decreased from 34 degrees to 0 degrees.

Tests Reveal Best Angles

It is evident that for a close clearance fit, a wide angle bevel aids immensely in speeding up the operation but that for comparatively loose fits, there is an optimum bevel angle. A few tests of various angles no doubt would quickly show which was best in any particular instance.

An investigation reported under the title of "A Study of Hand Motions Used in Small Assembly Work" (ref. 6) is a study of the time required to grasp machine screws and nuts from various types of bins. Such an investigation furnishes valuable information for fabricators of small parts, and in any assembly operation where small fastenings might be used. Fig. 1 shows the types of bins used. The conclusions drawn from this study are:

For machine screw nuts, the bin with tray produced the fastest "grasp" throughout the entire range of nut sizes studied. The hopper type bin required, on the average, 51 per cent more time for "grasp." The rectangular bin required on the average, 50 per cent more time for grasp.

The bin with tray produced the shortest cycle time throughout the entire range of nut sizes studied. The hopper type bin required an average of 21 per cent more time for a complete cycle, and the rectangular bin required an average of 28 per cent more time.

The time for "grasp" with the bin with tray tended to remain constant independent of the size of the nut. The time for "grasp," for the hopper and rectangular bins, decreased 1 per cent as the size of the nut increased from No. 2 to No. 12.

The time for the "transport loaded" following the "grasp" tended to be at a minimum with the hopper type bin throughout the entire range of nut size studied. With the bin with tray, the "transport loaded" required an average of 6 per cent more time, and with the rectangular bin an average of 22 per cent more time.

The "transport empty," preceding the "grasp," required the least time with the hopper type bin throughout the entire range of nut sizes studied. With the bin with tray, the "transport empty" required on the average 30 per cent more time, and with the rectangular bin the "transport empty" required on the average 5 per cent more time.

For machine screws, the bin with tray tended to produce the fastest "grasp" throughout the entire range of screw size studied. The hopper type bin averaged 26 per cent more time; the rectangular bin, 16 per cent more time.

The bin with tray produced the shortest total cycle time throughout the entire range of screw sizes. The hopper type bin averaged 10 per cent more time for a complete cycle;

Fig. 2—Types of bins: 1, hopper type; 2, ordinary rectangular bin; 3, bin with tray attached

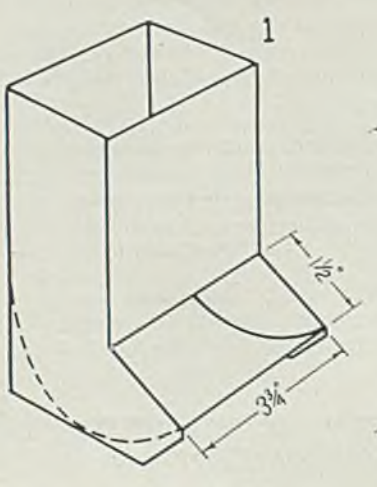
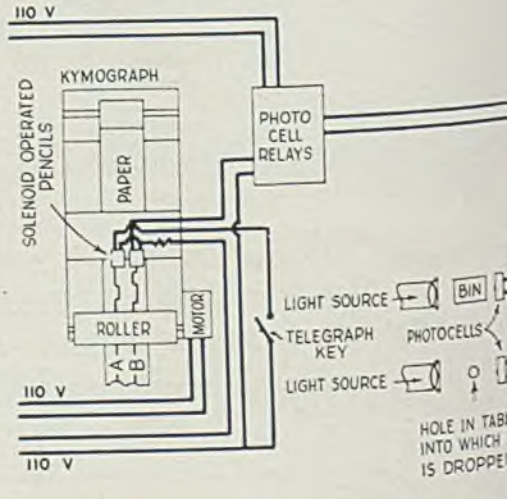
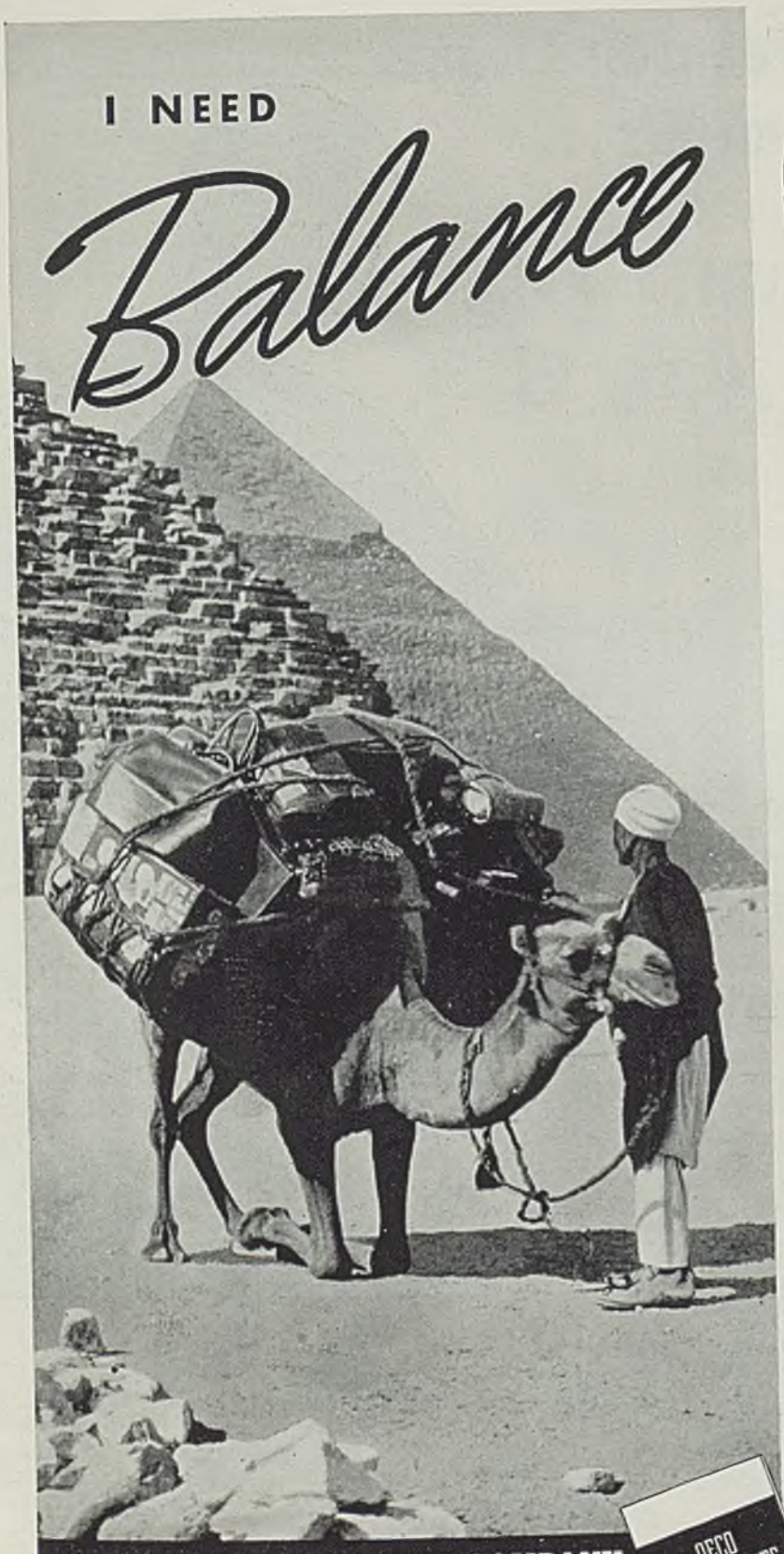


Fig. 3—Wiring diagram of photo cells and recording pens on moving paper st as set up for the study of bins

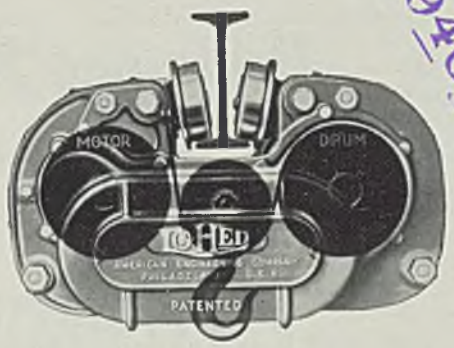


I NEED

Balance

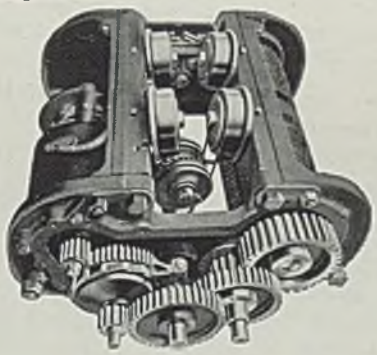


AMERICAN ENGINEERING COMPANY



You Need BALANCE in a HOIST

LO-HED, the *Balanced* Hoist. You can instantly single out a Lo-Hed hoist because of its characteristically different appearance. Ordinarily, appearance isn't important in a hoist but it just so happens that a Lo-Hed hoist gets its appearance from a basically different construction. Motor and drum are arranged on opposite sides of the beam. The hook is directly in the center and can be pulled up close to the beam—an extra advantage where headroom is low. Because motor and drum shafts are separate and parallel the motor can be geared to the drum through efficient spur gears. Buy the hoist that's balanced if you want low operating and maintenance costs. Write for Lo-Hed catalog today.



LOOK AT THE BALANCED LO-HED!

It Costs Less To Operate—All gears are efficient stub-tooth spur gears running in a sealed oil bath . . . gear shafts and trolley wheels are equipped with heavy-duty ball or roller bearings.

It Costs Less To Maintain—Sturdy construction . . . seldom, if ever, requires removal from rail . . . covers of controller, motor, drum and gearing are easily removed.

It's Safe—Factor of safety of over 5 at full capacity . . . 100% Positive Automatic Stop when load reaches upper limit . . . Automatic Holding Brake prevents load from drifting when current is shut off . . . short, strong shafts minimize torsional stresses.

It's Protected—Controller is fire, dust and moisture proof . . . motor totally enclosed . . . gearing sealed in . . . motor and drum covered by easily removable covers.

The Lo-Hed Hoist Is Applicable To Any Monorail System There's A Balanced Lo-Hed Electric Hoist For Every Purpose

OTHER A-E-CO PRODUCTS: TAYLOR STOKERS, MARINE DECK AUXILIARIES, HELE-SHAW FLUID POWER

Look in your Classified Telephone Directory under "A-E-CO LO-HED HOISTS" for your nearest representative.

AMERICAN ENGINEERING COMPANY
2484 Aramingo Avenue, Philadelphia

☐ Please send me your complete catalog of LO-HED HOISTS.
☐ Ask your representative to get in touch with me promptly.

Name_____

Company_____

Street Address_____

City_____ State _____
(Please print plainly)

Using one Pennsalt Cleaner on several metals...

MAKERS OF COMMUNITY PLATE CUT CLEANING COSTS 20%

After 25 years' experience with metal cleaners, Oneida Ltd. adopted a Pennsalt Cleaner for cleaning a wide variety of metals in both electrolytic and still operations. This maker of famous Community Plate silverware found these advantages:

1. Only one-half as much cleaner by volume is used, saving storage space and handling.

2. The cost of the cleaner itself has been cut 20%.

3. Different metals are cleaned successfully at the same time in the one Pennsalt Cleaner solution.

In the Oneida plant at Sherrill, N. Y., products made of nickel silver, copper, steel, stainless steel, Britannia Metal and brass, which have been buffed with Tripoli, emery and rouge, are all cleaned with one Pennsalt Cleaner . . . and the percentage of rejects is infinitesimal.

Since every plant has its own cleaning problems, there are available a number of Pennsalt Cleaners . . . developed for varied and extreme requirements. All have exceptional dissolving and emulsifying action, tremendous lasting power and quick cleaning ability.

Maybe a Pennsalt Cleaner can help you save money, too. Write Dept. E for details. Pennsalt Cleaner Division, Pennsylvania Salt Mfg. Co., Widener Bldg., Philadelphia, Pa.

PENNSYLVANIA SALT
MANUFACTURING COMPANY
Chemicals

OTHER PENN SALT PRODUCTS:

Liquid Chlorine
Anhydrous Ferric Chloride
Sal Ammoniac
Carbon Tetrachloride
Soda Ash
Hydrofluoric Acid
Mineral Acids
Caustic Soda
Kryolith
Acid-Proof Cements
Perchloron
Hydrogen Peroxide

PENNSALT
CLEANERS FOR INDUSTRY

rectangular bin, 13 per cent more.

Time for "grasp," with the bin with tray, decreased 15 per cent as screw size increased from No. 2 to No. 12. The time for "grasp" with the hopper type bin also decreased 8 per cent for the same range of size while the time for "grasp," for the rectangular bin increased 15 per cent as screw size increased.

Time for the "transport loaded," following the "grasp" tended to be at a minimum with the bin with tray throughout the entire range of screw sizes. The hopper type bin averaged 6 per cent more time, and the rectangular bin 32 per cent greater time.

The "transport empty," preceding the "grasp" required the least time with the hopper type bin throughout the entire range of screw size studied. The bin with tray took 5 per cent more time. The rectangular bin required 25 per cent extra time.

Saves One-Third Screwdriver Time: Investigations also have been reported on screwdriver work, the conclusions from which may be summarized as follows: The total time of screwdriver usage (the time between the instant the hand grasped the screwdriver until the instant it released it after running down a screw was at a minimum when the completely prepositioned screwdriver was used. A screwdriver partially prepositioned averaged 23 per cent more time. When the screwdriver was not prepositioned at all, 46 per cent more time was consumed. That part of the cycle not included in this "total of time of screwdriver usage" was "index wheel." This did not affect the other data because no change was introduced at any time in the manner of difficulty of this operation.

In other words, 16 per cent of the total time of screwdriver usage may be saved by partially prepositioning the screwdriver, and 32 per cent of the total time of screwdriver usage may be saved by completely prepositioning the screwdriver, taking the time required when the screwdriver is not prepositioned at all as the base time.

Bibliography—Part II

4. University of Iowa Studies, New Series 350, Bulletin 12, March 1, 1938, "Studies of Hand Motions and Rhythm Appearing in Factory Work," by Ralph M. Barnes and Marvin E. Mundel.
5. Handbook of Business Administration, edited by W. J. Donald, pp. 628-643, "Motion Study," by Lillian M. Gilbreth.
6. University of Iowa Studies, New Series 365, Bulletin 16, Jan. 15, 1939, "A Study of Hand Motions Used in Small Assembly Work," by Ralph M. Barnes and Marvin E. Mundel.
7. University of Iowa Studies, Bulletin 22, No. 387, November, 1940. "A Study of the Effect of Practice on the Elements of a Factory Operation," by Ralph M. Barnes and James S. Perkins.

(Concluded Next Week)

Reproduces Templets In Five Minutes

■ Work templets now can be reproduced in 5 minutes by an electrolytic transfer process developed by Lockheed laboratories, Burbank, Calif. Claimed to be faster and more economical than other processes, the new method is simple and materials used are standard in most plants.

A master layout is scribed from an engineer's drawing on a galvanized iron sheet about 0.040-inch thick, one face of which has been prepared with a special coating of insulating paint. This layout is then sprayed with a transfer solution and the wetted surface is pressed into firm and uniform contact with a copy plate in a specially built press. An electric current passing between the two plates results in the layout of the master plate being transferred instantly to the copy plate. Given a thin protective coating, the copy plate is then ready for immediate use by the templet cutters. Total time required is not more than 5 minutes.

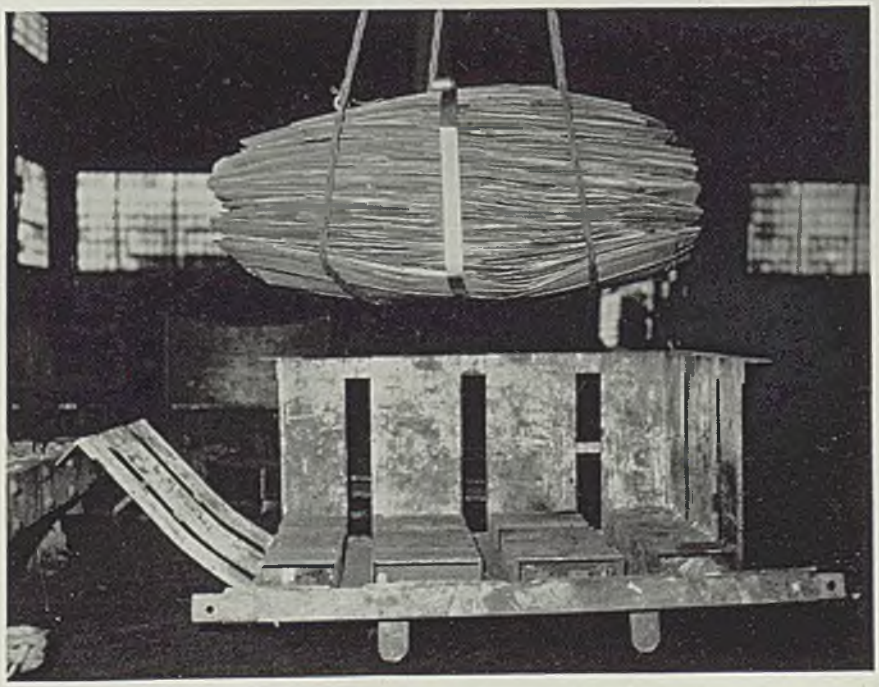
The press utilized at Lockheed will accommodate 48 x 144-inch plates and is estimated to have a daily layout copying capacity equivalent to 500 man-hours of manual copying. Size of layout is limited only by size of press employed, and total cost, including labor and materials, has been found to be less than 10 cents per square foot.

Special Size Bearings Carried as Standard

■ Establishment of a stock of low-cost standard size Torflex bearings (rubber backed for insulation of noise, vibration, shock, etc.) representing the more popular of the sizes heretofore manufactured exclusively as specials is announced by Harris Products Co., 5408 Commonwealth avenue, Detroit.

While standard as to diameters and in two torsional angles, even the standard sizes are available—without extra cost or delay in shipping—in optional or "special" lengths. This is made possible by the method of manufacture whereby the bearings are first made up in 4-foot lengths and then cut to required lengths by high-speed saws or in automatic screw machines.

Taking Care of the Scrap Problem



■ When scrap steel began accumulating—taxing the storage facilities of the open hearth department of American Rolling Mill Co., something had to be done. Pictured above is the result—a new type of scrap bundling box. Developed at the Butler Works, the box proved so efficient that today there are several in use. The sides of the box are collapsible, so that scrap may be placed in position easily for bundling. They are then put back to hold the scrap together firmly while being bundled

These men are

"Now that we're working on defense orders our past experience with U·S·S Carilloy Alloy Steels is invaluable. Although we are daily running into new and unfamiliar problems of production we know that we can confidently rely on Carnegie-Illinois to give us the right Alloy Steel and help us to use it to best advantage. By using U·S·S Carilloy Alloy Steel we are assured of uniformity of response to our heat treatment. That's mighty important today when we must maintain a high rate of production with no sacrifice in quality."

"Suggested steel change-over saves us $70 a day on raw material cost alone. Formerly we used a highly alloyed steel for an intricate gear in the drive mechanism we manufacture. After a comprehensive survey of all properties required, your metallurgist suggested the use of an alternate type of alloy steel which meets all requirements, and saves us $19 per ton in raw material cost alone. It actually effects further economy because the new steel is considerably more machinable."

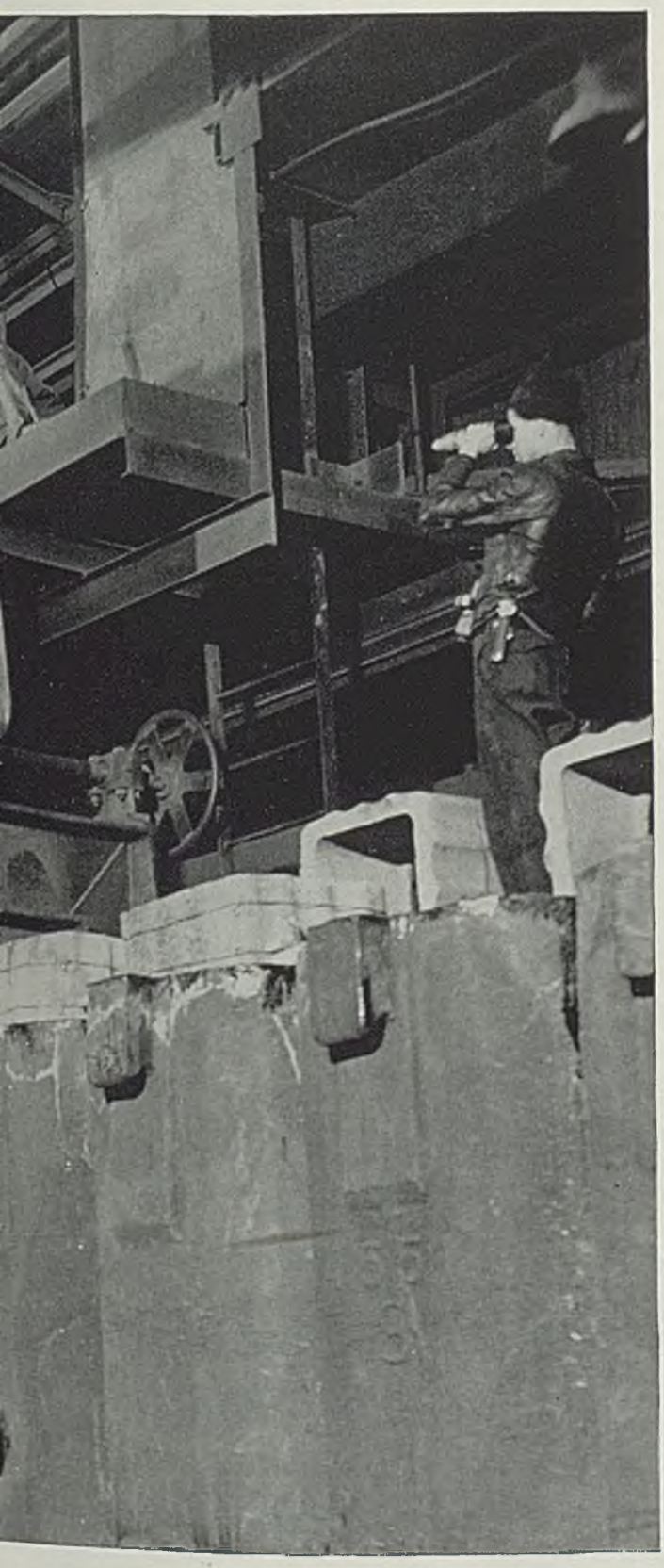
"When we built the 'Jumbo' earth-moving trucks we insured their dependability by making all vital parts of U·S·S Carilloy Alloy Steel. In this multi-wheeled road giant, front and rear axles, transmission and steering parts throughout are made of U·S·S Carilloy Alloy Steel. They help to keep these trucks on the job day after day and to assure profitable operation."

"We are drilling oil wells deeper and 5 times faster than 10 years ago, because of improvements in drilling equipment made possible by better alloy steels. U·S·S Carilloy Alloy Steels in drill bits, drill collars, Kelly bars and auxiliary drilling equipment have given us, at reasonable cost, high speed drilling equipment better able to stand the rough usage that oil field equipment must take. The toughness, strength and wearing qualities of these alloy steels make it possible to drill at speeds and at depths undreamed of only a few years ago."

"Our forge shop is a busy place today. The present emergency has created a production volume with exceptionally high quality standards which must be met. U·S·S Carilloy Alloy Steels help us meet these requirements most economically in our forgings for ordnance equipment, aircraft and marine engines."

U·S·S CARILLOY *Dependable*

talking your language



...And what they say about Carilloy Alloy Steels is important

WHETHER your work today is on production for defense or for domestic consumption your problems as they involve steel are basically the same.

To insure uniform and maximum service of any product made by mass production methods, and to do it economically, you must use the least expensive steel that can provide the maximum performance in the finished part. We are prepared to assist you in selecting such a steel for your purpose.

In U·S·S Carilloy Alloy Steels we offer you a complete range of superior quality S.A.E. Alloy Steels, Aircraft Quality Steels, and Special Alloy Steels for all purposes. U·S·S Carilloy Alloy Steels are produced in modern mills in which the most advanced facilities are matched by the skill of experienced operating and metallurgical personnel.

To help you in properly selecting the steels best fitted for your needs and to assure the most economical treating procedure with the equipment available in your plant, we offer you the assistance of our metallurgical staff. These men know steel. They are familiar with the most advanced shop methods of using it. If your job can be done better, or faster, or at lower cost, they are competent to point out a way to do it.

CARNEGIE-ILLINOIS STEEL CORPORATION
Pittsburgh and Chicago

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Export Company, New York

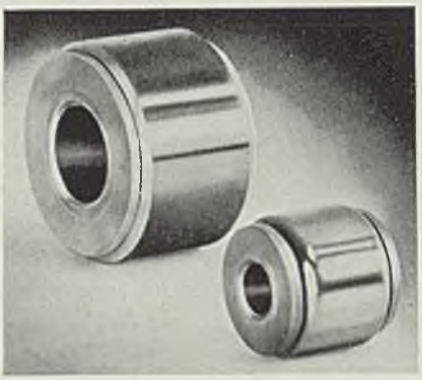
ALLOY STEELS

UNITED STATES STEEL

Industrial

Needle Bearings

■ Torrington Co., Torrington, Conn., announces new needle bearing assemblies for the aircraft industry. These are made in two series, designated as the AR series for normal service and the AT series for heavy duty work. The bearings in both



series are provided with inner races and permanently attached end washers. All exposed surfaces are cadmium plated.

