

EDITORIAL STAFF

E. L. SHANER
Editor-in-Chief
E. C. KREUTZBERG
Editor
A. J. HAIN
Managing Editor
G. W. BIRDSALL
Engineering Editor
J. D. KNOX
Steel Plant Editor
GUY HUBBARD
Machine Tool Editor
D. S. CADOT
Art Editor

ASSOCIATE EDITORS

G. H. MANLOVE W. J. CAMPBELL
HAROLD A. KNIGHT
New York
W. G. GUDE B. K. PRICE
L. E. BROWNE
Pittsburgh Chicago
R. L. HARTFORD E. F. ROSS
Detroit Washington
A. H. ALLEN L. M. LAMM
London
VINCENT DELPORT

ASSISTANT EDITORS

GEORGE URBAN JAY DEEULIS
J. C. SULLIVAN LA VERNE NOCK
New York
JOHN H. CALDWELL

BUSINESS STAFF

G. O. HAYS
Business Manager
C. H. BAILEY
Advertising Service
New York.....E. W. KREUTZBERG
B. C. SNELL
Pittsburgh.....S. H. JASPER
Chicago.....L. C. PELOTT
Cleveland.....R. C. JAENKE
D. C. KIEFER
J. W. ZUBER
Circulation Manager

MAIN OFFICE

Penton Building, Cleveland

BRANCH OFFICES

New York.....110 East 42nd St.
Chicago.....520 North Michigan Ave.
Pittsburgh.....Koppers Building
Detroit.....6560 Cass Ave.
Washington.....National Press Building
Cincinnati.....1734 Carew Tower
San Francisco.....1100 Norwood Ave.
Oakland, Calif., Tel. Glencourt 7559
London.....Caxton House
Westminster, S.W. 1

Published by THE PENTON PUBLISHING CO.,
Penton Building, Cleveland, Ohio. E. L. SHANER,
President and Treasurer; G. O. HAYS, Vice
President; F. G. STEINERBACH, Secretary.
Member, Audit Bureau of Circulations; Associated
Business Papers Inc., and National Pub-
lishers' Association.

Published every Monday. Subscription in the
United States, Cuba, Mexico and Canada, one
year \$4, two years \$6; European and foreign
countries, one year \$10. Single copies (current
issues) 25c.

Entered as second class matter at the postoffice
at Cleveland, under the Act of March 3, 1879
Copyright 1940 by the Penton Publishing Co



