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STEEL

ESTABLISHED 1882

Contents

Volume 108—No. 16 **April 21, 1941**

PRODUCTION • PROCESSING • DISTRIBUTION • USE

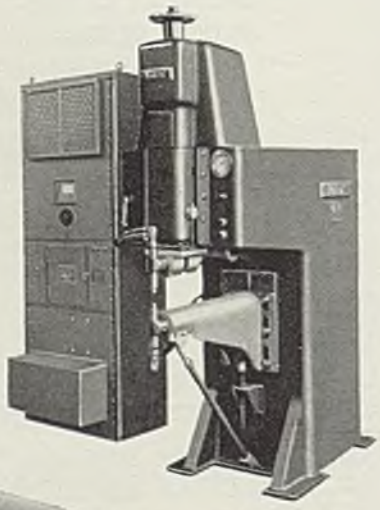
★ Micrograph (10 power) 24 S-T Alclad Sheet, two pieces, each 0.081" thick. Single spot shear, 1350 lbs.

★ Micrograph (10 power) 24 S-T Alclad Sheet, two pieces, each 0.064" thick. Single spot shear, 1100 lbs.

WELDED STRENGTH IN EXCESS OF STANDARD SPECIFICATIONS

FEDERAL UNI-PULSE SPOT WELDERS, used extensively in the fabrication of sheet stainless and aluminum alloys, are a contributing factor of great importance in the mass production of aircraft. Micrographs of Uni-Pulse Spot Welds on various gage thicknesses of 24 S-T Alclad, as illustrated above, show consistent welding results with strength IN EXCESS of standard specifications. With Federal Uni-Pulse Spot Welders this difficult aluminum alloy fabrication problem is accomplished with greater efficiency and economy.

This improved method of welding stainless sheet and aluminum alloys employs electrostatic storage of energy and greatly reduces peak power demands, at the same time providing flexible control of the current wave form. As a result, life of the welding electrode tips is greatly increased and the weld nugget size and shape consistently accomplished. Federal Uni-Pulse spot welding, especially adaptable to the aircraft industry, will help you meet defense order demands ON TIME.



Federal Uni-Pulse Spot Welders of the "Press Type," shown here, are constructed with low inertia high speed patented head, and supplement Federal's conventional "Rocker Arm Type" Welders so predominant among leading aircraft manufacturing concerns.

In England, made by British Federal Welder & Machine Co. Ltd., Dudley, England

Federal MACHINE AND WELDER COMPANY WARREN, OHIO

SALES OFFICES IN ALL PRINCIPAL CITIES

HIGHLIGHTING
THIS ISSUE OF
STEEL

■ FREEZING of steel prices at first quarter levels proved disconcerting to steel producers last week. The 10 cents an hour wage increase will increase the industry's costs during 1941 by some $125,000,000, an amount equivalent to about half of its net profit in 1940. Some nonintegrated companies **(p. 21)** went so far as to declare that their position, under the price ruling, would become untenable. This is true especially because other steelmaking costs also are rising. In view of the need for all the steel that can be produced, modifications and revisions in the price ruling are expected. In fact, complaints of "extreme hardship or inequity" under the ruling are invited **(p. 22)** by Leon Henderson.

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Spring Speeds Steel Sales

A new wave of buying is encountered by steelmakers, partly **(p. 107)** because of premature warm weather which revives outdoor projects. With some makers new orders run about 20 per cent over the similar March period. . . . Prices on Lake Superior iron ore have been reaffirmed but carriage charges on the Great Lakes have been increased 10 per cent. . . . The coal strike is affecting pig iron production due to coke shortage. . . . Export steel business is at a standstill **(p. 24)** due to confusion resulting from the steel price ruling. . . . Displacement of steel by plastics so far **(p. 29)** has been of minor consequence. . . . Steel production last week stood unchanged **(p. 29)** at 98 per cent of ingot capacity.

• • •

Thin Coatings On Tin Cans

Alloy steel substitutions and relaxed tolerances are being considered **(p. 24)** as a means toward speeding production of heavy ship and gun forgings. . . . Used tin cans might yield 12,000 tons of reclaimed tin annually but **(p. 31)** the emergency is not yet serious enough to justify the high cost. Thinner coatings on tin cans are being considered. . . . Ratings to govern shipments of aluminum to nondefense industries **(pp. 31 and 33)** were announced last week. . . . An Iron and Steel Industry Defense Committee has been organized **(p. 24)** to work with OPM. . . . Production of 1942 model automobiles will be cut **(p. 25)** 20 per cent. . . . L. H. Korndorff **(p. 26)** recommends reappraisal of the entire shipbuilding program.

• • •

Motion Study Of Handling

Prof. G. B. Carson begins a series of articles **(p. 83)** explaining how two industrial organizations effected great improvements in their materials handling systems as a result of motion study and methods engineering. . . . Molybdenum, tantalum, stainless steel and nickel scrap are sorted at one plant **(p. 87)** through color identification under daylight fluorescent lighting. . . . Contrary to customary belief, zinc alloy die castings can be welded; R. T. Gillette **(p. 78)** describes satisfactory results obtained with resistance welding. . . . E. R. Longwell **(p. 72)** tells of the advantages obtained as a result of the steel industry's first installation of an ignitron rectifier.

• • •

Hipersil, New Alloy

Prof. Arthur F. Macconochie **(p. 54)** concludes his discussion of high-speed tooling for production of high-explosive shell and other ordnance. In next week's issue he will begin a treatise on production of cartridge cases. . . . A new protective coating **(p. 53)** prevents damage from moisture condensation. . . . H. V. Putnam **(p. 52)** comments on the characteristics of Hipersil, new alloy steel for transformer cores. . . . Magnesium can be heat treated at temperatures as high as 800 degrees Fahr. in convection type gas furnaces **(p. 70)** if a small percentage of sulphur dioxide is added to the gas. . . . This week's offerings of new and improved equipment include **(p. 100)** an artillery shell sprayer.

FOR almost a century —through wars, panics, depressions and other crises, Industry has come to Ryerson for steel. Today, stocks at the 10 Ryerson plants —America's great Reservoir of Steel— are quite complete, and service in general is prompt. In times like these, however, some sizes of certain products are low, a few are out. But generally you can depend on Ryerson for good service on reasonable quantities of over 10,000 different kinds, shapes and sizes of steel and allied products. If you do not have the current Ryerson Stock List, we'll gladly send a copy.

RYERSON CERTIFIED STEELS

JOSEPH T. RYERSON & SON, INC.—Steel-service—Plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City

STEEL

Steel's Costs Studied as Government Orders Ceiling Over Prices

- "Freezing" Follows Sharp Wage Increases.
- Door Left Open for Possible Adjustments.
- Doubt Advances Can Be Absorbed.
- Senators Assail Price Control Office.

■ COST studies, to analyze the effects of recently-granted wage increases and the establishment of steel price ceilings on earnings, will be made by individual steel companies and by the government. If these prove prices increases are warranted by the heavier costs, appeals will be made to the Office of Price Administration and Civilian Supply to relax its order last week freezing prices at those prevailing during the first quarter.

Consensus in the industry last week was that the 10-cent hourly increase granted by most companies would necessitate upward revisions for at least some products, and on most products by some producers.

Leon Henderson, OPACS director, left a door open for later increases, should the need be indicated, in issuing the price ceiling order. Said he:

"The action to freeze steel prices at levels prevailing during the first quarter of 1941 should not be interpreted as fixing summarily a steel price ceiling for the duration of the emergency, or for any set period. Rather, it is an effort designed to be helpful to the industry and its customers, of which the federal government is the largest, as to the economy in general. Today's action establishes, if you like, a cooling-off period during which the effect of the defense program upon the industry and its cost factors may be rationally appraised."

The price freezing order, Mr. Henderson stated, was precipitated by the wage increases.

Reports that the steel companies would ask a court injunction against the price-freezing order were discounted in Washington and other quarters. While many believe there is no legal basis for the ruling, they are disposed to attempt to rectify the inequalities created in some other way. At Washington, it was

Peace Maintained—at a Price

■ J. L. Perry, president, Carnegie-Illinois Steel Corp., United States Steel Corp. subsidiary, signs the new contract with the Steel Workers Organizing Committee which provides a 10-cent hourly wage advance. Philip Murray, CIO president, looks on. Officials estimated wage increases in U. S. Steel plants will cost $62,000,000, in the next 12 months. See story page 28. Pittsburgh Press photo

pointed out that a petition for an injunction probably would be seized upon by Mr. Henderson as an excuse to ask for specific legislative authority to fix prices.

Mr. Henderson's action was sharply attacked in the senate late last week. Senator Austin, Vermont, said: "I think the Henderson price-fixing orders are absolutely illegal and represent an usurpation of the authority which Congress only may exercise."

Senator Austin declared the orders read like laws and that if a company does not observe them it would be "pilloried."

Senator Taft, Ohio, charged the OPACS was created "without authority of any kind."

Although effect of the increased costs has not yet been accurately analyzed, some inequalities are certain to develop. Certain products, tin plate, for example, require more man-hours to produce than do other products; the ratio of labor to other costs in making such products will be increased disproportionately.

Production costs for several products had increased sharply even before the wage increase. Galvanized sheets is a notable example, due to the advance in zinc. Adjustments already have been made in most galvanized steel products.

Particularly hard hit by the price maximums are the smaller, nonintegrated producers. These companies have less flexibility in costs than do the larger companies, and also less control over costs.

Government spokesmen, in commenting on the price ceilings, pointed out that the present high rate of operations spreads overhead costs over a greater tonnage and that they believed the industry could absorb the added wage costs without price advances. While it is axiomatic that overhead costs per ton decrease as operations increase, it is also true that a period of extremely high production such as the present involves many cost-increasing factors.

As Gano Dunn explained in his report to the President on the adequacy of steel capacity, the maintenance of production at or above rated capacity over any extended period requires that the time allowed for relinings and other repairs must be shortened. This requires working overtime on repairs and is more costly.

Costs Higher in Older Plants

Direct production costs also are increased by overtime payments when the industry is working at capacity. Present average workweek for the entire industry is just under 40 hours, which means that many workers are receiving overtime rates.

A third cost-increasing factor is the operation of marginal, older facilities. Many of these less efficient units—beehive coke ovens as well as iron and steel producing and finishing units—have been placed in operation during the present emergency.

These factors suggest that the steel industry at a high but undetermined rate of operations reaches a "point of diminishing return."

Effect of the wage increase upon the industry was summarized by E. J. Kulas, president, Otis Steel Co., Cleveland, as follows:

"In 1929, the average hourly rate in the industry was 65.4 cents. With the recent increase the average hourly rate has reached an all-time high of about 97 cents, an increase of nearly 50 per cent. Direct wages in the industry represent approximately 40 per cent of the selling price of steel. As opposed to this steel composite price levels have increased about 2 per cent over 1929, with a large tonnage of highly competitive steel products actually selling under the 1929 prices.

"The direct additional cost of the wage increase will run from $2.50 to approximately $5 a ton, the exact cost increase depending on the product. In addition, there will be other indirect cost increases as the industry pays higher prices for coal and other materials without taking into consideration past cost increases which have not, to date, been reflected in the selling price of steel.

"I am fully in sympathy with the viewpoint that there should be no unwarranted increase in prices. It is obvious, however, that many steel producers will not be able to absorb this wage increase, together with the sharp increases already absorbed plus those which will shortly follow."

The price ceiling, if maintained, will sharply reduce the tax collections from the steel industry, for the simple reason earnings will be lower. Some statisticians have estimated that 50 to 70 per cent of cost of the wage increase will be offset by lower taxes paid.

Steel producers representing 90 per cent of the country's ingot capacity last year paid taxes aggregating $208,000,000. The portion of this tax bill representing corporate income or excess profits taxes will be sharply reduced this year if present costs and prices are maintained, industry spokesmen contend.

Iron, Steel Price Schedule as Issued by Henderson

■ STEEL is the nation's basic durable commodity, even in ordinary times. It is an indispensable raw material of a very large number of important industries. The prices of this key commodity set the tone of prices generally.

In a national defense emergency, the significance of steel products and steel prices to the economy is heightened. The production of steel in large quantities is not only basic to our defense, but with the nation's business being increasingly diverted from normal pursuits to defense production, is more than ever a bellwether for the entire price structure.

Up to the present time steel prices have been held relatively firm. Unless prompt action is taken, however, steel prices may be raised as a result of rising costs and in particular rising wage costs due to recent wage increases.

This price schedule is issued to assure that for the immediate present steel prices will not be raised. The Office of Price Administration and Civilian Supply will immediately undertake to study the data on prices and costs, including the significance of capacity volume and the differences in the costs of different producers. Estimates and guesses are not enough when the nation's welfare may be at stake. An expeditious study, involving relatively little delay and injustice, will permit the garnering of actual experience.

Some inequities or injustices may be involved in this decision. But the iron and steel producers will undoubtedly continue their patriotic co-operation in the interest of price stability. Individual instances of extreme or disproportionate hardship may be presented by application for modification of the price schedule. The dominant consideration must be the prevention of undue price rises: to protect the government, which purchases directly or indirectly a very substantial part of the nation's steel production; and to protect the nation's price

structure which must be guarded vigilantly, particularly at the present time, in order to prevent price spiraling and inflation.

In this price schedule the Office of Price Administration and Civilian Supply is utilizing the basing point, price leadership and extras systems, presently in effect in the steel industry, including the customary practice of steel producers in gearing their own delivered prices to the base prices announced by recognized price leaders. Such acceptance of these systems, merely as a vehicle for determining prices, should not be regarded as approval thereof, nor should this reservation be regarded as indicating disapproval.

Accordingly, pursuant to and under the authority vested in me by executive order No. 8734, and after consultation with the Price Administration Committee, it is hereby directed that,

1. Maximum ("ceiling") prices on sales of iron or steel products. On and after April 17, 1941, no person who produces iron or steel products shall sell or deliver or offer to sell or deliver any such product, and no purchaser shall buy or accept delivery or offer to buy or accept delivery from such person of any such product, at a price exceeding the maximum ("ceiling") price.

The ceiling price for any iron or steel product for which there are basing point base prices as defined in this price schedule shall be the sum of these elements: (1) the basing point base price as defined in this price schedule; (2) extras as defined in this price schedule; (3) transportation charges from the governing basing point to the place of delivery as customarily computed, but in no event in excess of the lowest published common carrier freight rate from the governing basing point to the place of delivery, including such switching charges as may be applicable.

For all iron or steel products, such as specialty products, for which there are no basing point base prices and extras as defined in section 5 of this price schedule, the ceiling prices shall be the prices and extras which were or would have been charged by the seller on March 31, 1941 (upon the basis of the prices, discounts, charges or extras then listed or quoted by the seller) for such iron or steel products, exclusive of any premium or charge for advanced delivery or any other inducement offered by the buyer or demanded by the seller to negotiate the sale.

A lower price than the ceiling price may be charged, demanded, offered, or paid. The price limitations set forth in this price schedule shall not be evaded by additional charges for prompt or early delivery, or by other direct or indirect methods, nor shall the terms and other conditions of sale be made more onerous to the purchases than those available or in effect on March 31, 1941.

2. Exports. Where iron or steel products sold or delivered for export are not available in sufficient quantity at or near the governing basing point as defined in this price schedule, a person producing such products at a place other than the governing basing point may designate the basing point at or nearest its place of production as the governing export basing point, and on such products sold or delivered for export, the ceiling price shall be the sum of these elements: (1) the basing point base price applicable to the governing export basing point; (2) extras; and (3) transportation charges from the governing basing point to the place of delivery as customarily computed, but in no event in excess of the lowest published common carrier freight rate from the governing export basing point to the place of delivery, including such switching charges as may be applicable.

3. Records. (a) Every person who produces iron or steel products shall retain copies of all invoices, dated Jan. 1, 1941, or later, relating to sales of such products to warehousemen, jobbers, brokers and all other persons purchasing for resale. Reports on such sales, in such form as may be determined, will be required by supplements issued under this price schedule.

(b) Every person who produces and sells iron or steel products shall file a copy of said person's price announcements, including extra books, stating the prices, charges and discounts in effect on March 31, 1941. Such materials shall be filed with the Office of Price Administration and Civilian Supply, 2000 Massachusetts avenue, N. W., Washington, on or before April 23, 1941.

(c) The preceding paragraphs shall continue in effect until further notification by the Office of Price Administration and Civilian Supply.

4. Existing Contracts. Nothing herein shall be construed to alter or modify the terms of any contracts entered into prior to the issuance of this price schedule, to prohibit increases provided for under the terms of such contracts.

5. Supplement. In order to facilitate the application of this schedule, supplements further stating its scope will be issued from time to time as may be necessary or appropriate.

6. Definitions. When used in this Schedule:

(a) The term "person" includes an individual, corporation, association, partnership, or other business entity.

(b) The term "iron or steel products" includes all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled or cold-rolled iron or steel products, and all iron or steel products further finished (by galvanizing, enameling, plating, coating, drawing, extruding or otherwise) in a manner commonly performed at steelworks or rolling mills, and shall include all products listed in the table of Capacity and Production for Sale contained in the Annual Statistical Report of the American Iron and Steel Institute for 1939, pages 42-43: Provided, that the term shall not include pig iron.

(c) The term "basing point base prices" means the prices announced prior to Dec. 31, 1940, by Carnegie-Illinois Steel Corp., American Steel & Wire Co., and National Tube Co., as base prices effective during the first quarter of 1941 and applicable to delivery at designated basing points of selected types and specifications of iron and steel products. Where arbitrary delivered prices have been announced, applicable to delivery at a particular place, and such prices are less than the basing point base prices at the nearest basing point plus transportation charges, such prices shall for the purposes of this price schedule be deemed basing point base prices applicable to delivery at such place.

(d) The term "extras" means the charges in effect March 31, 1941 prescribing additions or deductions from the base price to make adjustment for variations in the product sold from the product governed by the base price, which variations may be in size or other physical specifications, chemical analysis, processing, or other quality or treatment, or may be in the quantity of the product.

(e) The term "governing basing point" means that basing point the use of which results in the lowest delivered price at the place of delivery.

7. Modification. This price schedule is issued upon the basis of presently existing conditions. It is subject to adjustment or revocation if called for by changed conditions. Persons complaining of extreme or disproportionate hardship or inequity in the operation of this Schedule may apply to the Office of Price Administration and Civilian Supply for approval of any proposed modification thereof.

Issued this 16th day of April, 1941.

LEON HENDERSON,
Administrator

Steel Export Trade at Standstill Pending Price-Ceiling Clarification

NEW YORK

■ PENDING clarification of Leon Henderson's price-fixing order on steel, export trade here is at a standstill. Leading exporters are not yet able to judge fully the ruling's scope as it affects exports, although to many it appears that seaboard prices, as allowed under the Webb-Pomerene act, will have to give way to prices ruling at basing points of various producers selling for foreign shipment, and should this be the case, premiums offered by foreign buyers over recent weeks above the established seaboard prices will, of course, be eliminated.

Exports Lower

As a number of producers are no longer offering steel for export, other than for the essential needs of Great Britain, Canada and their allies, a much smaller tonnage will be affected than would have been the case had the order been applied earlier. Not only has there been a disposition on the part of producers to conserve their production for domestic and British needs, but there has been the action of the government in applying a rigid licensing system which in itself has curtailed the movement of much steel to neutral countries.

In this, South American countries as well as many in other parts of the world have been affected. Brazil, Chile and two or three other South American countries which lately have not been particularly large buyers, have not been restricted greatly. Nevertheless much less foreign business than is being offered has been taken.

Export Prices To Be Affected

Little question exists that export prices will be affected, it is largely a question of how much, with an official interpretation of the regulations being awaited. If domestic prices are frozen, so would be prices on steel for Great Britain, and considering domestic and British demand, it stands to reason that premiums will not be permitted to tempt producers to sell steel to other parts of the world.

Great Britain recently put a ban on all carbon steels under production here, and it appears the capacity thus freed has been quickly absorbed by domestic needs and by requirements of some of the British colonies. Meanwhile England is taking alloy steels, particularly tool steels, bars and billets, and is exerting pressure for forgings, pig iron and scrap. As a result of the ban on carbon steels, accumulation of British steel at seaboard, estimated at the beginning of this month at around 500,000 tons, is being slowly reduced. However, there is no improvement to date in the number of ships available.

Steel Executives Organize Advisory Group To Work with Defense Officials

■ FORMATION of an Iron and Steel Industry Defense Committee to work in co-operation with the Office of Production Management in the solution of iron and steel problems arising in connection with national defense was announced last week by B. F. Fairless, president, United States Steel Corp., and chairman of the new organization.

The committee was formed by members of the industry at the request of officials of the OPM. Membership consists of 30 chief executives of representative companies producing the various kinds of rolled and finished steel products.

Under present plans, the work of the committee will be carried on through specialized subcommittees dealing with various products, including pig iron, scrap, bars, plates, sheets, strip, structural shapes, tin plate, tool steel, tubular products, wire and wire products, aluminum, nickel, zinc and stainless steel.

An executive subcommittee has been appointed, consisting of Mr. Fairless; T. M. Girdler, chairman, Republic Steel Corp.; E. G. Grace, president, Bethlehem Steel Co.; E. L. Ryerson, chairman, Inland Steel Co., and E. T. Weir, chairman, National Steel Corp.

The exact procedure by which the work of committee will be carried out has not yet been crystalized, Mr. Fairless stated.

The committee has appointed Walter S. Tower, president of the steel institute, to act on behalf of the committee in co-ordinating its efforts with those of OPM.

Officers of the committee in addition to Mr. Fairless are: C. V. McKaig, vice chairman; George S. Rose, secretary. Offices will be at 350 Fifth avenue, New York, adjacent to those of the American Iron and Steel Institute.

$13,022,000,000 in Defense Awards Since June 1, 1940

■ War and Navy Department contracts awarded from June 1, 1940, to March 31, 1941, totaled $13,022,000,000, according to a report issued by the Office of Production Management's research bureau late last week.

Navy awards for ships and parts aggregated 34.6 per cent of the total; ordnance, ammunition and munitions, 21.0 per cent; airplanes, engines and accessories, 18.6 per cent; industrial facilities, excluding Reconstruction Finance Corp. contracts and privately financed construction, 9.1 per cent.

Posts, depots and stations accounted for 7.2 per cent of the total; transport equipment, 1.7 per cent; and equipment and subsistence, 7.8 per cent.

Consider Revisions in Forging Specifications

■ Changes in specifications and substitution of metals, as well as expanded plant facilities, are being considered by heavy forgings manufacturers in order to speed up deliveries for ships and distance guns.

OPM production officials reported last week they have asked 18 fabricating companies to explore the effect on deliveries of such steps as relaxing tolerances and substituting various alloys of steel.

Company representatives were called to Washington April 11 and April 17, to hear the OPM plan for increasing facilities. In addition to agreement to erect new facilities and capacity, OPM received assurances from the manufacturers that they would undertake an investigation of production methods aimed at cutting down delivery time.

"Although relaxation of tolerances would mean less precise finishing in certain cases, efficiency would not be impaired and substantial savings in both man and machine hours might result," stated an OPM announcement.

■ OPM accepted "with delight" recently an offer of 500,000 pounds of aluminum ingots by the William Wrigley Co. Aluminum was used for chewing-gum wrappers. The company decided to use substitute wrappings and to sell the aluminum to the United States in the interests of national defense.

Limit on 1942 Automobile Output To Release Critical Metals for Defense

WASHINGTON

■ CURTAILMENT of automobile production by 20 per cent in the 1942 model year, just announced by OPM Director Knudsen, will result in a substantial cut in automotive demand for steel and other raw materials. Tentatively, it is estimated curtailment will cut automobile production by 1,000,000 units in the year starting Aug. 1.

The cut will be wholly voluntary on the part of the automobile industry and willingly accepted, Director Knudsen said.

Roughly, it is estimated the 20 per cent curtailment will leave the industry to produce about 4,000,000 of 1942 models, which would be in excess of 1939 production and better than average. Some operators estimate the cut will subtract about 200,000 units from Chrysler output, about 350,000 from General Motors, and about 225,000 from Ford Motor production.

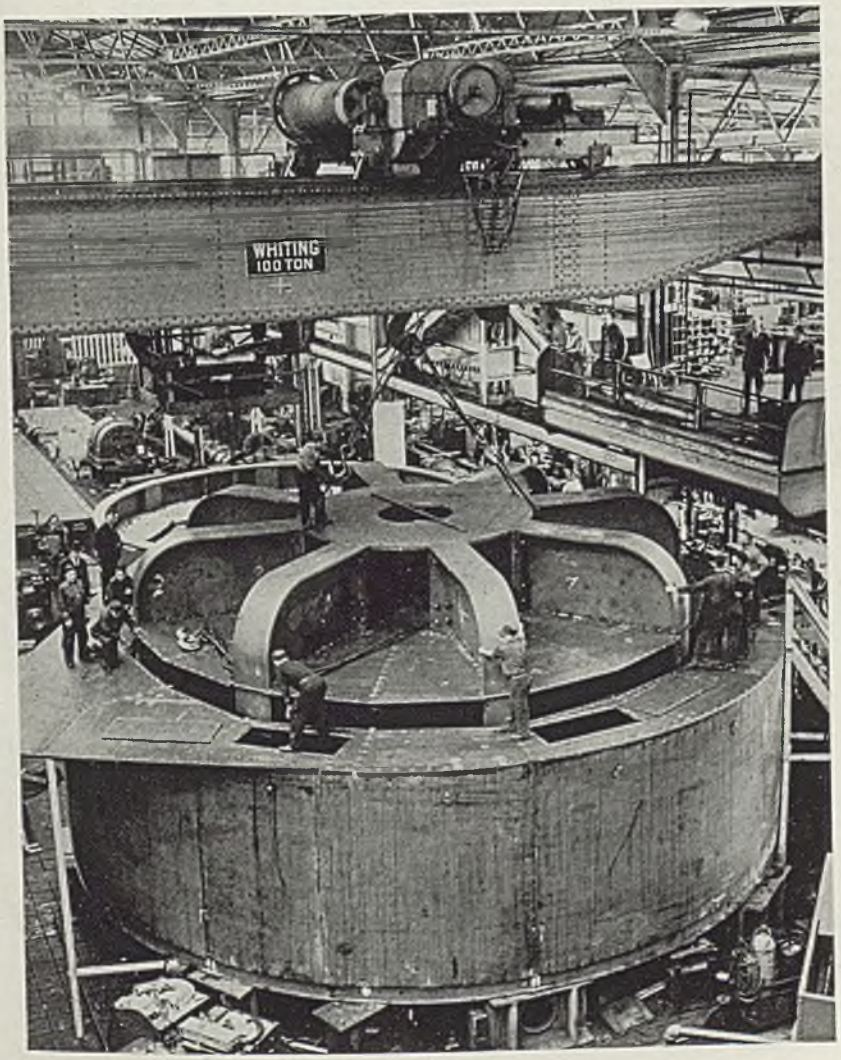
Other aspects of the projected curtailment include: Release of $500,000,000 worth of raw materials for defense use; release of 350,000 skilled automobile workers for direct defense production; release of many hundreds of thousands of square feet of factory space; and diversion of many machines and tools for defense work.

Large quantities of steel, gasoline, rubber, glass, nickel, lead, and other vital materials will be affected by the curtailment. Government statistics estimate the reduction in terms of raw material saved, based on total auto consumption in 1939, as follows:

Steel, 1,198,718 tons; malleable iron, 57,200 tons; gray iron, 189,584 tons; crude rubber, 94,720 tons; plate glass, 23,545,000 square feet; leather upholstery, 5,415,400 square feet; aluminum, 4200 tons; copper, 22,000 tons; tin, 10,000 tons; lead, 45,600 tons; zinc, 15,200 tons; nickel, 4,000,000 tons; cotton, 146,829 bales; hardwood lumber, 35,000,000 cord feet; softwood lumber, 20,800,000 cord feet; glycerin, 3,640,000 pounds; upholstery cloth, 9,024,000 yards; gasoline, 4,153,102,600 gallons; antifreeze solution, 6,600,000 gallons.

Curtailment proposal was adopted at a meeting of representatives of the automotive industry with OPM. The decision was described as "an initial 20 per cent reduction." It is emphasized that it will not mean closing of any factories or laying off men. Rather, plants and machines relieved from automotive work willl be diverted into defense production.

Automobile men attending last week's conference included: Alvin McCauley, Packard Motor Car Co.; Paul Hoffman, Studebaker Corp.; Byron Roy and B. H. Hutchinson, Chrysler Corp.; Robert Black, White Truck Co.; George W. Mason, Nash Motors; A. E. Barit, Hudson Motors Co.; E. C. Fink, Mack Truck Co.; O. E. Hunt and Donald Brown, General Motors Corp.; and H. C. Doss, Ford Motor Co.



Secondary Aluminum Situation "Serious"

■ A small group of secondary producers, members of the Aluminum Research Institute, met in Cleveland last Thursday to study present operating difficulties, chiefly the inability to get scrap, which government regulations have brought about.

The situation was described as "serious," with production of ingots nearly at a standstill. Means are sought to obtain material in sufficient quantity to permit resumption of business on a more normal basis. Also, to simplify and minimize the work involved in compulsory detailed reports of orders, production and inventories required by the government.

✦

Machine Does the Muscle Work of 2,261,250 Men

■ This single machine, one of four 75,000-kilowatt generators being built by General Electric Co. for the Shasta dam development on the Sacramento river, can do the muscle work of 2,261,250 mem. Men work but an eight-hour day, while this machine works a 24-hour day. Therefore, it can do the muscle work of 6,783,750 men, day in and day out, or one third more than could have been done by all the 4,700,000 slaves in this country before the Civil war

FINANCIAL

$747,210 First Quarter Net Profit Earned by M. A. Hanna Co.

■ M. A. HANNA CO., Cleveland, reports consolidated net income in first quarter was $747,210 after all charges and provision for federal taxes on the basis of present tax laws. It was equal, after preferred dividend requirements, to 58 cents per share on common, and compared with net income of $390,238 or 22 cents per share on common in the period in 1940.

Net income in last quarter, 1940, was $1,005,216 or 83 cents per share on outstanding common.

Sharon Steel's First Quarter Net Profit 70 Per Cent Above 1940

Sharon Steel Corp., Sharon, Pa., reports net profit in first quarter was $527,253. This was equal, after dividend requirements on the company's $5 cumulative convertible preferred stock, to $1.15 per share on common. It was more than 70 per cent higher than net income in first period of 1940.

In the first quarter last year, net income was $309,576 or 60 cents per share on common after preferred dividend requirements.

Keystone Steel & Wire Co. Nets $410,137 Profit in March Quarter

Keystone Steel & Wire Co., Peoria, Ill., reports net profit earned in quarter ended March 31 was $410,137, after all charges including federal taxes and provision of $56,815 for excess profits taxes. Equal to 54 cents per share on capital stock outstanding, this compared with a net profit of $279,386 or 37 cents per share in the corresponding period last year.

Total net profit for the nine months ended March 31 was $979,512 or $1.29 per share. In the same period a year ago, net profit totaled $971,798 or $1.28 per share.

Sales for the nine months totaled $11,362,696, against $9,513,763 in the corresponding period in 1940. Gain was 19 per cent.

Keystone's fiscal year ends June 30.

Blaw-Knox Co. Reinstates Incentive Compensation Plan

Reinstatement of a plan of incentive compensation was approved last week by stockholders of Blaw-Knox Co., Pittsburgh, at the company's annual meeting in Camden, N. J. Directors were re-elected.

Net profit earned in the first quarter by Blaw-Knox totaled $584,853, after provision of $535,968 for income and excess profits taxes. No comparison with earnings in past years is available, as statements were formerly made semi-annually.

Plant extensions and improvements last year aggregated $666,027, large part of which was for national defense program, according to William P. Witherow, president. Further appropriations have already been made for 1941. Outlook, said Mr. Witherow, is for continued high operations.

2590 Manufacturers' Net Profit Up 10 Per Cent In 1940

Combined net profit, less deficits and after taxes, of 2590 leading corporations last year was 19 per cent higher than aggregate for the same companies in 1939, according to the National City Bank of New York.

Total net profit represented a return upon net worth of 7.4 per cent, compared with rate of 6.3 per cent in 1939. Net worth, as calculated by the bank, includes book value of outstanding preferred and common stock and surplus account at the beginning of each year.

Iron and steel industry's rate of return, according to the bank, was up from 4.4 per cent in 1939 to 8.5 per cent. Average rate of return for the "metal products group" of 519 companies, including "iron and steel," rose from 7.2 per cent to 10.8 per cent. Transportation equipment, chemical products and beverage industries' rates of return on net worth in 1940 were, respectively, 15.4 per cent, 13.4 per cent, and 20.1 per cent.

Automobile industry's return on net worth was 16.8 per cent, up 1.2 points from 15.6 per cent in 1939. Auto accessories manufacturers' rate increased more sharply, from 12.6 per cent in 1939 to 17.2 per cent. Transportation industry's rate was smallest last year, 1.6 per cent.

Outstanding features of the reports tabulated were: Substantial increase in employment and payrolls; sharp rise in income and excess profits taxes; uneven changes among different lines in net profits after taxes.

Tabulation of 1495 leading companies in manufacturing groups shows sharpest gains occurred in capital goods and other industries stimulated by war and the national defense progam. In many consumers' goods industries, which had only moderate increase in sales, rise in operating costs and taxes limited gains in net profits, and in many cases caused decreases as compared with the preceding year.

Come and Go—Story of Steel Dollars

(Republic Steel Corp.'s receipts and disbursements in 1940, as stated last week in its report to employes.)

Gross Income This represents the net sales value of the company's products and miscellaneous earnings such as dividends, interest, royalties and discounts		$305,006,963
Deduct from this the expenses of doing business except wages and salaries:		
Materials, Supplies, Freight and Expenses In this is the cost of all materials, repairs, supplies, selling, advertising, freight, legal and other expenses	$154,437,096	
Depreciation and Depletion This is the cost of wear and tear on plants and equipment and exhaustion of mines	11,787,630	
Taxes Federal income, capital stock, and excess profits taxes, old age and unemployment taxes, real and personal property taxes to city, county and state, and many other miscellaneous taxes	16,034,921	
Interest Interest payments on borrowed money	4,062,961	186,322,608
Amount available for employes, stockholders and for re-investment in business		$118,684,355
This $118,684,355 was distributed as follows:		
Wages and Salaries of Employes (82%)	$ 97,570,848	
Dividends to Stockholders (6%)	6,832,400	
Re-invested in the Business (12%)	14,281,107	$118,684,355

Man-Hours for Steel, According to Institute

■ Steel products most largely in demand for national defense and for export to England require, on the average, fewer man-hours per ton to produce than the steel required by ordinary commercial users. Increased demand for semi-finished steel, such as ingots, blooms and billets, and for heavy products like plates and structural shapes characterized the market last year, according to the American Iron and Steel Institute.

Production of one ton of semi-finished requires an average of only 12½ hours of direct labor in the steel mills. Shapes and plates require an average of 16 man-hours, as against 33 man-hours per ton of sheet steel, 37 man-hours per ton of pipe and 52 man-hours per ton of tin plate.

Shipyards Face "Colossal" Task In Building $10,000,000,000 Fleet

■ UNITED STATES shipyards, faced with the necessity of building 900 merchant vessels, aggregating 5,000,000 gross tons, and 900 naval vessels, about 2,500,000 displacement tons, already have increased their forces 500 per cent over the past year and must add 200,000 to 300,000 more workers. The present program will require approximately 1,000,000-man-years of labor and will cost about $10,000,000,000.

This was the picture of shipbuilding activity presented by L. H. Korndorff, president, Federal Shipbuilding & Dry Dock Co., United States Steel Corp. subsidiary, before the annual meeting of Academy of Political Science in New York last week.

Mr. Korndorff said merchant tonnage has been sunk at an average rate of 290,000 tons a month since the war started and that recent sinkings have been at a higher rate. Replacements by construction in the United States and Great Britain since the war started have been at an average rate of about 100,000 tons a month.

The shipbuilding program now under way "must be considered colossal," said the speaker. "Witness the $9,000,000,000 to $10,000,000,000 of shipbuilding today, which includes $7,000,000,000 for the United States Navy's ships alone, as compared with $3,000,000,000 for merchant ships and $2,000,000,000 for the Navy in the last World war. . . . The problems confronting the industry are unprecedented and they must be faced frankly to avoid any disappointments which might affect vitally the outcome of the war."

Recommends 48-Hour Law

These problems include the necessity of increasing the labor force by 200,000 to 300,000 men and the obtaining of a maximum productive effort from those employed. Mr. Korndorff recommended that for the duration, all plants should be put on a 48-hour week by law and no overtime should be paid except for work in excess of 48 hours. This, he said, would discourage men working at overtime pay and then laying off on straight time days.

The urgency of demand for ships should result in shipbuilding industries being granted the highest possible priority ratings for materials and tools.

Great care in locating new shipyards to avoid further dilution of the supply of experienced supervisors and labor was recommended.

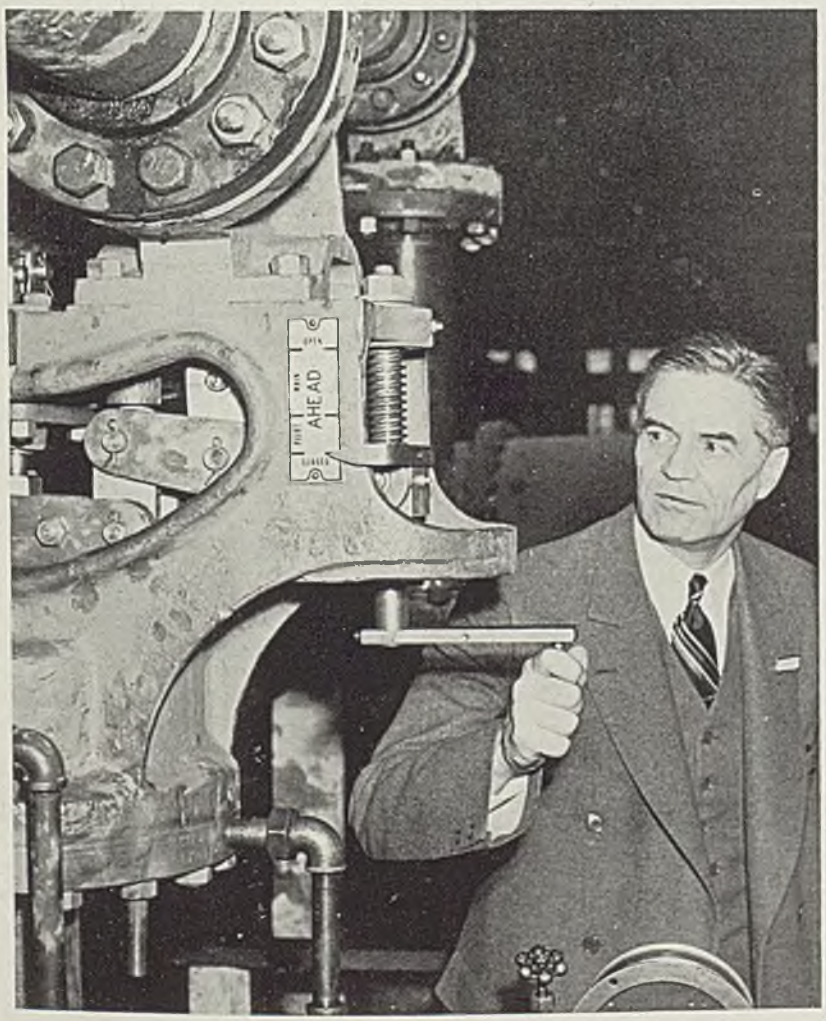
Contract negotiations should be concluded promptly and on an equitable basis. In these negotiations, the government should keep in mind that the first essential is to get ships built; that the hazards of future contracts are uncertain and great; and that any unreasonable profits will be leveled off by taxes.

"In view of the changing conditions that have to be met and other problems confronting the industry, it might be advisable for the government to reappraise the shipbuilding ability of the country so as to be assured that it is being used in the most effective manner to produce to greatest number the most essential types of ships in the least possible time.

"It may develop as a result of such reappraisal that it can be shown that energy is now being exerted on types of ships which can't possibly be delivered before 1944 or 1945, which energy might better be expended on ships which could be made available in 1942 and 1943, if diverted promptly."

Mr. Korndorff pointed out that there is a vast amount of paperwork involved before actual construction of a ship can be started. Approximately 600 plans are necessary for the construction of a merchant ship and about 1600 for a destroyer.

Ratio of labor cost to total cost is higher in shipbuilding than many other industries, running between 30 and 50 per cent depending on the type of ship and equipment. Twenty basic trades are involved in a progressive operation and these must be available when needed.



■ Assistant Secretary of Navy Ralph A. Bard throws a hand throttle releasing jets of steam in a marine turbine on final test at the Westinghouse Electric & Mfg. Co. shops in Lester, Pa. Mr. Bard and a party of 200 navy officials and industrial leaders recently inspected completed turbines. The plant is working 24 hours a day, building propulsion machinery for more than 100 warships and some 30 cargo vessels

Steel Wage Advances Spread; Will Increase Production Costs Sharply

■ FLAT wage increases of 10 cents an hour granted by leading steel producers last week will cost the industry approximately $125,000,000 during 1941, or about half the industry's 1940 net profit. This estimate of cost of the wage increase is based upon current employment and work-week, which, with the industry operating near practical capacity, are unlikely to change materially during the remainder of the year.

During February, last month for which employment figures are available, the industry employed 603,000 workers, who were engaged an average of 39.4 hours per week. As the average work week is so near the basic work week, it is probable that many employes have been receiving and will continue to receive time and one half for overtime work. This factor would tend to lift the estimated cost of the increase above $125,000,000.

The wage increase, first announced by National Steel Corp., and followed by other independent producers and the steelmaking subsidiaries of the United States Steel Corp., averts threats of a widespread stoppage of production.

Increased wages generally are retroactive to April 1. Basic wage rates are raised to 72½ cents an hour.

"Little Steel" companies, which have not recognized the Steel Workers Organizing Committee, adjusted their rates to the new levels before or soon after the U. S. Steel-SWOC agreement was announced. SWOC had demanded recognition by these companies.

The new agreement between SWOC and the U. S. Steel is a continuation of the 1937 contract with certain modifications, the most important of which is wage increase.

The company recognizes the union as the collective bargaining agency for those employes who are members of the union. Company agrees not to interfere with the right of employes to become members of the union and the union agrees not to intimidate or coerce employes into membership and not to solicit membership on company time or plant property.

The agreement does not provide for a closed shop or for a checkoff.

Vacation plan provides one week's vacation with pay to all employes with three years' continuous service and two weeks' vacation to employes with 15 years' service.

Procedure for adjustment of grievances has been materially changed, with the object of providing speedy determination of any grievance raised.

Section of agreement dealing with wage adjustment provides that rates cannot be changed except by mutual agreement, and in all cases of changing technology which necessitates a change in rate, it provides that changes made in the absence of mutual agreement may be carried through the grievance procedure to an umpire for determination as to whether the change represents a violation of the wage section and whether the new rate correctly considers the added employe effort, if any.

July 4, Labor day and Christmas are recognized as holidays. Time and one half will be paid employes working on these days in other than continuous operation jobs. Standard work day remains at 8 hours and the work week at 40 hours. Time and one half will be paid for all overtime.

In a separate memorandum the corporation agreed to place women's wages on a parity with men's.

Direct cost of the increased wages will amount to more than $62,000,000 during the next 12 months, the corporation estimates. This includes the cost of extending the vacation plan, wage increases to be granted coal miners and clerical employes. Average wage increase will be approximately 12 per cent.

Indirect costs resulting from the wage increase also will reach a "very substantial" sum over the year, U. S. Steel spokesmen said.

Many of the steel companies in announcing the flat 10-cent increase to wage earners said salaries in the lower brackets will be adjusted proportionately.

Common Labor Up From 20 to 72.5c in 25 Years

■ Steel's common labor rate has advanced 262.5 per cent since 1915 when it was 20 cents an hour. Trend has been upward throughout the 25 years with the exception of the depression years of 1921, 1931 and 1932, when reductions were necessitated by low operations.

The recent increase lifted average hourly earnings of all wage earners to approximately 97 cents, among the highest paid by any industry. Even before the increase average iron and steel wages were fourth highest in a group of 25 industries, according to the National Industrial Conference Board. Only automobile, news and magazine printing and the rubber industries paid higher average rates. Average for the group was 76.4 cents, compared with 86.9 for iron and steel.

Following table shows hourly wage rates for common labor paid by the United States Steel Corp. since 1915:

	Hourly wage	Per cent advance	Per cent advance over 1915
1915	20.0	...	...
Feb 1, 1916	22.0	10	10
May 1, 1916	25.0	13.6	25
Dec. 15, 1916	27.5	10	37.5
May 1, 1917	30.0	9	50
Oct. 1, 1917	33.0	10	65
April 16, 1918	38.0	15	90
Aug. 1, 1918	42.0	10.5	110
†Oct. 1, 1918	46.2	10	131
†Feb. 1, 1920	50.6	10	153
†May 16, 1921	40.5	*20	102.5
July 16, 1921	37.0	* 8.6	85
Aug. 29, 1921	30.0	*18.9	50
Sept. 1, 1922	36.0	20	80
April 16, 1923	40.0	11	100
‡Aug., 1923	44.0	10	120
Oct. 1, 1931	39.6	*10	98
May 16, 1932	33.7	*15	68.5
Aug. 19, 1933 (Code)	40.0	18.7	100
April 1, 1934	44.0	10	120
Nov., 1936	52.5	19	162
March, 1937	62.5	19	212.5
April, 1941	72.5	16	262.5

*Reduction. †Basic 8-hour day in effect; time and one-half for overtime. ‡Twelve-hour day abolished; pending general adjustment, labor on 8-hour day was paid 50 cents; on 10 hours, 44 cents.

Cost of Living Advances Fractionally in March

Living costs advanced 0.2 per cent during March, according to the National Industrial Conference Board's survey. This was the fourth consecutive month of fractional increases.

Living costs are still 23.6 per cent lower than in March, 1929, although 1.8 per cent above March, 1940, and 20.4 above April, 1933.

International Harvester Grants 5-Cent Increase

■ International Harvester Co., Chicago, last week advanced wages for all employes in its domestic truck, tractor, farm implement and twine factories five cents an hour, retroactive to April 14. Increase will affect approximately 42,000. Comparable advances will be granted salaried nonmanagerial employes.

■ Representatives of three Chicago district plants of Carnegie-Illinois Steel Corp. will receive plaques May 8 in recognition of their winning the twenty-fourth semiannual interplant accident prevention contest sponsored by the Greater Chicago Safety Council. Plaques will be presented at the council's nineteenth annual Midwest Safety conference in that city.

Steel Institute Group Reports On Plastics

■ DISPLACEMENT of steel by plastics so far is of minor consequence, according to a subcommittee of the committee on manufacturing problems, American Iron and Steel Institute. It points out that during 1939 the total tonnage of plastics material produced amounted to only 1/3 of 1 per cent of the total tonnage of steel for the same period, and probably less than one-quarter of that amount superseded steel.

In the immediate future there are few applications which may become a direct threat to steel tonnage, as for example, automobile bodies, refrigerator liners and containers.

However, it is suggested that the institute review the subject from time to time, to keep in touch with any sudden or radical changes. The subcommittee pointed out that the plastics industry is basically an industrial chemical development, operated by well-established and progressive manufacturers, known for intensive research.

"Their activity will undoubtedly cause radical changes," it was declared, "which through new materials, new processes and lowered costs may result in entirely different competitive relationships between plastics and steel, other than those existing today."

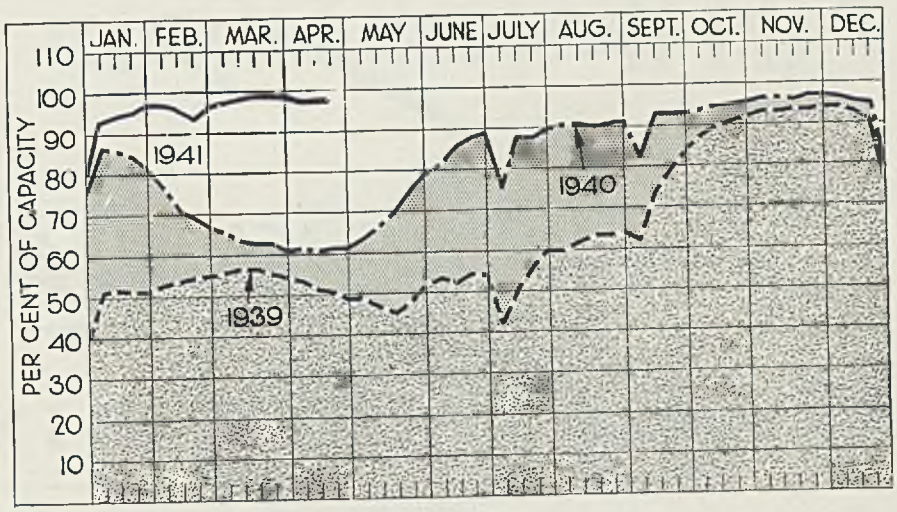
Headed by L. H. Underwood, Youngstown Sheet & Tube Co., Youngstown, O., subcommittee also includes R. M. Bowman, Republic Steel Corp., secretary, Cleveland; W. O. Clinedinst, National Tube Co., Pittsburgh; F. C. Elder, American Steel & Wire Co., Cleveland; E. D. Martin, Inland Steel Co., Chicago; Charles Schenck, Bethlehem Steel Co., Bethlehem, Pa.; and J. J. Strachan, Carnegie-Illinois Steel Corp., Pittsburgh.

Awards Blast Furnace

■ H. A. Brassert & Co., Chicago, consulting and contracting engineers, recently were awarded contract for construction of a 400-ton blast furnace for the Monterey Iron & Steel Co., Monterey, Mexico.

■ Total income received by individuals from governmental sources reached a new high last year, according to an estimate by the National Industrial Conference Board Inc., New York.

Aggregate for the year was $13,200,000,000, compared with $12,700,000,000 in 1939 and $1,800,000,000 in 1913.



PRODUCTION . . . . Steady

■ STEELWORKS operations last week continued at 98 per cent. Three districts made small gains, four declined and five were unchanged. A year ago the rate was 61½ per cent; two years ago it was 50½ per cent.

Youngstown, O.—Steady at 97 per cent with 76 blast furnaces and three open hearths in production. Carnegie-Illinois Steel Corp. and Republic Steel Corp. each had blown out a blast furnace for relining ahead of schedule, due to short coke supply. Several stacks will be banked unless coke is received this week. Rate scheduled at 97 per cent for this week, cold iron replacing hot metal increasingly in open hearths.

Detroit—Resumption by Ford Motor Co. steelmaking furnaces early last week increased the average for the week to 70 per cent, up 9 points. Damage to open hearths will prevent full production for several weeks.

Cincinnati—Down 2½ points to 91½ per cent, two open hearths being under repair. Higher rate is expected this week.

St. Louis—Continued at 98 per cent, one open hearth being out for repair.

Birmingham, Ala.—Held at 90 per cent, with 22 open hearths active. Woodward Iron Co. has resumed pig iron production in two stacks out for several days following an explosion but the third stack is delayed in its return.

Central eastern seaboard—While some plants are at or above capacity the district rate holds at 96 per cent for the sixth week.

Cleveland—Lost 2 points, to 96½ per cent, because of open-hearth repairs. Republic Steel Corp. banked a merchant blast furnace because of lack of coke.

Pittsburgh—Receded 2 points to 100 per cent, due to coke shortage reducing pig iron production.

Wheeling—Dropped 4 points to 84 per cent on account of furnace repair. Return to 88 per cent is scheduled for this week.

New England—Advanced 2 points to 92 per cent, with likelihood of a further rise this week.

Buffalo—Unchanged at 90½ per cent with possibility of a 2-point increase this week as Republic Steel Corp. lights a repaired furnace.

Chicago—Gained ½-point to 102 per cent, a new all-time peak. Carnegie-Illinois Steel Corp. has banked a blast furnace at Gary, Ind., and one at South Chicago, Ill., works and two to four more may be taken off soon if the coke supply is not increased.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

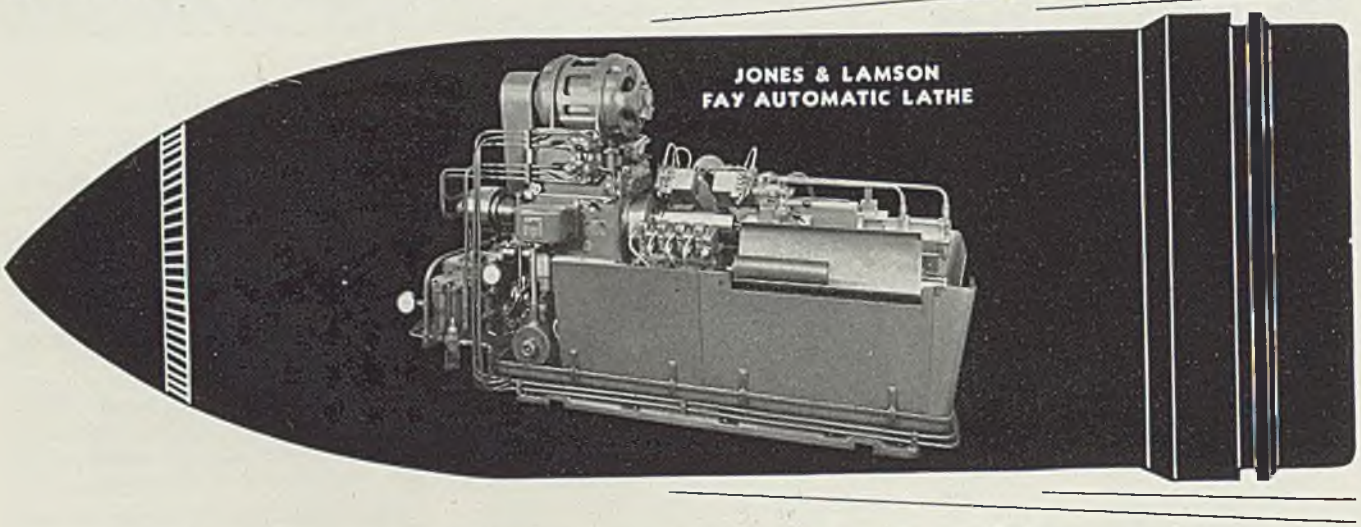
	Week ended Apr. 19	Change	Same week 1940	Same week 1939
Pittsburgh	100	— 2	55	43
Chicago	102	+ .5	61.5	53.5
Eastern Pa.	96	None	56	38.5
Youngstown	97	None	43	43
Wheeling	84	— 4	73	65
Cleveland	96.5	— 2	65	36.5
Buffalo	90.5	None	42	46.5
Birmingham	90	None	81	60
New England	92	+ 2	60	35
Cincinnati	91.5	— 2.5	50	46
St. Louis	98	None	45	44.5
Detroit	70	+ 9	72	57
Average	98	None	61.5	50.5

Scrap Directors To Meet

■ Meeting of the board of directors, Iron and Steel Scrap Institute, will be held April 21, in Hotel Statler, Cleveland. Effect of recent government regulations will be discussed.

Speed

BEHIND THE FIRING LINE!!



This is a national emergency, but your new Jones & Lamson equipment will earn peace-time profits later

Because they can be changed rapidly from job to job, Fay Automatic Lathes have established their ability to earn welcome profits on highly competitive peace-time work. In the automotive field, for example, the same Fay Automatic Lathes continue to handle a multitude of pieces that would otherwise require new special machinery every year.

Because of their proven adaptability, Fay Automatic Lathes will also obviate the need of special machinery for many of your defense assignments. What is more, you can look forward with greater confidence to a return to normal conditions when you know your standard Fay Automatics can continue to pay you profits in the face of post-war competition.

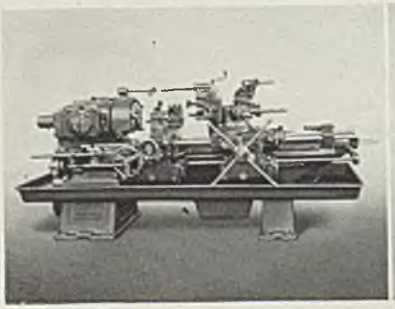
PROFIT PRODUCING J&L MACHINE TOOLS

JONES & LAMSON MACHINE CO.

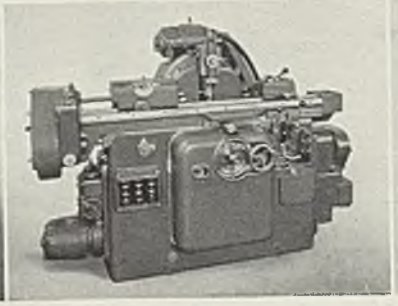
SPRINGFIELD, VERMONT, U.S.A.

Manufactures of Saddle & Ram Type Universal Turret Lathes . . . Fay Automatic Lathes . . . Automatic Double-End Milling & Centering Machines . . . Automatic Thread Grinding Machines . . . Comparators . . . Tangent and Radial, Stationary and Revolving Dies and Chases

RAM & SADDLE TYPE UNIVERSAL TURRET LATHES



AUTOMATIC THREAD GRINDERS



OPTICAL COMPARATORS

AUTOMATIC OPENING DIE HEADS

Windows of WASHINGTON

By L. M. LAMM
Washington Editor, STEEL

Reclamation of tin from used containers might yield 12,000 gross tons annually, survey reveals, but high transportation costs to detinning plants would make project unfeasible . . . Priorities division issues preference rating classification of aluminum consumers . . . Bituminous coal price schedule modified. Permits collateral agreements with purchasers

WASHINGTON

■ USED tin cans collected for reclamation might yield as much as 12,000 gross tons of tin annually, but costs of transporting the cans to detinning plants would be so high as to make the project almost impractical.

This conclusion was reached by a committee of the National Academy of Sciences which surveyed, at the request of the Office of Production Management conservation and reclamation unit, possibilities of recovering waste tin. Total tin consumption in United States in 1939 was about 70,000 gross tons.

Committee's report was filed as R. R. McConnell, head of the unit, met with tin can manufacturers to discuss ways of curtailing consumption in event of a tin shortage.

If it becomes imperative to conserve tin regardless of cost, the committee said, government should erect detinning plants to supplement those now operating in New York, Pittsburgh, Chicago and San Francisco.

Forced reclamation program outlined in the report contemplates cans would be collected only from principal urban centers, where organized collection of domestic refuse is carried on by municipal governments. It rejected as "not practical or desirable" the suggestion that persons on relief rolls be assigned to collect cans, although the committee added this procedure might be successful in some communities.

Committee stated it had not found any detinning method during its investigations superior to the present method of dissolving the tin in an alkaline bath containing an oxidizing agent, removing the lead and electrolyzing the resultant sodium stannite solution to recover high-grade tin.

Only about half the used tin cans in the country could be collected economically for removal to detinning plants, committee estimated. Survey of municipal methods and facilities for collection and disposition of refuse, made by a competent commission, should be the first step in a reclamation program, the report declared.

F. W. Willard headed the Academy of Science's committee on recovery of tin. Other members were M. F. McConnell and Prof. W. K. Lewis.

May Reduce Tin Coating on Cans

Representatives of can-making companies reported that if the government found it necessary to request a 10 per cent reduction in the tin coating of cans, such a reduction could be made safely for about 95 per cent of all tin can uses.

Statement was made in response to an inquiry as to whether a reduction of about 17 per cent in the weight of the tin coating might be made to conserve the tin supply for defense and essential civilian needs.

Opinion was expressed that a 17 per cent reduction in the coating of cans should not be made. It was declared, however, that to conserve the metal, weight of the tin coating on about 95 per cent of all tin cans could be reduced safely by 10 per cent. Reduction in the weight of the coating of cans used for baby foods, kraut and high acid fruits such as cherries was opposed. These products fill about 5 per cent of the cans used in the country, it was estimated.

Paint manufacturers were reported already switching from tin-plated to terne-plated cans, with some exceptions. Terne-plate, made of tin and lead, requires less tin than tinplate.

It was estimated 5000 to 7500 tons of tin per year could be saved through a 10 per cent reduction in the coating of tin cans on which such a reduction could be made safely, and by savings now being accepted by industries using cans.

OPM officials reserved judgment temporarily as to what reduction in tin can coatings, if any, they would recommend.

Index of Aluminum Purchasers' Preference Ratings Issued

Index instructing suppliers of aluminum how to classify purchasers' orders into various preference rating classes was issued last week by the Priorities Division, Office of Production Management. It lists industries by general categories and affects distribution of the metal for all major civilian uses.

Ratings given in the index apply almost entirely to orders which fall into nonmilitary or B classes, as distinguished from defense orders which generally bear ratings in the A class. Products listed take higher ratings than those indicated, when defense orders are involved.

E. R. Stettinius Jr., director of priorities, said the index classifications are to be the basis of aluminum shipments by producers, fabricators and secondary smelters for May.

Under regulations previously issued, customers whose orders fall into B classes may receive only certain stipulated percentages of their average 1940 orders. In the case of high-grade aluminum, these percentages range from 10 for B-8 to 80 for B-2. In the case of low-grade aluminum, for which there is little

defense use, the percentages range from 50 for B-8 to 100 for B-2 and B-3.

Only industry group given an A-class rating in the index is "blast furnaces, steel works and rolling mills," which get an A-10 rating for deoxidizing ingots. This rating is assigned so that the quantity of such deoxidizing ingots will not be limited under the percentage formula.

$1,350,000 Authorized for Aircraft Parts Manufacturing Equipment

Defense Plant Corp. has authorized a lease agreement with Goodyear Aircraft Corp., Akron, O., providing for construction and equipment of a manufacturing plant to cost approximately $3,600,000, Federal Loan Adminstrator Jesse Jones announced last week.

Plant will produce military aircraft parts and will be located near the present Goodyear plant in Akron. Title will be held by the Defense Plant Corp. and property will be leased to the Goodyear company for operation.

Of the authorized sum, about $2,250,000 will be used for land and buildings and $1,350,000 for machinery and equipment.