Heat Treating Unit

■ Ohio Crankshaft Co., 6600 Clement avenue, Cleveland, has introduced a new, streamlined, TOCCO Junior heat treating unit of 20 kilowatt (output) specially designed for heat treating small parts. Offered in two models, it is available for applications not requiring quenching, such as annealing, brazing, soldering, heating for forming and forging; and for localized hardening. In the hardening machine a transformer housing and work pan have been added to the otherwise flat-topped basic unit. The rotatable transformer panel to which the inductor block is attached is similar to that of the larger units, as are the quench and cooling water valves, condensers, tapped bosses for holding fixtures in alignment

with inductor, and other features. Both models use the same high frequency motor generator sets, supplying 9600 cycles of high frequency current at 220 volts, and both have all required control devices. For TOCCO-hardening, the unit is equipped with preset, full automatic controls and a suitable hardening fixture. The high frequency generator is mounted on 3-point suspension to insure level operation. Air filters back up the ventilating louvres to keep out shop dust and grime.

"Baby" Grinder

■ Ingersoll-Rand Co., Phillipsburg, N. J., has introduced a new 1¼-pound Multi-Vane size 00 grinder to be used as a die grinder for tool room and bench, or for light grinding jobs wherever metal must be removed from places that would otherwise be hard to reach. Weighing only 1¼ pounds, it operates at 20,000 revolutions per minute at 90 pounds pressure. It is built to take 1½-inch diameter organic bonded or 1¼-inch diameter vitrified

wheels. Also available are various sizes of collets to take mandrel mounted grinding wheels or small twist drills.

Low Steel Desks

■ Shaw-Walker Co., Muskegon, Mich., announces that its entire line of steel and plastic desks has been rescaled to a new 29-inch height. This change is said to insure a natural working position for the worker, providing greater comfort. The desk's natural working level has been achieved without sacrificing knee space or drawer room.

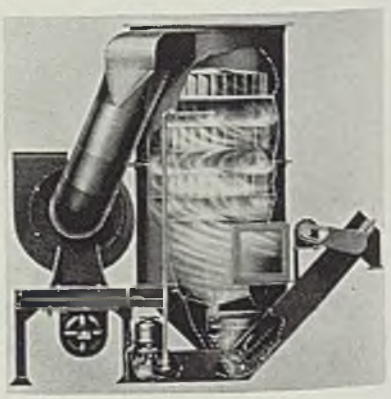
Combination Desk

■ Balster Desk Co., Tribune Tower, Chicago, has placed on the market a new combination typewriter-calculating machine desk which features a unique and entirely new type of drop-head mounting and platform for the typewriter. The drop-head mounting provides more knee and leg room for the operator. In addition, the desk is electrically equipped with provision for electric typewriters and electrically

operated calculating machines. Additional outlets at each of its sides are embodied for connecting desks in chains.

Fume Collector

■ Claude B. Schneible Co., 3951 Lawrence avenue, Chicago, has placed on the market a new line of unit dust collectors in 2000 to 10,000 cubic foot per minute capacities. Designated as type UC each model in the line consists of a fan; 5-spray curtain tower; pump; settling chamber and sludge ejector-conveyor. The collector tower is of conventional multiwash design employing water in a cyclonic wash action to absorb dust and fumes



on impingement plates and vanes. Heavy particles are precipitated in the lower inlet cone of the collector, fines being collected and washed back into the sludge chamber by the downward moving water spray curtain. The sludge ejector-conveyor operating at slow speed re-

Equipment

moves sludge from the precipitation chamber, dewaters it in the conveyor boot and discharges it into any convenient receptacle. The unit occupies a minimum of floor space and requires a negligible amount of maintenance.

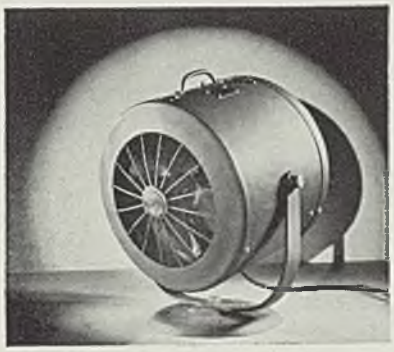
Light-Weight Relays

■ Struthers Dunn Inc., 1335 Cherry street, Philadelphia, has developed two new light weight Dunco relays designed for aviation service in controlling of air flaps and similar applications. Special nonwelding contacts make them suitable for use with lamps, motors or other devices where high inrush loads are likely to be encountered. One of these, the standard type C3007 relay is of the single pole, single

throw type with normally open contacts rated 50 amperes at 12 or 24 volts direct current. It will stand an inrush of 100 amperes and its contact pressure is 10 pounds. Its dimensions are 2¾ x 1⅞ x 2 inches and its weight 8 ounces. A larger relay, CXA3008 is rated at 100 amperes at 12 volts direct current or 80 amperes at 24 volts direct current and will stand an inrush of 300 amperes. Its contact pressure is 15 pounds. It measures 3¾ x 2½ x 2⅞ inches and weighs 1 pound 5 ounces.

Electric Unit Heater

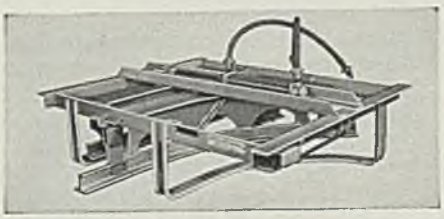
■ Westinghouse Electric & Mfg. Co., Department 7-N-20, East Pittsburgh, Pa., has placed on the market a new fan-type all electric unit heater for year round use. Available in 2, 3, and 4 kilowatt sizes at 115 and 230 volts, alternating current, the units have an output of 7000, 10,000 and 14,000 B.t.u. per



hour respectively. The all-metal heater is cylindrical in shape incorporating a swivel bracket designed for both vertical and horizontal adjustment. Its overall dimensions are 16¼ x 13¾ x 11½ inches. It features a Corox heating element. The switch for winter operation controls both heating element and fan and a bimetal thermostat removes motor and heater from the line in case of overheating. The fan operates independently for summer use. Baffles direct the flow of incoming air over the motor and protect it from radiant heat.

Air-Operated Switch

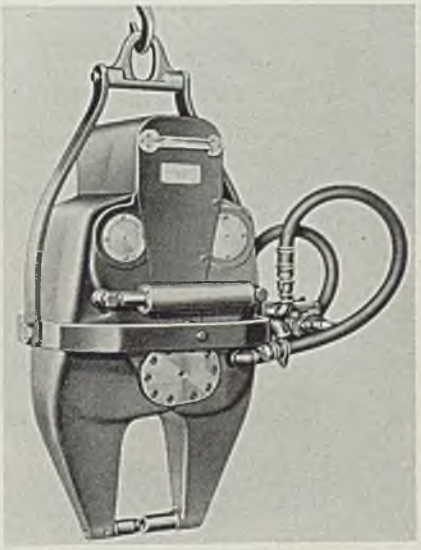
■ Cleveland Tramrail Division, Cleveland Crane & Engineering Co., Wickliffe, O., announces a new air-operated switch for use with cab-operated, gravity, or automatic dispatch overhead materials handling systems. It enables the tramrail operator to preset the switch at some distance ahead while traveling and thus lose no time. Likewise, indexes on gravity or automatic dispatch carriers may be set to actuate trippers which will cause one or



several switches to take the positions desired. Ruggedly built, the unit consists of two main assemblies—an outer supporting frame and an inner sliding frame. The outer frame is for bolting to the super-structure. The inner assembly carrying a straight and a curved rail, rides on multiple rollers, and is set in position by an air cylinder.

Squeeze Riveter

■ Hanna Engineering Works, 1765 Elston avenue, Chicago, has introduced a new Alligator riveter of the "nut cracker" type wherein both the driving jaw and stationary jaw must enter restricted areas to drive rivets. It also incorporates the Hanna pressure stroke feature. During the initial part of the pressure stroke, when little, if any work is done upon the rivet, the driving jaw moves forward rapidly at relatively low power consumption. The mechanism then automatically merges into its uniform pressure stroke area, in which the rated tonnage is exerted upon the rivet and maintained until the control valve is released. This permits the rivet to flow and completely fill the hole, with the forming of the rivet head following automatically. The riveter has a 15-inch

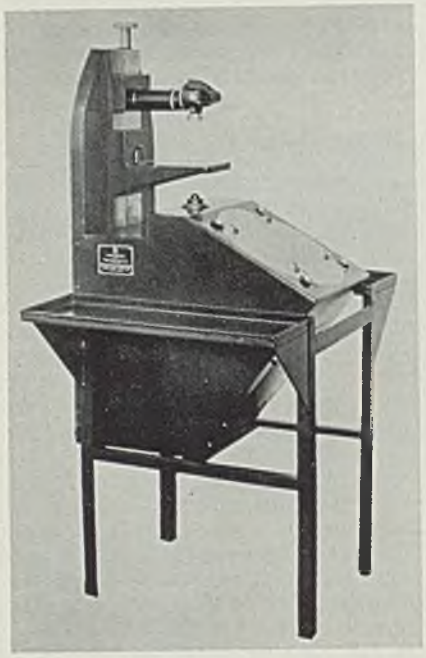


reach, 9-inch gap, and exerts 50 tons pressure when operated at about 100 pounds air pressure. It also is available for other pressures, reach, etc., to meet individual requirements.

Optical Comparator

■ Jones & Lamson Machine Co., Springfield, Vt., has placed on the market a new all metal vertical optical comparator suitable for laboratory or shop use. It is designed for checking small, flat objects which can be laid directly on the glass stage. Set in the 7 x 8-inch object staging table, centered with the condensing and projection lenses, there is a 3¼-inch diameter glass disk on which objects may be

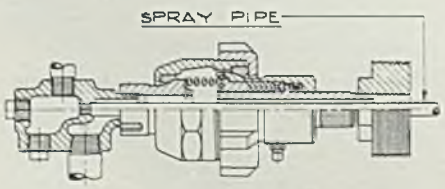
staged for projection. By adjusting the table vertically by a screw at the top of the machine, the object is put into focus. A substantial 8-inch



diameter ground and lapped mirror, coated with aluminum oxide, reflects the object shadow onto a 14-inch diameter receiving screen. This is located in a convenient position for the operator to study the shadow outline. The enlarged shadow of the contour can be compared with an outline on the screen. A table for making co-ordinate measurements also is available. Its slides are of hardened steel and the 5/16-inch diameter balls which support and guide the slides operate in V-ways. The table will measure up to 2 inches sidewise and 1 inch backward or forward. It can be equipped with micrometers graduated to read 0.0005 or 0.0001-inch. Several projection lenses also are available.

Revolving Joints

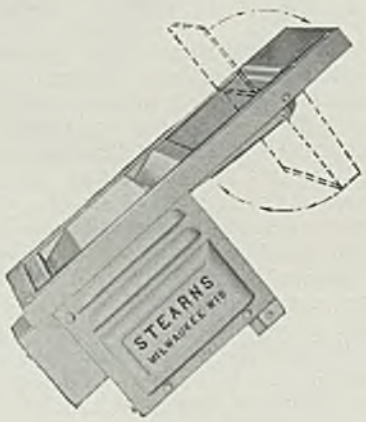
■ Barco Mfg. Co., 1801 Winnemac avenue, Chicago, announces a new series of revolving joints for use in steel mills in cooling cold mill rolls. Each joint in the series is equipped with ball bearings to take care of



any thrust within the joint. These bearings, however, do not come in contact with the water at any time. They are 1½ inches in size and are furnished with a 3½ x 1½-inch bushing that screws into the roll. A spray pipe can be inserted in the joint, and because of the flexible ball seat fastened to the adapter, this spray pipe can be moved about to locate the spray pipe bearing on the opposite end of the roll; this then also eliminates all strains on the revolving joint. According to tests, the rolls are kept cooler with these joints than previously, and leakage has been eliminated.

Magnetic Separator

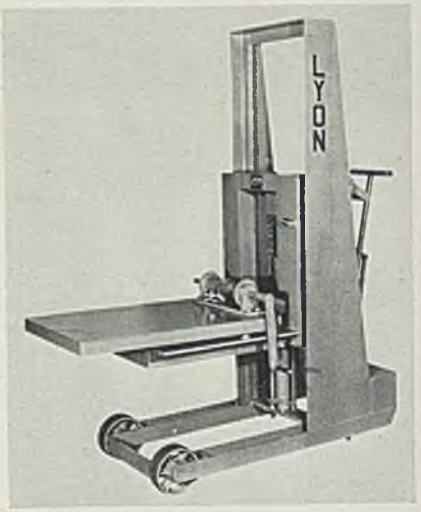
■ Stearns Magnetic Mfg. Co., Milwaukee, announces its latest model AA spout type magnetic separator featuring simplified operation and fewer operating parts. Incorporating a stronger and more powerful magnetic field, the unit's coils are now protected by aluminum plates. These are provided with spacious louvres to allow ample ventilation and also to keep out dirt and dust. The former gate operating bar has been replaced by a toggle plate which opens and closes the safety gate automatically as the current is turned on or off. Among other



improvements is included a new type rectifier. This model is furnished in sizes from 8 to 20 inches wide and operates from 110 or 220-volt alternating or direct current.

Die Handling Truck

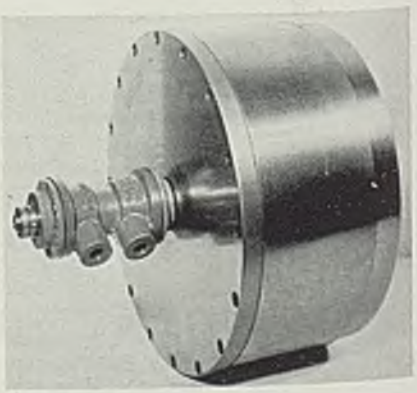
■ Lyon Iron Works, 712 Madison street, Greene, N. Y., announces a new hydraulic die handling truck which features a revolving table arranged to revolve with stops at each 90 degrees. The table which extends about 1 foot beyond the edge of the wheels in its normal position, can be placed close to the press when taking out or putting in dies. This arrangement also is convenient when taking dies on and off shelves where the lower shelves may have dies stored on them that protrude beyond the edge of the shelves. Dies are pulled on and off the table with a winch attached directly to the table itself. Of 1000-pound capacity, the truck has a lowered height of 51 inches. It, however, is capable of elevating to 39 inches, a 2-speed hydraulic air pump



controlling the elevating. Trucks may be obtained in other capacities and also with motor drive pumps.

Air Cylinder

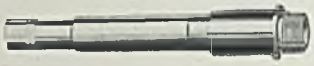
■ Airgrip Chuck Division, Anker-Holth Mfg. Co., Port Huron, Mich., has introduced a new model D ball bearing Airgrip revolving air cylinder suitable for use in connection with chucks, fixtures, jigs and other machine tools. Approved by the American Standard Association, it does not require manual adjustment of packings as all wear is taken up by the air pressure within the cylinder automatically. To insure long life the unit embodies graphite-treated piston packing incorporating a copper wire in each strand. The air pressure on the airshaft packings in each air inlet is balanced. Consequently there is no end thrust and the entire air con-



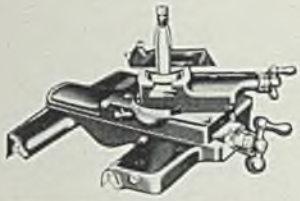
nection may be revolved freely around the airshaft, with the full pressure in the cylinder. The air inlet body has a long bearing on the airshaft, of small diameter, incorporating ball bearings at both ends. This reduces friction to a minimum and permits the cylinder to run at high speeds. Both a semifinished

ecision is Assured IN A SOUTH BEND LATH

HEADSTOCK. Cutaway view showing integral type bearing and the capillary oiling system.



SUPERFINISHED SPINDLE is made of alloy steel with bearing surfaces carburized, hardened, ground and superfinished.

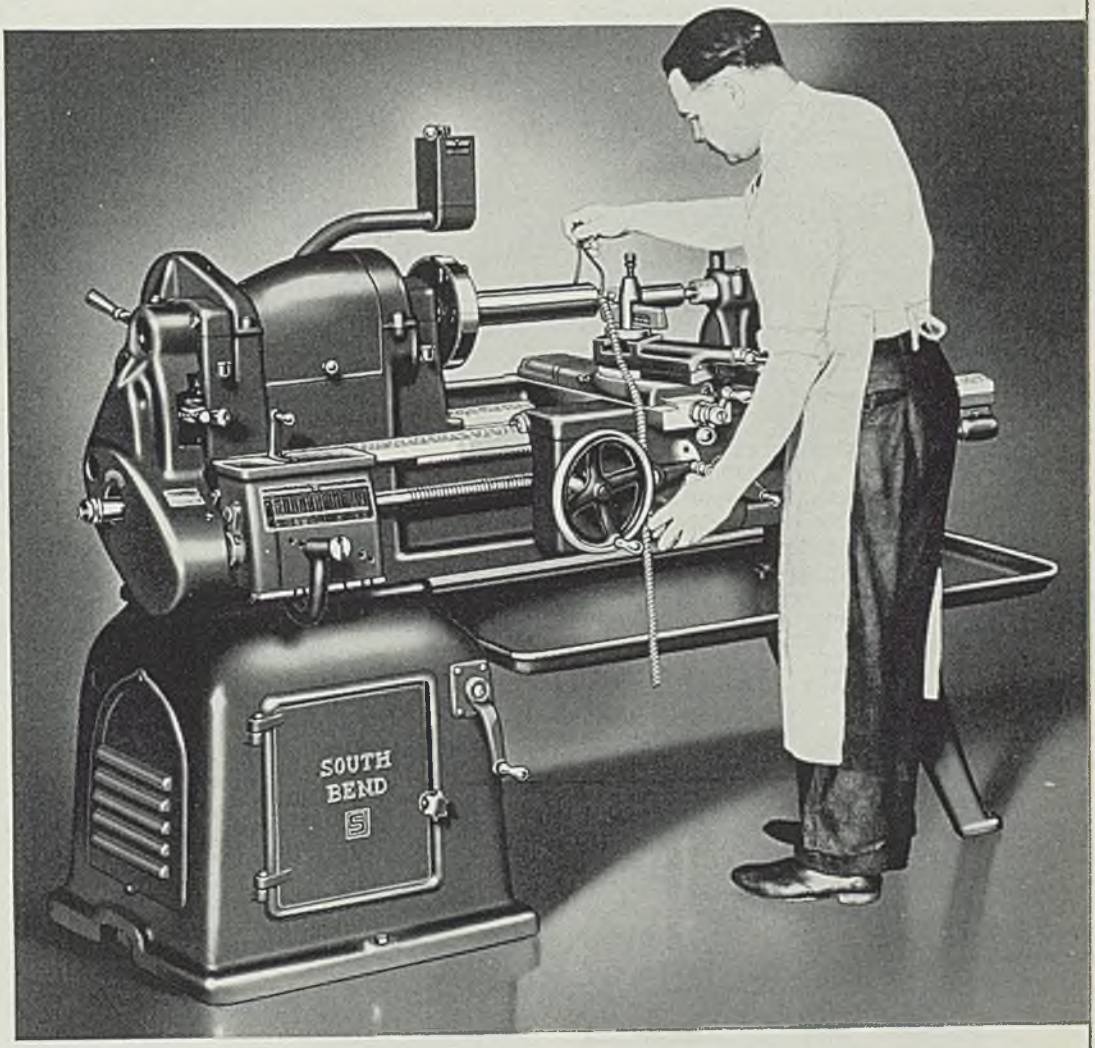


IMPROVED SADDLE and compound rest with adjustable tapered gibs. Cross slide bridge is wide and deep, providing rigid support for the tool rest.

DOUBLE WALL APRON is rigid box type construction with all steel gears running in oil bath.

MULTIPLE DISC CLUTCH. Cutaway view shows alternate keyed steel disc construction.

UNDERNEATH MOTOR DRIVE. Belt drive to spindle is smooth and powerful and provides a wide range of spindle speeds.



PRECISION is assured in South Bend Lathes by combining fine workmanship with sound machine design. Expert mechanics, skilled by years of experience, fit and test each unit with a degree of exactness known only to the machine tool builder.

South Bend Lathes are used in the tool and gauge departments of nationally known manufacturers for the most exacting classes of precision work. They are also used for production operations on interchangeable parts requiring a high degree of accuracy. Conveniently located controls assure an ease of operation which reduces operator fatigue, resulting in a uniformly efficient rate of production over a long period of time.

South Bend Lathes are manufactured in over 65 sizes and types. Popular sizes are available for prompt delivery from dealer display stocks in important cities throughout the world. Made in 9", 10", 13", 14½", and 16" swing, in 3' to 12' bed lengths, in Countershaft and Motor Drives.

ON DISPLAY IN ALL PRINCIPAL CITIES

Baltimore, Md.—Carey Machinery & Supply Co.
Boston, Mass.—South Bend Lathe Works*
Bridgeport, Conn.—A. C. Bisgood
Buffalo, New York—R. C. Neal Company, Inc.
Chicago, Ill.—South Bend Lathe Works**
Cleveland, Ohio—Reynolds Machinery Co.
Detroit, Mich.—Lee Machinery Company
Los Angeles, Cal.—Eccles & Davies Mach. Co.
Milwaukee, Wis.—W. A. Voell Machinery Co.
Newark, N. J.—J. R. Edwards Machinery Co.
New York, N. Y.—A. C. Colby Machinery Co.
Philadelphia, Pa.—W. B. Rapp, Machinery
Pittsburgh, Pa.—Tranter Manufacturing Co.
Portland, Ore.—Portland Machinery Company
Providence, R. I.—Geo. T. Reynolds & Son
Rochester, New York—Ogden R. Adams
San Francisco, Cal.—Moore Machinery Co.
York, Pa.—York Machinery & Supply Company

*Boston Sales Office, 67 Broadway, Kendall Sq., Cambridge, Mass., Tel., Trowbridge 6369
**Chicago Sales Office, Room 308 Machinery Sales Bldg., Tel., State 7283

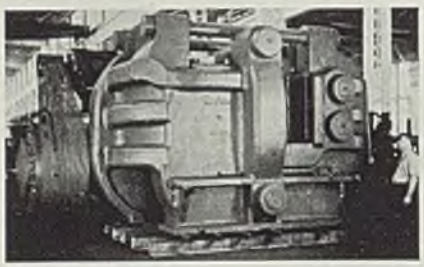
SOUTH BEND LATHE WORKS

TRADE MARK SOUTH BEND TWINS

adapter and Airgrip operating valve are furnished with each cylinder. The latter is made in standard sizes from 3 to 20 inches in diameter. Also available is a revolving cylinder with a hole through the center for feeding barstock through the spindle of a machine, as well as a complete line of stationary cylinders of various types.

Forging Machine

■ National Machinery Co., Tiffin, O., reports what is said to be the world's largest forging machine. Rated at 9-inch capacity and weighing more than 500,000 pounds, it features the greatest possible stiffness and rigidity—essential for making accurate machine forgings. Although weighing more than the combined weight of 140 cars, its design is so compact it only takes up the space of four cars. This design has been made possible because the flywheel shaft is mounted in the neutral axis in the bed frame, and the over arm heading slide permits locating the main shaft further forward without sacrifice in tool



alignment. Thus, all of the bed frame weight is effective in providing the degree of rigidity which insures freedom from "spring". Wedge adjustments are provided at the sides of both the heading and gripping slides in order that a high degree of accuracy of alignment may be obtained. Large longitudinal and cross tie bars also are incorporated. A tandem, by-pass automatic grip relief plus a friction-slip flywheel protect the machine against accidents. An air-cooled friction clutch starts the machine instantly, and at high speed. Finger tip action, positive control enables the operator to obtain high output with little manual effort.

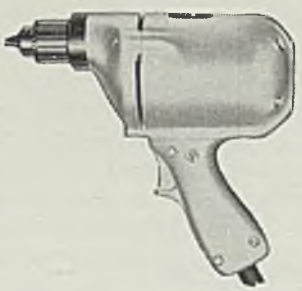
Portable Belt Lacer

■ Clipper Belt Lacer Co., Grand Rapids, Mich., has placed on the market a No. 9 portable belt lacer capable of generating pressure over 30,000 pounds. This enables it to embed belt hooks flush with the surface of a belt, clinching the points. The clinching of the points combined with the jaw action which "sets" the hooks in a closed position so that the natural tendency to spring back is eliminated, gives the hooks maximum pulling ability. The lacer also produces a straight line of well rounded loops which makes

possible the use of a larger size connecting pin. It will lace one end of any belt up to 6 inches wide, and not exceeding ⅜-inch thick, in one quick operation and wider belts by repeating the operation.