STEEL

ESTABLISHED 1882

Contents



Volume 107—No. 23

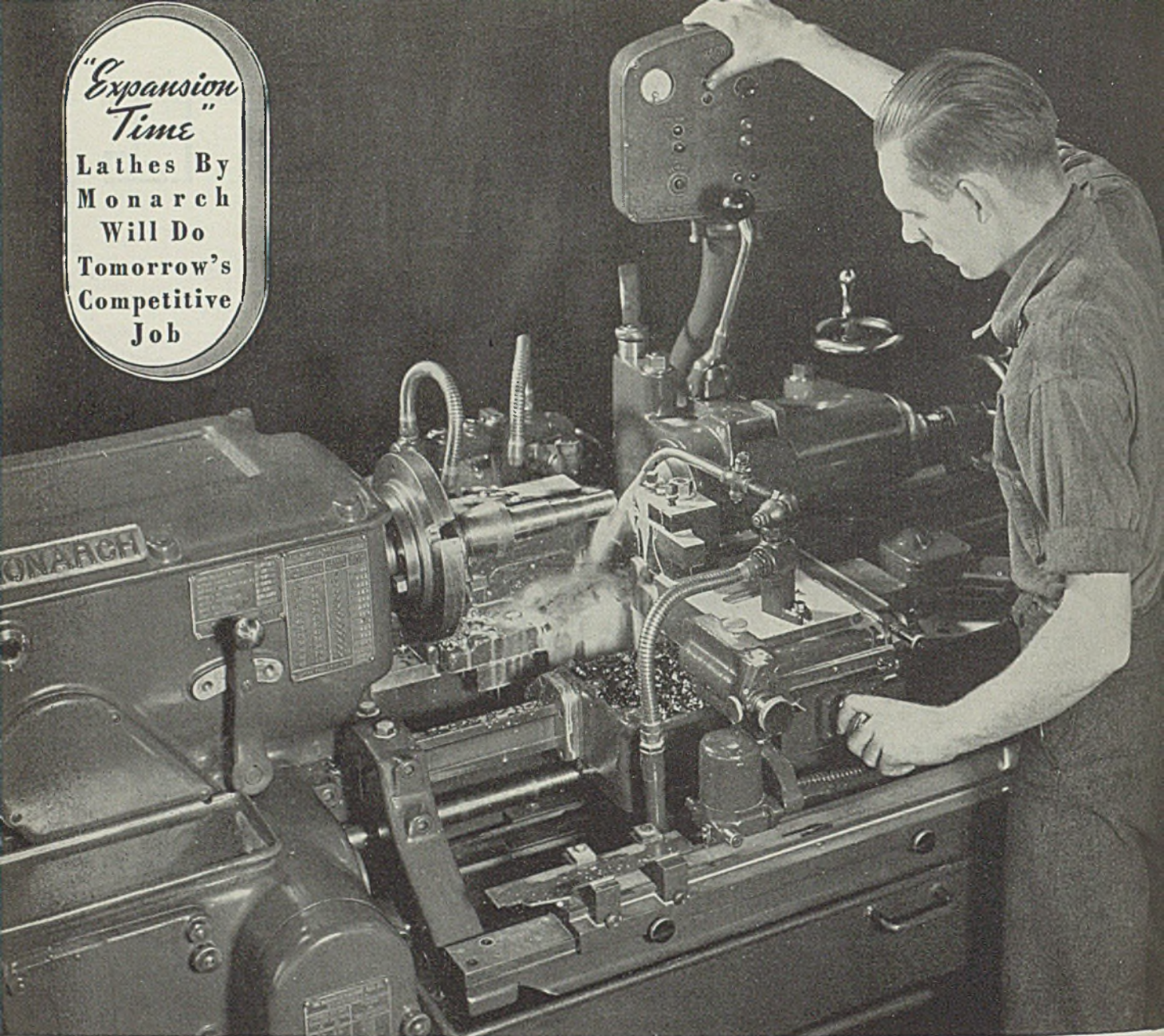
December 2, 1940

READER COMMENTS	4
HIGHLIGHTING THIS ISSUE	19
NEWS	
After a Record Steel Year—History Says: "More Capacity"—but Times Have Changed	21
Aluminum Supply Adequate for Defense Needs; Capacity Increased ..	23
Automotive Industry Organizes To Expedite Aircraft Production	24
Nitriding Furnaces To Aid Mass Production of Aircraft Engines	25
Government Defense Awards	26
Financial	28
Meetings	28
Steelworks Operations for Week	29
Men of Industry	30
Obituaries	31
Emergency Lathes, Capable of Turning Shell a Minute, Described	35
Precision Methods in Armament Production Work	40
WINDOWS OF WASHINGTON	32
MIRRORS OF MOTORDOM	37
EDITORIAL—Industry's Status Again Is Changing	42
THE BUSINESS TREND	43
TECHNICAL	
Hydraulic Press Mfg. Co.'s New Press Plant Aids Armament Program ..	46
Bofors Anti-Aircraft Guns	50
Modern Cave Dwellers Please Note	66
Fastens Pulley to Shaft Without Keys	69
No "Bottlenecks" in U. S. Optical Industry	77
Hydraulic Shuttle Promotes Safety	86
<i>Metal Finishing</i>	
New Processes Resist Oxidation at High Temperatures—By William C. Reid	48
Porcelain Enameling Control—By E. W. Dietterle	60
<i>Materials Handling</i>	
The "Whirly" Goes to Town	52
<i>Joining and Welding</i>	
Self-Locking Nuts for Aircraft—By D. M. Warner	58
<i>Progress in Steelmaking</i>	
Dephosphorization—An Inexpensive Method—By Gordon M. Yocom ..	72
INDUSTRIAL EQUIPMENT	80
MARKET REPORTS AND PRICES	91
BEHIND THE SCENES	106
CONSTRUCTION AND ENTERPRISE	117
INDEX TO ADVERTISERS	144

PRODUCTION • PROCESSING • DISTRIBUTION • USE

"Expansion
Time"

Lathes By
Monarch
Will Do
Tomorrow's
Competitive
Job



America...