A $50,000 Reconstruction Finance Corp. loan to Benson Mfg. Co., Kansas City, Mo., to construct a new building and purchase machinery and equipment for production of airplane parts was also announced.

Defense Mediation Board Names Seward Executive Secretary

National Defense Mediation Board has named Ralph T. Seward, New York, executive secretary. Mr. Seward, former chairman of the Department of Justice's immigration appeals board, took up his duties April 16. He is a former instructor in government at New York university and was director of the Geneva Institute of International Relations and executive director and general counsel of the New York State Labor Relations Board.

Proclamation Placing Machinery Under Export Control In Effect

President Roosevelt's proclamation putting machinery under export control became effective April 15.

Export control schedule No. 3, covering machinery, includes only construction and conveying machinery and certain mine, well, and pumping machinery Proclamation was issued on the recommendation of Brig. Gen. Russell L. Maxwell, administrator of export control.

In accordance with provisions of executive order, General Maxwell announced issuance of export control schedule covering the forms, conversions and derivatives which have become subject to the provisions of the export licensing system.

Henderson Reports Bituminous Coal Price Schedule Modified

Modification of the bituminous coal price schedule to avert hardship for mines where work has been resumed under retroactive wage agreements during strike settlement negotiations was announced last week by Leon Henderson, administrator, Office of Price Administration and Civilian Supply.

Modification took the form of a supplement which permits bituminous coal sellers operating under such conditions to sign collateral agreements with purchasers.

Under such agreements, an operator is permitted to obtain, for coal mined after the price schedule is revoked and there has been substantial resumption of production, an agreed sum equal to the maximum price set up in the schedule plus the increase in costs necessitated by the retroactive wage agreement.

"Because of the depressed nature of the bituminous coal industry," Mr. Henderson said, "the actual prices on March 28, 1941, which constitute the maximum prices contained in price schedule No. 5, approximate the minimum prices fixed by the Bituminous Coal Division. The industry is practically unique in that these prices, generally speaking, do no more than to return to producers their average costs. In the event, therefore, that a wage increase is made retroactive, hardship and inequity to producers and other sellers might result unless this relief is granted."

Dougherty Appointed Head of Production Planning Board

Latest appointments to various branches of organizations set up to facilitate the national defense program include:

Robert E. Dougherty, president, Carnegie Institute of Technology, and a member of the OPM production planning board since its formation last February, named chairman.

He succeeds Samuel R. Fuller Jr., who was recently appointed chief of the materials branch of the OPM production division, and resigned to devote full attention to his new duties.

John W. Farley, Needham, Mass., was named New England regional representative of the state and local co-operation division, Office of Emergency Management, according to Frank Bane, director.

Mr. Farley was formerly director of the Massachusetts committee on public safety, which has developed civilian defense plans in the state and surrounding area.

M. F. McOmber was selected manager of the Pittsburgh area, Fourth Federal Reserve district, OPM defense contract service, it was announced last week by George F. Brainard, co-ordinator at Cleveland. Mr. McOmber's office will be in the Federal Reserve building, 717 Grant street, Pittsburgh.

Mr. McOmber was loaned to the Federal Reserve defense contract service by Jones & Laughlin Steel Corp., Pittsburgh. Previously he had served with U. S. Alloy Steel Corp. and the Timken Roller Bearing Co., steel and tube division, both of Canton, O.

He will facilitate introduction of prime contractors to subcontractors in defense.

H. G. Batcheller, president, Allegheny Ludlum Steel Corp., Brackenridge, Pa., was appointed recently to the OPM's priorities division. Mr. Batcheller is serving as the industrial users' representative in the ferrous metals and alloys division.

Maritime Commission To Exercise Emergency Powers

Invoking its emergency condemnation powers for the first time, the Maritime Commission will take over 2425 feet of frontage on the Delaware river adjoining the Sun Shipbuilding & Dry Dock Co., Chester, Pa.

The land is owned by Joseph Bancroft & Sons Co., which asked the government $2,594,000 for the property, refusing to lease it. The commission asserted that the entire property, of which it seeks only a portion, cost the present owners $1,028,000. The frontage is required for expansion of Sun shipbuilding facilities.

The commission added that "in any case where excessive demands are made we shall not hesitate to seek proper action by the courts."

Zinc Pool for May Raised To 17 Per Cent of Output

E. R. Stettinius Jr., director of priorities, last week announced the zinc pool will be raised from 5 per cent of production to 17 per cent for May. The 17 per cent figure will be based on March production, and will yield about 12,000 tons, it was reported.

Mr. Stettinius' order followed a recommendation made by the Minerals and Metals Group of the Priorities Division, which found that while production is increasing, demand is increasing even more rapidly.

Recommends Ways for Conserving Aluminum

■ Recommendations aimed at conserving the supply of aluminum have been made to the Office of Production Management by a committee of the National Academy of Sciences known as the Metals Conservation and Substitution Group of the Advisory Committee on Minerals and Metals. These methods, it was recommended, should be considered:

1. Toll fabrication of market scrap. This means that the manufacturer, instead of selling his scrap on the scrap market, returns it to an aluminum producer who reworks it for him for a fee. Authorization by the Priorities Division of the OPM is now required for toll fabrication of aluminum scrap.
2. Use of thinner gages.
3. Use of aluminum dross, aluminum sawdust, etc., in place of aluminum ingots in the production of steel requiring this metal.
4. Use of more 3S (manganese alloy aluminum) in place of 2S (pure aluminum metal) for greater strength and thinner gages.
5. Preparation of regulations governing classification and segregation of scrap, plus designation of secondary alloys which may be made from specified scrap alloys.
6. Increased education among fabricators and their employes to reduce spoilage and scrap. This applies particularly to aircraft companies.

This and subsequent reports of the group will be considered by OPM in formulating policies to be put into effect by its Unit of Conservation.

The Metals Conservation and Substitution Group said it was estimated that primary gross aluminum production by the Aluminum Co. of America would inerease from 42,645,000 pounds in March this year to 53,065,000 pounds next December.

More Low-Grade Aluminum To Be Allowed Civilian Industries

New formula for the distribution of low-grade aluminum which makes possible allocation of greater quantities to nondefense industries that can use this grade of metal was announced last week by E. R. Stettinius Jr., director of priorities. The change is accomplished by increasing the percentage of average 1940 shipments which consumers of this grade now may obtain.

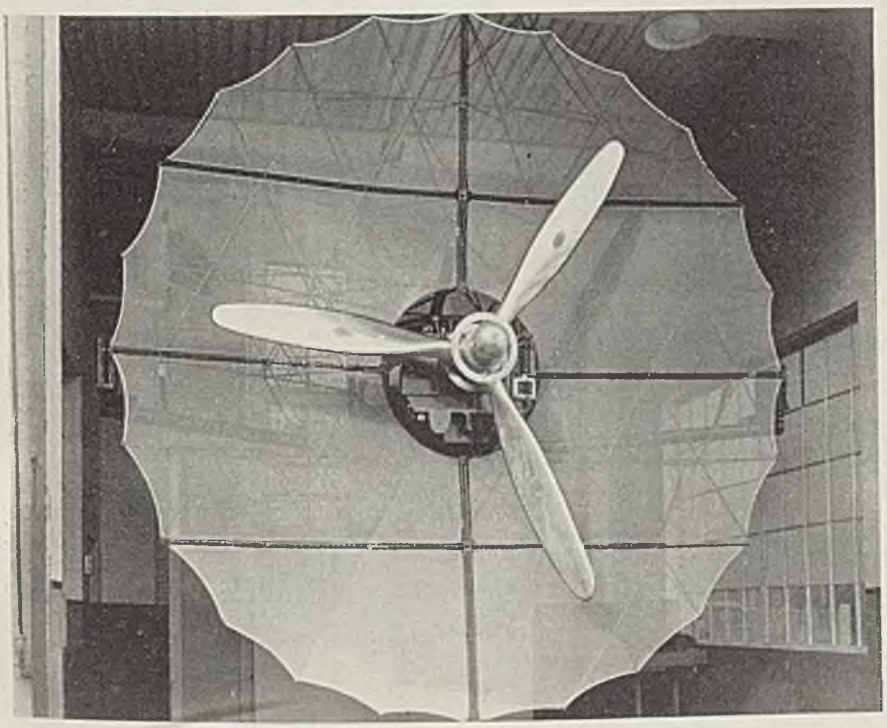
Under a general preference order issued several weeks ago, consumers whose orders fell into preference rating classes from B-2 to B-8 could obtain quantities of the metal ranging from a high of 80 per cent to a low of 10 per cent of average 1940 shipments from the same producers for corresponding purposes.

The following table shows how the percentages are increased for consumers of low-grade aluminum. Left column shows the percentages provided in the general preference order, which remains in effect for all classes of aluminum except low-grade, and the right column shows the new percentages which apply for the low-grade metal:

Rating	General Order (per cent)	Order for Low-Grade (per cent)
B-2	80	100
B-3	70	100
B-4	60	90
B-5	50	80
B-6	40	70
B-7	30	60
B-8	10	50

Low-grade aluminum is defined as any copper-type of aluminum alloy reduced from scrap containing at most 87 per cent of aluminum, the remaining constituents of said alloy being composed of at least 6.5 per cent copper and 1.5 per cent zinc, or if the remaining constituents do not contain 1.5 per cent zinc, they shall contain at least 1 per cent of either nickel, manganese, tin, lead or bismuth, or at least 1 per cent of a combination of these metals.

Steel Screen Aids in Balancing Warplane Propellers



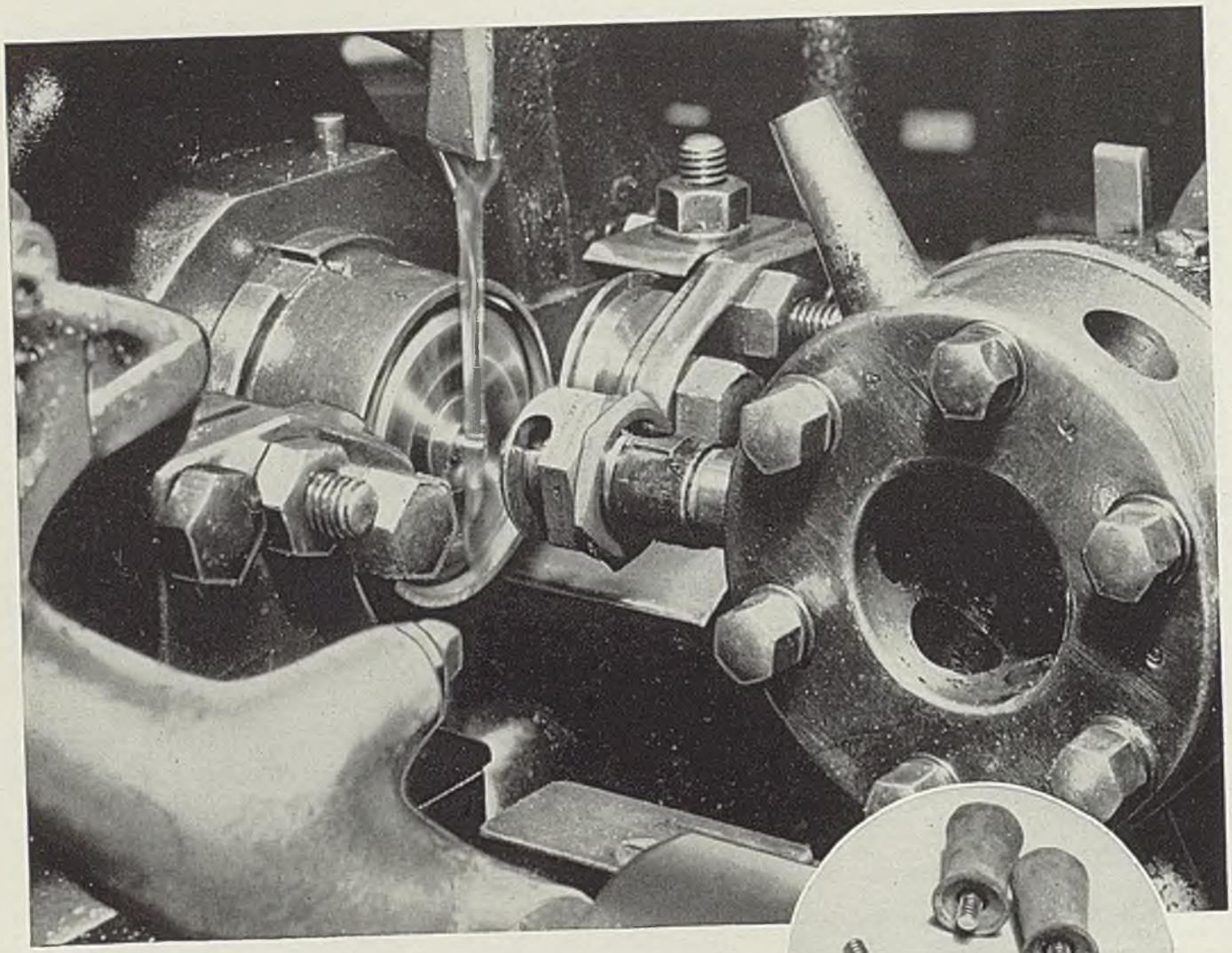
■ This "spider web" disk of steel wire mesh is used to measure any possible lack of aerodynamic balance caused by variations-in-pitch between the several blades of the propeller mounted in front of it. Minute variations from imperfect balance causes the disk to flutter about its fixed axis. Flutterings, transmitted to electrical instruments, can be expressed as readings of the amount and angularity of the propeller's unbalance. Aeronautical Chamber of Commerce photo

Sayres Suggests Methods To Conserve Manganese

Five suggestions by which the steel industry might conserve considerable quantities of manganese, strategic metal for which this country is primarily dependent upon foreign supplies, were offered last week by Dr. R. R. Sayres, director, Bureau of Mines.

Dr. Sayres' suggestions for conserving supplies:

1. Economy in the use of manganese by making certain that the steel does not contain more manganese than necessary for the purpose for which it is used.
2. Substitution of alloys containing less manganese for those containing more—for example, the substitution of spiegeleisen for ferromanganese. Ores suitable for the former type of product are relatively more abundant in the United States.
3. Substitution of other deoxidizing agents such as zirconium and titanium.
4. Substitution of other agents for modifying properties such as nickel and chromium.
5. Use of furnace procedures designed to yield a high-residual manganese metal at the end of the heat and thus make possible smaller additions of manganese alloy.



"Have Used 'Acorns' for
20 YEARS!"

SO said a big manufacturer when he gave us these pictures of dental polisher parts. We figure 20 years' loyalty to "*Acorn*" Dies is pretty significant. It is recognition of the leadership established by "*Acorn*" Dies in the field of fast, accurate threading on automatic machinery. This particular job is cutting 1-72 M.S. threads and by using "*Acorn*" Dies at 2420 R.P.M., he turns out 900 per hour. The average production runs well over 10,000 parts per "*Acorn*" die.

Working with this manufacturer for many years has enabled us to meet his changing requirements with a minimum of disruption to his production schedules.

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Mirrors of MOTORDOM

By A. H. ALLEN
Detroit Editor, STEEL

Nickel steels off list, car builders turn to reduction of amount required in electroplating, requiring extra copper and more buffing . . . Plastics suffer from wide temperature ranges to which they are subjected . . . Relaxing on aluminum restrictions brightens outlook for motor makers . . . 6-6 high-speed steels for tools seen as promising new developments

DETROIT

■ PRIORITIES on nickel-bearing steels suggest the automobile industry may as well scratch nickel from its list of essential materials for 1942 model production. While there have been few, if any, changes made because of these regulations up to now, engineering departments are preparing for the worst. In some cases, actual substitutions in specifications have been forwarded to suppliers, but so far shipments continue to be on the established basis.

The problem of devising suitable substitutes for nickel steels in cars is not particularly tough. Chrome-molybdenums can be used for such things as axle shafts, suspension members, etc.; the silchrome steels can be reverted to where nickel valve steels now are in use.

But an important amount of nickel goes into plated finishes for hubcaps, decorative trim, moldings, window reveals and like parts. This plate is usually a three-layer electro-deposit, comprising a base plate of about 0.001-inch of copper, 0.001-inch of nickel and a flash plate of at least 0.000015-inch chromium. Emphasis on glitter and gleam in recent years has meant as much as 4000 square inches or more on some cars, calling for something like 1½ pounds of nickel each.

Present plans call for cutting the thickness of nickel in such plating by about two-thirds, to somewhere around 0.0003-inch, increasing copper proportionately to about 0.0017, with the same flash of chrome. Extra buffing of the copper plate appears to be required because of reduction in the amount of nickel. Complete elimination of the nickel does not seem feasible because of the adverse color effect which the base copper has on the thin chromium outer layer, and further because any pitting or peeling of the chromium bares the copper base plate, not true when a nickel interlayer is used.

If nickel is not to be available even on this reduced scale, the alternative may be elimination of plating altogether, except for the barest essentials. Decorative parts could be painted or changed to colored plastics, but rather than paint attached moldings, it would seem better to leave them off and put contrasting paint right on the body.

Plastic Brittle When Cold

A change to plastics involves several factors which are not generally appreciated. First in importance is the inability of most plastics to stand up under wide temperature sweeps which automobiles undergo in North American climates—from 50 below zero to 130 above. Plastics become brittle in the below-zero range, and have unequal expansion characteristics when compared with metals, making their attachment difficult. Further, they cannot be repaired (straightened or bent) like some metal pieces.

One of the "big three" motor companies several years ago imported some hubcaps of molded acrylic plastic from one of its associate companies in England. The caps were beautiful things, resplendent in color and with snap-on lugs nicely molded into their edges. They were put on some cars around Detroit and seemed to be very distinctive. It was during the winter and after a particularly severe cold snap the plastic hubcaps met their demise, cracking around the edges and dropping off.

Use of molded plastics in carburetor bodies has been suggested, in fact experimented with, but here again the excessive temperature range to which they are subjected likely will prove troublesome.

Molded plastics, too, are not the easiest materials to machine and thread accurately, if tight fits are expected.

In the aluminum field, the outlook last week brightened for the motor industry, following relaxation by the PSD (Price Stabilization Division) of tonnages released to various industries according to preference ratings. No announcement has been made as to where the auto industry stands in the B series of ratings. Optimists contend it falls under B-4 (standard apparatus, equipment or devices which cannot be redesigned to use substitute materials without serious interruption of current production . . .) while the pessimists are resigned to the B-7 or B-8 categories.

The higher rating now is allotted 90 per cent of average monthly shipments from the same producer for 1940, while the lower are granted 60 and 50 per cent respectively. Easing of aluminum restrictions is encouraging to aluminum piston users, especially when cognizance is taken of large stocks of material now on hand, development of new lower-grade alloys for piston use, and the possibility of appreciably lower car production this fall.

Executives make no bones about anticipating a scaling down of production, at least in private conversations. Their only hope is that it will come about naturally, through

an oversold market, higher taxes and shortages of materials, rather than by arbitrary government edict.

There are dissenters to this belief, of course, such as Don Bathrick of Pontiac who says that stoppage of new car production would freeze cars with their present owners. Then older cars would begin to pass out of existence and, since there would be no new cars coming in to filter down to used car owners, the men who need cars most would be least able to get them. Furthermore, curtailment of motor car production would affect all industries connected with the automobile, which last year employed 6,500,000 persons, or one-seventh of all employed in the U. S.

So you pays your money and you takes your choice. This department will go on record as forecasting at least a 33 per cent slicing of the current level of car output by fall, not figuring in the normal reduction incident to model changeover.

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 22	124,805	103,395
March 29	124,405	103,370
April 5	120,055	101,655
April 12	99,260	101,940
April 19	99,945	103,725

†Comparable week.

Twin-Six High-Speed Steel Shows Possibilities

Motor companies and their parts suppliers constitute probably the largest market for high-speed steel tools in the form of drills, reamers, hobs, milling cutters, broaches and lathe tools; hence are keenly interested in the development of new types of high-speed steel known variously as "twin six," "double six," "6-6 motung," "DBL," according to the producer supplying them.

Essentially, the material is a compromise between the Mo-Max type of high-speed (straight molybdenum) and the familiar 18-4-1 and 18-4-2 types, being denser than the Mo-Max and easier to heat treat in the average small shop, while showing results equal to the 18-4-1 steel at 9½ cents a pound less cost. What was done by the original compounders was to replace 12 per cent of tungsten with 6 per cent molybdenum, to make a steel with 6 molybdenum, 6 tungsten, 4 chromium, 1.5 vanadium and 0.85 per cent carbon, this being the basic type from which there are several variations.

Patents on the basic material are held by Allegheny-Ludlum Steel Co. which has given free license to other tool steel producers to make the analysis. Allegheny-Ludlum calls its steel DBL, initials being taken from the names of DeVries, Breeler and Lounsberry, metallurgists who had a hand in cooking up initial batches. Royalty-free licenses are being exercised by several tool steel suppliers, including Braeburn, Latrobe, Crucible, Universal and Vanadium Alloys. Latrobe appears to have been doing the most active promotion of the material so far.

Ford Motor Co. took delivery of 10,000 pounds of forging billets of this steel for experimental purposes in connection with car manufacturing operations. Recently, when tungsten restrictions became more acute, it was decided to reconsign all this material to the aircraft engine plant for use in production tools.

Now the question seems to be: Will there be enough tungsten available even for this 6 per cent steel, to permit its use in nondefense work. Out of the welter of conflicting rumors it is difficult to sift any answer, but for the moment tool steel companies are being allotted fairly good supplies from the heavy shipment of tungsten lately arrived into this country.

Beauty of the double-six high speed steel is that it can be hardened without resort to salt baths or atmosphere-controlled furnaces, both scaling and decarburizing being limited well below what is experienced with straight-molybdenum high-speeds. Base price is 57½ cents a pound, comparing with 54 cents for Mo-Max and 67 cents for 18-4-1.

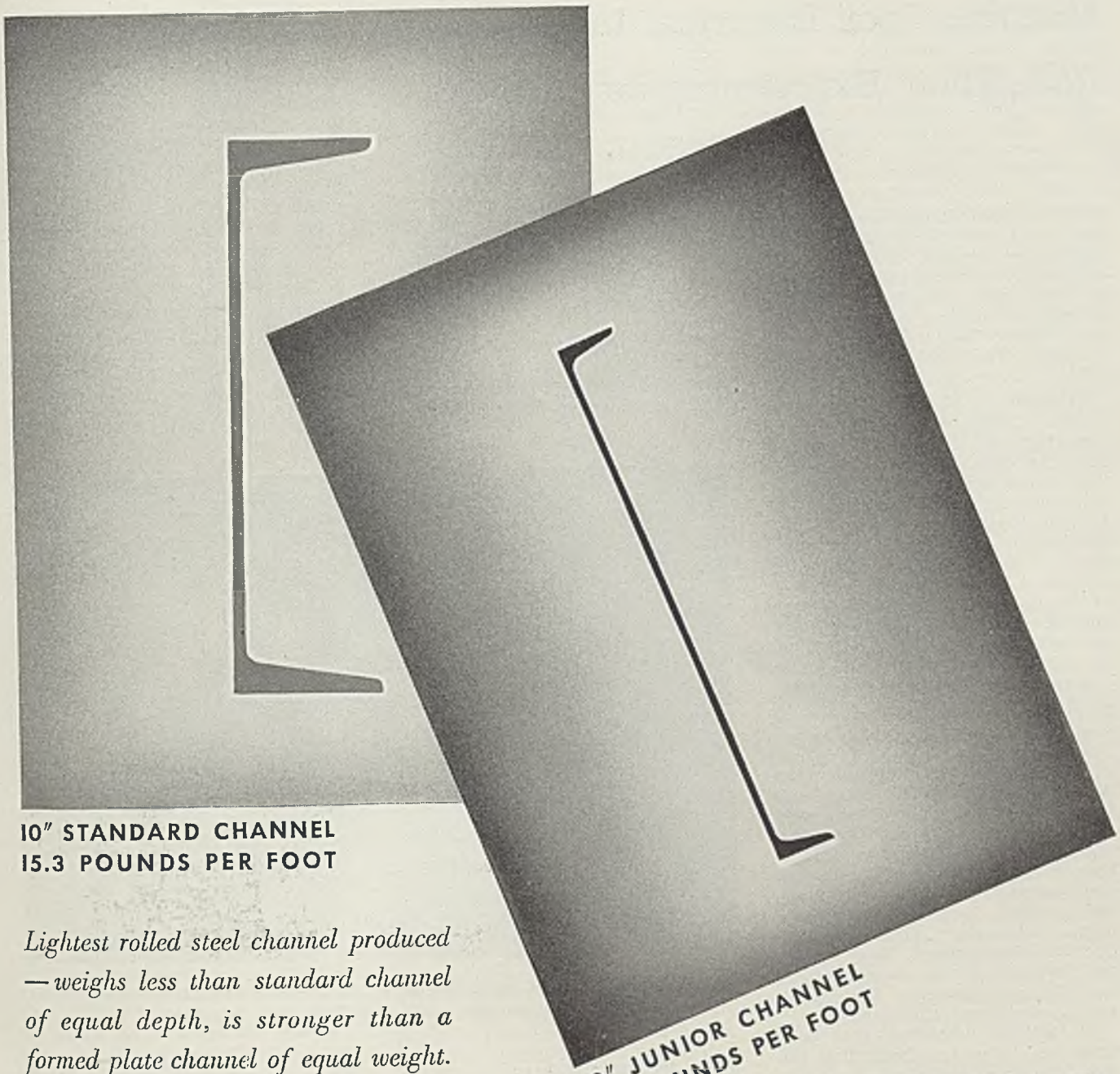
■ Official start of the Great Lakes package freight season for 1941 was marked with the departure from Detroit of the CRESCENT CITY with a cargo of De Soto automobiles for Cleveland. Waiting to be warped alongside the dock for loading is the GRAHAM C. WOODRUFF, also an auto carrier

Experiment with Cast Rings In Cylinder Bores

Metallurgical interest attaches to experiments being made by Ford engineers with "austenitic rings" in the top section of cylinder walls. Particularly in truck engines, the the concentration of heat at the top inch of the cylinder bore has been found to have a destructive effect on liners, so it was decided to try shrinking in place a cast alloy iron ring, with about ⅛-inch wall thickness and 1 inch depth, to provide heat, corrosion and wear resistance.

Various analyses of rings have been tried, including Ni-resist, high-chrome iron, copper-manganese alloy and others. It is essential that the material be austenitic in structure, to obtain corrosion resistance, secure fit and avoidance of any

(*Please turn to Page* 42)



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15.3 POUNDS PER FOOT

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Machine Tool, Electrical Industries Pool Their Experiences for Defense

By GUY HUBBARD

Machine Tool Editor

■ MECHANICAL engineers, including specialists in hydraulic and pneumatic devices, and electrical engineers, including specialists both in drive and control, work more closely in harmony in the machine tool industry now than in any other branch of the industrial machinery field.

This state of affairs is exemplified by the Westinghouse Machine Tool Electrification Forum. Operating on the principle of "Mahomet coming to the Mountain," this annual electrical-mechanical meeting has for the sixth time drawn to the great electrical works at East Pittsburgh, Pa., a large delegation of important engineers and executives of leading machine tool building and allied companies. Record attendance was chalked up April 14-16 with at least 125 individuals representing 80 companies registered.

Emphasis on Defense Speed-Up

As is true of practically all noteworthy engineering conferences these critical days, the Forum was concerned primarily with speeding up and improving defense production. Urgency of the situation was emphasized by the presence of Howard Dunbar, technical chief, machine tool section, Office of Production Management, Washington, and by Tell Berna, general manager, National Machine Tool Builders' Association, Cleveland.

In informal addresses, both bore down heavily on the theme that the machine tool industry — already geared far beyond any speed believed possible a few months ago— is but one important element in the powerful American production machine upon which democracies of the world now pin their hopes. Both emphasized how co-operative efforts by the machine tool and electrical industries toward standardization and simplification already were bearing fruit in more rapid deliveries of machines of key importance in defense industries.

Concrete example was given in the case of a new 40-foot vertical boring mill now in operation in the Westinghouse plant, which was studied in operation by the forum visitors. Through application of electrical drive and control, described in detail by G. A. Spohn, General Machinery Corp., Hamilton, O., the mechanical design of this huge machine tool was simplified to such an extent it was delivered and put into operation months ahead of the time it would have been had conventional engineering methods of past years been followed.

For instance, two balanced motors drive the table through direct gear connections which do away with complicated shaft drives of older designs and keep the entire drive mechanism out of the way in compact cases under the table below the floor level. In similar manner, tool controls are concentrated in compact cases integral with the tool carriages.

Important by-product of this electrified design is the concentration of all controls at pushbutton stations at strategic operating positions. This is of great importance on a machine of such great size. What it means to design and build one of these machine tools was emphasized by the statement this one represented 20,000 engineering hours and 40,000 shop hours.

Mr. Spohn also went into detail on recent developments in special machine tools for turning, boring and rifling big guns—prefacing this with remarks about theory and practice of gun design. It is significant the latest gun lathes are capable of handling 20-inch guns and have overall length of 200 feet.

In keeping with the pleas of Messrs. Dunbar and Berna for standardization and simplification was the paper by R. H. Clark, electrical engineer, Warner & Swasey Co., Cleveland, on "Standardization of Electrical Apparatus Installation."

Mr. Clark described his company's new system of machine tool electrification giving: Lower labor cost; possibility of bench assembly of the electrical apparatus; possibility of installation of electrical assemblies at any point of manufacture after bed is set up for final mechanical assembly; use of interchangeable, standardized parts to permit "farming out" of the electrical work if necessary; fitting this system to about 90 per cent of the electrical apparatus regularly specified by customers; and making it possible to provide complete wiring and installation facilities on machines so that the purchaser can readily install his own apparatus.

As a result of this program the same force of electricians now wire one-third more machines than formerly; production in the mechanical assembly department has been increased greatly because electricians no longer tie up the machines; purchaser can mount his own equipment easily and quickly; appearance and rigidity of the electrical installations are much improved; and accessibility for maintenance is far greater.

Another representative of the machine tool industry who dealt directly with electrification was S. G.

■ R. S. Kersh, chairman, opens session of 1941 Machine Tool Electrification Forum, held at Westinghouse works, East Pittsburgh, Pa., April 14-16

Leonard, electrical engineer, Fellows Gear Shaper Co., Springfield, Vt. Mr. Leonard traced progressive electrification of gear generating machinery from motorized belt-driven machines with simple electrical apparatus "hung-on" to modern designs in which electrical drive and control is a part of the basic conception and is entirely "built-in."

He used a diagram to illustrate a series of cycle controls which, through modern control boxes, allow all settings to be made merely by setting selector switches. Mr. Leonard urged machine tool electrical engineers to have this thought always in mind: "What can happen, *will* happen." If electrical applications are made and circuits designed in line with that thought, reliable and successful operations of the resulting highly electrified machine tools is assured.

In keeping with policy of the Forum to give due consideration to methods other than electrical which tie into modern machine tool design, attention was given also to mechanical devices for attaining infinitely variable speed. The speaker, H. G. Keller, P. V. I. division engineer, Link-Belt Co., Philadelphia, dealt with mechanisms of friction disc type; ratchet or interrupted motion type; flat belt type; differential type; and adjustable conical pulley type; with emphasis on the last mentioned type having chain drive with positively gripping elements.

Increase Older Machines' Efficiency

Mr. Keller stressed the important role these transmissions—in conjunction with electrical drive—can play in modernizing older machine tools perforce employed in meeting the present production crisis. By making it possible for the operator to select quickly and easily speed exactly suited to the machining operation, efficiency of these older machines is largely increased.

"However," said Mr. Keller, "application of any kind of variable speed transmission must not be thought of as a magic process through which the impossible will be achieved. There are premiums to be paid and limitations to be recognized. It is necessary to pay for power consumed by the variable speed unit itself, averaging 10 per cent of the motive force under maximum conditions. Nor can the variable units be expected to be quite as long-lived as a simple transmission. High speed reversal should be avoided, and where absolute accuracy of speed is necessary, the variable transmissions should not be considered as substitutes for conventional gear boxes."

Bearing in mind that the primary object of any machine tool, however powerful and complicated it may be, is to bring tools and work into controlled contact for productive machinery, the subject of the tiny cutting points was dealt with seriously at this 1941 forum. The speaker was Philip M. McKenna, McKenna Metals Co., Latrobe, Pa. Mr. McKenna spoke primarily of recent improvements in cemented carbide tools which make them practical on interrupted cuts and in the cutting of steel ranging in tensile strength from 60,000 to 270,000 pounds per square inch.

Intermetallic Compound Used

Successful tools for this service, as described by Mr. McKenna, are made of an intermetallic compound, tungsten-titanium carbide. Compositions of this material with binders of carburized tungsten and cobalt are cemented in vacuum electric furnaces and have compressive strength up to 690,000 pounds per square inch. They have fine-grain surfaces which do not adhere to the hot chips generated when cutting steel, a condition resulting heretofore in the undesirable "built-up" edge.

"Machine tool manufacturers must now recognize that greater power must be had at the point of the tool," he said. "This can best be attained through increased speed, thereby not exceeding the reasonable ability of a machine to hold the work and feed the tools. After all, this business of machining today means converting electric power into piles of chips in the least possible time."

Another paper slightly off the beaten path of electrification was that presented by Dr. H. B. Osborn Jr., Ohio Crankshaft Co., Cleveland, on recent developments in induction heating to localized surface hardening of machine and other parts. This paper was very much in order, presenting as it did a new field for electricity in production shops, in metallurgical improvement of parts of machine tools and parts made on machine tools, and in speeding up heat treatment of these parts, in the interest of national defense.

In listening to talks presented by members of the electrical industry, papers such as those by A. H. Heywood, T. C. Fockler, C. B. Stainback, J. B. Weaver, R. S. Kersh, G. A. Caldwell, O. G. Rutemiller, and others of the Westinghouse organization for example, the writer who has attended all of the forums since their founding in 1936, is strongly impressed by two things.

One is the complete passage from the scene of the generation of electrical men who considered the machine tool industry as a small but terribly tough nut, not worth cracking.

The other is that there also has vanished from the scene that generation of machine tool designers which had been steeped in traditions of individual plant waterwheels and steam power drives, of line shafting, countershafts, belt-shippers, multi-step cone pulleys and tangled jungles of belts.

Gone forever are the days when electrical engineering theory and electrical apparatus were viewed with superstitious distrust by the machine tool industry.

Gone forever are the days when electrical men, equally bigoted and uninformed as to the practical phases of machine tool engineering, neglected those rugged individualists known as machine tool builders.

It was a major event in the development of the American system of manufacturing when the machine tool and electrical industries finally got to understand each other and joined forces. Had that not come about as and when it did, the national defense program would not hold forth the hope for perpetuation of democracy that it actually does present today.

Ten Days from Ore Mine To Finished Steel

■ First ore cargo to be received at Cleveland this season was converted into finished steel at Republic Steel Corp.'s Warren, O., plant within ten days after it had left the Tobin mine in northern Michigan.

The ore started to leave the mine April 1 and shipment to Escanaba, Mich., was completed April 4. At Escanaba it was loaded on the MARQUETTE and arrived in Cleveland April 9, and shipped to Warren by train the same day. At Warren it was unloaded and charged into the blast furnace on April 10. Pig iron was tapped April 11 at 6 a. m.

At 9 a. m. work began on charging heat No. 36604 in the open hearth. By noon 100 tons of scrap had been charged and started to melt and 128 tons of the Tobin molten iron was charged by 6 p. m. The heat was tapped at midnight and pouring of the steel into ingot completed at 1:15 a.m. on April 12. Ingots were charged into the soaking pits 45 minutes later, and two hours after that, were rolled into flats which were taken immediately to the strip mill and rolled into strip. Upon cooling it was shipped to fill national defense orders.

Joins Gear Association

■ Michigan Tool Co., Detroit, producers of Cone-Drive area contact worm gearing, gear cutting tools, and gear finishing, lapping and checking equipment, has been elected to membership in the American Gear Manufacturers' Association.

Week's Defense Awards $107,926,621; Navy Total 30% Greater Than Army's

■ DEFENSE awards last week reported by the War and Navy departments totaled $107,926,621. Aggregate of navy contracts was about 30 per cent greater than the Army's total for the week. Following awards were reported during the week by the War department:

Jack & Heintz Inc., Cleveland, $396,021 Defense Plant Corp. contract under which machinery and equipment will be leased to contractor for manufacture of electric aircraft starters. Approved by OPM.

Martin, Glenn L., Co., Baltimore, construction and equipping one separate complete plant and six additions to existing plant at Middle River, Md., $24,275,034. Estimated $15,145,195 will be required for construction. Facilities provided by this emergency plant facilities contract to be principally for construction of heavy bombers. Approved by OPM.

Ordnance Department Awards

Abel, Robert, Inc., Boston, electric hoists, $1110.

Acme Steel Co. Inc., New York, connectors, $1260.

Aluminum Co. of America, Pittsburgh, aluminum, $101,902.61.

American Car & Foundry Co., Berwick, Pa., turrets, $4740.

Bendix Aviation Corp., Eclipse Aviation Division, Bendix, N. J., tank parts, $12,660.20.

Bohn Aluminum & Brass Corp., Detroit, funnels, $3756.

Brown & Sharpe Mfg. Co., Providence, R. I., calipers, gages and parallels, $6208.32.

Building Maintenance Corp., Milwaukee, lighting system, $1595.

Carnegie-Illinois Steel Corp., South Chicago, Ill., steel, $4101.50.

Carrier Corp., Syracuse, N. Y., drying units, $2196.

Christiansen, C. B., Newark, N. J., holders, $1530.

Cleveland Tractor Co., Cleveland, tractor parts, $16,168.45.

Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., small arms materiel, $2121.

Columbia Tool Steel Co., Chicago Heights, Ill., steel, $3115.48.

Continental Motors Corp., Muskegon, Mich., parts, $2040.30.

Dana Tool-D Nast Machinery Co., Cincinnati, shapers, $3115.

Daniels, C. R., Inc., New York, breech covers, $10,120.

Diamond T Motor Car Co., Chicago, parts, $18,098.33.

Eagle Grinding Wheel Co., Chicago, grinding points, $1309.98.

Federal Products Corp., Chicago, gages, $1078.50.

Firth-Sterling Steel Co., McKeesport, Pa., carbide blanks, steel, $3707.06.

Fox Munitions, Philadelphia, gages, $10,186.

General Cable Corp., St. Louis, cable, $1057.98.

General Railway Signal Co., Rochester, N. Y., artillery materiel, $38,360.

Gibson, M., Co., Bellevue, Iowa, drive pin punches, $1176.

Gould & Eberhardt, Irvington, N. J., shapers, $5136.

Great Lakes Steel Corp., Ecorse, Detroit, Mich., steel, $6552.06.

Hayes Pump & Machinery Co., Allentown, Pa., pumps and motors, $1135.

Hickman, Williams & Co., St. Louis, iron, $1247.

Jones & Laughlin Steel Corp., Pittsburgh, carbon steel, $1913.03.

LaSalle Steel Co., Hammond, Ind., carbon steel, $4711.88.

Latrobe Electric Steel Co., Latrobe, Pa., steel, $10,321.22.

Lawson, E. P., Co. Inc., Dayton, O., precision machines, $2070.

Lincoln Tool & Gage Co., Lincoln Park, Mich., gages, $1977.95.

Magnus Tool & Die Co., Newark, N. J., punches, $50,369.

Manning, Maxwell & Moore Inc., Buffalo, N. Y., drill presses, $2740.

Mercury Mfg. Co., Chicago, electric trucks, $3554.44.

Mesta Machine Co., Pittsburgh, barbette carriages (acceptance of letter of intent) $8,211,800.

National Machine Works, Philadelphia, boring bars, $1262.05.

Niles-Bement-Pond Co., West Hartford, Conn., gages, taps, $127,729.40.

Norton Co., Worcester, Mass., grinding wheels, $2520.

Ohio Seamless Tube Co., Shelby, O., tubing, $1868.65.

Oliver-Barth Jack Co., Milwaukee, jacks, $2034.45.

Reliable Tool Co., Irvington, N. J., punches, $31,950.

Ryerson, Joseph T., & Son Inc., Chicago, steel, $3909.30.

Scully-Jones & Co., Chicago, tap chucks, $1539.

Seamless Products Co., New York, oil cans, $14,072.50.

Sieg Co., Davenport, Iowa, chain hoists, $4061.

Sipp-Eastwood Corp., Paterson, N. J., fixtures, wrenches, $4851.

Standard Tool & Mfg. Co., Arlington, N. J., dial indexing mechanisms, $2531.

Sterling Products Co. Inc., Moline, Ill., extractors, $1198.92.

Stokes, F. J., Machine Co., Philadelphia, presses, $54,340.

Stromberg Time Corp., Philadelphia, time recorders, $1340.

Taft-Peirce Mfg. Co., Woonsocket, R. I., micrometer plug gages, $12,614.40.

Talon Inc., Meadville, Pa., gages, $3,257.71.

Threadwell Tap & Die Co., Greenfield, Mass., tools, $1000.

Timken-Detroit Axle Co., Detroit, gun parts, $1762.90; Wisconsin Axle Division, Oshkosh, Wis., parts, $16,244.10.

Tungsten Electric Corp., Union City, N. J., tools, $1724.64.

Uehtorff Co., Davenport, Iowa, trays, $1116.

Union Mfg. Co., New Britain, Conn., chucks, $1074.60.

United Drill & Tool Corp., Detroit, drills, $1694.82.

Van Praag Sales Co., New York, furnace parts, $1656.25.

Vascoloy-Ramet Corp., North Chicago, Ill., tools, $1994.40.

Vinco Tool Co., Detroit, gages, $5452.

Weldon Tool Co., Cleveland, cutters, $6050.

Youngstown Sheet & Tube Co., Struthers, O., nails, $2152.80.

Zimmerman Steel Co., Bettendorf, Iowa, steel castings, $2418.84.

Quartermaster Corps Awards

Anchor Post Fence Co., Baltimore, construction of boundary fence, Atlanta general depot, Georgia, $24,577.

Dawson Engineering Co., Charleston, S. C., construction of cold storage room, Ft. Moultrie, South Carolina, $7584.

Equitable Equipment Co. Inc., New Orleans, armor plating, $8458.

Espy Paving & Construction Co., Savannah, Ga., storm sewers, sanitary sewerage system, water pumping plant, water distribution system, $299,500.

Eure Bros., Beaufort, N. C., construction, temporary infirmary, Nansemond ordnance depot, Virginia, $9950.

Farnell, A. Blair, Decatur, Ga., construction of 14 warehouses at Atlanta general depot, Georgia, $4,271,084.

Helstrom, John, Astoria, Oreg., construction of heating plants, Ft. Stevens, Oregon, $37,989.

Jannsen, N. C., Drilling Co., Seattle, deep well pump and horizontal booster pump, Ft. Lewis, Washington, $4653.

McKee, Robert E., Los Angeles, construction, outside continental limits United States, $242,700.

Nash Kelvinator Corp., Detroit, trailers, $1,029,915.

Otis Elevator Co., New York, construction, outside continental limits United States, $156,873.

Schuler & MacDonald, Oakland, Calif., construction of barracks and warehouses, Ft. Baker, California, $28,375.

Medical Corps Awards

Acme Shear Co., Bridgeport, Conn., scissors, $11,400.

General Electric X-ray Corp., Chicago, machines, $41,150.

Haslam, Fred, & Co. Inc., Brooklyn, N. Y., forceps, $13,130.

Kny-Scheerer Corp., New York, forceps, $2320.70.

Langbein, William, & Bros., Brooklyn, N. Y., forceps, surgical instruments, $18,413.10.

Onan, D. W., & Sons, Minneapolis, portable generators, $38,884.50.

Oneida Ltd., Sherrill, N. Y., forceps, $30,165.50.

Ritter Dental Mfg. Co. Inc., Rochester, N. Y., chairs, $91,911.

Schnefel Bros. Corp., Newark, N. J., forceps, $3000.

Superior Sleeprite Corp., Chicago, hospital beds, $87,000.

Air Corps Awards

Bendix Aviation Corp., Eclipse Aviation Division, Bendix, N. J., assemblies, $221,064; Pioneer Instrument Division, Bendix, N. J., maintenance parts, $1,339,888.86.

Crosley Corp., Cincinnati, bolts and brackets, $78,204.

Electric Auto-Lite Co., La Crosse, Wis., gage assemblies, $123,807.90.

Goodyear Tire & Rubber Co. Inc., Akron, O., brake assemblies, $113,173.70.

Gosiger, C. H., Machinery Co., Dayton, O., drill presses, $53,116.

Ingersoll-Rand Co., Cincinnati, air compressors, $84,660.

Lindberg Engineering Co., Chicago, heat treating furnaces, $58,470.

Manning, Maxwell & Moore Inc., Bridgeport, Conn., gage assemblies, $50,071.65.

Robinson, C. S., Ithaca, N. Y., camera mounts, $168,112.

Wright Aeronautical Corp., Paterson, N. J., maintenance parts, $695,197.48.

Corps of Engineers Awards

Albert & Davidson Pipe Corp., Brackenridge, Pa., pipe, $7719.75.

Buda Co., Harvey, Ill., earth augers, $89,$96.80.

Caterpillar Tractor Co., Peoria, Ill., generating sets, $5835.40.

Chicago Pneumatic Tool Co., New York, pneumatic sump pumps, $19,930.

Chicago Pump Co., Chicago, pumps and motors for pumping stations, North Little Rock, Ark., $3606.

Cincinnati Lathe & Tool Co., Oakley, Cincinnati, engine lathes, $8202.

Cleveland Pneumatic Tool Co., Cleveland, pneumatic tampers, $9000.

Cleveland Trencher Co., Cleveland, trench digger, $5475.

County Supply Co., Greenfield, Mass., drills, $14,512.25.

Darby Corp., Kansas City, Kans., steel water tank, Phoenix Military airport,

Arizona, steel water tank, Las Vegas airport, Nevada, $110,574.
Douthitt Corp., Detroit, photographic equipment, $2879.52.
Dowzer Construction Co., Houston, Tex., electric distribution system, Ellington field, Texas, $91,000.
Electric Arc Inc., Newark, N. J., arc welders, $2190.
Fairbanks, Morse & Co., St. Louis, pumps and motors for pumping stations, North Little Rock, Ark., $19,222.
Federal Pipe & Supply Co., Youngstown, O., galvanized pipe, $5299.
G. & O. Mfg. Co., New Haven, Conn., cooling units, $4633.04.
Gayle Bros., Houston, Tex., sewage treatment plant, Ellington field, Texas, $84,347.18.
General Electric Co., Schenectady, N. Y., generators and auxiliaries, Bonneville powerhouse, Bonneville, Oreg., $2,858,300; power plant equipment, electrical equipment, $29,203.40.
Graybar Electric Co. Inc., Economy, Pa., cable, $6241.95.
Harris Seybold Potter Co., Cleveland, presses, $80,600.
Harrold, J. D., Duluth, warehouse, garage, dwelling, U. S. Vessel Yard, Duluth, $56,995.
Honeycutt, A. J., Co. Inc., Birmingham, Ala., temporary housing, Drew field, Tampa, Fla., $37,357.
Independent Pneumatic Tool Co., Aurora, Ill., pneumatic tools and drills, $36,177.20.
Ingersoll-Rand Co., New York, pneumatic circular saws, grinders and vibrators, air compressors, $51,182.75.
Kinnear Mfg. Co., Columbus, O., steel doors, $2324.
Lanston Monotype Machine Co., Philadelphia, cameras, $28,198.50.
Layne-Texas Co., Houston, Tex., Ellington field, Texas, water well and chlorine dispensing units, and water supply pressure system, $50,350.
Meili-Blumberg Corp., New Holstein, Wis., trailers, $27,920.
National-Standard Co., Charles Wagner Litho Machinery Co. Division, Hoboken, N. J., off-set press, $5000.
O. K. Clutch & Machinery Co., Columbia, Pa., hoists, $4689.
Outboard, Marine & Mfg. Co., Johnson Motors Division, Waukegan, Ill., outboard motors, $52,656.33.
Paving Supply & Equipment Co., Mansfield, O., rail driving machines, $8977.
Rogers Bros. Corp., Albion, Pa., trailers, $5525.
Sperry Gyroscope Co. Inc., Brooklyn, N. Y., scales, $15,616.
Stettler, Ernest, & Sons Construction Co., Logan, Utah, construct sewer and water systems, Wendover bombing range, Utah, $77,465.80.
Swind Machinery Co., Cincinnati, power shapers, heavy duty drills, $6068.
Tampa Gas Co., Tampa, Fla., gas line, Drew field, Tampa, Fla., $25,000.
Vallas, Lionel, Chicago, doors, $3893.07.
Webb, Del E., Construction Co., Phoenix, Ariz., temporary buildings, Phoenix military airport, Arizona, $1,110,334.95.
Western Hardware & Specialty Mfg. Co., Milwaukee, bench grinders, $5886.13.
Woodcock, O. P., Jacksonville, Fla., hangar and boiler house, Jacksonville municipal airport, Florida, $110,200.

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Navy department awarded the following contracts:

Busch-Sulzer Bros., Diesel Engine Co., St. Louis, ordnance equipment, $5,911,829.
Cooper-Bessemer Corp., Mt. Vernon, O., propelling machinery for 15 motor minesweepers at unit price of $124,000; total cost, $1,860,000. Also for 14 minesweepers at unit cost of $269,000; total, $3,766,000.
Ford Instrument Co. Inc., Long Island City, N. Y., ordnance equipment, $5,522,715.
General Machinery Corp., Hamilton, O., $1,499,000 for acquisition, construction and installation of additional plant facilities. Hooven, Owens, Rentschler Co., a subsidiary of General Machinery Corp., will operate the facilities in manufacture of propelling machinery.
General Motors Corp., Detroit, ordnance equipment, $13,076,049.
Nordberg Mfg. Co., Milwaukee, ordnance equipment, $11,998,776.
United Aircraft Corp., Hamilton Standard Propellers Division, East Hartford, Conn., $1,035,400 maximum for construction, acquisition and installation of additional plant facilities and equipment at the East Hartford and Pawcatuck, Conn., plants.
Willamette Iron & Steel Corp., Portland, Oreg., supplemental $542,000 Defense Plant Corp. contract for shipbuilding facilities' expansion.

Bureau of Yards and Docks Awards

American Chain Link Fence Co., Medford, Mass., nonclimbable fence and protective lighting at navy yard, Portsmouth, N. H., $35,000.
Hamilton Mfg. Co., Two Rivers, Wis., metal hospital furniture for naval medical center, Washington, $109,690.
Nelson-Pedley Inc., Philadelphia, navy yard storehouse at Philadelphia; total estimated cost on a cost plus fixed fee basis, $720,000.
St. Louis Fire Door Co., Everett, Mass., hoistway doors at navy yard, Boston, $4443.

Still Complete

■ With this issue STEEL discontinues publication of the awards under the Walsh-Healey act, as announced by the Public Contracts Board of the Department of Labor. Careful check reveals that the awards publicized by the board in nearly all cases have been announced by the War and Navy Departments. STEEL thus avoids this duplication, conserving time of its readers.—The Editors.

Bureau of Supplies and Accounts Awards

Adams, S. G., Co., St. Louis, galvanized paint pots, $7740.
Allis-Chalmers Mfg. Co., Milwaukee, synchronous motor-generator sets, $49,854.
American Brass Co., Waterbury, Conn., copper-nickel alloy tubing, $112,427.54.
American Chain & Cable Co. Inc., American Cable Division, Wilkes-Barre, Pa., target towing hawsers, $64,645.60.
American-LaFrance-Foamite Corp., Elmira, N. Y., parts for fire extinguisher, $21,839.75.
American Rolling Mill Co., Middletown, O., flat, black sheet steel, $32,000.
American Tool Works Co., Cincinnati, heavy duty drills, $23,390.
Anaconda Wire & Cable Co., New York, general interior communication, triple conductor cable, $31,028; multi-conductor cable, $278,700.
Axelson Mfg. Co., Los Angeles, heavy-duty engine lathes, $5604.20.
Baker-Raulang Co., Cleveland, bomb skids, $25,667.50.
Baldt Anchor, Chain & Forge Co., Chester, Pa., navy type and stockless steel anchors, chain, $67,839.
Bendix Aviation Corp., Pioneer Instrument Division, Bendix, N. J., manifold pressure aircraft gages, $5800; Eclipse Aviation Division, Bendix, N. J., aircraft starters, $1,290,993.80.
Bernz, Otto, Co. Inc., Rochester, N. Y., gasoline fire pots, $5603.70.
Bethlehem Steel Co., Bethlehem, Pa., shield for 16-inch plates, Slide Mk. VI, complete in all respects and special tools, $21,717.40.
Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., hydraulic press, $8690.
Blackburn-Smith Mfg. Co. Inc., Hoboken, N. J., steel or composition strainers, $5956.
Bliss, E. W., Co., Brooklyn, N. Y., machines for reforming fired cartridge cases, $27,450.
Bostitch Inc., East Greenwich, R. I., paper fastening machines, $11,700.
Bowser, S. F., & Co. Inc., Ft. Wayne, Ind., gasoline meters, with flow integrator and indicator, $8608.42.
Burke Electric Co., Erie, Pa., ballasters, $9425.
Camillus Cutlery Co., New York, jackknives, $27,853.20.
Carlton Machine Tool Co., Cincinnati, drilling machine, $6062.
Chisholm-Moore Hoist Corp., Tonawanda, N. Y., parts for modification of bomb hoists, $8712.30.
Cincinnati Milling Machine & Cincinnati Grinders Inc., Cincinnati, cylindrical grinding machines, $15,966.
Collyer Insulated Wire Co., Pawtucket, R. I., multi-conductor cable, $40,260.
Consolidated Machine Tool Corp., Rochester, N. Y., heavy duty, vertical, boring and turning mills, $2,249,970.
Consolidated Supply Co., Portland, Oreg., iron pipe, $268,350.71.
Eagle-Picher Sales Co., Cincinnati, dry white lead, $21,600.
Eastman Kodak Co., Rochester, N. Y., adapters for telescopes, $20,350.
Electric Products Co., Cleveland, welding control panels, $57,000.
Fritz, George J., Foundry & Machine Co., St. Louis, cast iron plates, $40,289.34.
General Cable Corp., New York, cable, $1,541,700.
General Electric Co., Schenectady, N. Y., rheostat units and spare parts, electric cable, welding machines, $222,310.50.
General Motors Corp., Cleveland Diesel Engine Division, parts for model 16-248 engine, $29,627.75; Harrison Radiator Division, Lockport, N. Y., oil coolers, $20,764.29.
Haffner-Thrall Car Co., Chicago, railway steel cars, $14,880.
Heil Co., Milwaukee, portable gasoline pumping units and drum suction hose, $103,970.
Holley Carburetor Co., Detroit, carburetors, $5568.
Hooven, Owens, Rentschler Co., Hamilton, O., spare parts for main generator diesel engine, $23,534.63.
International Machine Tool Corp., Indianapolis, turret lathes, $23,945.
Keuffel & Esser Co., Hoboken, N. J., drawing instruments, $8906.25.
Kreamer, A., Inc., Brooklyn, N. Y., copper measures, $10,184.90.
Lehmann Machine Co., St. Louis, motor-driven lathes, $8670.
Leland-Gifford Co., Worcester, Mass., drilling machines, $16,470.
Leonard, Ward, Electric Co., Mt. Vernon, N. Y., rheostat unit and spare parts, $67,223.40.
Leslie Co., Lyndhurst, N. J., steam whistles, $5870.
Levene Motor Co., Philadelphia, direct current ammeters; parts for distributors; ignition switches, $5011.95.
Mercer Tube & Mfg. Co., Sharon, Pa., welded or seamless steel pipe, $78,754.02.
National Electric Products Corp., Pittsburgh, electric cable, $679,455.
Niles-Bement-Pond Co., Pratt & Whitney Division, West Hartford, Conn., vertical miller and profiler machines, $9200.
Northill Co. Inc., Glendale, Calif., steel cast or forged galvanized anchors, $12,209.22.
Okonite Co., Passiac, N. J., cable $230,684.80.
Oliver Instrument Co., Adrian, Mich., grinders, $6655.75.
Penn Tool Co., Philadelphia, drive-pin center punches, $8878.14.
Phelps Dodge Copper Products Corp.,

Habirshaw Cable & Wire division, New York, electric cable, $2,400,160.
Prentiss, Henry, & Co. Inc., New York, boring, drilling and milling machines, $9116.
Reichhold Chemicals Inc., Ferndale, Detroit, chrome zinc, $7957.50.
Reid, L. F., Philadelphia, valve reseating outfit services, $5198.
Remington Arms Co. Inc. Bridgeport, Conn., case percussion primers, $40,854.72.
Russell Electric Co., Chicago, electric glue pots, $6838.70.
Schroeder Bros. Mfg. Co., Torrington, Conn., hacksaw frames, $7270.50
Selas Co., Philadelphia, standard, gasoline-fired heaters, $6590.
Singer Sewing Machine Co., New York, sewing machines, $16,980.
Steuart Motor Co., Washington, automobiles, $21,664.82.
Thorrez & Maes Mfg. Co., Jackson, Mich., steel bodies, $12,765.
Ulmer, Theo. C., Inc., Philadelphia, steel sockets for Morse taper shank tools, $17,364.13.
U. S. Brass Turning Co. Inc., New York, brass oil syringes, $8192.83.
Viking Instruments Inc., Stamford, Conn., contact makers, $17,718.
Waltham Watch Co., Waltham, Mass., aircraft clocks, $90,000.
Weinman Pump Mfg. Co., Columbus, O., circulating pumps, $5600.80.
Wheeler, C. H., Mfg. Co., Philadelphia, airplane crane hoisting and rotating machinery, $366,150.
White Sewing Machine Co., Cleveland, sewing machines, $8265.95.
William & Wells Co., New York, distributors; ignition switches; ignition terminals, $14,058.42.
Worthington Pump & Machinery Corp., Harrison, N. J., centrifugal pumps, motor driven, complete with motor and controller, spare parts, tools and wrenches, $62,285.
Yellow Truck and Coach Mfg. Co., Pontiac, Mich., motor trucks, $11,675.52.

Canadian War Orders in Week Total $6,608,957

TORONTO, ONT.

■ Department of Munitions and Supply, for the week ended April 4, placed 1939 contracts with total value of $6,608,957, including orders placed with United States companies valued at $22,781. Awards:

Capital expenditure: General Engineering Co. Ltd., Toronto, $281,250; Clark Ruse Aircraft Ltd., Halifax, N. S., $925,751; British Aeroplane Engines Ltd., Montreal, $10,000; Canadian Car & Foundry Co. Ltd., Montreal, $7100; Dominion Rubber Co. Ltd., Montreal, $163,470; MacDonald Bros. Aircraft Ltd., St. James, Man., $48,171; Mid-west Aircraft Ltd., Winnipeg, Man., $6040.

Munitions: Accessories Mfrs. Ltd., Montreal, $7854.

Ordnance: Dominion Tire & Rubber Goods Co. Ltd., Toronto, $54,650; Sorel Industries Ltd., Sorel, Que., $233,280.

Electrical equipment: Northern Electric Co. Ltd., Ottawa, $14,350.

Aircraft: DeHavilland Aircraft Co. of Canada, Toronto, $9513; Air Ministry, England, $16,535; Canadian Pratt & Whitney Aircraft Co. Ltd., Longueuil, Que., $81,135; MacKenzie Air Service, Edmonton, Alta., $6872.

Land transport: Chrysler Motor Corp., Windsor, $5137.

Instruments: Ontario Hughes-Owens Co. Ltd., Ottawa, $128,752.

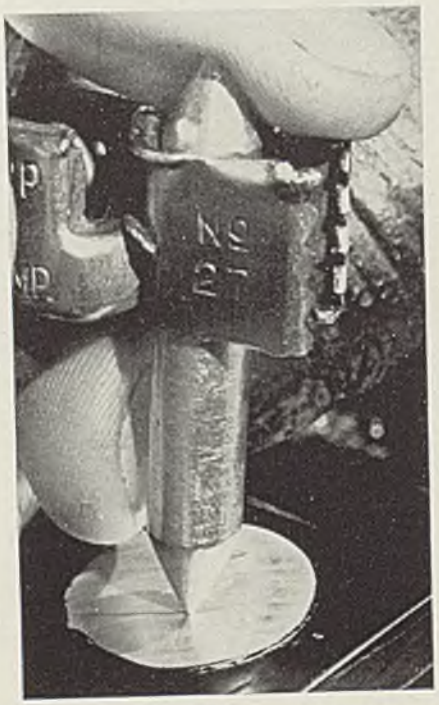
Machinery: Dominion Engineering Co. Ltd., Montreal, $20,470; T. E. Ryder Machinery Co., Montreal, $16,980.

Shipbuilding: J. H. LeBlanc Shipbuilding Co., Weymouth, N. S., $170,000; Grand Trunk Pacific Development Co., Montreal, $1,320,00; Armstrong Bros., Victoria, B. C., $104,050.

Miscellaneous: Duro Aluminum Ltd., Hamilton, $22,050; Beatty Bros. Ltd., Fergus, Ont., $33,227; Hayes Steel Products Ltd., Merritton, $6253; Morrow Screw & Nut Co. Ltd., Ingersoll, $5178; Walter Kidde & Co. of Canada Ltd., Montreal, $115,768; Horton Steel Works Ltd., Toronto, $9000.

Wires Only 1/2000-Inch Diameter Spot Welded

■ Nickel-chromium wires 1/2000 of an inch in diameter—one-quarter the thickness of a human hair—are being spot welded together at



General Electric Co. laboratory, Schenectady, N. Y., into tiny filaments for sensitive thermocouples to measure high-frequency, alternating currents or voltage. Each filament consists of three pieces of wire welded into a K-shape. Filament itself is then spot welded to the posts of the thermocouple stem. So detailed is the work that the operator must use a magnifying glass to see the wire and a pair of small tweezers to hold it.

Another recent advance is pulsation welding which enables temperature to be equalized across an assembly of 199 plates of 1/32-inch steel, making a satisfactory weld.