Ball-Bearing Drill

■ Black & Decker Mfg. Co., Towson, Md., has placed on the market a new ¼-inch standard ball-bearing drill featuring a drilling capacity in steel of ¼ inch. It has a standard speed of 2000 revolutions per minute but also is available in speeds of 3500 and 5000 revolutions per minute. Being a production tool the drill is equipped with antifriction bearings throughout, a splined gear mounting, locked inner and outer races on spindle bearing and removable commutator end cover. With



close offset and choice of end or side handle, this drill is particularly adapted to aircraft work.

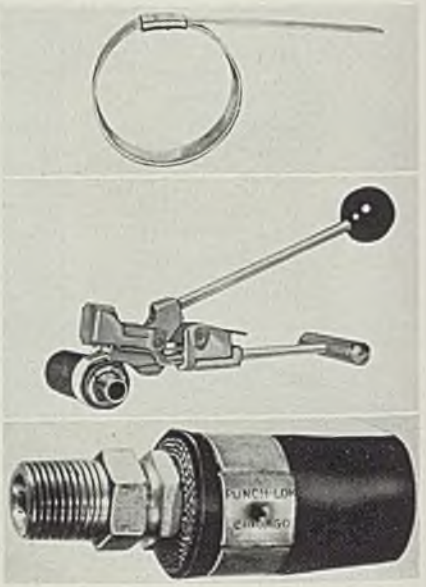
Truck Tire

■ B. F. Goodrich Co., Akron, O., reports a new truck tire designed to conserve rubber by producing more mileage per pound of rubber. Called the Speedliner Silvertown, it gives 25 per cent more mileage. This extra mileage is due to a change in construction that places the breaker strips between the plies, instead of on top of the carcass as in the conventional tire. This lessens heat and permits the use of a thicker, wider and flatter tread.

In addition, the new construction places the breakers so that the cords run parallel with those in the ply above thereby reducing friction between cords.

Hose Clamp

■ Punch-Lok Co., 430 North Wolcott avenue, Chicago, announces a new hose clamp—a mechanical device for connecting various kinds of male and female fittings, special nipples, menders, or ordinary pipe to a hose. Once it has been locked, vibration or rough handling cannot loosen it. It consists of a broad, flat, high tensile strength galvan-



ized steel band. This band is doubly wrapped around the joint and after tensioning with a pull of 1000 pounds within the Loking-Tool, the ends are locked together without loss of tension within the flat pressed steel clip. Then the excess band is cut off flush with the clip so that the entire joint is "streamlined" for safety. A single hose clamp is sufficient for all ordinary commercial pressures—two clamps and a double groove fitting are desirable wherever the fluid is dangerous such as steam, chemical solutions or hot liquids.

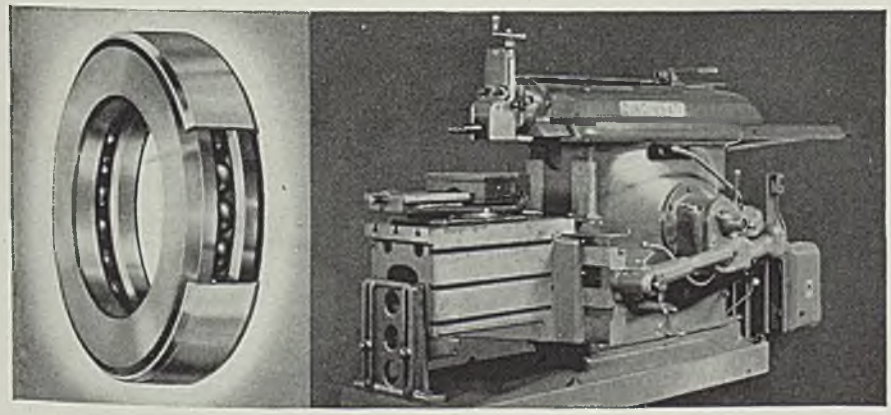
Fluorescent Lamp

■ General Electric Co., Nela Park, Cleveland, announces a new 36-inch Mazda F (fluorescent) lamp rated at 65 watts and available in 3500-degree white and daylight. It is designed to provide lighting designers with a more flexible tool for creating well-styled and efficient commercial luminaires. Like the 100-watt F lamp, the new 65-watt employs a tubular bulb 2⅛ inches in diameter.

IN THE NEWS

WITH BANTAM BEARINGS

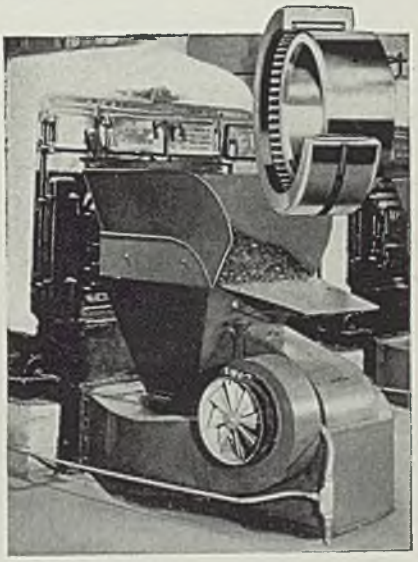
THE MISSISSIPPI STEAMBOAT of today combines the advances of up-to-the-minute engineering design with the long-recognized advantages of the paddle-wheel steamer for shallow river service. Among the newest of river boats is the *Jason*, designed and built by Marietta Manufacturing Company. In keeping with its progressive design, Bantam Quill Bearings are used on the cam rollers that actuate the valves of the *Jason's* engines.



EVERY MAJOR TYPE of anti-friction bearing is included in Bantam's line—straight roller, tapered roller, needle, and ball. Bantam serves every industry with a wide range of standard bearings that meet many normal requirements. Bantam engineers offer unbiased advice on selection of standard bearings—and design custom-built bearings in large sizes or special types for unusual conditions. If you have an exceptionally difficult bearing problem, TURN TO BANTAM.

FAST, EFFICIENT PRODUCTION is the keynote of the comprehensive line of shapers built by The Cincinnati Shaper Co. The line includes 24 models in 10 sizes and 5 types—and *all* use Bantam Ball Thrust Bearings on the rail and table elevating mechanism, to take the entire thrust load when table is raised or lowered.

FOR LONGER BEARING LIFE, Bantam employs bronze cages in many of its bearings, because the bronze cage surfaces are long-lasting, and provide a safeguard against wear on the steel rollers. Photo shows welding of the bronze cage for a Bantam Precision Tapered Roller Bearing.



HEAT, GRIT, AND HEAVY LOADS are normal operating conditions for mechanical stokers, which must perform reliably even if neglected or overloaded. Combustion Engineering, Inc. assures long life and efficient operation of its Skelly Stoker Units by installing Bantam Quill Bearings at vital points. For further information on this compact, high-capacity anti-friction bearing, write for Bulletin H-104.

BANTAM BEARINGS

STRAIGHT ROLLER · TAPERED ROLLER · NEEDLE · BALL

BANTAM BEARINGS CORPORATION • SOUTH BEND • INDIANA

McBride Re-Elected Porcelain Institute Head

■ P. B. McBride, Porcelain Metals Corp. of Louisville, Louisville, Ky., was re-elected president, Porcelain Enamel Institute, at the tenth annual meeting, French Lick Springs, Ind., April 17-18. Other officers: R. H. Turk, Porcelain Enamel & Mfg. Co., Baltimore, vice president; R. R. Danielson, Metal & Thermit Corp., Carteret, N. J., vice president; William Hogenson, Chicago Vitreous Enamel Product Co., Cicero, Ill., treasurer; and C. S. Pearce, managing director.

Col. Philip G. Murphy, United States Army, presented an address on procurement planning. Industry was urged to prepare for resumption of peace-time operation by R. A. Dadisman, development division manager, American Rolling Mill Co., Middletown, O. Mr. Dadisman offered a program for organization of the institute to meet industry's problems when that time comes.

"Control of Furnace Atmosphere as an Aid to Enameling" was discussed by Dr. A. I. Andrews, University of Illinois. This new development, he said, has eliminated many difficulties encountered in conventional methods of firing porcelain enamels.

March Consumption of Scrap at New Peak

■ Steelworks and foundries in United States consumed a record breaking total of 4,662,000 gross tons of iron and steel scrap in March, according to Institute of Scrap & Steel Inc., Washington. This compared with 4,172,000 tons consumed in February, and 2,723,000 tons in March, 1940.

In the first quarter of 1941, domestic consumption aggregated 13,112,000 tons, compared with 9,121,000 tons in the corresponding period of 1940. Annual indicated consumption, based on the March rate, is 55,944,000 tons, against record consumption of 41,687,000 tons in 1940.

Exports in February, as reported by the Department of Commerce, were 72,666 gross tons. United Kingdom took 67,876 tons, Canada 3037 tons, and Mexico 1459 tons.

Value of March Electric Truck Bookings at Peak

■ March electric truck and tractor bookings reached a new high in value, although the number of units booked was less than the record established in February. During March 436 units were booked, as compared with 112 in the same month of 1940, and 478 in February this year, according to the Industrial Truck Statistical Association, 208 South LaSalle street, Chicago.

Total net value of chassis only was $1,557,591.91, as compared with $376,439 in March, 1940, an increase of 313 per cent, and $1,441,521.50 in February, an increase of 8 per cent.

Chassis bookings last month included: 45 nonelevating platform units valued at $89,030; 318 cantilever trucks valued at $1,223,967; 60 cranes valued at $228,976; 10 light and heavy duty tractors valued at $16,728.91; 3 special units valued at $11,995.

Detailed information may be obtained from the association.

Convention Calendar

April 28-29—American Zinc Institute. Twenty-third annual meeting at Hotel Chase, St. Louis. E. V. Gent, 60 E. 42nd street, New York, is secretary.

April 28—Association of Iron and Steel Engineers. Annual spring meeting, Ohio hotel, Youngstown, O.

April 28—Associated Machine Tool Dealers of America. Spring convention, Mayflower hotel, Washington. Thomas A. Fernley Jr., 505 Arch street, Philadelphia, is executive secretary.

April 28—May 1—Chamber of Commerce of the U. S. Annual meeting, Washington. Ralph Bradford, 1615 H street N. W., Washington, is secretary.

May 1-2—Galvanizers Committee. Spring meeting at William Penn hotel, Pittsburgh. E. V. Gent, 60 East 42nd street, New York, is secretary.

May 5-7—American Gear Manufacturers Association. Twenty-fifth annual meeting, The Homestead, Hot Springs, Va. J. C. McQuiston, 602 Shields building, Wilkinsburg, Pa., is manager-secretary.

May 5-8—American Supply & Machinery Manufacturers' Association Inc. Annual meeting, Palmer House, Chicago. R. K. Hanson, 1108 Clark building, Pittsburgh, is general manager.

May 5-8—National Supply & Machinery Distributors' Association. Annual meeting, Palmer House, Chicago. H. R. Rinehart, 505 Arch street, Philadelphia, is secretary.

May 5-8—Southern Supply & Machinery Distributors' Association. Annual meeting, Palmer House, Chicago. Alvin M. Smith, P. O. Box 1353, Richmond, Va., is secretary.

May 12-13—Society of Automotive Engineers, Inc. National production meeting, Schroeder hotel, Milwaukee. John A. C. Warner, 29 West 39th street, New York, is secretary.

May 12-14—American Steel Warehouse Association, Inc. Annual meeting, Fairmont hotel, San Francisco. Walter S. Doxsey, 442 Terminal Tower, Cleveland, is secretary.

May 12-15—American Foundrymen's Association. Annual meeting, Pennsylvania hotel, New York. R. E. Kennedy, 222 Adams street, Chicago, is secretary.

May 19-21—American Institute of Chemical Engineers. Semiannual meeting, Edgewater Beach hotel, Chicago. S. L. Tyler, 50 East 41st street, New York, is secretary.

May 19-23—American Society for Metals. Fourth Western metal congress and exposition, Biltmore hotel and Pan Pacific auditorium, Los Angeles. W. H. Eisenman, 7301 Euclid avenue, Cleveland, is secretary.

May 22—American Iron and Steel Institute. Fiftieth general meeting, Waldorf-Astoria hotel, New York. George S. Rose, 1829 Empire State building, 350 Fifth avenue, New York, is secretary.

May 26-29—National Association of Purchasing Agents. Annual meeting, Stevens hotel, Chicago. G. A. Renard, 11 Park Place, New York, is secretary.

Officers Elected by Warehouse Chapters

■ Chapters of the American Steel Warehouse Association, Cleveland, have elected officers as follows for the ensuing year:

CINCINNATI: President, **W. A. Kruse Jr.**, Union Iron & Steel Co., Cincinnati; vice presidents, **G. E. Mayer**, Jones & Laughlin Steel Corp., Cincinnati, and **L. E. Dallas**, Peninsular Steel Co., Dayton, O.; secretary, **D. L. McCubbin**, Joseph T. Ryerson & Son Inc., Cincinnati; treasurer, **L. E. Denman**, C. R. Talbott Co., Cincinnati; national director, **J. A. Thiele**, Miami-Dickerson Steel Co., Dayton.

NORTHERN OHIO: President, **W. O. Kurtz**, Peninsular Steel Co.; vice president, **R. M. Beutel**, Paterson-Leitch Co.; secretary-treasurer, **A. Hurschman**, Sandvik Steel Inc.; all of Cleveland.

BALTIMORE: President and national director, **George J. Parke**, Eagleston-Parke Inc., Norfolk Va.; vice president, **H. A. Lowry**, Seaboard Steel & Iron Corp., Baltimore; secretary, **J. D. Boan**, Scully Steel Products Co., Baltimore.

NEW ENGLAND: President, **J. B. McIntyre**, Scully Steel Products Co., Allston, Mass.; first vice president, **Quincy W. Wales**, Brown-Wales Co., Boston; second vice president, **G. A. Putnam**, George F. Blake Inc., Worcester, Mass.; secretary-treasurer, **C. S. Harvey**, Arthur C. Harvey Co., Allston, Mass.; chapter director, **G. M. Congdon**, Congdon & Carpenter Co., Providence, R. I.

NORTHERN CALIFORNIA: President and national director, **H. E. Oliphant**, Tay-Holbrook Co., San Francisco; vice president, **J. C. Hickinbotham**, Hickinbotham Bros. Ltd., Stockton, Calif.; vice president, **Curtiss Hayden**, Dunham, Carrigan & Hayden Co., San Francisco.

PACIFIC NORTHWEST: President, **W. A. Haseltine**, Portland, Oreg.; vice president, **R. P. Mercer**, Jacobs & Gile Inc.; secretary-treasurer, **H. F. Morrow**, Pacific Metal Co.; national director, **J. N. Barde**, Barde Steel Co.; all of Portland, Oreg.

SOUTHERN: President and national director, **I. W. Tull**, J. M. Tull Metal & Supply Co. Inc., Atlanta, Ga.; vice president, **Phil Pidgeon**, Pidgeon-Thomas Iron Co., Memphis, Tenn.; secretary-treasurer, **George W. Smith**, Southern Steel Co., Birmingham, Ala.

SOUTHERN CALIFORNIA: President and national director, **E. Jungquist**, Percival Steel & Supply Co.; vice presidents, **J. L. Robertson**, A. M. Castle & Co., and **Donald Priest**, Los Angeles Heavy Hardware Co.; secretary-treasurer, **L. B. Yeaton**, H. W. Heilman building; all of Los Angeles.

WISCONSIN: President, **G. W. Smith**, Joseph T. Ryerson & Son Inc.; vice president, **John Pritzlaff**, John Pritzlaff Hardware Co.; secretary-treasurer, **Fred O'Dell**, Edgar T. Ward's Sons Co.; chapter director, **George Gibbs**, Gibbs Steel Co.; all of Milwaukee.

< < HELPFUL LITERATURE > >

1. Lathes

R. K. LeBlond Machine Tool Co.—72-page spiral-bound illustrated catalog "America Sings" gives information on complete line of "LeBlond" lathes. Close-up sectional and action photographs show operation and construction of individual parts. Technical data is interspersed with 3-color airbrush illustrations and text discussing challenge facing industrial America.

2. Arc Welding

Lincoln Electric Co.—Illustrated data sheet No. 79 is technical exposition on rigid frames with fixed ends. Engineering data on stresses and moments is presented with formulas and redundant moment diagrams.

3. Fiber Glass

Owens-Corning Fiberglas Corp.—24-page booklet is non-technical pictorial presentation of varied applications of "Fiberglas". Photographs show material being made, and being used in factories, marine service, and in electrical and automotive equipment.

4. Atmosphere Furnace

Lithium Corp.—6-page illustrated folder describes construction and operation of "Lithco" atmosphere furnaces which eliminate decarburization, carburization and scaling. Photomicrographs compare hardening with this furnace and with conventional furnaces without special atmospheres.

5. Air Compressors

Worthington Pump & Machinery Corp.—8-page illustrated bulletin No. L-611-B11A presents complete data on single horizontal two-stage steam and motor driven compressors. Line drawings explain construction features. Units are designed for pressures between 150 and 500 pounds per square inch.

6. Precision Lathe Grinders

Dumore Co.—14-page illustrated booklet, entitled "The Care and Operation of Portable Precision Lathe Grinders", contains general description of grinding process. Problems of precision grinding and typical time-saving setups are discussed.

7. Direct Current Motors

Allis-Chalmers Manufacturing Co.—4-page illustrated bulletin No. B-6131 is descriptive of "Lo-Maintenance" type E direct current motors and generators for ratings up to 200 horsepower and 150 kilowatts. Features of construction and operating characteristics are included.

8. High Speed Steel

Jessop Steel Co.—12-page illustrated bulletin on "Mogul" molybdenum tungsten high speed steel explains advantages of this material over 18-4-1 high speed steels. Physical properties, approximate analysis, hardness values at various drawing temperatures and complete heat treating procedure are enumerated.

9. Snap-Action Switch

Micro Switch Corp.—36-page illustrated general catalog No. 52-1 describes complete line of micro switches. Engineering data, dimensions, prices, operating characteristics and information as to their use are presented together with sectional views and line drawings of construction details.

10. Motor Truck Scales

Toledo Scale Co.—Illustrated folder enumerates structural advantages of "Truckmaster" and "Truckweigh" motor truck scales. Close-up photographs show features of self-gaging pivots, suspension assembly, and seven lever system with 100 per cent end loading. Also included are views of some scale installations made during past year.

11. Speed Reducers

Link-Belt Co.—20-page illustrated Bulletin No. 1515 describes advantages of motorized reducers. Cutaway view of double reduction motorized reducer shows features of design. Tables list service factors, data for selecting proper unit, dimensions, and maximum allowable pull in pounds. Photographs illustrate typical applications.

12. Machining Die Castings

New Jersey Zinc Co.—32-page illustrated manual "Practice in Machining Zinc Alloy Die Castings" summarizes current machining practice in bending and forming, broaching and shaving, buffing, burnishing and tumbling, drilling, facing, gear cutting, knurling, milling, punching and other operations. Typical applications with fixtures and jigs used are shown.

13. Insulating Firebrick

Babcock & Wilcox Co.—16-page illustrated bulletin No. R-2-G explains advantages of insulating firebrick and their application to boiler and industrial furnaces. Relationship between weight, heat conductivity and heat storage capacity is described. Data on panel walls, suspended arches, insulating concrete and special mortars are included.

14. Heat Treating Products

National Copper Paint Corp.—6-page bulletin No. 113 is descriptive of line of "Sel-Car" heat treating products. Material is solution which is brushed or sprayed on metal to be heat treated. It provides surface protection for steels against carburization, decarburization and scaling, and allows for selective cyaniding in liquid baths by means of special application.

15. Hydraulic Presses

A. B. Farquhar Co.—4-page illustrated bulletin No. 41-H-01 describes line of hydraulic straightening and general purpose presses. These units are self contained. Specifications are given for each size and type.

16. Combustion Instruments

Hays Corp.—12-page illustrated catalog No. 40-323 lists complete data on line of flue gas analyzers and portable combustion testing instruments, including draft gages, thermometers, combustion test sets and automatic carbon dioxide testing set.

17. Steel Treating

Lindberg Steel Treating Co.—8-page bulletin "Steel Stamina" is bi-monthly publication devoted to general information on better steel performance. Current issue contains article on value of atmosphere control in heat treating, as well as cartoons and semi-humorous essays.

18. Materials Handling

Koppers Co.—Illustrated bulletin No. D-2 describes engineering service maintained by company which analyzes material handling problems and suggests means of reducing costs and simplifying layouts and operations. Photographs show typical installations.

19. Carburizing Furnace

General Electric Co.—4-page illustrated bulletin No. GEA-3523 contains complete information on new "G-E" gas-carburizing electric furnace in which any desired treatment can be produced at any time, assuring uniformity of results. Features of design and operation are shown in cut-away illustration.

20. Alloy Pipe & Tubing

International Nickel Co.—12-page illustrated technical bulletin No. T-17 discusses fabrication of "Monel", nickel and "Inconel" seamless pipe and tubing. Properties and design, bursting pressure and other engineering data are given.

STEEL

Readers' Service Dept.
1213 West Third St.,
Cleveland, Ohio

AA
4-22-41

Please have literature circled below sent to me.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24 25 26 27 28 29
30 31 32 33 34 35 36 37 38 39 40 41

Name _____ Title _____

Company _____

Products Manufactured _____

Address _____

City _____

FIRST CLASS
PERMIT No. 36
(Sec. 510 P.L.&R.)
Cleveland, Ohio

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

4c POSTAGE WILL BE PAID BY—

STEEL
Penton Building
CLEVELAND, OHIO

<<< HELPFUL LITERATURE

(Continued)

21. Material Handling

Lyon Iron Works—Illustrated circular No. 120 points out advantages of line of hydraulic material handling equipment. Complete specifications are presented for hydraulic lift trucks, elevating tables, die handling trucks, utility trucks, steel frame skid platforms and special handling equipment.

22. Speed Reducers

W. A. Jones Foundry & Machine Co.—128-page illustrated spiral-bound catalog No. 70 contains complete information on general line of herringbone speed reducers. Available styles, design and construction details, rating tables, specifications and application data are given for all sizes.

23. Welding Electrodes

Page Steel & Wire division, American Chain & Cable Co.—10-page bulletin No. DH-1023 lists services, types, coatings, sizes and markings for line of stainless steel electrodes suitable for welding of practically every commercial composition of stainless steel. Tables give composition of each grade.

24. Pre-Finished Metals

American Nickeloid Co.—6-page illustrated folder, "Hand in Hand", explains application of bright and satin finished metals as reflector or diffuser of light, respectively, when incorporated in fluorescent fixtures. Samples of two finishes are attached.

25. Sliding Grilles

Cornell Iron Works, Inc.—8-page illustrated bulletin No. SG3 explains design and application of sliding grilles. These flexible steel curtains are hung from overhead track and are made of galvanized chain link mesh. Standard stock size of 10 x 12 feet lists for $48.50. Any size can be made to order.

26. Blowers & Pumps

Roots-Connersville Blower Corp. — 8-page illustrated folder No. G-70 is devoted to positive displacement blowers, positive gas exhausters and boosters, rotary displacement meters, liquid and vacuum pumps, centrifugal blowers and exhausters, and inert gas generators. Tables list briefly applications for which each type of equipment is suited.

27. Arc Welder

Hobart Brothers Co.—36-page illustrated booklet, "Arc Welding and the Hundreds of Ways It Pays You," pictorially shows use of arc welding in repair and maintenance work, and in new construction on bridges, boilers, automobiles, cargo ships and other equipment. Electric and gas powered welders are described with full specifications.

28. Variable Speed Drive

Graham Transmissions, Inc.—16-page illustrated bulletin No. 501 is technical guide for application of variable speed drives to machinery. Infinitely variable speed is obtainable with these units which use principle of metallic rolling contact. Standard, geared head and motorized units are available.

29. Disc Grinding

Norton Co.—27-page illustrated handbook No. 1141 describes use of disc grinder as production tool. Types of discs are pictured together with recommended usage for each. Mounting instructions for various makes of grinders are also included.

30. Gear Lapper

Michigan Tool Co.—Illustrated folder No. 991 enumerates design and construction features of Model No. 991 three-lap gear lapper which operates with crossed-axis rotation for laps and gears plus fast reciprocating motion. Machine refines gears and eliminates helix angle wobble and eccentricity.

31. Airplane Riveting

Chicago Rivet & Machine Co.—16-page illustrated brochure pictures four models of new line of automatic riveting machines in bench and pedestal types which are designed especially for setting aircraft rivets. Feeding, inserting and upsetting of rivets is accomplished automatically at single machine stroke.

32. Tipped Cutting Tools

McKenna Metals Co.—32-page illustrated catalog No. 41 is devoted to "Kennametal" steel cutting tools and blanks. Prices and dimensions for all tools, including blanks and semi-finished tools, are listed in tables. Drawings show design of each style.

33. Bronze Welding Rods

Air Reduction Sales Co.—4-page illustrated bulletin No. ADG-1074 outlines physical properties of "Hi-Test" flux-coated bronze welding rods. Reasons for using this rod are explained. Rods are available in ⅛, 3/16 and ¼-inch sizes.

34. Industrial Trailers

Ohio Galvanizing & Manufacturing Co.—4-page illustrated folder is descriptive of "Ohio 2001" one-piece, T-section steel frame trailer of 2½ tons capacity for materials handling, general industrial and warehouse use. Features and specifications of unit are given.

35. Fire Extinguishing

Cardox Corp.—20-page illustrated bulletin No. F-12 presents complete information on "Cardox" fire extinguishing systems for application to all types of equipment and industrial structures. Operation and advantages of system which employs carbon dioxide as extinguishing medium are explained.