KEEP YOUR BLOOD PRESSURE DOWN

WHEN hysteria holds the reins and plies the whip, we're in for a rough, hard ride. Let's be calm about this. Shouting names and pointing fingers will increase your blood pressure but it will never increase production. To speed up production, you need machines that have been planned, designed and built to meet tomorrow's high-speed requirements.

Monarch has spent years developing new lathes to anticipate industry's present and future needs. For example . . . the

MONARCH-KELLER *Monu-Matic* Lathe, illustrated above, is the most advanced, universal automatic lathe ever conceived. The tool "set-up" to change from one job to another is so simple and is done so quickly, that these lathes are used on small lot production. Such Monarch Lathes will help your plant meet the strain of emergency production schedules and will give you the lowest production cost on "peace-time" work after the emergency is over. The Monarch Machine Tool Co., Sidney, Ohio.

M O N A R C H L A T H E

HIGHLIGHTING THIS ISSUE

■ **TONNAGE** involved in new orders for finished steel is somewhat less than in recent weeks but still is above the current rate of shipments. Although production last week (p. 29) again was at 97 per cent of ingot capacity, therefore, earliest available deliveries continued to move slightly further into the future. Greatest congestion (p. 91) is in the supply of wire rods, plates and shapes. Mills expect—and hope for—some slight recession in new buying during December or during the first quarter. A feature of the present market situation is the elimination of cross-hauls, with consequent localization of the steel business. . . . Scrap prices are up 25 to 75 cents on some grades.

• • •

An important shift in thinking has occurred in high places in Washington. As far as industry is concerned (p. 42), the doctrine of an economy of scarcity has been tossed out the window and has been replaced by the concept of an economy of superabundance. The situation is one that presents new problems to industrial management. . . . Defense "prosperity" is reflected more and more in sales of peace-time goods. Sales of major household appliances (p. 29) are breaking all records. . . . Of many defense awards last week the largest (p. 26) involved \$73,000,000, to Remington Arms Co. Inc., for procurement of equipment and for operation of a government-owned small arms plant near Kansas City.

Changes Thinking

• • •

An export licensing system, says Lynne M. Lamm (p. 32), may be applied to finished steel products. Policy aimed at preventing labor troubles from closing defense plants, he reports, is in formation. He also lists the additional equipment now covered by the machine tool export licensing system. . . . Defense Commissioner Stettinius reports (p. 23) the supply of

May License Steel Exports

aluminum for national defense will be adequate. . . . Four gage manufacturers have been authorized by the war department (p. 22) to expand their facilities. . . . A New Jersey iron ore mine which has been idle for 60 years (p. 22) resumed production last week. . . . A. H. Allen (p. 37) details the defense activities of the automobile industry.

• • •

William C. Reid describes three new processes (P. 48) for providing a relatively inexpensive form of protection to ferrous metals against oxidation and scaling at high temperatures. All of them involve coatings of non-ferrous metal alloys applied by metal spraying equipment.