Rebuild Duquesne Stack

■ Carnegie-Illinois Steel Corp., Pittsburgh, has awarded contract to H. A. Brassert Co., Chicago, for rebuilding No. 4 blast furnace at Carnegie's Duquesne, Pa., works. Now operating, the stack has been in blast continuously since early in 1939. It was last relined in 1929 and last rebuilt in 1919.

Mirrors of Motordom

(Concluded from Page 36)

growth resulting from the repeated heating and cooling. Similar inserted rings are understood to have been tried in Italy and England in years past. Whether Ford is planning to use them in place of hardened sheet steel liners is not known as yet. A large amount of press and furnace equipment has been installed for processing liners, although Ford has not released any technical details or photographs.

Chrysler Dealers Buy First Tank as Gift to Army

Thursday of this week will see the debut of the first M-3 medium tank from the Chrysler arsenal here. It will be fully equipped with armor and guns and will be put through a series of combat maneuvers before being turned over to Maj. Gen. C. M. Wesson, chief of ordnance. The first unit was largely hand-built, being one of two pilot jobs. Mass production on the vehicles is expected to start by early fall. Only 900 of an eventual 10,000 men are now working at the plant.

Interestingly, the first tank was purchased by a group of Chrysler dealers and distributors (cost around $33,000) who wished to present it to the army as a token of their interest in defense work.

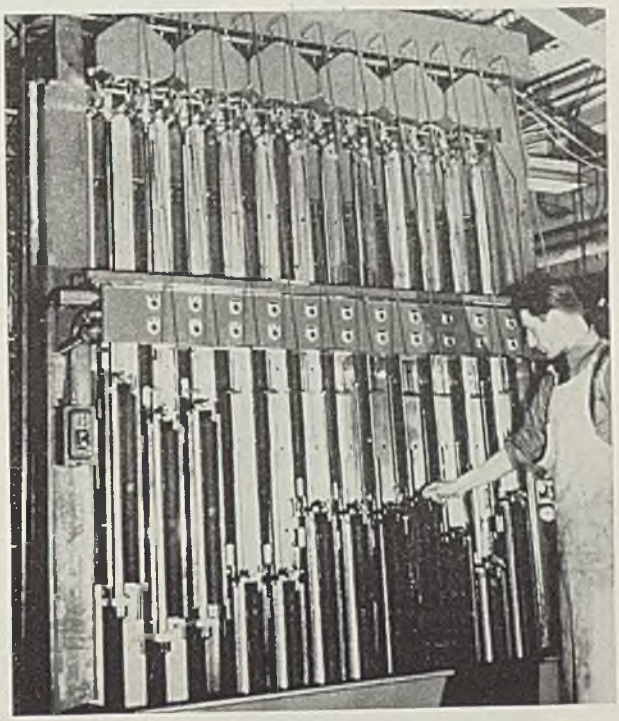
At the Chrysler stockholders meeting last week, K. T. Keller, president, announced the corporation is tooling up for production of a 40-millimeter antiaircraft gun for the navy, understood to be the Swedish Bofors gun which will be made complete except for barrels, shipments being consigned to Canada. Mr. Keller noted his engineers also are working on designs for a new type of airplane landing gear, and are making rapid progress in building samples of a new 2000-horsepower aircraft engine.

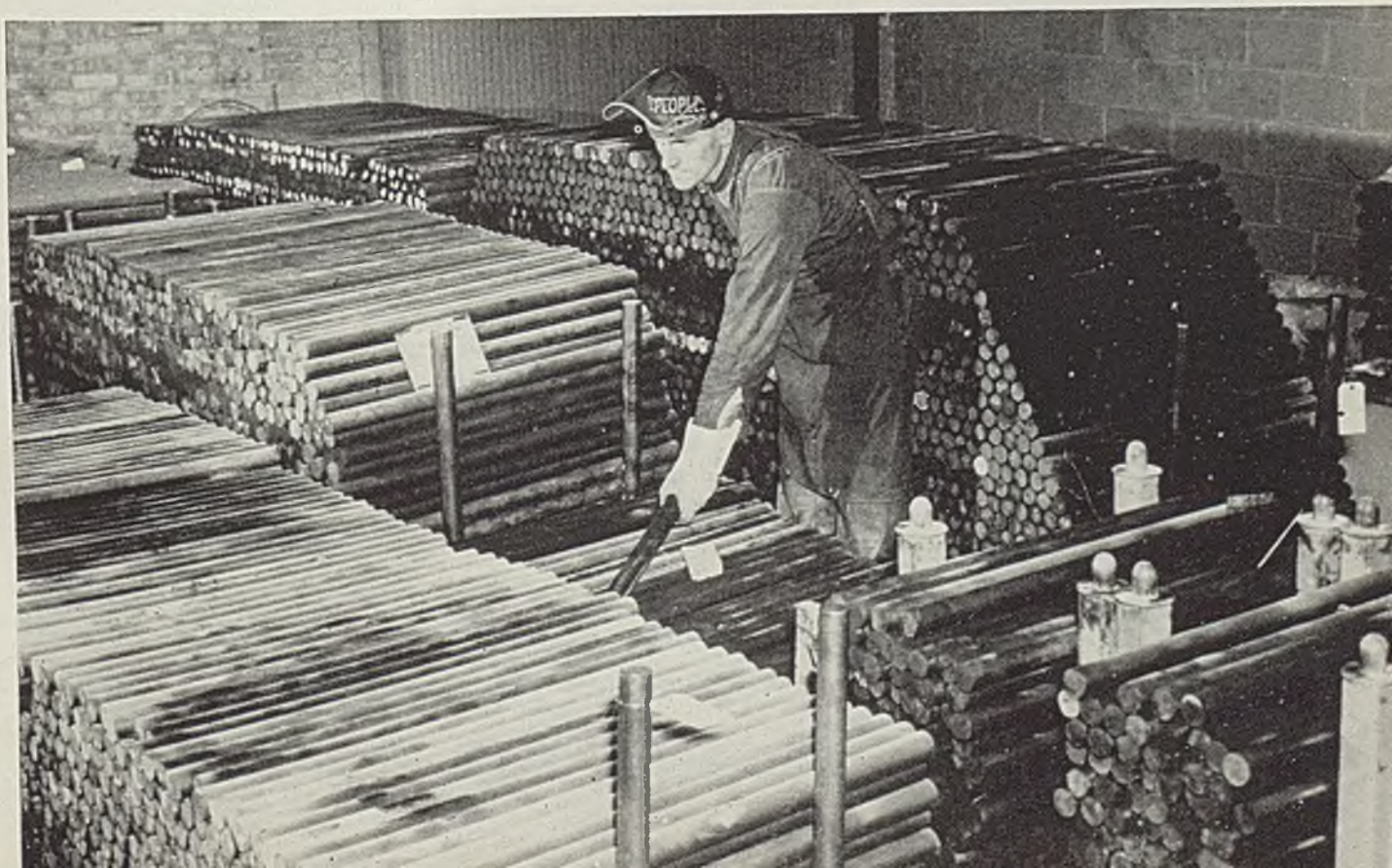
What Did Strikers Win?

With the Ford strike settled pending a labor board election among employes, the question is asked: What did the union win by its two-week shutdown of Ford operations? Only two important victories can be ascertained—first, demonstration of its ability to close what was considered to be a near-impregnable plant; and second, opportunity to sign up thousands of new members before the election. This last is of vital significance, and is probably the chief reason for the strike. Idle employes are easy meat for organizers and membership recruiting agents. The brief strike probably will prove to be just enough to swing the balance of voting in favor of the UAW-CIO.

Start Machine Gun Production Before Plant Is Completed

■ Months ahead of contract schedule, General Motors Corp. is producing 0.30-caliber and 0.50-caliber machine guns for which it has orders aggregating $61,000,000. In a new five-acre plant at the Saginaw Steering Gear Division, Saginaw, Mich., men and machines are at work in one end of the plant, upper left, while at the other end, upper right, construction work still is in progress. At right, a worker in the new Frigidaire Division plant, Dayton, O., operates a multiple 12-barrel reaming machine. Below are shown stocks of steel rounds, machine gun barrels "in the raw." In addition to the Saginaw and Dayton plants, GM will build machine guns at a converted AC Spark Plug Division at Flint, Mich., and a converted Brown-Lipe-Chapin plant of the Guide Lamp Division at Syracuse, N. Y.





MEN of INDUSTRY

Forest S. Baster

Robert Cass

O. F. Quartullo

Frank W. Curtis
Recently elected president, American Society of Tool Engineers; STEEL, March 31, page 22

■ **FOREST S. BASTER** has been elected vice president in charge of engineering, White Motor Co., Cleveland. A graduate of Case School of Applied Science, Cleveland, Mr. Baster joined the Packard Motor Car Co., Detroit, in 1919, subsequently becoming associated with Lycoming Mfg. Co., Williamsport, Pa., as chief engineer. He joined White Motor in 1936, becoming chief engineer a year later.

Robert Cass, heretofore executive engineer, succeeds Mr. Baster as chief engineer. A native of London, England, Mr. Cass has been associated with White Motor since 1926.

O. F. Quartullo, who has been special design engineer, has been named chief engineer of the White Horse division of the company.

♦

Harry L. Horton has become affiliated with Differential Wheel Corp., Detroit, as sales executive and a member of the board of directors.

♦

W. K. Ebel, chief engineer, Glenn L. Martin Co., Baltimore, has been elected vice president in charge of engineering, and also a director.

♦

E. E. Richards has joined Studebaker Corp., South Bend, Ind., as assistant to president. The past 13 years he has been a member of the industrial department, Lehman Bros., Chicago, investment bankers.

♦

Harry J. Scheidt has joined the engineering department of Northern Equipment Co., Erie, Pa. On completing the factory training course he will be assigned to duty as a service engineer.

♦

H. M. Rowlette, purchasing agent, Whiting Corp., Harvey, Ill., has been elected president, Purchasing Agents Association of Chicago. **Roy F. Stiles,** purchasing agent, Stewart-Warner Corp., has been named first vice president, and **M. J. Hartigan,** purchasing agent, Joseph T. Ryerson & Son Inc., second vice president. **H. L. Brueggemann,** purchasing agent, Acme Steel Co., retiring president, has been named national director.

♦

William Smila, formerly master mechanic, Jefferson plant of Chrysler Corp., Detroit, has been named master mechanic, Plymouth division. He succeeds **Otto W. Franke,** who has been transferred to the Dodge division as general master mechanic.

♦

Walter Brown, of Huntington, W. Va., has been elected a director, Western Electric Co. Inc., New York. Since June, 1940, Mr. Brown has been vice president and general counsel, Henry L. Doherty & Co., which position he will resign April 30.

Charles J. Whipple, president, Hibbard, Spencer, Bartlett & Co., Chicago, has also been elected a director of Western Electric.

♦

J. E. Skinner has been placed in charge of welding wire sales, as assistant to **W. H. Bleecker,** sales manager, Page Steel & Wire Division, American Chain & Cable Co. Inc., Monessen, Pa., taking over duties of **V. H. Godfrey,** who has been called to duty with the United States navy. **W. G. Hoagland,** of the Chicago office of Page Steel & Wire Division, has been transferred to Monessen, to take over duties previously handled by Mr. Skinner.

♦

Erskine Ramsay was elected chairman of the board, Alabama By-Products Corp., Birmingham, Ala., at the annual stockholders' meeting April 8. Other officers elected were: President, **J. W. Porter;** vice president and treasurer, **H. L. Morrow;** secretary, **J. A. Shook;** assistant secretary and assistant treasurer, **H. M. Cowart.**

The following officers were re-

Harlow Bradley

James E. Bottoms

David Lyle

Joseph Stross

elected for the ensuing year for A B C Coal & Coke Co., a subsidiary of Alabama By-Products: President, **J. W. Porter**; vice presidents, **P. H. Neal** and **P. H. Haskell Jr.**; secretary-treasurer, **H. L. Morrow**; assistant secretary and assistant treasurer, **H. M. Cowart.**

The following officers of Smokeless Fuel Co., another subsidiary, were re-elected: President, **J. W. Porter**; vice-president, **S. B. Murray**; secretary and treasurer, **H. L. Morrow.**

♦

Harlow Bradley, associated with Allis-Chalmers Mfg. Co., Milwaukee, many years, has been appointed supervisor of foreign dealers, with headquarters in Milwaukee. In his new capacity he will promote sales of the company's line of industrial machinery in foreign countries. He joined Allis-Chalmers in 1915 as a graduate student apprentice; five years later was sent to France as sales engineer, and in 1929 became European manager for the company's tractor division. Mr. Bradley returned to the United States in the summer of 1936 and shortly thereafter was assigned to the export division of Allis-Chalmers New York office.

♦

Ralph M. Hoffman, since January, 1940, assistant to the president, Link-Belt Co., Chicago, has been elected a vice president. He will have general direction and supervision of sales for the company. He joined the company in 1923 as manager of Link-Belt Meese & Gottfried Co.'s Seattle branch, serving in that capacity until 1931 when he became vice president and sales manager of Link-Belt Co.'s Pacific division, with headquarters at San Francisco.

♦

David Lyle, mechanical engineer in the sales department of Mesta Machine Co., Pittsburgh, has been assigned new duties as traveling representative in the roll and rolling mill sales division. A graduate of Carnegie Institute of Technology, Mr. Lyle has been with Mesta the greater part of his career.

James E. Bottoms has joined the roll sales division of Mesta. He began his career in the steel industry in 1926 with American Rolling Mill Co. in Ashland, Ky. Later he was transferred to the Butler works where he was made superintendent of cold mills, and subsequently served in a similar capacity for Wheeling Steel Corp. and Jones & Laughlin Steel Corp. He went to England in 1938 to become manager of the hot and cold strip mills of Richard Thomas & Co. Ltd. at Chester.

♦

Joseph Stross has joined Metal Specialty Co., Cincinnati, as purchasing agent. He formerly was buyer for the Crosley Corp., with which firm he was associated 16 years. Prior to that he was purchasing agent, Pollak Steel Co.

♦

Charles J. Stilwell, president, Warner & Swasey Co., Cleveland, has been elected president, Cleveland Chamber of Commerce. **Clifford H. Hood,** president, American Steel & Wire Co., Cleveland, has been elected vice president of the chamber.

♦

Louis J. Borinstein, president, Institute of Scrap Iron and Steel Inc., Washington, this year heads the institute's national defense co-operation committee, which is a successor to the war service committee. **Philip W. Frieder,** Philip W. Frieder Co., Cleveland, is vice chairman.

Other members of the committee are: **Frank B. Gordon,** Harcon Corp., Boston; **Harry S. Grant,** Grant Iron & Metal Co., Detroit; **Nathan H. Jacobs,** Buffalo House Wrecking & Salvage Co., Buffalo; **Ben G. Kaplan,** M. S. Kaplan Co., Chicago; **J. J. Rubenstein,** Alton, Ill.; **Benjamin Schwartz,** Schiavone-Bonomo Corp., Jersey City, N. J.; and **Edward L. Solomon,** Max Solomon Co., Pittsburgh.

♦

Harold G. Beebe has joined the staff of the industrial division of International Resistance Co., Philadelphia. He formerly was sales manager of Isolantile Inc., New York.

♦

Frank A. Ketcham has been re-elected president, Graybar Electric Co. Inc., New York. **Elbert A. Hawkins,** heretofore vice president in charge of sales, has been elected senior vice president, while **Alfred H. Nicoll** has been re-elected vice president.

The following district managers were elected vice presidents: **Walter P. Hoagland,** Chicago; **Walter J. Drury,** New York, and **Alfred L. Hallstrom,** Philadelphia. They will continue their headquarters in those cities.

Elmer W. Shepard was re-elected treasurer, and **Martin E. Wagner** continued as secretary and comptroller.

♦

Charles S. Williams has retired as chairman of the board, Thomas A. Edison Inc., West Orange, N. J., and as an officer and director of various affiliated companies. The position of chairman has been abolished, but **Arthur Walsh,** executive vice president, will succeed to the duties.

Mr. Walsh has also been promoted from executive vice president to the office of president of the following companies: Edison-Splitdorf Corp., Edison Wood Products Inc., Ediphone Co., Edison Storage Battery Supply Co., Thomas A. Edison of Canada Ltd., and Dictating Machine Ediphone Corp.

Responsibilities of **Howard Eckert,** vice president and treasurer, will be increased to cover many of the executive duties formerly handled by Mr. Walsh.

Activities of Steel Users, Makers

■ WRIGHT Aeronautical Corp., Paterson, N. J., has awarded a $1,000,000 plumbing contract to Frank A. McBride Co., Paterson, for sanitary and storm installations at the 50-acre aircraft engine plant now under construction in Cincinnati.

♦

Aeroproducts division of General Motors Corp. will start production in July of airplane propellers for army pursuit planes in a new plant at Dayton, O. Plant construction was started last fall on the plant covering 193,000 square feet floor space. Negotiations are on for doubling this size.

♦

Pratt & Whitney Aircraft division of United Aircraft Corp., East Hartford, Conn., is building an addition covering 500,000 square feet floor space, bringing the plant to 2,000,000 square feet. To make room two large hangars are being moved more than half a mile to a new location. The hangars weigh 1000 tons and 2000 tons, making a difficult moving job.

♦

Hygrade Sylvania Corp., Salem, Mass., manufacturer of fluorescent lamps and lighting units, has purchased a fluorescent powder plant at Towanda, Pa., which formerly was operated as a division of the Patterson Screen Co., Towanda.

♦

Aluminum Industries Inc., Cincinnati, will start operations May 1 at its $800,000 aluminum and magnesium foundry and paint plant, the first unit to be completed in the company's building program, which includes also a large machine shop and office building, all on a 35-acre site. The foundry and paint plant contains 150,000 square feet of floor space, four 50-foot monitor bays and five intermediate 30-foot bays. Estimated capacity of the foundry is 2,235,000 pounds of castings per month.

♦

Hydro-Arc Furnace Corp., Chicago, has booked an order from Saginaw Malleable Iron Division, General Motors Corp., Saginaw, Mich., for a 30-ton per hour hot metal duplexing electric arc furnace. Company also has taken an order from Wehr Steel Co., Milwaukee, for a 3-ton per hour top-charge steel electric melting arc furnace.

♦

Manchester Iron Works Inc. has moved its office and plant to 3235 Sutton avenue, Maplewood, Mo.

♦

Wesson Co., Detroit, has moved its office and plant to 1220 Woodward Heights boulevard, Ferndale, Mich.

♦

Peninsular Steel Co. has opened a new office and warehouse at 401 Kiser street, Dayton, O. L. E. Dallas is manager.

♦

Holland-Rieger Corp., Sandusky, O., a division of Apex Electrical Mfg. Co., Cleveland, has purchased the Sweeper Vac Co., Worcester, Mass., and will remove manufacturing operations and sales offices to Sandusky.

♦

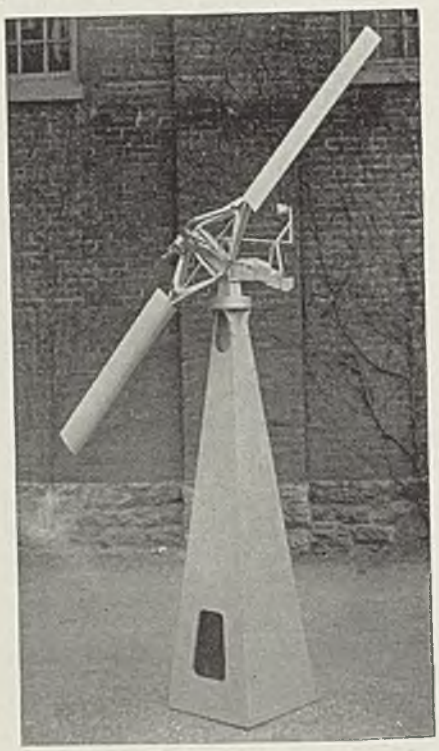
With its new plant in West Pullman, Ill., nearing completion, Ingersoll Steel & Disc Division, Borg-Warner Corp., Chicago, expects to start production in May on the $7,960,000 cartridge case order which it received from the government recently.

Build Giant Windmill For Commercial Power

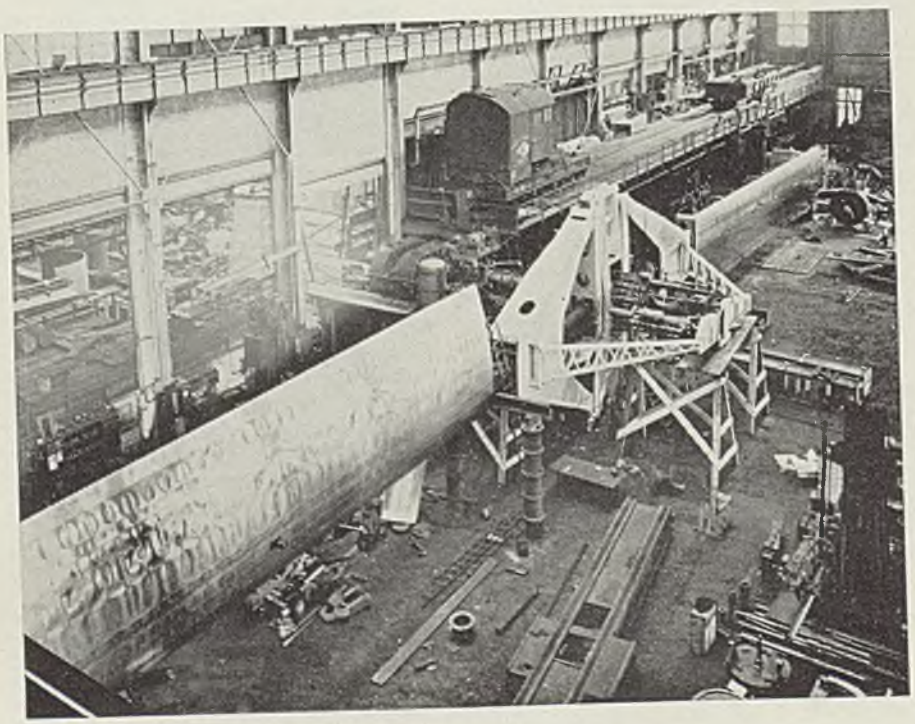
■ An aero-electric generating turbine, designed to test the feasibility of harnessing winds as sources of commercial electric power, is nearing completion in the Green Mountains near Hubbardtown, Vt. An 110-foot steel tower, weighing 125 tons, already has been erected. Atop this will be installed two 8-ton blades, resembling the wings on an army bomber. Parts are being fabricated in the shops of S. Morgan Smith & Co., York, Pa.

Turbine will be ready for trial about July 1. If successful, nearly a score more may be built. The experimental unit will develop 1000 kilowatts of power, sufficient to light ten thousand 100-watt lamps.

The blades are 65½ feet long and 11 feet wide. With framework, they will have a total span of 175 feet. They will have a variable pitch and capacity to pivot back in sudden violent wind gusts. Speed of rotation will be constant with the vane tips traveling about 180 miles an hour. A wind of three to five miles an hour will be sufficient to start the blades.



Accompanying photos show a miniature model of the unit and the two blades in the Smith company's shops.



MEETINGS

Tower, Olds, Desvernine To Address Steel Institute

■ THREE addresses are scheduled for the opening session of the American Iron and Steel Institute's meeting, Waldorf-Astoria, New York, May 22. The speakers are Walter S. Tower, president of the institute; Irving S. Olds, chairman, United States Steel Corp., and R. E. Desvernine, president, Crucible Steel Co. of America.

In the afternoon there will be a technical session under chairmanship of Quincy Bent, vice president, Bethlehem Steel Co. Operating and metallurgical problems will be considered in a panel discussion. A session dealing with industrial relations, under chairmanship of L. H. Burnett, vice president, Carnegie-Illinois Steel Corp. also will be held in the afternoon. Additional details will be announced later.

Defense Conference April 22-23

A management conference on national defense sponsored by the American Society of Mechanical Engineers will be held at Engineers Club, 1317 Spruce street, Philadelphia, April 22-23. Subcontracting, selection and training of men and quality control are scheduled for discussion.

Chamber Features Foreign Trade

Sir Gerald Campbell, British minister to the United States, will speak on "The World Today" at the annual dinner, American section, International Chamber of Commerce, participating in the annual meeting of the Chamber of Commerce of the United States, Washington, April 28-May 1.

Zinc in Defense Program

The place of zinc in national defense will be the keynote of discussions at the annual meeting of the American Zinc Institute, Chase hotel, St. Louis, April 28-29. J. A. Church and D. H. Wallace of the advisory committee to Council of National Defense will speak. Reports will be made on zinc concentrates, slab-zinc production and the condition of the zinc mining industry in this country.

Monthly Tungsten Needs Greater Than in All 1938

■ Monthly consumption of tungsten for tungsten carbide cutting tools in United States is greater today than in entire year 1938, according to W. G. Robbins, president, Carboloy Co. Inc., Detroit. Speaking before the American Society of Tool Engineers at Worcester, Mass., recently, Mr. Robbins declared that while consumption during the defense program will total about 25,000 pounds per month, every pound of the metal used for these tools "frees" about 100 pounds for other purposes.

This saving, he said, is effected through use of tungsten only in the "tip" of such tools. In other forms of tools it is used as an alloying element for the entire unit.

Tremendous expansion in the use of carbide tools for rearmament production increases productivity per man and per machine, reduces number of machines needed, cuts production costs and conserves tungsten as a raw material, added Mr. Robbins.

Aluminum-Frame Tent Houses Research Show

■ General Motors' research exhibit, now traveling through the South, is housed in a collapsible and portable auditorium which itself is attracting considerable attention. Actually it is a huge tent 152 feet long, 80 feet wide and 26 feet high, supported by aluminum ribs. Fabric covering is canvas impregnated with aluminum powder to give it a metallic sheen.

Supporting ribs are made of 61S-T aluminum sheet, extrusions and tubing asssembled by welding. Joints between the ribs are so made that less than 200 bolts are required for complete erection of framework.

Aluminum sheet, extrusions and tubing used in the main framework weigh 17,000 pounds, and 1200 pounds were used for the entrance and auxiliary canopy.

The tent is called the "Aer-o-Dome" and is part of GM's Parade of Progress which will tour the nation. The new show succeeds the one which played to more than 9,500,000 persons in more than 200 cities during the past five years. Exhibit was designed and built under direction of Charles F. Kettering, GM vice president in charge of research.

More Than "Crack-Down" Needed To Build Up National Morale

■ AS THIS is being written, developments in the theaters of war do not look too bright for the democratic belligerents. The disturbing news of April—openly anticipated in London and Washington—has materialized.

These developments bear directly upon the problem of production which has been assumed by the United States. They indicate clearly that the best we can do may not be good enough to prevent disconcerting reverses in the Balkans and elsewhere in the near future.

• • •

President Roosevelt probably will refer to this critical situation in his next progress report to the American people. Perhaps he will use it to emphasize the need of greater speed in all phases of defense effort.

But if the conjectures of well-informed Washington observers are borne out, the President also will take occasion in this forthcoming address, to speak rather pointedly to those who do not seem to be co-operating whole-heartedly in the defense program. It is predicted that he may cite management and labor as being deficient in this respect.

• • •

No reasonable person can object to straight-from-the-shoulder talk at this time. Many persons feel that plain talk, uttered almost any time during the past 30 days, would have helped considerably in bringing home to everybody the seriousness of the present situation. Therefore, if the President chooses to "crack down" his words will be welcomed by a great majority of the people.

However, if criticism must be meted out at this stage of the program, it should be fair criticism. To single out management, or labor, or both, as culprits without taking into account past dilatory action of the government administration would be grossly unfair. Also to accuse labor too severely for its recent stoppages of work would be inconsistent with the government's manifest policy of almost openly encouraging unions in their demands for greater recognition and higher wages.

In short, many of the things for which the President might criticize management and labor grew out of past situations for which government policy was responsible.

• • •

In reality, the time for an effective "crack-down" has passed. Today the emphasis should be directed toward building up morale for the big job ahead. Everybody knows mistakes have been made, but if we could appreciate what will confront us in the next few months, we would not waste time with fault-finding over past blunders.

We have told the world at large that we will be the arsenal of democracies. We must make good at this self-assumed task.

Thus far this nation has "talked" a good war, but it has delivered a very limited amount of material to the battle lines where it can be used.

We are close to the time when deeds alone will count, and when talk will avail little.

E. L. Shaner

EDITOR-IN-CHIEF

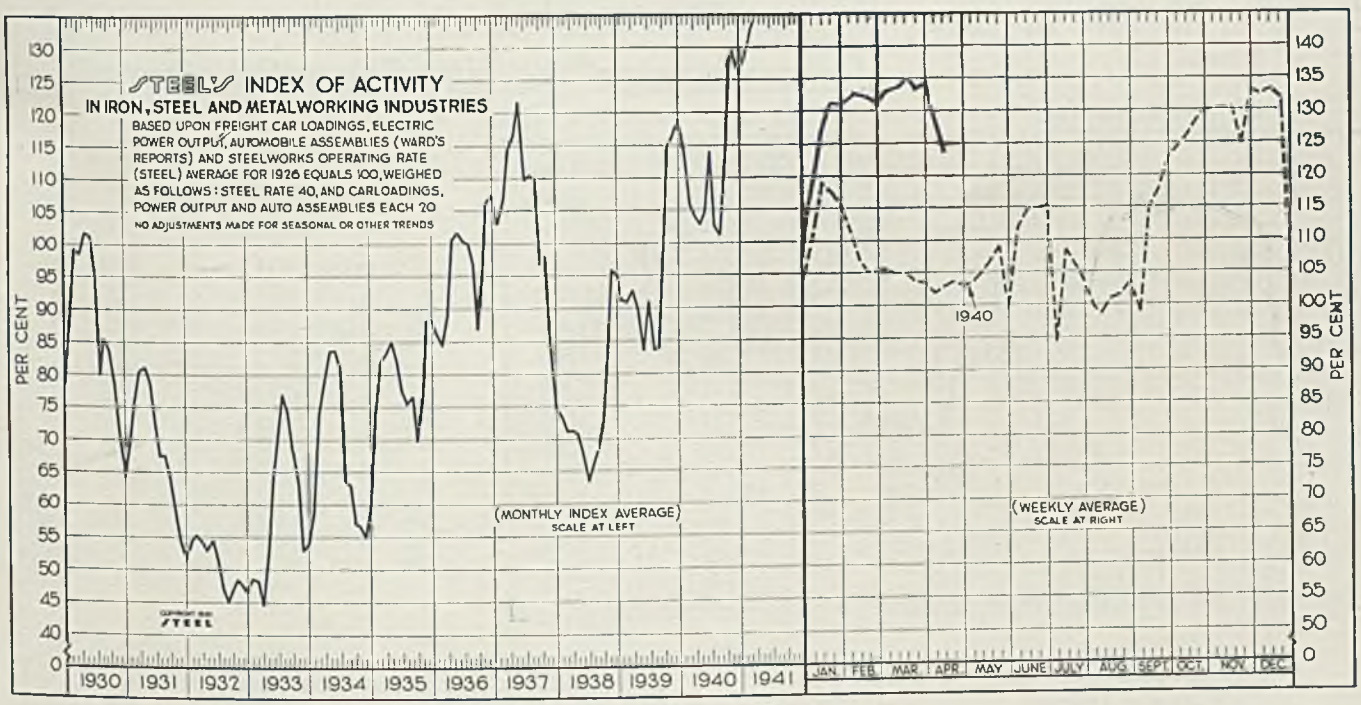
The BUSINESS TREND

Delivery Problems Are Holding Chief Interest

■ THE STEADY inflow of new demand shows no signs of abatement. In some instances, deliveries are extended into early 1942. However, most manufacturers are now limiting new orders to actual needs with the result that extensive forward coverage in some lines has been curtailed. With production sold far ahead in key industries, the delivery problem continues of chief interest.

In many industries further sharp increases in production await only the completion of expansion programs now underway. This is particularly true among the aircraft, machine tool and shipbuilding interests. However, the production curve in these industries and numerous others involved in the defense program has been edging steadily upward.

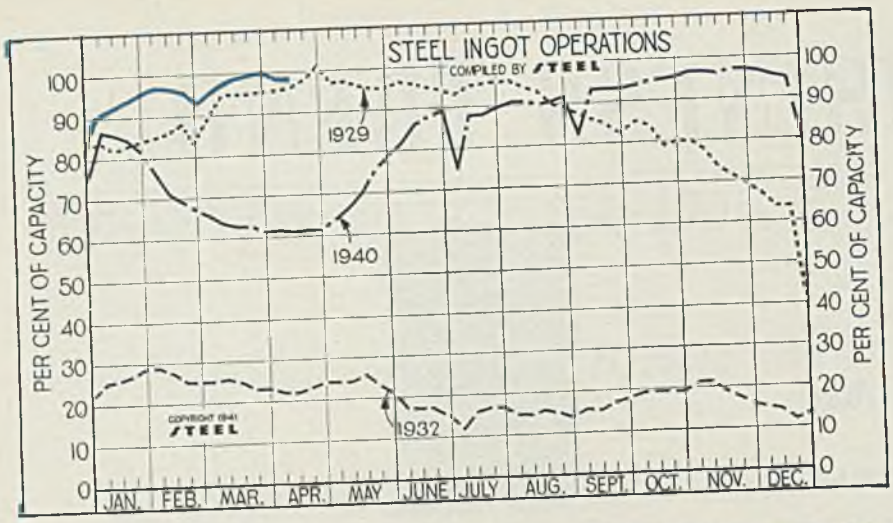
Bituminous coal strike and disruption of activity at the Ford Motor Co. were the main factors in the decline in revenue freight carloadings and automobile production during the week ended April 12. In that period STEEL's index of activity declined 5.1 points to 123.8. At this time a year ago the index stood at 102.7, while in 1937 it was 112.



STEEL'S index of activity declined 5.1 points to 123.8 in the week ended April 12:

Week Ended	1941	1940
Jan. 25	130.7	115.4
Feb. 1	132.0	111.6
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

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	71.9
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

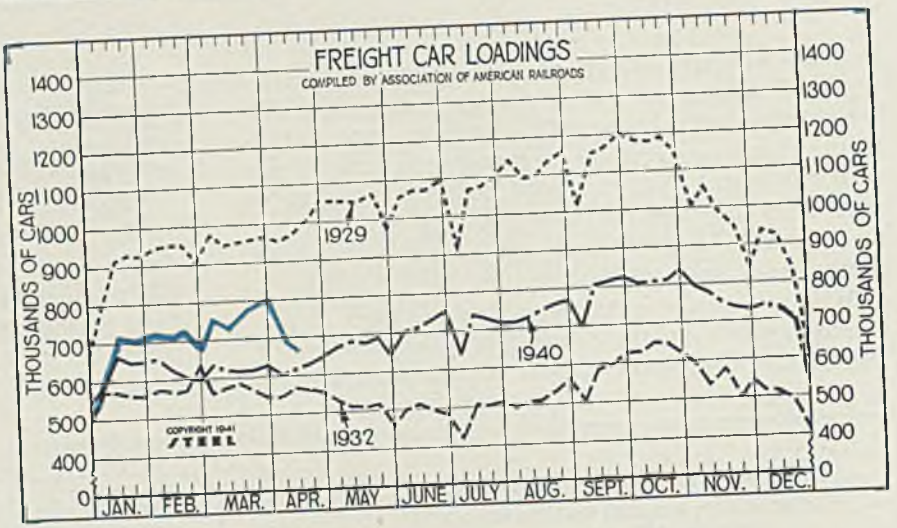
(Per Cent)

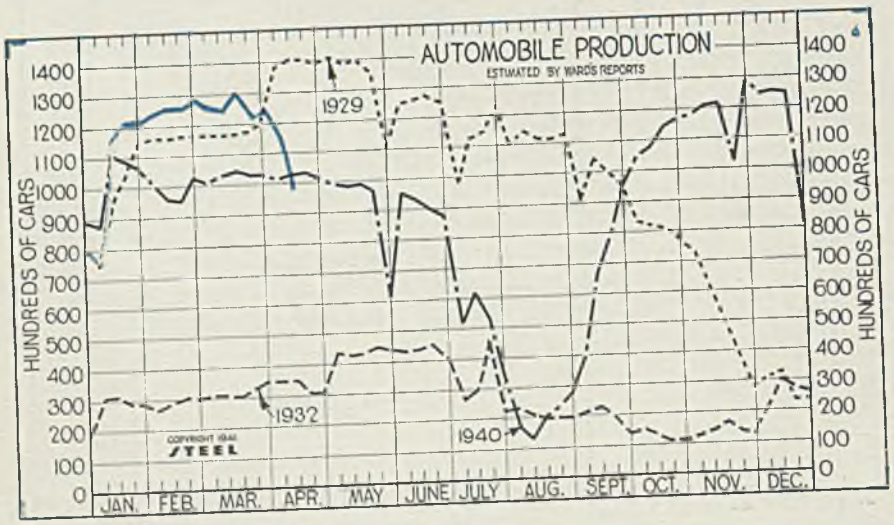
Week ended	1941	1940	1939	1938
April 12...	98.0	61.0	51.5	32.0
April 5 ..	98.0	61.5	53.5	32.0
March 29 ..	99.5	61.0	54.5	36.0
March 22 ..	99.5	62.5	55.5	35.0
March 15 ..	98.5	62.5	56.5	32.0
March 8...	97.5	63.5	56.5	30.0
March 1...	96.5	65.5	56.0	29.5
Feb. 22....	94.5	67.0	55.0	30.5
Feb. 15....	96.5	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
Jan. 4....	92.5	86.5	51.5	26.0

Freight Car Loadings

(1000 Cars)

Week ended	1941	1940	1939	1938
April 12.....	660	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
Jan. 4.....	614	592	531	552





Auto Production

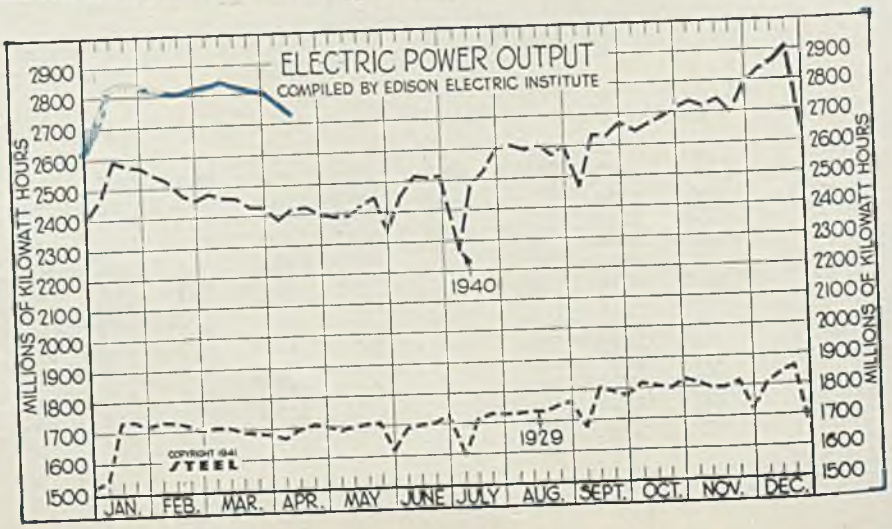
(1000 Units)

Week ended	1941	1940	1939	1938
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
Jan. 4....	76.7	87.5	76.7	54.1

Electric Power Output

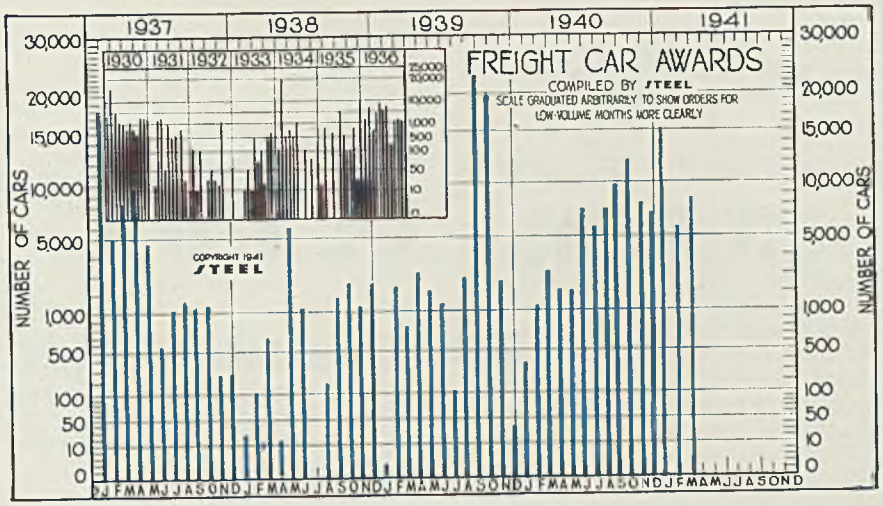
(Million KWH)

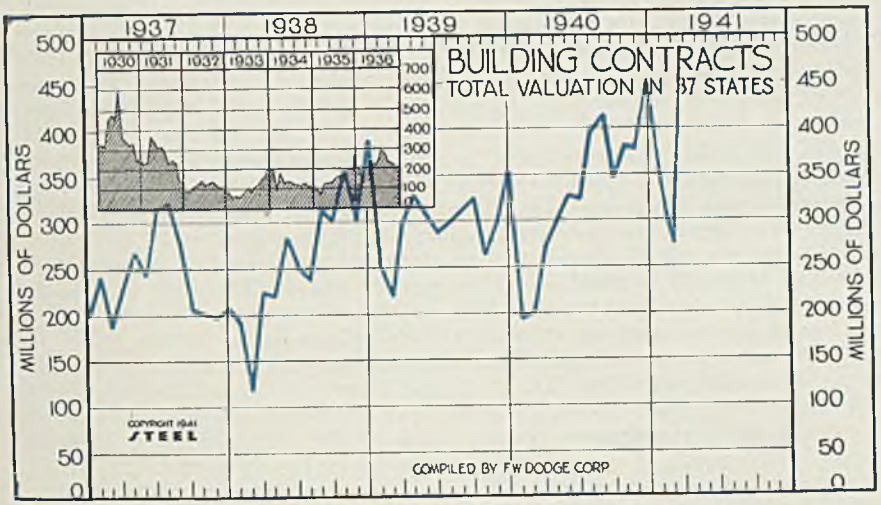
Week ended	1941	1940	1939	1938
April 12..	2,721	2,418	2,171	1,958
April 5 ..	2,779	2,381	2,174	1,990
March 29.	2,802	2,422	2,210	1,979
March 22.	2,809	2,424	2,199	1,975
March 15 .	2,818	2,460	2,225	2,018
March 8..	2,835	2,464	2,238	2,015
March 1..	2,826	2,479	2,244	2,036
Feb. 22...	2,820	2,455	2,226	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
Jan. 4...	2,705	2,473	2,169	2,140



Freight Car Awards

	1941	1940	1939	1938
Jan.	15,169	360	3	25
Feb.	5,508	1,147	2,259	109
March	8,074	3,104	800	680
April	.....	2,077	3,095	15
May	.....	2,010	2,051	6,014
June	.....	7,475	1,324	1,178
July	.....	5,846	110	0
Aug.	.....	7,525	2,814	182
Sept.	.....	9,735	23,000	1,750
Oct.	.....	12,195	19,634	2,537
Nov.	.....	8,234	2,650	1,232
Dec.	.....	7,181	35	2,581
Total	.....	66,889	57,775	16,303





Construction Total Valuation In 37 States

(Unit: $1,000,000)

	1941	1940	1939	1938	1937
Jan.	$305.2	$196.2	$251.7	$192.2	$242.7
Feb.	270.4	200.6	220.2	118.9	188.3
Mar.	479.9	272.2	300.7	226.6	231.2
April	.....	300.5	330.0	222.0	269.5
May	.....	328.9	308.5	283.2	243.7
June	.....	324.7	288.3	251.0	317.7
July	.....	398.7	299.9	239.8	321.6
Aug.	.....	414.9	312.3	313.1	281.2
Sept.	.....	347.7	323.2	300.9	207.1
Oct.	.....	383.1	261.8	307.7	202.1
Nov.	.....	380.3	299.8	301.7	198.4
Dec.	.....	456.2	354.1	389.4	209.5
Ave.	.....	$333.7	$295.9	$266.4	$242.8

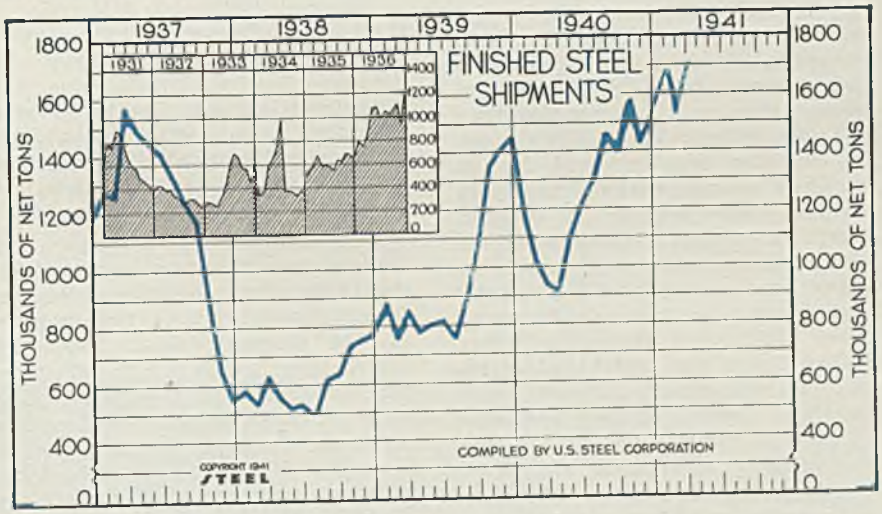
Finished Steel Shipments

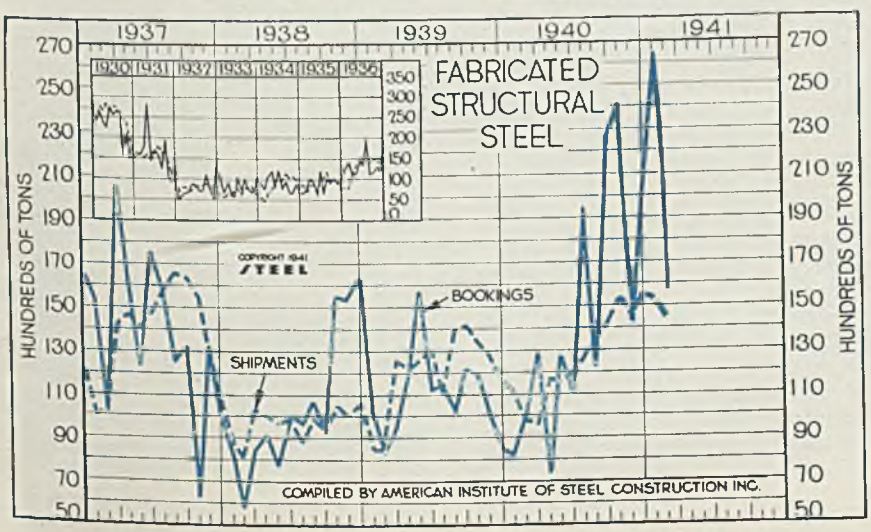
U. S. Steel Corp.

(Unit 1000 Net Tons)

	1941	1940	1939	1938	1937
Jan.	1682.5	1145.6	870.9	570.3	1268.4
Feb.	1548.5	1009.3	747.4	522.4	1252.8
Mar.	1720.4	931.9	845.1	627.0	1563.1
Apr.	.....	907.9	771.8	550.5	1485.2
May	.....	1084.1	795.7	509.8	1443.5
June	.....	1209.7	807.6	525.0	1405.1
July	.....	1296.9	745.4	484.6	1315.3
Aug.	.....	1455.6	885.6	615.5	1225.9
Sept.	.....	1392.8	1086.7	635.6	1161.1
Oct.	.....	1572.4	1345.9	730.3	876.0
Nov.	.....	1425.4	1406.2	749.3	648.7
Dec.	.....	1544.6	1444.0	765.9	539.5
Tot.†	.....	14976.1	11707.3	7315.5	14097.7

†After year-end adjustments.





Fabricated Structural Steel

(1000 tons)

	Shipments			Bookings		
	1941	1940	1939	1941	1940	1939
Jan.	154.2	110.9	84.3	266.6	81.7	101.7
Feb.	146.6	97.2	84.4	159.8	98.9	82.7
Mar.	.....	95.9	125.3	.....	128.3	95.1
Apr.	.....	116.3	120.9	.....	73.8	118.3
May	.....	115.6	125.9	.....	126.8	156.9
June	.....	119.1	130.1	.....	109.7	111.6
July	.....	127.1	110.5	.....	194.9	114.1
Aug.	.....	134.9	139.7	.....	122.5	100.9
Sept.	.....	142.8	140.8	.....	225.5	121.4
Oct.	.....	153.2	133.8	.....	233.1	118.8
Nov.	.....	147.0	128.2	.....	141.9	99.3
Dec.	.....	155.5	116.2	.....	203.1	84.4
Tot.	.....	1515.5	1440.1	.....	1748.1	1305.0

NEW ALLOY STEEL

For Transformer Cores

Cuts Transformer Size, Weight

Boosts Overload Capacity and Saves Copper

Hipersil, with name derived from "high permeability silicon," is a joint development of Westinghouse and American Rolling Mill Co. Metallurgically, it is a steel with a preferred orientation of the crystal lattice. Cost per pound is about double that of ordinary hot-rolled silicon steel. Its unidirectional property is utilized by slitting into narrow strips, wound continuously to form a core shaped like an elongated doughnut of rectangular cross section. Core is plastic bonded, sawed in two at right angles to direction of winding; coils are slipped over legs, two core halves strapped together for single-phase units. Core loss is not increased by these butt joints. Three-phase units have stacked cores similar to conventional designs. Material has no appreciable aging characteristics

By H. V. PUTNAM
Manager
Transformer Division
Westinghouse Electric & Mfg. Co.
Sharon, Pa.

■ NEWEST offspring of industrial research is Hipersil, an improved magnetic material which, used in transformer cores, has one-third greater flux-carrying capacity than the best conventional silicon steel. In carrying this increased flux, it requires no more magnetizing force and its losses will be no greater. Furthermore, its magnetostriction, or sound-producing property, is reduced so the increased magnetic flux causes no increase in sound level. In its first application it has reduced size and weight of distribution transformers as much as 25 per cent; has facilitated reduction of copper losses some 10 per cent and thereby increased short-time overload capacity.

Depends on Grain Orientation: A crystal of any magnetic steel is cubical in form; is easily magnetized along its edges, less easily along its diagonal. If these molecules could be packed face to face like toy building blocks in a tray, the material would be easily magnetized in any one of six directions. Such a steel would be perfectly "grain orientated." Ordinary silicon steel has little or no grain orientation, but the special process of producing Hipersil results in orientation in one direction (that of rolling); hence the material is easily magnetized in this direction.

Its flux carrying capacity in this direction is almost one-third greater than that of conventional hot-rolled silicon steel, but used at right angles to the grain it would be much less effective than the older material.

Less Hum: Under a magnetizing force a piece of steel elongates, then contracts when the flux collapses. Elongation depends on the strength of the magnetic field. With an alternating flux, as in a transformer, this dimensional change takes place twice each cycle; so the core is a structure that changes in size continually. These mechanical vibrations are transmitted through transformer oil to tank wall, then to surrounding air, thereby resulting in transformer hum. Though the movement is extremely small—only about 0.00012-inch for a core 4 feet long—the resulting noise may be annoying in residential substations or industrial plants.

Known technically as magnetostriction, this cyclic dimensional change in Hipersil is less than in ordinary silicon steel at the same flux density. Even at the higher densities at which Hipersil is utilized in transformers, magnetostriction is at most no greater, so transformer noise will not be increased as a result of greater flux density in the core. Should it be important to produce a transformer of unusual quietness, a relatively small reduction in flux density in the Hipersil core would produce the desired effect.

Makes Transformers Smaller, Lighter: Because Hipersil can be worked at higher induction than ordinary silicon steels, the size and weight of transformer cores can be reduced; consequently, fewer turns of copper are needed, and the average length of turn is diminished. This means that less iron, copper and oil can be used, and that these components can be placed in a smaller tank. For distribution transformers weight reduction is from 20 to 25 per cent.

About the largest single-phase transformer that can be mounted on a pole is 75 kilovolt-amperes. With Hipersil such a unit can be replaced by a 100-kilovolt-ampere transformer. Similarly, prevailing practice limits the size of three transformers hung on a single crossarm to about 37½ kilovolt-amperes each, but this limit now can be easily increased to 50 kilovolt-amperes.

More Capacity per Dollar Invested: Improvement in voltage regulation gives to the system operator more electrical capacity per dollar of investment. Normally energy must be supplied to the consumer at a specified maximum reg-

ulation; therefore, if the transformer can carry a larger load safely to reach a given voltage regulation, it has an increased useful capacity.

Greater flux-carrying capacity of the newly evolved material can be used by the designer in two ways to improve the voltage regulation. Shorter average length of turns in the winding, and consequently lower copper resistance, reduces voltage drop at unity power factor, while shorter mean turn and fewer number of turns gives lower reactance, which reduces voltage drop at low power factor. In general, incandescent lamps and heating appliances operate at unity power factor; motor-driven devices and fluorescent lights result in low power factor loads. Since the usual load comprises all types of devices, it is important to reduce not only resistance but also reactance so that regulation may be improved under all conditions.

In transformers rated at 15 kilovolt-amperes and less, voltage regulation has been improved, on the average, approximately 10 per cent at unity power factor and 12 per cent at 0.80 power factor. In larger sizes, impedances are determined by short circuit considerations rather than by regulation, so in this range emphasis is placed on smaller weights and dimensions.

Short-Time Overload Capacity Boosted: The simple magnetic circuit of a Hipersil transformer makes ventilation of the winding easy, so the temperature gradient between coils and oil can be reduced. Since copper losses for a given load are decreased, the quantity of heat generated in the winding is lessened, and a greater short-time overload can be carried without exceeding a safe operating temperature. A typical distribution transformer using the new magnetic material carries 2¼ times full load for an hour but an older transformer of the same rating carried only 1/9 times full load for the same period and same temperature rise.

Better Suited to Modern Loads: During the last two decades, distribution loads and load factors have increased steadily because of the increasing use of major electric appliances. In 15-kilovolt-ampere and smaller transformers using Hipersil, losses are adapted to these modern loads by lowering copper losses and increasing iron losses, so that their product remains essentially the same as in older transformers. As a result of these changes, the total loss in service is lowered; and as a result of lower coil temperature gradients the transformer is better able to stand the severe overload peaks imposed by large appliances.

Makes Maintenance Easier: The newly developed magnetic material benefits the transformer user in still one other way. Distribution transformer cores made from it are assembled in two pieces that can be taken apart easily for replacement of coils, if it becomes necessary.

One typical power company finds it uneconomical to repair a transformer smaller than the 10-kilovolt-ampere size, because labor costs offset savings. With the simplified Hipersil structure, it probably would be economical for the utility operator to keep a stock of spare coils and repair all transformers, regardless of size.

New Coating Prevents Condensation Damage

■ With the use of Insulmat, a protective coating recently developed by J. W. Mortell Co., Kankakee, Ill., raw materials, food and other stored material can be protected from damage caused by "sweating" and "dripping" structures—such as storage houses, freight cars, etc. Applicable to any metal surface, the coating is a spray-on compound containing specially treated cork particles. It is self-bonding, requires no priming coat, adhesive or supports.

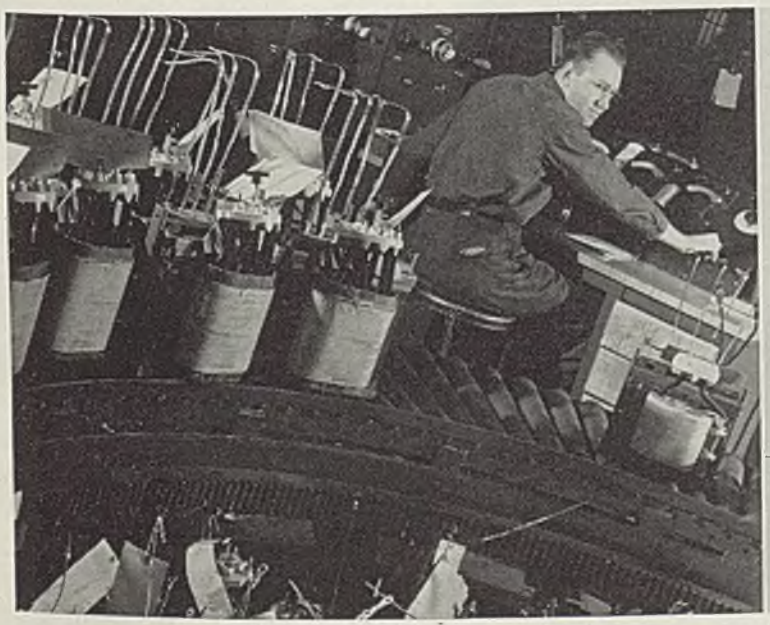
Tests conducted at Purdue university show that the compound will withstand intensive vibration and its life is as long as that of the metal to which it is applied. The material also is odorless, deadens sound, is noninflammable when wet and will not propagate fire when dry.

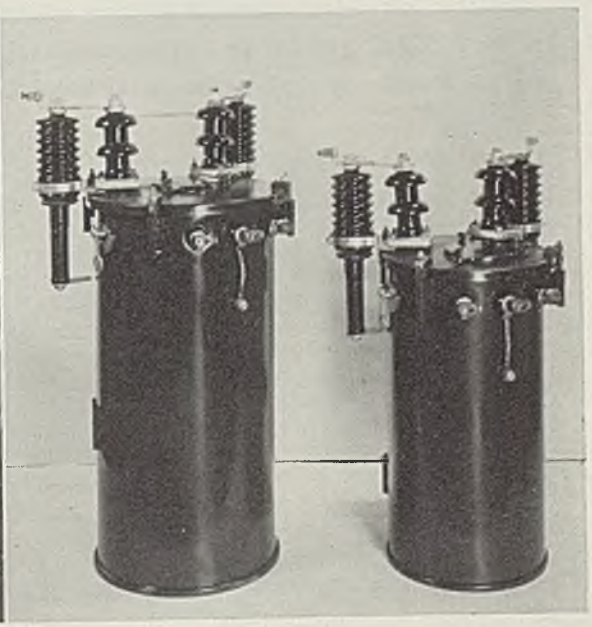
Fire Fighting Poster "Tells All"

■ "What To Do in Case of Fire" is described on a new poster released recently by Walter Kidde & Co., Bloomfield, N. J. It gives brief instructions on how extinguishers should be used on each type of fire.

Avoiding technical language, the wall sign gives basic fire fighting facts on carbon dioxide, foam, carbon tetrachloride and water-type extinguishers. It is designed for use as an instruction sheet to be posted on bulletin boards or to be hung beside each fire extinguisher in the shops and offices. Posters are being distributed free, in any quantity, to business or manufacturing concerns intetrested.

Left, transformers on test. Right, comparable size of conventional and new distribution transformers—both are 10 kilovolt-ampere. New designs are 25 per cent smaller and lighter. They are available in sizes from 1½ to 500-kilovolt amperes for voltages of 2400, 4800 and 7200





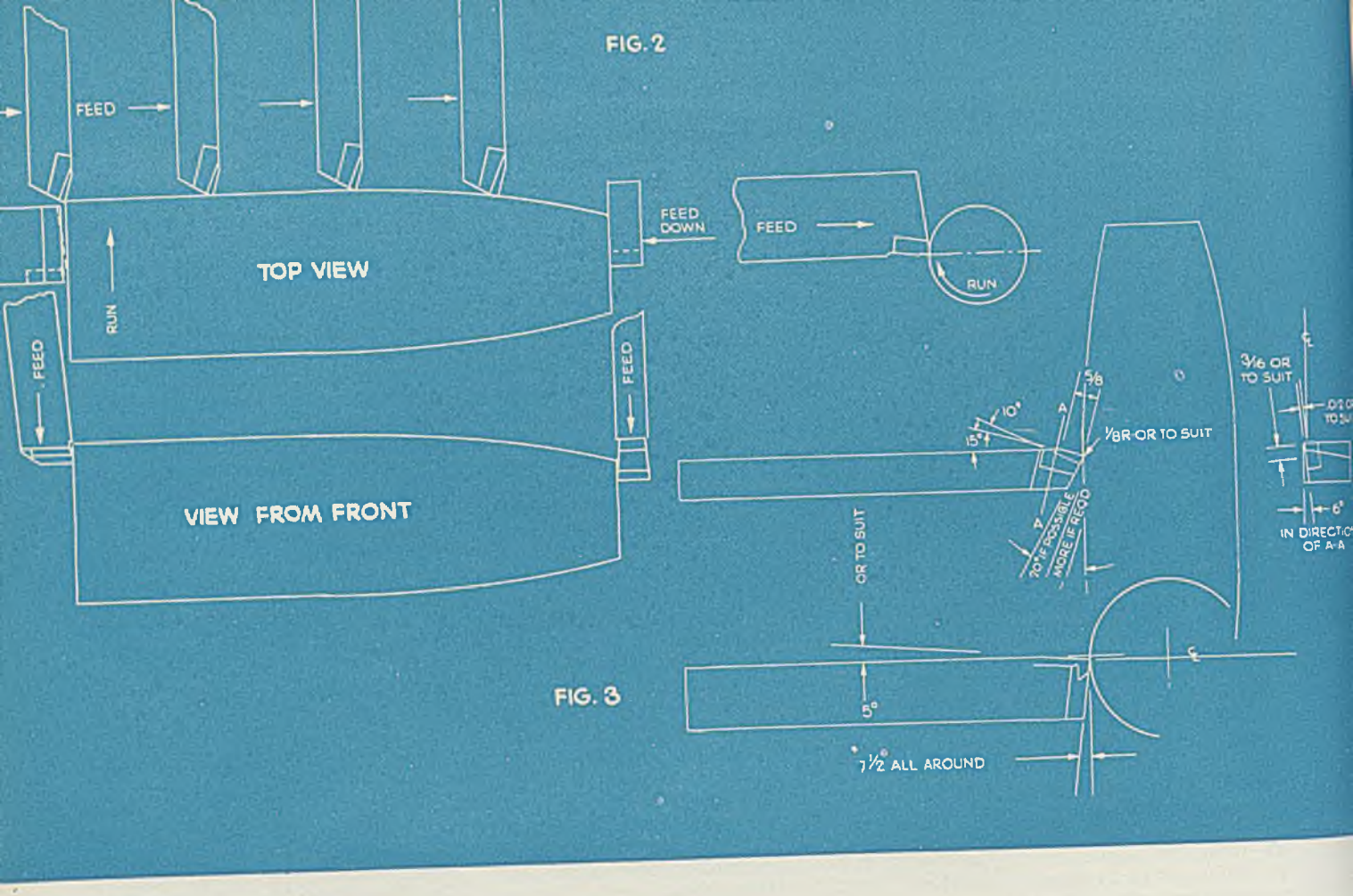


FIG. 2

FIG. 3

High-Speed Tooling for Machining High-Explosive Shell And Other Ordnance Work

Continuing his presentation of cutting fundamentals, Professor Macconochie follows through calculations of cutting speed and horsepower, using data from the A.S.M.E. Manual on Cutting of Metals. Details of high-speed tooling for machining shell at National Steel Car Corp.'s plant is included

■ Starting Jan. 27, 1941, this series of weekly articles on shell production has covered: One, background on shell production; two, types of shell and their metallurgy; three, parting off and heating billets for forging; four, forging problems and the Witter cross roll; five, the Baldwin-Omes and upsetter forging machines; six, machining considerations; seven, "emergency" lathes designed by National Machine Tool Builders' Association; eight, step-by-step study of operations at S. A. Woods Machine Co. shell plant; nine, multi-spindle automatic lathes; ten, survey of equipment for machining shell; eleven, typical tooling setup for multi-spindle automatic; twelve, first part of section on high-speed tooling.