36. Buckets

Blaw-Knox Co. — 20-page illustrated catalog No. 1807 describes buckets for coal and coke handling. All types are mentioned and diagrams explain features. Included is analysis of cable life and table on bucket capacities.

37. Power Transformers

R. E. Uptegraff Manufacturing Co.—16-page illustrated bulletin No. 111 is descriptive of line of large power transformers. Units are shown in process of manufacture, through various stages of assembly and in completed form.

38. Water Conditioning

Hall Laboratories, Inc.—16-page illustrated bulletin No. 1117 presents 17 case histories of water conditioning operations in various applications. Problems encountered and their solutions are related in factual text.

39. Toggle-Type Clutch

Rockford Drilling Machine division, Borg-Warner Corp. — Illustrated data sheet gives information on toggle-type over-center clutch. Line drawings and unassembled view show details of design and construction.

40. Direct Air Heaters

Despatch Oven Co.—4-page illustrated bulletin No. 72 is descriptive of controlled combustion gas fired direct air heaters for convected air applications on ovens, dryers and furnaces. Sizes range from 75,000 to 1,000,000 British thermal units per hour.

41. Sling Chains

American Chain & Cable Co.—16-page illustrated bulletin No. DH1124-B gives complete specifications on line of sling chains. Data are included on wrought iron, "Endweldur", "Accalloy", corrosion resistant and multiple leg sling chains for all types of applications. Physical specifications and instructions covering purchasing and use of chain are included.

STEEL

Readers' Service Dept.
1213 West Third St.,
Cleveland, Ohio

AA
4-28-41

Please have literature circled below sent to me.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24	25	26	27	28	29			
30	31	32	33	34	35	36	37	38	39	40	41				

Name _____ Title _____

Company _____

Products Manufactured _____

Address _____

FIRST CLASS
PERMIT No. 36
(Sec. 510 P.L.&R.)
Cleveland, Ohio

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

4c POSTAGE WILL BE PAID BY—

STEEL

Penton Building
CLEVELAND, OHIO

Output Loss from Coal Strike Millions of Tons

About 20 blast furnaces blown out or banked. Coke lag will prevail two weeks after strike is settled.

MARKET IN TABLOID ★

Demand
Somewhat curbed by sold-out condition.

Prices
Freezing has made for greater uniformity.

Production
Down 2 points to 96.

■ Approximately 20 blast furnaces had ceased operating by the end of last week because of a shortage of coke due to the coal strike, equivalent to a loss of 15,000 tons of pig iron production daily, which may ultimately affect adversely production of steel and perhaps finished goods. Moreover after the coal strike ceases it will take two or three weeks before coke ovens can get a replenished supply of coal to resume operations.

Because of the fuel shortage steel ingot production last week dropped 2 points to 96 per cent of capacity and still further declines in the future are in prospect before the momentum of the downward trend can be halted. Some bessemer converters and coke ovens have closed down. Many steelmakers are trying to conserve pig iron by employing larger proportions of scrap, but in the long run the industry will have to pay dearly for loss of time and materials unless coal labor difficulties are settled at once. The exact pig iron situation will be better known in another week, or when STEEL compiles April production.

A survey by the war department reveals that if the coal strike continues steel ingot production will have been reduced by next month 1,000,000 tons monthly and by May 5 more than 2,500,000 tons, the annual ingot-making capacity of the country being over 80,000,000 tons.

Constantly a greater proportion of orders for steel is for defense work and steel men predict that before long filling of civilian needs will be shoved far into the background. It is suggested that perhaps with the aid of Washington steel still available for civilians will be rationed with strictness. The trade fairly buzzes with prophesies, such as that virtually all forms of steel will fall under priorities, that steel producing capacity will be enlarged further and that much steel, now scheduled for 1941 deliveries, will not attain delivery until 1942. One authority foresees that at least two months' production scheduled for this year's delivery, will actually be shipped next year.

More and more are delivery schedules being upset by defense orders carrying priorities. Usually steelmakers are at least two weeks behind promises in making deliveries.

Civilian purchases of plates are particularly severely affected by defense orders. Close to 700,000 tons of plates are now being distributed for over 200 "ugly duckling" vessels for the Maritime Commission.

The magnitude of 1941 steel business is shown by comparison with last year. One larger maker has booked five times as much steel, from Jan. 1 to the present, as for the same period last year. Another company reports March sales as ten times the volume of March, 1940. A long-established New England shipbuilder estimates it will have consumed 500,000 tons of plates this year and enough welding wire to circle the globe.

Many steelmakers continue to welcome decreased business. Sales of merchant pipe in April have been 20 per cent under March. Some prominent makers of sheets and strips find their business considerably curtailed, attributing this to lessened buying by automobile makers, a condition, however, which is not uniform. Building steel inquiry and awards are much lighter than earlier this year.

Some consumers are ground between the upper and nether millstones, being unable to buy more for 1941 delivery and being discouraged by producers from buying into 1942.

The steel scrap markets are usually quiet, with chief trading in those grades on which the government has placed maximum prices. Railroads generally withhold material until prices are established. Cast scrap is particularly scarce, largely because it has been used as a pig iron substitute.

Automobile production for the week ended April 26 was scheduled at 108,165 units, an increase of 8220 because of the cessation of the Ford strike, comparing with 101,405 for the corresponding 1940 week.

Steel ingot production last week gained in three districts: Wheeling 4 points to 88 per cent of capacity, Cincinnati 1 point to 92½ and Detroit 9 points to 79. Declines were: Pittsburgh by 4 points to 96, Chicago by 6 points to 96, Youngstown by 3 points to 94 and Cleveland by 4½ points to 92. Unchanged were eastern Pennsylvania at 96, Buffalo 90½, Birmingham 90, New England 92 and St. Louis 98.

STEEL's three composite price groups for last week were unchanged: iron and steel at $38.15, finished steel at $56.60 and steelworks scrap at $19.16.

COMPOSITE MARKET AVERAGES

	Apr. 26	Apr. 19	Apr. 12	One Month Ago March, 1941	Three Months Ago Jan., 1941	One Year Ago Apr., 1940	Five Years Ago Apr., 1936
Iron and Steel	$38.15	$38.15	$38.15	$38.27	$38.38	$36.69	$31.10
Finished Steel ...	56.60	56.60	56.60	56.60	56.60	55.90	52.20
Steelworks Scrap..	19.16	19.16	19.16	20.04	20.88	16.00	14.39

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

COMPARISON OF PRICES

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

Finished Material

	Apr. 26, 1941	Mar. 1941	Jan. 1941	Apr. 1940
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.47
Iron bars, Chicago	2.25	2.25	2.25	2.25
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.225	2.17	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.00
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	2.95
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	1.95
Sheets, cold-rolled, Gary	3.05	3.05	3.05	2.90
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 ⅜-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron

	Apr. 26, 1941	Mar. 1941	Jan. 1941	Apr. 1940
Bessemer, del. Pittsburgh	$25.34	$25.34	$25.34	$24.34
Basic, Valley	23.50	23.50	23.50	22.50
Basic, eastern, del. Philadelphia	25.34	25.34	25.34	24.34
No. 2 fdry., del. Pgh., N.&S. Sides	24.69	24.69	24.69	23.69
No. 2 foundry, Chicago	24.00	24.00	24.00	23.00
Southern No. 2, Birmingham	20.38	20.38	19.38	19.38
Southern No. 2, del. Cincinnati	24.06	24.06	23.06	22.89
No. 2X, del. Phila. (differ. av.)	26.215	26.215	26.215	25.215
Malleable, Valley	24.00	24.00	24.00	23.00
Malleable, Chicago	24.00	24.00	24.00	23.00
Lake Sup., charcoal, del. Chicago	30.34	30.34	30.34	30.34
Gray forge, del. Pittsburgh	24.19	24.18	24.17	23.17
Ferromanganese, del. Pittsburgh	125.33	125.33	125.33	105.33

Scrap

Heavy melting steel, Pitts.	$20.00	$20.75	$22.15	$16.45
Heavy melt. steel, No. 2, E. Pa.	17.75	18.65	19.31	15.50
Heavy melting steel, Chicago	18.75	19.45	20.15	15.20
Rails for rolling, Chicago	22.25	24.00	24.40	11.25
Railroad steel specialties, Chicago	23.75	23.55	23.95	18.05

Coke

Connellsville, furnace, ovens	$5.50	$5.50	$5.50	$4.75
Connellsville, foundry, ovens	6.00	6.00	6.00	5.75
Chicago, by-product fdry., del.	11.75	11.75	11.75	11.25

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

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

Sheet Steel

Hot Rolled

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

Cold Rolled

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

Galvanized No. 24

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

Black Plate, No. 29 and Lighter

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

Long Ternes No. 24 Unassorted

Pittsburgh, Gary	3.80c
Pacific Coast	4.55c

Enameling Sheets

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

Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.

Chrome-Nickel

	No. 302	No. 303	No. 304
Bars	24.00	26.00	25.00
Plates	27.00	29.00	29.00
Sheets	34.00	36.00	36.00
Hot strip	21.50	27.00	23.50
Cold strip	28.00	33.00	30.00

20% Nl.-Cr. Clad

Plates	18.00*
Sheets	19.00

**Annealed and pickled*

Straight Chromes

	No. 410	No. 416	No. 430	No. 442
Bars	18.50	19.00	19.00	22.50
Plates	21.50	22.00	22.00	25.50
Sheets	26.50	27.00	29.00	32.50
Hot strip	17.00	18.25	17.50	24.00
Cold stp.	22.00	23.50	22.50	32.00

Steel Plate

Pittsburgh	2.10c
New York, del.	2.29c
Philadelphia, del.	2.15c
Boston, delivered	2.43c-2.57c
Buffalo, delivered	2.33c
Chicago or Gary	2.10c
Cleveland	2.10c
Birmingham	2.10c
Coatesville, Pa.	2.10c
Sparrows Point, Md.	2.10c
Claymont, Del.	2.10c
Youngstown	2.10c
Gulf ports	2.45c
Pacific Coast ports	2.65c

Steel Floor Plates

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

Structural Shapes

Pittsburgh	2.10c
Philadelphia, del.	2.21½c
New York, del.	2.27c
Boston, delivered	2.41c
Bethlehem	2.10c
Chicago	2.10c
Cleveland, del.	2.30c
Buffalo	2.10c
Gulf ports	2.45c
Birmingham	2.10c
St. Louis, del.	2.34c
Pacific Coast ports	2.75c

Tin and Terne Plate

Tin Plate, Coke (base box)

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

Mfg. Terne Plate (base box)

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

Roofing Ternes

Pittsburgh base, package 112 sheets 20 x 28 in., coating I.C.

8-lb.	$12.00	25-lb.	$16.00
15-lb.	14.00	30-lb.	17.25
20-lb.	15.00	40-lb.	19.50

Bars

Soft Steel

(Base, 20 tons or over)

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

Rail Steel

(Base, 5 tons or over)

Pittsburgh	2.15c
Chicago or Gary	2.15c
Detroit, delivered	2.25c
Cleveland	2.15c

Buffalo	2.15c
Birmingham	2.15c
Gulf ports	2.50c
Pacific Coast ports	2.80c

Iron

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

Reinforcing

New Billet Bars, Base

Chicago, Gary, Buffalo, Cleve., Birm., Young., Sparrows Pt., Pitts.	2.15c
Gulf ports	2.50c
Pacific Coast ports	2.60c

Rail Steel Bars, Base

Pittsburgh, Gary, Chicago, Buffalo, Cleveland, Birm.	2.15c
Gulf ports	2.50c
Pacific Coast ports	2.60c

Wire Products

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

Standard and cement coated wire nails	$2.55

(Per Pound)

Polished fence staples	2.55c
Annealed fence wire	3.05c
Galv. fence wire	3.40c
Woven wire fencing (base C. L. column)	67
Single loop bale ties, (base C.L. column)	59
Galv. barbed wire, 80-rod spools, base column	70
Twisted barbless wire, column	70

To Manufacturing Trade

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

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

Worcester, Mass., $2 higher on bright basic and spring wire.

Cut Nails

Carload, Pittsburgh, keg..$3.85

Cold-Finished Bars

	Carbon	Alloy
Pittsburgh	2.65c	3.35c
Chicago	2.65c	3.35c
Gary, Ind.	2.65c	3.35c
Detroit	2.70c	*3.45c
Cleveland	2.65c	3.35c
Buffalo	2.65c	3.35c

*Delivered.

Alloy Bars (Hot)

(Base, 20 tons or over)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem 2.70c
Detroit, delivered 2.80c

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.35	3100	0.70
2100	0.75	3200	1.35
2300	1.70	3300	3.80
2500	2.55	3400	3.20

4100 0.15 to 0.25 Mo. 0.55
4600 0.20 to 0.30 Mo. 1.50-2.00 Ni. 1.20
5100 0.80-1.10 Cr. 0.45
5100 Cr. spring flats 0.15
6100 bars 1.20
6100 spring flats 0.85
Cr. N., Van. 1.50
Carbon Van. 0.85
9200 spring flats 0.15
9200 spring rounds, squares 0.40
Electric furnace up 50 cents.

Alloy Plates (Hot)

Pittsburgh, Chicago, Coatesville, Pa. 3.50c

Strip and Hoops

(Base, hot strip, 1 ton or over; cold, 3 tons or over)

Hot Strip, 12-inch and less

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, Birmingham	2.10c
Detroit, del.	2.20c
Philadelphia, del.	2.42c
New York, del.	2.46c
Pacific Coast ports	2.75c
Cooperage hoop, Young., Pitts.; Chicago, Birm.	2.20c
Cold strip, 0.25 carbon and under, Pittsburgh, Cleveland, Youngstown	2.80c
Chicago	2.90c
Detroit, del.	2.90c
Worcester, Mass.	3.00c

Carbon	Cleve., Pitts.
0.26—0.50	2.80c
0.51—0.75	4.30c
0.76—1.00	6.15c
Over 1.00	8.35c

Worcester, Mass. $4 higher.

Commodity Cold-Rolled Strip

Pitts.-Cleve.-Youngstown	2.95c
Chicago	3.05c
Detroit, del.	3.05c
Worcester, Mass.	3.35c

Lamp stock up 10 cents.

Rails, Fastenings

(Gross Tons)

Standard rails, mill	$40.00
Relay rails, Pittsburgh 20—100 lbs.	32.50-35.50
Light rails, billet qual., Pitts., Chicago, B'ham.	$40.00
Do., rerolling quality	39.00

Cents per pound

Angle bars, billet, mills.	2.70c
Do., axle steel	2.35c
Spikes, R. R. base	3.00c
Track bolts, base	4.15c
Car axles forged, Pitts., Chicago, Birmingham.	3.15c
Tie plates, base	2.15c

Base, light rails 25 to 60 lbs., 20 lbs., up $2; 16 lbs. up $4; 12 lbs. up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base plates 20 tons.

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller	68 off
Do., ⅝ and ⅝ x 6-in. and shorter	66 off
Do., ¾ to 1 x 6-in. and shorter	64 off
1⅛ and larger, all lengths	62 off
All diameters, over 6-in. long	62 off
Tire bolts	52.5 off

Stove Bolts

In packages with nuts separate 73-10 off; with nuts attached 73 off; bulk 81 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts	60 off
Plow bolts	68.5 off

Nuts

Semifinished hex.	U.S.S.	S.A.E.
½-inch and less	66	70
⅝-1-inch	63	65*
1⅛-1½-inch	61	62
1⅝ and larger	60	--

Hexagon Cap Screws

Upset 1-in., smaller 68 off

Square Head Set Screws

Upset, 1-in., smaller	74.0 off
Headless set screws	64.0 off

Piling

Pitts., Chgo., Buffalo 2.40c

Rivets, Washers

F.o.b. Pitts., Cleve., Chgo., Bham.

Structural	3.40c
⅞-inch and under	65-10 off

Wrought washers, Pitts., Chi., Phila., to jobbers and large nut, bolt mfrs. l.c.l. $5.40; c.l. $5.75 off

Welded Iron, Steel, Pipe

Base discounts on steel pipe. Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less on lap weld, 1 point less on butt weld. Chicago delivery 2½ and 1½ less, respectively. Wrought pipe, Pittsburgh base.

Butt Weld

Steel

In.	Blk.	Galv.
½	63½	51
¾	66½	55
1—3	68½	57½

Iron

¾	30	10
1—1¼	34	16
1½	38	18½
2	37½	18

Lap Weld

Steel

2	61	49½
2½—3	64	52½
3½—6	66	54½
7 and 8	65	52½

Iron

2	30½	12
2½—3½	31½	14½
4	33½	18
4½—8	32½	17
9—12	28½	12

Line Pipe

Steel

1 to 3, butt weld	67½
2, lap weld	60
2½ to 3, lap weld	63
3½ to 6, lap weld	65
7 and 8, lap weld	64

Iron

	Blk.	Galv.
¾ butt weld	25	4
1 and 1¼ butt weld	29	10
1½ butt weld	33	12½
2 butt weld	32½	13
1½ lap weld	23½	4
2 lap weld	25½	6
2½ to 3½ lap weld	26½	8½
4 lap weld	28½	12
4½ to 8 lap weld	27½	11
9 to 12 lap weld	23½	6

Boiler Tubes

Carloads minimum wall seamless steel boiler tubes, cut-lengths 4 to 24 feet; f.o.b. Pittsburgh, base price per 100 feet subject to usual extras.

Lap Welded

Sizes	Gage	Steel	Charcoal Iron
1½"O.D.	13	$ 9.72	$23.71
1¾"O.D.	13	11.06	22.93
2" O.D.	13	12.38	19.35
2¼"O.D.	13	13.79	21.68
2¼"O.D.	12	15.16	....
2½"O.D.	12	16.58	26.57
2¾"O.D.	12	17.54	29.00
3" O.D.	12	18.35	31.36
3½"O.D.	11	23.15	39.81
4" O.D.	10	28.66	49.90
5" O.D.	9	44.25	73.93
6" O.D.	7	68.14	....

Seamless

Sizes	Gage	Hot Rolled	Cold Drawn
1" O.D.	13	$ 7.82	$ 9.01
1¼"O.D.	13	9.26	10.67
1½"O.D.	13	10.23	11.79
1¾"O.D.	13	11.64	13.42
2" O.D.	13	13.04	15.03
2¼"O.D.	13	14.54	16.76
2½"O.D.	12	16.01	18.45
2½"O.D.	12	17.54	20.21
2¾"O.D.	12	18.59	21.42
3" O.D.	12	19.50	22.48
3½"O.D.	11	24.62	28.37
4" O.D.	10	30.54	35.20
4½"O.D.	10	37.35	43.04
5" O.D.	9	46.87	54.01
6" O.D.	7	71.96	82.93

Cast Iron Pipe

Class B Pipe—Per Net Ton

6-in., & over, Birm.	$45.00-46.00
4-in., Birmingham	48.00-49.00
4-in., Chicago	56.80-57.80
6-in. & over, Chicago	53.80-54.80
6-in. & over, east fdy.	49.00
Do., 4-in.	52.00

Class A Pipe $3 over Class B
Stnd. fitgs., Birm., base $100.00.

Semifinished Steel

Rerolling Billets, Slabs
(Gross Tons)

Pittsburgh, Chicago, Gary, Cleve., Buffalo, Youngs., Birm., Sparrows Point.	$34.00
Duluth (billets)	36.00
Detroit, delivered	36.00

Forging Quality Billets

Pitts., Chi., Gary, Cleve., Young, Buffalo, Birm.	40.00
Duluth	42.00

Sheet Bars

Pitts., Cleveland, Young., Sparrows Point Buffalo, Canton, Chicago.	34.00
Detroit, delivered	36.00

Wire Rods

Pitts., Cleveland, Chicago, Birmingham No. 5 to ⅝-inch incl. (per 100 lbs.)	$2.00
Do., over ⅝ to 41/64-in. incl.	2.15

Worcester up $0.10; Galveston up $0.25; Pacific Coast up $0.50.

Skelp

Pitts., Chi., Youngstown, Coatesville, Sparrows Pt.	1.90c

Shell Steel

Pittsburgh, Chicago, base, 1000 tons of one size, open hearth 3-12-inch	$52.00
12-18-inch	54.00
18-inch and over	56.00

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur.	$5.00- 5.75
Connellsville, fdry.	5.25- 6.00
Connell. prem. fdry.	6.00- 6.60
New River fdry.	6.50- 7.00
Wise county fdry.	5.50- 6.50
Wise county fur.	5.00- 5.25

By-Product Foundry

Newark, N. J., del.	11.85-12.30
Chicago, outside del.	11.00
Chicago, delivered	11.75
Terre Haute, del.	11.25
Milwaukee, ovens	11.75
New England, del.	13.00
St. Louis, del.	11.75
Birmingham, ovens	7.50
Indianapolis, del.	11.25
Cincinnati, del.	11.00
Cleveland, del.	11.55
Buffalo, del.	11.75
Detroit, del.	11.50
Philadelphia, del.	11.63

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	14.00c
Toluol, two degree	27.00c
Solvent naphtha	26.00c
Industrial xylol	26.00c

Per lb. f.o.b. Frankford and St. Louis

Phenol (less than 1000 lbs.)	13.75c
Do. (1000 lbs. or over)	12.75c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers	7.00c

Per ton, bulk, f.o.b. port

Sulphate of ammonia	$30.00

Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25 sil.; 50c diff. below 1.75 sil. Gross tons

	No. 2 Fdry.	Malleable	Basic	Bessemer
Basing Points:				
Bethlehem, Pa.	$25.00	$25.50	$24.50	$26.00
Birmingham, Ala.§	20.38	.....	19.38	24.00
Birdsboro, Pa.	25.00	25.50	24.50	26.00
Buffalo	24.00	24.50	23.00	25.00
Chicago	24.00	24.00	23.50	24.50
Cleveland	24.00	24.00	23.50	24.50
Detroit	24.00	24.00	23.50	24.50
Duluth	24.50	24.50	.....	25.00
Erie, Pa.	24.00	24.50	23.50	25.00
Everett, Mass.	25.00	25.50	24.50	26.00
Granite City, Ill.	24.00	24.00	23.50	24.50
Hamilton, O.	24.00	24.00	23.50	24.50
Neville Island, Pa.	24.00	24.00	23.50	24.50
Provo, Utah	22.00	.....	.....	.....
Sharpsville, Pa.	24.00–24.50	24.00–24.50	23.50–24.50	24.50–25.00
Sparrow's Point, Md.	25.00	.....	24.50	.....
Swedeland, Pa.	25.00	25.50	24.50	26.00
Toledo, O.	24.00	24.00	23.50	24.50
Youngstown, O.	24.00–24.50	24.00–24.50	23.50–24.50	24.50–25.00

§Subject to 38 cents deduction for 0.70 per cent phosphorus or higher.

Delivered from Basing Points:				
Akron, O., from Cleveland	25.39	25.39	24.89	25.89
Baltimore from Birmingham†	25.61	.....	25.11	.....
Boston from Birmingham†	25.12	.....	.....	.....
Boston from Everett, Mass.	25.50	26.00	25.00	26.50
Boston from Buffalo	25.50	26.00	25.00	26.50
Brooklyn, N. Y., from Bethlehem	27.50	28.00	.....	.....
Canton, O. from Cleveland	25.39	25.39	24.89	25.89
Chicago from Birmingham	†24.22	.....	.....	.....
Cincinnati from Hamilton, O.	24.44	25.11	24.61	.....
Cincinnati from Birmingham†	24.06	.....	23.06	.....
Cleveland from Birmingham†	24.12	.....	23.62	.....
Mansfield, O., from Toledo, O.	25.94	25.94	25.44	.....
Milwaukee from Chicago	25.10	25.10	24.60	25.60
Muskegon, Mich., from Chicago, Toledo or Detroit	27.19	27.19	.....	.....
Newark, N. J., from Birmingham†	26.15	.....	.....	.....
Newark, N. J., from Bethlehem	26.53	27.03	.....	.....
Philadelphia from Birmingham†	25.46	.....	24.96	.....
Philadelphia from Swedeland, Pa.	25.84	26.34	25.34	.....

Pittsburgh dist.: Add to Neville Island base, North and South Sides, 69c; McKees Rocks, 55c; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, 84c; Monessen, Monongahela City, $1.07; Oakmont, Verona, $1.11; Brackenridge, $1.24.

	No. 2 Fdry.	Malleable	Basic	Bessemer
Saginaw, Mich., from Detroit	26.31	26.31	25.81	26.81
St. Louis, northern	24.50	24.50	24.00	.....
St. Louis from Birmingham	†24.12	.....	23.62	.....
St. Paul from Duluth	26.63	26.63	.....	27.13

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50, base; $30.74 delivered Philadelphia.

Gray Forge		Charcoal	
Valley furnace	$23.50	Lake Superior fur.	$27.00
Pitts. dist. fur.	23.50	do., del. Chicago	30.34
		Lyles, Tenn., high phos.	28.50

†Silvery

Jackson county, O., base: 6-6.50 per cent $29.50; 6.51-7—$30.00; 7-7.50—$30.50; 7.51-8—$31.00; 8-8.50—$31.50; 8.51-9—$32.00; 9-9.50—$32.50; Buffalo, $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base; Prices are the same as for silveries, plus $1 a ton.