Oxidation Prevented

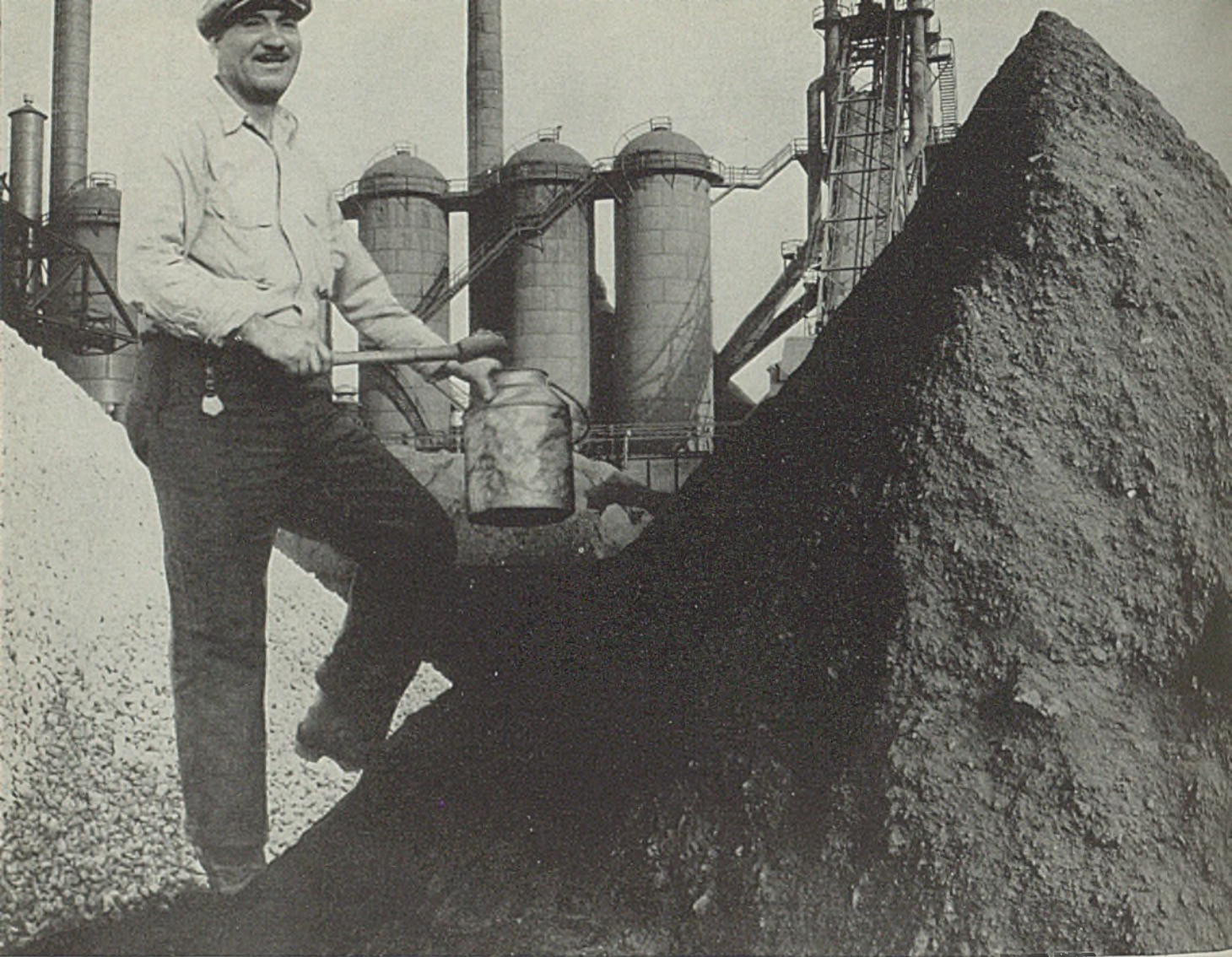
. . . At a Los Angeles iron and steel warehouse (p. 52) the handling of materials is simplified by a system whose key unit is a utility service truck with a 19-foot boom. It can be swung in an arc of approximately 300 degrees and has lifting capacity of 6000 pounds at 7-foot outreach. . . . A manufacturer of bolts, nuts and screws (p. 55) is shipping its products in packages that have sales appeal.