(Concluded from Last Week)

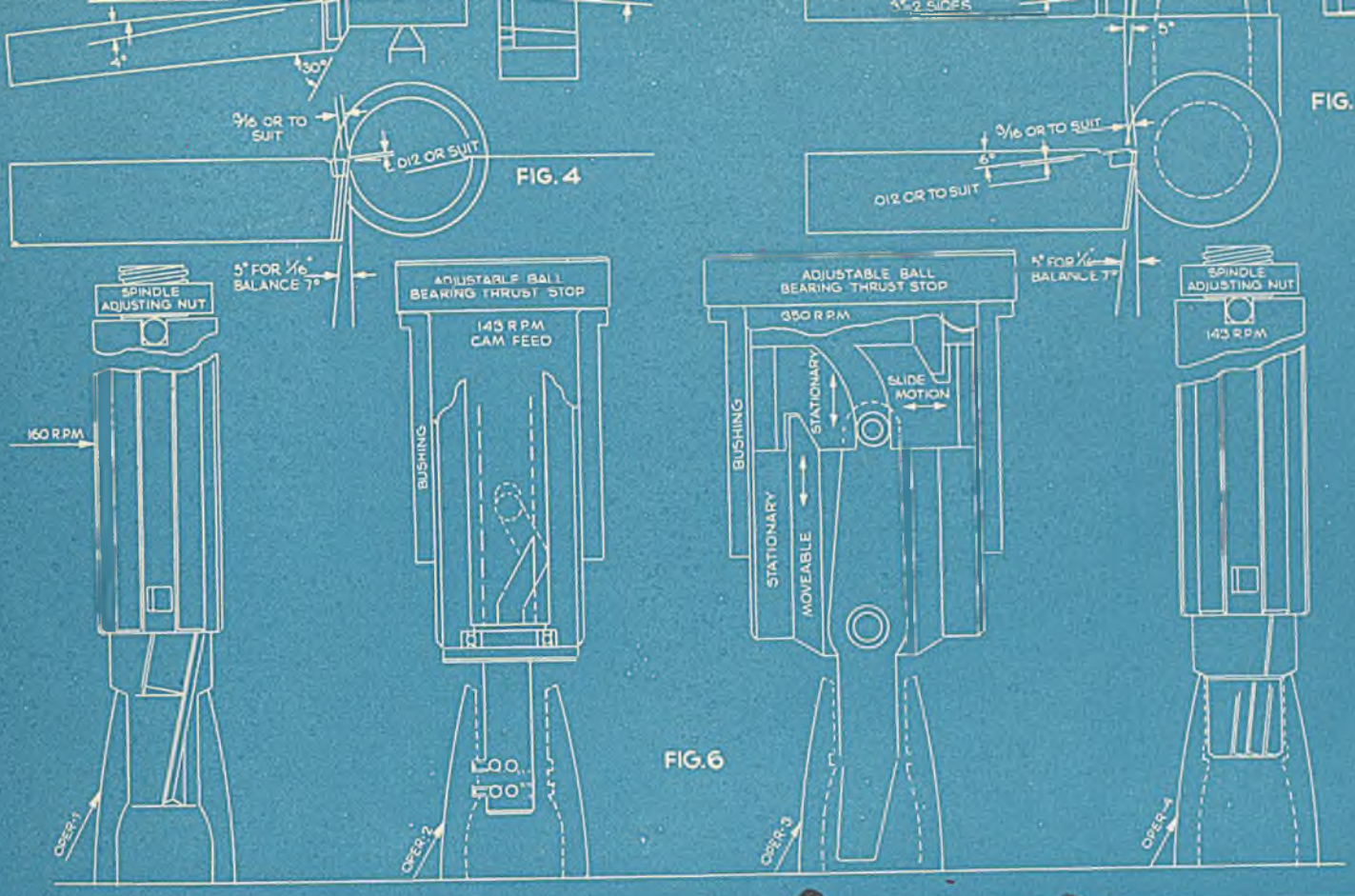
■ OVER a long period of years and especially since Taylor's epoch making address to the American Society of Mechanical Engineers in 1906, "On the Art

research has amplified but wrought no important changes in his fundamental conclusions. We are still unable to rationalize the results of our experiments, but the influence of such variables as the length of cutting edge in active engagement with the work and the average thickness of the chip has made possible the construction of an equation which is generally applicable and which is not restricted to one particular form of cutting tool. As familiarly expressed, this equation reads as follows:

$$V \text{ equals } \frac{K_t \times K_h \times K_d \times K_m \times K_f \times K_r \times K_c}{T^a \times L^{bT} \times M^n}$$

where,

V is the cutting speed measured on the uncut section of the work ahead of the tool (feet per minute)



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

T is the average thickness (in inches) of the chip as cut from the workpiece. It may always be found by dividing the chip area by the total length of the cutting edge of the tool actively engaged. Further reference will be made to this later.

L is the total active length of the cutting edge of the tool in contact with the work (inches)

M is the tool life (in minutes). This obviously means the time during which the tool is actually at work.

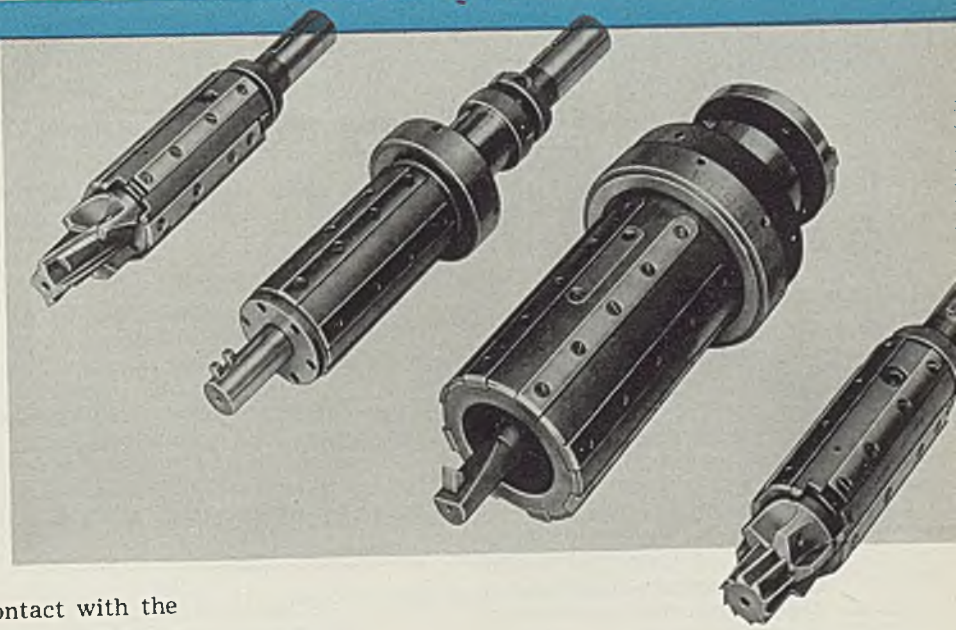


Fig. 1—Group of special tools developed for high-speed machining of shell by the Wesson Co., Detroit. Tools work on interior of shell nose. Tool at extreme left rough bores and chamfers interior of shell nose; next tool undercuts the groove and rough forms; third tool finishes forming; fourth handles finish ream and finish chamfer. Tools two and three have internal cams controlling cutters. That's why they require larger diameter holders. All tools have hardened slide bars on outer circumference of holder permitting them to be revolved inside bushings. See detail in Fig. 6

Fig. 2—A conventional method to rough turn, face base and cut off nose surplus on 3.7-inch anti-aircraft shell. The setup produces 300 shell per 8-hour shift with a speed of 235 feet per minute and feed of 0.012-inch per revolution

Fig. 3—Cemented carbide rough-turning tool. Handles cuts ranging from 1/8 to 5/8-inch deep at 235 feet per minute, 0.012-inch feed per revolution. Finish turning operation similar to roughing but done at 334 feet per minute, 0.020-inch feed per revolution. All diagrams show tools developed by Wesson Co., Detroit

Fig. 4—Base facing tool for shell. Cuts to 1-inch width; speed, 175 to 225 feet per minute; feed, 0.010 to 0.030-inch per revolution. Handles cuts ranging from 1/8 to 7/8-inch wide, at 235 feet per minute, 0.012-inch feet per revolution. Can be used at feeds up to 0.030-inch per revolution

Fig. 5—Cut-off tool for nose end of shell. Takes cut 1/2-inch wide at 235 feet per minute, 0.012-inch feed per revolution

Fig. 6—This diagram is same tooling setup as in Fig. 1 but shows detail of tool holders. At station one, core drilling and rough chamfer; station two, cam fed recess; three, contour radius, also cam fed; four, ream and finish chamfer hole to be threaded in nose end of shell. Speeds are, respectively, 160, 143, 350 and 143 revolutions per minute at the four stations. Feeds are 0.050-inch per revolution except chamfer feed which is 0.010-inch per revolution

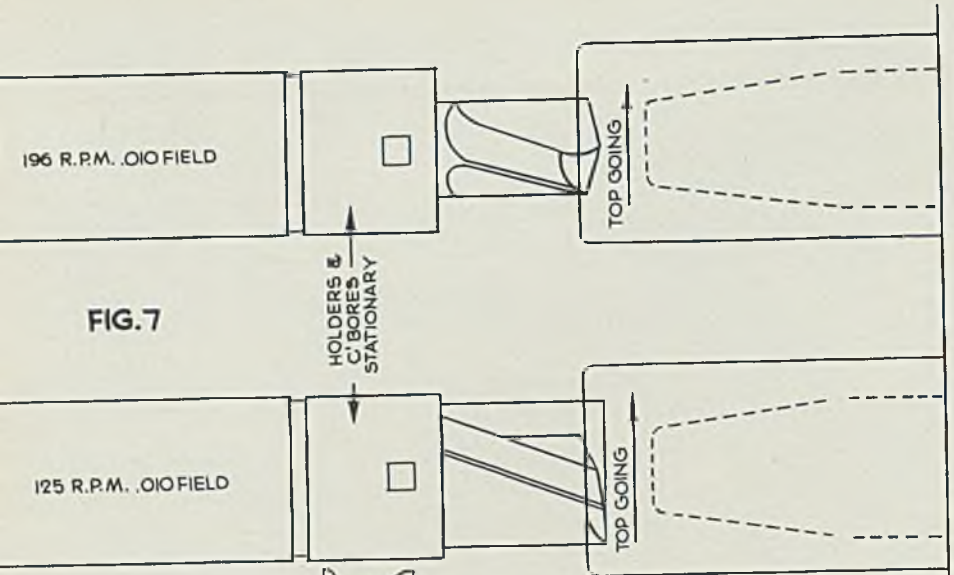


FIG. 7

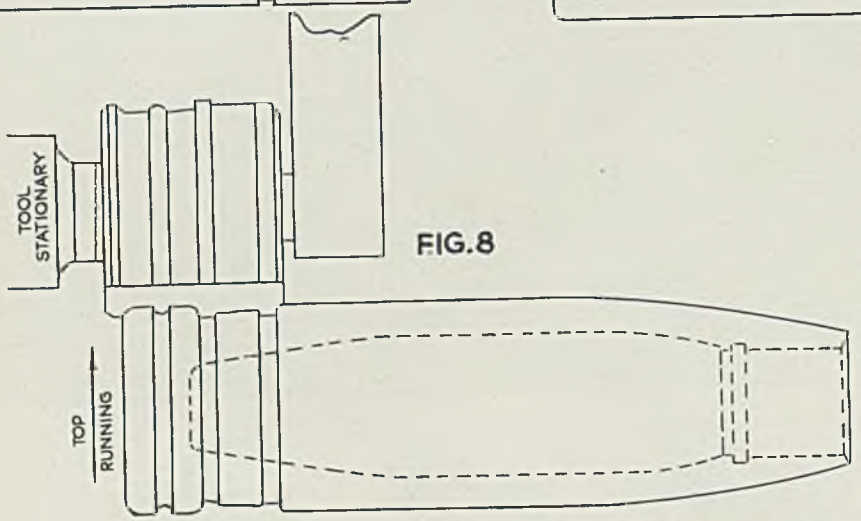


FIG. 8

Fig. 7—A successful method of roughing and semi-finishing base cap counterbore as used on a multi-spindle screw machine, employing a Wesson snap lock holder

Fig. 8—A circular forming tool for a multi-spindle screw machine making 1200 shells per 24 hours

And the constants or factors:

K_t is tool material.

K_m depends on the hardening treatment of a steel tool. In the case of Stellite or the cemented carbides it has a value of unity.

K_a depends on the tempering of a steel tool. This term also has a value of unity for Stellite and the cemented carbides.

K_m depends on the machinability of the metal cut.

K_f depends on the kind and quantity of the cutting fluid used.

K_c depends on the type of cut.

And the exponential factors whose value:

a depends on the material cut.

b depends on material of the tool.

n depends on tool material, kind of metal being cut and nature of tool failure.

Not As Bad As It Looks: This all looks very formidable but assumes a much less forbidding aspect when applied to the conditions under consideration. First we observe that certain of these factors disappear if we specify the form of the tool to be used and still more if we know what depth of cut will be taken by such a tool—thus we are well on the way to considerable simplification. Of course, shell forgings do not always lend themselves to predictions as to the amount which will have to come off in the first roughing, nor are they always cylindrical and concentric. But shell forging techniques are steadily improving and we will assume, for a beginning, a depth of cut of ⅛-inch and an end cutting edge angle of 30 degrees, a nose radius of ⅛-inch and an end cutting edge angle of 6 degrees. There will be a side rake of 14 degrees, a back rake of 8 degrees and end-relief angle of 8 degrees.

Our first concern in this problem is to determine the "length of engagement" of the cutting edge with the work. The recommendation usually offered is that a drawing of the tool be made to an increased scale up to fifty times full size and that from this drawing the length of engagement be scaled. In the particular example under discussion, this quantity will be found to be about 0.217-inch. Then T, the average thickness of the chip, will be found by dividing the total area of the chip by 0.217. Once we have decided upon the tool life desired, the chip area is really the only variable left. Further since the depth of cut may be fixed by circumstances beyond our control (such as excess metal in the forging) and in this case is taken as ⅛-inch, the feed alone may be changed. Such changes will be found to affect both the speed at which the metal should be cut for a given tool life and the horsepower required at the point of the tool.

Let's Try One: Suppose we select a feed of 0.018-inch per revolution and decide upon a tool life of 10 hours. The area of the chip, neglecting in this case the small area of the ridge left between successive cuts, will be 0.125 x 0.018 or 0.00225, and the average thickness of the chip is given by the quotient of area and length of engagement or 0.00225 divided by 0.217, as above explained. Thus T is 0.0104. So L, T and M are settled, and we can now proceed to consult the tables in the Manual for K_t, K_m, K_f, K_c, K_r; a, b and n.

K_t the constant related to tool material from Table 331 on p. 255 is 4.000

K_m the constant relating to the machinability from Table 9, Chapter 11, page 67, considering hot rolled shell steel X1335, is found to be 8.4

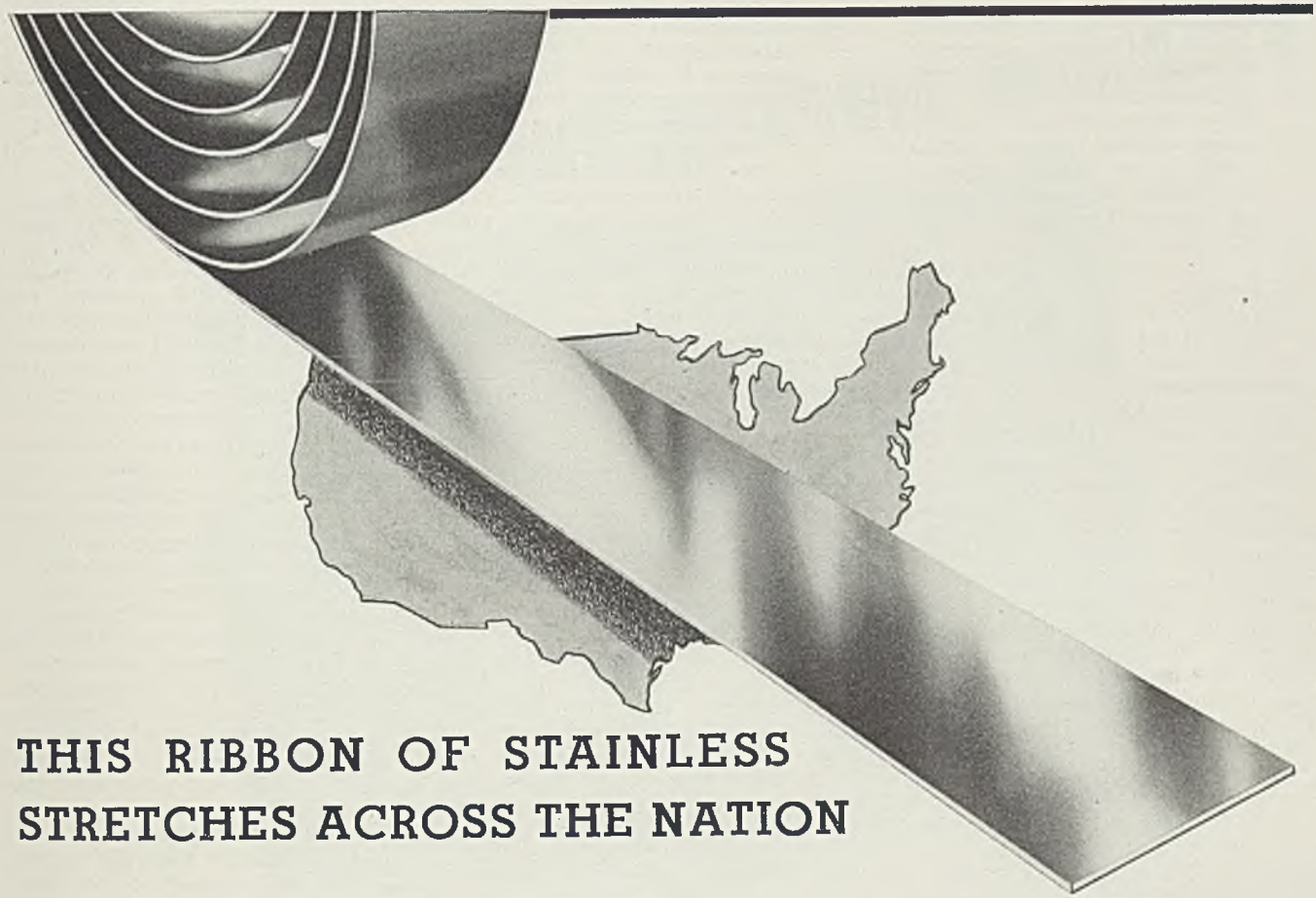
K_f the constant concerned with the cutting fluid is given as 1.16

K_c the constant which takes care of the nature of the cutting operation will be found on page 258. For roughing cuts this equals 1.00

For cemented carbides operating on steel, the values of the exponents a, b and n are, respectively, from Table 336, page 258, 0.67; 1.0; 0.129, the thickness of the chip being less than 0.015-inch.

Other Articles on Production of Ordnance

■ For other articles in addition to the series by Professor Macconochie, see issues 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.



THIS RIBBON OF STAINLESS STRETCHES ACROSS THE NATION

FROM it, thousands of parts, vital to the smooth, safe functioning of American life, are being made. You find it in the magnetos and carburetors of today's speediest planes, in giant turbine blades, in the delicate mechanisms which control the ebb and flow of radio waves, in gasoline refining equipment, in valves—wherever performance is vitally important from Maine to California.

But maintaining the quality and uniformity that permits industry to entrust vital functions to Carpenter Stainless Steels takes skill, and care, and time, and equipment. Months ago, training of new men and purchases of new equipment were initiated at Carpenter. Gradually, these new facilities are coming into production. As they come in, they go at once into 24-hour operation. Today, Carpenter customers are being provided with the same high quality that has always been characteristic of Carpenter Steels.

For vital functions, Carpenter Stainless Steels will continue to serve industry and the nation.

THE CARPENTER STEEL COMPANY, Reading, Pa.

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K_r has to do with the rake angle of the tool. While experimental results are not particularly comprehensive, the matter is of small importance since the effect of the rake on cutting speed is not very great. For our particular purpose a value of unity will be adopted.

Our equation now becomes:

$$V = \frac{4.00 \times 8.4 \times 1.16 \times 1.00}{(0.0104)^{0.67} \times (0.217)^{0.0104} \times (600)^{0.129}}$$

or 279 feet per minute.

If this calculation is repeated, but using high-speed steel in place of cemented carbide, it will be found that for the same tool life only about one-third of this cutting velocity can be tolerated. Hence the tremendous advantage of cemented carbide, especially on roughing operations. Of course greater power and machine rigidity must be provided. By way of exemplifying this remark in terms of precise figures, we note that the relationship between the tangential component of the pressure between the tool and the work is given by the following equation:

$P_t = K_p \times K_a \times T^c \times L^d$

in which:

P_t is the tangential component of chip pressure in pounds

K_p is a constant to be determined experimentally and which appears to be related to the nature of the material being cut

K_a is a constant depending on the "true-rake" angle of the tool in the direction of chip flow

and c and d are exponents which again appear to depend on the material being cut.

L is, as before, the length of engagement of the cutting edge with the work.

Consulting Table 9, Chapter 11, of the Manual once more, we find K_p for hot-rolled shell steel of composition X1335 on page 67. It is given as 87,000.

The constant K_a must be found from the expression 1—0.0075R (where R is the "true-rake" angle, measured in the direction of chip flow) as given in 339, page 274. In our particular case R is 12 degrees very nearly and thus K_a becomes, 1—(0.0075 x 12) or 0.91.

From the same table, c is found to be 0.78; and d to be 1.10.

We may now determine the tangential component of chip pressure. It should be observed that this is practically independent of the speed, and completely independent of the nature of the cutting tool—that is, of the material of which the cutting tool is made (but not, of course, of the shape).

P_t equals $87{,}000 \times 0.91 \times (0.0104)^{0.78} \times (0.217)^{1.10}$ or 419 pounds.

Since the horsepower required is very nearly $P_t \times V$, this tool would call for:

$$\frac{419 \times 279}{33{,}000}$$ or 3.54 horsepower.

This is not, of course, the horsepower input to the machine, per tool, since no account has been taken of the efficiency of the machine itself. If this were 67 per cent, the machine would require a power input of 5.28 horsepower.

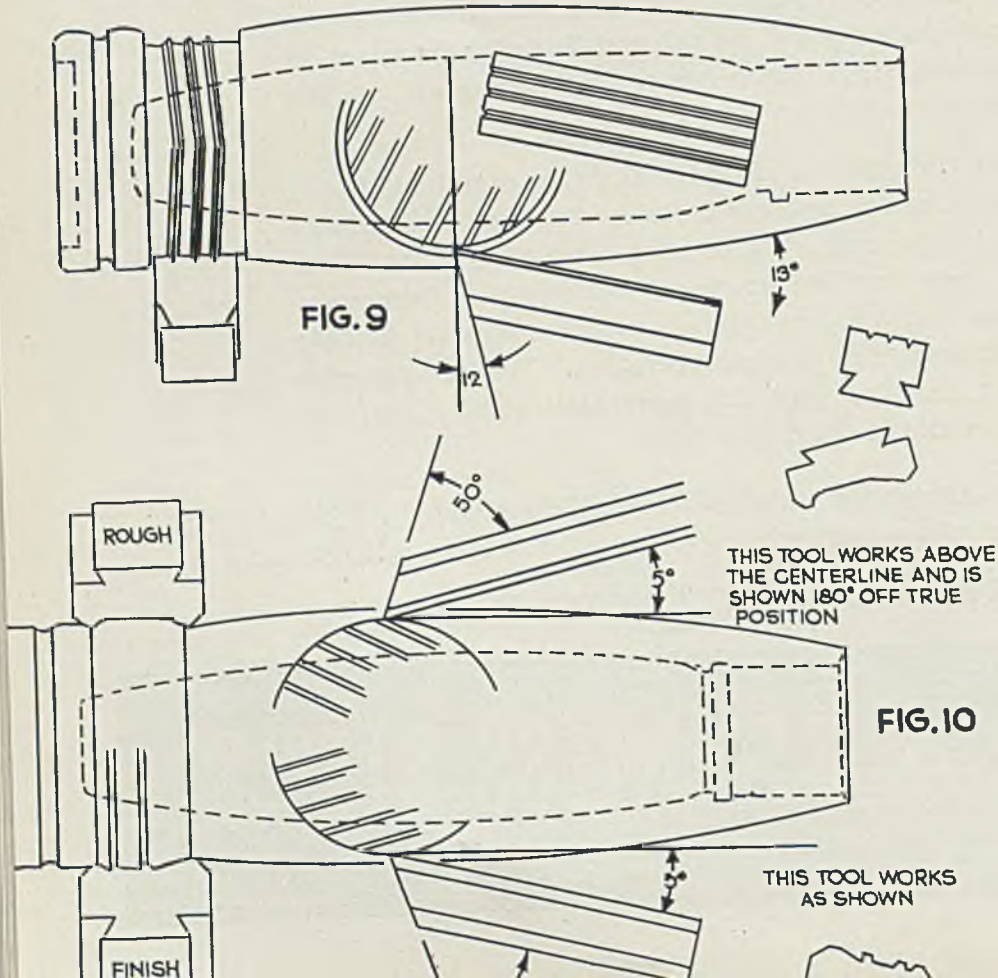
High-Speed Setup: By comparison with these basic applications of the data collected and tabulated in the Manual, there is presented a study of the tooling of the machines manufacturing 3.7-inch antiaircraft shell in the National Steel Car Corp.'s plant, Hamilton, Ont. After forging as described in STEEL, Feb. 10, 1941, p. 54, the shell bodies are centered on the base end by mounting on an expanding arbor which revolves in the opposite direction to the centering drill, thereby giving the best chance for concentricity with the forged cavity. Next they are rough turned in several different types of lathes, including Fay automatics, the base being faced and the nose cut off in this same operation. See Fig. 2. The speeds and feeds mentioned are exceeded in practice, the former being around 240 feet per minute and the feed 0.018-inch per revolution.

The amount of stock to be removed varies from 3/16-inch upward. Cemented carbide tools are used, including four body tools, one nose tool, one parting off tool for the nose end and one base facing tool. All have tips measuring ⅜ x ½ x 1-inch except the parting tool, which has a tip ⅜ x ½ x ¾-inch. All tools are provided with chip breakers. When shells are not chilled and are otherwise free from hard spots, the nose tool will last through 150 pieces, while the body tools will stand up to some 400 or 500 blanks. Base and parting tools are good for 200 pieces. Proper rakes and clearances are essential to efficiency and long life. The position, too, of the tool with respect to the centerline of the work is of the first importance since a cemented carbide tool may be ruined by setting above the centerline.

Fig. 3 shows a detail of the roughing tool. It may be observed that the design indicates a true rake of 6 degrees and a negative back rake of 5 degrees. There is a side-cutting-edge angle of from 10 to 15 degrees and an end-cutting-edge angle of 20 degrees. The nose radius shown here is ⅛-inch. Fig. 4 is a detail of the base facing tool, which is capable of taking cuts

Fig. 9—Band seat waving tool for same machine

Fig. 10—These tools rough from the back, finish from the front—are fed by hand, machining copper bands at 170 feet per minute with production of 1500 per 24 hours



FOR THOSE IN THE AIRCRAFT INDUSTRY

The new Bryant Aircraft Catalog is filled with photos and line drawings showing Bryant Internal Grinders used in the production of aircraft engine parts. It also shows how the Bryant feature of single slide and three point control assists in meeting the exacting requirements of the Aircraft Industry in its National Defense Program. A request on your company letterhead will bring your copy without obligation. Just write—

BRYANT CHUCKING GRINDER CO., Springfield, Vermont

up to 1-inch wide with a feed of from 0.010 to 0.030-inch per revolution, and speed of 235 feet per minute. Fig. 5 shows the cut-off tool, which takes a ½-inch wide cut with a feed of from 0.010 to 0.030-inch per revolution at a speed of 175 to 225 feet per minute.

Fig. 6 exhibits the sequence of operations on a Natco vertical machine. The first operation is loading the shell, gaging from the bottom of the cavity. In the second position, the nose is rough bored and chamfered, the cutter used for the purpose being shown at the left of the figure. Adjusting nuts are used to control the depth of the cut. The speed used is 160 revolutions per minute. In the third operation (second from the left in the figure) the undercutting tools first descend to the required depth as determined by the adjustable ball bearing thrust stop and then a cam feeds them into the work until the necessary depth of groove has been obtained. The cutting bits in this case are of high-speed steel and the speed of the bar is 143 revolutions per minute.

The fourth operation, shown third from the left, is known as "scabbing" and blends the internal profile with the end of the hole in the nose. As may be noted, the action takes place under cam control of the boring bar pivoted on a fulcrum, and ends when the thrust stop bearing is seated on the spindle bushing. A carbide bit is used in the bar, which revolves at 350 revolutions per minute. The fifth operation on the Natco consists in finish reaming the hole in the nose with a combination high-speed reamer and chamfering tool at 143 revolutions per minute. Feed per revolution here is 0.050-inch except when chamfering, when the rate is reduced to 0.010-inch per revolution.

After finish turning with carbide tools at a speed of 300 feet per minute and a feed of 0.012-inch per revolution, a Gridley automatic performs the following sequence of operations:

1. Drills off base center and rough drills the base hole with a 1¾-inch high-speed drill. See Fig. 7.

2. Rough beads and forms the band groove using a high-speed circular form tool, as shown in Fig. 8.

3. Bores the base 2¾-inch diameter using a 3-fluted counterbore, with one flute cutting to center, Fig. 7.

4. Undercuts the band groove. This is done with a right and left-hand tool feeding in their respective directions.

5. Waves the band groove with a high-speed grooving tool traveling sidewise right and left and timed with the spindle to give the correct number of waves per revolution. See Fig. 9.

6. Finishes the base recess with a single-bladed adjustable tool cutting to center and at the same time boring to size and facing the bottom of the recess.

The base plate is now riveted on with a Grant spinner-type machine, the shell being rotated manually. Now we come to thread milling on a planetary mill manufactured by the Standard Machine Co., Windsor, Ont., after which grease is removed on a Blakeslee degreasing machine. Next the band is pressed into place and we are ready for the rough and finish turning of the band as shown in Fig. 10.

These tools are hand fed, and the surface speed employed is about 170 feet per minute. With the cutting edges carefully mounted on center, the rough form tool at the back and feeding toward the operator, and the finish form tool in front, the band is cut to its proper diameter and profile, except for the edges which are trimmed by trimming tools brought into play by a hand lever which is pressed downward until the tool comes in contact with the steel of the shell body. All tools used in this operation are of high-speed steel.

A single-purpose machine is now employed to face the base with a carbide facing tool and also to radius the base of the shell, again with a carbide tool ground to form. The surface speed of the shell during these operations is 250 feet per minute. Finally the shell is sprayed, painted and inspected and is ready for despatching to the loading plant.

Whether "off-hand" grinding of these cemented carbide tools by the individual mechanic or machinist (a procedure which is not, in general, recommended) or whether a semiprecision grinder is provided, the abrasive used is either silicon carbide or, for lapping, diamond or boron carbide. Silicon carbide is almost as hard as diamond, being intermediate between corundum and diamond, the points 9 and 10 on Moh's scale. Silicon carbide is rather unique inasmuch as it is a purely artificial product manufactured by fusing together coke and sand in an electric furnace of the resistance type. Salt and sawdust are also present, the first to form chlorides with the impurities present and the latter to leave interstices, as it burns away, which permit the escape of carbon monoxide.

Watch Centerline Distance: By way of final comment it may be noted that in order to insure successful performance of sintered carbide tools, the operator must know exactly how far it is from the rest to the centerline of the work. With modern machines having tools coming in at almost any position, this quantity is not as easy to determine without assistance from the manufacturer as it used to be when lathes were simpler in design and when it mattered less if the point of the tool were a little too high. Now it is imperative that the rigid and relatively brittle carbide tool be placed exactly on center, or perhaps a little below, if anything, if injury is to be avoided.

This discussion should be especially valuable to superintendents who can walk around their plants and find bright uncolored chips coming off the roughing operations. Let them sit down with the formulas and the Manual and see that they (the chips) turn BLUE.

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 May 1. Advance reservations, which will help determine the quantity to be run, should be addressed to STEEL, Readers' Service Department, Penton Building, Cleveland.

New Booklet Covers Tinning of Steel, Iron

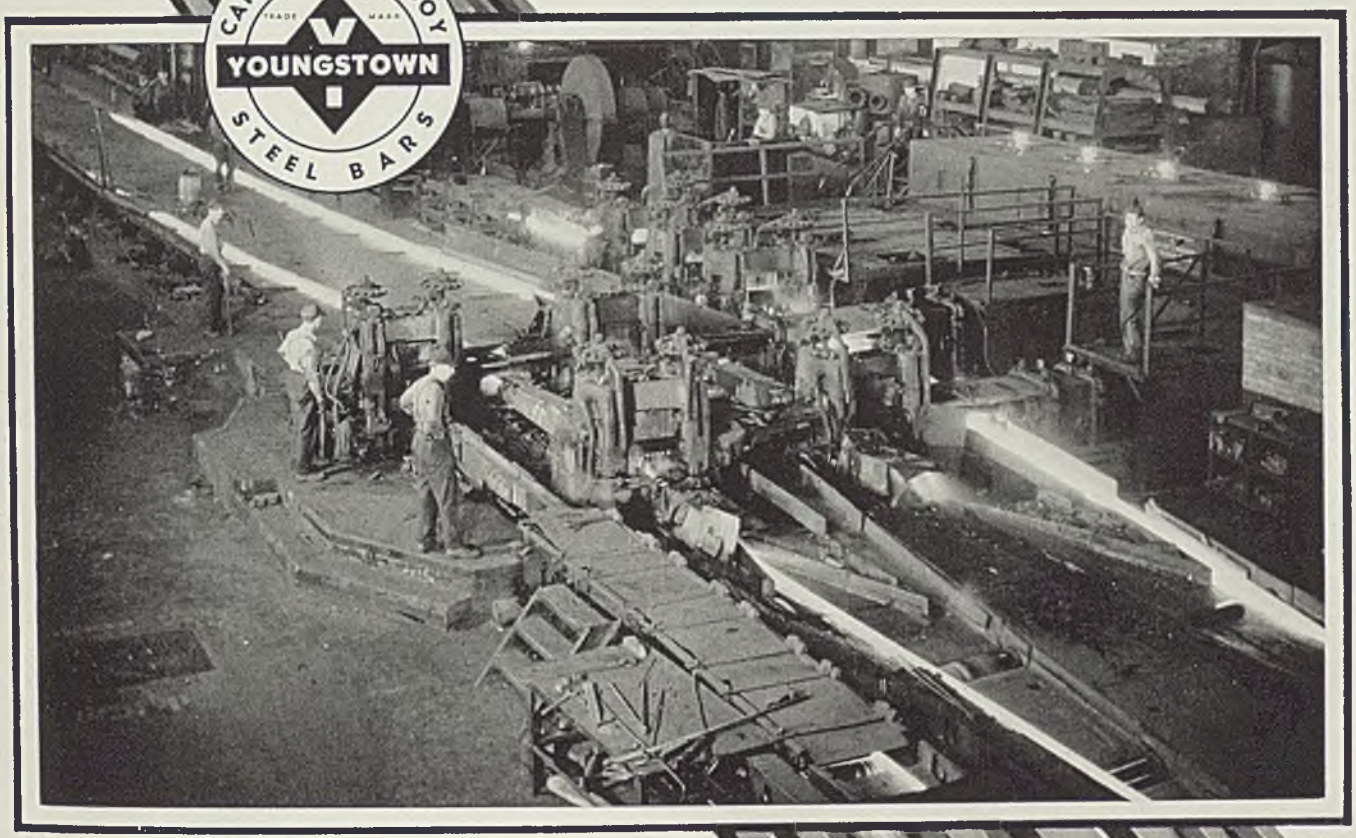
■ An account of the tinning of steel, iron, copper, brass and bronze by the hot-dipping process is embodied in a booklet entitled "Hot-Tinning" recently issued by the Tin Research Institute, Battelle Memorial Institute, Columbus, O. The booklet gives a comprehensive account of the different processes used, with some explanations of the various factors which influence the quality of the coatings produced.

In the introductory paragraphs, it discusses the applicability and the limitations of the process, describing the preliminary processes involved. The various types of tinning baths, their operating temperatures and maintenance in continuous operation are also covered.

Included in the booklet are ten diagrams and illustrations, and under "Additional References" mention is made of three books and 28 reports and articles dealing with various aspects of tinning. The booklet should be helpful both to practical tinners and to the controlling staff in works.

BARS and SHAPES

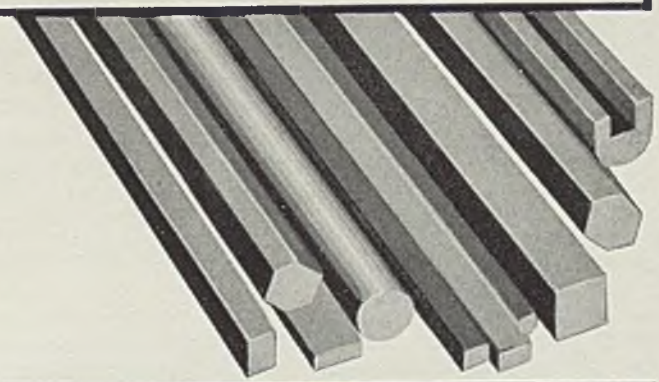
to Meet Your Needs



Night and day this mill keeps rolling -- to turn out the thousands of miles of bars and shapes that you will want from us in 1941.

Rounds and squares, hexagonals and flats, angles and specials, these merchant steels are quality-made as well as quantity produced. When you buy them the name and trade-mark of Youngstown are your assurance of top values -- uniform strength and workability, evenly smooth finish, close accuracy to gauge.

Specify Youngstown for bars and shapes to meet your needs, to get those extra values built into all our products by master steel makers who are also master craftsmen. 15-3D



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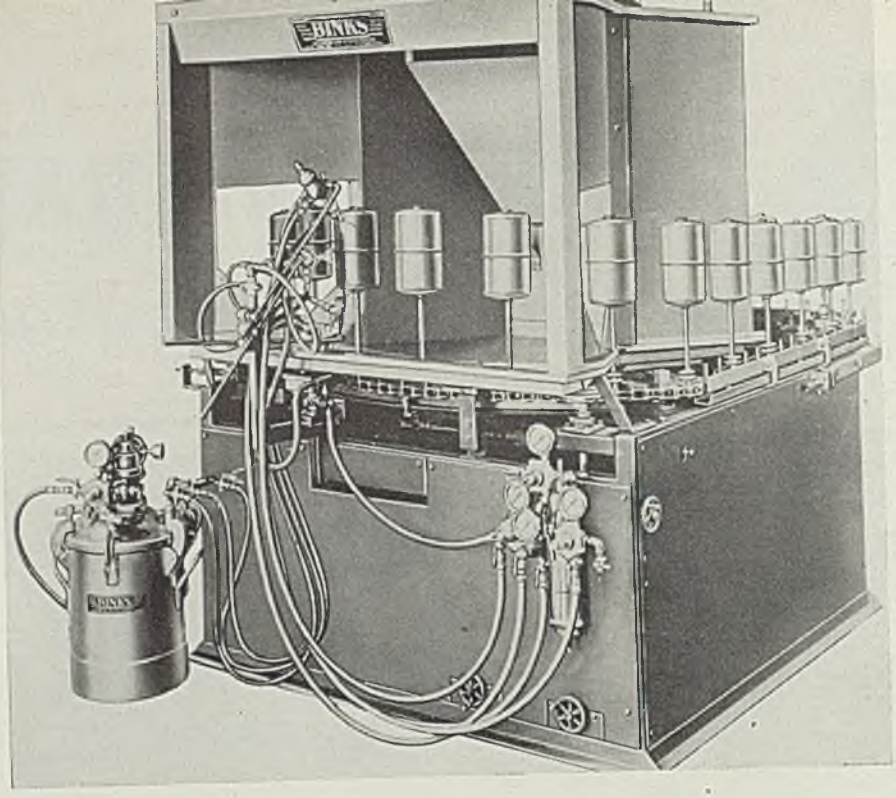


Fig. 1—This Binks automatic rotary spindle finishing machine is readily adaptable to handling many items. It utilizes three spray guns to apply simultaneously finish on top, side and bottom of the cylinders shown here. As many as 20,000 units can be painted per day in a setup like this

Do You Know Whether or Not You Can Use

AUTOMATIC SPRAYING

To Finish Your Product ??

Instead of being suitable only for certain shapes of work, automatic spray finishing setups have an extremely broad range of application, can coat and finish a wide variety of objects. Exceptional production rates are obtainable since conveyors can be extended to be fed directly from fabricating lines and in turn carrying sprayed work through drying and baking ovens. The several basic types of machines are described, typical production rates given and method of arriving at a suitable setup for a specific job explained

■ AT LEAST 85 per cent of all the products of industry requiring a surface finish are given that finish by means of the spray gun. Spraying is so generally accepted as a most efficient means of production coating and finishing that there is little comparison between it and older methods.

Even though the spray has made possible exceptional advances in both speed and quality of the work produced, industry is today no more satisfied with its finishing speed than it is with the rate of its other production operations. The cry today is faster—faster, and the producers of spray finishing and spray painting equipment are answering that cry by the development of machines and equipment that are as far beyond the capacity of the hand operated spray gun as the spray gun was beyond the brush.

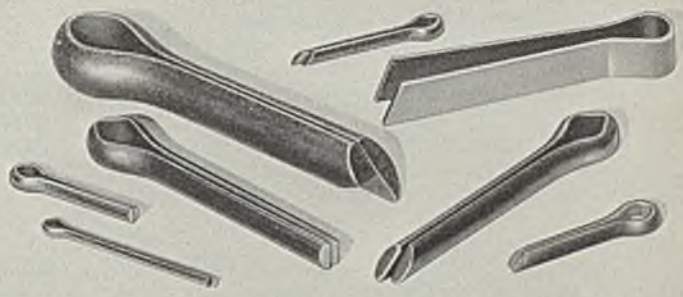
Production finishing can now be done by machines in semiautomatic and automatic operations in much the same manner as other high production manufacturing operations. A simple rotary spray finishing machine, for instance, will do as many as 3600 small, light weight articles per hour. The product to be coated is loaded in one end of the machine and comes out finished at the other end. Such a unit can be set into the production line, receive the article mechanically from the last manufacturing operation and discharge it completely finished and dry to a wrapping or packaging machine.

Basic principle of the rotary machine is the rotation of the product to be finished before an open spray gun. Machine design and operation vary with product and plant requirements. Usually, however, the product is loaded on a workholder or spindle which starts rotating just before it enters the spray gun range and stops rotating as soon as it passes the gun. This assures even coating of the object. One or more spray guns are so mounted that the spray is properly directed to reach all exposed surfaces. Gun operation may be continuous, or operating devices such as the electric eye or mechanical cam can be used to start and stop the spray at the proper instant as the object rotates before the spray gun.

Automatic spindle or rotary spray setups are already in use in finishing automobile wheels, drapery hardware, containers and automobile accessories such as fender guards, headlight bodies, oil filters and the like. The shape and con-

ALL ON ONE INVOICE AND IN ONE *Shipment*

Milled and rough Studs are stocked in popular sizes. When physical requirements and raw materials are specified, made to order in production quantities of carbon or alloy steel, or non-ferrous alloys, from ¼-inch to 1½-inch diameters, any length.



A blow on the diamond-shaped head of Lamson Cotters spreads prongs. "Efficiency" points serve as a drift pin. Lamson stock cotters conform to all Government specifications. Cotters made to order from brass, bronze, aluminum and stainless steel.

Lamson full finished Cap Screws of SAE 1020 steel have approximately 90,000 lbs. per sq. in. *minimum* tensile strength. Our high carbon cap screws of SAE 1035 steel, heat treated, have approximately 150,000 lbs. *minimum* tensile strength.

Lamson Set Screws of a special high carbon heat treated steel compare favorably with much higher priced alloy steel set screws in performance. Cost you no more than common low carbon set screws available heretofore.

● As manufacturers of the most complete line of bolt and nut products in this country, Lamson & Sessions can fill an order for a wide variety of standard fastenings out of warehouse stocks. And a nation-wide network of responsible jobbers re-inforces these facilities for your demands. Obviously, it is least costly of time, effort and expense to order every fastening you need—*in one shipment, at one time, on one invoice, from one manufacturer.* And next best to that is specifying the Lamson line when you order from your mill supplies dealer or hardware jobber—for the quality is exactly the same—backed by 75 years of bolt-making experience.

THE LAMSON & SESSIONS COMPANY, Cleveland, Ohio

Plants at Cleveland and Kent, Ohio; Chicago and Birmingham

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tour of objects to be sprayed is limited to protruding portions that would prevent the actual spray from striking the main body at certain points, such as spouts on tea kettles and cans. This limitation, however, by no means discards such objects from automatic spray finishing. It merely necessitates mounting an extra gun for applying the finish to a very small zone whereby the paint loss and the adjusting of the extra gun will more than offset the cost of a hand operator to apply the finish in conjunction with the machine. Jobs such as these are usually handled by the machine operator with a hand spray gun as he attends the automatic.

Internal rotary spraying is contingent upon the user keeping clean the spray gun nozzles and extensions as these gradually accumulate heavy deposits of paint during the time the gun is thrust into the opening and pulled out.

To check the possible efficiency of the operation and to determine the suitability of applying automatic rotary spraying in the finishing of an object, it is safe to imagine the object being rotated on a spindle in front of a gun fixed at the proper angle and discharging a spray approximately 2 inches wide where it strikes the work. Of course in many cases, two or more guns can be utilized, set at various angles to get the coverage wanted.

Maximum output on such work will average around 30 to 40 pieces per minute as that is about as fast as an operator can load and unload a conveyor. Certain work may no doubt permit much higher maximum speeds if it is exceptionally easy to handle on and off the conveyor.

Fig. 1 shows a typical automatic rotary spraying setup employing three guns and made by Binks Mfg. Co., 3114 Carrol avenue, Chicago. It is designed to be readily adaptable to finishing clocks, battery boxes, lamp fixtures and many other items. Guns are connected to a 3-way valve which operates them only when work is being revolved in front of the gun fixture. This cuts overspray and waste as the sprays operate only when work is in a position to receive the paint. This type of setup can easily be arranged to spray as many as 15,000 to 20,000 units per day.

Larger Products in sheet, roll or panel form with curved or flat surfaces are automatically and mechanically sprayed at a rate of 240 square feet per minute by machines of another type. These are frequently referred to as swinging arm, horizontal transverse and vertical transverse spray coating machines. Each has its particular application according to the requirements of product or production. Figs. 2 to 10 inclusive show various setups of automatic spray equipment built by the De Vilbiss Co., Toledo, O.

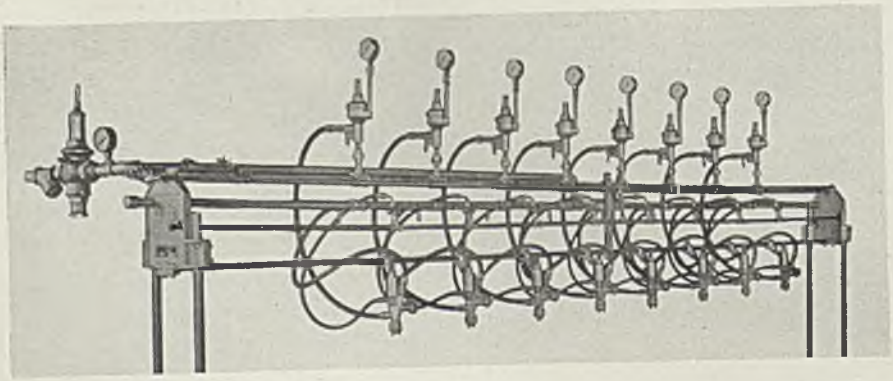
The swinging arm machine, Fig. 7, automatically sprays almost any type of flat article which does not exceed 4 feet in width. The guns, mounted on long arms, swing back and forth across the work very much the same as the human arm in manual spraying.

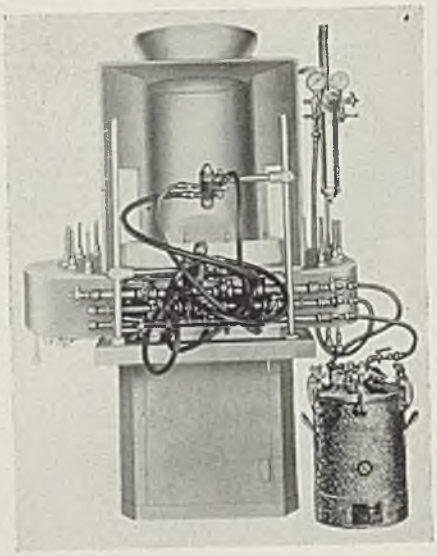
Fig. 2—This gang spray, directly below, possibly is the simplest form of automatic spray-coating machine. Designed for high speed where fine finish is not of first importance, it is mounted over a conveyor like the transverse machine, Fig. 8, but employs multiple guns to cover the surface instead of transversing it with one or two guns. This and remaining illustrations show DeVilbiss equipment

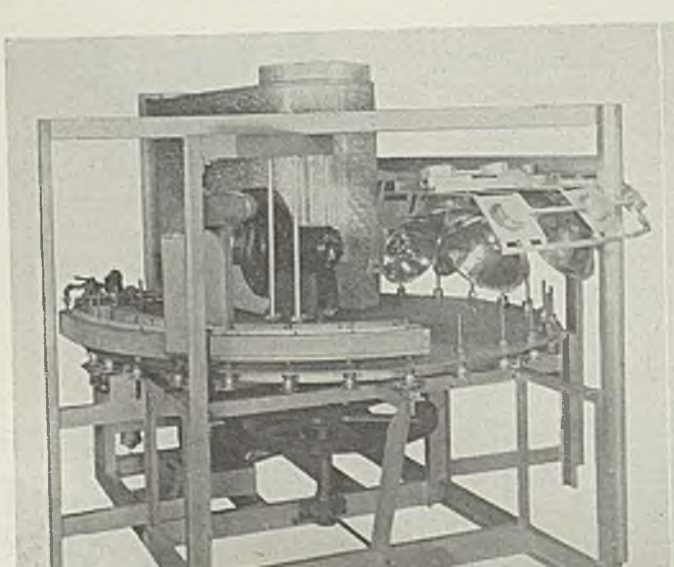
Fig. 3—This medium size rotary, at right, easily handles containers, toys and other small objects at rates up to 3600 per hour. A light-duty machine similar to this but with only 15 spindles has finished more than 10,000 pieces in an 8-hour day

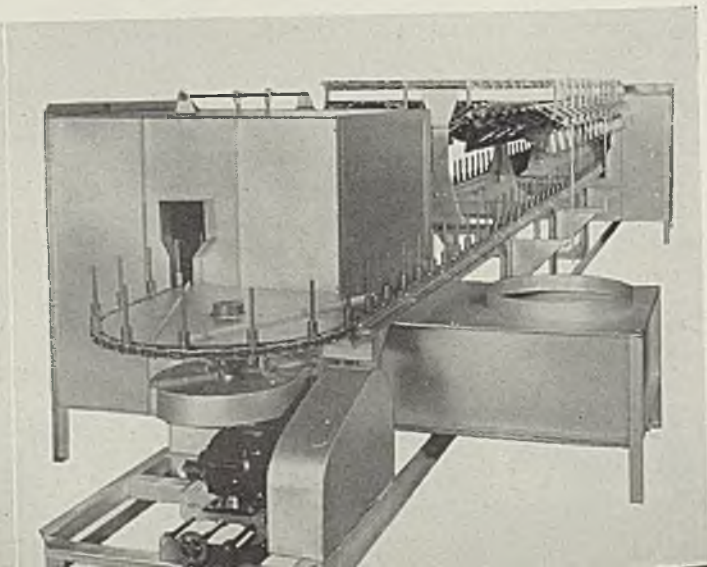
Fig. 4—This larger unit, bottom left, finishes 900 clock cases per hour and is equipped with infra-red lamps and a forced draft drying system

Fig. 5—Conveyor-type rotary machine with infra-red lamps and drying oven, bottom right, finishes 1000 shallow drawn automobile parts per hour

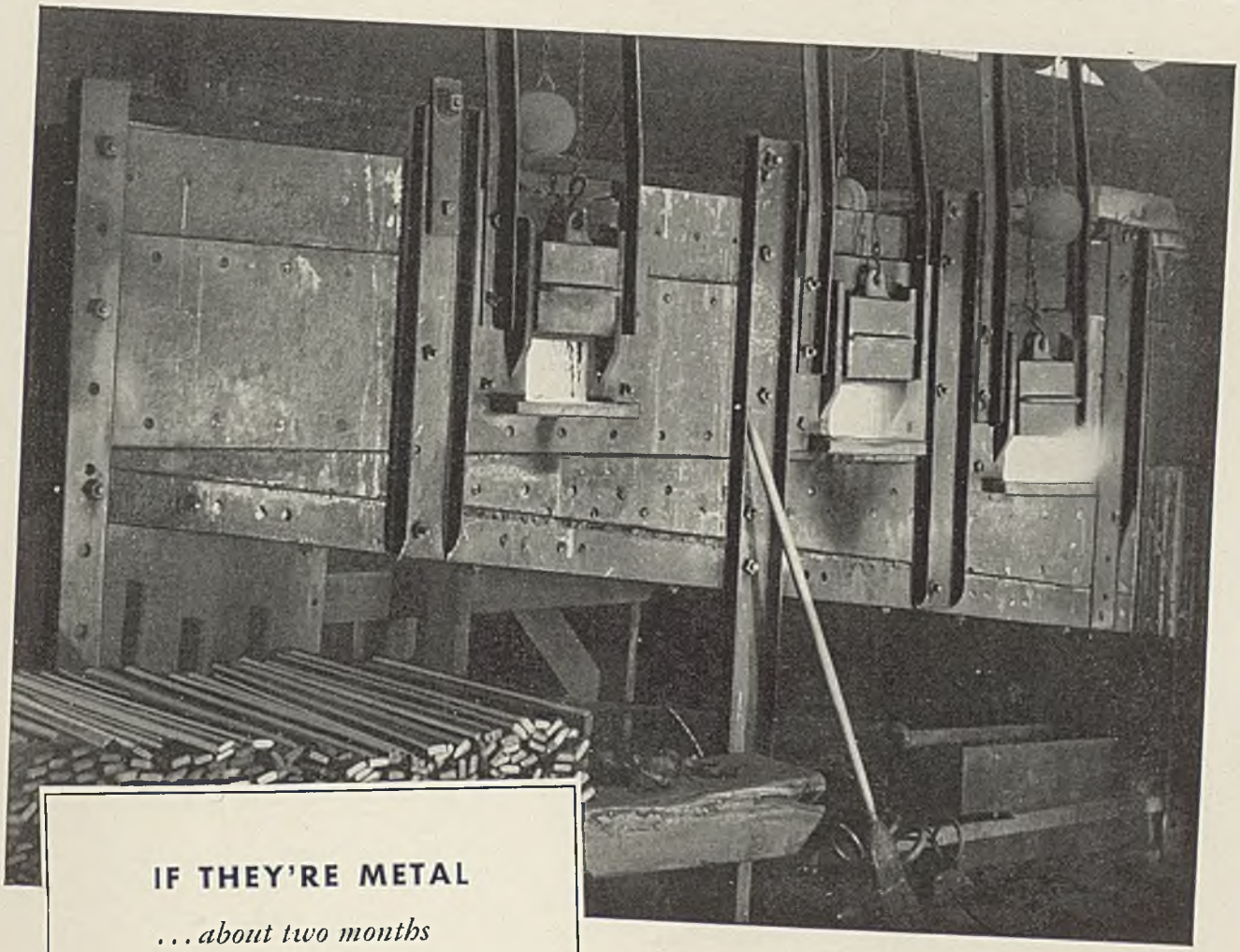








HOW LONG DO SKID RAILS LAST?

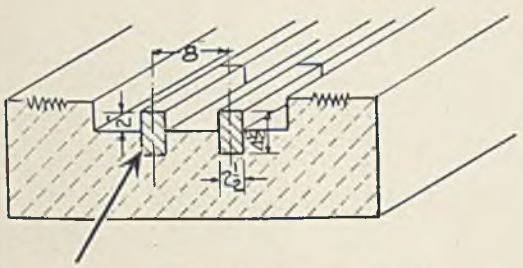


IF THEY'RE METAL

... about two months

IF THEY'RE "CARBOFRAX"

... at least one year at this plant



Detailed construction of "Carbofrax" skid rails as installed above. After 12 months, only about 2 feet had to be replaced at discharge end.

REFRACTORY CARBORUNDUM PRODUCTS

● "Carbofrax" skid rails built up of brick and special shapes of "Carbofrax," the Carborundum Brand Silicon Carbide Super Refractory, certainly have made an attention-getting record in this plant.

These "Carbofrax" rails, fifteen feet long, are in a pusher type oil fired furnace handling steel bars. The furnace operates 12 hours a day at 2200° F.

After twelve months only about two feet of the "Carbofrax" rails had to be replaced at the discharge end. Alloy rails, formerly used, had to be completely replaced about every two months.

This is but another example of the savings to be gained through the use of "Carbofrax" in metallurgical and heat treating furnaces. Why not call in our nearest listed refractory representative for a discussion of your complete super-refractory requirements?

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District Sales Branches: Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh. Distributors: McConnell Sales and Engineering Corporation, Birmingham, Ala.; Christy Fire Brick Company, St. Louis, Mo.; Harrison & Company, Salt Lake City, Utah; Pacific Abrasive Supply Company, Los Angeles, San Francisco, Calif.; Denver Fireclay Company, El Paso, Texas; Smith-Sharpe Company, Minneapolis, Minn.

(Carborundum and Carbofrax are registered trade-marks of and indicate manufacture by The Carborundum Company)

The Coal Carbonization ... modernizes and expands for ...

ght oil recovery plant at
mill has a capacity of
gallons of crude light oil
y, which is refined at an-
plant. There is a contin-
wash oil purifier which
es muck from the circulat-
ash oil and prevents un-
ble deposits in the scrub-
d tubular equipment.

Here is a simple light oil recovery system at a gas plant with a capacity of 6,000 gallons of crude light oil per day. It has no rectifier but has a continuous motor benzol recovery column. The scrubber is a single steel spiral-packed tower.

Light Oil Recovery and Refining Plants Recently Installed by Koppers

Many American companies are modernizing their light oil plants to provide the nation with essential toluol output.

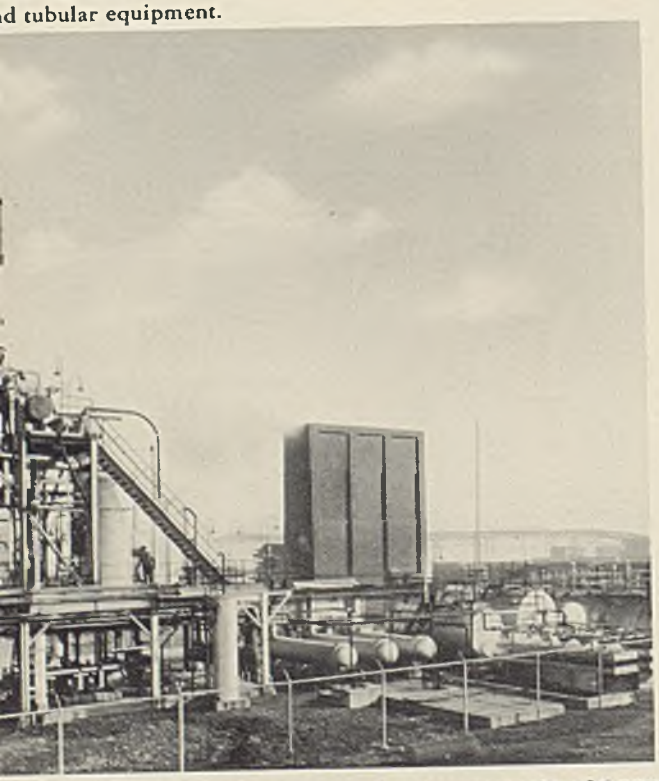
The plants shown on these pages, all built by Koppers, represent an annual capacity of 26,000,000 gallons of light oil or 4,000,000 gallons of toluol, of which 6,500,000 gallons of light oil or 1,000,000 gallons of toluol are new production.