†The lower all-rail delivered price from Jackson, O., or Buffalo, is quoted with freight allowed.

Manganese differentials in silvery iron and ferrosilicon, 2 to 3%, $1 per ton add. Each unit over 3%, add $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$60.80

First Quality

Pa., Ill., Md., Mo., Ky.	47.50
Alabama, Georgia	47.50
New Jersey	52.50

Second Quality

Pa., Ill., Ky., Md., Mo.	42.75
Georgia, Alabama	34.20
New Jersey	49.00

Ohio

First quality	39.90
Intermediate	36.10
Second quality	31.35

Malleable Bung Brick

All bases	$56.05

Silica Brick

Pennsylvania	$47.50
Joliet, E. Chicago	55.10
Birmingham, Ala.	47.50

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$28.00
Wire cut	26.00

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$50.00
Chem. bonded chrome	50.00
Magnesite brick	72.00
Chem. bonded magnesite	61.00

Fluorspar

Washed gravel, duty pd., tide, net ton	$25.00-$26.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	20.00-21.00
Do. barge	20.00
No. 2 lump	20.00-21.00

Ferroalloy Prices

Ferromanganese, 78-82%, carlots, duty pd. $120.00
Ton lots 130.00
Less ton lots 133.50
Less 200 lb. lots 138.00
Do., carlots del. Pitts. 125.33

Spiegeleisen, 19-21% dom. Palmerton, Pa., spot 36.00

Ferrosilicon, 50%, freight allowed, c.l. 74.50
Do., ton lot 87.00
Do., 75 per cent 135.00
Do., ton lots 151.00
Spot, $5 a ton higher.

Silicomanganese, c.l., 2½ per cent carbon 118.00
1½% carbon 128.00
Contract ton price $12.50 higher; spot $5 over contract.

Ferrotungsten, stand., lb. con. del. cars 1.90-2.00

Ferrovanadium, 35 to 40%, lb., cont. 2.70-2.80-2.90

Ferrophosphorus, gr. ton, c.l., 17-18% Rockdale, Tenn., basis, 18%, $3 unitage, 58.50; electric furn., per ton, c. l., 23-26% f.o.b. Mt. Pleasant, Tenn., 24% $3 unitage 75.00

Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb., contained cr., del. carlots 11.00c
Do., ton lots 11.75c
Do., less-ton lots 12.00c
less than 200 lb. lots. 12.25c

67-72% low carbon:

	Carloads	Ton lots	Less ton
2% carb.	17.50c	18.25c	18.75c
1% carb.	18.50c	19.25c	19.75c
0.10% carb.	20.50c	21.25c	21.75c
0.20% carb.	19.50c	20.25c	20.75c

Spot ¼c higher

Ferromolybdenum, 55-65% molyb. cont., f.o.b. mill, lb. 0.95

Calcium molybdate, lb. molyb. cont., f.o.b. mill 0.80

Ferrotitanium, 40-45%, lb., con. ti., f.o.b. Niagara Falls, ton lots $1.23
Do., less-ton lots 1.25
20-25% carbon, 0.10 max., ton lots, lb. 1.35
Do., less-ton lots 1.40
Spot 5c higher

Ferrocolumbium, 50-60% contract, lb. con. col., f.o.b. Niagara Falls $2.25
Do., less-ton lots 2.30
Spot is 10c higher

Technical molybdenum trioxide, 53 to 60% molybdenum, lb. molyb. cont., f.o.b. mill 0.80

Ferro-carbon-titanium, 15-18%, ti., 6-8% carb., carlots, contr., net ton $142.50
Do., spot 145.00
Do., contract, ton lots 145.00
Do., spot, ton lots 150.00

15-18% ti., 3-5% carbon, carlots, contr., net ton 157.50
Do., spot 160.00
Do., contract, ton lots. 160.00
Do., spot, ton lots 165.00

Alsifer, contract carlots, f.o.b. Niagara Falls, lb. 7.50c
Do., ton lots 8.00c
Do., less-ton lots 8.50c
Spot ½c lb. higher

Chromium Briquets, contract, freight allowed, lb. carlots, bulk 7.00c
Do., ton lots 7.50c
Do., less-ton lots 7.75c
Do., less 200 lbs. 8.00c
Spot ¼c lb. higher

Tungsten Metal Powder, according to grade, spot shipment, 200-lb. drum lots, lb. $2.50
Do., smaller lots 2.60

Vanadium Pentoxide, contract, lb. contained $1.10
Do., spot 1.15

Chromium Metal, 98% cr., contract, lb. con. chrome, ton lots 80.00c
Do., spot 85.00c

88% chrome, cont. tons. 79.00c
Do., spot 84.00c

Silicon Metal, 1% iron, contract, carlots, 2 x ⅛-in., lb. 14.50c
Do., 2% 13.00c
Spot ¼c higher

Silicon Briquets, contract carloads, bulk, freight allowed, ton $74.50
Ton lots 84.50
Less-ton lots, lb. 4.00c
Less 200 lb. lots, lb. 4.25c
Spot ¼-cent higher

Manganese Briquets, contract carloads, bulk freight allowed, lb. 5.50c
Ton lots 6.00c
Less-ton lots 6.25c
Spot ¼c higher

Zirconium Alloy, 12-15%, contract, carloads, bulk, gross ton 102.50
Do., ton 108.00

35-40%, contract, carloads, lb., alloy 14.00c
Do., ton lots 15.00c
Do., less-ton lots 16.00c
Spot ¼c higher

Molybdenum Powder, 99%, f.o.b. York, Pa. 200-lb. kegs, lb. $2.60
Do., 100-200 lb. lots 2.75
Do., under 100-lb. lots 3.00

Molybdenum Oxide Briquets, 48-52% molybdenum, per pound contained, f.o.b. producers' plant 80.00c

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials

	Soft Bars	Bands	Hoops	Plates ¼-in. & Over	Struc-tural 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	4.48	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	....	4.05	....	....
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	4.00	4.92	3.47	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	3.30	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	3.18	4.23	4.73	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
Kansas City	4.05	4.15	4.15	4.00	4.00	5.60	3.90	....	5.00	....	4.30	....	....
Indianapolis	3.60	3.75	3.75	3.70	3.70	5.30	3.45	....	5.01	....	3.97	....	....
Memphis	3.90	4.10	4.10	3.95	3.95	5.71	3.85	....	5.25	....	4.31	....	....
Chattanooga	3.80	4.00	4.00	3.85	3.85	5.68	3.75	....	4.50	....	4.39	....	....
Tulsa, Okla.	4.44	4.34	4.34	4.49	4.49	6.09	4.19	....	5.54	....	4.69	....	....
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	....	4.80	5.00	4.60	....	....
Houston, Tex.	3.75	5.95	5.95	3.85	3.85	5.50	4.20	....	5.25	....	6.90	....	....
Seattle	4.00	4.00	5.20	4.00	4.00	5.75	4.00	6.50	5.25	....	5.75	....	....
Portland, Oreg.	4.25	4.50	6.10	4.00	4.00	5.75	3.95	6.50	5.00	....	5.75	....	....
Los Angeles	4.15	4.65	6.45	4.15	4.15	6.40	4.30	6.50	5.50	....	6.60	10.55	9.80
San Francisco	3.75	4.25	6.00	3.90	3.90	5.60	3.90	6.40	5.65	....	6.80	10.65	9.80

	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	5.85	....	8.00	7.85	8.65
Portland, Oreg.	5.70	8.85	8.00	7.85	8.65
Los Angeles	4.80	9.55	8.55	8.40	9.05
San Francisco	5.25	9.65	8.80	8.65	9.30

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300-4999 pounds in Portland; 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; 300-1999 Los Angeles.

Galvanized Sheets: Base, 150-1499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 150-1049 in Los Angeles; 300-4999 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, 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	2.75c	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, 21 gage	4.61c	25 12 6
Tin plate, base box, 20 x 14, 108 pounds	$ 6.29	1 11 4

British ferromanganese $120.00 gen ered 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	7.15	1 15 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	10.00

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.
Chinese wolframite, net ton, duty pd.	$24.00-25.00
Brazil iron ore, 68-69%, ord.	7.50c
Low phos. (.02 max.)	8.00c

F.O.B. Rio Janeiro.

Scheelite, imp.	23.50-24.00
Chrome ore, Indian, 48% gross ton, cif.	$43.00-46.00

Manganese Ore

Including war risk but not duty, cents per unit cargo lots.

Caucasian, 50-52%	....
So. African, 48%	68.00-70.00
Brazilian, 46%	63.00-65.00
Chilean, 47%	65.00
Cuban, 50-51%, duty free	67.50

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

IRON AND STEEL SCRAP PRICES

Quotations are those of Price Stabilization Board on grades covered by announcement.

Corrected to Friday night. Gross tons delivered to consumers except where otherwise stated; †indicates brokers prices

HEAVY MELTING STEEL

Birmingham, No. 1.	17.00
Bos. dock No. 1 exp.	14.00-14.50
New Eng. del. No. 1.	†13.50-14.00
Buffalo, No. 1	19.25
Buffalo, No. 2	18.25
Chicago, No. 1	18.75
Chicago, auto, no alloy	18.25
Cincinnati, No. 1	18.50
Cincinnati, No. 1	†16.00-16.50
Cleveland, No. 1	19.50
Cleveland, No. 2	18.50
Detroit, No. 1	17.85
Detroit, No. 1	†16.50-17.00
Detroit, No. 2	16.85
Detroit, No. 2	†15.50-16.00
Duluth No. 1	18.00
Duluth No. 2	17.00
Eastern Pa., No. 1	18.75
Eastern Pa., No. 2	17.75
Los Ang., No. 1	14.50
Los Ang., No. 2	13.50
New York No. 1	†15.25-15.75
New York, No. 2	†14.25-15.75
N. Y., No. 1, exp.	†15.25
N. Y., No. 2, exp.	†14.25
Pitts., No. 1 (R. R.)	21.00
Pittsburgh, No. 1	20.00
Pittsburgh, No. 2	19.00
St. Louis, No. 1 R. R.	18.50
St. Louis, No. 1	17.50
St. Louis, No. 2	16.50
San Fran., No. 1	14.50
San Fran., No. 2	13.50
Seattle, No. 1	14.50
Toronto, dlrs., No. 1	12.25-12.50
Valleys, No. 1	20.00

COMPRESSED SHEETS

Buffalo	19.25
Chicago, factory	18.75
Chicago, dealers	17.75
Cincinnati	17.50
Cincinnati	†15.00-15.50
Cleveland	19.50
Detroit	17.85
Detroit	†16.50-17.00
Duluth	18.00
E. Pa., new mat.	18.75
E. Pa., old mat.	17.50
Los Angeles	14.50
New York, old	†14.25
Pittsburgh	20.00
St. Louis, No. 1	17.50
St. Louis, No. 2	15.50
San Francisco	14.50
Valleys	20.00

BUNDLED SHEETS

Buffalo, No. 1	18.25
Buffalo, No. 2	17.25
Cleveland	16.00
Cincinnati, No. 1	†15.00-15.50
Cincinnati, No. 2	†14.00-14.50
Duluth No. 1	17.00
Duluth No. 2	16.00
Pittsburgh	19.00
St. Louis	13.50
Toronto, dealers	10.00-10.50

SHEET CLIPPINGS, LOOSE

Chicago	15.50-16.00
Cincinnati	14.25
Cincinnati	†12.00-12.50
Detroit	†13.00-13.50
St. Louis	12.00-12.50
Toronto, dealers	8.50- 8.75

BUSHELING

Birmingham, No. 1	16.50
Buffalo, No. 1	18.75
Chicago, No. 1	18.25
Cincin., No. 1	18.00
Cincinnati, No. 1	†15.50-16.00
Cincin., No. 2	14.00
Cincinnati, No. 2	†10.00-10.50
Cleveland, No. 2	15.00
Detroit, No. 1 new	17.35
Detroit, No. 1 new	†16.00-16.50
Duluth No. 1	17.50
Duluth No. 2	13.50
Valleys, new, No. 1	19.50
Toronto, dealers	7.00- 7.50

MACHINE TURNINGS (Long)

Birmingham	12.50
Buffalo	14.75
Chicago	14.25
Cincinnati	14.00
Cincinnati	10.00-11.00
Cleveland, no alloy	15.00
Detroit	13.35
Detroit	†10.00-10.50
Duluth	13.50
Eastern Pa.	14.25
Los Angeles	10.00
New York	†10.75-11.75
Pittsburgh	15.50
St. Louis	13.00
San Francisco	10.00
Toronto, dealers	†8.75- 9.00
Valleys	15.50

SHOVELING TURNINGS

Buffalo	15.75
Cleveland	16.00
Chicago, specl, anal.	16.25-16.75
Cincinnati	10.50-12.50
Detroit	14.35
Detroit	†12.00-12.50
Duluth	14.50
Pitts., alloy-free	16.50
St. Louis	14.00

BORINGS AND TURNINGS

For Blast Furnace Use

New England	11.00
Buffalo	14.75
Cincinnati	14.00
Cincinnati	†10.00-11.00
Cleveland	15.00
Eastern Pa.	14.25
Detroit	13.35
Detroit	†12.00-12.50
Duluth	13.50
New York	†10.75-11.25
Pittsburgh	15.50
St. Louis	13.00
Toronto, dealers	†8.75- 9.00

AXLE TURNINGS

Buffalo	17.00-17.50
Boston district	†12.50-13.00
Chicago, elec. fur.	20.00-20.50
East. Pa. elec. fur.	19.50-20.00
St. Louis	15.50-16.00
Toronto	†7.75- 8.00

CAST IRON BORINGS

Birmingham	12.50
New England, chem.	11.00
Buffalo	14.75
Chicago	14.25
Cincinnati	14.00
Cincinnati	†10.00-11.00
Cleveland	15.00
Detroit	13.35
Detroit	†12.00-12.50
Duluth	13.50
E. Pa., chemical	17.50-18.00
New York	†10.75-11.25
St. Louis	13.00
Toronto, dealers	†8.75- 9.00

RAILROAD SPECIALTIES

Chicago	23.50-24.00

ANGLE BARS—STEEL

Chicago	23.50-24.00
St. Louis	21.50-22.00

SPRINGS

Buffalo	25.00-25.50
Chicago, coil	24.75-25.25
Chicago, leaf	23.50-24.00
Eastern Pa.	23.75
Pittsburgh	26.75-27.25
St. Louis	23.25-23.75

STEEL, RAILS, SHORT

Birmingham	21.00
Buffalo	23.75
Chicago (3 ft.)	22.75
Chicago (2 ft.)	23.25
Cincinnati, 3 ft.	†22.00-22.50
Cincinnati, 2 ft.	†22.50-23.00
Detroit	21.85
Detroit	†22.00-22.50
Duluth, 3 ft. & less	22.00
Duluth, 2 ft. & less	22.50
Duluth, 18-in. & less	23.00
Pitts., 2 ft. and less	24.50
St. L. 2 ft. & Less	22.00

STEEL RAILS, SCRAP

Birmingham	19.00
New England	17.50
Buffalo	21.50
Chicago	20.75
Cleveland	21.50
Cincinnati	†20.00-20.50
Duluth	20.00
East Pa.	20.75
New York	†17.25
Pittsburgh	22.00
St. Louis	19.50
Seattle	16.50

PIPE AND FLUES

Chicago, net	14.50-15.00
Cincinnati, dealers	14.50

RAILROAD GRATE BARS

Buffalo	14.50-15.00
Chicago, net	14.00-14.50
Cincinnati	†14.00-15.00
Eastern Pa.	20.50-21.00
New York	†17.50
St. Louis	15.00-15.50

RAILROAD WROUGHT

Birmingham	16.00
Boston district	†11.75-12.25
Eastern Pa., No. 1	20.50-21.00
St. Louis, No. 1	14.25-14.75
St. Louis, No. 2	16.50-17.00

FORGE FLASHINGS

Boston district	†12.50-12.75
Buffalo	18.50-19.00
Cleveland	18.50-19.00
Detroit	†16.00-16.50
Pittsburgh	20.00-20.50

FORGE SCRAP

Boston district	†12.75-13.00
Chicago, heavy	24.00-24.50

LOW PHOSPHORUS

Buffalo	25.50
Cleveland, crops	24.50
Detroit	†19.00-19.50
Duluth	23.00
Eastern Pa., crops	23.75
Pitts., billet, bloom, slab crops	25.00
Toronto, dealers	13.50-14.00

LOW PHOS. PUNCHINGS

Buffalo	24.25
Chicago	23.75
Cleveland	24.50
Eastern Pa.	23.75
Pittsburgh	25.00
Seattle	19.50

RAILS FOR ROLLING

5 feet and over

Birmingham	20.50
New England	†19.50-20.00
Chicago	22.25
Cincinnati	†21.50-22.00
Duluth	21.50
New York	†18.75
Eastern Pa.	22.25
St. Louis	21.00

STEEL CAR AXLES

Birmingham	18.00
Boston district	†20.00-20.50
Chicago, net	26.00-26.50
Eastern Pa.	27.50-28.00
St. Louis	25.50-26.00

LOCOMOTIVE TIRES

Chicago (cut)	23.50-24.00
St. Louis, No. 1	20.00-20.50

SHAFTING

Boston district	†19.50-19.75
New York	†21.00-21.50
Eastern Pa.	24.50
St. Louis, 1¼-3¾"	19.75-20.25

CAR WHEELS

Birmingham iron	18.00
Boston dist., iron	†16.50-17.00
Buffalo, steel	24.50-25.00
Buffalo iron	21.50-22.00
Chicago, iron	20.50-21.00
Chicago, rolled steel	23.00-23.50
Cincinnati, iron	†17.00-18.50
Eastern Pa., iron	24.00
Eastern Pa., steel	23.75
Pittsburgh, iron	22.00-22.50
Pittsburgh, steel	26.75-27.25
St. Louis iron	21.75-22.25
St. Louis, steel	22.50-23.00

NO. 1 CAST SCRAP

Birmingham	19.50
Boston, No. 1 mach.	†19.00-19.50
N. Eng., del. No. 2	19.25-19.50
N. Eng. del. cupola	23.50
Buffalo, No. 1	20.50
Buffalo, mach.	22.75
Chicago, agri.	22.60
Chicago, auto	22.60
Chicago, railroad	22.60
Chicago, mach.	22.60
Cincin., No. 1 cupola	†20.00-21.00
Cleveland, mach.	22.50
Detroit, cupola	†21.50-22.00
Eastern Pa., cupola	23.69-24.39
E. Pa., No. 2	23.00-23.50
Los Angeles	16.50-17.00
N. Y., No. 1, cupola	†21.00
Pittsburgh, cupola	22.50-23.00
San Francisco	14.50-15.00
Seattle	14.00-15.00
St. L., agri. mach.	20.00-20.50
St. L., No. 1 mach.	22.00-22.50
Toronto No. 1 mach., net dealers	17.75-18.00

HEAVY CAST

Boston dist. break.	†17.50-18.00
New England, del.	22.00
Buffalo, break.	20.50-21.00
Cleveland, break	21.00
Cincinnati, break	†18.00-19.50
Detroit, auto	†21.50-22.00
Detroit, break.	†17.50-18.00
Eastern Pa.	22.34-23.03
Los Ang., auto, net.	13.00-14.00
New York break.	†18.80

STOVE PLATE

Birmingham	13.50
Boston district	†14.50-14.75
Buffalo	17.00-17.50
Chicago	17.60
Cincinnati	†14.00-15.00
Detroit	†15.00-15.50
Eastern Pa.	18.84-19.53
New York fdry.	†17.50
St. Louis	17.00-17.50
Toronto dealers, net	14.00-14.25

MALLEABLE

New England, del.	22.00-23.00
Buffalo	23.00-23.50
Chicago, R. R.	24.50-25.00
Cincin. agri., deal.	18.00-18.50
Cleveland, rail	25.00-25.50
Eastern Pa., R. R.	23.00-23.50
Los Angeles	12.50
Pittsburgh, rail	26.00-26.50
St. Louis, R. R.	21.50-22.00

Sheets, Strip

Sheet & Strip Prices, Pages 100, 101

Sheet producers are having difficulties in meeting consumer shipping requests and constant juggling of mill schedules is necessary. This is complicated by the growing percentage of business identified with defense work. Schedules are constantly interrupted by priority tonnage taking precedence. Mill books are heavily loaded with commoner grades. Little capacity is available for the remainder of the year in hot-rolled sheets and galvanized and lighter gages of cold-rolled are in tight position.

Move toward production of light plates on sheet mills is seen as a factor in further congestion of sheet bookings. At present most mills can offer little more tonnage for 1941, such open space as exists being reserved for expected priority orders. Considerable tonnage is being booked at convenience, which will go over into 1942, although books are not open for that delivery.

Preference ratings being required on chromium-nickel stainless sheets, buyers are increasingly turning to straight chromium sheets, but capacity for these grades also is limited, delivery of four months being general.

Automotive demand shows no lessening, builders continuing efforts to place requirements at unchanged rate for third quarter. Some steel needed for 1941 models probably will not be delivered until July.

Some mills are now planning third quarter schedules from orders formerly accepted without delivery promise, based on 1940 purchases.

Warehouse distributors find difficulty in keep assortments of stainless sheets and other grades, galvanized sheets being in especially small supply.

All sheet producers have been queried by an industry committee as to the availability of their facilities for plate production, and it is expected light plate tonnage will be allotted as far as possible, to free plate mills for heavier sizes only.

Wide strip, 2½ to 8 inches, formerly at 6 to 7 months delivery, is now 7 to 8 months.

Cold-Finished Steel

Cold Finished Prices, Page 101

Cold-drawn carbon bars can be had early in fourth quarter in some cases, but particular difficulty is met in obtaining small rounds, ⅝ to 1 inch in diameter. Screw machine manufacturers are accepting over-sized bars where necessary, oversized by at least 1/16-inch, and

consumers generally are less rigid in specifications where it is at all possible to make substitutions.

Plates

Plate Prices, Page 100

Demand for steel plates continues to increase, although as a rule producers are sold out for the remainder of the year. Accurate determination of open capacity over the next nine months is difficult until shipping dates and tonnage is decided on plate requirements for the Maritime Commission's large shipbuilding campaign. This applies particularly to mills in the East. As initial pressure from construction work has eased the marine program has more than taken up the slack. This is felt far inland, as barge builders in the Pittsburgh district have taken contracts or subcontracts for naval vessels and subassemblies for them.

Some relief will be afforded by sheet mills equipped to roll plates and this may be aided by reduction in automotive demand. Construction work is being done on three plate mills in the Pittsburgh district, now in process of revamping and another will be started shortly, to be in production before the end of the year.

The tight supply situation is discouraging some forms of commercial work and inquiries are less numerous than several months ago. Railroad repair shops have been in the market for substantial tonnages and new car programs are being announced, builders combing the market for all available tonnage.

All plate quotations are on the 2.10c base, higher prices quoted by some eastern mills being ruled out for the present by the government price ceiling order.

New equipment for armor plate production, including presses and heating furnaces, is nearing completion. Heavy forged armor plate output is at the highest point in history and will be considerably augmented before the close of the year. Forge plants have been able to meet requirements of the naval construction program and the new equipment will cope with heavier demand in the future.

A leading maker has booked 50,000 tons of plates for a portion of the 212 ships to be built by the Maritime Commission. It is estimated that 650,000 tons will be needed altogether, orders which are now being placed. Fore River shipyard of Bethlehem is estimated officially as using 500,000 tons of plates in 1941, as well as enough welding wire to reach around the world.

Deliveries of plates against orders placed earlier in the year are heavier than usual in New England, somewhat relieving the tight situation with boiler shops and small tank fabricators as regards quarter-inch and other light material.

Between 1300 and 1500 tons of plates are required for a blast furnace for the Monterey Iron & Steel Co., Monterey, Mexico, on which H. A. Brassert & Co., Chicago, are engineers. This new unit will give the Monterey producer two stacks.

Plate Contracts Placed

400 tons, oil storage tanks, Dahl Oil Co., Norwich, Conn., to Chicago Bridge & Iron Co., Chicago.

325 tons, 2,800,000-gallon water tank, Pennichuck Water Co., Nashua, N. H., to Chicago Bridge & Iron Co., Chicago.

140 tons, 37,500-barrel oil storage tank, Lehigh Petroleum Co., Norwich, Conn., to Chicago Bridge & Iron Co., Chicago.

Plate Contracts Pending

49,980 tons, 24 emergency type cargo carriers for Maritime Commission, Washington, to Richmond Shipbuilding Corp., Richmond, Calif.; plate award not yet made.

49,980 tons, 24 emergency type cargo carriers for Maritime Commission, Washington, to California Shipbuilding Corp., Los Angeles; plate award not yet made.

24,990 tons, 12 emergency type cargo carriers for Maritime Commission, Wash-

lington, to Oregon Shipbuilding Corp., Portland, Oreg.; plate award not yet made.

400 tons, two steel cutters, tug boat and ice-breaker type for navy; Birchfield Boiler Co. Inc., Tacoma, Wash., low.

Bars

Bar Prices, Page 100

Merchant carbon bar producers are filling third quarter books so rapidly some consumers find it difficult to obtain desired protection. Some fourth quarter capacity is still open, but only in certain sizes. Flats are largely sold out through the year. Some sellers are booked solidly into February and most producers have little to offer even in plain carbon bars.