• • •

D. M. Warner (p. 58) discusses self-locking nuts which have been found by the materiel division of the air corps to speed the production of aircraft. . . . E. W. Dietterle (p. 60), in a paper on porcelain enameling control, gives some pointers on how the average shop can

All-Steel Shelter

save \$38.15 per 1000 square feet of surface. . . . Now offered in this country (p. 66) is a new all-steel air raid shelter. . . . Gordon M. Yocom (p. 72) reveals details of an inexpensive method for reducing the phosphorus content of bessemer steel. It is in use at the Benwood, W. Va., plant of the Wheeling Steel Corp. . . . Two new aluminum alloys (p. 88) possessing excellent machinability and other properties are announced.



A Sound Raw Material Program Leads to **INLAND QUALITY STEEL**

One of the most important means used by Inland to produce steel of highest quality is a program which assures continuous flow of uniform raw materials. This Inland practice is illustrated by the great care taken in selecting, mixing and blending basic iron ore.

To assure uniformity and continuity of supply, Inland owns large ore reserves of known quality. These are mined by methods which avoid inclusion of impurities. Every car of ore, used by Inland, is sampled as it leaves the mine. When these cars are dumped into pockets at the upper lake docks, the highest and lowest in different elements are evened out with infinite pains by blending. Further mixing occurs when the ore flows into the steamer.

The ore is mixed a third time during the process of unloading and piling at the mill. Again, when loading the skips that feed the Inland blast furnaces, the grabs that dig through the ore accomplish a final mixing.

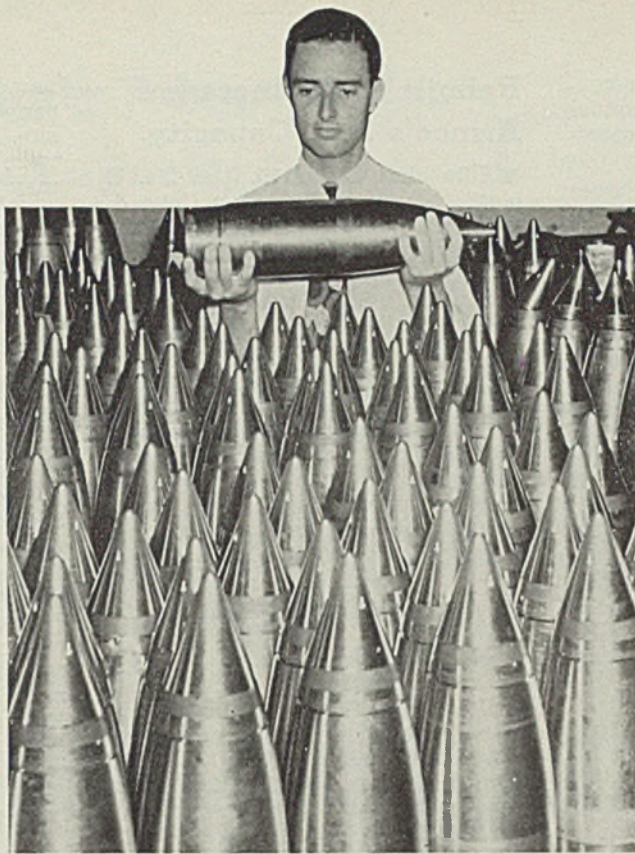
Equally important are Inland's large stocks of specialty ores that allow adjustments up or down in manganese, phosphorus, silicon and other elements to meet manufacturers' special requirements for particular products.

Throughout this program, uniformity is the watchword of the Inland organization. It begins with the mining of raw materials at distant points and follows through every step of the Inland process of making quality steel.

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

INLAND STEEL CO.

38 S. Dearborn Street, Chicago • Sales Offices: Milwaukee, Detroit, St. Paul, St. Louis, Kansas City, Cincinnati, New York



■ Frankford arsenal, Philadelphia, produces a wide range of ammunition and fire control apparatus for the army. Pictured are 42½-pound, 155-millimeter shells awaiting shipment. Wide World photo

After a Record Steel Year—History Says: “More Capacity”—but Times Have Changed

Greatest Ingot Production Accomplished in 1940 with Only 82.7 Per Cent of Plant Facilities Engaged, Compared with 90 in World War Years. Less Time Off for Repairs Because of Better Equipment

■ UNITED STATES' steel ingot production this year will exceed the previous record output of 1929 by about 8 per cent. It will surpass that of 1917—peak in the World war period—by 34 per cent. It will top 1939 by 27 per cent.