These plants include a wide variety of designs, which cover every requirement. Koppers will be glad to have representatives discuss this subject with you personally.

KOPPERS LIGHT OIL RECOVERY AND REFINING PLANTS HAVE BEEN RECENTLY COMPLETED OR ORDERED FOR

Wheeling Steel Corp.
Dominion Steel and Coal Corporation, Ltd.
Algoma Steel Co.
Connecticut Coke Co.
Bethlehem Steel Co.,
Philadelphia Coke Co.
Eastern Gas and Fuel Associates
Brooklyn Union Gas Co.

KOPPERS COMPANY
Engineering and Construction Division, Pittsburgh, Pa.

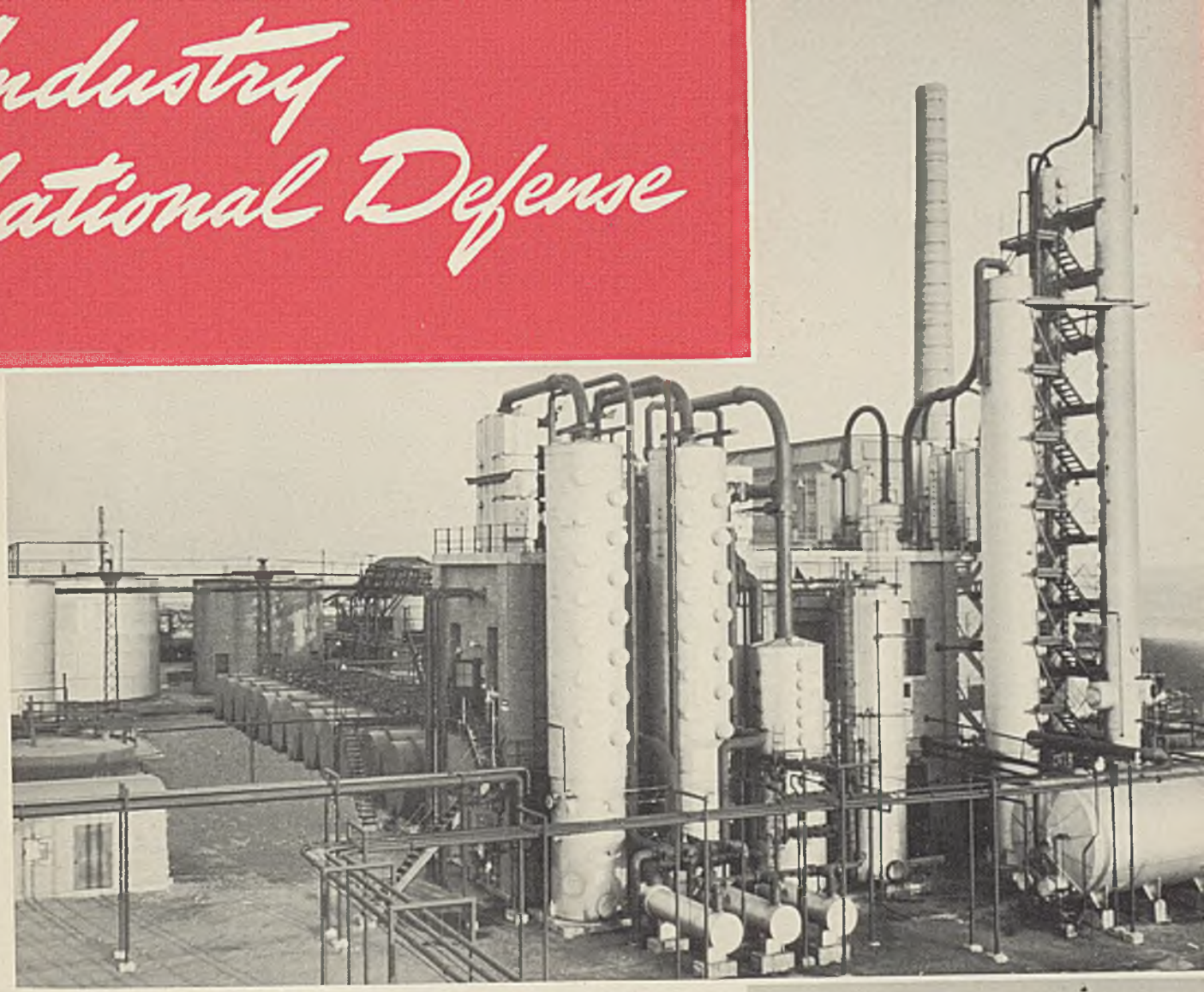


s light oil recovery system at a gas plant has a capacity of 6,000 ons of crude light oil per day. It has a continuous motor fuel mn and heating is provided almost entirely by dowtherm vapor liquid generated in a gas-fired boiler. There is a wash oil pur- and a light oil rectifier.

The usual wood hurdles are replaced in this new scrubber with steel spiral packing and this one scrubber has the same recovery efficiency as customarily obtained with two scrubbers in series.

Koppers built the light oil recovery installation at this steel plant and a year later built a refining plant. It has a capacity of 10,000 gallons of crude light oil per day.

Industry National Defense

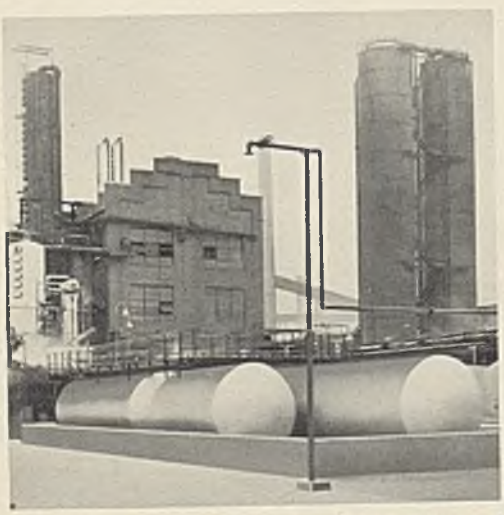


This is the largest complete light oil recovery and refining plant built in the last 20 years. It can recover 24,000 gallons of crude light oil per day and refine 34,000 gallons.

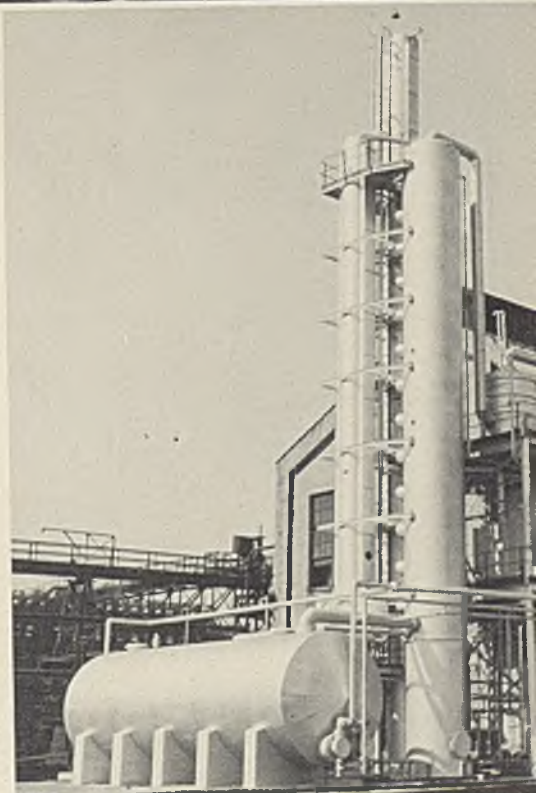
Refining is semi-continuous. Forerunnings and motor fuel are produced continuously. Toluol and xylol are produced in batch operations. A separate batch still produces crude solvent and naphthalene from the intermediate crude light oil fraction boiling above 150°C.

The semi-continuous plant affords the utmost flexibility in production of any and all grades of crude and pure products.

Koppers coordinated this refining plant with an existing recovery plant. It has a capacity of 9,000 gallons of crude light oil, producing toluol, as well as motor and



This plant was modernized with new stills and accessories about ten years ago and, within the past year, its capacity has been extended to permit it to refine the crude light oil from three other recovery plants.

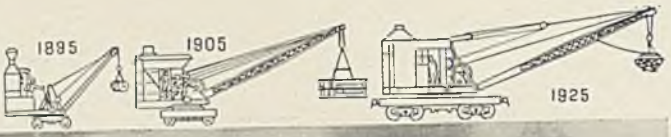


This first semi-continuous refining plant has a c
ity of 12,000 gallons of crude light oil per day
the continuous operation and 32,000 gallons fro
batch units. The difference is in crude light oils
another plant. It has two continuous rectifying col

There is no substitute for experience!

In all phases of life experience is the best teacher. The 1941 Industrial Brownhoist Crane for example is the result of over 50 years of brainwork and toil — of engineering research and experiment — of hundreds of operating tests under a wide variety of conditions. The crab mechanism operates with a smoothness never before thought possible. The Power plant develops a maximum of power with a minimum of fuel consumption. Cabs allow greater visibility. The undercarriage is built with a greater strength and power than ever before. Largely because of the many years experience in building cranes, the modern Industrial Brownhoist crane does an unusually low-cost job of material handling.

It will pay you to profit from Industrial Brownhoist's experience in building cranes. Write today for further facts about Industrial Brownhoist Gas, Diesel, or Steam locomotive cranes in capacities from 10 to 250 tons.



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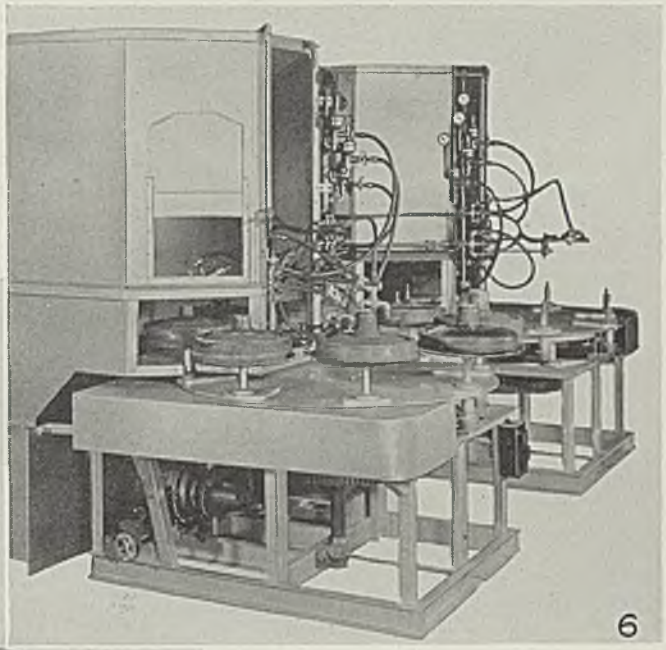
INDUSTRIAL BROWNHOIST
BUILDS BETTER CRANES

Fig. 6—Heavy-duty dual machine painting automobile wheels automatically. Fig. 7—This is a swinging arm machine. Each of the two swinging arms shown at far end of setup carries a spray nozzle and is moved back and forth across the work by motor-driven cams underneath the supporting framework. Note infra-red drying station on conveyor. Fig. 8—Above is the bare mechanism of a horizontal transverse spray machine for coating large flat surfaces. It is placed over a conveyor and inside a spray booth, as shown in Fig. 8A, to make a complete finishing setup. Guns move back and forth across the work



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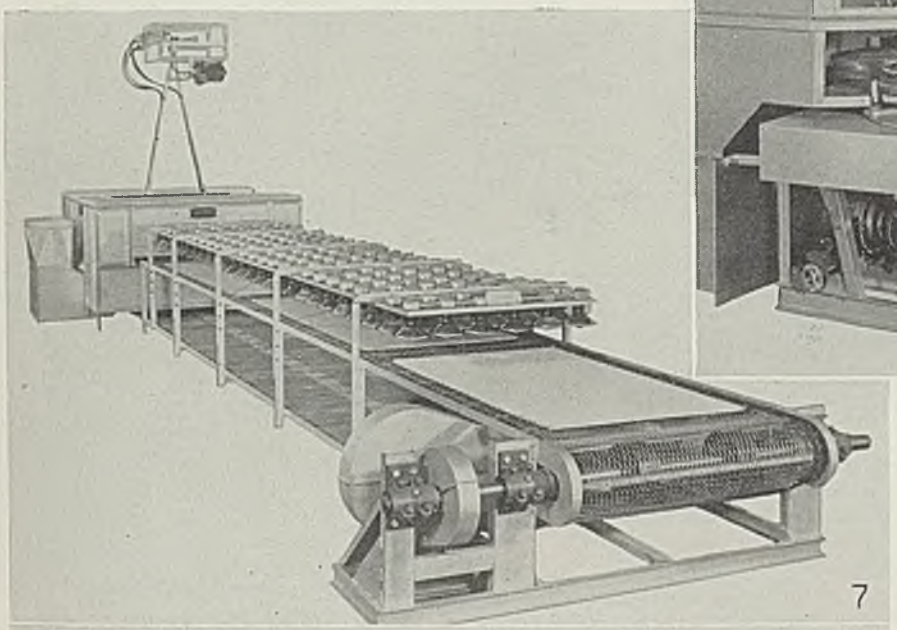

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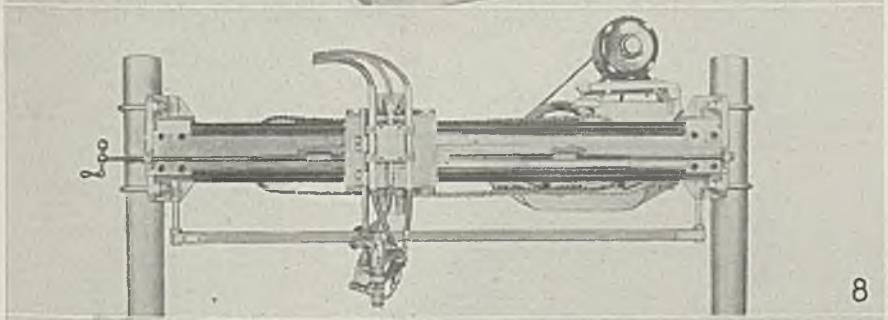

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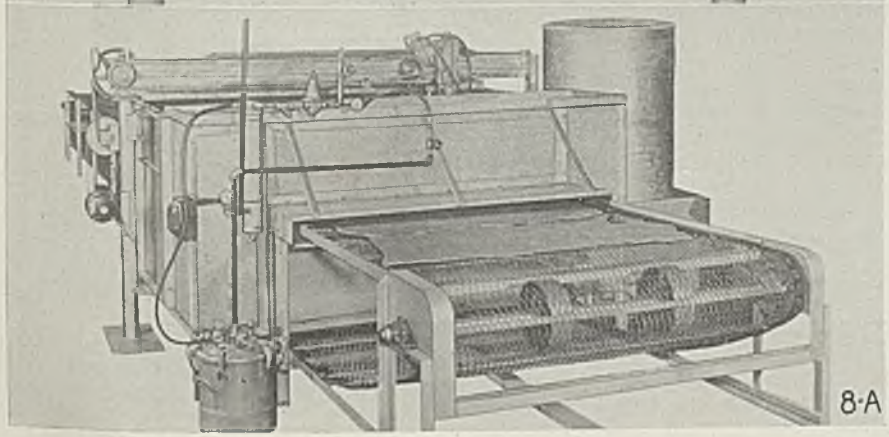


8-A

Another machine for automatically spraying flat objects as they are conveyed in a horizontal position is called the horizontal transverse spray coating machine, Fig. 8. Designed for operation over a conveyor, the work passes under the guns as they move back and forth across the work. This machine is usually employed for coating larger objects such as sheets and nearly flat objects. It can be detailed to fit product, conveyor speed, coating material or other condition which must be reckoned with in automatic spray operation.

Sometimes the transverse machine is mounted vertically instead of horizontally—and such a machine can really do tricks. See Fig. 9. This type of machine is usually employed to coat both sides of panels or forms as they move before the guns suspended from an overhead conveyor. The guns move up and down and can be mounted to spray one or two sides of the product, edges, around corners and other difficult spots which all must be caught in one spraying operation.

Broad Scope: While these units just described are four of the basic designs of automatic spray coating and finishing machines, each can be adapted to a multiple of special operations. Special machines of unusual nature are being built to handle peculiar finishing operations which can be accomplished automatically if justified by the speed desired and volume of production. Hardly a day passes but some manufacturer installs a machine specially designed and built to meet the particular requirements of his finishing operation to speed up his production and lower his costs.

One manufacturer finishes 3000 camera parts an hour, another does 1200 lamp shades. Pipe is painted at a rate of 200 feet a minute, shingles coated two a second. Nine hundred clock cases are finished in an hour on a rotary machine, 10,000 doll heads in an 8-hour day.

Another machine does 120 finely finished pieces of table ware, lipstick cases are coated at a speed of 3000 per hour and automobile wheels at 1200 an hour. Automatic machines spray paint on axle assemblies, glue on veneers, dyes on leather, porcelain enamel on metal panels, graphite on gaskets, paraffine on cartons, lacquer on golf balls. Wherever there is a volume coating or finishing operation to be done, it can be accomplished with speed, economy and quality of fin-

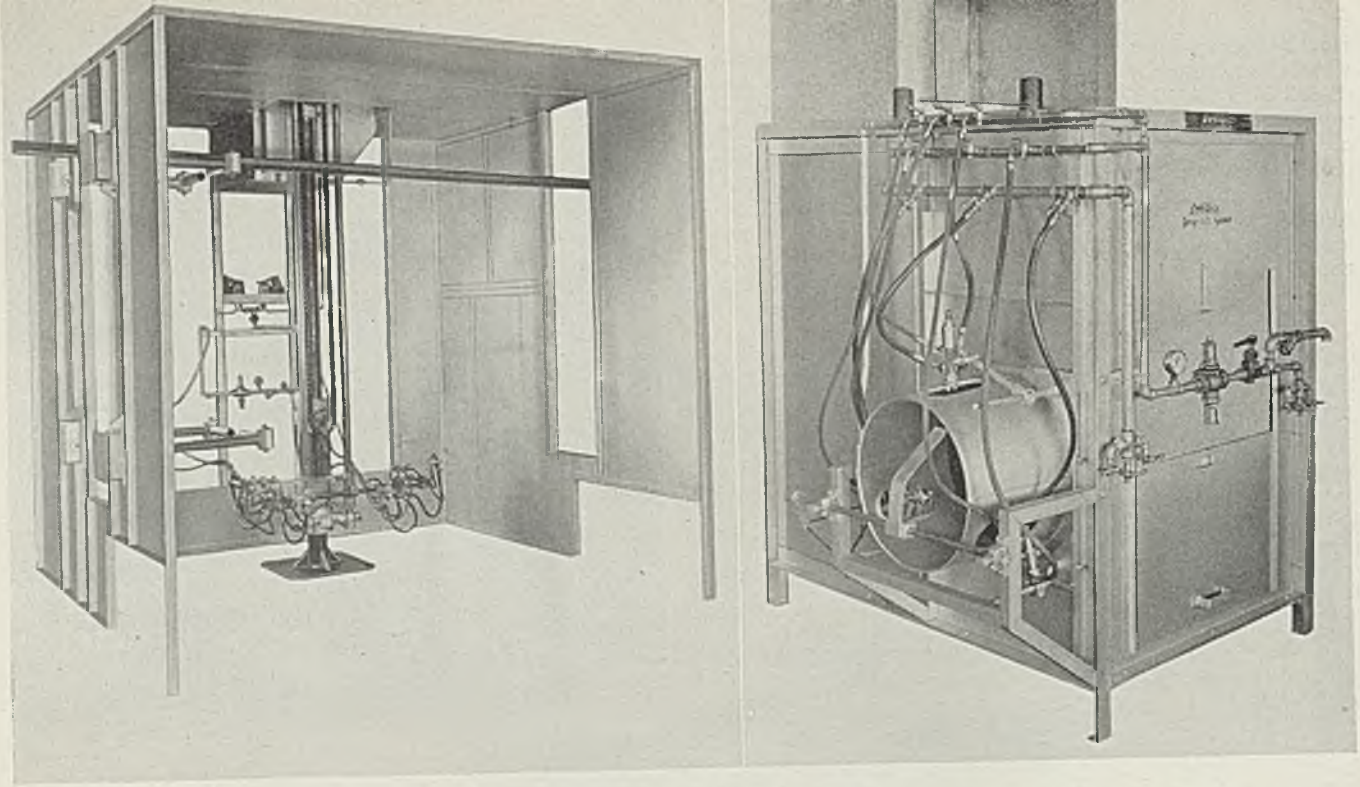


Fig. 9. (Left)—Here the spray heads are mounted on a vertical slide with a drive arranged to move them up and down while they are set at such angles as to spray sides, tops and edges of the work which passes through the spray booth on the overhead monorail conveyor. This setup handles refrigerator body panels at high production rates

Fig. 10. (Right)—This is a high-speed fully automatic machine for coating the exterior of pipe. It is a good example of how a special machine can be built for a specific job

ish by an automatic machine just as satisfactorily as machine operations can be utilized in other production processes.

Laying Out the System: One manufacturer of such automatic spraying equipment points out that there are three important points to be taken into account when considering the possibility of using such equipment: The shape and contour of the objects to be finished, the type of coating material to be applied, the maximum production requirements desired. His method of designing an automatic spray machine for a specific job—and most jobs do require a made-to-order design—is to have the prospective user send in five or six samples of the objects to be sprayed, together with a small quantity of the finishing material to be applied. Then with the samples and knowing the production rates that are desired, the spray equipment manufacturer figures out the kind of machine that should be used and its production possibilities.

Conveyor equipment is usually designed to tie directly into fabricating operations on the input side of the spray equipment, the work being carried directly into a continuous oven or through a bank of infra-red lamps to bake the finish upon emerging from the automatic spray. Often, the object may not be adapted to this type of finishing—or may best be handled by a combination of manual and semi-automatic equipment. In any event, the spray equipment must usually be engineered specifically for the work at hand if maximum economies and full production possibilities are to be obtained.

Another manufacturer of automatic spray equipment regards these setups to be so highly specialized that he has no "general purpose" automatic spray machines, deeming it necessary to precede each application by an exhaustive survey of the plant's requirements, followed up by special engineering in designing and constructing a machine exactly suited to the job.

Booklet Discusses Danger of Fire Gases

■ "Dangers and Health Hazards of Fire Gases," is the title of a handy booklet recently compiled by Harold Joe Davis, safety engineer, 3927 East Admiral Place, Tulsa, Okla. Its purpose is to familiarize those responsible for both industrial and public safety with the dangers of fire gases.

The booklet discusses such subjects as the action and behavior of fires, reactions of materials under fire conditions, and materials, chemicals and gases that are dangerous to life under fire conditions. Those interested may obtain this publication for 25 cents at the address mentioned.

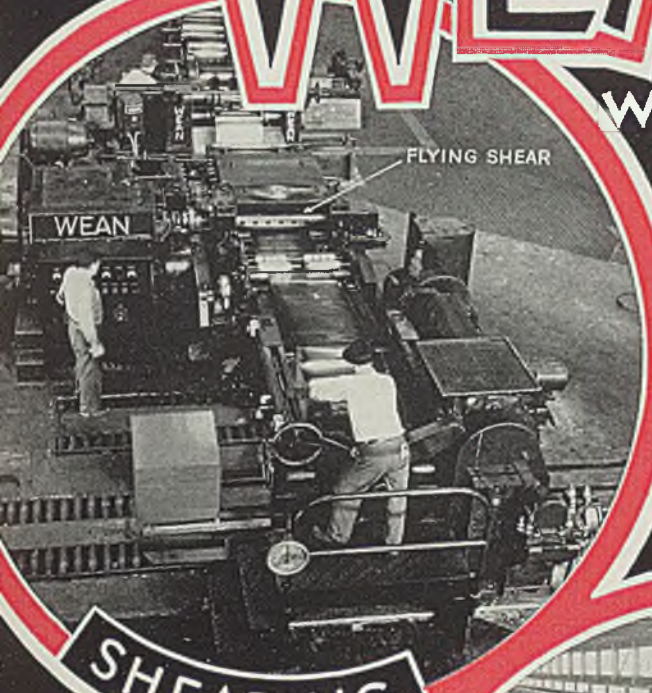
Atmosphere Developed for Heat Treating Magnesium

■ While present rate of airplane production is about 700 per month, a rate of 500 per day has been discussed. But production of 500 planes per day would require approximately 50 million pounds of aluminum alloy sheets per month against about 8 million at present. The "pinch" of a possible aluminum shortage is bound to result in an increase in the use of magnesium alloys, with as much as 90 per cent magnesium The heat treatment of this metal presents certain problems which are new. Desired heat treating temperature is in the neighborhood of 800 degrees Fahr. At that temperature, and even at somewhat lower temperatures, in an alkaline atmosphere, some magnesium alloys are subject to serious attack resulting in quite unsatisfactory surface conditions, if not physical properties.

Tests have been conducted which appear to demonstrate conclusively that these high magnesium alloys can be heat treated satisfactorily at temperatures even as high as 800 degrees Fahr. in typical convection type gas fired furnaces, if there is added to the convection gases a small percentage of sulphur dioxide. The amount required is only enough to put the atmosphere on the acidic side, according to information released by the Committee on Use of Gas in National Defense, Industrial and Commercial Section, American Gas Association, New York.

THE WEAN ENGINEERING CO. Inc.

WARREN
OHIO



SHEARING

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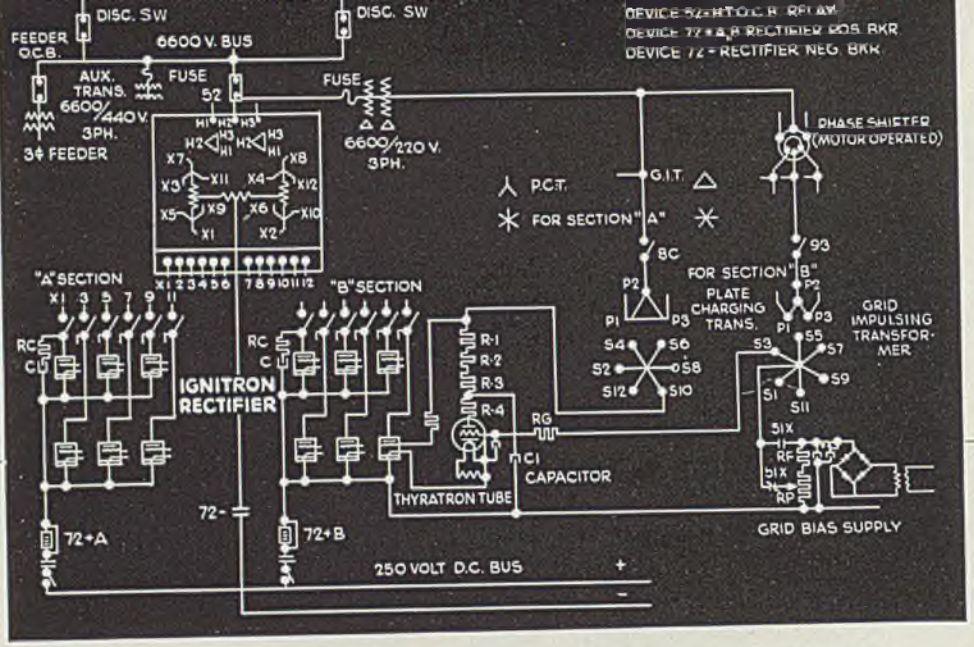
PECIALISTS IN SHEET, TIN AND STRIP MILL EQUIPME



Schematic diagram for first steel mill rectifier substation. Power circuits shown at left, typical control circuit at right

The Steel Mill's First Ignitron Substation

Ignitron unit with voltage regulating control and automatic switchgear handles loads of 200 to 300 per cent rated value for considerable periods of time without stress. Damage to electrical equipment by dust and corrosive gases in ventilating atmosphere is minimized by water-cooled system. Installation at steel plant in Pittsburgh district meets necessity for faster automatic operation of power supplying circuits

By R. R. LONGWELL

Switchboard Engineer
Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

■ INSTALLATION of an ignitron rectifier, the first in the steel industry, has recently been made at the Edgar Thomson works of the Carnegie-Illinois Steel Corp. Replacing an outdated 1000-kilowatt motor-generator substation, with all its auxiliary equipment, the 1000-kilowatt ignitron unit with voltage regulating control, and automatic switchgear gives the substation a short time overload capacity of some 100 to 200 per cent higher than before. Because the substation was located where atmospheric conditions were severe, the water-to-water cooled ignitron eliminated the cleaning and ventilation problems which would have been encountered with forced air-cooled equipment, thus reducing considerably the rehabilitation cost of the station. Other features include quiet operation, and reduced station maintenance brought about by the absence of rotating equipment.

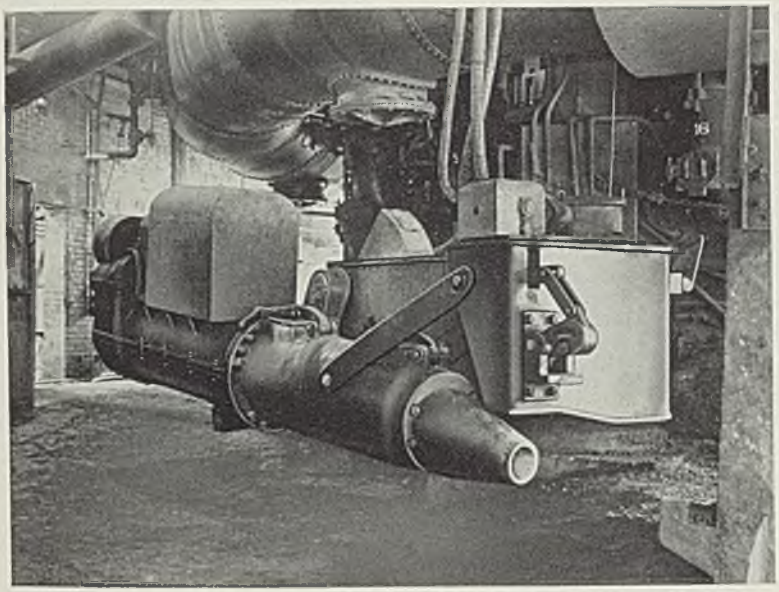
Equipment Needed Reconditioning: Increased production needs and the necessity for faster and surer automatic operation of power supplying circuits necessitated increasing the overload capacity and modernizing of an existing 1000-kilowatt motor-generator substation. Simplest method, at first, seemed to point toward a complete modernization, utilizing the existing equipment. Investigation, however, disclosed that prevailing severe atmospheric conditions had seriously affected all of the existing equipment which was housed in an old style building having ordinary louvres. Rehabilitation of all relays, rewinding of the direct-current generator and new, modern heavy duty direct-current breakers seemed to be the minimum requirement in order to approach present-day demands. In addition, if the equipment was to be kept free from the damaging effect of fumes, dirt, and gases, expensive air cleaning equipment would be required. The building, of course, would have to be partially rebuilt to accommodate the cleaning and ventilating equipment.

Rectifier Breaks Mill Tradition: Company engineers, looking for something to eliminate extensive building reconstruction and requiring minimum air volume for cooling, abandoned rotating machinery and decided upon the installation of a 1000-kilowatt ignitron rectifier having voltage regulating and control equipment. The ignitron, by eliminating major reconstruction costs, made it economically practicable to dispose of all the old equipment, even the old switchgear, which is replaced by a complete new set of automatic switchgear.

Exerting none of the reaction torques of rotating equipment, and using water as a cooling medium, the ignitron needed no special foundation, and did away with any need for a large capacity ventilating system. Although of the same capacity as the old motor-generator set, the rectifier has a far greater overload capacity. Because rotating parts are eliminated, it requires less maintenance. From the overload angle alone, the ignitron far surpasses rotating equipment by its ability to handle loads of 200 and 300 per cent of rated value for considerable periods of time without stress or damage. In addition, all equipment is now the latest and

BAILEY EQUIPMENT PERFORMS THE TWO MOST DIFFICULT OPERATIONS ON THE BLAST FURNACE FRONT

Surely and Efficiently



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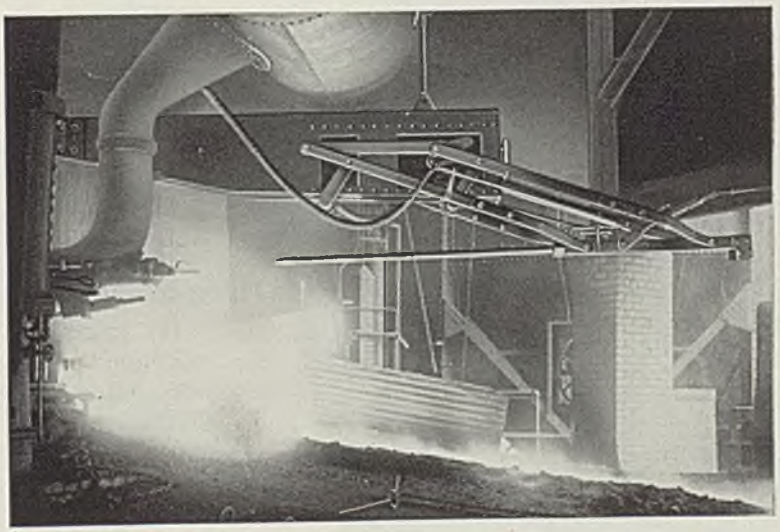
Its 9½ cu. ft. clay capacity at 600 lbs. pressure per square inch assures a long plug of denser clay, which guarantees sureness and safety in plugging the Tapping Hole continuously.

THE BAILEY CINDER NOTCH STOPPER

ACCOMMODATES ANY CINDER NOTCH

Provides safety to men in closing the Cinder Notch at end of flushing period. It is unnecessary for anyone to approach the Cinder Notch when inserting or withdrawing the Botter Rod.



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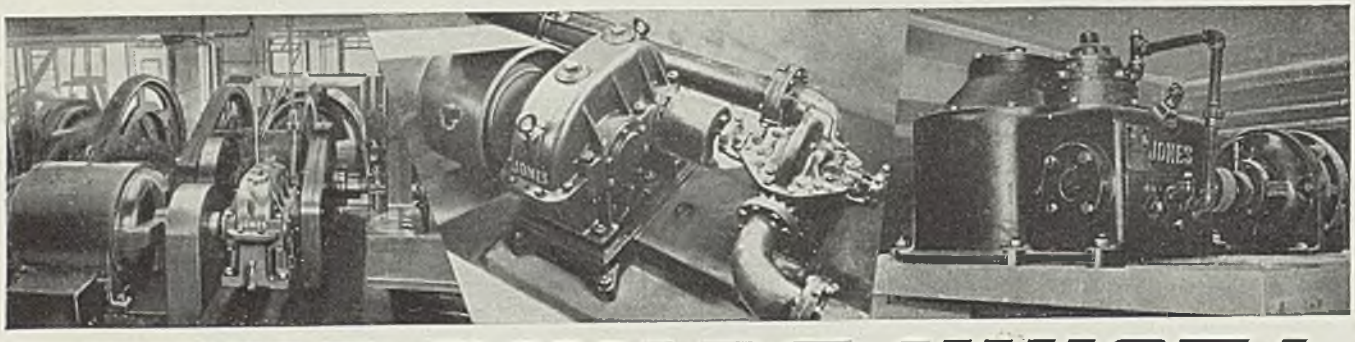
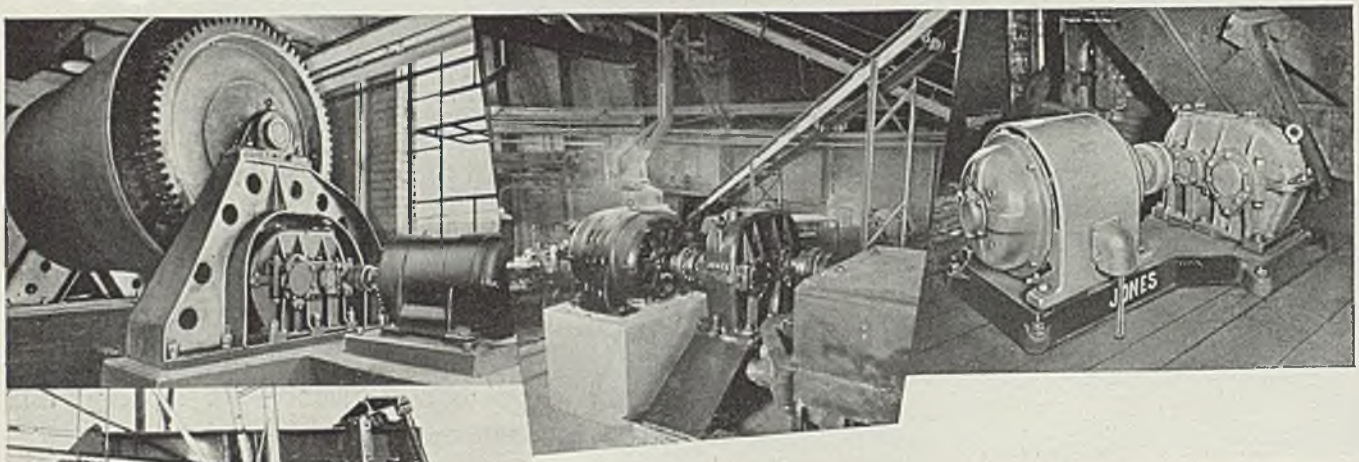
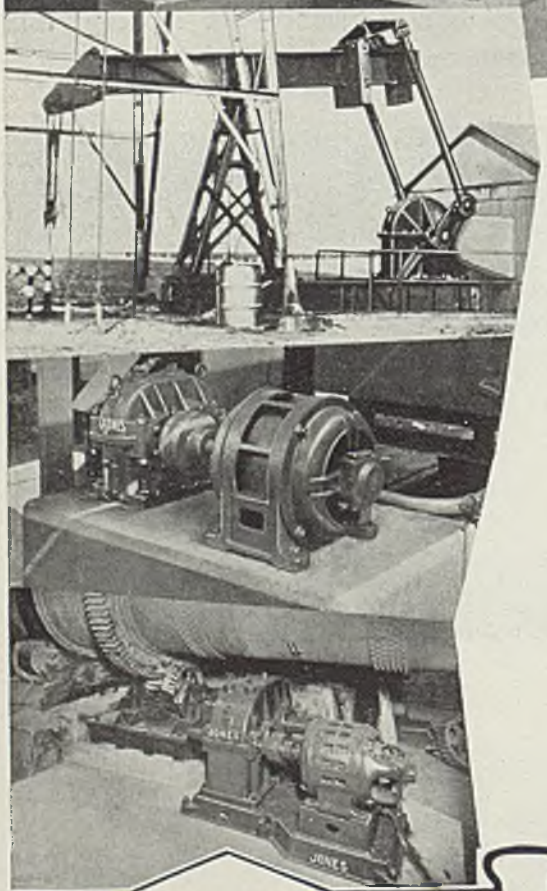


WHO BUILDS WHAT!





THESE are days when a knowledge of who builds what is so important that we have just issued a new 20 page bulletin entitled "Jones Drives for Industry."

In addition to the standard lines of Jones Herringbone, Worm, Worm-Helical and Spur Gear Speed Reducers, Jones Cut and Molded Tooth Gears and other Jones standard transmission products, it will give you a better conception of the specialized Jones Products such as car pullers, skip hoist drives, furnace door hoists and other odds and ends that you may need in a hurry any day.

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W. A. JONES FOUNDRY & MACHINE COMPANY

4437 Roosevelt Road, Chicago, Illinois

• These illustrations show application of Jones drives to solve a wide range of industrial power transmission problems.

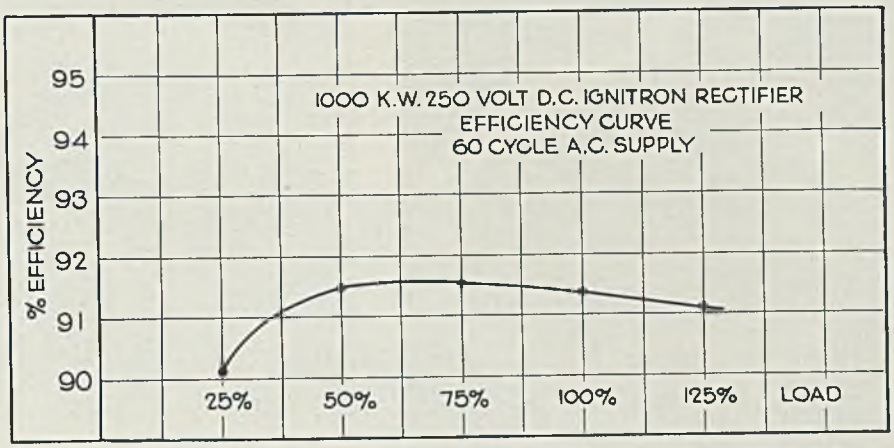
Jones Since 1890

HERRINGBONE—WORM—SPUR—GEAR SPEED REDUCERS • CUT AND MOLDED TOOTH GEARS • V-BELT SHEAVES

ANTI-FRICTION PILLOW BLOCKS • PULLEYS • FRICTION CLUTCHES • TRANSMISSION APPLIANCES

most up-to-date in design. Breakers, both alternating and direct current have all the features, and interrupting capacities necessary for reliable operation on present-day high-power steel mill circuits.

Another factor governing the change to the ignitron rectifier was the ease with which it could be adapted to use on either 25 or 60-cycle voltage. At the present time all equipment is operating on 25 cycles. At some time in the near future a change will be made to 60 cycles. At that time it will merely be necessary to remove a reactor connected in series with the primary of the rectifier transformer, and replace a few minor small transformers in the rectifier control.



Efficiency curve showing the fairly high efficiency of the rectifier under all loads

Component Parts of Unit

The ignitron rectifier consists of two 500-kilowatt, six single anode tank units with a 12-phase transformer and interphase transformer, both in a single tank, for supplying energy at 250 volts direct current to the mill bus. The transformer is self-cooled and installed outside the substation building with an enclosing metal duct to carry the anode loads through the wall into the building. The two units of the rectifier are mounted on insulators in one end of the substation building and are enclosed behind a grille fence. Cooling of the rectifier is accomplished with a water-to-water heat exchanger, automatically controlled to reduce the amount of cooling water required to a minimum. It is because cooling is accomplished through the medium of water that no appreciable amount of ventilation is required in the station. Simple filters used with ordinary ventilators are entirely adequate.

Switchgear Is Automatic: The primary switching equipment consists of two remotely operated oil-immersed disconnecting switches, one on each of the two 6600-volt power supply lines feeding the substation. There is one feeder oil circuit breaker with automatic reclosing equipment, and a high-tension breaker unit for switching the rectifier on and off the line. This high-tension switchgear is of the metal enclosed, lift-up type in which is embodied all current and potential transformers for metering and protection. The automatic switchgear, for control and protection of the rectifier, is mounted, partly on the metal clad units and partly on three self-support panels.

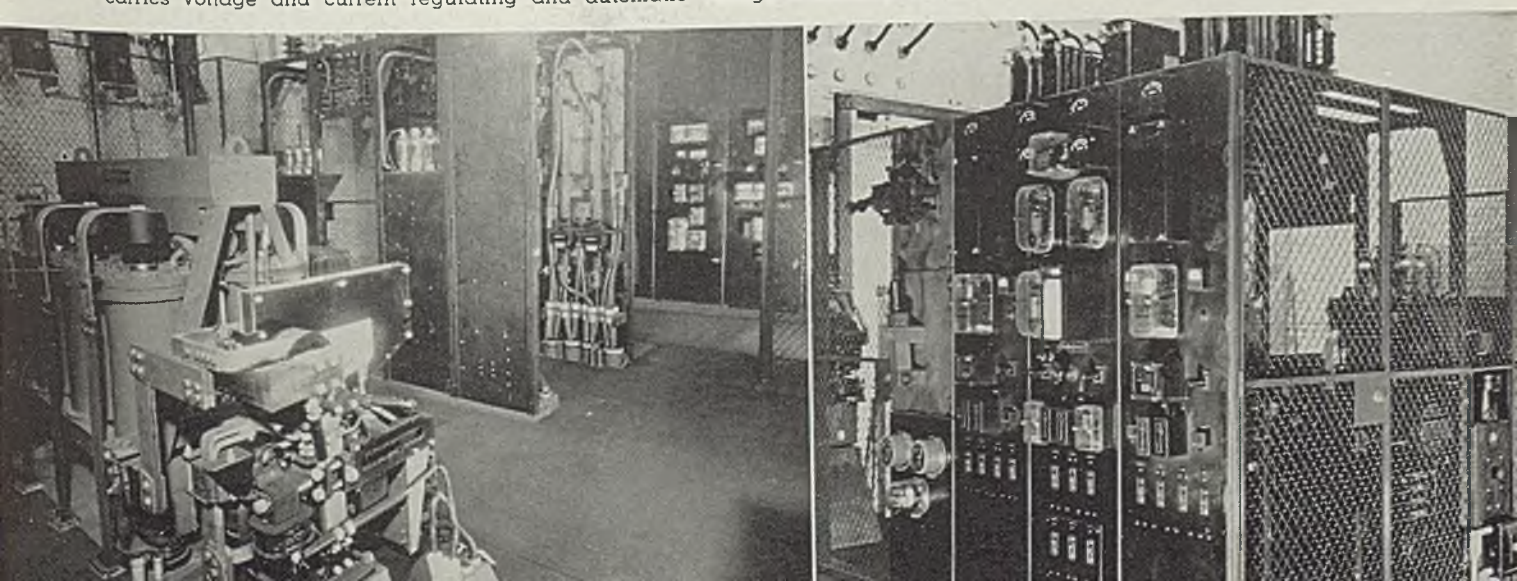
The control scheme is fully automatic; the rectifier is started and stopped from a remote mill power control point by the mere operation of a hand control switch. The control switch operates a master relay in the substation. All operations essential to completing either the starting or stopping function are completely automatic and, at all times the unit is protected from damage due to severe overload, short-circuit, or other fault conditions by protective relays.

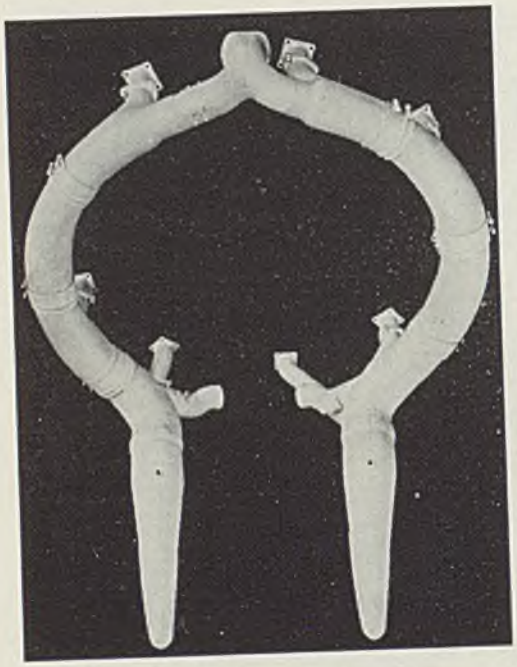
The rectifier has its arc ignited by thyratron tubes with plate charging and grid biasing transformers. The filaments of the tubes are energized continuously as the rectifier operates most of the time. Such tube operation eliminates delays in starting incidental to filament heating time requirements.

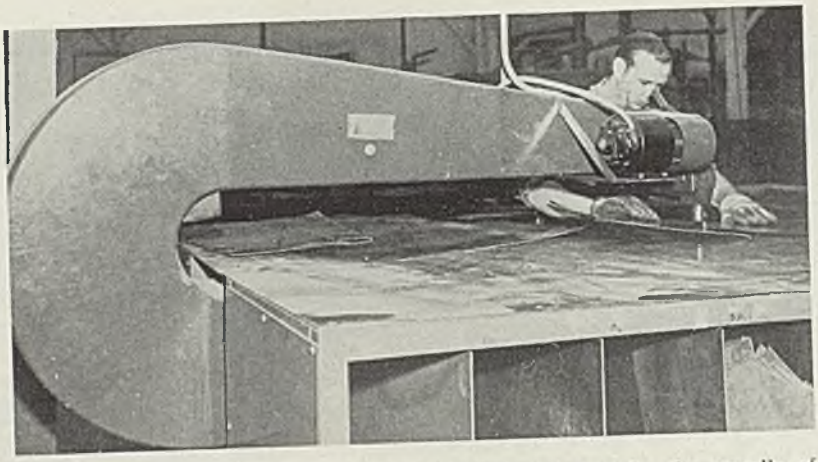
The time required to place the rectifier in operation is short and would be only a few seconds except for the requirement for matching the rectifier and direct-current bus voltages before closing the negative breaker. The time required to match these voltages varies with the stability of the bus voltage and the per cent that it is away from normal value. Under normal voltage conditions, the rectifier will be delivering power about 5 seconds after its start button is operated. This time delay, incidental to matching voltages may be eliminated in the future by maintaining the rectifier voltage below that of the bus before closing the direct-current breaker. As soon as the breaker closes the rectifier voltage may then be raised gradually to the normal

(*Please turn to Page* 104)

To the right of the 6-anode rectifier is the 250-volt negative circuit breaker which connects it to the load. Rear panel carries automatic rectifier control while far to rear a section of high-tension metal-clad switchgear is visible. Control for rectifier is contained on 3-panel sections to right. Each of the two end panels of the three carry automatic control for two ignition units. Center panel section carries voltage and current regulating and automatic voltage balancing control

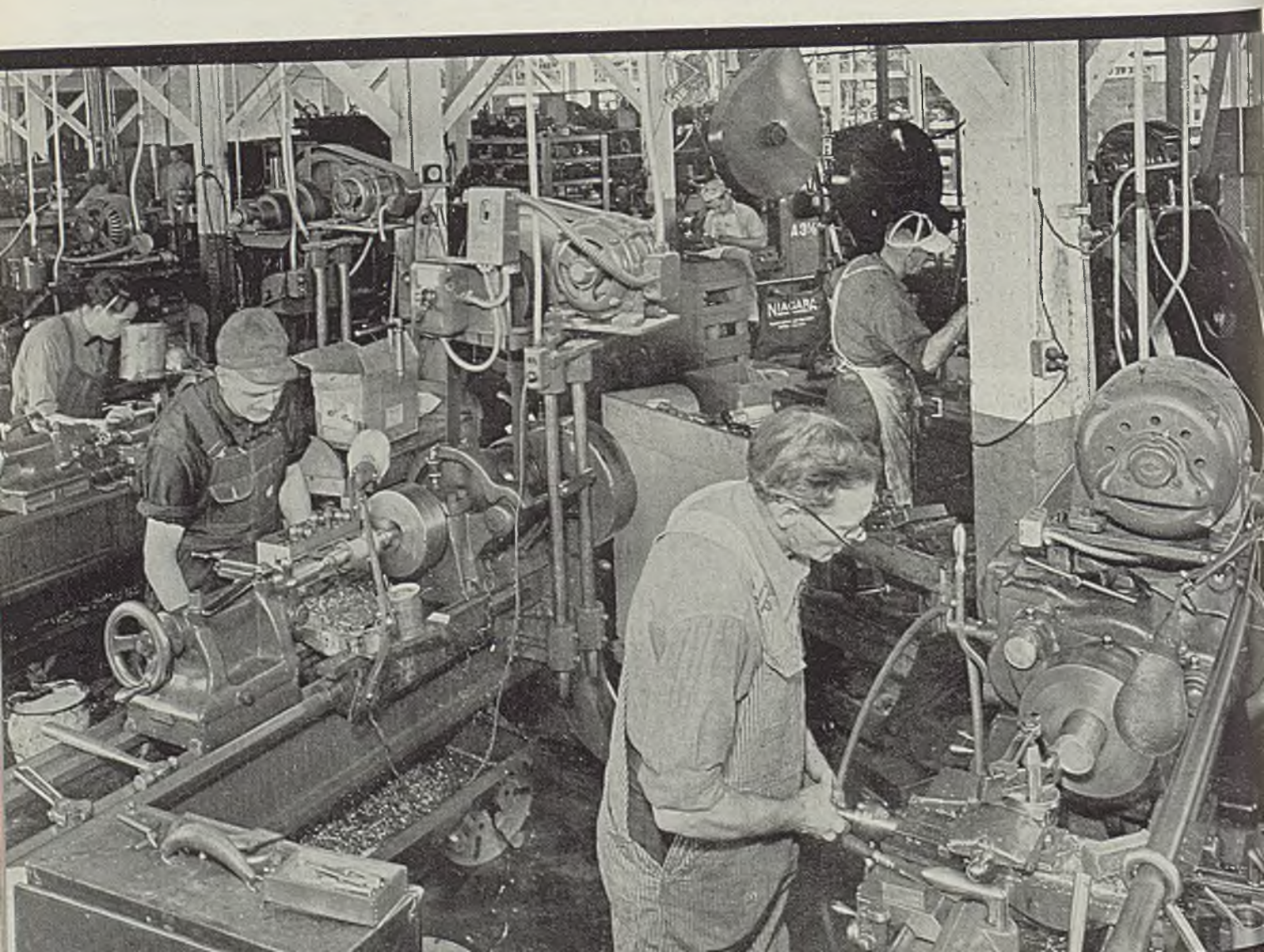






Arrow, opposite page, indicates exhaust collector ring under the nacelle of this United Airlines' passenger plane. At Solar Aircraft, irregular patterns are the rule for exhaust manifold drop hammer work. Powerful shears, above, cut the stainless steel to shape. This single exhaust manifold for nine cylinders, left, has two outlets and equipment for tapping heat. Note joints between cylinders which allow for expansion and contraction. Points of attachment of the Solar exhaust manifolds to the cylinder ports must match accurately to insure gas tightness. Hence considerable machining, as shown below, is necessary

Stainless Steel in the



The "depression" in this particular case put the "Indian sign" on the aircraft exhaust manifold, the former bugaboo of the industry. It was the impetus that caused the introduction of collector rings that could take terrific punishment

"Hot Spot"

■ THIS MIGHT be called "The Adventures of Stainless Steel in the 'Hot Spot' "—a title in keeping with the role stainless is playing in one phase of aircraft development—exhaust manifolds.

A number of years ago Solar Aircraft Co., San Diego, Calif., when in its "short pants" stage, was all set to produce and market a first-class metal airplane—an innovation as the use of metal for the skin was new. This plane was a complete success, so the company sank considerable time and money in it.

Then came the "big crash." The company found itself with one airplane—good but expensive—on its hands. And here is where the adventures of stainless in the "hot spot" began, for the company in studying the airplane market, waiting for its entrance cue which never came, noted one trouble common to all aircraft—exhaust manifolds. Until then, the manifold had received little attention, being treated as a sort of orphan both by airplane manufacturer and engine maker.

Aircraft operators, however, knew too well the importance of this item as they had replaced them all too often—an expensive procedure. And, the prime difficulty in building a good, serviceable manifold or collector ring lay in the material.

Many smaller craft of that day sidestepped the problem of conducting exhaust gases away by providing small stacks for each cylinder—letting the cylinders bark into the slipstream. But in larger planes, the dangers from carbon monoxide in the exhaust fumes, nearness of flame to fuel supply lines, etc., became acute—particularly with the army and navy planes using high-powered engines.

Ordinary steel could hardly be expected to hold up under conditions of excessive heat which cause grain growth leading to the rapid deterioration of metal, corrosive and erosive action of the exhaust gases, the exposure to the elements including freezing conditions, plus in the case of seaplanes, exposure to the corrosive action of salt spray. Thus stainless solved the material problem.

The making of a good manifold, however, did not end with the material. The problems of design, engineering and manufacture of exhaust manifolds for aircraft engines became compounded as the industry of aviation progressed.

For instance, between each cylinder, provision must be made for a slip joint—one that is gas tight as possible. Then too, the exhaust collection is started with the top cylinder and progresses down both sides, with the added gas of each succeeding cylinder coming into the ring. This means that as the ring approaches the bottom, it must increase in area of cross section to prevent back pressure which would impair the engine's efficiency. Also, the exhaust gases from each cylinder must be made to flow into the main collector with minimum disturbance. It also means the manifold is forced to a shape devoid of straight lines in any direction.

Added to this is the problem of fitting the collector ring under the nacelle without interfering with the multitude of controls, attachments and appurtenances packed into the already small space, the necessity of keeping the exhaust ring away from certain parts of the engine for safety.

At other spots it is desirable to utilize this waste heat. Thus the designing of a collector unit that can dart in and about closely packed cylinders crowding each breath of air for its cooling effect and simultaneously emitting huge quantities of hot gases is not simple.

The bulk of shaping these manifolds are thrown on special dies. And for this the company employs a drop hammer method, with the lead punch and zinc female die. Each section of the manifold is made in two halves—the halves welded up along the seam—the lugs, fittings and brackets also being welded where necessary. The accompanying illustrations give some idea of the problems that must be overcome and the work involved.

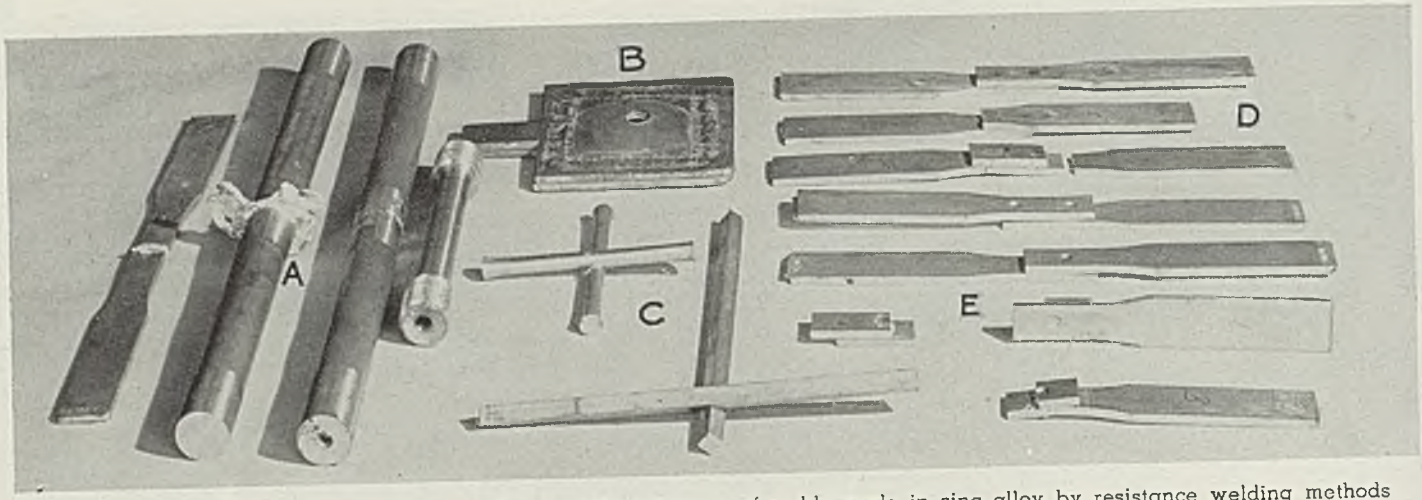


Fig. 1—Different types of welds made in zinc alloy by resistance welding methods

Now Zinc Alloy Diecastings Are Resistance Welded

By R. T. GILLETTE
Works Laboratory
General Electric Co.
Schenectady, N. Y.

Contrary to generally accepted opinion, it is quite possible to make satisfactory resistance welds in commercial zinc alloy diecastings. Here are revealed a number of tests on spot, projection, seam, cross-wire and butt-type resistance welds in this material—all successful welds

■ IT HAS been generally thought that the diecast zinc alloys could not be resistance welded successfully, but enough preliminary work has been done to show that this is possible in many cases.

The use of pulsation welding was of considerable help in making many of the welds described. This is a method of welding where the power is applied in several impulses instead of continuously. As an example, we may make a weld with eight impulses of power of five cycles duration with three cycles off between each impulse. This gives more accurate control of metals with various melting points, better heat distribution without overheating, and better cooling and longer life of electrodes in the case of high melting point metals.

The following types of resistance welds have been made: Spot, projection, seam, cross-wire and butt. Attempts were also made to make stud welds, that is, to weld a small stud or bar on end to a plate. These welds were not very successful.