Consumers are becoming increasingly concerned over future prospects. Practically all are on a strict quota basis with allotments predicated on a percentage of increase over annual requirements in recent years. Some of these increases have been as high as 50 per cent but are proving inadequate in many instances, some consumers already having ordered out a full year's allotment from their regular suppliers. Current requirements are being met in most cases but it is feared second half shipments may prove inadequate.

The situation is particularly tight in cases of consumers making products having no special preference rating and for small consumers whose requirements have increased several hundred per cent for direct or indirect defense work. These usually find mills have many similar demands and are not in position to supply all needs.

Among those particularly hard hit are bolt and nut manufacturers, railroads, car and locomotive builders and manufacturers of mining and drilling equipment, all important in defense, who have no preference ratings. Carbuilders are behind on schedules and railroads have difficulty in obtaining sufficient steel for repair work. Warehouses are unable to obtain tonnage to fill wide gaps in stock.

Some consumers, by keeping close to regular suppliers, are able to have a particularly needed tonnage worked in at some favorable shift in mill schedules, although usually at the expense of other tonnage under quota.

In alloy bars and those requiring heat treatment sellers generally are booked well into next year and have been for some time, due to specially heavy demand for such material for defense work.

An important producer for the automotive industry has taken its large bar mill off motor orders to expedite defense tonnage.

Much of present demand by automotive interests probably is for defense work, in production of tanks, trucks and other mobile units. Separation of the latter from regular automobile production is not yet sufficiently clear to indicate the proportion.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 101

Bolt and nut business is limited by the ability of manufacturers to get steel. Stock replacements are becoming more difficult, the trade believes the situation is going to become decidedly worse before it gets better.

Generally speaking, jobber carlots are being quoted for delivery in four to six weeks and direct requirements for consumers, such as shipyards and contractors, four to five weeks on larger items and around four weeks on smaller. Where bolt and nut makers do not have steel supplies on hand they refuse to quote in most cases, due not only to extended mill deliveries but to uncertainty of mills being able to meet promises. Some manufacturers have already ordered out all the tonnage allotted them by

some of their regular mill suppliers for the entire year and there is concern as to later needs.

Pipe

Pipe Prices, Page 101

Merchant pipe producers state that April sales to date are 20 per cent less than for the corresponding period in March, affording opportunity to rebuild their own warehouse stocks and to reduce order backlogs. The decline parallels that in the structural material as defense building needs have passed the crest of buying.

Oil country casing pipe demand is brisk, deliveries being two to three weeks, and line pipe is in about equal demand.

Boiler tubes are in heavy demand, boilers for naval craft taking a heavy tonnage. As an illustration of present consumption rate an Ohio manufacturer of marine boilers is turning out 11 units per day where one a day was the former rate. Stationary boiler demand is quiet seasonally, the usual heavy demand for this purpose beginning in August.

A new outlet for mechanical tubing is in treads for army combat tanks, used in conjunction with rubber blocks to absorb shocks of rough terrain.

Operations by at least one eastern cast iron pipe foundry have been materially curtailed by lack of pig iron, with deliveries hampered as a result. Schedules have been reduced to three days per week or slightly better, although backlogs would permit full operations were pig iron available.

Cast Pipe Placed

2100 tons, 6 and 8-inch, class 250, east bay municipal utility district, Oakland, Calif. to United States Pipe & Foundry Co., Burlington, N. J.

670 tons, 6 to 20-inch, South Gate, Calif., to American Cast Iron Pipe Co., Birmingham, Ala.

600 tons, 16-inch, San Diego, Calif., to United States Pipe & Foundry Co., Burlington, N. J.

600 tons, 4-inch, class 250, east bay municipal utility district, Oakland, Calif., to American Cast Iron Pipe Co., Birmingham, Ala.

500 tons, 16-inch and under, Metropolitan District Commission, Hartford, Conn., to Warren Pipe Co., Everett, Mass.

500 tons, various sizes, housing project, Hartford, Conn., to United States Pipe & Foundry Co., Burlington, N. J.; Cauldwell-Wingate Co., New York, contractor.

400 tons, 6 to 36-inch, metropolitan district commission, water division, Boston, to United States Pipe & Foundry Co., Burlington, N. J.; bids April 17.

160 tons, 10-inch, Manchester, N. H., to connect with air base, to R. D. Wood & Co., Florence, N. J.

105 tons, 4 and 6-inch, class 150, Fresno, Calif., to United States Pipe & Foundry Co., Burlington, N. J.

Cast Pipe Pending

700 tons, 20-inch and under, air field, Windsor Locks, Conn., through contractor.

100 tons or more, 4 and 6-inch and accessories, district No. 43, King county, Washington; bids to Parker & Hill, engineers, Seattle, April 29.

Rails, Cars

Track Material Prices, Page 101

Railroads continue to buy rolling stock, particularly locomotives, to put equipment in shape for heavy traffic demands. Rail buying is light at present, tonnage bought last winter now being delivered for track improvement this season. Some programs are under consideration which will call for important rail tonnages. Union Pacific plans to lay 653 miles of new rails on its main lines this year.

Class I railroads placed 18,464 freight cars in service during first quarter, compared with 20,253 in the same period last year. Freight cars on order April 1 were 42,335, an increase of 2032 over March 1 and 21,223 more than a year ago. During first quarter 123 locomotives were put in service, against 79 a year ago.

Locomotives on order April 1 numbered 335, against 298 March 1 and 115 a year ago. Of this number 166 were steam and 169 diesel-electric.

Car Orders Placed

Baltimore & Ohio, 23 seventy-ton gondolas to Bethlehem Steel Co., Bethlehem, Pa.

Baltimore Transit Co., 25 trolley cars to Pullman-Standard Car Mfg. Co., Chicago.

Illinois Central, 100 fifty-ton flat cars to American Car & Foundry Co., New York; in addition to 2300 distributed recently by this railroad.

Louisville & Nashville, 2100 freight cars, 500 box cars and 500 hoppers to American Car & Foundry Co., New York; 500 hoppers and 600 box cars to Pullman Standard Car Mfg. Co., Chicago; 1000 of the box cars are 40 feet 6 inches and the remainder 50 feet 6 inches.

Navy, six 70-ton flat cars, to Haffner-Thrall Car Co., Chicago, and one flat car to Greenville Steel Car Co., Greenville, Pa.

Car Orders Pending

Missouri Pacific, 1100 cars; bids asked.

Norfolk & Western, 700 to 1500 fifty-ton steel-sheathed box cars; bids asked.

Southern Pacific, four 200-ton flat cars; pending.

Locomotives Placed

Baltimore & Ohio, four 4000-horsepower diesel-electric locomotives, to Electro-Motive Corp., La Grange, Ill.

Detroit, Toledo & Ironton, two 600-horsepower diesel-electric switch engines, to Electro-Motive Corp., La Grange, Ill.

Great Lakes Steel Co., two 600-horsepower diesel-electric switch engines, to Electro-Motive Corp., La Grange, Ill.

Minnesota Transfer Railway, three 360-horsepower diesel-electric switch engines, to American Locomotive Co., New York.

Newfoundland Railway, one 2-8-2 type freight locomotive, to Montreal Locomotive Works, Montreal.

Rail Orders Placed

Atlantic Coast Line, 8500 tons, to Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

Rutland, 500 tons, to Bethlehem Steel Co., Bethlehem, Pa.

1300 tons, standard rails, Plum Brook TNT plant, Sandusky, O., to Carnegie-Illinois Steel Corp., Pittsburgh; 1000 tons of accessories to be placed.

Buses Booked

The a.c.f. Motors Co., New York, has booked 14 motor coaches, 10 for Middlesex & Boston Street Railway Co., Newtonville, Mass., and four for Penobscot Transportation Co., Bangor, Me.

Wire

Wire Prices, Page 101

Wire mills are revising operating schedules from week to week to meet changing delivery requirements involving defense material. Although not all tonnage offered is being taken by mills, bookings continue ahead of shipments, with backlogs growing. Demand for wire rods is strong, with supplies limited and in spots, some temporary curtailment on some finishes is due to lack of semifinished. One Pittsburgh district mill is able to make shipments of bessemer rods at about the normal rate.

Shapes

Structural Shape Prices, Page 100

Inquiries and awards have fallen off considerably in volume, welcomed by many fabricators who are not soliciting business. Five months is average period between booking of fabricated shapes and delivery. One fabricator has eight months' orders on books. Inability to get plain material often causes postponement of delivery of fabricated. Shape producers forecast easier deliveries within 60 days.

Fabricating shops continue to establish time records in fabrication and erection for defense plants, one instance being a bomber plant at Fort Crook, Okla., involving 6500 tons, with deliveries to start in 40 days, the job to be completed in 150 days. The suggestion that some defense construction be redesigned

for reinforced concrete is making little headway because of lengthening deliveries of bars. Thus Texas, planning 70 bridges, considered reinforced concrete, but finally decided on structurals, deliveries starting in 12 weeks. Indications are that a secondary defense construction program is being prepared at Washington which will be almost as large as the current one, munition and bomber plants to be especially prominent.

Shape Contracts Placed

3300 tons, grade crossing, state highway project, Herkimer, N. Y., to American Bridge Co., Pittsburgh, through Lane Construction Co., Meriden, Conn.

1800 tons, building, New England Telephone Co., Providence, R. I., to Bethlehem Steel Co., Bethlehem, Pa.

1596 tons, including 553 tons sheet steel piling, improvement work on Los Angeles River between Atlantic and Randolph streets, Los Angeles, to Columbia Steel Co., San Francisco.

1100 tons, bridges, Slauson avenue, Los Angeles, Calif., army engineers, to American Bridge Co., Pittsburgh.

820 tons, bridge, Wethersfield, Conn., to American Bridge Co., Pittsburgh, through Mariani Construction Co., New Haven, Conn.

655 tons, carbide plant, Air Reduction Co., Louisville, Ky., to Bethlehem Steel Co., Bethlehem, Pa.

650 tons, hangar at airport, St. Paul, Minn., to St. Paul Foundry Co., St. Paul, Minn.

647 tons, bearing piles, improvement work on Los Angeles River between Arroyo Seco and North Broadway, Los Angeles, to Columbia Steel Co., San Francisco.

652 tons, Kootenai River bridge, Kootenai county, Mont.; contract to McNutt Bros., 351½ Broadway, Eugene, Oreg., at $244,633.

600 tons, aircraft plant, Goodyear Rubber Co., Akron, O., to Bethlehem Steel Co., Bethlehem, Pa.

600 tons, pattern shops, Philadelphia navy yard, to Bethlehem Steel Co., Bethlehem, Pa.; Berclay White Co., Philadelphia, contractor.

550 tons, buildings, Bakelite Corp., Bound Brook, N. J., to Savary & Glaeser Co., Dunellen, N. J.

513 tons, plant addition, National Carbon Co., Fostoria, O., to Bethlehem Steel Co., Bethlehem, Pa., bought by Defense Corp., Washington.

310 tons, underpass, Middle River, Md., for state, to American Bridge Co., Pittsburgh.

275 tons, additions, Bendix Aviation Corp., Sidney, N. Y., to American Bridge Co., Pittsburgh.

250 tons, theatre and store, Guelich & Boebel Co., Buffalo; to R. S. McMannus Steel Construction Co. Inc., Buffalo.

250 tons, Tainter gates, Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis., to Wisconsin Bridge & Iron Co., Milwaukee.

250 tons, additional for towers and bracing, Cramp Shipbuilding Co., Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa.

200 tons, building, Northwest Paper Co., Cloquet, Minn., to Worden-Allen Co., Milwaukee.

160 tons, asphalt plant, contract 3-AP, New York, for city, to American Bridge Co., Pittsburgh.

112 tons, addition, General Electric Co., Ft. Wayne, Ind., to Ft. Wayne Structural Steel Co., Ft. Wayne, Ind.

100 tons, power building, Electron, Wash. to Standard Steel Fabricating Co., Seattle.

100 tons, additional, sheet steel piling, quay wall, Mare Island navy yard, Calif., to Bethlehem Steel Co., San Francisco.

Shape Contracts Pending

26,000 tons, plant, Consolidated Aircraft Corp., Fort Worth, Texas, Bethlehem Steel Co., Bethlehem, Pa., low.

6000 tons, building 104 and 105, Western Cartridge Co., St. Louis.

4000 tons, flood protection project, Massillon, O., United States Engineers, Huntington, W. Va.; E. J. Albrecht Co., Chicago, low; bids March 27.

3,300 tons, grade crossing elimination, New York Central railroad, Herkimer County, New York; Lane Construction Co., Meriden, Conn., low.

2800 tons, sheet piling, lock in Mississippi river, Hastings, Minn.; bids May 9.

1500 tons, bag manufacturing building, Watson, Ind., for government.

1470 tons, viaduct, Bergen county, New

Shape Awards Compared

	Tons
Week ended April 26	15,490
Week ended April 19	30,911
Week ended April 12	41,148
This week, 1940	11,204
Weekly average, 1941	33,025
Weekly average, 1940	28,414
Weekly average, March, 1941	20,157
Total to date, 1940	286,306
Total to date, 1941	561,433

Includes awards of 100 tons or more.

Jersey; bids May 2.

1400 tons, including 900 tons H-pier, war department, Pedricktown, N. J.

900 tons, H-piling, Hamilton county, Ohio, project 21, delivery to Valley Junction, O.

900 tons, bridge, Hamilton county, Ohio; De Salvo, Cincinnati, low on general contract.

775 tons, sheds, army depot, Columbus, O.; bids April 25.

725 tons, addition to bottling house, Pabst Brewing Co., Peoria, Ill.

652 tons, 938-foot Bureau of Roads bridge, Lincoln county, Montana; McNutt Bros., Eugene, Oreg., low.

650 tons, ordnance depot, Delaware river pier, Pedricktown, N. J., for government.

600 tons, south approach, bridge 5900, Winona, Minn., for state.

550 tons, three manufacturing buildings, Bakelite Corp., Bound Brook, N. J.

500 tons, state bridge, contract 2141, Columbus, Ind.

480 tons, building, Armstrong Cork Co., Millville, Pa.; bids in.

480 tons, chemical warfare building, National Carbon Co., Fostoria, O., for army.

475 tons, building, Bell Telephone Co., Trenton, N. J.

450 tons, public school, No. 21, New York.

400 tons, power plant addition, No. 41, Brooklyn, N. Y., for navy.

325 tons, plant, Western Automatic Screw Machine Co., Elyria, O.

300 tons, girder spans, various locations, Union Pacific railroad.

275 tons, state bridge, Looney creek, Harlan county, Kentucky.

270 tons, state bridge, contract 2140, Columbus, Ind.

260 tons, state bridge, Ossipee river, Effingham-Freedom, N. H.

250 tons, field artillery armory, Syracuse, N. Y., for state.

225 tons, state bridge, contract 2143, Lafayette, Ind.

225 tons, state bridge, Pecos river, project 803-B (1), Carlsbad, N. Mex.

200 tons, state bridge, Ashuelot river, Troy, N. H.

200 tons, kitchen buildings, Kings County hospital, Brooklyn, N. Y., for city of New York.

200 tons, overpass, Mercer county, Pennsylvania; bids to state highway department, Harrisburg, Pa., May 2.

180 tons, state bridge, contract 2146, Greendale, Ind.

170 tons, 5-stringer state bridge, Yakima county, Washington; bids in.

170 tons, metal storage building, Washington, for navy.

170 tons, machine shop extension, building 431, Bremerton, Wash., for navy.

165 tons, bridges, Jordan and Helena, Minn., Minneapolis & St. Louis railroad.

150 tons, state bridge, contract 2144, Portland, Ind.

150 tons, Winslow S. E. station, Superior Water, Light & Power Co., Superior, Wis.

125 tons, state bridge, Commerce street, Hartford, Conn.

110 tons, addition to chemical warfare school, Edgewood Arsenal, Md., for government.

110 tons, high school addition, Norwich, Conn.

110 tons, addition to soda and sulphite woodrooms, soda mill, Northwest Paper Co., Cloquet, Minn.

110 tons, towers and frames, Wiley Equipment Co., Port Deposit, Md.

110 tons, track stringer renewal, Jersey City, N. J., Central Railroad of New Jersey.

100 tons, Garfield-Cedar exchange building, Cleveland, Ohio Bell Telephone Co.

Unstated, $250,000 radio shop building, Puget Sound navy yard; bids in April 23.

Unstated, 271-foot viaduct, six span state structure, Libby, Mont.; Clifton Applegate, Spokane, Wash., low $78,960.

Unstated, 125-ton traveling crane, Covington substation; Cyclops Iron Works, San Francisco, low $44,795.

Unstated, radial gate and hoist, Deschutes Project, Oreg.; John W. Beam, Denver, and Western Foundry Co., Portland, low.

Metallurgical Coke

Coke Prices, Page 101

Coke sellers expect to increase prices on all grades of beehive coke 50 cents per ton when production is resumed, contingent on settlement of coal price adjustment now under consideration by the government.

Sellers expect the coal price increase to be 23 to 28 cents per ton, based on the increase in wages to coal labor. On top of this increased cost of raw material, the coke oven operator must make wage increases since coke handlers are members of the United Mine Workers.

Coke shortage is being reflected in banking of steelworks blast furnaces but merchant furnaces have not been affected to the same degree. Probably a score of stacks are banked or under reduced blast.

Behind the Scenes with STEEL

Shop Talk

■ Our Roving Reporter, aroused by the deluge of "short cut words" that have been flaunted about in the magazines, across drug store lunch counters, and up and down automobile assembly lines (see March 17 issue), set about the task of unearthing some real, colorful shop talk words and phrases. Now, unfortunately, we fear the little man with the big blue pencil won't let us print most of his findings, but here's a smattering of what's left of his *mots de shoppe*:

Hack-Hack: A most unfriendly game of cards, played in the hoosegow during lunch. A combination of black jack, euchre, and old maid.

Hoosegow (pronounced Whose Cow?): A conservatory, library, billiard room, etc., etc.

Horace: Any new man, about to learn that a bottle of crudely labeled "Hand Protector" is really shellac; that you don't stand at attention and salute army and navy inspectors; that Jim is not his understudy but the night superintendent who will *not* run errands; that steel filings and chalk are not a good floor sweeping compound; that left and right hand blue prints are the same.

Motorola: A 10-lb. badge, "awarded" to new men for "unusual efficiency." Made out of 4-inch bar stock, neatly polished, and with a horse-robe safety pin welded on the back to hold it in its proper position on the stomach. "Horace" usually finds before his week of recognition is up, that his honors hang a little heavily in the wrong place.

Customer Relations

■ For members of the "why advertise now?" school of thought, we strongly recommend a close reading of page 57 this week, by Revere Copper & Brass.

Heart Flutter

■ If you wonder why your income tax next year is going to put you on the ropes, sharpen your pencil and go to work on Morgenthau's announcement that defense spending alone will run at the clip of a billion bucks a month beginning July 1. That's just about $330 every time your heart beats—if it still will.

On Their Way

■ With the pile of orders that came in last week for the Modern Shell Production reprint handbook, the press run has been upped to take care of all comers, we hope. It will be ready sometime the week of May 5 at a buck a throw.

Idea Dept.

■ We'll let this idea go absolutely free of charge to any of the bearings advertisers who wants to grab it. With the trend toward pretty girls reaching a point of "where do we go from here," get a nice, friendly spinster model to tell the tale and —of course, you're 'way ahead of us—call her "Aunty Friction." Ouch!

On The (Hot) House

■ A pipe coupling manufacturer we know over in South Bend calls a partial holiday every time the thermometer hits 100 in the shade. All machinery is shut down and free beer is furnished to every department. During that hot spell week before last the boys were checking those twelve thermometers every day, but have now resigned themselves to a little longer wait.

Leave It To Nature

■ Sometimes in one of our overly-enthusiastic moments we may make some rather broad claims but compared to the makers of the cosmetic preparation, Kongolene, we're plain sissies. It may be all right for such products as fountain pens, etc., to give a life-time guarantee but Kongolene "will benefit you for generations to come; if you are homely, likewise will be your offspring; if you are handsome, they will be likewise." The FTC could stand it no longer and in deciding Kongolene was not "the greatest discovery of the age" also came to the conclusion it benefited neither hair nor heir.

SHRDLU.

Reinforcing

Reinforcing Bar Prices, Page 101

Regular spring highway building and improvements has increased the proportion of orders in that field at the time defense housing and engineering demand has subsided. WPA work in Ohio is prominent, particularly in Hamilton county where piling and structurals are also wanted. The number of awards listed below is the largest in a long time, with the bulge in demand coming just as spring work gets under way in earnest.

Reinforcing Steel Awards

5750 tons, ordnance work, Hermiston, Oreg., to Bethlehem Steel Co., San Francisco; contractor, J. A. Tertling & Sons, Portland, Oreg.

2265 tons, improvement work on Los Angeles River between Fourth and Aliso streets, Los Angeles, to Blue Diamond Corp., Los Angeles.

2200 tons, improvement work on Los Angeles River between Arroyo Seco and North Broadway, Los Angeles, to Columbia Steel Co., San Francisco.

1300 tons, Clinton-Peabody housing project, St. Louis; to Laclede Steel Co., St. Louis; Millstone Construction Co., St. Louis, contractor.

1260 tons, Carr Square Village housing project, St. Louis; to Sheffield Steel Corp., Kansas City, Mo.; J. E. Dunn, Kansas City, Mo., contractor.

1000 tons, additional buildings, ammunition loading plant, Elwood, Ill., for government, to Joseph T. Ryerson & Son Inc., Chicago; Sanderson & Porter, Joliet, Ill., engineers.

1000 tons, ammunition factory, Western Cartridge Co., and McQuay-Norris Mfg. Co., St. Louis, to Laclede Steel Co., St. Louis.

780 tons, improvement work on Los Angeles River between Downey Road and Randolph street, Los Angeles, to Soule Steel Co., Los Angeles.

700 tons, hotel, Washington, Statler Corp., to Bethlehem Steel Co., Bethlehem, Pa.; John W. Harris, associate contractor.

600 tons, additional facilities, naval operating base, Norfolk, Va., to Bethlehem Steel Co., Bethlehem, Pa., through Virginia Steel Co.; Doyle & Russell, contractors.

400 tons, hotel, Jefferson City, Mo., to Missouri Rolling Mill; Brunson Construction Co., contractor.

363 tons, additions, airplane engine plant, Buick Motor Division, General Motors Corp., Chicago, to Calumet Steel Co., Chicago; Thorgerson & Erickson Co., Chicago, contractor. Includes 210 tons for dynamometer building, 75 tons for

Concrete Bars Compared

	Tons
Week ended April 26	20,775
Week ended April 19	14,596
Week ended April 12	22,883
This week, 1940	1,725
Weekly average, 1941	12,415
Weekly average, 1940	9,661
Weekly average, Mar., 1941	12,486
Total to date, 1940	137,403
Total to date, 1941	211,056

Includes awards of 100 tons or more.

propeller building, 48 tons for boiler house and 30 tons for personnel building.

350 tons, hotel, Jefferson City, Mo., to Missouri Rolling Mill Corp., St. Louis; E. A. Brunson, contractor.

325 tons, power station, Connecticut Light & Power Co., Devon, Conn., to Bethlehem Steel Co., Bethlehem, Pa.

303 tons, pavement, Chanute field, Rantoul, Ill. U. S. Treasury, Chicago, to Ceco Steel Products Co., Chicago; bids April 21.

300 tons, plant, Plankington Packing Co., Milwaukee, to Joseph T. Ryerson & Son Inc., Chicago, through Kroening Engineering Co.

250 tons, sewage treatment plant, Jamaica, N. Y., to Igoe Bros., Newark, N. J., through Caye Construction Co., New York.

200 tons, Anchorage, Alaska, improvement, to Bethlehem Steel Co., U. S. engineers.

175 tons, WPA proj. 2 W 1513, Ohio, to Bethlehem Steel Co., Bethlehem, Pa., through O. W. Merrill Supply Co.

150 tons, structural assembly shop, navy yard, Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa.; Hughes-Foulkrod Co., contractor.

129 tons, U. S. engineers' inv. 699-41-195, Providence, R. I., to Bethlehem Steel Co., Bethlehem, Pa., through Congdon & Carpenter.

115 tons, WPA proj. 5 W 1127, Ohio, to Bethlehem Steel Co., Bethlehem, Pa., through O. W. Merrill Supply Co.

110 tons, WPA proj. 6 W 1050, Ohio, to Ben Tom Supply Co., Columbus, O.

100 tons, nurses' home, Canton, O., to Truscon Steel Co., Youngstown, O.

100 tons, highway project, Ferry county, Washington to Northwest Steel Rolling Mills, Seattle.

100 tons, highway bridge work, Wichita, Wilbarger and Presidio counties, Texas, state highway department, to North Texas Iron & Steel Co., Fort Worth, Tex.

Reinforcing Steel Pending

1200 tons, TNT and DNT plant, Weldon Springs, Mo., Atlas Powder Co.

1100 tons, brass plant, Bridgeport Brass Co., Indianapolis, Stone & Webster Co., Boston, engineers.

1000 tons, Plum Brook ordnance plant, Sandusky, O., for government; bids April 26.