These figures are predicated on the assumption that open-hearth and bessemer tonnage in December will approximate the average of the past two months. There usually is some recession during the holidays, but it does not appear this will materially affect the result.

Does a year of record production suggest increasing capacity during following years?

History would indicate that it does. In 1930, after the production peak of 1929, ingot capacity was enlarged by 4,272,397 net tons, or 6 per cent; in 1931, by 1,523,110 tons, or 2 per cent. In 1932 there was a slight reduction in capacity, due to the depression and the government-sponsored steel code.

Estimated production of 65,663,000 net tons this year represents rough-

ly two-thirds as much steel as made in two chief war years, 1917 and 1918, when 48,858,504 and 48,217,145 tons, respectively, were produced, a total of 97,070,649 tons. This year the United States has merely been preparing for a possible war.

In the three worst years of the depression, 1932, 1933 and 1934, combined output was 68,897,953 tons, which tops 1940 by only 3,235,000 tons, or a half-month's tonnage at the recent rate.

Operations Average 82.75 Per Cent

Average monthly production this year is 5,471,900 tons. This is nearly equal to six months' output in 1932.

Open-hearth and bessemer ingot capacity was engaged during the year at an average of about 82.75 per cent. In 1929 the average rate was 89.05, and in the record month of May, that year, it was 102.01 per cent of capacity. This compares with a calculated 96.2 per cent average for November and December in 1940. The record this year is one of tonnage rather than percentage of

capacity. In World war years percentages also were higher: 93.4 for 1916, 90.8 for 1917 and 84.6 for 1918. In 1932 the average rate was only 19.75 per cent.

Whether 1940 presages an increase in capacity, is a matter for conjecture. Between the record production of 1929 and 1940 capacity was increased by 8,634,090 net tons. Two-thirds of this gain took place in the two years following 1929.

In 1917 open-hearth capacity was augmented by 6,062,560 net tons, a record from 1913 to the present. In 1918, 2,455,600 tons were added; in 1919, 2,095,520 tons; tapering each year to only 407,680 tons in 1922.

Following heavy output in 1937—55,443,256 tons—capacity was increased 1,043,056 tons in 1938.

Going back still further it is observed largest gains in capacity followed years of large production. Thus 1912 witnessed the sharpest increase in production in several years—to 33,919,000 net tons—or 7,840,000 tons over 1911. In 1913 capacity was stepped up 3,080,000

net tons, or 8½ per cent, in contrast to about 1,000,000 tons annual increment in the years just preceding 1912.

Past experience, however, does not necessarily dictate a course of action today. In normal times, rising production engenders confidence and expansion. In actual warfare expansion is forced. But in a situation—as today—when there is no telling how soon and how abruptly capacity may be considered burdensome, the incentive is less than in prosperous peacetime, or outright conflict.

Capacity Well Balanced

Steelmakers still insist that steel-making capacity is adequate to meet defense needs. Moreover, because of great progress in recent years in the manufacture of refractory bricks and other equipment, open hearths do not have to be relined as frequently as in the past. Present coke, pig iron and ingot capacity appear fairly well balanced with finishing mill capacity.

The final turn of world events, of course, will decide the question. Will the world be divided sharply into two groups: Axis and non-Axis powers? Will the United States be allied with Great Britain? If so, to what extent will British steelmaking capacity have been damaged during the war? What per cent of the export markets will be controlled by the Axis? By the non-Axis? And what will be our share? After the war, will the world be too paralyzed to make rapid restoration calling for the use of steel?

How far can steelmakers or statesmen see ahead when the peace of the world is so shattered as it is today?

Rebuilt Stack Increases Armco's Iron Capacity

■ Idle since Aug. 15, the No. 2 blast furnace of Hamilton Coke & Iron Co., Hamilton, O., a subsidiary of American Rolling Mill Co., Middletown, O., was put back in blast last week. Stack was completely remodeled, its capacity increased to 700 tons daily.