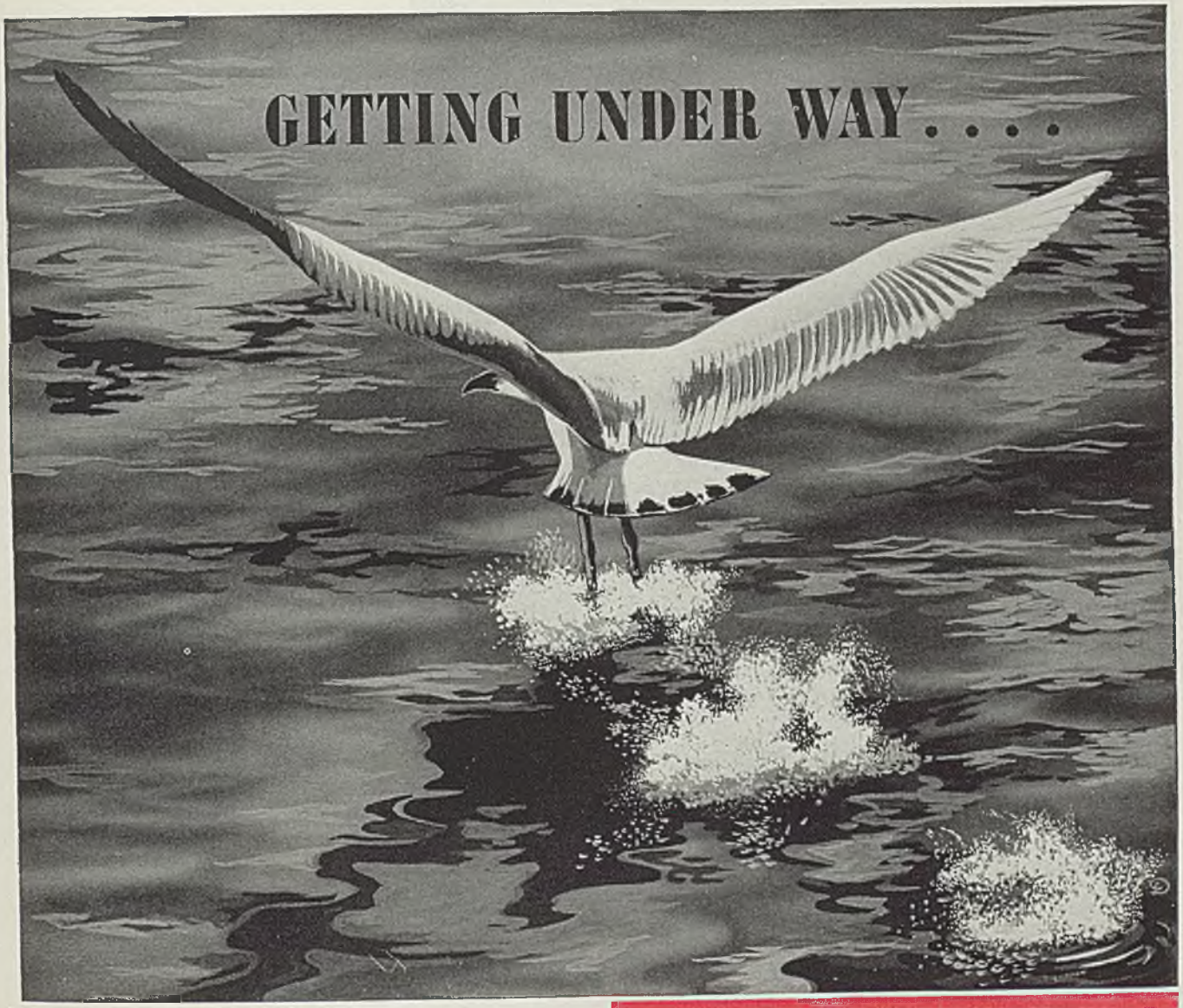
Fig. 1 shows the various types of welds made. At A are butt welds made in flat bar and round rods including one standard machined test sample. At B are two pieces, ⅛-inch thick, seam welded around the outer edge. At C is a cross-wire type of weld in round and also in square rod. At D are three spot-welded samples. At E are our projection-welded samples.

The following is a description of the welding procedure and test results: **At A:** Butt welds in ¾-inch diameter round rod, welding procedure—current 19,400 amperes; time 2.3 seconds; pressure 670 pounds. These specimens then were machined to standard ½-inch test specimens as shown. The tensile strength average of three specimens was 22,220 pounds per square inch. The ½ x ⅛-inch specimens: butt-welded; no record kept of welding procedure; tensile strength average two specimens 39,000 pounds per square inch. The higher strength in the smaller section butt welded may be explained by the fact that small cross sections are always stronger in proportion to their area in tensile strength than larger cross sections because of the diecast skins. Fig. 2 is a macrograph of a butt weld in the ¾-inch diameter rod, the breaks in the butt-welded specimens broke in the parent materials near the weld.

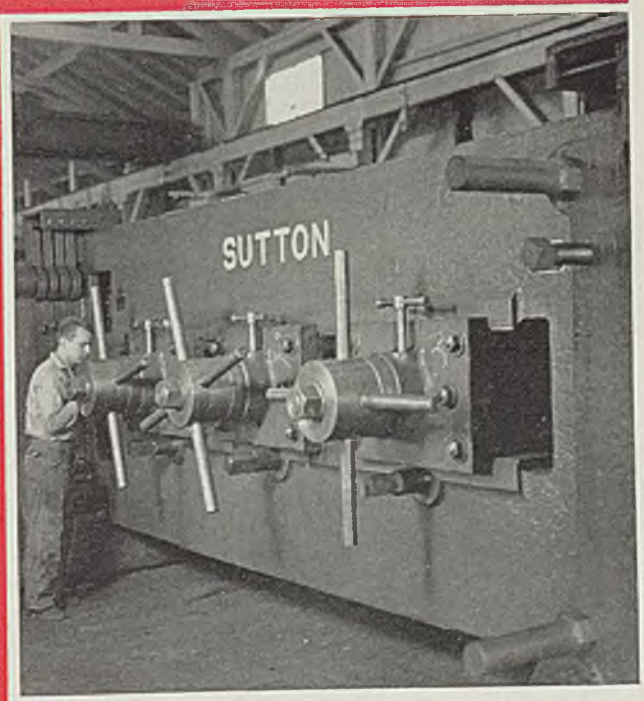
At B is a seam weld made by welding all around two pieces of ⅛-inch thick material with the following procedure: Both welding contact wheels were 9 inches diameter. Elkaloy with 11/32-inch wide face; wheel speed, 14 inches per minute; timing, 33 cycles on, 12 cycles off; current, 19,700 amperes; pressure on wheels, 1680 pounds welded under a flow of water. Test by screwing ⅛-inch standard pipe nipple in one piece and applying water pressure to area 2 x 2 inches inside of weld. Weld was tight at 200 pounds per square inch pressure. Above this, pieces started to separate, and at 300 pounds per square inch water pressure, nipple was forced out of piece, the weld still remaining intact. Fig. 3 is a macrograph taken through a longitudinal section of the seam weld.

At C: Cross wire welds crossing two ¼-inch round pieces. The following welding procedure was used: Electrodes material as B grooved to fit one-half the diameter of the rod. Pressure, 130 pounds; current, 7400 amperes; time, 8 impulses of power, 5 cycles on, 2 cycles off. Tests were made by bending two of the arms of the cross together

From *Welding Journal*, published by The American Welding Society, New York.



Do not delay in placing your orders for defense equipment: Bar Straighteners, Tube Straighteners, Sheet Stretchers, Cold Bar Stretchers, Hot Bar Stretchers, Roller Levellers, Mechanical Hammers, Tube Expanding Machines, Polishing Machines, Shape Straighteners, Sizing Machines, Gag Presses, Automatic Shearing, Straightening and Sizing Units, Reeling Machines, Shell Sizing Machines, Special Straighteners for upset end bars and tubes, and Mechanical Descaling Equipment.



Sutton's Largest Straightener. Weight, 250,000 pounds.

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Fig. 2—Butt weld on ¾-inch diameter rod

Fig. 3—Longitudinal section of a seam weld

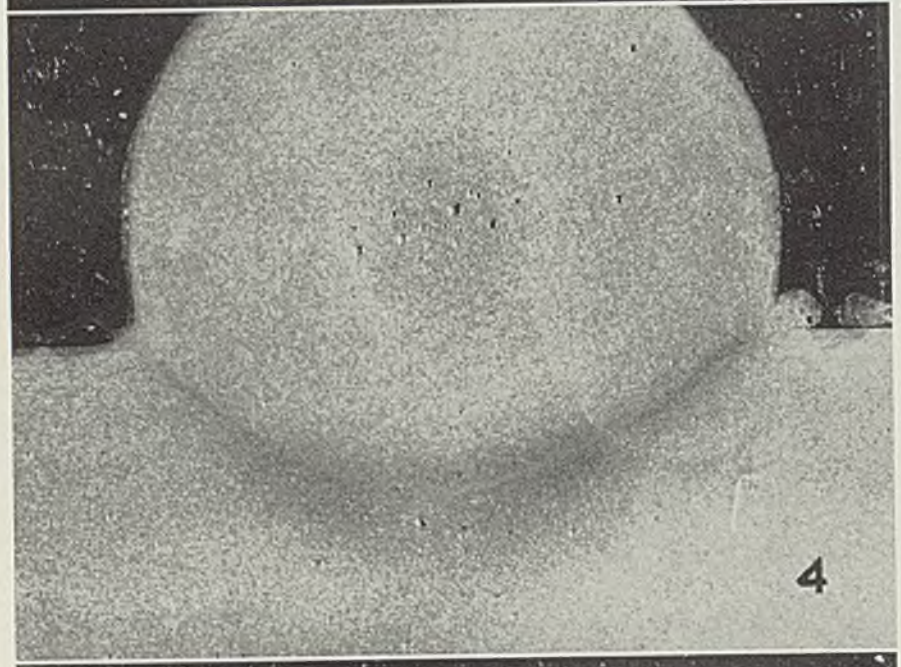

Fig. 4—Section through cross-wire weld in the ¼-inch round material

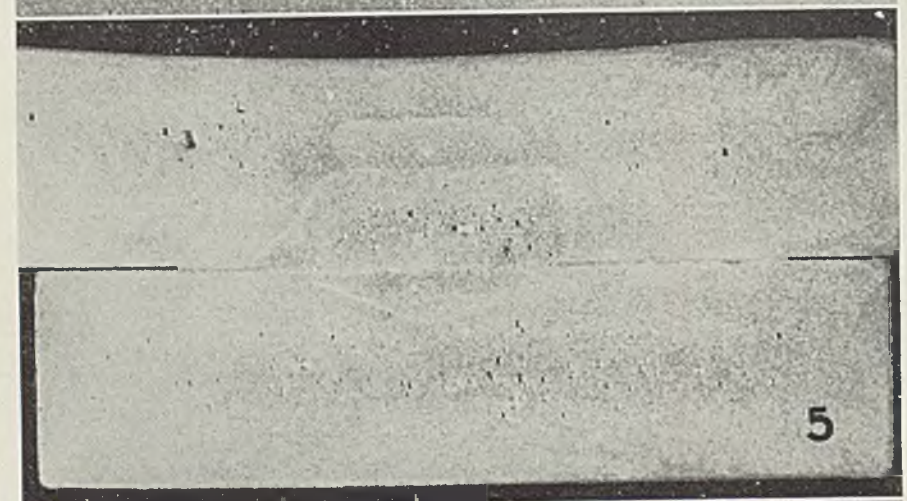

Fig. 5—A spot weld through ⅛-inch pieces

Fig. 6—Section through a projection weld

until the material broke in the weld. The break showed good clean material but it was impossible to give the test a numerical value. Fig. 4 is a macrograph of a section through the center of the weld in the ¼-inch round. The ¼-inch square pieces were cross wire welded with practically the same procedure and results as the round ones.

D, Spot Welds: Welding two pieces ⅛-inch thick and ½-inch wide with the following procedure: ¼-inch diameter electrode point on one side and a flat electrode on the other, same material as B. Pressure, 230 pounds; current, 10,500 amperes; time, 3 impulses of power, 13 cycles on, 5 cycles off. Two welds in tandem broke in the parent material adjacent to the welds at 1400 pounds total load, average of two welds. Simple spot welds in shear broke at 1080 pounds total load, average of three welds. Fig. 5 is a macrograph of a spot weld as described above.

At E: Projection welds (a modi-spot weld where the current is localized by projections on the material instead of a small cross section or point on the extreme ends of the electrodes) between two pieces ½-inch wide and ⅛-inch thick, welded with the following procedure: One projection, 0.064-inch high, ¼-inch diameter, both electrodes flat face material as in B; 130 pounds pressure; current, 15,000 amperes; time, 8 impulses, 5 cycles on, 1 cycle off. Tested in shear, 1135 pounds total load, average of three welds. The failures were all in the parent material, the bar breaking adjacent to the weld. Fig. 6 is a macrograph of a section through a projection weld.

The above work was all done on the zinc-base diecast alloy known as Zamak No. 5 which has a shear strength of 38,400 pounds per square inch in the parent metal. Some work has also been done on Zamak No. 2 and Zamak No. 3, and it is the author's opinion that No. 2 and No. 3 can also be welded using a slightly different procedure.

Some preliminary tests have also been made in spot welding sheet aluminum to Zamak No. 5. The results are very encouraging.

Fully synchronous electronic con-

(*Please turn to Page* 103)

A wide range of consistencies available for any method of application or operating condition.

YEARS of exhaustive research by Gulf's technologists have produced two superior lines of lubricating greases for ball and roller bearings — greases which provide a "second wind" for today's hard pressed equipment.

One, Gulf Anti-Friction Grease, is recommended for heavy duty service. The other, Gulf Precision Grease, is recommended for lighter duty and higher speeds. Both have a high melting point and are specially prepared for greatest resistance to oxidation and separation.

Gulf's newly developed method of compounding, employing special high pressure kettles and mixing methods, produces these greases with a relatively smooth, non-fibrous texture, which gives a true picture of their consistency.

Both of these superior new lubricants are available in a standardized consistency range in line with the National Lubricating Grease Institute consistency recommendations which went into effect March 1, 1941. Write today for complete information.

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3800 Gulf Building, Pittsburgh, Pa.

S

Please send me without obligation complete information about your new long life greases for anti-friction bearings.

Name.....
Company.....
Address.....

Wanted:

Precision Manufacturing Facilities

ARE you anxious to undertake subcontracts on defense work? If you can help us on our defense contracts, we should like to hear from you.

In order to speed our defense work and advance our schedules, we are seeking additional metal-working plants able to help us with this program. Such plants may have suitable facilities not now fully employed, or may be capable of expanding to handle defense work.

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 non-ferrous metals), and gears of all sizes and 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 process; and sub-assembly work.

Many Army and Navy specifications call for precisions of plus or minus 1/10 of 1/1000 inch, although on miscellaneous machine work tolerances of plus or minus 1/1000 inch—and in some cases plus or minus 3/1000 inch—are acceptable.

If you are interested, please tell us the types and quantities of work you are fitted to undertake, and what tolerances you can hold on a production basis. Address your reply to Purchasing Department, Room 133, General Electric Company, Schenectady, N. Y.

GENERAL ELECTRIC

962-124-211

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

More Efficient Materials Handling

Through Motion Study and Methods Engineering

In this first of a series of three articles, Mr. Carson details the need for motion study and shows how it fits into the picture as an aid to more efficient handling of materials. The methods employed so successfully by General Electric Co. to create motion mindedness in shop men are described as well as the method employed with excellent results by Cleveland Graphite Bronze Co.

■ "TIME STUDY is not enough." That has a familiar ring; and yet few, indeed, are the industries that have acted on the truth of that statement.

To the worker who has been through a standardization program where the net return to him was harder work for the same pay, there was just one reaction to any such program—bitter resistance. To management, which had spent money to standardize and had gained nothing but worker ill will, there was also but one reaction—open suspicion of any proposal to study methods, work and equipment.

The last few years, however, have marked a change in such attitudes, at least so far as management is concerned. There is a newly awakened interest in relatively tried and proven science—motion study and methods engineering.

It has at last been realized that fundamentally there are just two ways to accomplish more in a given time. One is to work harder and faster. The other is to work more simply and with higher efficiency.

The worker of 1941, who has lived through the present era of increased reward to labor, can never be convinced that it is for his ultimate gain to work harder and faster. He is, however, far more receptive to the idea of doing the same amount of work with less effort, or of accomplishing more (and getting more pay) with the same effort.

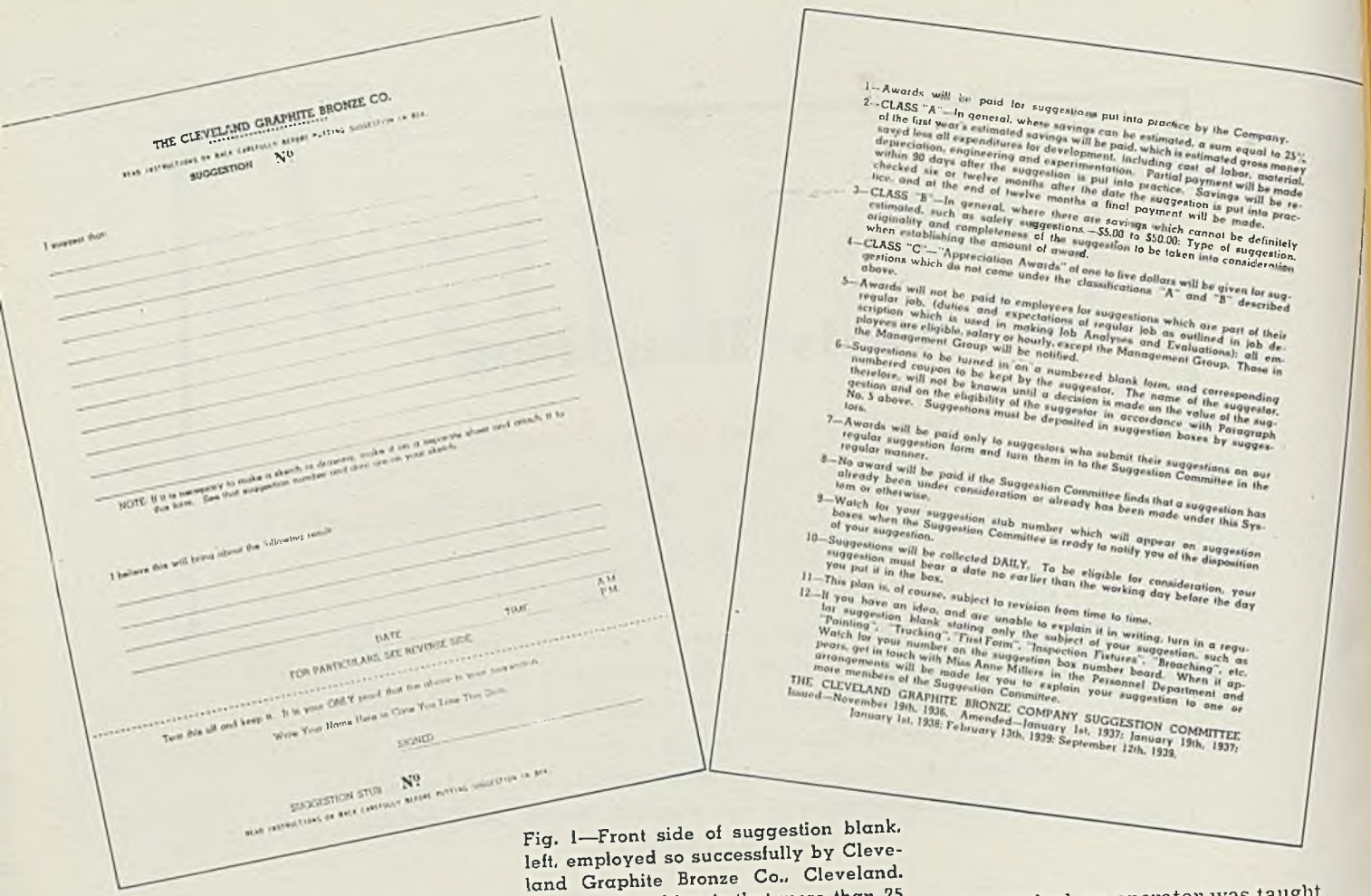
Just as today improved materials handling methods offer the greatest opportunities for increasing output and lowering costs, so is it true that motion study and methods engineering hold enormous possibilities for increasing efficiency of handling operations. New developments in motion study should be of intrest to every person in business today. Every man charged with organization of handling operations will quickly recognize the fundamental importance of the advances made possible by motion study. To give a complete exposition of all such developments in a brief article such as this would be manifestly impossible, but many of the more important phases will be covered in this and succeeding sections of this series.

Motion Study for the Worker: Perhaps the most significant trend is the establishment of motion study classes in many plants. The General Electric Co. at Fort Wayne, Ind., has carried on a successful program since 1929 (see reference 1 at end of article). These classes are adapted to the needs of each individual company. But it is important to note that principles, rather than specific problem solutions, are being taught in almost every instance. The order of the day is to teach employes—*and management*—to become "motion minded."

More specifically, it is the trend to instill the ability to analyze and break down every industrial process; not for what physical transition is being accomplished, but for the actual methods and operations being used to look beyond the process and to see the methods themselves. It is realized that every person in the organization, from the top executive on down, must be on the lookout for awkward processes and inefficient methods since it is so easy to let familiar long-standing mistakes in setting up such process pass unnoticed.

The General Electric Co. had a sudden need for new operators on delicate parts. As is the usual case, they first tried placing one old operator with one or two new operators. Not only did production from the old operators fall from 40 to 50 per cent of the normal output, but new operators failed to achieve the speed desired. The failure of the "on the line" instruction encouraged the use of motion studies, as depicted in the motion pictures, for training purposes.

The program, according to L. P. Persing (ref. 1) has progressed so that in about three years time after its inception, there had been held in the laboratory: three beginning



THE CLEVELAND GRAPHITE BRONZE CO.

SUGGESTION No

I suggest that:

NOTE: If it is necessary to make a sketch to demonstrate, make it on a separate sheet and attach it to this form. See that suggestion number and date are on your sketch.

I believe this will bring about the following results:

DATE TIME A.M. P.M.

FOR PARTICULARS, SEE REVERSE SIDE

Tear this off and keep it. It is your ONLY proof that the above is your suggestion.

Write Your Name Here in Case You Lose This Stub.

SIGNED

SUGGESTION STUB No

1—Awards will be paid for suggestions put into practice by the Company.

2—CLASS "A"—In general, where savings can be estimated, a sum equal to 25% of the first year's estimated savings will be paid, which is estimated gross money saved less all expenditures for development, including cost of labor, material, depreciation, engineering and experimentation. Partial payment will be made within 90 days after the suggestion is put into practice. Savings will be rechecked six or twelve months after the date the suggestion is put into practice, and at the end of twelve months a final payment will be made.

3—CLASS "B"—In general, where there are savings which cannot be definitely estimated, such as safety suggestions.—$5.00 to $50.00: Type of suggestion, originality and completeness of the suggestion to be taken into consideration when establishing the amount of award.

4—CLASS "C"—"Appreciation Awards" of one to five dollars will be given for suggestions which do not come under the classifications "A" and "B" described above.

5—Awards will not be paid to employees for suggestions which are part of their regular job. (duties and expectations of regular job as outlined in job description which is used in making Job Analyses and Evaluations); all employees are eligible, salary or hourly, except the Management Group. These in the Management Group will be notified.

6—Suggestions to be turned in on a numbered blank form, and corresponding numbered coupon to be kept by the suggestor. The name of the suggestor, therefore, will not be known until a decision is made on the value of the suggestion and on the eligibility of the suggestor in accordance with Paragraph No. 5 above. Suggestions must be deposited in suggestion boxes by suggestors.

7—Awards will be paid only to suggestors who submit their suggestions on our regular suggestion form and turn them in to the Suggestion Committee in the regular manner.

8—No award will be paid if the Suggestion Committee finds that a suggestion has already been under consideration or already has been made under this System or otherwise.

9—Watch for your suggestion stub number which will appear on suggestion boxes when the Suggestion Committee is ready to notify you of the disposition of your suggestion.

10—Suggestions will be collected DAILY. To be eligible for consideration, your suggestion must bear a date no earlier than the working day before the day you put it in the box.

11—This plan is, of course, subject to revision from time to time.

12—If you have an idea, and are unable to explain it in writing, turn in a regular suggestion blank stating only the subject of your suggestion, such as "Painting", "Trucking", "Tool Form", "Inspection Fixtures", "Broaching", etc. Watch for your number on the suggestion box number board. When it appears, get in touch with Miss Annie Millers in the Personnel Department and arrangements will be made for you to explain your suggestion to one or more members of the Suggestion Committee.

THE CLEVELAND GRAPHITE BRONZE COMPANY SUGGESTION COMMITTEE

Issued—November 19th, 1936. Amended—January 1st, 1937; January 19th, 1937; January 1st, 1938; February 13th, 1939; September 12th, 1939.

Fig. 1—Front side of suggestion blank, left, employed so successfully by Cleveland Graphite Bronze Co., Cleveland. The amazing thing is that more than 25 per cent of the suggestions received are usable

Fig. 2—Back side of the suggestion blank includes rules. The close following of these or similar ones is most important for successful use of the suggestion method, it is emphasized

classes of planning and time study engineers, 27 men; four advanced classes of planning and time study engineers, 61 men; 16 classes of general foremen, foremen, assistant foremen, leading operators, 268 men; two classes of special tool and machine designers, 27 men; three classes of leading operators, expert workers and personnel workers (female) 42; one class of plant construction engineers, 22 men; one class of expert workers (assemblers), 16 men. Total was 30 classes with 463 men.

The purpose of the classes was twofold: First to sell motion study principles to those not versed in its importance; second to create motion mindedness on the part of the individual, and thus increase his or her ability to improve work.

Mr. Persing reports good results. Motion mindedness *was* created, new ideas aimed at job improvement *did* come from the men in the shop, and operators were trained better and faster. Specifically, he points out the high spots in the program as: Four times normal size pictures that can be obtained by projecting closeups on the screen make a much more forceful impression on the mind than observation of the same job in the plant would leave; one instructor and one experienced operator can easily train 18 operators at a time; 15 operators were released from instruction duties; operator training time was cut to one-third of that required by conventional methods.

It is noteworthy that the General Electric experience points to training in a motion study laboratory rather than "on the job." Reasons for this preference are: 100 per cent worker attention is obtained. No confusion and noise of other activities to distract the learner. Operators do not get nervous—other workers are not watching. Operators are more receptive—the ideas get across better. Problems of mutual interest are readily explained to the laboratory group by calling them together. The use of motion pictures necessitated the use of a confined, darkened area, increasing greatly the attention value.

Briefly, the procedure in training was as follows:

The operation presenting the greatest difficulties was taken to the laboratory and analyzed, motion by motion. Workplace design was the optimum according to the teachings of the late R. M. Blakelock (ref. 2 and 3).

When the best therblig sequence was reached, an operator was taught the new hand motions.

Moving pictures of the new method were taken when the operator reached proficiency. This picture was then used repeatedly in training other operators for this particular operation.

Operators who had had one week's training were transferred to other jobs.

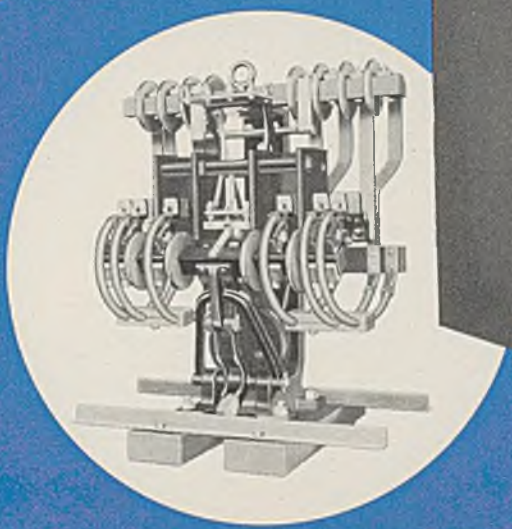
Operations were interpreted by the instructor in detail. Pictures were shown repeatedly to drive home the fundamentals. Slow projection was used to enable closer observation of hand motions.

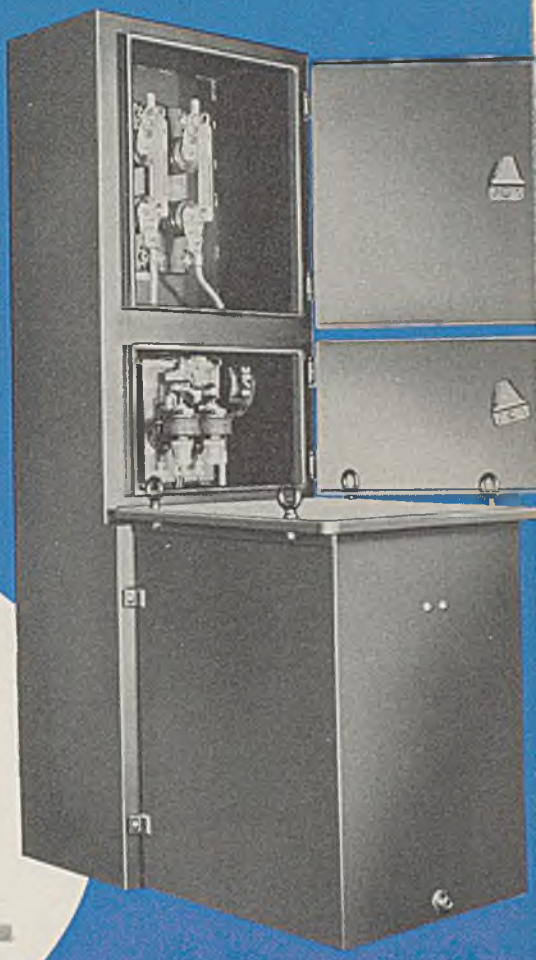
Individual help was given where needed.

Obviously, this time tested program has paid dividends. The lessons here presented should certainly have far wider application in industry than they have enjoyed to date.

A second development is to give impetus to the program by paying handsome bonuses to all those who make significant contributions to the motion study program. (Only those persons whose main duty lies outside the field of methods, engineering, standardization, and engineering for production are eligible). Several plans present themselves, but a typical one is the use of the old familiar "suggestion box" method. Here, however, compensations paid for major innovations may run as high as 10 to 25 per

50,000 KVA Interrupting Capacity





with EC&M 2300 Volt Full Voltage Motor Starters

MANY installations require motor starting equipment with high short circuit interrupting capacity. This is true on low impedance systems having high KVA capacity which the starter may be called upon to interrupt if a fault occurs.

EC&M Type ZHS 2300 Volt Starters are designed for this service. In a series of thorough tests, these Magnetic Contactor Starters successfully interrupted short circuits of 50,000 KVA and over. Full normal frequency voltage was re-established within one cycle after each interruption. This means a clean and quick break.

When planning 2300 Volt Motor installations, put your control problems up to EC&M. Being of magnetic contactor design, these Type ZHS Starters are capable of many operations with infrequent attention. They are arranged for push button or master switch operation; *low voltage* for the *control circuit* being supplied by a self-contained potential transformer.

Type ZHS Starters ar furnished with Ma netic Contactor ar Potential Transform mounted in the tar under oil. Adjustab type, Magnetic Ove load Relays for pr tecting the mot against overloads a self-contained in ove load compartmer equipped with hinge door for ready acce to these units.

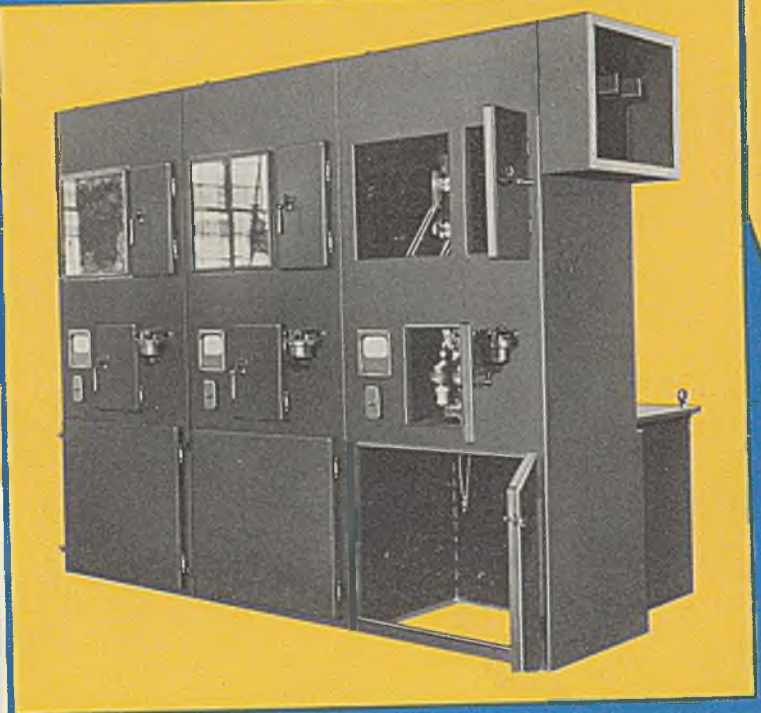
EC&M 2300 VOLT MAGNETIC CONTACTOR STARTER

NOW YOU CAN HAVE

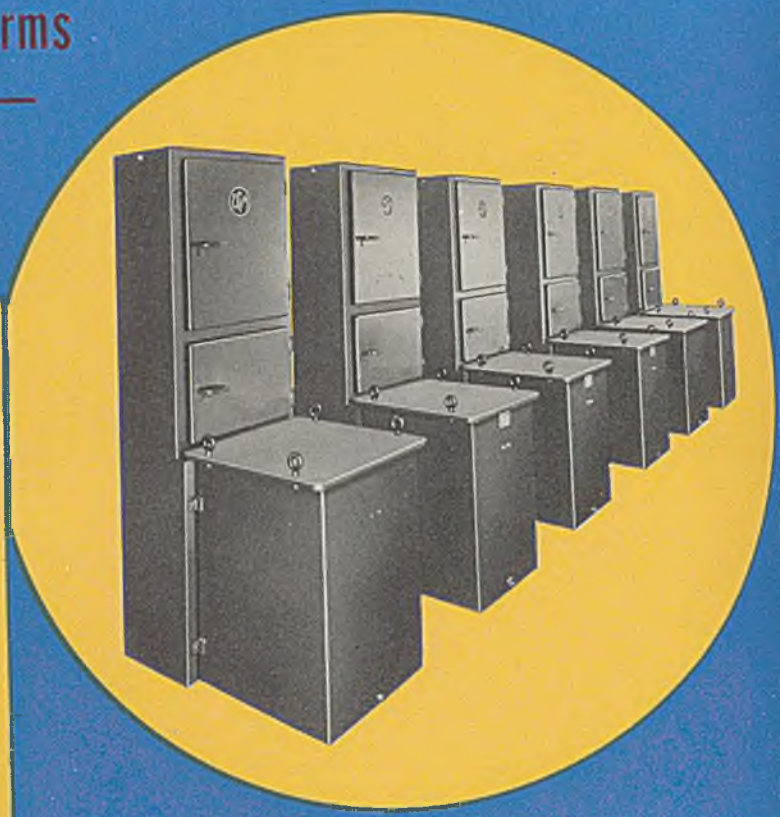
1. STANDARD 2300 VOLT
2. HIGH ARC-RUPTURING CAPACITY STARTER

These units are available in many forms to meet your specific requirements —

1. Cubicle type
2. Individual type



Left: View taken during manufacture of three 800 HP, 2300 Volt Full Voltage Starters for synchronous motors for installation in oil refinery. Type EO Push Buttons (for Class 1, Group D Hazardous Locations) are mounted on the front.

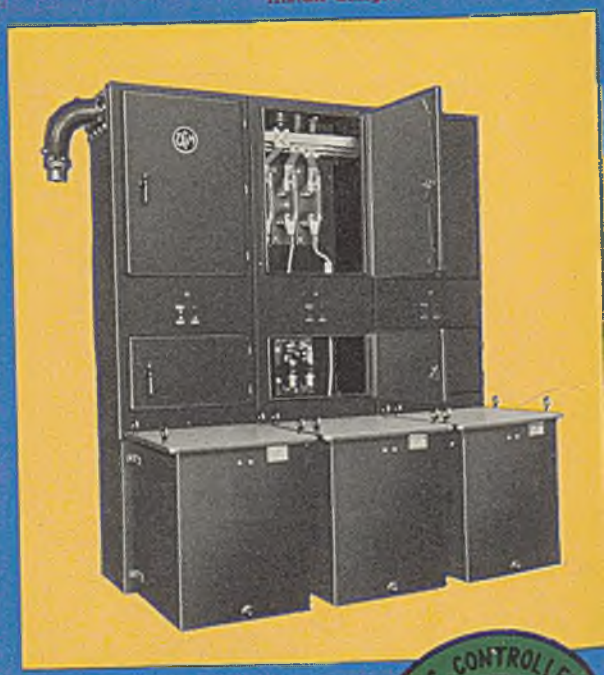


Above: 6 of 60 individual units for powder plant. For installation in one of the new government powder plants, these EC&M Type ZHS Starters combine high arc-rupturing capacity with a compact, self-contained, easy-to-install design.

ON circuits where the impedance is high due to the characteristics of the power system or to a long length of cable between power-source and starter, it is not necessary that a starter have high arc-rupturing capacity. For these applications, the standard Type ZHS 2300 Volt Starter is available.

Both types of starters are built in a wide variety of designs for (1) single motor installations, (2) group motor installations. They may have self-contained disconnect switches with safety door interlock to prevent pulling disconnect switches under load. Grouped Starters are built with self-contained bus structure. To these, additional units can be easily added and matched to the original installation. Metering instruments may be self-contained and when used for synchronous motors, an automatic field-switching panel is mounted in the lower part of the cubicle.

For high voltage squirrel-cage or synchronous motors or as the primary contactor for wound-rotor motors, EC&M Type ZHS Starters have no equal. They are easy to install and provide an attractive, neat-appearing installation. Ask for Bulletin 1062-C describing them.



Above: Three EC&M Type ZHS Starters for 100 HP, 2300 Volt Motor Drives in rayon manufacturing plant. Note self-contained push buttons, bull's-eye indicating lamp, bus and pothead for power connection.

THE ELECTRIC CONTROLLER & MFG. CO. CLEVELAND, OHIO

EC&M TOTALLY ENCLOSED Starters

cent of the first year's savings. Individuals receiving bonus check totaling several hundred dollars are not unknown.

Theodore S. Sadler, personnel manager of the Cleveland Graphite Bronze Co., Cleveland, has been kind enough to furnish details on this company's successful program. Fig. 1 shows a typical suggestion form used. Fig. 2 shows the instructions detailed on the back of each form.

Make Rewards Interesting

In this case it is important to note the method of computing "Class A" awards, which are those involving method changes. The company pays 25 per cent of the first year's estimated savings for such suggestions, the remuneration being computed from "the estimated gross money saved less all expenditures for development, including cost of labor, material, depreciation, engineering and experimentation." Partial payments are made within 90 days after the suggestion is put into practice with final payments at the end of 12 months after checks have been made on the savings involved.

A few "tremendous trifles" which may make or break such a system should be noted: The employe's name should never appear on the blank. Identification should be by stub and number only. Definite rules covering *all* types of suggestions should be stated clearly on the blank. Suggestions should be considered at regular frequent intervals and should be acted upon promptly. Ideas should be adequately paid for in a manner commensurate with the return of such ideas to the company, insofar as it is possible to estimate such a return.

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1. Factory and Industrial Management, September, 1932, pp. 337-b340, "Motion Study, The Teacher"—L. P. Persing.
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3. "Operation Study," a paper for the conference "Re-Engineering for Economical Manufacture," held at Case School of Applied Science, May, 1933—by R. M. Blakelock.

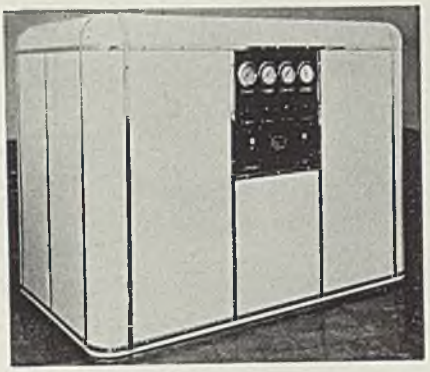
(*Continued Next Week*)

♦

Appearance of Lindsay Structure Improved

■ Dry-Zero Corp., 222 North Bank drive, Chicago, announces new Lindsay structure cabinets and housings finished in white enamel with a chromium trim for manufacturers whose products require a highly attractive covering. These units feature an entirely different principle of assembly.

The high tensile strength of the panel sheets is made available by



Lindsey structure all-steel housing finished in white enamel with chromium trim for "dressing up" equipment

pulling the sheets into tension between framing members. This tension binds the entire structure together rigidly. The "pre-tensed" sheets are fastened to the framing without the use of rivets or welds, and the completed unit has the appearance of a machine-finished job. Complete details on this unusual method of assembly was carried in STEEL, March 4, 1940, p. 50.

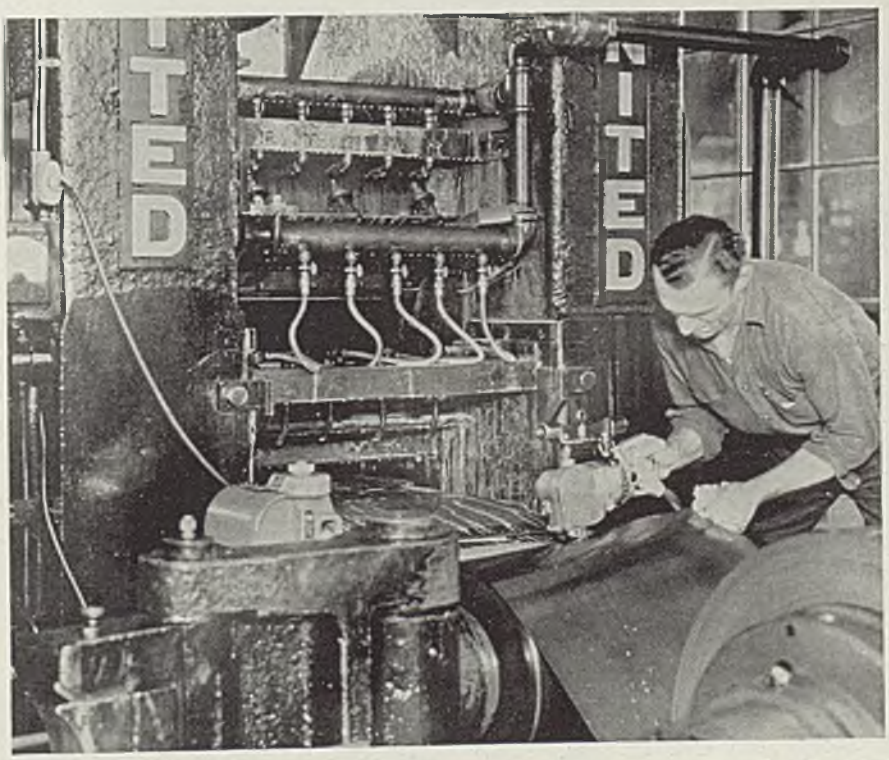
Fluorescent Lighting Identifies Metals

■ Molybdenum, tantalum, stainless steel and nickel scraps are being identified and separated positively and quickly at the Westinghouse Lamp Division, Bloomfield, N. J., by characteristic color tinges appearing on the different metals under daylight fluorescent lighting.

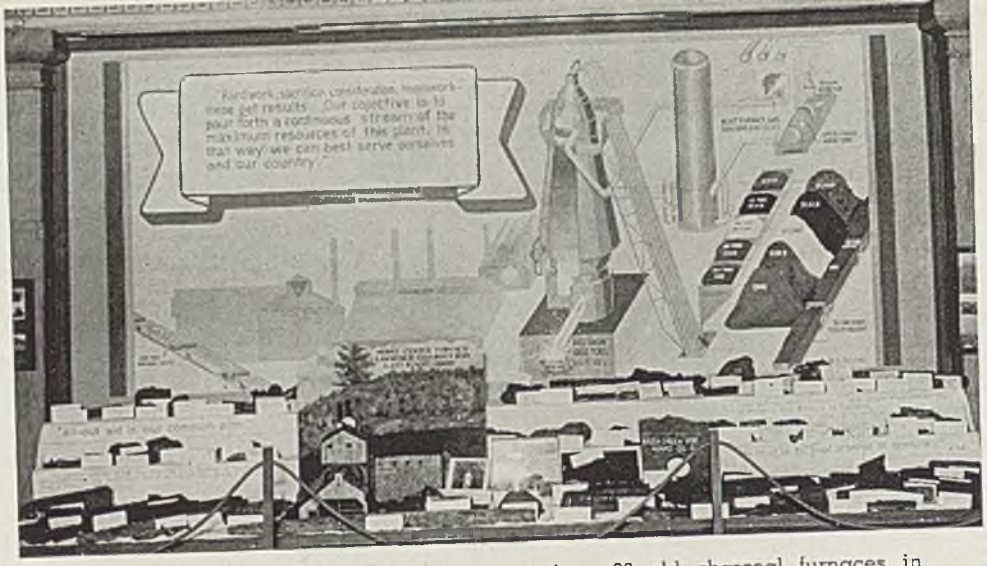
Sheet molybdenum and tantalum, especially, look alike under normal incandescent light, and cannot be separated by visual inspection. By segregating the scraps into small piles and lighting them with a single 24-inch daylight fluorescent lamp in a concentrating reflector, the tantalum can be identified instantly by its apparent bluish hue, while molybdenum retains its characteristic metallic color.

The method is so foolproof that these materials now are sold separately with a purity guarantee. Recently from salvaged molybdenum having a value of about $700 in its pure state, an additional $100 worth of tantalum was recovered.

Who Said This Is a "Tough Job"?



■ Cutting strip steel as it completes its pass in this 4-high mill ordinarily is a tough job, but with the use of a Stanley portable Unishear such as the one shown "in action", the "tough" part of the job is simply nonexistent. This tool is capable of cutting any material up to 12-gage hot-rolled steel—cutting it cleanly and smoothly at a speed up to 15 feet per minute. In addition, its portability multiplies its number of applications



Collection of pig iron samples gathered from 96 old charcoal furnaces in Southern Ohio

Collect Pig Iron from Old Stone Furnaces as Hobby

By JOHN D. KNOX
Steel Plant Editor, STEEL

■ MANY AN executive in the iron and steel industry has a hobby of some sort or other. Collecting stamps, accumulating photos of blast furnaces, building models and what-not. But who has ever thought of gathering samples of iron made in old stone blast furnaces which long have disappeared or now are hidden by trees and brushwood and crumbling stonework?

Early this month I met a couple of lads in their early twenties who are doing just this thing as a hobby —John Jr. and Donald List, 621 South Sixth street, Ironton, O. Their collection of samples of pigs from 96 historical old stone blast furnaces in the Hanging Rock district in Southern Ohio, was displayed in the lobby of the Henry Clay hotel, Ashland, Ky., during the Ashland Armco Expansion celebration sponsored by the Ashland Business Men's Association.

How Hobby Originated

Here is how they became interested in their project. Their grandfather had worked for many years at the old Vesuvius stack located in Lawrence county, Ohio, and built in 1833. When this stack passed the way of many other old stone furnaces in the Hanging Rock region, the grandfather became identified with the Belfont furnace, of the Belmont Iron Co., Ironton, O. In 1933 when the acetylene torches were wrecking this stack, the List brothers decided to secure a pig that had been cast at the furnace where their grandfather had last worked. The wreckers gladly gave them one and this was mounted in a prominent place in the backyard of the boys' home.

Then the thought occurred to them, "Why not secure a sample of iron from other furnaces in the Hanging Rock district?" The idea found lodgement and the lads set out on their mission. In the course of a few days they returned to their home with 15 or 20 pigs which they had secured from as many old charcoal blast furnaces not far from Ironton. These found a resting place in their backyard. The more the lads inspected various samples, the more fascinated they became with their hobby.

Read Treatises on Subject

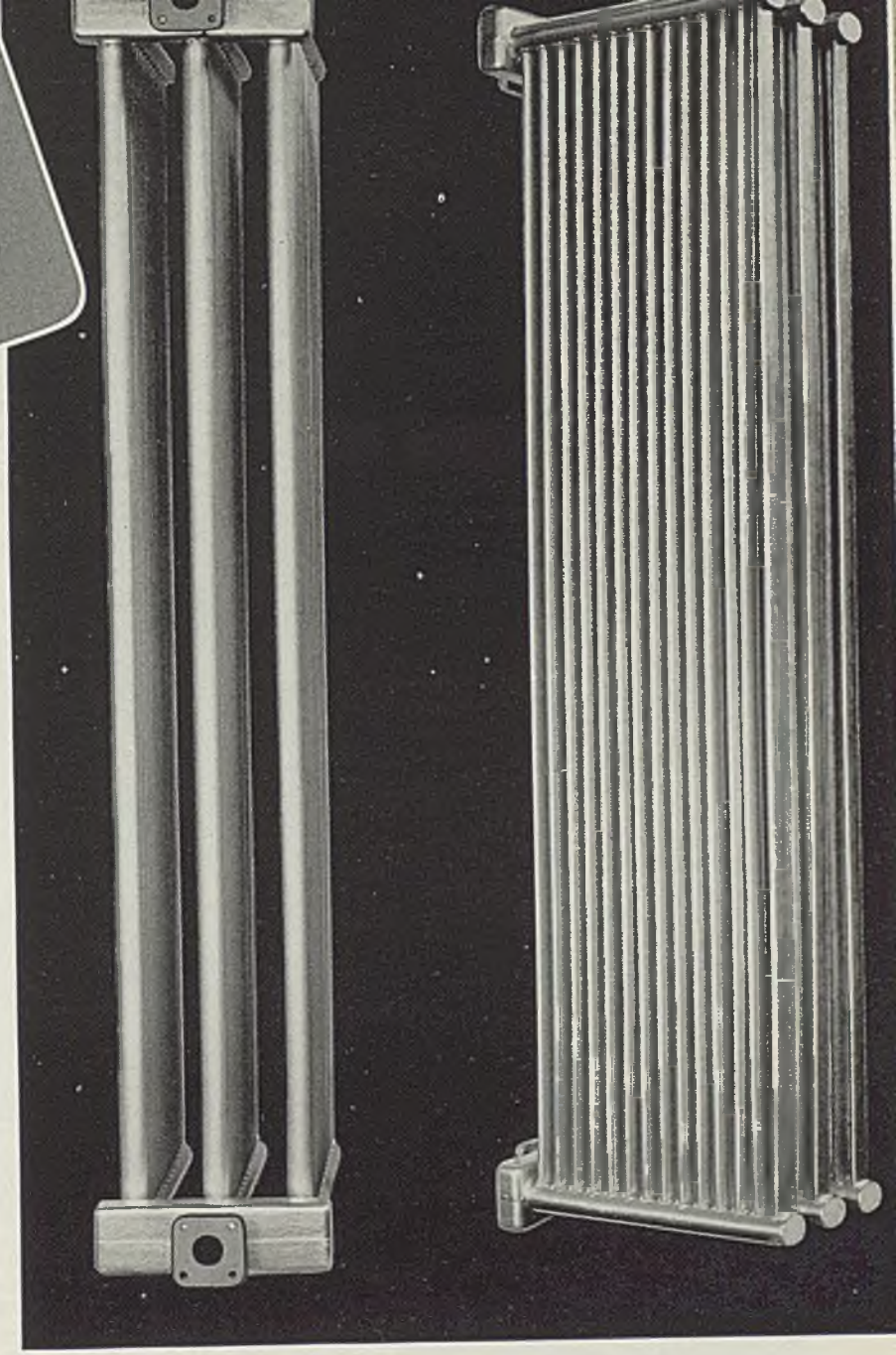
Books that had anything to say about old stone blast furnaces in the region were read with great eagerness. They stored up their knowledge on old stone stacks and when summer vacation rolled around the following year, the lads cranked their flivver and, with pick and shovel rattling in the trunk compartment, set out on their treasure hunt. They went over the countryside asking for souvenirs from old settlers in the way of chunks of pig iron. At one farm they found a pig that was part of the foundation of a log cabin. At another farm they obtained a piece of a pig that was used to hold the roof of a beehive in place. Each nightfall they chugged into their garage with the rear end of their flivver touching on the axle. The next morning after unloading and properly identifying their catch, they would set out again. And when there was no more territory to explore they counted the samples of iron in their collection and totaled them at 96. Of this number of stacks that once dotted the countryside, only five are standing today—the Globe and Jisco at Jackson, O., one at Portsmouth, O., and the Sixth street and Norton stacks at Ashland, Ky.

Built Model of Stack

The pig iron collection and a model of old Center furnace built to scale by the List brothers is shown in the accompanying illustration. To the right of the model is a photograph of Mrs. Nannie Kelley Wright, Huntington, W. Va., who with her husband worked in the operation of their ore mines and old stone blast furnaces. Upon the death of her husband, Mrs. Wright took over the properties including the Center furnaces. She was the first woman in this country to manage blast furnaces, and it was a common sight to see her in the early morning and late at night on horseback riding cross-saddle on her way to and from her furnace properties.

Pigs cast at many of the old charcoal furnaces were branded in raised letters with the name of the stack, such as Boone, Vernon, Lawrence, Olive, Grant, etc. The exhibit is backed by a mural depicting a modern blast furnace and the raw materials used in making iron.

NEVER A "BLACK SHEEP" in a Flock of this Tubing



You can't afford to find "black sheep" lengths—off-size, hard-to-fabricate or rough-surfaced lengths—in the tubing you buy. Every length must be uniformly accurate and sound to insure uniform quality in your product and easy, uninterrupted fabrication—and that's what you get when you order Republic ELECTRUNITE Tubing.

Because it is made by the electric resistance welding process, all lengths of Republic ELECTRUNITE Tubing of the same size and gauge *MUST* be identical within a few thousandths of an inch—in wall thickness, diameter and concentricity. And all lengths must possess the same uniformly high degree of ductility and smooth, flawless surface finish. There just isn't an opportunity for a "black sheep" length to be produced by this fully-mechanical, fool-proof process.

Regardless of how or for what purpose you use tubing—for transformer cooling coils as shown here or for a thousand other —uses you'll find no other that can equal commercially the consistent uniformity of tubing made by the electric resistance welding process—Republic ELECTRUNITE.

Steel and Tubes engineers—with a vast accumulation of experience acquired in the production and application of more than a billion feet of tubing—are ready to assist you in selecting the proper grade for your purpose, and in suggesting how best to fabricate it by any modern method. Let them tell you how to save money and improve product quality with Republic ELECTRUNITE Tubing. Steel and Tubes Division, Republic Steel Corporation, Cleveland, Ohio.

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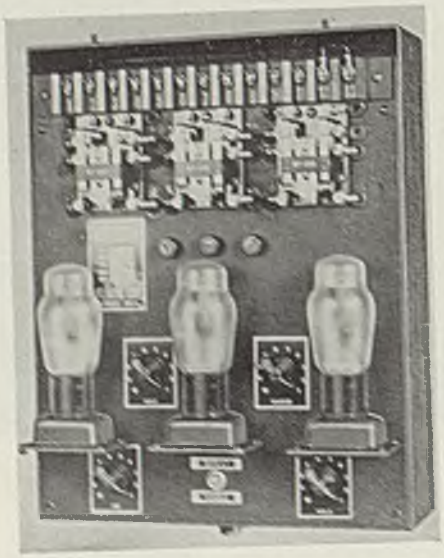
Industrial Equipment

Electronic Timer

■ Weltronic Corp., 3082 East Outer drive, Detroit, announces a model 75 electronic tube-type timer for providing accurate timing control for any air-operated stationary or portable single or multispot welder. It now features four adjustments—squeeze, weld, hold, and off time. The squeeze time is the interval between the instant the initial welding pressure is applied and the welding current is on, which allows sufficient time to permit the full welding pressure to build up before welding current is applied. Thus, the timer will compensate for the effects of



lowered room temperatures or extreme distance from pressure switch to welder, insuring uniform performance and better quality welds. The four adjustments are made by means of "dialing" the control knobs on the front of the panel. The wide range of optional time selection from 2 to 30 cycles in close steps is sufficient to provide accurate timing for almost any stationary or portable, single or multiple spot welding operation. Single weld or automatic repeat operation is optional to suit the work. A toggle switch on the front of the panel permits rapid changeover as required. The timer is available for use with either a magnetic or Ignitron tube contactor and is standard for 110-volt 60-cycle current operation. It can be supplied, however, for use on any commercial voltage and frequency. The unit is mounted in a compact cabinet to facilitate moving.

Unit Type Coal Washery

■ McNally Pittsburgh Mfg. Corp., 307 North Michigan avenue, Chicago, has placed on the market a new unit type coal washery for handling coal tonnages of 25 to 75 tons per hour in stoker, nut, egg and stove sizes. Component parts

of the washery include a 2 or 3-cell wash box with air compressor, valves, rejects elevator, spiral hutch conveyor and automatic refuse controls. It has a settling tank, washed coal launder, and spiral sludge conveyor. Launders discharge to the dewatering washed coal elevator. The water recirculating system includes a centrifugal pump, valves and automatic water pressure relief valve. Complete washery controls and necessary electric motors are integral parts of the new unit. Some of the operating advantages are: Clean coal returned to practically the same point at which raw coal enters, easy installation and low cost preparation.

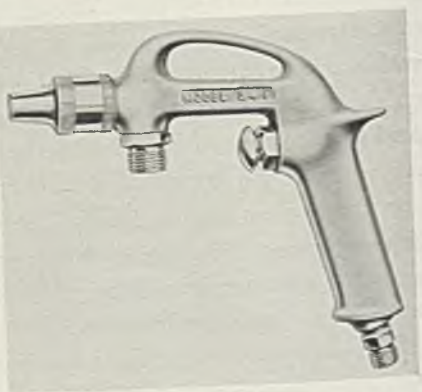
Electric Polishers

■ Stanley Electric Tool Division, New Britain, Conn., has developed two new polishers for cleaning and polishing metal and removing

stains or heat tint caused by welding. Of slow speed (600 revolutions per minute) they use brushes specially developed by Osborn Mfg. Co., Cleveland. These two tools are designated as the No. 182 and No. 187. The former is a two purpose tool, it can be used as a polisher, or a drill chuck can be attached in place of the arbors to make a practical ½-inch drill. Arbors for two or four brushes and ½-inch Jacobs chuck also are available. The latter has a straight handle and is used for polishing only. Arbors however, for two or four brushes are available. Both tools are equipped with Universal motors suitable for alternating or direct current in 110, 125, 150, 220, 230 or 250 volts.

Foundry Gun for Spraying Molds

■ Binks Mfg. Co., 3114 Carroll avenue, Chicago, reports a new gun for spraying molds with the various compounds used in foundries. It is of the siphon type, and has no fluid valve incorporated in it. The gun comes in two models—34F-1, in which the material comes from the outside and air from the inside nozzle, and 34F-2, in which the material comes through the



center and the air through the outside nozzle. The former is a fast gun, and can be used on large molds. The latter gives a finer and better atomized spray and is used where the finish must be watched carefully.

Atomizing Nozzle

■ Spraying Systems Co., 4021 West Lake street, Chicago, reports a wide angle Parasol atomizing nozzle which gives a hollow cone spray with uniform distribution and exceptionally wide spray angle. Sturdily constructed, it is accurately machined with polished orifice insert.

It is now available with male and female ¼-inch pipe connection with capacities from 4 to 16 gallons per hour at 60 pounds pressure. It can be supplied with or without strainer. Standard stock construction is brass with 18-8 stainless steel in-

BIG ONES FROM LITTLE ONES

each a single, leakproof section

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OXYACETYLENE WELDING

Pipe, bought in economical mill lengths, is readily converted into large sections of any desired length with the Airco Oxyacetylene Welding Process. Here, three 20-foot pieces are being welded into one length of leakproof pipe using Airco No. 1 alloy rod for the filler metal. When properly made, the welds will be strong and ductile — and will outlast the pipe itself. The revolving jig shown in the illustration is motor driven and controlled by a foot switch. It permits rotating the pipe as welding proceeds.

Whether your need is to make big ones from little ones or to fit pipe into difficult places, the versatility of this Airco welding process makes design problems vanish. It is applied rapidly and economically even under adverse shop and field conditions. The apparatus employed is portable and easy to operate. Further information about this flexible metal fabricating process — whether for construction or maintenance purposes — is yours for the asking. Any Airco office will gladly tell you about the practical engineering assistance which is available to our customers. Write for full details.

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Anything and Everything for GAS WELDING or CUTTING and ARC WELDING

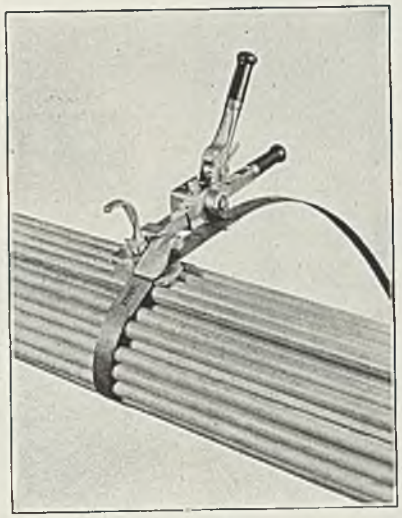
serts—other materials can be specified.

Industrial Lamp

■ Radiant Lamp Corp., 260 Sherman avenue, Newark, N. J., reports a new type high-wattage lamp suitable for industries working nights on defense orders. It increases illumination to 250 per cent or more without changing fixtures. This development was brought about through the use of a hard glass bulb which now makes it possible to reduce the size of a 500-watt lamp to that of an ordinary 200-watt lamp. This same improvement also permits the lamp to withstand thermal shocks when used outdoors. In place of the large "mogul screw" base and heavy fixture necessary to support the weight of an ordinary 500-watt lamp, the new unit can use a "medium screw" base similar to those in ordinary household fixtures. Other size industrial lamps up to 10,000 watts are available to meet special requirements.

Stretching Tool

■ Signode Steel Strapping Co., 2600 North Western avenue, Chicago, has introduced a stretching tool for steel strapping shipments, which embodies a completely new gripper action principle. It makes it possible to apply strap of wide and heavy gages to small bundles of steel rounds, flats, hexagons and other noncompressible commodities such as auto truck springs, steel coils, etc., with considerable tightness. The gripper jaws of the tool are located in the bottom of the front base of the tool. The strap is gripped at the edges so that the foot or base of the stretcher is not under the strap in the tensioning operation. The stretcher is manufactured in two sizes—model EG1 for strap ¾ x 0.028-inch, ¾ x 0.035-inch, 1¼ x 0.035-inch and 1¼ x 0.050-inch. Model EGS1 is for strap sizes from ⅜ x 0.020 to ¾ x 0.023-inch inclusive.



Extinguisher Seal

■ Pyrene Mfg. Co., Newark, N. J., announces Gardeseals to facilitate frequent inspection—and to tell at a glance whether pump type extinguishers have been tampered with or used. These are bright red, trademarked, visual signals or handle seals that are destroyed the moment an extinguisher is taken from its bracket. They are easily applied by soaking in water and

placing over handle and bracket, shrinking to a tight seal in an hour. They are available in cartons each containing 25 seals.

Cabinet for Displaying Light-Duty Pillow Blocks

■ Ahlberg Bearing Co., 3058 West Forty-seventh street, Chicago, announces a new merchandising unit for ball bearing pillow blocks. It consists of a compact steel cabinet with swing cover providing storage and display space for a selected

stock of light-duty ball bearing pillow blocks. Two sizes are mounted on the cabinet base to demonstrate the design and easy action of these antifriction units which are protected by no-drag labyrinth seals of Neoprene.