778 tons, flood protection, sec. 6, Johnstown, Pa.

700 tons, plane parts factory, Ford Motor Co., Ypsilanti, Mich.; bids April 9.

600 tons, Brooklyn tunnels, contr. 5, Brooklyn, N. Y.

488 tons, lock in Mississippi river, Hastings, Minn.; bids May 9.

440 tons, Youghiogheny dam embankment and spillway, Confluence, Pa.; bids May 2.

375 tons, plant addition, Hartford Electric Light Co.; Stone & Webster Co., Boston, contractor.

355 tons, substructure, South Canal street bridge, city of Chicago; bids May 21. Also 70 tons shapes.

350 tons, project, Hamilton county, Ohio; De Salvo, Cincinnati, low on general contract; bids April 23.

300 tons, warehouse, United Drug Co., Pittsburgh.

250 tons, utility building, Commonwealth Edison Co., Chicago.

170 tons, nurses home, La Crosse, Wis.; bids April 16.

150 tons, store, Sears, Roebuck & Co., Wausau, Wis.

150 tons, air field, Windsor Locks, Conn.; bids in.

143 tons, state highway project 2139, Columbus, Ind.

140 tons, state highway bridges, Sutton, Mass.

135 tons, Covington, Wash. substation, Bonneville Project; bids in.

126 tons, Bureau of Roads bridge, Libby, Mont.; McNutt Bros., Eugene, Oreg., low $244,633.

120 tons, bridge, Saugus-Revere, Mass.; bids in.

120 tons, aero model testing basin, Langley Field, Va.

Unstated tonnage, warehouse and boiler house, Veterans hospital, Hines, Ill., for government; bids May 6.

Unstated, 730-foot pier, Puget Sound navy yard; bids April 30.

Unstated, state underpass, Kootenai, Idaho; Sather & Son, Seattle, low $172,801.

Iron Ore

Iron Ore Prices, Page 103

Shipping of lake ore was handicapped during the past week when ice blew into the harbor of Superior and prevented ore boats entering or leaving. Ore operators have been very busy writing contracts for 1941 and it is expected that a record tonnage in aggregate will appear on order books. Apparently all operators recognize the reaffirmation of last season's prices and freezing of steel prices makes this reaffirmation seem logical.

Scrap

Scrap Prices, Page 104

Activity in the steel and iron scrap market continues to center about deliveries of tonnages booked before the April 3 maximum price announcement. In most instances this tonnage will be cleared up before the May 10 deadline. Melters are taking all material that can be obtained. Meantime, the market is becoming more accustomed to new conditions, although a number of points remain to be cleared up. It is not yet apparent whether sufficient scrap will be brought out under the new prices to meet requirements.

Present supplies have been enough for mill and foundry needs but users are apprehensive of the future. This is particularly true of cast grades, which are in unusually small supply. The fact that pig iron is also scanty handicaps consumers seeking to build up sufficient material to meet needs. One source of supplies is the accumulation at upper lake ports, which will be available to consumers along the lower lakes as rapidly as it can be transported. Several thousand tons is said to be available.

Uncertainty still exists as to prices on railroad specialties and other grades not covered by the price announcement. Closing of railroad lists is awaited to give a clue to these quotations. A sale out of yard at Pittsburgh is reported to have been at $25, plus commission, for railroad specialties. Difficulty is experienced in correlating dealer buying prices and ceiling prices, a range of as much as $2 existing in some cases.

One result of the new price schedule is disruption of the accustomed fields of supply to various consuming centers. In the case of Buffalo a survey has indicated that district will be able to draw shipments formerly going to other markets, while Birmingham, Ala., believes freight rates will divert material to northern and western points at its expense.

Reduction of blast furnace operation because of coke shortage may increase demand for scrap as a larger proportion of the latter is being used in foundry mixtures.

Steel in Europe

Foreign Steel Prices, Page 103

London — (*By Cable*)—Pig iron situation in Great Britain is satisfactory except for short supply in hematite. Increasing output of domestic iron ore is counteracting reduced and irregular imports. Britain is exporting coke to the United States and Canada. Production of steel ingots is below requirements, causing increasing imports from America, the same condition applying to semifinished steel. Intense domestic demand for black and galvanized sheets leaves little for export. Tin plates at the moment are fairly active in domestic and export demand.

Pig Iron

Pig Iron Prices, Page 102

Coke supply is the largest factor in the pig iron situation, continuation of the coal strike threatening serious curtailment of production. Already numerous blast furnace stacks have been banked and others placed on low production as coke supplies dwindle. Widespread banking is seen as imminent under present conditions.

Due to producer and consumer stocks no serious interruption of the melt has appeared but shipments are falling behind and consumer stocks are being depleted. As for some time, shipments are being rationed in the effort to spread the supply and inventories are not being increased.

Prices have not been changed, although pig iron was not included in the government order freezing steel prices to first quarter level. Present sales are at price prevailing at time of delivery. With labor and coke prices higher many producers feel an increase would be justified but hesitate to make such an announcement because of the attitude of the Office of Price Administration and Civilian Supply.

Foundries are adding to their bookings for both defense and nondefense purposes, many having orders for capacity operations for several months.

Woodward Iron Co., Birmingham, Ala., has resumed production from its third stack, damaged by an explosion April 11, all its stacks now being returned to service.

Carnegie-Illinois Steel Corp. banked one blast furnace at Gary and one at South Chicago, Friday, making four stacks idle at these plants.

An eastern cast iron pipe foundry has reduced production to three days a week on account of shortage of pig iron, although order backlogs would warrant full operations.

Tin Plate

Tin Plate Prices, Page 100

Buying of tin plate for export is active. Domestic demand has slackened, with principal users well cov-

ered. Deliveries are extended, little tonnage being available on current buying for delivery before fourth quarter. Operations are at 88 per cent, representing more than 100 per cent capacity of active mills. Stocks are good at mills and consuming plants.

Producers are experimenting with means of reducing the weight of tin coating and the electrolytic process again is being discussed. While producers do not believe there will be a shortage of tin this year, the future is uncertain. As yet no satis factory substitute has been developed and principal effort is toward making use of the available supply and extending it as far as possible.

Pacific Coast

Seattle—Important projects are developing rapidly. Plans are said to be under way for a further extension of the Boeing Aircraft Co. plant here, shipyards are adding additional ways. The Portland Gas & Coke Co. has awarded contracts for a $1,500,000 plant expansion, purchasing coke ovens and equipment for a chemical plant. Two major improvements at the Puget Sound navy yard, bids in, include a three-story radio shop building and a 730-foot concrete pier.

Rolling mill activity is at a peak, the major problem being prompt deliveries. Backlogs will run to the end of the quarter. Army and navy officials are almost daily placing additional small orders. Commercial orders step aside for federal requirements. Fabricating shops are full and report slow mill deliveries.

No important plate projects are pending but a large volume is being brought by water for ship construction.

The jobbing trade is the best in a decade with a steady volume of orders from both public and private sources. Deliveries are uncertain and hurry shipments are ordered by rail as space shortage on intercoastal vessels is increasingly acute.

Cast iron pipe projects are developing, an increase in orders under 100 tons being noted. Business pending is larger than normal. Seattle plans some major extensions at an early date.

The scrap market is adjusting to fixed prices. Old commitments are being cleaned up. Steel scrap continues to reach tidewater in ample volume but there is a continued scarcity of cast iron, demand for which is exceptionally strong.

San Francisco—Awards of cast iron pipe were the largest for any week so far this year, 4797 tons, bringing the total for the year to 18,777 tons compared with 11,085 tons for the corresponding period in 1941.

Outlook in the plate market is most encouraging and general contracts have been placed for 60 additional emergency type cargo carriers for the Maritime Commission, involving close to 125,000 tons for 24 vessels to be constructed at Richmond, Calif., and Los Angeles and 12 scheduled for Portland, Oreg. Material for these ships is expected to be purchased soon.

Shape awards aggregated 4898 tons, bringing the total for the year to 159,816 tons, compared with 59,663 tons for the corresponding period in 1941. Over 41,000 tons for 36 vessels to be built in Pacific Coast shipyards, contracts for which have been placed, is expected to be placed with plate mills within the near future. Pending business exceeds 62,000 tons.

Awards of reinforcing bars totaled 17,410 tons, the largest weekly total for the year, bringing the total for the year to 39,590 tons, compared with 44,112 tons for the same period last year. Pending business calls for close to 5000 tons.

Ferroalloys

Ferroalloy Prices, Page 102

Ferroalloy shipments are expand-

ing, due primarily to more effective utilization of existing equipment rather than to any added capacity. Increased facilities are under way but have not yet reached the stage where they are contributing importantly to the improved output and shipments.

Prices generally are steady, with ferromanganese at $120, duty paid, Atlantic and Gulf ports, and 19 to 21 per cent spiegeleisen at $36, Palmerton, Pa.

Equipment

Detroit — With priority numbers required on all machine tool purchases, nondefense industries are practically excluded from the market. Motor companies are confining mechanical changes to relatively unimportant items, where alteration in tooling or fixtures on present machines can handle production. For example, certain engine changes can be effected in this way, such as increasing cylinder bores, or lengthening stroke slightly to step up horsepower.

Watchful eye is being kept on the European situation, in view of the fact an estimated 25 per cent of American machinery production is being shipped to Britain. It is held entirely possible that further allied reverses might mean diversion of this equipment to American plants to prevent its destruction before being placed in operation.

Cleveland — Possibility that the boom in machine tools will come to an end is ever on the minds of the trade, it being recognized that tooling is one of the first phases of a defense program. However, most observers look for good business for at least two years. Builders count on volume of business for profits rather than on large margin of profit per tool. Freezing of steel prices to first quarter levels reminds tool builders that price advances are not in order. The strict government price schedule for second-hand machinery causes many to avoid entering that field.

Philadelphia — Steady lengthening of deliveries on most types of machine tools continues, despite greatly amplified production. Prospective buyers without good priority rating are combing the used machinery market, although better quality second-hand machinery is being picked up promptly and the number of available units is limited. Time of delivery on new equipment depends on material required in their manufacture and the number of suppliers. A limited number of general purpose motors is obtainable from stock, with deliveries otherwise ranging up to two months or more.

Seattle—Road building and maintenance machinery is in strong demand. The lumber and logging industry is active in replacements. County units are purchasing tractors and highway items. General Electric Co. is low at $29,426 to Bonneville project for three circuit breakers. Denver has awarded contracts for power equipment for Parker dam, Colorado river, to General Electric Co. at $98,064 and Ne-Page Electric Co., Seattle, at $47,-660. City Electric & Fixture Co., Seattle, is low $192,283 for substation and expansion of transmission system at Fort Lewis. Idaho state has called bids April 29 for four portable air compressors, two wagon drill outfits and two crawler-type tractors.

Canada

Toronto, Ont.—While Canadian steel mills are not seeking business diversified orders continue to pour in. Mills now are chiefly concerned with production and delivery, the latter falling farther behind. Buying is well in excess of production and on a number of materials output has been covered to the end of the year.

Sheet demand continues the leading feature and inquiries are appearing for 1942. Consumers are pressing for delivery. Automotive plants are choked with orders for war vehicles.

Hamilton platemakers report brisk demand for shipbuilding and output has been sold to the year end. While shipbuilding activities are increasing, officials of some companies state that operations are being retarded by deliveries of steel, especially plates. Tank builders also are waiting delivery of armor plate, for which demand is expanding rapidly.

Backlogs of merchant bars have topped all previous records, and orders continue to appear. While bar contracts are not as extensive as in sheets and plates mill capacity is being taxed to meet shipping schedules.

Structural steel shows steady improvement despite restriction on use announced by the steel controller. In addition to about 12,000 tons pending in connection with war construction projects, about 8000 tons are in prospect for work not associated with the war. Awards for the past week totaled about 10,-000 tons.

Pig iron melters are seeking larger tonnages to offset shortage of cast scrap, but producers are unable to provide foundry and malleable grades for this surplus demand, although they are taking care of all ordinary business. Sales for the past week mostly were for spot

delivery, and producers are holding shipments to 100 to 200 tons.

While there was temporary reduction in sales of cast scrap and stove plate last week, pending more definite settlement of prices, demand has increased and is well in excess of supply. Early announcement is expected with regard to price stabilization. Demand for steel scrap from mills in the Hamilton district and from electric furnace interests is heavy, consumers taking all offerings. Dealers report better offerings from collectors and automobile wreckers, while special efforts are being made by municipalities to pick up all available scrap from householders.

Alloy Steel

Alloy Prices, Page 101

Nickel-bearing steel priorities are being closely observed by mills and warehouses, according to a close observer of the industry. Apparently no nickel-steel has been sold to anyone without a priority certificate. It is believed that the nickel-steel set-up will be used as a model for priorities later in other steels and commodities.

Warehouses have been granted OPM priority certificates on nickel-steels entitling them to buy from mills the full amounts previously bought, as determined by average purchases over the preceding four months.

Nonferrous Metals

New York — Nonferrous metal producers are faced with an ever increasing demand which continues to exceed domestic production. A larger portion of present production is being put under priorities and OPACS has suggested maximum prices for copper and threatens to take other steps to maintain price stability.

Copper — OPACS has suggested the following maximum prices, effective as of Friday, April 25: Primary producers who are selling at 12.00c should continue to do so; primary producers who are selling at more than 12.50c should reduce their selling price so as not to exceed 12.50c; all custom smelters should sell not in excess of 12.50c; casting copper producers should sell at prices not exceeding 12.25c; 85-5-5-5 brass ingot should sell at prices not exceeding 13.00c and other ingots at the usual differentials. "In the event that a price schedule does prove necessary," Leon Henderson, chief of OPACS, said, "contracts entered into after April 25 at a price exceeding those suggested above, will not receive special consideration." Statistics were released showing that consum-

Nonferrous Metal Prices

Apr.	Copper: Electro, del. Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin, New York: Spot	Straits Tin, New York: Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
19	12.00	12.00	12.25	52.37½	51.62½	5.85	5.70	7.25	17.00	14.00	35.00
21	12.00	12.00	12.25	52.50	51.62½	5.85	5.70	7.25	17.00	14.00	35.00
22	12.00	12.00	12.25	52.25	51.50	5.85	5.70	7.25	17.00	14.00	35.00
23	12.00	12.00	12.25	52.25	51.50	5.85	5.70	7.25	17.00	14.00	35.00
24	12.00	12.00	12.25	52.25	51.50	5.85	5.70	7.25	17.00	14.00	35.00
25	12.00	12.00	12.25	52.12½	51.50	5.85	5.70	7.25	17.00	14.00	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	9.10
Zinc, 100 lb. base	12.50

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

Nom. Dealers' Buying Prices

No. 1 Composition Red Brass

New York	9.00-9.25
Cleveland	9.00-9.50
Chicago	8.75-9.00
St. Louis	9.00

Heavy Copper and Wire

New York, No. 1	10.00-10.25
Cleveland, No. 1	10.00-10.50
Chicago, No. 1	9.75-10.00
St. Louis	10.00

Composition Brass Turnings

New York	8.75-9.00

Light Copper

New York	8.00-8.25
Cleveland	8.00-8.50
Chicago	7.75-8.00
St. Louis	8.00

Light Brass

Cleveland	4.50-5.00
Chicago	6.25-6.50
St. Louis	5.00

Lead

New York	4.85-5.00
Cleveland	4.75-5.00
Chicago	4.55-4.80
St. Louis	4.50

Old Zinc

New York	4.00-4.12½
Cleveland	4.00-4.12½
St. Louis	5.00

Aluminum

Mis., cast	11.00
Borings, No. 12	9.50
Other than No. 12	10.00
Clips, pure	13.00

SECONDARY METALS

Brass ingot, 85-5-5-5, l. c. l.	13.25
Standard No. 12 aluminum	16.00

ers are short 231,000 tons of copper as of March 31. Metals Reserve Co. will make up the shortage but consumers will get their allocations only month by month, and the allocations have been slow in coming through.

Lead — Demand continues heavy and at least one seller has allocated tentatively all his June production. The United States is getting 74 per cent of its lead from domestic sources and the balance from abroad. Prices remained firm last week at 5.85c, New York.

Zinc—Complete priorities for zinc metal are being considered. The industry is contributing 12,000 tons for OPM distribution in May. Consumption remains restricted due to lack of adequate supplies. Prime western held at 7.25c, East St. Louis.

Tin — Prices held fairly steady during the week at 52.25c until Friday when the market eased to 52.12½c. Futures were offered less freely.

4-Weeks' Training Fits Men for Tooling Jobs

■ Defense training program developed by Wright Aeronautical Corp., Paterson, N. J., recently enabled the company to put 4000 young men through four weeks of vocational school study and directly into tooling jobs with a loss of only 16 for incompetence. Bartley Whiteside, supervisor of training, credited the program with making possible expansion of total personnel at the Paterson plants from 2900 in 1936 to 17,000 at present.

Initial vocational school course is followed by actual plant work under foremen possessing groundwork in pedagogy. Each foreman serves as teacher in addition to his regular duties.

Plan grew out of an apprenticeship program initiated in 1936, when it was found easier to train green help than to recondition available skilled men to meet the severely exacting standards of airplane engine manufacture. When the apprenticeship system was found too slow for rapid expansion in the industry, the present system was substituted.

Republic Producing Two Forms of Armor Plate

■ Two forms of light armor plate are being produced by Republic Steel Corp., Cleveland. Flat plates are now being produced at a rate of about 3500 a month and are being shipped to fabricators of tanks, armored cars and similar equipment for shaping and heat treating. This production will be increased to 5000 tons a month by

June 1, with further increases later.

The other form is armor plate that has been shaped, heat treated and fabricated so that it can go into final assembly with very little further work. Fabricated armor plate is being produced in quantities sufficient for the completion of 18 tanks a month. By the first of June it is expected this will be stepped up to 100 tanks monthly and by Sept. 1, for 200 or more monthly.

The company credits the speed with which armor plate production is being increased to the work by its research department during the past ten years. During that period more than a thousand small heats have been poured and tested. As result of this research, the company was able to produce armor plate as rapidly as equipment could be installed.

A 300,000-square foot building was speedily remodeled and equipped as the armor plate department. Work was begun Jan. 3 and production started March 1. Nearly a dozen straightening presses and a score of heat treating furnaces will be installed in addition to those now in operation. Other equipment needed in armor plate fabrication is cutting, rolling, leveling, quenching, tempering and torch-cutting equipment.

FTC Reports on Machine Tool Accessory Makers

■ Federal Trade Commission last week reported on financial statistics of a group of seven machine tool accessory and machinists precision tool manufacturing corporations. As in earlier reports on other industries data for the seven companies are combined in a manner that does not identify any company.

The classification as used by the FTC refers to companies that are engaged primarily in manufacturing accessories for use in machine tools, including dies, machinists' precision tools, or specialized equipment, other than forged or shaped hand tools.

Combined total sales of the seven companies for 1939 was $42,525,947, of which $34,268,515 represented domestic sales, and $8,257,432 represented exports.

Combined net income, before deduction of interest on long-term borrowings and income taxes, on the average total capital of $36,468,929 was $5,605,438, a return of 15.4 per cent.

Net income on the average corporate net worth investment, or stockholders' equity, after provision for income taxes, amounted to $4,664,225, a return of 13.5 per cent on the stockholders' investment. The range in rates for individual corporations on this base was from a profit of 4.9 per cent to 20.5 per cent.

The seven corporations realized a net income, after provisions for the payment of income taxes, of $4,664,225 for 1939. The combined cash dividends paid, or accrued, during the year, amounted to $153,975 on preferred shares, and to $1,574,892 on common shares. Cash dividends paid or accrued during the year represented a return of approximately 5 per cent to the stockholders on the average ledger value (not market value) of their equity of $34,516,866.

Operating ratios for six of the seven corporations for which complete data are available for their 1939 operations show that the cost of goods sold (exclusive of taxes, social security and pension fund payments, selling expenses, administrative and general office expenses, research and development expenses, etc.), represented 71.7 per cent of the total sales. Of the total cost of goods sold, raw materials represented 26.1 per cent; production wages and salaries, 32.6 per cent; other costs and expenses, 6.6 per cent; depreciation and obsolescence applying to production facilities, 2.7 per cent; and finished goods purchased for resale, 3.7 per cent. The gross margin on sales was 28.3 per cent.

Total of items listed as expenses represented 16.8 per cent of the total sales. Of the total expenses, selling expenses represented 9.7 per cent of the total sales; advertising, 0.7 per cent; administration and general office expenses, 3.0 per cent; all taxes (except income tax and social security payments), 1.1 per cent; all social security and pension fund payments, 1.7 per cent (ratio here is to sales dollar and not payrolls); and research and development expense, 0.6 per cent. After deduction of the items listed as expenses, together with the provisions for uncollectible accounts of 0.1 per cent, from the gross margin on sales, plus other operating revenue of 0.3 per cent, there remained a net profit from manufacturing and trading of 11.7 cents from every dollar of sales.

Aluminum Restricted to War Needs in Canada

(*Concluded from Page 44*)

bilization of foundry trades raw materials prices.

Department of Munitions and Supply awarded 1680 contracts in the week ending April 11, with total value of $3,608,642. Contracts totaling $113,512 were awarded United States companies. The contracts:

Shipbuilding: Victoria Motor Boat & Repair Works, Victoria, B. C., $104,050.

Dockyard supplies: Dominion Wire Rope & Cable Co. Ltd., Montreal, Que., $20,277; Anglo-Canadian Wire Rope Co. Ltd., Montreal, $26,710; Canadian Locomotive Co. Ltd., Kingston, Ont., $5720; Donald Ropes & Wire Cloth Co. Ltd., Hamilton, Ont. $9727; Wrights' Canadian Ropes Ltd., Vancouver, B. C., $131,785.

Aircraft: Dunlop Tire & Rubber Goods Co. Ltd., Toronto, $8897; British Aeroplane Engines Ltd., Montreal, $13,674.

Instruments: British Admiralty, England, $146,460.

Electrical equipment: Burlec Ltd., Scarborough Junction (Toronto), $51,986.

Machinery: Rudel Machinery Co. Ltd., Montreal, $14,356; Canadian Fairbanks-Morse Co. Ltd., Ottawa, Ont., $16,225; General Supply Co. of Canada Ltd.,

Ottawa, $27,378.

Ordnance: Robert Mitchell Co. Ltd., Montreal, $9963.

Capital expenditure: Foundation Maritime Ltd., Halifax, N. S., $427,873; L. A. Amos Co., Montreal, $27,000; Canadian Car & Foundry Co. Ltd., Montreal, $125,000; Goodyear Tire & Rubber Co., of Canada Ltd., New Toronto, Ont., $6000.

Miscellaneous: Galt Malleable Iron Co. Ltd., Galt, Ont., $8981; Way Sagless Spring Co. Ltd., Toronto, $14,994; Aluminum Goods Ltd., Toronto, $22,050; Wrought Iron Range Co. Ltd., Toronto, $5055; LaFrance Fire Engine & Foamite Co. Ltd., Toronto, $20,902; Duro Aluminum Ltd., Hamilton, $32,050; Coast Construction Co. Ltd., Vancouver, $15,000; Metals Ltd., Calgary, Alta., $11,000; W. C. Wells, Wilkie, Sask., $17,000; E. G. M. Cape & Co. Ltd., Montreal, $34,000; Enterprise Foundry Co., Sackville, N. B., $5000; Bennett & Wright Ltd., London, Ont., $25,000.

$250,000 Development at New Iron Ore Mine

■ Construction will be started May 1 on a modern $250,000 layout providing ground facilities for the new iron ore mine now being developed two miles northeast of Ishpeming, Mich., by Negaunee Mine Co., which is owned jointly by Cleveland-Cliffs Iron Co., and Bethlehem Steel Corp. Contracts for design and construction of the building have been awarded to The Austin Co., Cleveland.

The development has been planned to provide the most complete facilities obtainable for convenience of miners and to meet all the mechanical needs of the mine, which will have an ultimate capacity of 1,600,000 tons per annum.

Four main buildings are included in the interconnecting ground layout which includes a 90-foot covered passageway to the mine elevator platform, so that men coming from the mine can reach the dry house where they change clothes without going out of doors.

The accommodations will be adequate to meet maximum labor requirements on three shifts representing the employment of approximately 1000 men. Salt-glazed tile will be used on wall surfaces throughout the dry house, which will have panels of glass block and will be equipped with a special ventilating system.

An office building is to be erected in front of the dry house and will be of modern design with face brick and Indiana limestone trim.

Power machinery required to operate the mine will be housed in a two-story engine house, 60 x 241 feet.

The property will be operated by Cleveland-Cliffs. It is situated midway between the first two mines ever developed on the Marquette range, oldest ore fields in the Lake Superior region. It is 17 miles from the port of Marquette.

The mine shaft is being developed to a depth of approximately 3000 feet.

Construction and Enterprise

Ohio

AKRON, O.—Goodyear Aircraft Corp., subsidiary of Goodyear Tire & Rubber Co., Paul Litchfield, president, has given general contract to Clemmer Construction Co., Akron, for an airplane parts plant, 400 x 1000 feet, a steam plant and drop-hammer building on 25-acre site, at cost of about $3,700,000. Plant will be financed by Defense Plant Corp. (Noted March 17.)