Other improvements, including construction of 25 by-product coke ovens, installation of a turbo-blower to speed pig iron production, and enlargement of the company's ore yard are also being made. Total cost of the improvement program is estimated at \$1,100,000.

Bethlehem To Erect Pipe Warehouse

■ Bethlehem Steel Co., last week announced plans for a new pipe warehouse and increased finishing capacity to round out facilities of its new continuous-weld pipe mill at the Maryland plant, Sparrows Point, Md. The warehouse will increase storage facilities 70 per cent.

Columbia Will Remove San Francisco Plant

■ Columbia Steel Co., subsidiary of United States Steel Corp. will remove its wire rope and fence manufacturing plant from San Francisco to Pittsburg, Calif. On the San Francisco site it will erect a 250,000 square foot steel warehouse.

Removal of the wire rope and fence plant was occasioned by the

navy's recent acquisition of the company's San Francisco warehouse and site. New warehousing facilities were necessary so that Columbia may continue to use San Francisco as a central distributing point for northern California.

Equipment transferred to Pittsburg will be housed in a new building covering 197,000 square feet.

Carnegie Making Iron For Jones & Laughlin

■ Co-operating in the interest of national defense, Carnegie-Illinois Steel Corp., Pittsburgh, is utilizing one of its Mingo Junction, O., blast furnaces to make pig iron for Jones & Laughlin Steel Corp., Pittsburgh. Iron ore and coke are being shipped to the furnace by Jones & Laughlin. All the Jones & Laughlin blast furnaces in Pittsburgh and Aliquippa, Pa., are in blast.

Gage Manufacturers Authorized To Expand

■ Four gage manufacturing companies last week were authorized to expand facilities by the war department. National defense production has increased demand for gages greatly and their production has become one of the "bottleneck" threats.

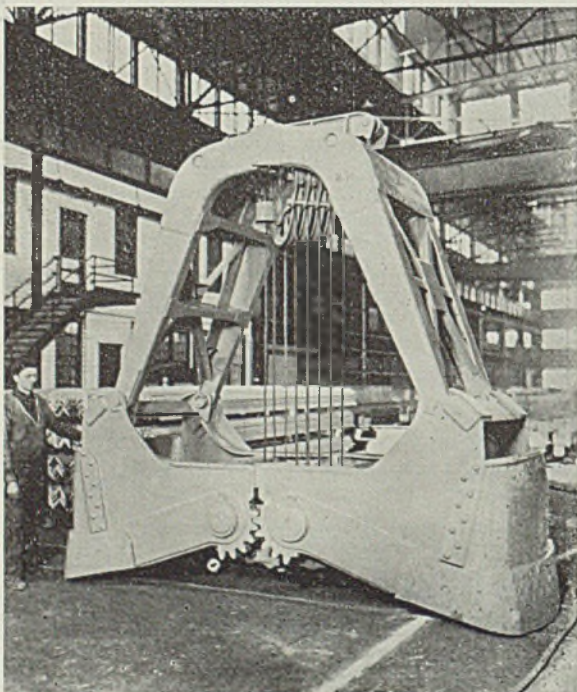
Companies authorized to expand: Sheffield Gage Corp., Dayton, O.; Niles-Bement-Pond Co., Pratt & Whitney division, Hartford, Conn.; Taft-Peirce Mfg. Co., Woonsocket, R. I.; Greenfield Tap & Die Corp., Greenfield, Mass.

Sheffield corporation is erecting an air conditioned plant, of war-time, black-out type. Additional floor space will be approximately 32,000 square feet and will double present capacity. Total cost is estimated at \$1,000,000.

New Jersey Iron Mine, Idle 60 Years, Resumes

■ Owing to the increased demand for low phosphorus ore, the Jugtown mountain iron mine, Dover, N. J., resumed operations last week after a shutdown of 60 years, according to Henry M. Roche, local consulting engineer and official of the recently incorporated West Portal Mines Inc., the operating company. The mine was closed in 1880, at the time Lake Superior deposits were opened.