Aluminum Ladder

■ Aluminum Ladder Co., 154 Adams street, Tarentum, Pa., has introduced a new aluminum channel ladder for use as a service ladder to be carried on airplanes,

boats, trucks and other places where space is limited. It folds laterally in the center, making it

compact for storage. Although the ladder weighs only 1 pound per foot, it is strong enough to support the heaviest workman. Its side rails are of 1⅝ x ¾ x 5/32-inch aluminum channel, and its rungs of ¾-inch round stock, corrugated to provide safe footing. Because of the light construction, the ladder can be produced only in lengths up to 16 feet and in widths up to 16 inches.

Circuit Breaker

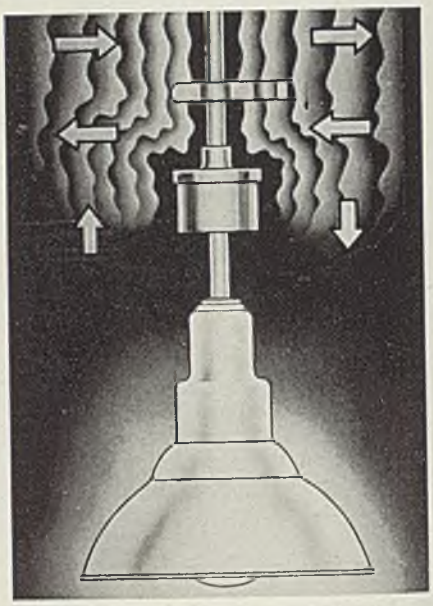
■ General Electric Co., Schenectady, N. Y., has introduced a new type AM-10-25 magne-blast circuit breaker for such severe service as encountered in steel mills, chemical and automotive manufacturing plants. It is rated at 250,000 kilovolt amperes for services from 4200 to 7500 volts, and has all the fundamental advantages of smaller breakers. The solenoid mechanism is mounted on the front of the breaker and is isolated from it by a heavy steel panel.

The principle of driving the arc into an interleaving arc chute by means of magnetic blowout coils has been retained, together with the contact design principle of other breakers in the line. To assist in the rapid interruption of low currents, an air "booster" or dashpot is included in the contact structure.

The breaker framework provides a rigid support for the arc chutes, contacts and mechanism. Besides the support given by the bushings, the contact structure is given additional rigidity by a heavy-duty porcelain insulator from the contacts to the frame.

Shock Absorber

■ Lintern Corp., 7960 Lorain avenue, Cleveland, announces a new M-T lamp shock absorber which is capable of increasing lamp life as much as 90 per cent wherever lamps are subjected to vertical or horizontal shocks. Both fixture and lamp support floats in flexible sponge rubber, consequently absorbing shocks in all directions. The metallic connection between the fixture and vibrating structure is completely eliminated. To withstand corrosive atmospheres the mounting is protected by a synthetic rubber "skin". The shock absorber can be easily attached to any fixture accommodating from 100 to 750-watt lamps.



Variable Speed Lathe

■ Schauer Machine Co., 2063 Reading road, Cincinnati, has placed on the market a new powerful low-speed variable speed lathe capable of lapping gages and other parts at speeds as low as 20 revolutions per minute. Capable also of rotating heavy work up to 4000 revolutions per minute, it can be adapted to final finishing operations such as filing, burring or polishing. Infinitely variable speeds of the lathe are in ratio of 5½:1 based on the lowest speed desired by using a single-speed motor—11:1 with 2-speed motor. An

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FOR BLOOMING AND SLABBING MILLS

More tons and lower cost per ton rolled; less slippage; greater bite; better surface and resistance to fire cracking—these are the profit making advantages you get with "TECHNI" Process Blooming and Slabbing Mill Rolls. These extra qualities are made possible by the "TECHNI" Process, an exclusive development of Mackintosh-Hemphill, which regulates the quality and grain size of the rolls with as much exactness as the best modern steel practice regulates the quality of steel. Make your next set of rolls "TECHNI" Process.

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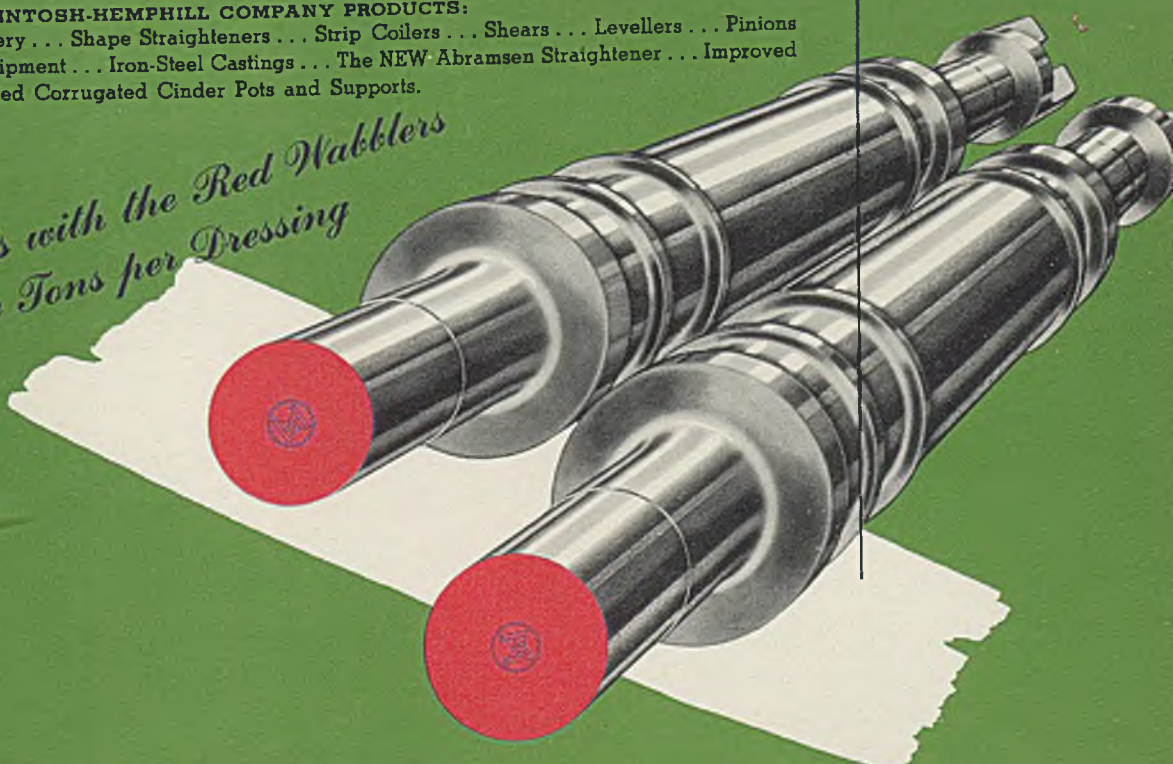
OTHER MACKINTOSH-HEMPHILL COMPANY PRODUCTS:
Rolling Machinery . . . Shape Straighteners . . . Strip Coilers . . . Shears . . . Levellers . . . Pinions . . . Special Equipment . . . Iron-Steel Castings . . . The NEW Abramsen Straightener . . . Improved Johnston Patented Corrugated Cinder Pots and Supports.

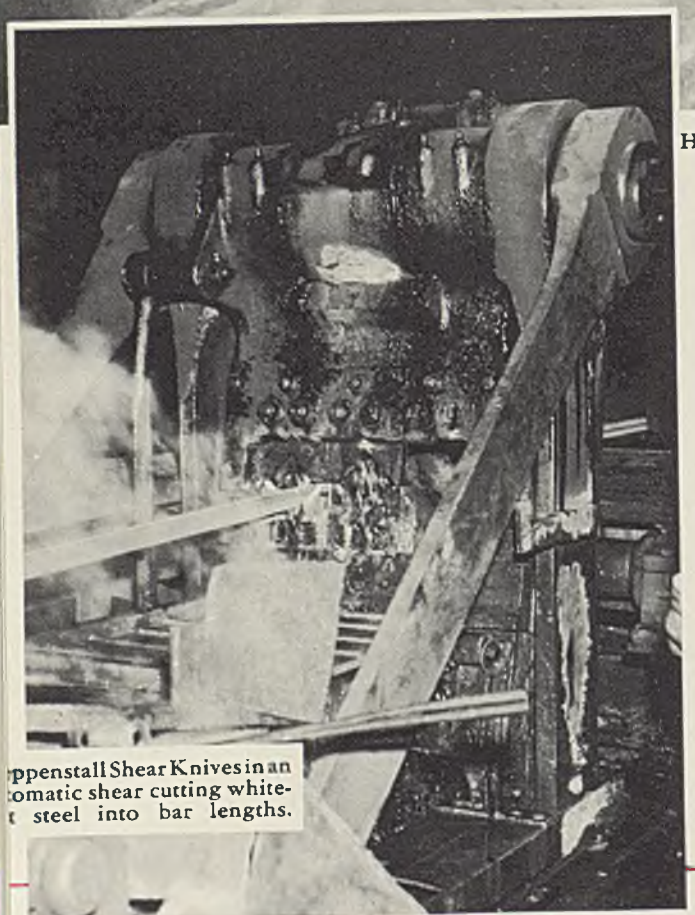
The Rolls with the Red Wabblers
They Roll More Tons per Dressing



Heppenstall products

speed production... cut costs

Heppenstall Automatic Safe-T-Tongs lifting three large ingot molds in one operation.



ppenstall Shear Knives in an omatic shear cutting white- steel into bar lengths.

In an Ohio steel plant Heppenstall Automatic Safe-T-Tongs have cut lifting costs and greatly speeded up the handling of ingot molds. Before these tongs were installed the job of handling molds required two cranes with ground crews, and each crane handled only one mold at a time. Now, one crane, with the aid of Heppenstall Automatic Safe-T-Tongs, handles three ingot molds in one lift without the aid of a ground crew, thereby releasing the second crane for other work and greatly speeding up the entire handling job.

Being fully automatic and not requiring electricity or other means of power, Heppenstall Automatic Safe-T-Tongs operate with no more manipulation than dropping them on the work. They go through their entire cycle of operation automatically, safely, quickly.

In any plant or department where equipment or steel in any form has to be lifted, Heppenstall Automatic Safe-T-Tongs will do the job faster, more economically, and remove one of the greatest hazards to employee life and limb. Ask for a Heppenstall engineer to call.

HEPPENSTALL PRODUCTS: Die Blocks . . . Shear Knives . . . Hammer Rams . . . Piston Rods . . . Tinning and Galvanizing Rolls . . . Automatic Safe-T-Tongs . . . Locomotive Axles, Pins and Rods . . . E.I.S. and O.H. Alloy Steels . . . Carbon and Alloy Forgings.

HEPPENSTALL Heppenstall has the Edge QUALITY

HEPPENSTALL COMPANY

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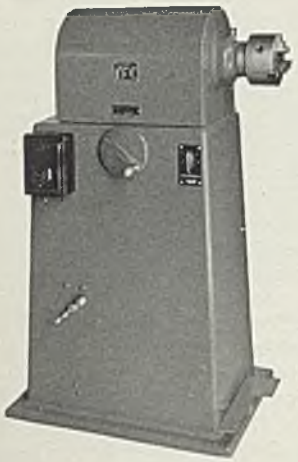
adjustable slippage arrangement between motor and spindle, permitting the application of only a predetermined amount of pressure on



the part to be lapped is optional. The unit is equipped with a quick-acting automatic brake, 3 or 4-jaw chuck or special fixture for holding the work.

Circuit Breaker

■ Westinghouse Electric & Mfg. Co., Dept. 7-N-20, East Pittsburgh, Pa., announces a new De-ion air circuit breaker for circuit protecting applications indoors in central stations, power plants and in industrial plants. It is available in ratings from 100,000 to 250,000 kilovolt-amperes interrupting capacity; 600, 1200, and 2000 amperes, for operation on 2500 and 5000 volts, 3 phase,

60 cycle alternating current. The breaker features silver-to-silver main contacts, arcing contacts of a special tungsten alloy, isolation of high voltage and control circuits and the De-ion method of arc quenching, which in this breaker employs a special magnet coil to forceably draw out the arc quicker. Closing operation is of the solenoid type, with a mechanism that is mechanically and electrically trip-free. Contact opening is accelerated by strong springs. The breaker can be installed so that access to the rear, except for connecting the main leads, is unnecessary. Barriers are used to isolate the live phases from each other and from the metal enclosure.

Electric Water Coolers

■ Cordley & Hayes, 443 Fourth avenue, New York, announces a complete new line of electric water coolers featuring redesigned cabinets which increase the cooling capacity. Units in the line are equipped with a specially designed Cold Saver which takes advantage of the cold waste water to precool the incoming water. The copper cooling coils in bubbler models are hot tinned inside and out to assure high heat transfer. The bottle type coolers are equipped with sanitary stainless steel reservoir. All coolers have removable cabinet panels, are self-contained, and occupy minimum floor space. Bubbler models can be equipped with goose neck or push back glass fillers.

Desk Data Outfit

■ Oxford Filing Supply Co., Brooklyn, N. Y., has placed on the market a Pendaflex desk data outfit which enables the office worker to get instant, one hand reference to desired data, rates, schedules, prices, etc. It consists of a bottomless steel

tray in which are suspended 25 angled tab folders with a supply of 100 suggested headings.

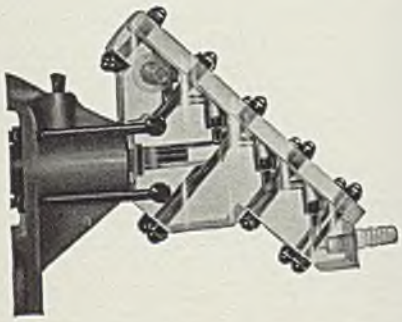
Because of the unit's design, the folders cannot lean or sag, and all headings are always at the same level. Folders opened for removal of papers remain open for their quick replacement. Thus, reference to and return of data is accomplished with a minimum of motion.

Pneumatic Die Cushion

■ Dayton Rogers Mfg. Co., Minneapolis, has introduced a new model DM universal pneumatic die cushion which can be adapted to all punch press deep drawing operations, and can be used for the pressure pad control on many forming dies. It is completely self-contained, requiring no surge reservoir. It also is furnished with a combination regulator and gage for shop airline connections. The pin pressure pads, however, are fabricated for the individual press application, with the correct amount of press bed clearance in each case. The correct height of the pin pressure pad is maintained and controlled by a hand-wheel adjustable feature. This cushion installation makes it possible to remove the bolster plate at any time without disturbing the cushion installation. It is now being manufactured in six sizes, having deep drawing capacities of 5 inches and less with ring holding pressure up to 10 tons on 100-pound air line. Each cushion is complete with the necessary high pressure flexible hose, and necessary fittings.

Transparent Pump

■ Milton Roy, 1308 East Mermaid avenue, Philadelphia, has placed on the market a transparent plastic pump for handling dilute acids, hypochlorites and many other chemicals. Machined from a solid block of clear plastic material known as Plexiglas, its feature is the visibility, at all times, of the flow of liquid being pumped,

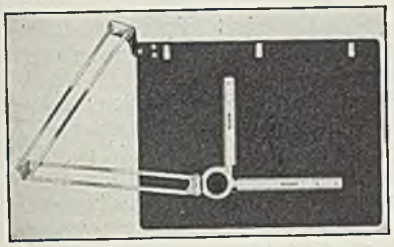


and the movement of the valve checks and pump piston. The pump's valve contains all the advantages of the standard step-type valve. Accessibility is provided by a flat-plate cover which, when removed, permits cleaning of the complete valve assembly without disturbing pipe connections to the pump. This unit has a capacity of 18 gallons per hour against a maximum discharge pressure of 150 pounds per square inch. It is driven by a 1/6-horsepower integral-gear motor. Other pumps are available in capacities of from ½ to 20 gallons per hour.

Portable Drawing Units

■ Drafto Co., 253 Walnut street, Cochranton, Pa., has placed on the market a new line of drawing machines, taking paper sizes from 9 x 12 to 18 x 24 inches. All models are mounted on Masonite board with parallel arms and protractor place constructed of stainless steel. Two small models, known as No. 10 and No. 15, which take paper sizes 9 x 12 and 10 x 15 inches, feature scales made in one piece, permanently attached to the protractor plate. The protractor for these models is graduated in 2 degrees and the clamping device provides equal locking tension at all angles. Two larger sizes, No. 30 and No. 35, have a capacity for drawings to 12 x 18 and 18 x 24 inches. The protractor for these models is equipped

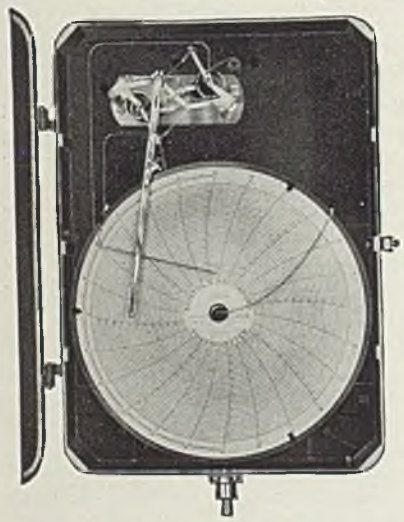
with a vernier so that the machine can be set accurately to ½-degree readings. Also for speed and convenience, a latching device is provided which locks the scales at 0, 30, 45, 60 and 90-degree readings on



either side of the 0 degree reading. Models Nos. 30 and 35 are equipped with detachable scales which can be easily removed or inserted.

Recording Thermometer

■ Bristol Co., Waterbury, Conn., has developed two new liquid filled recording thermometers — a case-compensated class I recording thermometer and a fully-compensated class I recording thermometer. The case-compensated instrument is offered in temperature ranges up to 400 degrees Fahr. and tubing



lengths up to 10 feet or longer depending on conditions surrounding the installation. The fully-compensated thermometer may be had in ranges up to 400 degrees Fahr. equipped with 200 feet or less of connecting tubing between the instrument and the bulb. Both units have higher sensitivity and accuracy. The measuring element is considerably stronger and more powerful than previous designs.

Arc Welder

■ Glenn-Roberts Co. Inc., 1009 Fruitvale avenue, Oakland, Calif., has placed on the market a new G-R model eighty-five 2000-ampere multipurpose arc welder for all heavy-duty applications. It is designed to operate either as a single-circuit welder with a current range of 100-2000 amperes, or as a 2, 3, or 4-operator multicircuit machine. Each of the four welding circuits has an independently controlled output range of 90-625 amperes, and any combination of lines may be made to gain higher amperages. A remote control unit provides stepless, full-range current control for each circuit or combination from a push-button station located anywhere in the welding work area, or mounted directly on the flare shield of the welding tongs. The welder's arc stability is uniform in all positions and at all heats. No variation in line voltage, open circuit or under load, takes place when current settings are changed, the unit carrying a heat control which provides infinite stepless regulation of amperage. Safe operation and reliable service under continuous top-output duty were of prime consideration in designing this unit. Maximum voltages with which operators can come in contact are 70 volts or less; complete grounding of the transformer frame and the unit's outer case is provided so that in the event of damage to the unit or accidental over-voltage on power supply lines, dangerous shocks will ground out safely without reaching the operator. Other features include core

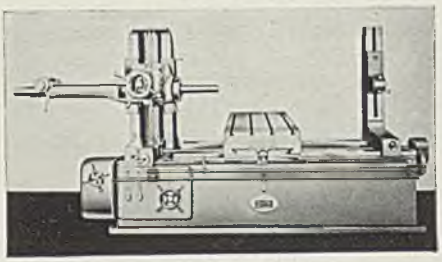
plates die-stamped from low-loss silicon transformer steel, heavy structural steel transformer frames and bases, fiber glass and mica insulation throughout, and complete protection against deterioration or failure from moisture and heat.

Punch Table for Holding Plates

■ A. Jay Hofmann, Narberth, Pa., announces a new 1941 model Lysholm plate punch table. It is now equipped with adjustable bearings on the shafts near the punch to facilitate adjustment of a plate up or down depending upon the punch requirements. The table can be operated with any punch unit provided it is equipped with a floating type punch. Use of this floating punch enables one man to punch 6700 holes per day. Tables are available in standard size for plates measuring 40 x 10, 30 x 8, 25 x 8 and 20 x 6 feet.

Horizontal Boring Mill

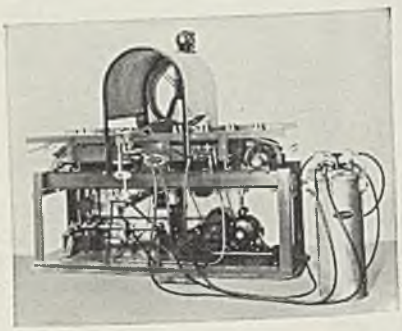
■ Yoder Sales Co., West Fifty-fifth and Walworth avenue, Cleveland, has placed on the market a new horizontal boring mill for use in general machine shops, tool and die plants, production and miscellaneous plants. It features 16 power speeds for head, saddle and table, in any direction, and 16 spindle speeds in any direction ranging from 8 to 380 revolutions per minute. A star-wheel, with clearly visible markings, gives any power speed desired. The machine's main drive is direct from motor through V-belts and multiple disk clutch. Its power driven rapid traverse operates on head, table and saddle in all directions. Controls are mounted at the front of the machine. Starting, stopping and reversing of



machine and feed are controlled through two bars running along the front of the unit. Both the base and column of the machine is of heavy box section and is ribbed to prevent distortions.

Artillery Shell Sprayer

■ Eclipse Air Brush Co., 400 Park avenue, Newark, N. J., reports a fully automatic machine to spray coat the inside of projectiles. It sprays the inside of 155 millimeter shell at the rate of 500 per hour. It also can be built to handle any size projectile or other cylindrical ob-



ject. In operation, the shell is picked up by metal arms from the conveyor belt, then carried along in a horizontal position on the machine to a point in front of an automatic spray gun fitted with an extension nozzle. At this point a master switch trips the trigger on the gun as it starts to move forward and a rotating device, with which the gun is synchronized, spins the shell to insure an even coating. As soon as the nozzle has withdrawn from the projectile, the shell moves along, making room for the next one. At the end of the machine, metal arms again pick up

and deposit the sprayed shell, still in a horizontal position, on another conveyor belt.

Checking Furnace

■ Leeds & Northrup Co., 4934 Stenton avenue, Philadelphia, announces a newly redesigned furnace for checking thermocouples with greater accuracy and over a wider temperature range. It utilizes a new accessory which increases accuracy of checking. This consists of a cylindrical copper equalizing block that fits inside the furnace. Drilled into this block are five wells to hold the comparison standard and the four couples being checked. With the equalizing block, checks can be made within 1 degree Fahr. from

room temperature up to 1000 degrees Fahr. Without it, checks can be made within 3 degrees Fahr. over a range of 300 to 1800 degrees Fahr. Available with heating elements for either alternating or direct-current operation on 115 or 230 volts, the furnace requires an input ranging from 40 watts at 300 degrees Fahr. up to 1000 watts at 1800 degrees Fahr. When temperature must be raised rapidly, input can be increased to 5000 watts. The working space inside the furnace is 4 inches in diameter and 46 inches deep. The outside diameter is 14¼ inches.

Acetate Tube

■ Precision Paper Tube Co., 2033 Charleston street, Chicago, announces a new self-supporting spirally wound transparent acetate tube for high frequency and electronic applications in various branches of the radio and electrical industry, and for certain types and applications of low-amperage cartridge fuses. Being highly transparent, not easily broken, and having a low moisture absorption rate, it is suitable for liquid gages where temperatures do not exceed 180 degrees Fahr.

The tube consists of acetate tape spirally wrapped over a steel form of the required inside diameter. The tape is held together by an acetate cement to insure a solid nonseparating wall. Being preformed, the tube will not shrink. It is supplied in continuous lengths of any wall thickness with any inside and outside diameter.

Control System

■ Brown Instrument Co., 4508 Wayne street, Philadelphia, announces a completely flexible program control system particularly adaptable to the steel and metal industry to provide automatic control of such heat treating processes as annealing, normalizing, carburizing and stress relieving. The basic instrument is a potentiometer type controller, and is usually a single point indicating or recording pyrometer although it is also possible to use the two or three record controllers, controlling at the same temperature.

The movement of the control index is governed by a control point drive motor mounted in the instrument. This drives the control index in either direction desired. An adjustable current interrupting device

is connected in series with each motor winding so that the speed of control index movement may be varied at will. Adaptable to nearly any control sequence desired, these program control systems are easily adjusted, have no cams to cut, and can control multiple zone furnaces from one master program.

Exhaust Hose

■ B. F. Goodrich Co., Akron, O., announces a new specially constructed exhaust hose for conducting fumes and abrasive dust. Light and flexible, it can be easily bent at short angles so that it may be easily brought to the machine or spot from which the fumes and dust may originate.

The hose consists of a smooth rubber tube with helical wire reinforcement plies of fabric and corrugated rubber cover. The ends regularly furnished are built 3 inches back without wire to facilitate fittings. Sizes ranging from 2 to 12 inches in diameter, in 8, 15 and 25-foot lengths are available.

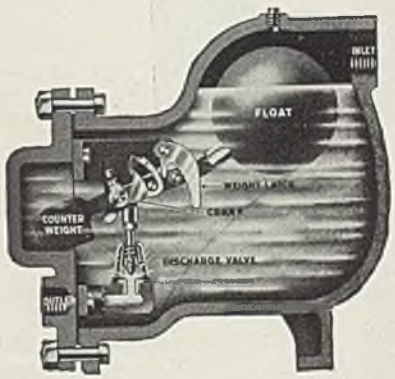
Air Circulators

■ Emerson Electric Mfg. Co., 1824 Washington avenue, St. Louis, announces a complete new line of modernly styled air circulators for industrial use. It includes 24 and 30-inch sizes operating on alternating and direct current and available with four styles of mounting accessories. Each unit is equipped with three large aluminum blades and grease packed ball bearings that require relubrication only every 6000 hours.

For added protection, each unit also is equipped with 2-piece heavy gage wire welded to the guard frame. Two speed operation on these circulators gives them greater flexibility in moving air. They also are guaranteed for 5 years.

Weight-Operated Trap

■ W. H. Nicholson & Co., 12 Oregon street, Wilkes-Barre, Pa., announce a model JR weight-operated trap for automatically draining water and oil from compressed air after-coolers, separators, receivers, etc. It is made in one pattern size only with



either ½, ¾ or 1-inch inlet and ½-inch outlet screwed connections. The unit features a welded stainless steel float, a water sealed discharge valve and intermittent discharge. It is of the large capacity type.

Resistors for Fluorescent Lamps

■ International Resistance Co., 401 North Broad street, Philadelphia, has placed on the market a complete line of type FL resistors for direct current operation of fluorescent lamps. Units are now available in voltages and sizes to fit all standard wiring strips. They are of the wire wound type having full molded 1250-volt insulation topped by a metal strip to aid in heat dissipation. Enclosed in low metal boxes of special ventilated construction, they are small enough to fit in the fixture channel. They operate at a temperature rise of from approximately 40 to 50 degrees Cent. with standard auxiliaries. Overall box dimensions are approximately 6¾ x 1¾ x 1¼ inches and the total assembled weight is less than 12 ounces.

Welding Zinc Diecastings

(*Concluded from Page* 80)

trol was used on all the above welding and it appears that the use of this accurate type of control is necessary to eliminate the various inaccuracies of other types of controls, particularly transients caused by nonsynchronous switching which would undoubtedly cause surface melting and expulsion of metal.

The use of pulsation welding gave better control of the various factors affecting the welds than the single impulse of power welding, particularly the overheating of the surfaces of the low melting point zinc alloy.

Conclusions: It is apparent from the results of the welding tests outlined above that, with the proper type of equipment and control, satisfactory welds can be made by the various resistance-welding methods provided the material is thoroughly cleaned and close tolerances adhered to in the welding procedure, such as the factors of time, current, pressure and electrode and equipment maintenance.

The use of welding should be of considerable value in fabricating various structures by welding together diecast parts to form an assembly which could not be cast as a complete structure or to reduce cost on structures which are difficult to cast in one piece.

Prizes Offered for Papers On Aircraft Welding

■ Prizes totaling $600 will be awarded to authors of papers treating of any type of welding which is or can be used for the fabrication of structures or assemblies in production of aircraft steels such as 1025, X4130, X4135, X4340 or similar steels. They may cover any phase, joint design, fabrication or laboratory investigations. Papers are to be submitted by Aug. 18, 1941, to Aircraft Welding Contest, American Welding Society, 33 West Thirty-ninth street, New York. Prizes are $300, $200, and several totaling $100. The contest, open to any American, has been established by the Summerill Tubing Co., Bridgeport, Pa.

Steel Industry Large User of Textiles

■ Purchasing agents for steel companies must know how to buy textiles as well as iron ore and machinery, for the industry uses millions of yards of textiles every year, according to the American Iron and Steel Institute.

About 1,500,000 pounds of cotton waste are used a year to wipe the grime from steel men's hands, to remove excess oil from machinery and generally to maintain good housekeeping conditions in the plants of the steel industry.

Linen is used in making mechanical drawings. Thousands of yards of the finest grade, specially treated to take ink from a drawing pen, are bought annually.

Burlap consumption is estimated to average about 3,000,000 yards per year. The burlap is wrapped around finely finished steel products such as cold drawn bars, certain kinds of wire, stainless steel sheets and strips to protect them during shipment.

Publishes Study on How To Save Payroll Taxes

■ *Employment Stabilization,* a special study on how to save on payroll taxes, has been published by Prentice-Hall Inc., 70 Fifth avenue, New York.

Pamphlet explains merit rating provisions of unemployment compensation laws, discusses methods that have been successfully applied in various industries to stabilize employment, and a number of case studies of companies where these methods have been applied.

Ignitron Substation

(*Concluded from Page 75*)

value, under control of the voltage regulator.

Obviates Constant Supervision: Voltage balancing, voltage regulation and current limitation are automatic operations and are accomplished by changing the point, on the positive half of the cycle, at which the arc is ignited in the ignitron tank. This action is accomplished by grid control of the thyratron tube by means of a grid impulsing transformer and phase shifter. For normal, 250-volt direct-current, bus voltage, the phase relation of the grid-biasing transformer's secondary voltage, to the voltage of the corresponding rectifier anode is such that most economic operation exists. A downward reduction in bus voltage is accomplished by delaying the firing of the main arc by a phase shift of grid voltage, of the thyratron tube, to a delayed position with respect to the anode voltage.

Standard voltage regulator equipment is used; supplied with special control to permit the unit to carry long time overloads within the thermal limits of the transformer. When this limit is reached, the regulator is automatically re-calibrated for a normal load value until the transformer cools sufficiently to permit resumption of operation at the higher load value.

Operation Provides Flexibility: One half of the rectifier may be operated separately should it become necessary or desirable to perform any repair or maintenance operations on the other half. The operation of changing from full to half unit operation is similar to ordinary stopping and starting with exception that six anode disconnecting switches are opened. A selector switch on the control board permits selection of the operating half which shall function. Contacts of the selector switch prepare the automatic circuits so that only those devices associated with the half unit which is to operate will function. Also, the load control devices are automatically re-calibrated to prevent overloading the half unit beyond its capacity. With this arrangement the substation may be operated at half capacity, while servicing or "treating-out" the other half of the unit, thereby greatly enhancing the utility of the installation.

Arc suppression equipment, which functions to extinguish the rectifier arc in the event of short circuit on the direct-current system, or the occurrence of an arc-back in one of the tanks, provides rapid limitation of overload current values. Only the affected half of the rectifier unit will be removed from service at the time of an "arc-back."

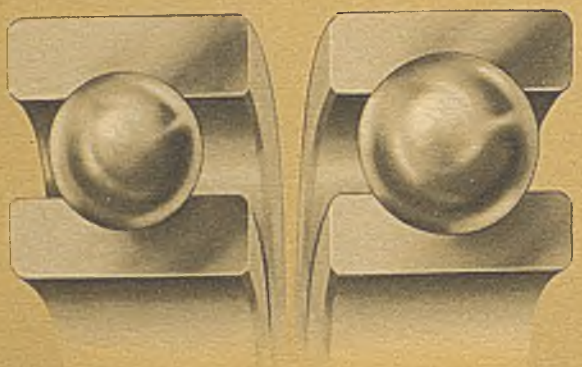
Such operational flexibility allows this rectifier substation to stand with ease, the severe load surges common to heavy steel mill operation. Since it is this industry's first ignitron rectifier substation, known operating results are of course not yet available. Should operating results be no more than average however, the rectifier already has established for itself a few major accomplishments.

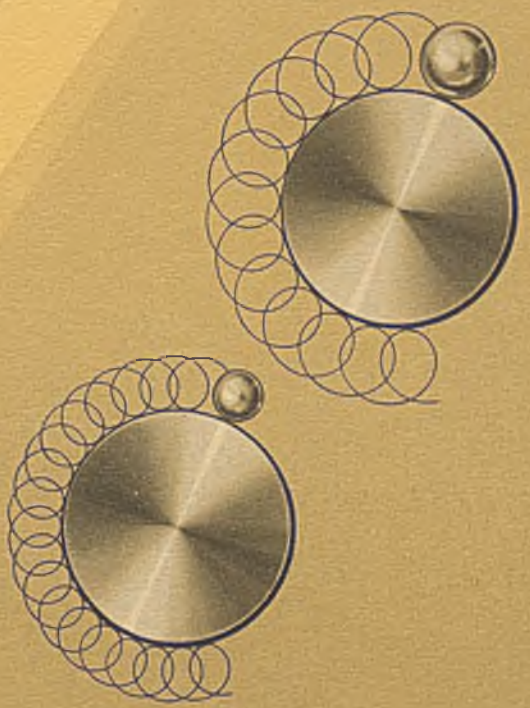
It made possible a new modern substation having greater overload capacity by some 100 to 200 per cent, than its predecessor, without any major building changes. It allows foolproof remote operation with positive protection that on certain faults does not even cause a power failure. This last is important enough.

By far, its greatest achievement, though, is one which attacks the problem that began with mill electrification—the problem of minimizing damage to electrical equipment by dust and corrosive gases in the ventilating atmosphere. By using a water-to-water cooling medium, the volume of interchanged air, between the inside and outside of the building, is reduced and this problem considerably simplified.

The Bearing on the Left has

"HIGH BLOOD PRESSURE"





FAFNIR BALANCED DESIGN

These two ball bearings are identical in size and type. But the balls in the Fafnir are $^{17}/_{32}$" — those in the one on the left are only $^{15}/_{32}$". Just as a heart is forced by high blood pressure to beat faster, these smaller balls must revolve faster — and make over a million more revolutions than the Fafnir balls in 24 hours at 2000 r.p.m.! Obviously, fewer revolutions within the Fafnir Ball Bearing mean less wear, longer life.

This Fafnir Balanced Design — ring thickness adequate for strength; ball size and race depth brought to the proper point for maximum performance — is inherent in the entire line — it means not only longer life but also greater radial and thrust capacity in any Fafnir you buy. The Fafnir Bearing Company, New Britain, Connecticut.

DOUBLE ROW BEARING

GREASE SHIELD BEARING

RADIAL THRUST BEARING

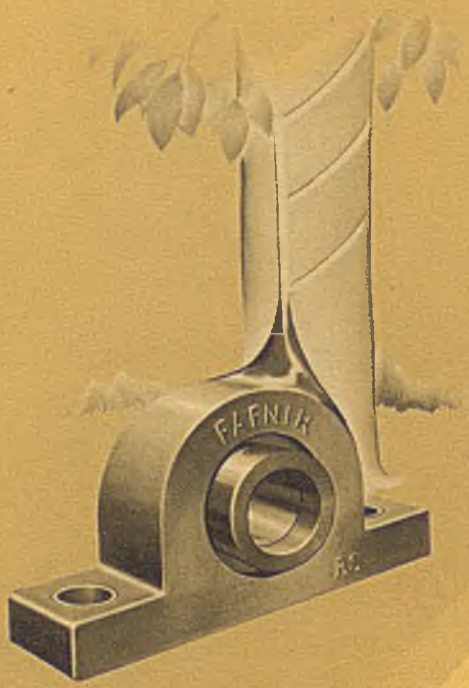
"MECHANI-SEAL" BEARING

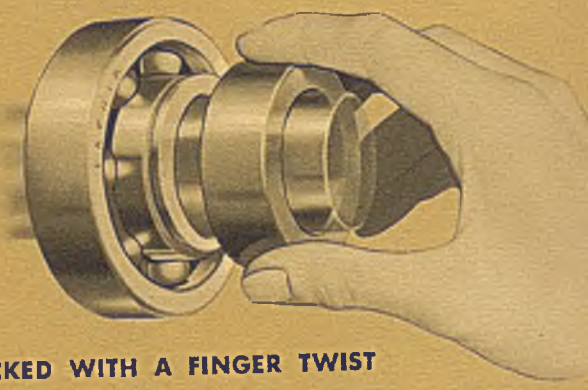
FAFNIR

Ball Bearings

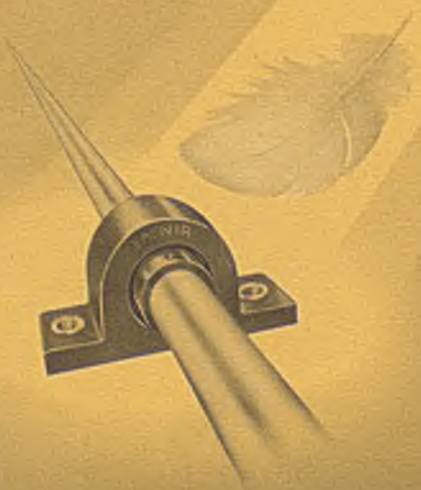
THE BALANCED LINE
MOST COMPLETE IN AMERICA

Bearing Housings from Rubber Trees for QUIETNESS and ECONOMY





LOCKED WITH A FINGER TWIST



An easily installed Fafnir Wide Inner Ring Ball Bear
pressed into a housing of molded rubber — it's the id
unit for low-cost, light-duty applications — and it provides
extra bonus in quiet operation!

Bored to inch instead of metric diameters, for slip fi
stock shafting, this Fafnir unit is locked with a finger-t
Supplied with steel reinforcing strap, and with or wit
grease fitting. Made to fit shaft diameters from ½" to 1
Two cartridge type units also available.

Rubber Pillow Blocks exemplify Fafnir's unique adapt
of ball bearings to every need of industry. For every
mon or unusual ball bearing application you'll do we
look to the "Most Complete Line in America". The F
Bearing Company, New Britain, Connecticut.

RSU TYPE
With steel strap
for extra rigidity

RBGF TYPE
Rubber Flange
Cartridge (Re-greasable)

RSC TYPE
Rubber
Cylindrical Cartridge

FAFNI
Ball Bearin
THE BALANCED LIN
MOST COMPLETE IN AM

Steel Price Freezing Raises New Questions

Wages, highest cost factor, now at record level, with some raw materials prices and freight rates higher. Ore is reaffirmed

MARKET IN TABLOID ★

Demand
Warm weather speeds outdoor projects, enlarging sales.

Prices
"Frozen" at first quarter levels, sometimes hard to define.

Production
Unchanged at 98.

■ FREEZING of steel prices at first quarter levels when wage rates, the principal cost factor, had advanced sharply, last week proved disconcerting to the steel industry. Some leading producers indicated that a general increase of $2 a ton would prevent deterioration of their profit position as affected by the 10-cent wage boost. Non-integrated producers in some cases declared that their position has been made untenable by the steel price ruling.

Other steelmaking costs have risen. Just 24 hours before the "freezing" order, for instance, iron ore freight rates on the Great Lakes were raised 10 per cent, which will increase materially the cost of transporting the predicted record 75,000,000 tons of Lake ore this season. An instance of the high costs of raw materials used in steel making was the rise of $4 per ton in pig lead the past month, which will increase the cost of producing terne plate, as one example. Costs of rolling mill and auxiliary mechanical equipment are at least 15 per cent higher, on an average, than a year ago.

Moreover there will be considerable confusion as to what first quarter prices are in view of several irregularities. In finished steel prices charged by individual producers for various extras for size, quality, quantity and special service in preparation have lacked uniformity. Moreover the "freeze" ruling may wreak hardship on marginal steel producers, such as certain plate makers; healthy conditions among platemakers are greatly needed in this era of major shipbuilding.

The new ruling will also tend to disrupt the periodic adjustments of extras and discounts, revisions which are needed every so often to keep prices abreast of changing costs of manufacture. Such revisions are sometimes downward as economies of manufacture are accomplished. But under the present ruling extras, too, are frozen.

In view of all these factors it is commonly expected that the Price Stabilization Commission later will recognize the necessity of allowing exceptions and revisions, as has been the case with steel scrap prices. It is recognized as possible that certain steelmakers, particularly smaller independents, may be allowed to show proof that higher prices are necessary for their effective co-operation in pushing steel production to the highest possible level. A mitigating factor is that prices are statedly not being fixed for the duration of the present emergency necessarily.

A new wave of demand is encountered by steelmakers, partly because of premature warm weather which revives outdoor projects. Some makers report improvement in orders by as much as 20 per cent over the similar March period. It is expected that 1941 production will have been 95 per cent sold out by May 1, with only some ten items still obtainable, including floor plates, wire rope, nails, manufacturers' wire, fencing, merchant pipe, bolts and nuts, tool steel and casings, on all of which fairly prompt delivery still can be obtained.

Though slowing down in demand has been reported frequently in fabricated shapes actual sales in April ran far ahead of March when the average was 20,000 tons weekly. Consolidated Aircraft is inquiring for two lots of 26,000 tons each, one for a plant at Fort Worth, Tex., and another at Tulsa, Okla.

Prices on Lake Superior iron ore for 1941 have been reaffirmed at levels named in early spring of 1940 and several millions of tons have been sold.

The coal strike has caused a number of blast furnaces and foundries to shut down or slow down because of the shortage of coke. A number of blast furnace operators are fearful lest linings of furnaces will wear out on an epidemic scale because of the long strain placed on them. In fact some recent shutdowns were for relining, with fuel shortage incidental.

Scheduled automobile production for the week ended April 19 was 99,945 units, an increase of 685 for the week comparing with 103,725 for the 1940 week.

Steel production last week was unchanged at 98 per cent of capacity. Gains took place as follows: Detroit 9 points to 70 per cent, New England 2 points to 92 and Chicago ½ point to 102. Declines were: Cincinnati 2½ points to 91½, Cleveland 2 points to 96½, Pittsburgh 2 points to 100 and Wheeling 4 points to 84. Unchanged were eastern Pennsylvania at 96, Birmingham at 90, St. Louis at 98, Buffalo at 90½ and Youngstown, 97.

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. 19	Apr. 12	Apr. 5	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

	April 19, 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	2.25	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

	April 19, 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% Ni.-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-2.44c
Philadelphia, del.	2.15c-2.30c
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--2.25c
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

Alloy	S.A.E.	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., ⅜ 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
2¼" O.D.	12	16.01	18.45
2½" O.D.	12	17.54	20.21
2¾" O.D.	12	18.59	21.42
3" O.D.	12	19.50	22.48
3½" O.D.	11	24.62	28.37
4" O.D.	10	30.54	35.20
4½" O.D.	10	37.35	43.04
5" O.D.	9	46.87	54.01
6" O.D.	7	71.96	82.93

Cast Iron Pipe

Class B Pipe—Per Net Ton

6-in., & over, Birm.	$45.00-46.00
4-in., Birmingham	48.00-49.00
4-in., Chicago	56.80-57.80
6-in. & over, Chicago	53.80-54.80
6-in. & over, east fdy.	49.00
Do., 4-in.	52.00

Class A Pipe $3 over Class B Stnd. fitgs., Birm., base $100.00.

Semifinished Steel

Rerolling Billets, Slabs

(Gross Tons)

Pittsburgh, Chicago, Gary, Cleve., Buffalo, 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 ⅜-inch incl. (per 100 lbs.) $2.00

Do., over ⅜ to ¼-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

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
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	Structural Shapes	Floor Plates	Sheets: Hot Rolled	Sheets: Cold Rolled	Sheets: Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars: Carbon	Cold Drawn Bars: S.A.E. 2300	Cold Drawn Bars: S.A.E. 3100
Boston	3.98	4.06	5.06	3.85	3.85	5.66	3.71	4.48	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	2.79c	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 delivered Atlantic seaboard duty-paid.

Domestic Prices Delivered at Works or Furnace—

		£	s	o
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, dealers	18.50
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	†15.25-15.50
Phila., 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, dealers	17.50
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
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	18.50
Duluth No. 1	17.00
Duluth No. 2	16.00
Pittsburgh	19.00
St. Louis	18.50
Toronto, dealers	10.00-10.50

SHEET CLIPPINGS, LOOSE

Chicago	15.50-16.00
Cincinnati, dealers	14.25
Detroit	†13.00-13.50
St. Louis	12.00-12.50
Toronto, dealers	9.00

BUSHELING

Birmingham, No. 1	16.50
Buffalo, No. 1	18.75
Chicago, No. 1	18.25
Cincin., No. 1	18.00
Cincin., No. 2	14.00
Cleveland, No. 2	15.00
Detroit, No. 1 new	17.85
Detroit, No. 1 new	†16.00-16.50
Duluth No. 1	17.50
Duluth No. 2	18.50
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
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	†10.75-11.25
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
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, dealers	14.00
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, dealers	14.00
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	28.50-24.00
Eastern Pa.	28.75
Pittsburgh	26.75-27.25
St. Louis	28.25-28.75

STEEL RAILS, SHORT

Birmingham	21.00
Buffalo	23.75
Chicago (3 ft.)	22.75
Chicago (2 ft.)	23.25
Cincinnati, dealers	22.50
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
Duluth	20.00
East Pa.	20.75
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, dealers	17.00
Eastern Pa.	20.50-21.00
New York	†17.00-17.50
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
Duluth	21.50
New York	†19.25-19.50
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.	25.50
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
Cincin., iron deal.	19.50-20.00
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., mach. del.	22.24
Cleveland, mach.	22.50
Detroit, cupola	†21.50-22.00
Eastern Pa., cupola	23.84
E. Pa., No. 2	23.00-23.50
Los Angeles	16.50-17.00
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
Detroit, auto	†21.50-22.00
Detroit, break.	†17.50-18.00
Eastern Pa.	22.34
Los Ang., auto, net	13.00-14.00
New York break.	†18.75-19.25

STOVE PLATE

Birmingham	13.50
Boston district	14.00-14.50
Buffalo	17.00-17.50
Chicago	17.60
Cincinnati, dealers	13.00-13.50
Detroit	†15.00-15.50
Eastern Pa.	18.84
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

Steel Prices Are "Frozen"

Announcement Wednesday by Leon Henderson, Office of Price Administration and Civilian Supply, fixing steel prices at the "levels prevailing during first quarter," has frozen quotations for the present.

Numerous questions relative to exceptions from the order are expected to be raised. It is possible that prices on certain items may be revised upward but nothing definite has yet occurred along these lines. Details of the order and its reception by the industry are presented on page 21 of this issue.

Sheets, Strip

Sheet & Strip Prices, Pages 108, 109

Sheet mills are operating at practical capacity, the national rate being estimated at better than 90 per cent, some hand mills being idle and some sheet mill capacity being used for light plates. Production is also somewhat hampered by lack of sheet bars for nonintegrated producers. This condition is likely to continue as integrated sheetmakers are pressed for their own supply and to meet British demands. Considerable pressure is being exerted to increase light plate production by sheet mills.

Many mills have large volume of orders which have not been scheduled for rolling and on which no delivery dates have been promised. Preference for defense material often causes rearrangement of schedules but most consumers are sufficiently protected to avoid serious interruption.

Continuous mills have heavy backlogs for automotive use. It is believed there will be some letdown in demand for this material in the next 60 days but present retail demand for cars indicates the decreased demand will be less than normal. In the south, seasonal conditions have increased demand for roofing sheets as well as for other material for outdoor use.

Restrictions on sale of nickel-bearing stainless sheets, limiting them largely to defense industries, permits some leeway and industries essential to national welfare still are able to obtain such material.

Continued decline in sheet galvanizing is a hardship to metal specialty manufacturers and all galvanizers have been forced to turn down business. Some sheet metal works have curtailed production for lack of material and a newly completed plant in the Pittsburgh district has been unable to reach a substantial

operating rate. Experiments with substitute coatings are being pursued.

Cold strip rerolling operations are not seriously curtailed by lack of hot strip but schedule rearrangement has been necessary in some instances where stainless and other special finishes are involved. Pressure for hot strip delivery is insistent and some cold strip has been sold into first quarter, 1942.

Narrow cold strip bookings are limited by the volume rerollers are willing to accept and orders frequently are rejected, accounting for any decrease in buying. Despite peak production, heavy shipments and curtailment of orders backlogs are growing, Jan. 1 being the best offered by many mills. Coated cold strip is being substituted for brass and aluminum in many cases.

Plates

Plate Prices, Page 108

Plate demand for miscellaneous purposes is somewhat easier, due to heavy coverage and to mill position, offering little chance for delivery until late in the year.

Shipbuilding and other defense work hold backlogs at a peak. Proportion of defense demand to total business is increasing, limiting supply of plates for ordinary commercial purposes, including railroad requirements.

For shipbuilding most yards have fixed specifications with mills for tonnage to be shipped well into 1942. Shipway construction has progressed ahead of expectations, resulting in need for plates earlier than first estimated. Sun Shipbuilding & Dry Dock Co., Chester, Pa., will lay the keel July 1 for the first of 72 tankers for the Maritime Commission. Steel for these vessels is being placed. Cramp Shipbuilding Co. will start work about midyear on six navy cruisers. It is reported that a large producer has booked 96,000 tons of steel for one of the newly-created yards.

Miscellaneous plate consumers are concerned as to future allotments and deliveries. Practically all orders are being referred to mills for acceptance. Quarter-inch plates are in short supply as makers of small tanks are using them in large volume. Most boiler shops have fair backlogs and are busy on miscellaneous work. For the most part railroads are specifying only for maintenance work.

Reflecting the urgency of some demands, buyers recently paid $10 and more a ton above the 2.10c Sparrows Point base, to one eastern mill for nearby delivery, and have practically cleaned jobbers out on certain sizes. Ship repairs and remodeling have resulted in particularly urgent demands, especially for ¾-inch plate and heavier for deck housings and the like.

Plate Contracts Placed

900 tons, four fleet tugs for navy, San Francisco, to United Engineering Works, San Francisco.

220 tons, floor plates, for bureau of reclamation, invitation A-33,172-A, Pitt River bridge Redding, Calif., to Alan Wood Steel Co., Conshohocken, Pa.

200 tons, Mare Island navy yard, Calif., schedule 5234, to Worth Steel Co., Claymont, Del.

Plate Contracts Pending

Unstated, five navy tankers, to Seattle-Tacoma Shipbuilding Co.

Unstated, two 110-foot harbor ice breakers for coast guard; Birchfield Boiler Co. Inc., Tacoma, low.

Unstated, pressure and oil storage tanks; bids to Bonneville project, April 23 and April 25; Spec. 1829 and 1836.

Cold-Finished Steel

Cold Finished Prices, Page 109

Shell production appears the most important factor in cold-finished bars. It is generally believed during last half heavy tonnages will be

placed, all with immediate priorities, with detrimental effects on deliveries for commercial consumption.

Smaller shells, such as the 20-millimeter and the 1.1-inch projectiles for aircraft arms, will provide most business. Substantial bid invitations have already been received for these shells, and subsequent buying will be much heavier. In addition, parts for larger shells, including 75 and 105 millimeter projectiles, will required increasing tonnage.

It is the policy of most cold-finished steel producers to allot steel on the basis of past performance. This allotment is made after defense requirements of Britain and the United States have been provided.

Sellers are making no delivery promises and all orders are on a mill convenience basis. Incoming specifications for defense tonnage come first, and local producers are bidding on all government invitations. British have placed blanket orders and are releasing as rapidly as bottoms are available for shipping. Mills have been unable to build up appreciable stocks with the result that British releases are placed on mills at once and upset all delivery schedules.

About 8400 tons of cold-drawn steel will be required for 24,000,000 shells of 1½-inch and 20 millimeter diameter, for which the army has asked bids.

Bars

Bar Prices, Page 108

Steel bar buying continues unabated and in excess of shipments, causing further delivery delay, bookings extending into 1942 in some instances and deliveries into fourth quarter on many sizes of carbon bars. Consumption is expanding in several industries engaged in defense work as extensive tooling operations are completed. Makers of marine hardware are taking larger supplies as shipbuilding programs progress.

In some cases, where possible, revised specifications are being filed in releases of alloy and electric furnace bars originally requiring nickel. In government work this is difficult as specifications are generally closely maintained.

Heavy pressure is experienced from manufacturers of bolt and nut specialties and forging shops operating on alloy forging stock for aircraft. The latter in many cases are working off stock much faster than replacements can be obtained. Forging shops generally are working at capacity.

One producer of wire rods has been rolling bars on his rod mills, up to 1-inch diameter rounds and plans production later of flats and hexagons.

Pipe

Pipe Prices, Page 109

Distributors of merchant steel pipe generally anticipated the advance of $6 per ton on galvanized and stocks are well rounded to meet the slightly improved demand. Steel pipe buying is mainly for construction needs, with resale prices firmer than usual. Consumers have been supplied to an extent that no real distress has been met. Reorders to mills are more frequent.

Line pipe inquiry is brisk and oil country casings are one of the few items which can be supplied promptly.

Alloy tubing is active, notably for use in the aircraft industry. Except in a few instances demands are being met sufficiently well to prevent distress.

Cast pipe foundries are doing a substantial volume of small lot business, with specifications against blanket contracts being released more heavily.

Cast Pipe Placed

2355 tons, 4 to 8-inch, Class 250, Los Angeles, allocated as follows: 1171 tons to National Cast Iron Pipe Co., Birmingham, Ala.; 614 tons to American Cast Iron Pipe Co., Birmingham, Ala.; and 570 tons to United States Pipe & Foundry Co., Burlington, N. J.

Cast Pipe Pending

2500 tons, 4 to 8-inch, Los Angeles; bids opened.

1545 tons, 4 to 8-inch Class 250, east bay municipal utility district, Oakland, Calif.; United States Pipe & Foundry Co., low on 1187 tons of 6 and 8-inch and American Cast Iron Pipe Co., Birmingham, Ala., low on 358 tons of 4-inch.

1000 tons or more, 4 to 12-inch bell and spigot, 100 hydrants, valves, service, boxes, etc., also 46,000 feet ¾ to 1½-inch copper service pipe; bids to C. T. Bogart, purchasing agent, Spokane, Wash., April 24.

790 to 869 tons, water, gas and sewer system, military airport, Phoenix, Ariz.; bids opened.

670 tons, 6 to 20-inch, South Gate, Calif.; Fred W. Weber, Downey, Calif., low on general contract at $65,452.25 with second bidder at $65,453.01.

550 tons, 8, 12 and 16-inch, Newark, N. J.; bids in.

421 to 507 tons, water, gas and sewer system, Las Vegas, Nev.; bids to United States engineer office, Los Angeles, Invitation 155; bids April 21.

302 tons, 6 to 12-inch, Pasadena, Calif.; bids April 25.

300 tons, 2 to 12-inch, for Shelton, Wash.; bids in.

236 tons, 6 to 10-inch, Class 250, Burbank, Calif.; bids opened.

105 tons, 4 and 8-inch, Fresno, Calif.; bids opened.

Steel Pipe Placed

345 tons, 1-in. tubing, bureau of reclamation for delivery at Friant, Calif., to Laclede Steel Co., St. Louis.

Wire

Wire Prices, Page 109

Wire buying has slackened slightly, in some instances being off 5 to 10 per cent from last month, but releases are heavier and buying is in excess of shipments. Automotive demand is brisk and builders and parts makers are taking full commitments. Specifications for Ford cars have been resumed after being held up about a week. Deliveries this month are at a peak, which is expected to continue through the summer. Most business currently booked is for fourth quarter delivery, although some scattered open capacity is available for third quarter. The bedding industry is buying spring wire for October-December.

Wire rod supplies are limited, some producers being sold through the year and allocating tonnage to regular customers. Even integrated mills find their supply less than could be desired.

Some galvanized products makers are out of the market except on priority orders. Chromium-nickel rods are also being limited to priority uses by some makers. In some cases miscellaneous tonnage is being

booked, contingent on lesened demand from automotive users during the summer.

Southern mills have orders sufficient to maintain capacity production and seasonal influences are bringing increased sales.

In general wire products may be obtained more promptly than in most steel classifications. Wire rope, nails and manufacturers' wire can be shipped by some suppliers within four weeks or less. Jobber and mill supply houses have good stocks of wire rope.

Rails, Cars

Track Material Prices, Page 109

Heavy buying of rolling stock by carriers continues, placing of locomotives being especially heavy, both in heavy road units and light switchers. Car buying of all descriptions also is active and indications are it will continue for some time, plans being under consideration by numerous roads for additional equipment.

Supply of plates and other items entering into car and locomotive construction is limited and some delays are being met in completing contracts.

Locomotives Placed

Atchison, Topeka & Santa Fe, one 5400-horsepower diesel-electric freight locomotive to Electro Motive Corp., La Grange, Ill.

Central of Georgia, two diesel-electric switchers, to Baldwin Locomotive Works, Eddystone, Pa.

Chicago, Milwaukee, St. Paul & Pacific, eight diesel-electric locomotives: one 4000-horsepower each from Electro-Motive Corp., LaGrange, Ill., and American Locomotive Co., New York; two 1000-horsepower switchers to American Locomotive Co.; one 5400-horsepower and one 60-horsepower to Electro-Motive Corp.; two 44-ton switchers to Davenport Besler Corp., Davenport, Iowa.

Chicago & North Western, three 660-horsepower switchers to American Locomotive Co., three 350-horsepower to Whitcomb Locomotive Co., Philadelphia.

Chicago, Rock Island & Pacific, two 2000-horsepower to Electro-Motive Corp. and one to American Locomotive Co.; five 44-ton switchers to Davenport Besler Corp.

Day & Zimmerman Inc., two Diesel-electric switch engines, one of 1000-horsepower and the other of 650-horsepower, to Baldwin Locomotive Works, Eddystone, Pa.

Dewey Portland Cement Co., Kansas City, Mo., to Davenport Besler Corp.

New York, New Haven & Hartford, five electric locomotives, to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.; bodies to be built by Baldwin Locomotive Works, Philadelphia.

Pennsylvania, one 1000-horsepower diesel-electric, to Electro-Motive Corp., La Grange, Ill.

Pickands, Mather & Co., Cleveland, one 0-8-0 locomotive, to Baldwin Locomotive Works, Eddystone, Pa.

St. Louis-San Francisco, two 44-ton switchers to Davenport Besler Corp.

Car Orders Placed

Bethlehem Steel Co., three 200-ton ingot cars, to own shops.

E. I. Du Pont De Nemours & Co., 192 small two and 4-wheel industrial cars awarded during March and April to American Car & Foundry Co., New York; this is in correction of previous report to the effect that this buyer closed on 192 tank cars to the American Car & Foundry Co.

Erie, 1600 cars: 800 box, to Pullman-Standard Car Mfg. Co., Chicago; 100 automobile, 100 furniture and 50 covered hoppers, to American Car & Foundry Co., New York; 250 hoppers, to General American Transportation Co., Chicago; 250 gondolas and 50 flat cars, to Greenville Steel Car Co., Greenville, Pa.

Chicago, Indianapolis & Louisville, 150 box cars and 60 flat cars, to Pullman Standard Car Mfg. Co., Chicago.

General Electric Co., one 70-ton covered hopper car to American Car & Foundry Co., New York.

Nickel Plate, 500 box cars, to American Car & Foundry Co., New York.

Southern Pacific, 50 70-ton high side gondolas, to American Car & Foundry Co., New York.

Rail Orders Pending

1300 tons, standard rails and 1000 tons,

accessories, Plum Brook Ordnance Works, Sandusky, O.

Car Orders Pending

Chicago, Rock Island & Pacific, 1000 box cars, bids asked.

Buses Booked

A.c.f. Motors Co., New York: Ten 36-passenger for Montreal Tramways Co., Montreal, Que.; two 29-passenger for Bowen Motor Coaches, Fort Worth, Tex.

J. G. Brill Co., Philadelphia: Twenty-eight 44-passenger single-motor trolley coaches for Louisville Railway Co., Louisville, Ky.

Twin Coach Co., Kent, O.: Forty-four 31-passenger for Rochester Transit Corp., Rochester, N. Y.; ten 27-passenger for Arkansas Power & Light Co., Pine Bluff, Ark.; fifteen 41-passenger for Houston Electric Co., Houston, Tex.; six 29-passenger and three 27-passenger for Southern Pennsylvania Bus Co., Chester, Pa.; seven 36-passenger for South Carolina Power Co., Charleston, S. C.; five 35-passenger for Pacific Gas & Electric Co., San Francisco; four 41-passenger for Boston Elevated Railway, Boston; three 33-passenger for Bluebird Systems Inc., Chicago.

Yellow Truck & Coach Mfg. Co., Pontiac, Mich.: Thirty-four 27-passenger, for Chicago Surface Lines, Chicago.

Shapes

Structural Shape Prices, Page 108

Sales of fabricated shapes in April are running much heavier than in March which had been the low point for several months. However, fabricators insist that business is waning. Apparently any tapering will be gradual. Two large aircraft plants for Consolidated Aircraft Co., at Tulsa, Okla., and Fort Worth, Tex., will take 26,000 tons each, specifications being practically identical.

Five months' delivery is average on new business, but this can be shortened to four in exceptional cases. Fabricators are often handicapped by inability to get necessary shapes and sizes of plain material. Rolling mills frequently do not complete a rolling of one description scheduled, but are forced to shift to some other specification in the present emergency, thus violating the usual precedent of rolling to completion.

A Pennsylvania mill continues to figure costs on individual projects and is getting nearly $3 per ton more than the general market on plain material. Sun Shipbuilding Co., Chester, Pa., is still debating whether to use wood or steel for additional ways.

Shape Contracts Placed

7500 tons, superstructure, bridge, Mississippi river, Dubuque, Iowa—East Dubuque, Ill., for Dubuque bridge commission, to Bethlehem Steel Co., Bethlehem, Pa.; bids April 11.