CANTON, O.—Timken Roller Bearing Co., 1835 Dueber avenue, will build new power plant to house two boilers with 80,000-pound capacity, with provision for two others later. Ralph Spengler, 5614 Prospect avenue, Cleveland, is architect. C. M. Maratta, Timken engineer, is in charge.

CLEVELAND—Efficient Tool & Die Co., 9314 Elizabeth avenue, T. Libuda, president, is having plans prepared for a one-story addition 38 x 106 feet, to cost about $10,000. Herman W. Maurer, 316 Scarborough road, is architect.

CLEVELAND—Moslo Machinery Co., 5005 Euclid avenue, Ernest P. Moslo, president, has bought a building at 4516 Superior avenue and will move its equipment there at once to obtain larger space.

CLEVELAND—Parker Appliance Co., 17325 Euclid avenue, Arthur L. Parker, president, with one addition nearly completed, two under way will start erection of another at once. This program will add about 90,000 square feet of manufacturing space for production of fuel and hydraulic systems, valves, couplings and fittings, largely for aircraft construction.

CLEVELAND—Grimes Tool Co., 3863 Ridge road, will build tool shop at 7210 Ridgemore avenue at cost of about $3400. Fred T. Grimes is in charge.

CLEVELAND—Federal Foundry Supply Co., 4600 East Seventy-first street, Louis H. Heyl, vice president, will add to office and production space by a machine shop addition 60 x 140 feet and office addition 38 x 66 feet, both two stories. Harlen E. Shimmin, 1720 Euclid avenue, is architect.

CLEVELAND—Ohio Crankshaft Co., 6600 Clement avenue, William C. Dunn, president, will build an addition 60 x 250 feet to plant No. 3. This is separate from new defense plant costing about $5,000,000, financed by government, now about ready for production.

CLEVELAND — Cleveland Automatic Machine Co., 2269 Ashland road, Arthur L. Patrick, president, is considering plant expansion to meet defense demands. C. B. Rowley & Associates, Keith building, probably will draw plans if project matures.

CUYAHOGA FALLS, O.—Akron Machine Mold Tool & Die Co., 2740 Hudson drive, will enlarge recently-constructed plant, doubling present working force. Eastern interests, represented by Maxim Kolmer, industrial engineer, have purchased company from M. H. Bernke, company founder. Mr. Kolmer will be vice president and treasurer. Addition will be 43 x 70 feet, costing $5000.

BELLEFONTAINE, O.—H. B. Ealter and J. J. Rairdan, Marysville, O., will build a one-story foundry building with 6000 square feet floor space, general contract to Knowlton Construction Co. New company will manufacture plumbing fixtures, globe valves and castings. Homer

■ Additional Construction and Enterprise leads may be found in the list of Shapes Pending on page 110 and Reinforcing Bars Pending on page 113 in this issue.

B. Fuson, Bellefontaine, is superintendent.

ELYRIA, O.—Western Automatic Machine Screw Co., Lake avenue and B. & O. railroad, will let contract soon for 40,000-square foot addition, costing $50,000 for structure and equipment. C. H. Smith is treasurer. (Noted March 24.)

Connecticut

NEW HAVEN, CONN.—Geometric Tool Co., Blake and Valley streets, is considering building a plant addition. L. F. Caproni, 1221 Chapel street, is engineer.

Massachusetts

DANVERS, MASS.—Hygrade Sylvania Corp., 60 Boston street, Salem, Mass., is having plans drawn for a plant in the Cashman area, to cost $250,000.

HYDE PARK, MASS.—B. F. Sturtevant Co., 89 Broad street, plans three-story 45 x 62 and 15 x 30-foot additions at cost of about $40,000. C. F. Roberts, 1400 Hancock street, Quincy, Mass., is architect.

New York

BROOKLYN, N. Y.—Atlantic Warwick Corp., 2923 Atlantic avenue, will let contract soon for a one-story 74 x 99-foot factory and office building to cost about $40,000. W. A. Lacerenza, 391 Fulton street, is architect.

BUFFALO—National Aniline & Chemical Co. Inc., 1051 South Park avenue, plans a plant addition to cost $150,000.

CORNING, N. Y.—Corning Glass Works, Walnut street, will build a two-story 100 x 350-foot plant costing $150,000. A. Vaksdal, care owner, is engineer.

NIAGARA FALLS, N. Y.—Electro Metallurgical Co., 137 Forty-seventh street, has let general contract for a furnace building to Scrufari Construction Co. Inc., 825 Fifteenth street, costing about $75,000.

NIAGARA FALLS, N. Y.—Great Lakes Carbon Corp., Pine avenue, has let general contract for 140 x 150-foot furnace building to Walter S. Johnson Building Co. Inc., 2532 Hyde Park boulevard, costing about $75,000.

NORTH TONAWANDA, N. Y.—Durez Plastics & Chemicals Inc., Walck road, will build plant additions costing $40,000.

WATERVLIET, N. Y.—Watervliet Tool Co. Inc., 1039 Broadway, Albany, N. Y., W. J. Kattrein, president, plans erection of a factory here, costing over $40,000.

New Jersey

ROSLYN, N. J.—A special election will be held soon on construction of a sewage disposal plant and sewers to cost about $160,000. S. Bowne, 222 Front street, Mineola, N. J., is engineer.

RUNNYMEDE, N. J.—City, A. C. Robertson, engineer, plans construction of a sewage disposal plant and sewers, at cost of about $25,000.

Pennsylvania

ALIQUIPPA, PA.—Aliquippa borough, Ellsworth A. Thomas, secretary, municipal building, will hold special election May 20 on $400,000 in bonds for improvements at West Aliquippa waterworks, purchase of fire truck and various street improvements.

BRADFORD, PA.—Case Cutlery Co. will let contract soon for a one-story 90 x 116-foot factory costing over $40,000. T. J. Hendryx, 165 Interstate parkway, is architect.

CORRY, PA.—Aero Supply Mfg. Co., S. J. Irvine, plant manager, West Main street, will let contract soon for a one-story 80 x 80-foot boiler house and coal and scrap storage. Beman & Candee, 374 Delaware avenue, Buffalo, are engineers. (Previous additions noted Feb. 17.)

HARRISBURG, PA.—Union Pipe Line Co., now being incorporated, care M. C. Sheaffer, attorney, Union Trust building, Harrisburg, will build a petroleum products pipe line from the Ohio to the New Jersey state line, with telephone and telegraph system, pumps stations, branch lines, etc., at cost of about $1,000,000.

MONONGAHELA, PA.—Ashland Oil & Refining Co., Ashland, Ky., will build a 60,000-barrel steel storage tank farm on the Monongahela river, with connecting lines, at cost of $50,000.

PHILADELPHIA — Atlantic Refining Co., 260 South Broad street, plans construction of plant at Point Breeze for manufacture of aviation gasoline at estimated cost of $7,000,000.

PHILADELPHIA—Jones Machine Tool Works Inc., Lancaster avenue, will build an addition at its Fifty-third street plant, costing about $100,000.

QUAKERTOWN, PA.—J. Berlenbach will build a one-story foundry costing over $40,000, with equipment.

YORK, PA.—A. B. Farquhar Co., is building a welding shop addition and remodeling its plant at cost of over $40,000.

Illinois

CHICAGO—Tuttle & Kift Inc., 2626 West Washington street, consulting engineer and manufacturer of electrical parts for the range industry, will occupy a plant to be built at 1823 North Monitor avenue, one story, with 35,000 square feet floor space. Site covers 65,000 square feet and provides for expansion. Cost estimated at $120,000. Property will be occupied under 15-year lease. Campbell-Lowrie-Lautermilch Corp., 400 West Madison street, is contractor.

CHICAGO — Mills Novelty Co., 4110 West Fullerton avenue, manufacturer of coin-operated machines, will build a second plant at Lake street and Kilpatrick avenue, one story, covering 150,000 square feet.

DECATUR, ILL.—A. W. Cash Valve Mfg. Co., 616 North Water street, has let contract to R. W. Christy for a one and two-story addition 104 x 160 feet, costing about $65,000. Harris & Spangler, 419 Standard Life building, Decatur, are architects.

GENEVA, ILL.—Burgess Norton Mfg. Co. has let contract to August Wilson for a one-story addition 50 x 150 feet.

LINCOLN, ILL.—Knox Glass Associates Inc., 501 West Huron street, Chicago, will build a plant here to manufacture glass food containers, etc. costing about $380,000.

Indiana

FORT WAYNE, IND.—Wayne Pump Co., B. F. Geyer, president, Tecumseh street, has let general contract to Bueschling Bros. Construction Co., 219½ East Berry street, for a one-story 50 x 200-foot plant costing $50,000. Pohlmeyer, & Pohlmeyer, 260 Central building, are architects.

SOUTH BEND, IND.—Bendix Aviation Corp. will let contract soon for a plant addition and equipment for manufacture of airplane engine parts, costing $300,000, including equipment.

Alabama

MOBILE, ALA.—Aluminum Ore Co., subsidiary of Aluminum Co. of America, Gulf building, Pittsburgh, will build power plant costing $2,000,000. J. G. White Corp., 80 Broad street, New York, are engineers in charge. Will have 7500 kilowatt capacity, primarily a steam plant.

Maryland

BALTIMORE—Rustless Iron & Steel Co. will build one-story melt shop addition at 1001 Edison highway, costing about $80,000. Cummins Construction Corp., 803 Cathedral street, is contractor.

District of Columbia

WASHINGTON—Bureau of supplies and accounts, navy department, will take bids as follows: May 2, schedule 6387, nine planers, jointers and grinders for Wickford, R. I., Jacksonville, Fla., and Corpus Christi, Tex.; schedule 6504, motor-driven vertical dial-type milling

machine for Newport, R. I.; May 6, schedule 6438, six motor-driven drill presses for New York, Atlanta, Ga., Detroit, New Orleans, Dallas, Tex., and Oakland, Calif.; schedule 6463, two electroplating motor-generating sets for Mare Island, Calif.; May 9, schedule 6505, four gasoline-engine-driven industrial trucks for Mare Island, Calif.

Louisiana

SHREVEPORT, LA.—Defense Plant Corp. has made lease agreement with Metallurgical Products Inc. for acquisition of existing plant and additional equipment at cost of about $125,000, for manufacture and processing of carbonyl iron. Equipment will cost about $69,000.

West Virginia

CABIN CREEK, W. VA.—Appalachian Electric Power Co., 1003 Electric building, Richmond, Va., has let contract to Sollitt Co., South Bend, Ind., for a $4,000,000 additional unit at plant here, doubling present capacity of 120,000 kilowatts. Includes boiler house and turbines. Site 145 x 145 feet bought for future transformer station.

Missouri

ST. LOUIS—Becker Iron & Metal Co., 2316 Biddle street, will build one-story warehouse 50 x 75 feet. J. Shannon & Sons are contractors.

Arkansas

HELENA, ARK.—Helena Manganese Co-operative Producers' Association, Arthur Lorch, organizer, plans construction of plant to handle low-grade manganese ore.

Wisconsin

KENOSHA, WIS.—Kenosha Machine & Grinding Co. has been incorporated by Edwin Erdman, Gale Blodgett and Joseph Grabinsky.

MILWAUKEE—Mid-City Foundry Co. has been incorporated by H. J. Ball, Michael Schneider and Clarence S. Wieland.

MILWAUKEE—Viselock Patents Corp. has been incorporated to manufacture machinery devices, by Carl H. Juergens, William H. Krueger and Walter C. Scheel.

WEST ALLIS, WIS.—Wehr Steel Co., 5234 West Mobile street, has given contract to Klug & Smith Co., 111 East Wisconsin avenue, for a one-story foundry addition 40 x 45 feet and extensive alterations to present foundry. (Previous additions noted March 10.)

Minnesota

HASTINGS, MINN.—War department, Major J. W. Moreland, district engineer, 1217 Postoffice building, St. Paul, will open bids May 9 for new lock at dam No. 2, Mississippi river, 110 x 600 feet. Bids for miter gates and operating machinery will be taken later. (Noted April 14.)

MINNEAPOLIS—Twin City Tool Co., 1515 Lowry avenue North, John and Steven Leba, owners, has given general contract to Clements Botner, 638 Baker building, for a one-story plant addition.

MINNEAPOLIS—Marwin & Co., paint and varnish manufacturers, have given contract to Hjalmer Benson for two one-story factory buildings, 36 x 60 and 18 x 44 feet.

SLEEPY EYE, MINN.—California Canning Co. has let contract to C. C. Pagenhart, Rochester, Minn., for a two-story canning plant addition 65 x 175 feet.

ST. PAUL—American Hoist & Derrick Co., 63 South Robert street, has plans by C. H. Johnston, 715 Empire Bank building, for a 90 x 200-foot shop costing $75,000. (Previous additions noted Jan. 27.)

ST. PAUL—Capitol Welding & Mfg. Co., tool manufacturer, has let contract to E. Strandlof & Sons for a one-story shop addition 40 x 40 feet, to house additional equipment.

Iowa

AUDUBON, IOWA—Election will be held May 16 on proposed municipal light and power plant, estimated to cost $225,000. Buell & Winter Engineering Co., Insurance Exchange building, Sioux City, Iowa, is engineer. (Noted Feb. 3.)

DES MOINES, IOWA—Marquette Cement Mfg. Co., 140 South Dearborn street, Chicago, will let contracts soon for additional plant buildings here costing $300,000. J. L. McConnell, 53 West Jackson boulevard, Chicago, is engineer.

MUSCATINE, IOWA—City plans additions and improvements to municipal power plant, including steam generating unit, pulverized coal burning equipment and accessories, or steam generator designed for stoker firing and multiple retort underfeed stoker. Stanley Engineering Co., Muscatine, is engineer.

California

LOS ANGELES—Acme Electric Welder Co. is building a factory at 2618 Fruitland road, at cost of $20,000.

LOS ANGELES—Aircraft Inc. has been organized with 2500 shares no par value, by Alvin W. Wendt, Guaranty building, Los Angeles, and associates.

LOS ANGELES — Beckwith Elevators, 1339 Santa Fe avenue, is building an office and shop building at 1020 Wilde street, 110 x 150 feet, costing about $25,000.

LYNWOOD, CALIF. — Grayson Heat Control Ltd., 3000 Imperial highway, Lynwood, will build a plant addition 94 x 123 feet, costing about $12,500.

SAN BERNARDINO, CALIF. — Hinds Nut, Lock & Bolt Co. has been incorporated with $200,000 capital by Fred Hines and Beulah M. Hinds, 886 West Ninth street.

Washington

SEATTLE—Bids are being considered for proposed 60 x 200-foot shop, storage and office building for Fruehauf Trailer Co. Exterior will be corrugated galvanized steel.

Canada

BROCKVILLE, ONT.—Lion Grinding Wheels Ltd., Pearl street East, has given general contract to Walter Patterson, 35 William street, for plant addition costing $50,000, with equipment.

HAMILTON, ONT.—Procter & Gamble Co. of Canada Ltd., Burlington street East, has let general contract to W. H. Cooper Construction Co. Ltd., Medical Arts building, for an addition and installation of new equipment in its boiler plant, at cost of about $72,000.

HAMILTON, ONT.—American Can Co. Ltd., Medical Arts building, will build plant addition here at cost of about $50,000, general contract to W. H. Cooper Construction Co., at same address.

LEASIDE, ONT.—Cochrane Tool & Machine Co. will build $50,000 plant on Laird avenue, general contract to C. Sheehan, 163 Vince street, Toronto. Robert Cochrane, 1 Rotal street, is president.

MIDLAND, ONT.—Midland Foundry & Machine Co. has been formed by James N. Bicknell and J. Pope, Toronto, Ont., and has bought the Hanley machine shop here, which will be remodeled and new equipment added for manufacture of car wheels, cranes, derricks, etc.

TORONTO, ONT.—Canadian Elevator Equipment Co., Queen and River streets, is building plant addition to enlarge production of tools, special machinery, etc., to cost about $65,000, with equipment.

WINGHAM, ONT.—Plant of Western Foundry Co. suffered damage by fire and will be rebuilt immediately.

AMHERST, N. S.—Canadian Car & Foundry Co. Ltd., Montreal, Que., will build airplane plant at 29 Lansdowne avenue, here, costing $200,000.

SOREL, QUE.—Sorel Steel Industries Ltd. will build plant addition here to cost about $100,000.

USED and REBUILT EQUIPMENT
MATERIALS

FOR SALE

MESTA 1500 H.P. DRIVE and G.E. MILL TYPE MOTOR

complete ready for IMMEDIATE USE. Motor is 1500 H.P., Type MT-24, 3 Ph, 60 Cyc, slip ring induction type, 300 R.P.M., 4600 Volts, with controls.

Motor can be reconnected for 2300 Volt service.

Drive Ratio is 9.75—1.

Also, the following

TWO HIGH HOT MILLS AND AUXILIARIES:

28"—2 HIGH STANDS BOTH STEEL AND IRON
SHOE PLATE
COUPLING BOXES
SPINDLES
SPINDLE CARRIERS
ELECTRIC REGENERATIVE DRAG
BAR SHEARS
MESTA PNEUMATIC PICKLERS
AUTOMATIC FEEDING AND CATCHING TABLES
ROLL HEATERS
ROLLS

GREAT LAKES STEEL CORP.
ECORSE — DETROIT — MICH.

FOR SALE
IMMEDIATE DELIVERY

2 PUNCHES
15" Throat
Capacity 1" through 1"

1 HEAVY BILLET SHEAR
Capacity 7" x 7"

C. A. WAITE CO.
32nd St. & Penn Ave., Pittsburgh, Pa.

OPPORTUNITY TO SAVE MONEY

MOTOR GENERATOR SET
125 KW General Elec. type CD, 125 volt DC generator driven by Gen. Elec. KT 559, 3 phase 60 cycle 1200 RPM motor. Late type unit for immediate shipment.

6,000 performance tested and guaranteed motors, generators, etc. in stock. Send inquiries.

THE MOTOR REPAIR & MFG. CO.
1558 HAMILTON AVE. • CLEVELAND, O.

SPEED REDUCERS

1—1½ HP. 200 AH. Cleveland ratio 80:1
4—2 HP. 200 AH Cleveland ratio 80:1
1—2.8 HP. Link Ratio 48.4:1
14—3 HP. 400 AH. Cleveland ratio 60:1
23—3/5 HP. Thomas 2 speed ratio 1 side 100 to 1, other side 5 to 1
2—5 HP. 100 RT Cleveland ratio 15:1
1—5 HP. 400 AH Cleveland ratio 70:1
1—7½ HP. 200 AH Cleveland ratio 80:1
2—7½ HP. 400 RT Cleveland ratio 80:1
3—7½ HP. National Tube Co. ratio 46.67:1
5—10 HP. 600 AT Cleveland ratio 90:1
1—50 HP. Falk ratio 6.3:1
2—50 HP. D. O. James ratio 3.4:1
1—150 HP. R. D. Nuttal ratio 1.6:1

write

DUQUESNE ELECTRIC & MFG. COMPANY
Pittsburgh, Pa.

Peresoteron mato dollareonoas!

IRON & STEEL PRODUCTS, INC.
36 Years' Experience
13462 S. Brainard Ave., Chicago, Illinois
"*Anything* containing IRON or STEEL"
SELLERS — BUYERS — TRADERS

WANTED—TRANSFORMERS

Of all descriptions and sizes
Burned Out or Good
Also interested in purchasing
Empty Transformer Cases
Will pay cash—send full description

PHILADELPHIA TRANSFORMER CO.
2829 Cedar St. Philadelphia, Pa.

—REBUILT—
BLOWERS - FANS - EXHAUSTERS

Connersville-Roots positive blowers.
Centrifugals for gas and oil burning.
Sand blast, grinder and dust exhausters.
Ventilating fans and roof ventilators.

GENERAL BLOWER CO.
404 North Peoria St. Chicago, Ill.

Rails—"1 Ton or 1000"

NEW RAILS—5000 tons—All Sections—All Sizes.
RELAYING RAILS—25,000 tons—All Sections—All Sizes, practically as good as New.
ACCESSORIES—Every Track Accessory carried in stock—Angle and Splice Bars, Bolts, Nuts, Frogs, Switches, Tie Plates.
Buy from One Source—Save Time and Money
'Phone, Write, or Wire

L. B. FOSTER COMPANY, Inc.
PITTSBURGH NEW YORK CHICAGO

USED AND REBUILT MACHINERY IS IN DEMAND TODAY

If you have any surplus equipment for sale, advertise it in STEEL's "Used and Rebuilt Equipment" section. Send your instructions today for the May 5 issue.

WRITE: STEEL, ROOM 827, PENTON BLDG., CLEVELAND, OHIO

CLASSIFIED

Positions Wanted

ADVERTISING MAN WANTS POSITION with manufacturer or agency handling industrial accounts. Thorough knowledge of and ability to create and produce trade paper advertising, booklets, catalogs, house organs, publicity material, etc. Twenty years experience with three manufacturers, seven years on heat treating equipment. Available at once. Salary requirements modest. Can submit samples and recommendations. Reply Box 439, STEEL, Penton Bldg., Cleveland.

SALES REPRESENTATIVE FOR CHICAGO area. Desires to handle one or more lines—structural steel, fabrications, forgings, castings. Acquainted with contractors, industrials, railroads. Has thorough knowledge of Federal, State, Municipal purchasing. Address Box 447, STEEL, Penton Bldg., Cleveland.

WELDER—SPECIALIZING IN TOOL AND die steels, reclaiming of worn dies, seeks connection. Reply Box 456, STEEL, Penton Bldg., Cleveland.

COMBUSTION ENGINEER, SALES BACK-ground, 30 years old. M. I. T. graduate, 8 years' experience in sales, engineering and estimating in the steel industry. Seeks responsible position in Pittsburgh District. Address Box 469, STEEL, Penton Bldg., Cleveland.

Accounts Wanted

AGGRESSIVE MANUFACTURERS' AGENT —San Francisco Area, thorough selling, financial experience, efficient office, wide acquaintance. Desires one additional productive line. Address Box 464, STEEL, Penton Bldg., Cleveland.

Help Wanted

WANTED

GENERAL MANAGER FOR LARGE ESTABLISHED SCRAP IRON AND METAL BUSINESS—CENTRAL OHIO. ADDRESS BOX 465, STEEL, PENTON BLDG., CLEVELAND.

SUPERINTENDENT OF SMALL TO ME-dium sized job stamping plant in Great Lakes area. Man of some experience required, with knowledge of dies, production, costs, buying, etc. Address Box 462, STEEL, Penton Bldg., Cleveland.

Wanted

QUOTATION WANTED IMMEDIATELY ON MACHINERY

1 only SAE 1040 Shaft, 25′ 2″ Overall. Right Hand Acme Thread in center for distance of 21′ 10⅝″, 3½″ diameter. Smallest diameter on each end 1 9/16″ with 2 keyseats on each end.

We will furnish Steel. Blueprint will be forwarded if interested. Address Box 461, STEEL, Penton Bldg., Cleveland.

CLASSIFIED RATES

All classifications other than "Positions Wanted," set solid, minimum 50 words, 5.00, each additional word .10; all capitals, minimum 50 words, 6.50, each additional word .13; all capitals, leaded, minimum 50 words 7.50, each additional word .15. "Positions Wanted," set solid, minimum 25 words 1.25, each additional word .05; all capitals, minimum 25 words 1.75, each additional word .07; all capitals, leaded, minimum 25 words 2.50, each additional word .10. Keyed address takes seven words. Cash with order necessary on "Positions Wanted" advertisements. Replies forwarded without charge.

Employment Service

SALARIED POSITIONS
$2,500 to $25,000

This thoroughly organized advertising service of 31 years' recognized standing and reputation, carries on preliminary negotiations for positions of the caliber indicated above, through a procedure individualized to each client's personal requirements. Several weeks are required to negotiate and each individual must finance the moderate cost of his own campaign. Retaining fee protected by refund provision as stipulated in our agreement. Identity is covered and, if employed, present position protected. If your salary has been $2,500 or more, send only name and address for details. R. W. Bixby, Inc., 110 Delward Bldg., Buffalo, N. Y.

Castings

OHIO

THE WEST STEEL CASTING CO., Cleveland. Fully equipped for any production problem. Two 1½ ton Elec. Furnaces. Makers of high grade light steel castings, also alloy castings subject to wear or high heat.

PENNSYLVANIA

NORTH WALES MACHINE CO., INC., North Wales. Grey Iron, Nickel, Chrome, Molybdenum Alloys, Semi-steel. Superior quality machine and hand molded sand blast and tumbled.

ADVERTISING INDEX

Where-to-Buy Products Index carried in first issue of month.

ADVERTISING INDEX

Where-to-Buy Products Index carried in first issue of month.

Whatever your need in Iron and Steel

ANDREWS STEEL

Consult Andrews First

Made to meet your individual requirements, Andrews offers special formulae Bars, Plates, Universal Mill Plates, Sheet Bars, Billets, Blooms, and Slabs in carbon and alloy steel of guaranteed, unvarying quality . . . manufactured to the highest metallurgical standards under rigid, scientific control.

Whatever your use of iron and steel it will be to your profitable advantage to consult Andrews first.

THE ANDREWS STEEL CO.
NEWPORT, KENTUCKY

ANDREWS STEEL

DIVISIONS
THE NEWPORT ROLLING MILL COMPANY
THE GLOBE IRON ROOFING & CORRUGATING CO.