4000 tons, shipyard construction, Sun Shipbuilding & Dry Dock Co., Chester, Pa., to Belmont Iron Works, Philadelphia.

3700 tons, five hangars, Washington National airport, Gravelly Point, Va., to Bethlehem Steel Co., Bethlehem, Pa. through John McShain Inc., Philadelphia, contractor.

2400 tons, building, York Safe & Lock Co., York, Pa., to Bethlehem Steel Co., Bethlehem, Pa.; James E. Stewart Co., New York, contractor; reported last week as 1800 tons.

1650 tons, plant, Lukenweld Inc., Coatesville, Pa., to Welded Steel Shapes, Coatesville, Pa.

1500 tons, bridges, Northern Pacific railroad, Thorpe, Wash., to American

Shape Awards Compared

	Tons
Week ended April 19.....	30,911
Week ended April 12	41,148
Week ended April 5.....	26,214
This week, 1940	10,014
Weekly average, 1941.....	34,121
Weekly average, 1940	28,414
Weekly average, March, 1941	20,157
Total to date, 1940	275,102
Total to date, 1941	545,943

Includes awards of 100 tons or more.

Bridge Co., Pittsburgh.

1350 tons, viaduct, East River drive, New York, to Bethlehem Steel Co., Bethlehem, Pa., through Lynn Construction Co., New York.

1000 tons, manufacturing building, Delco-Remy Division, General Motors Corp., Anderson, Ind., to Indiana Bridge Co., Muncie, Ind.

800 tons, power station, San Diego, Calif., to Minneapolis-Moline Power Implement Co., Minneapolis.

629 tons, steel superstructure, bridge over Kentucky Dam power house, Tennessee Valley Authority project, to Virginia Bridge Co., Roanoke, Va.; bids March 17, Knoxville.

600 tons, four fleet tugs, for navy, to United Engineering Works, San Francisco.

600 tons, hangar, naval base, Trinidad, B. W. I., to U. S. Steel Products Co., New York; James Stewart & Co., New York, contractor.

600 tons, steel piling, conversion tunnel, Board of Water Supply, New York, Neversink, N. Y., to Bethlehem Steel Co., Bethlehem, Pa., through George M. Brewster & Son, Bogota, N. J., contractor.

560 tons, storehouse, Fore River shipbuilding division, Bethlehem Steel Co., Quincy, Mass., to Bethlehem Steel Co., Bethlehem, Pa.

530 tons, sheet piling, water and power department, Los Angeles, to Columbia Steel Co., San Francisco.

500 tons, factory, Guide Lamp Division, General Motors Corp., Anderson, Ind., to Indiana Bridge Co., Muncie, Ind.

500 tons, sheet piling, quay wall, Mare Island, Calif., navy yard, to Bethlehem Steel Co., San Francisco.

450 tons, grade eliminations, Queens, N. Y., Tri-borough bridge authority project, to Bethlehem Steel Co., Bethlehem, Pa., through Leopold & Co., New York, contractors.

400 tons, building, Corning Glass Works, Corning, N. Y., to Belmont Iron Works, Philadelphia.

400 tons, mine installation facilities, Little Creek, Va., to Virginia Bridge Co., Roanoke, Va., through Vanguard Construction Co., New York.

400 tons, bridge, Leavittsburg, O., for Trumbull county, to Bethlehem Steel Co., Bethlehem, Pa.

350 tons, powerhouse, Dresden, N. Y., to Belmont Iron Works, Philadelphia.

315 tons, conveyor bridges and supports, Fort Loudon dam, Tennessee Valley Authority project, to Anthracite Bridge Co., Scranton, Pa.; bids March 17, Knoxville.

300 tons, manufacturing building, Mills Novelty Co., Chicago, to American Bridge Co., Pittsburgh.

275 tons, building, Landis Machine Co., Waynesboro, Pa., to Belmont Iron Works, Philadelphia.

275 tons, factory and office building, Remington-Rand Co. Inc., Ilion, N. Y., to American Bridge Co., Pittsburgh.

250 tons, warehouse, Buffalo Bolt Co., North Tonawanda, N. Y. to Buffalo Structural Steel Co., Buffalo.

232 tons, sheet piling, substructure, North State street bridge, Chicago, Fitzsimmons & Connell Dredge & Dock Co., Chicago, contractor, to Carnegie-Illinois Steel Corp., Chicago; bids March 20.

230 tons, bridge, Delaware & Hudson railroad, Ballston, N. Y., to American Bridge Co., Pittsburgh.

200 tons, plant extension, Great Lakes Carbon Co., Niagara Falls, N. Y., to Bethlehem Steel Co., Buffalo.

170 tons, boiler plant and laundry building, hospital, Stamford, Conn., to White Plains Iron Works, White Plains, N. Y.

155 tons, building, The Flintkote Co., East Rutherford, N. J., to Oltmer Iron Works, Jersey City.

155 tons, substructure, North State street bridge, Chicago, Fitzsimmons & Connell Dredge & Dock Co., Chicago, contractor, to American Bridge Co., Pittsburgh; bids March 20.

150 tons, warehouse, Iroquois Gas Co., Buffalo, to R. S. McMannus Steel Construction Co., Inc., Buffalo.

150 tons, gas filter plant, Carlisle Lumber Co., Seattle, to Isaacson Iron Works, Seattle.

150 tons, army warehouse, Seattle, to Truscon Steel Co., Youngstown, O.

150 tons, six bridges, Alaska Road Commission, to Worden-Allen Co., Milwaukee, Wis.

140 tons, bridge, Clinton county, Pennsylvania, to Bethlehem Steel Co., Bethlehem, Pa.

135 tons, addition, Blaine Dry Cleaning Co., Brooklyn, N. Y., to Simon Holland & Son Inc., Brooklyn.

110 tons, shop Atlantic Gelatine Co., Woburn, Mass., to A. O. Wilson Structural Co., Cambridge, Mass.

100 tons, factory, Wayne Pump Co., Ft. Wayne, Ind., to Ft. Wayne Structural Steel Co., Ft. Wayne, Ind.

Unstated tonnage, addition, Wico Electric Co., West Springfield, Mass., to Haarmann Structural Steel Co., Holyoke, Mass.; Ernest F. Carlson Inc., Springfield, contractor.

Shape Contracts Pending

26,000 tons, plant, Fort Worth, Tex., Consolidated Aircraft Co.; Austin Co., Cleveland, contractor.

26,000 tons, aircraft plant, Tulsa, Okla.,

Behind the Scenes with STEEL

Folded Fenders

■ It's always nice to start the day off with a bang, and that's exactly what we did this morning. As per usual we set our public enemy No. 1, the alarm clock, ahead another 10 minutes for a quick snooze, and as a result were crowding the deadline to make the train. Also perennially late is our down-the-street neighbor, whose car has very fine brakes, which we found out as he stopped cold, dead ahead, to pick up another tardy soul rushing along on foot. With sleep-filled eyes, half-closed, we plowed right on into him until we were convinced that an irresistible force doesn't stand a chance with an immovable De Soto. Our accordion fenders will prove it.

Piecemeal Trading

■ But, of course, as you probably read in Mirrors of Motordom week before last, on the new jalopies a well creased fender darned near requires buying a "whole new side" of the car, so we're lucky. That's an idea, though, when we get ready to trade—just get one new side at a time.

Invention

■ And while we're on cars and Mirrors of Motordom, we see where the new Packard Clipper is equipped with a soft whistle on the gas tank filler pipe which toots when gasoline first enters the tank and stops when the tank is just about full. What we need is one that works just the other way around.

Vitamins

■ We see where the *Weekly Chronicle* down in Maypearl, Texas is advertising that it's the only paper in Ellis County containing Vitamin B, and, of course, we won't argue the point. When it comes to our own backyard, however, we'll lay a few claims to a sufficiency of those mysterious essentials to nourishment and growth and point with pride to the healthy glow of STEEL's editorial performance, increase in advertising volume, and selective circulation gains. An all around well-balanced diet.

Reprints Available

■ And outstanding in the healthy job STEEL's editors have been delivering to your desk each week is the continuing series of articles, begun in early 1940, on the manufacture of armament and munitions. Now because of the unusual interest (in the form of a foot-high pile of advance requests) a 72-page reprint handbook on "Modern Shell Production" is in the works. It will incorporate all of the articles by Professor Macconochie and others that have appeared in earlier issues. They will be available May 1 at $1.00 per copy but we suggest you put your reservation in early in case we guess too low on the first run.

Music Lover

■ This last week here in Cleveland the Met Opera finished another highly successful "season" while we kept our distance and naively tried to figure out from the newspaper reviews what it was all about. They make Oswald Spengler's "Decline of the West" seem as simple as McGuffey's First Reader. For example: *There was something like familiarity with infinity in the suggestion of limitless space induced by her tracing of the vaulting melodic line . . . Some notes were covered by the turgid exuberance of orchestral sonority.* We suppose that means they they were in the groove, but no wonder we get scared out every year!

Key To Sales

■ Opposite the inside back cover this week STEEL unveils a symbol that probably better expresses in a single picture the job the paper is doing than a ream of copy. Like it?

SHRDLU.

Consolidated Aircraft Corp.; bids April 21.

2500 tons, engineering and service building, Cincinnati Milling Machine Co., Cincinnati.

2500 tons, staging towers, Bethlehem Steel Corp., Bethlehem Fairfield Shipyard Inc., Baltimore.

2000 tons, Brooklyn tunnels of Brooklyn-Battery tunnel, New York, New York; bids May 27 to New York City tunnel authority.

1805 tons, including 768 tons sheet piling, improvement Los Angeles River between Atlantic and Randolph streets, Los Angeles; United Concrete Pipe Co., Los Angeles, low.

1500 tons, three warehouses, Patterson field, Fairfield, O., for army engineers.

1500 tons, buildings, Western Cartridge Co., East Alton, Ill.; United Engineers & Constructors Inc., Philadelphia, contractor.

1474 tons, bridge route S-3, section 1, Rutherford-East Rutherford, N. J.; bids May 2, E. Donald Sterner, state highway commissioner, Trenton; work also includes 95,760 linear feet, reinforcement steel trusses, and 8910 linear feet, steel bearing piles.

900 tons, by-pass bridge, Hartford, Conn., for state.

700 tons, aircraft plant, Goodyear Rubber Co., Akron, O.

652 tons, Kootenai River bridge, Kootenai county, Montana, for the state; bids opened.

575 tons, reconstruction bridge A-140, Los Angeles division, Atchison, Topeka & Santa Fe railway.

550 tons, state bridge RC-41-3, Lakewood, N. Y.

525 tons, Western high school, Lansing, Mich., for board of education.

500 tons, outpatients' building, Harlem hospital, New York; bids May 5.

450 tons, machine shop, Edgewood arsenal, Edgewood, Md.; bids closed.

350 tons, bridge, Altamaha river, unknown location, for Seaboard Air Line railway.

330 tons, coal handling structures, Commonwealth Edison Co., Chicago.

315 tons, coal bin steelwork, Weirton Steel Co., Weirton, W. Va.

300 tons, state bridge 383, Sturtevant, Wis.

290 tons, bridge, Fleetwood, N. Y., for Westchester county.

280 tons, plate girder bridge, Snyder and Union counties, Pennsylvania; bids to state highway department, Harrisburg, Pa., April 25.

280 tons, state bridge, section 26-CF, Decatur, Ill.

275 tons, state bridge, route 4, section 67-SF, Carlinsville, Ill.

275 tons, addition and crane runways, Fitzgibbons Boiler Co., Oswego, N. Y.

270 tons, buildings, Connecticut Co., Hartford, Conn.

265 tons, machine tool manufacturing building, Mills Novelty Co., Chicago.

260 tons, bridge, Bronx river parkway, Mt. Vernon-Yonkers, New York; bids in.

255 tons, buckstays and oven framing, Monessen Coke & Chemical Co., Monessen, Pa.

250 tons, warehouse, Middletown, Pa., air depot; bids opened April 17 by United States Engineer, Baltimore.

250 tons, dock sheds, Ordnance depot, Curtis Bay, Md.; bids just taken.

240 tons, foundry building, Acme Pattern & Tool Co., Dayton, O.

230 tons, state bridge, route 49, section 122-VF, Ellis, Ill.

225 tons, building, for Scintilla Magneto

division, Bendix Aviation Corp., Sidney, N. Y.

215 tons, bridges, North Powder and Lonard, Oreg., for Union Pacific railroad.

200 tons, state bridge, Hagerstown, Md.; bids April 15.

175 tons, bridges, Catopaxi, Pleasanton and Eagle, Colo., for Denver & Rio Grande Western railroad.

172 tons, bridge, Higuera street, Los Angeles county; bids opened.

168 tons, five bridges, Yakima county, Washington, for the state; bids opened.

165 tons, addition to building 38, Cincinnati Chemical Works, Cincinnati, O.

160 tons, buckstays and oven framing, Weirton Steel Co., Weirton, W. Va.

150 tons, shops, Coast Guard, Curtis Bay, Md., bids just closed.

145 tons, repairs to bridge, Kenango, O.—Point Pleasant, W. Va., for West Virginia-Ohio Bridge Corp.

140 tons, store building addition, S. H. Kress & Co., Baton Rouge, La.

135 tons, underpass FAGH-54-A-4, Post Falls, Idaho, for state.

125 tons, I-beam bridge, Monroe county, Pennsylvania; bids to state highway department, Harrisburg, Pa., April 25.

120 tons, extension to slab and billet storage building, A. M. Byers Co., Economy, Pa.

105 tons, shapes and bars, five stream bridges, Burlington county, New Jersey; bids May 2, Trenton.

100 tons, transformer portal frames Coulee power plant; Des Moines Steel Co., Des Moines, Iowa, low.

Unstated, five navy tankers, to Seattle-Tacoma Shipbuilding Co.

Unstated, two 110-ft. harbor ice breakers for Coast Guard; Birchfield Boiler Co. Inc., Tacoma, low.

Unstated, six-span, 271-foot state bridge, Libby, Mont.; bids to Helena, April 18.

Reinforcing

Reinforcing Bar Prices, Page 109

Premature spring weather has hastened plans for highway construction. On the whole inquiry and sales are light, especially by comparison with other steel items. Most current projects are for 100 tons or less. However, close to 1000 tons were involved in a grain storage elevator at Buffalo. Prices are relatively firm and usually rail and billet bars carry no price differentials.

Large orders for concrete reinforcing bars are being placed for naval bases in the Atlantic area on sites acquired from Great Britain. A Pittsburgh district mill is getting out one lot of 215 tons to catch a boat sailing for Bermuda, April 25.

Reinforcing Steel Awards

3500 tons, naval base, Kingston, Jamaica, to Jones & Laughlin Steel Corp., through Frederick Snare Corp., New York.

1500 tons, naval supply depot, Bayonne, N. J., to Truscon Steel Co., Youngstown, O.; Wigton-Abbott Corp., New York, and Mahoney-Troast Construction Co., Passaic, N. J., joint contractors.

1400 tons, hangars, Washington national airport, Gravelly Point, Va., to Bethlehem Steel Co., Bethlehem, Pa.

965 tons, new grain storage elevator G. L. F. Mills Inc., Buffalo, to Truscon Steel Co., Buffalo.

700 tons, pier, navy yard, S. Boston, Mass., through J. F. Fitzgerald Construction Co., Boston.

600 tons, plant, Reynolds Metal Co., Longview, Wash., to Truscon Steel Co., Youngstown, O.; Austin Co. contractor.

520 tons, addition, Huntley station steam plant, Buffalo Niagara Electric Corporation, to Truscon Steel Co., Buffalo.

500 tons, annex, building, navy yard, S. Boston, Mass., to Carnegie-Illinois Steel Corp., Pittsburgh, through Merritt-Chapman & Scott, Boston.

400 tons, Washington state highway projects, to Northwest Steel Rolling Mills, Seattle.

394 tons, substructure, North State street bridge, Chicago, Fitzsimmons & Connell Dredge & Dock Co., Chicago, contractor, to Olney J. Dean Steel Co., Cicero, Ill.; bids March 20.

375 tons, U. S. engineer, Providence, for delivery, f.o.b. military reservation, Narragansett, R. I., to Joseph T. Ryerson & Son Inc.; bids March 25.

373 tons, inv. 699-41-194, Providence, U. S. engineers' office, to Joseph T. Ryerson & Son Inc., Chicago.

354 tons, Bureau of Reclamation, Invitation 48,774-A for delivery to Friant, Calif., to Bethlehem Steel Co. San Francisco.

340 tons, two highway projects 12 and 13, Lake and Trumbull counties, Ohio,

Concrete Bars Compared

	Tons
Week ended April 19.....	14,596
Week ended April 12.....	22,833
Week ended April 5	13,940
This week, 1940	10,576
Weekly average, 1941	11,893
Weekly average, 1940	9,661
Weekly average, Mar., 1941	12,486
Total to date, 1940	135,678
Total to date, 1941	190,281

Includes awards of 100 tons or more.

to Truscon Steel Co., Youngstown, O.; Horvitz Co., Cleveland, contractor.

300 tons, superstructure, Studebaker plane engine gear plant, Ft. Wayne, Ind., to Truscon Steel Co., Youngstown, O.; Consolidated Construction Co., contractor.

300 tons, four shipways and miscellaneous buildings, Sun Shipbuilding & Drydock Co., Chester, Pa., to Bethlehem Steel Co., Bethlehem, Pa.; Raymond Concrete Pile Co., contractor.

260 tons, building, Bristol, R. I., Collins & Aikman Corp., to Bethlehem Steel Co., Bethlehem, Pa.; Turner Construction Co., contractor.

250 tons, wire mesh, army ammunition depot, Hermiston, Oreg., to Bethlehem Steel Co.; J. A. Terteling & Sons, Boise, Idaho, contractor.

215 tons, first shipment of ultimate estimated 1000 tons, naval base, Bermuda, to Jones & Laughlin Steel Corp., Pittsburgh, through F. H. McGraw & Co., Hartford and Purdy & Henderson, New York, joint contractors.

200 tons, part of estimated total of 2000 tons, naval base, Newfoundland, to Jones & Laughlin Steel Corp., through George A. Fuller Co., New York.

200 tons, lamp plant, Westinghouse Electric & Mfg. Co., Fairmont, W. Va., to Jones & Laughlin Steel Co., Pittsburgh, through Metzger-Richardson Co.; Robert E. Lamb & Son, contractors.

175 tons, bottling plant, Coca Cola Co., East Hartford, Conn., to Scherer Steel Co., Hartford; Richard Johnson Co., Hartford, contractor.

160 tons, grocery warehouse and service station, Seattle, to Northwest Steel Rolling Mills, Seattle.

150 tons, power plant building No. 35, Deer Park, N. Y., to Truscon Steel Co., Youngstown, O.; Silverblatt & Lasker, contractors.

150 tons, superstructure, bridge, Mississippi river, Dubuque, Iowa—East Dubuque, Ill., Dubuque bridge commission, to Bethlehem Steel Co., Bethlehem, Pa.; bids April 11.

120 tons, by-pass section, Hartford, Conn., to Truscon Steel Co., Youngstown, O.; Patterson & Rossi, Hartford, contractor, $208,750.27, bids March 31, Hartford.

105 tons, barracks, Fort Monmouth, N. J., to Igoe Bros., Newark; Tuller Construction Co., Red Bank, N. J., contractor.

100 tons, state highway proj. 327, Cuyahoga county, Ohio, to Builders Structural Steel Co.; National Engineering & Construction Co., contractor.

Reinforcing Steel Pending

1800 tons, Lincoln Court housing Cincinnati, O.; H. M. Boyajohn, low.

1000 tons, ammunition loading plant, Elwood, Ill.

900 tons, sewage treatment works (div. P), Stickney, Ill.; bids April 24.

725 tons, housing project, Newark, N. J.; H.R.H. Construction Co., New York, contractor.

650 tons, plant, Thompson Products Co., Cleveland; Sam W. Emerson, Cleveland, contractor; previously reported as 200 tons.

525 tons, warehouse, Sears-Roebuck & Co., Somerville, Mass.

500 tons, housing project, Bridgeport Conn.; bids April 25.

500 tons, lock & dam No. 2, Hastings, Minn. U. S. engineer.

463 tons, improvement, Los Angeles River between Downey Road and Randolph street, Los Angeles; general contract to United Concrete Pipe Corp., Box 1, station H, Los Angeles at $1,148,291.

460 tons, Berry's Creek viaduct, Rutherford, N. J.

280 tons, bridge, route S-3, section 1, Rutherford-East Rutherford, N. J.; bids May 2, E. Donald Sterner, state highway commissioner, Trenton.

270 tons, highway proj. 17, Tuscarawas county, Ohio, Frank Mashuda Co., Milwaukee, low; bids April 16.

233 tons, utility building and repairs, turbine room, unit 17, Commonwealth Edison Co., Chicago; bids April 16.

200 tons, building, Ohio Oil Co., Findlay, O.

180 tons, highway proj. 21, Hamilton county, Ohio.

143 tons, state highway contract 2139, Bartholomew County, Indiana, St. Clair Construction Co., Wheaton, Ill., low; bids April 15.

130 tons, highway proj. 18, Washington county, Ohio; Hussey & Holderman, Columbus, O. low.

127 tons, bridge, FA-312-B(2) Revere-Saugus, Mass.

126 tons, Kootenai River bridge, Kootenai county, Montana; bids opened.

120 tons, store, Montgomery, Ward & Co., Madison, Wis.

120 tons, four bridges, Troy-Marlboro, N. H.

113 tons, including gates, Yakima Ridge canal, Roza Project, Washington state; Barnard-Curtis Co., Minneapolis, low; materials by Reclamation Bureau.

Tin Plate

Tin Plate Prices, Page 108

Tin plate buying has slackened noticeably because most domestic customers have anticipated needs as far in advance as possible. Export markets are active, one important factor being the decline of available tonnage from England. British customers, including many points in the empire as well as other countries, are inquiring for American plate and in many cases definite orders are being taken.

Operations are being maintained at approximately 85 per cent of capacity. Since much of present domestic shipments are going into stock, pressure is not as heavy as large backlogs indicate.

Tin plate requirements for the sardine pack on Maine coast will be substantially above last year when the total was approximately a million cases. Canning season started last week with the herring run heavy. The war has greatly interfered with the European supply and the domestic pack of 1940, about half of normal, will be topped by a large margin.

Semifinished Steel

Semifinished Prices, Page 109

Some nonintegrated mills report semifinished steel supplies have not been critical except in alloys and in a few cases involving sheet bars where mechanical troubles at the supply point caused temporary shutdowns.

Inventories are not high, but there has been no serious shortage

in rounds for seamless tube production, wire rods, billets and bar stock.

Pig Iron

Pig Iron Prices, Page 110

Pig iron supply, already tight, is being further restricted by several current events. Coke shortage resulting from the coal strike is causing blast furnace banking and an explosion at Woodward Iron Co.'s plant in the Birmingham district interrupted output from three furnaces for several days, one stack still being out of commission.

Fear is expressed that stricter regulations for rationing available tonnage may be necessary, should the present trend affect castings production for defense work. To this time suppliers have been able to make shipments sufficient to keep foundries operating, though no stocks could be accumulated. Most melters have contracts protecting them for second quarter if production is not materially interfered with. In some instances difficulty is met in meeting special analyses and some substitutions are being made.

Foundry output is increasing as defense needs multiply and the situation in cast scrap has caused some shift to larger proportion of pig iron in the melt. Silveries and malleable iron are somewhat more difficult to obtain in desired quantities. Some low-silicon iron is being produced at the Hamilton, O., furnaces.

Sellers are not booking tonnage for third quarter, although shipment of some orders now on books probably will extend into that period.

Republic Steel Corp. has blown out a stack at Youngstown, O., for relining, taking this action some weeks earlier than originally planned, because of coke shortage.

The Navy will take bids April 24 on 883 tons of various grades for several yards, including 561 tons for shipment to the Atlantic seaboard.

Scrap

Scrap Prices, Page 112

Extension of time for completing deliveries of scrap on contracts made before price ceiling was announced, carrying higher prices, has done much to resolve the confusion immediately following establishment of fixed maximums. Dealers are concentrating on completing deliveries and, in the main, it seems likely all such tonnage will be shipped before May 10.

Meanwhile there is practically no buying, although occasional tonnages have been placed at the established level. This has been largely in foundry grades, and scarcity has developed in nearly all districts, causing foundries to increase proportion of pig iron in their mixtures.

Considerable confusion still prevails over details of application of the regulations, many points remaining unsolved. Railroad lists have been delayed in closing, pending clarification of prices acceptable to Washington. Railroad specialties usually are priced on the same basis as low phosphorus grades but some other clasifications are in uncertain position. These matters are under consideration and railroads have been asked to ascertain the spread of railroad specialties over heavy melting steel from Sept. 30 to Feb. 1 and submit these to the price division as a guide.

Ceiling prices are not being quoted in all cases, instances appearing where scrap is moving at a lower level. In some cases mills are naming lower prices where freight advantage allows competition with other points less favorably situated.

Another angle has developed in the New England area. Under a $2 to $2.25 barge rate from that section to eastern Pennsylvania and Sparrows Point, Md., steelmaking scrap can be delivered at barge points at higher prices than can be obtained in New England. This also applies to several cast grades. It is feared this situation may work to the disadvantage of melters in New England, especially in western Massachusetts.

Metallurgical Coke

Coke Prices, Page 109

Coke supplies are becoming critical and several blast furnaces are on the verge of being banked because of fuel shortage. This is especially true in the Pittsburgh area where beehive supplies have been cut sharply. Although resumption of mining is indicated by expected strike settlement soon it probably will come too late to avoid some shutdowns. Several days will be required to preheat beehive ovens after coal is available.

Foundry coke supply is even more serious and a number of small plants, principally foundries, have been forced to close, although working on defense orders. Large steel producers generally are in better position than merchant iron makers and steel output has not yet been seriously affected.

Republic Steel Corp. has blown out a blast furnace at its Youngstown, O., plant for relining, the action being taken earlier than had been planned, because of coke short-

age. Last relined Nov. 26, 1924, the stack has produced 1,850,000 tons of pig iron on one lining. Republic also banked a merchant stack at Cleveland, due to shortage of coal for coke production.

Iron Ore

Iron Ore Prices, Page 111

Lake Superior iron ore prices have been reaffirmed for the 1941 season, as tested by heavy sales at 1940 prices. Moreover the sales were made prior to the order from Washington to freeze prices in the steel industry at first quarter levels. At the same time shipping rates on coal and ore on the Great Lakes have been raised approximately 10 per cent, and wages at several iron ore mines have been raised 10 cents per hour in harmony with higher wages at steel mills.

Reaffirmed ore prices, per gross ton, delivered lower lake ports, 51½ per cent iron guaranteed, are, in base grades as follows: Old Range bessemer, $4.75; Mesabi bessemer, $4.60; Old Range nonbessemer, $4.60; Mesabi nonbessemer, $4.45.

Vessel freight rates on iron ore for the two seasons are as follows:

	Cents per gross ton 1941	1940
Head of lakes to lower ports	77	70
Marquette to lower ports ...	69½	63
Escanaba to lower ports	58	52½
Escanaba to Chicago area ...	46	42

Consumption of Lake Superior iron ore in March was 6,411,531 gross tons, against 5,673,166 tons in February and 4,087,767 tons in March, 1940, states the Lake Superior Iron Ore association, Cleveland. This is an all-time high. Ore on hand at furnaces and Lake Erie docks April 1 totaled 17,760,742 tons, against 24,195,165 tons a month ago and 21,862,302 tons a year ago. Number of furnaces in blast using chiefly Lake Superior ore March 31 was 168, against 164 a month ago and 119 a year ago. Consumption of ore during first quarter was 18,415,715 tons, against 13,618,914 tons for the corresponding quarter of 1940.

Total number of ore boats in operation on the Lakes is 291, according to a report dated April 17.

Based largely on still higher ocean rates, foreign manganese ore prices have again advanced. Both South African and Indian ores, 50 per cent grade, are now being quoted nominally at 68.00c to 70.00c, eastern seaboard, before duty. Contributing to the higher cost of South African ore is an increase in the f.o.b. price. Brazilian manganese, 46 per cent, is now about 63.00c to 65.00c. There has been little buying, by private consumers at least, to fully test the market.

Most foreign chrome ore now available is from the Transvaal region, although no purchases have been reported recently. However, it is believed that trading would bring out prices ranging around $32 or $33 per gross ton, c.i.f. seaboard, for 48-49 per cent concentrates. Indian lump ore, 48-50 per cent, is nominally $43 to $46, probably nearer the outside figure.

Refractories

Refractories Prices, Page 110

Pittsburgh—Steel plant engineers report the refractory situation fairly good. Following initial pressure to get all available furnaces and ovens into operation, there has been a lull, enabling refractory plants to build up stocks somewhat. Repair work now is keeping them busy, but there is an apparent excess capacity which will keep available supply of refractories adequate for repair and rebuilding needs. Refractory men are surprised at the drop-off in demand, but attribute it

generally to the spurt of last year which served as an awakener and started rebuilding work in advance of the heavy production pressure. Largest source of new business currently is repair, relining and rebuilding blast furnaces. There has been little new open hearth construction, although electric furnace construction is at the highest point in history.

Steel in Europe

Foreign Steel Prices, Page 111

London—(*By Cable*)—The iron and steel situation in Great Britain shows little change, with intensive production directed almost entirely to the war effort. The Easter holidays brought practically no interruption. Export tonnages are closely restricted and include mainly small finished items. Tin plate exports show some activity, owing to release of some material from stock. South America and Australia are buying.

Pacific Coast

San Francisco—Something of a lull has taken place in steel buying, due largely to coverage by consumers and to long-deferred delivery. Plate orders and inquiries are practically all for lots of less than 100 tons. Tonnage placed this year aggregates 211,051 tons, compared with 21,230 tons in the comparable period a year ago. Structural awards last week totaled 1040 tons, including 530 tons of sheet piling for the Los Angeles water and power department and 500 tons for a quay wall at the Mare Island navy yard, the former going to Columbia Steel Co. and the latter to Bethlehem Steel Co. Reinforcing bar buying is in small lots, the total so far this year being 22,174 tons, compared with 43,230 tons in the same period a year ago.

Cast iron pipe demand is improving and pending business exceeds 4900 tons. Last week 2355 tons of 4 to 8-inch pipe was placed by Los Angeles, divided between three makers. This brings the total for this year to 13,980 tons, compared with 11,085 tons in the same portion of last year.

Conforming to the price stabilization announcement prices of scrap this week are quoted on a gross ton basis instead of the net ton previously used on the Coast. Some time will be required to iron out all the differentials and place prices on a stable basis.

Seattle—Additional shipbuilding contracts were awarded to Northwest plants last week, Seattle-Tacoma Shipbuilding Co. receiving a $10,600,000 contract to build five navy tankers, involving probably 5000 tons of shapes and 10,000 tons of plates. Birchfield Boiler Co., Tacoma, Wash., is low at $413,000 each for two 110-foot harbor ice breakers for the coast guard. Army and navy projects are calling almost daily for additional tonnages of shapes and bars. The smaller machine plants are busy with subcontracts.

Rolling mills are at full capacity with large backlogs. Demand for merchant bars is steady, one plant reporting larger orders for merchant than for reinforcing. Truscon Steel Co. will furnish 600 tons of reinforcing for the Reynolds Metal Co.'s aluminum plant at Longview, Wash. Northwest Steel Rolling Mills, Seattle, is increasing its capacity 50 per cent to 25,000 tons annually, erecting an addition and installing another electric furnace.

Fabricating plants report delays in obtaining material and jobbers and pipe agencies complain of uncertain deliveries of finished prod-

ucts. Increased use of transcontinental railroads is the result of space scarcity on intercoastal water carriers.

Extension of the order fixing maximum prices on scrap has somewhat allayed apprehension. Some adjustments will have to be made as the industry states conditions are not clear.

Canada

Toronto, Ont.—Buying of finished and semifinished steel continues at peak levels with further improvement expected, following announcement from Ottawa the war contracts soon may be increased to a rate of more than $5,000,000 per day.

Orders for sheets continue in excess of production and mill representatives state that practically the entire production for this year has been contracted.

Plate demand continues to expand and new busines is well in excess of Canadian output. Shipbuilding activities are increasing rapidly calling for additional large tonnages. New orders for six mine sweepers were announced this week, which will involve about 700 to 1000 tons of plates.

Buying continues at a brisk pace in merchant bars. Building trades are active buyers. Tool and machinery builders were prominent in the market recently for bars. Mills are increasing rolling schedules to keep pace with rapidly growing demand.

Orders for structural shapes, while somewhat under the peak level of a month or six weeks ago are holding at a high level, with most new orders traceable directly to war industry. Some 15,000 tons are pending in connection with new war projects.

Spot pig iron buying continues steady, with orders ranging up to 300 tons. Local melters report no difficulty in obtaining deliveries for current needs, but state there is not enough foundry and malleable iron available to fill all demand in plants that would replace cast scrap with pig iron.

While heavy demand continues for steel scrap, buying of cast scrap and stove plate is sluggish, due to scarcity of supply rather than lack of interest.

Equipment

New York—Revised priority schedules on machine tools provides largely for concentration of machinery deliveries for tooling aircraft plant additions on one plant at a time, completing installation of equipment at the shops nearest ready for machinery and then moving on to the next. Thus, for instance, expanding facilities at Hartford, Conn., may be tooled and finished for production first, the concentration of deliveries on the plant next ready for installation following. This will allow some aircraft production ahead of schedule which would be imposible were machinery deliveries spread thin through the industry as a whole.

Philadelphia—Buyers of machinery and plant equipment obtain best deliveries when specifying standard products. Pressure of manufacturers to speed production induces concentration on standard lines. This also tends to discourage introduction of revised or improved models, although in many cases development work is being rushed in order to capitalize on improvements when emergency is past. Electric motor supplies are reasonably adequate in standard units but buyers requiring special types in limited quantities meet difficulty in obtaining delivery, particularly if requirements have increased materially over normal needs.

Cleveland—Machinery and equipment builders apparently are confident that brisk demand will continue for several years. Some believe demand is now at the peak while others believe it is still in the future. Whether England survives or collapses American production of tools will continue at full pace, leading builders say. They point out that this will be a mechanized age as never before, in peace as well as war. Price advances on finished machinery have been few and moderate, though the general level is higher than a year ago. Occasionally tools are being sold to civilian enterprises, where such manufacturers have convinced Washington that they are entitled to priorities A-1, which apply generally to machine tools and equipment.

Seattle — All items are in continued strong demand ranging from heavy road and construction machinery to electrical equipment. Shipbuilding activity is being reflected in subcontracts for many lines of material. Bonneville project has received identical tenders of $40,614 from Anaconda Wire & Cable Co. and Phelps-Dodge Corp. for conductors and accessories for the Chehalis-Longview line. Allis-Chalmers Mfg. Co., Milwaukee, is low at $40,952 for a transformer for the Cosmopolis station. General Electric Co. has the award at $2,858,300 for furnishing generators and auxiliaries for Bonneville power house. Denver received 15 identical bids, $18,808, for Coulee power house transformers.

DIED:

Thomas M. Gregory, vice president and general manager, Hanlon-Gregory Galvanizing Co., Pittsburgh, in New York, April 15. Mr. Gregory was an organizer and past president, American Hot Dip Galvanizers Association.

♦

F. D. Hegwood, 57, vice president and general manager, Knight Screw Products Co., Detroit, April 15, in that city.

♦

Dan W. Elwell, 45, division production manager, Western Electric Co., Kearny, N. J., in East Orange, N. J., April 13.

♦

W. R. Appleby, 76, founder and

dean emeritus, school of mines, University of Minnesota, Minneapolis, in Boston, April 8. He was dean of the school and professor of metallurgy from 1891 until retirement six years ago.

♦

George S. Rutherford, 53, superintendent of industrial relations, Hawthorne works, Western Electric Co., Chicago, in that city, April 16.

♦

Clifford L. Osbun, 43, the past eight years export sales manager, Oliver Farm Equipment Co., Chicago, in Havana, Cuba, April 14.

Nonferrous Metals

New York — Nonferrous metal buyers continued to take all tonnages offered last week as consumption maintained a high level. Maximum prices were awaited on copper, although there was no change in that or any of the other major markets. The government is expected to establish soon maximum prices for copper and scrap nickel.

Copper—March deliveries of 134,000 tons to domestic consumers set a new record while production of refined copper increased to only 95,322 tons. Total April shipments may be 155,000 tons of which 100,000 tons would be domestic and 55,000 tons foreign metal. Refined stocks at the end of March totaled 89,873 tons. Sales currently are maintaining a monthly rate of 100,000 tons against 75,000 tons in March.

Lead—Sales continued heavy last week, indicating a monthly total of 70,000. Domestic producers supply about 75 per cent and importers the other 25 per cent of current needs. Lack of ships, rising ocean freight rates, and the advance in the Mexican settlement price for lead present serious problems to sellers. No move has been made to advance prices above the 5.85-cent level which is favored by the government.

Zinc—Division of priorities, OPM, has raised from 5 per cent to 17 per cent the portion of production which must be allocated to the zinc pool. This will yield about 12,000 tons in May which will be distributed to defense bottlenecks. Demand continued in excess of supply at the firm 7.25-cent level.

Tin—Importers easily disposed of their holdings at prices ranging from 52.00c to 52.25c a pound for Straits spot. This was well above the Metals Reserve Co.'s standing bid of 50.00c. The navy department bought 250 tons last week at a net price of 51.75c.

Aluminum—Movement of scrap remained negligible, forcing several remelters to curtail production. Others are working off high-priced material preparatory to close their plants unless scrap supplies are forthcoming.

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
12	12.00	12.00	12.25	51.75	51.12½	5.85	5.70	7.25	17.00	14.00	35.00
14	12.00	12.00	12.25	52.00	51.25	5.85	5.70	7.25	17.00	14.00	35.00
15	12.00	12.00	12.25	52.00	51.37½	5.85	5.70	7.25	17.00	14.00	35.00
16	12.00	12.00	12.25	52.25	51.62½	5.85	5.70	7.25	17.00	14.00	35.00
17	12.00	12.00	12.25	52.25	51.50	5.85	5.70	7.25	17.00	14.00	35.00
18	12.00	12.00	12.25	52.25	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
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	4.50

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.	13.25-13.50
Standard No. 12 aluminum	16.00

Construction and Enterprise

Ohio

BELLEVUE, O.—General Electric Co. light bulb filament factory being constructed here will be increased to twice original plans, making structure 80 x 485 feet. Steinle-Wolfe Inc., Fremont, O., is contractor.

CANTON, O.—Timken Roller Bearing Co., 1835 Dueber avenue, will build a further addition 90 x 160 x 17 feet, to cost about $20,000. Gibbons Grable Co., Mellett building, is contractor.

CINCINNATI—American Tool Works Co., manufacturer of radial drills and lathes for the navy, is having plans drawn for a plant addition to cost about $225,000.

■ Additional Construction and Enterprise leads may be found in the list of Shapes Pending on page 119 and Reinforcing Bars Pending on page 122 in this issue.

CLEVELAND—Acro Electric Co. Inc. is being incorporated to manufacture electrical supplies. Dan W. Duffy, N.B.C. building, is attorney.

CLEVELAND—Air-Maze Corp., 5200 Harvard avenue, Albert E. Schaaf, president, will build plant addition 94 x 181 feet, with provision for second story. Bids are being taken.

CLEVELAND—American Metal Forming Co. is being organized and will be incorporated by Robert Morissey, formerly of Metal Equipment Co., to operate a sheet metal forming Co. Company has leased 10,000 square feet at foot of West Seventy-ninth street.

CLEVELAND—HPL Mfg. Co., 2105 East Sixty-fifth street, has been organized to specialize in metal stampings from 25 to 5000 pieces. Members of the company are Ray Hedberg, Kermit Peterson and Melvin Lorentz formerly operating a similar business in Minneapolis.

CLEVELAND—Ohio Screw Machine Products Co., 1390 East Thirtieth street, has been incorporated and is starting operations. Plans are under way for an expansion in the fall to meet output requirements.

CLEVELAND—Hall Sheet Metal Co., 1932 West Twentieth street, John S. Hall, president, will build second story addition of 4500 square feet to increase productive space.

CLEVELAND—Park Drop Forge Co., 730 East Seventy-ninth street, Fred L. Ball, secretary-treasurer, will build machine shop across street from present plant, to increase capacity.

CLEVELAND—Ohio Forge & Machine Corp., 3010 Woodhill road, Henry B. Newell, executive vice president, will build three-story addition 20 x 50 feet, at cost of about $16,000.

CLEVELAND — Wellman Bronze & Aluminum Co., Fred S. Williams, president, 6017 Superior avenue, has leased plant at 2435 East Ninety-third street and will install equipment for manufacture of magnesium castings.

CLEVELAND—Singer Steel Co., 6316 Kinsman road, will improve plant by raising roof and installing crane runway, for which bids will be asked soon.

CLEVELAND—Grasselli Chemical division E. I. du Pont de Nemours & Co., 2615 Independence road, will build factory addition 42 x 42 feet and expand power plant. M. C. Sperry is Cleveland representative.

CUYAHOGA FALLS, O.—Falls Stamping & Welding Co., 1701 Front street, will consolidate its operations when new storage building is completed, 55 x 84 feet. This will allow rearrangement of production equipment. Ernest Lang is president.

LANCASTER, O.—Anchor Hocking Glass Corp. plans construction of a natural gas pipe line from West Virginia to its plants here. Federal power commission has been asked for permission.

PLYMOUTH, O.—Village, J. H. Rhine, clerk, will ask bids early in May for $65,000 municipal power plant to serve existing distribution system, including diesel engines, switchboards and accessories. Carl J. Simon & Associates, Evans-Central building, Van Wert, O., are drawing plans.

SANDUSKY, O.—Sandusky Foundry & Machine Co., 509 West Market street, Devereaux Lake, president, will build a 60 x 137-foot expansion at cost of $20,000.

VAN WERT, O.—Kennedy Mfg. Co., manufacturer of sheet metal containers, will build a 100 x 200-foot one-story addition, costing about $40,000.

YOUNGSTOWN, O.—United Engineering & Foundry Co., 219 South Phelps street, will build addition to its forge shop at cost of about $30,000.

YOUNGSTOWN, O.—Metal Carbides Corp., 107 East Indianola, has been incorporated with 3000 no par shares. J. P. Huxley, Mahoning Bank building, is attorney.

Connecticut

FAIRFIELD, CONN.—Handy & Harman, 80 Fulton street, New York, metal refiners, have let general contract for a one-story 60 x 210-foot plant addition to Gellatly Construction Co., 25 Housatonic avenue, Bridgeport, Conn., at about $44,000.

WINDSOR LOCKS, CONN. — United States engineer, 819 Industrial Trust building, Providence, R. I., is considering bids for 115 cantonment buildings at the airport. Corrado-DeGroodt Corp., 62 Eighth avenue, Newark, N. J., is low bidder at $779,520.

Massachusetts

BOSTON—Bureau of yards and docks, navy department, Washington, will build additional ship repair facilities at cost of about $3,090,000 and additional housing at $285,000.

New York

BROOKLYN, N. Y.—Bureau of yards and docks, navy department, Washington, has awarded contract for shipbuilding dry docks at New York navy yard to Walsh Construction Co., J. Rich Steers Inc., Cauldwell-Wingate Co. and Raisler Corp., 17 Battery place, New York, at about $31,000,000 on cost plus fixed fee basis.

BROOKLYN, N. Y.—United Brooklyn Corp., 70 Franklin avenue, will build a two-story 50 x 95-foot factory and machine shop at 433 Park avenue, to cost about $60,000. M. A. Schlendorf, 356 Fulton street is architect and engineer.

ELMIRA, N. Y.—Eclipse Machine Co., Oakwood avenue, will build a gun testing building, general contract being let to John B. Pike & Son Co., 1 Circle street, Rochester, N. Y., at about $40,000, with equipment.

ROCHESTER, N. Y.—Rochester Gas & Electric Corp., 89 East avenue, is building a steam generating plant at station 3, on Platt street, to cost about $2,840,000, and substations about $719,597.

TONAWANDA, N. Y.—Lake Erie Engineering Corp., Riverview and Woodward avenues, plans a factory to cost about $40,000.

New Jersey

HARRISON, N. J.—American Oxygen Service Co., 600 Essex street, will build a one and two-story compressed air and

gas production building on the Harrison and Newark turnpike, general contract to Mahony-Troast Construction Co., 657 Main street, Passaic, N. J., at $235,000.

SAYREVILLE, N. J.—National Lead Co., Chevalier avenue, South Amboy, N. J., has let general contract to Wigton-Abbott Corp., 1225 South avenue, Plainfield, N. J., for a three-story 40 x 70-foot plant costing about $60,000.

Pennsylvania

BUTLER, PA.—American Rolling Mill Co., Middletown, O., will improve its plant here at cost of about $840,000, including cold mill and annealing furnace.

PHILADELPHIA—Philadelphia Forge Corp., Milnor and Bleigh streets, manufacturer of steel forgings, will expand its plant for production of heavy navy forgings at cost of $2,500,000.

PHILADELPHIA—Philadelphia Bronze & Brass Co., Twenty-second and Market streets, has let general contract to Lauter Construction Co., 1613 Samson street, for a two-story 55 x 60-foot plant addition costing about $40,000, with equipment. S. D. Milner, 1117 Foulkrod street, is architect.

PITTSBURGH—Foxboro Co., Foxboro, Mass., is erecting a service building and offices at 5151 Baum boulevard, to house its Pittsburgh branch. First floor, 3700 square feet, will be devoted to assembly and servicing its indicating and recording instruments and the second floor, 1250 square feet, to offices. A. H. Shafer is manager of the Pittsburgh branch.

Michigan

DEARBORN, MICH.—Universal Products Co. Inc. is having plans made by Derrick & Gamber, architects, Detroit, for a plant addition.

DETROIT—Federal Mogul Corp., Detroit, has let general contract for an addition to its foundry to W. J. C. Kaufmann Co.

DETROIT—Midland Steel Products Co. has given general contract to F. H. Martin Construction Co. for an extension to its press building.

DETROIT—Superior Machine & Engineering Co. has given general contract to John E. Wilder, Detroit, for a factory and office building addition.

DETROIT—Gear Grinding Machine Co. has let contract to Haberkorn-Barry Co., Detroit, for a heat treating building at its Hamtramck plant. H. E. Beyster, Detroit is architect.

DETROIT—Jensen Specialties Inc. has been incorporated with $50,000 capital to deal in conveying equipment, by James W. Swenson, 439 East Fort street.

DETROIT—Fruehauf Trailer Co., 10940 Harper avenue, has let general contract to Collins Construction Co., 6138 Leman avenue, for 70 x 160-foot and 100 x 300-foot factory building to cost about $200,000.

DETROIT—Midland Steel Products Co. has given general contract to Barton-Malow Co. for an extension to the press building at its Detroit plant. Giffels & Vallet Inc., Detroit, is architect.

DETROIT—McCord Radiator & Mfg. Co. has given general contract to Cunningham-Rudy Co., Detroit, for a two-story factory building at Wyandotte, Mich. Giffels & Vallet Inc., Detroit, is architect.

DETROIT—Apex Broach Co. has given general contract to Trowell Construction Co., Detroit, for an office and factory building.

GRAND RAPIDS, MICH. — Imperial Metal Products Co. has let general contract to Barnes Construction Co., Grand Rapids, for a plant addition.

KALAMAZOO, MICH. — Emrick Machine Co. Inc. has been incorporated with $50,000 capital to deal in metal, wood and fiber products, by William F. Emrick, 1602 Fulford street.

LANSING, MICH.—Wolverine Portable Power Saw Co. has been incorporated with $50,000 capital to manufacture power hack saws, by Roy A. Wilson, 1516 Park avenue, Lansing.

SAGINAW, MICH. — Saginaw Scrap Baling Co., 815 North Washington avenue, has been incorporated with $50,000 capital to deal in scrap materials, by Jay Lenick, 404 Jefferson apartments.

WYANDOTTE, MICH. — Down River Sheet Metal Supply Co., 1623 Eureka avenue, has been incorporated with $2000 capital to manufacture steel products, by John A. Liss, 1668 Twentieth street.

Illinois

CHICAGO—Anderson & Quigley Corp., 2335 North Nelson street, has been incorporated with 250 shares common, $100 par value, to operate a machine shop. Charles J. Morgan, 11 South LaSalle street, is correspondent.

CHICAGO—Paasche Airbrush Co., 1909 West Diversey parkway, manufacturer of air brushes and spray booths, is building a plant addition costing $50,000 for structure and $20,000 for equipment.

CHICAGO — Independent Pneumatic Tool Co., 600 West Jackson boulevard, will build a plant addition costing about $600,000 for production of pneumatic tools for defense.

CHICAGO—Bell & Gossett Co., 3000 South Wallace street, manufacturer of domestic water heaters and specialties, has bought 19 acres in Morton Grove, Ill., and will build a new plant, first unit to cost about $250,000.

CHICAGO—Signode Steel Strapping Co., 2600 North Western avenue, manufacturer of tensional steel package reinforcement, is building a one-story addition with 22,000 square feet floor space, bringing total plant area to 112,000 square feet, costing about $70,000.

CHICAGO—C. P. Clare & Co., 4901 West Lawrence avenue, manufacturer of relays and controls, is having plans prepared by Rapp & Rapp, 230 North Michigan avenue, for plant with 7000 square feet floor space.

CHICAGO—H. M. Harper Co., 2620 West Fletcher street, manufacturer of nonferrous bolts, nuts, screws and washers, plans construction of a one-story plant 25 x 75 feet.

MARSEILLES, ILL.—Voters recently defeated proposal for a $250,000 municipal electric light and power plant project.

ROCK ISLAND, ILL.—War department has given contract to Priester Construction Co., Davenport, Iowa, for a forge and heat treating plant at Rock Island arsenal, at $184,800. Bids will be taken soon on warehouse additions at the arsenal.

SPRINGFIELD, ILL.—Central Illinois Public Service Co., Illinois building, plans a steam electric generating plant near Meredosia, Ill. J. D. Roberts, Springfield, is consulting engineer.

SYCAMORE, ILL.—Anaconda Wire & Cable Co., 20 North Wacker drive, Chicago, manufacturer of cables, conduits, etc., has let contract to B. J. Nelson, Sycamore, for construction of several factory buildings.

Indiana

HAMMOND, IND. — Hammond Brass Works, 1844 Summer boulevard, is building an addition 50 x 50 feet to its brass foundry, to cost about $5000.

Maryland

BALTIMORE—Consolidated Gas, Electric Light & Power Co., Lexington building, will build a steam-electric generating plant in the Riverside district with initial capacity of 50,000 kilowatts. Entire project will cost about $6,500,000.

CARDEROCK, MD.—Bureau of yards and docks, navy department, Washington, will build a wind tunnel building and other facilities at the model testing basin, to cost about $500,000.

Missouri

HAYTI, MO.—Pemiscot-Dunklin electric co-operative, Glenn Eaker, superintendent, has given contract to Walco Engineering & Construction Co., 2408 East Fourth place, Tulsa, Okla., at $84,780

for 145 miles of rural transmission lines to serve 483 customers. Ray W. Chanaberry Inc., 1000 Realty building, Louisville, Ky., is engineer.

KANSAS CITY, MO.—Benson Mfg. Co., 3001 East Eighteenth street, manufacturer of propeller spinners, cabin heaters and gasoline tanks for aircraft, has taken bids on a one-story addition 106 x 135 feet, costing about $35,000. Boillot & Lauck, 1012 Baltimore avenue, are architects.

ST. LOUIS—McCabe-Powers Auto Body Co., 5926 North Broadway, has given contract to Fruin-Colnon Contracting Co., 502 Merchants-Laclede building, for an addition to its plant, one story, 75 x 130 feet, costing about $40,000, with equipment.

Wisconsin

MILWAUKEE—Heil Co., manufacturer of motor truck dump bodies, body hoists, steel tanks, etc., has given contract to Klug & Smith Co., 111 East Wisconsin avenue, for one-story machine shop addition 125 x 125 feet.

MILWAUKEE—Engel Tool & Forge Co., 123 West Orchard street, has let contract to Peters Construction Co. for one-story machine shop addition. George Zagel & Bro., 424 East Wells street, are architects.

MILWAUKEE—McCulloch Engineering Co., manufacturer of superchargers, has let contract to J. G. Jansen Construction Co. for one-story machine shop 152 x 202 feet. Eschweiler & Eschweiler, 720 East Mason street, are architects.

MILWAUKEE—Artos Engineering Co., manufacturer of automatic cutting and stripping machinery, has given contract to Erich Prag for one-story plant addition 30 x 65 feet.

WEST ALLIS, WIS. — Pressed Steel Tank Co., manufacturer of steel barrels, cylinders and seamless steel tanks, has let contract to Wm. F. Eichfeld & Sons Co. for one-story shop addition 34 x 83 feet.

Minnesota

HUTCHINSON, MINN.—O. A. Bretzke & Son will build a one-story machine shop addition 43 x 67 feet.

MINNEAPOLIS—McQuay Inc., manufacturer of radiators and heating equipment, has given contract to J. W. Crawford Co. for plant additions and alterations.

Kansas

ELLIS, KANS.—City, E. R. Gibson, clerk, is taking bids on an oil-driven generating unit, exciter and auxiliaries. Black & Veatch, 4706 Broadway, Kansas City, Mo., are engineers.

GREAT BEND, KANS.—Central electric co-operative, William Groh, superintendent, has given contract to R. E. Mattison & Co., Britton, Okla., at $170,860 for 312 miles rural transmission line to serve 751 customers. A. W. Hefling, Salina, Kans., is engineer.

MCPHERSON, KANS.—Globe Oil & Refining Co. plans construction of a gasoline pipe line from this city to Council Bluffs, Iowa.

South Dakota

NEWELL, S. DAK.—Butte Electric Association Inc., Donald Soma, co-ordinator, has given contract to Langford Electric Co. Inc., 706 Metropolitan Life building, Minneapolis, for 195 miles rural transmission lines, to serve 377 customers.

VERMILLION, S. DAK.—City, care auditor, is taking bids on improvement of water softening and filtration plant at cost of about $15,000. H. S. Nixon, Grain Exchange building, Omaha, Nebr., is engineer.

VERMILLION, S. DAK.—REA has approved award by Clay-Union Electric co-operative to G. Z. Ferguson, Crandon, Wis., at $105,830 for constructing 180 miles of rural transmission lines. Buell & Winter, Insurance Exchange building, Sioux City, Iowa, are engineers.

Nebraska

BEATRICE, NEBR. — Beatrice Steel Tank Mfg. Co., T. A. Adams, president, will build a one-story plant addition and install additional equipment.

SEWARD, NEBR.—Bond issue for $22,000 has been voted and bids will be taken about May 1 for 250,000-gallon steel elevated water tank.

Iowa

DUBUQUE, IOWA — Dubuque bridge commission, C. T. Landon, chairman, 316 B and I building, Dubuque, has given contract to Bethlehem Steel Co., Bethlehem, Pa., for superstructure for 6500-foot bridge across Mississippi river. Howard, Needles, Tammen & Bergendorff, 1010 Orear-Leslie building, Kansas City, Mo., are engineers.

MANNING, IOWA—Board of trustees is considering bids on addition to municipal power plant, including diesel-engine generating set of 745 BHP and auxiliaries, switchboard and wiring. Buell & Winter, Insurance exchange building, Sioux City, Iowa, are engineers.

PAULLINA, IOWA—City is having plans drawn by Buell & Winter, 508 Insurance Exchange building, Sioux City, Iowa, for municipal light and power plant improvements to cost $40,000 or more.

SIOUX CITY, IOWA — International Milling Co., 625 Warnock building, has let contract to Jones-Hettelsater Construction Co., Mutual building, Kansas City, Mo., at $85,000 for 40 reinforced concrete grain storage tanks at its grain elevator here.

WEST POINT, IOWA — Mary G. Schroeder, clerk, will vote May 1 on construction of a municipal light plant, 11,000-volt transmission line, substation, distribution and street lighting system. G. L. Van Fleet Co., Cedar Falls, Iowa, is engineer.

Montana

FAIRFIELD, MONT.—D. M. Manning, Hysham, Mont., is low bidder on 192 miles of rural transmission line to serve 300 customers. John W. Hall, Fort Shaw, Mont., is engineer. .

California

LOS ANGELES—Ideal Wire Works has been organized by Wilbur H. Strom and Troy H. Bond to conduct business at 589 North Mission road.

LOS ANGELES—Quality Tool Co. has been organized by John E. McCullough to conduct a tool business at 4524 East Slauson avenue.

SOUTH GATE, CALIF.—Hardman Aircraft Co. has bought 80,000 square feet adjoining its plant and will build an addition to its plant at 12324 Center street. Plans have not yet been made.

Oregon

ASTORIA, OREG.—Astoria Marine Iron Works, recently formed by Thomas Bilyeu and associates, Portland, Oreg., has been given contract to build ten marine engines at cost of $1,000,000. Plant and shipways will be leased from Port of Astoria.

PORTLAND, OREG.—Willamette Iron & Steel Corp., engaged in defense work and shipbuilding, has been allotted $542,000 for plant expansion and facilities, in addition to original grant of $1,000,000.

Washington

PORT ANGELES, WASH.—Charles Anderson and associates, owners of Crescent manganese mines, have leased property to Sunshine mine, located in Idaho, and work preliminary to active development is being done.

SEATTLE—The navy has taken over a 90-acre tract on Bainbridge island as site for a $350,000 radio transmission station.

SEATTLE—Isaacson Iron Works has general contract to build a copper shop building at plant of Todd Seattle Dry Docks Inc.

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3 revolving dryers
1 United Coupling Screw on Machine. 8" to 12".
8 Centrifugal pumps
6 Air Compressors
2 Electric Traveling Cranes
2 Sets crane bridge girders & end trucks
1 Baker Brothers tapping and boring machine
1 Fifield Tool Co., Lathe 17' bed, 33" swing, countershaft and pulleys
1 Baker Brothers Drill Press, Style F-111, 18" heavy duty upright drill, back geared, power feed, 17" x 24" sliding table
1 Slab milling machine, bed 60" x 22" wide
1 Pond Machine Tool Co., 6' radial drill, cast iron bed, box table, countershaft
1 One hundred pound steam drop hammer cylinder 7" x 9"
1 Lennox-Ryerson Bevel Shear
2 3-ton Chicago Pneumatic Air Hoists
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ADVERTISING INDEX

Where-to-Buy Products Index carried in first issue of month.

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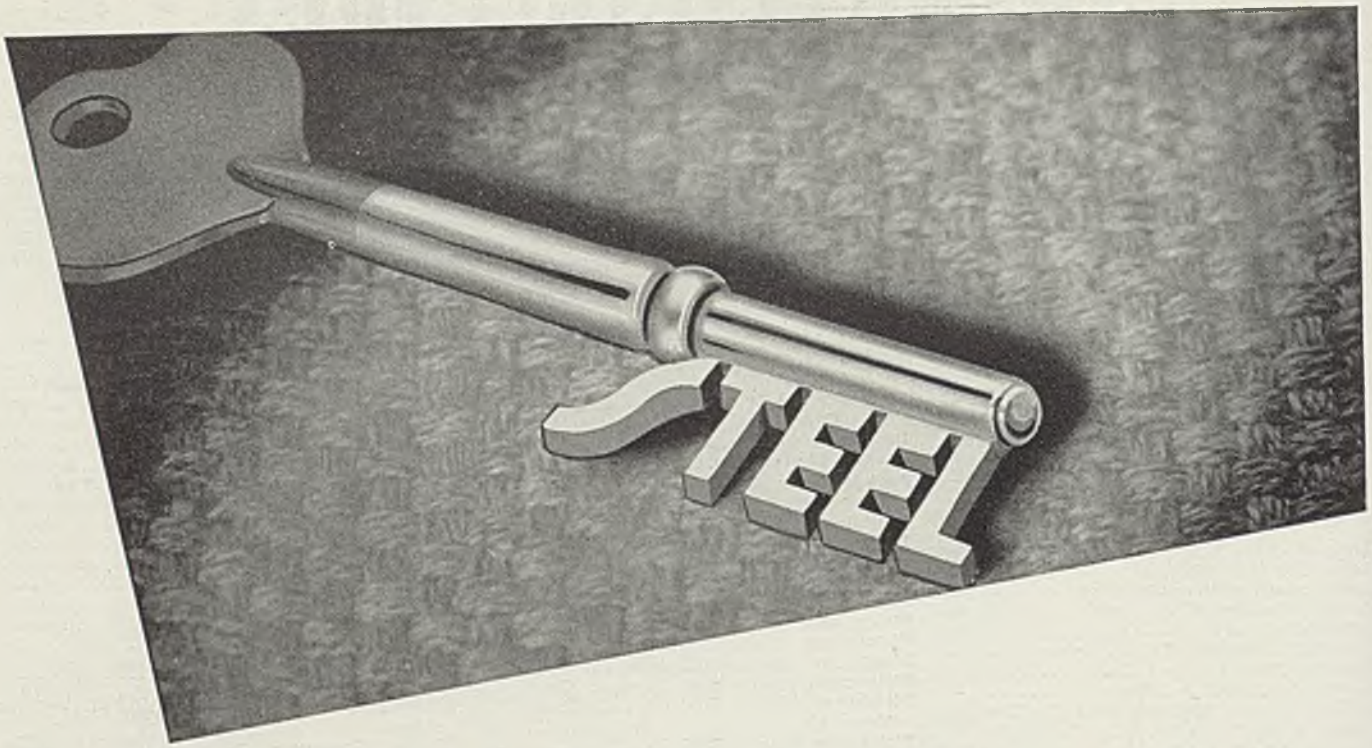

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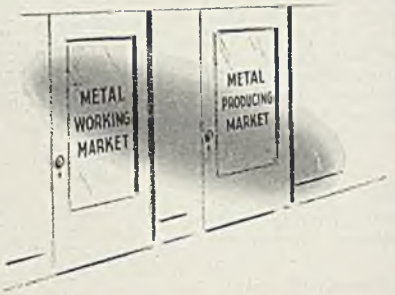

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