Reconditioning has been rushed and the first production job will be to concentrate 75,000 tons of ore left on the ground when the mine closed. When operating at capacity the mine will ship about 800 tons a day to Pennsylvania furnaces.



Loads Freight Car in 16 Grabs

■ This huge 17,000-pound welded all-alloy steel "four rope" slag-handling clamshell bucket can load a freight car in 16 grabs. Fabricated by Blaw-Knox Co., Pittsburgh, and recently installed in the open-hearth department of a Pittsburgh district steel plant, the bucket has two closing and two holding lines and uses 10 parts reeving

Aluminum Supply Adequate for Defense Needs; Capacity Increased

WASHINGTON

■ ALUMINUM supply will be adequate for the national defense program's needs, E. R. Stettinius Jr., national defense commissioner in charge of raw materials, assured the President at a White House conference last week.

Mr. Stettinius said aluminum production has been doubled to meet the defense demands and that Canadian production also has been greatly stepped up. No aluminum priorities are in sight at this time.

Magnesium production also has been greatly expanded. Production now is 13,000,000 pounds and by next spring it will be 26,000,000 pounds.

Mr. Stettinius said the production of ingot aluminum during the next two years from the present plants and those additional units already planned, together with the secondary supply, appears adequate to take care of military requirements as now estimated, and present civilian requirements, with a sufficient surplus to permit some increase in civilian requirements over the present level, or in military requirements if needed.

To Increase Ingot Capacity

He told the newsmen that the ingot capacity has already been increased from the 1939 level of 325,000,000 pounds to the present capacity of 465,000,000 pounds per year. Expansions already under way and planned will increase the level to 690,000,000 pounds per year by July, 1941, and 825,000,000 pounds by July, 1942. Thus July, 1942, capacity

will be two and one-half times the 1939 level.

Fabricating facilities of the industry, he stated, are being increased to take care of the increased requirements, and while there may be temporary delays in supplying civilian needs for some fabricated articles, no serious difficulties are expected.

Mr. Stettinius said aircraft requirements are based on the revised schedules of the army, navy and the British, and include the new British program.

The aluminum requirements are estimated four months in advance of airplane scheduled deliveries. These requirements will increase steadily

Navy Orders 200

"Mechanical Alligators"

■ Navy department has ordered 200 of these amphibian tanks, dubbed "mechanical alligators" because of the ease with which they travel on either land or water. They are built by Donald Roebling, Clearwater, Fla. Novel feature of the tanks is that they depend on the same equipment for traction on land or water and consequently are able to travel through swampland and mud. Traction is supplied through caterpillar treads equipped with extremely wide cleats, which act as fins or paddles in water but are close enough to provide fairly smooth transit on land. The model weighs 4 tons, is 20 feet long and 8 feet wide. It travels 25 miles an hour on land and 8½ in water. NEA photo

to meet the increasing requirements of the aircraft program.

Capacities of the sheet mills are being increased to produce the strong alloy sheets used in airplanes, he said. Anticipated supply of the strong alloy aluminum used in plane construction is ample to meet the present plane schedules.

At present there are large orders on hand for military requirements other than planes, such as field kitchens and the individual soldier's equipment, and while these orders are in process there may be temporary delays in meeting some civilian requirements.

There are some delays in forgings, Mr. Stettinius stated, but this is expected to be temporary. With the installation of new hammers this situation will be remedied.

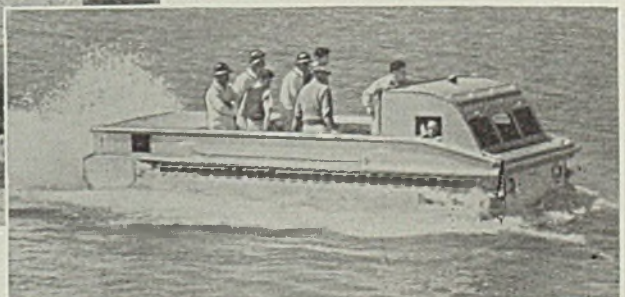
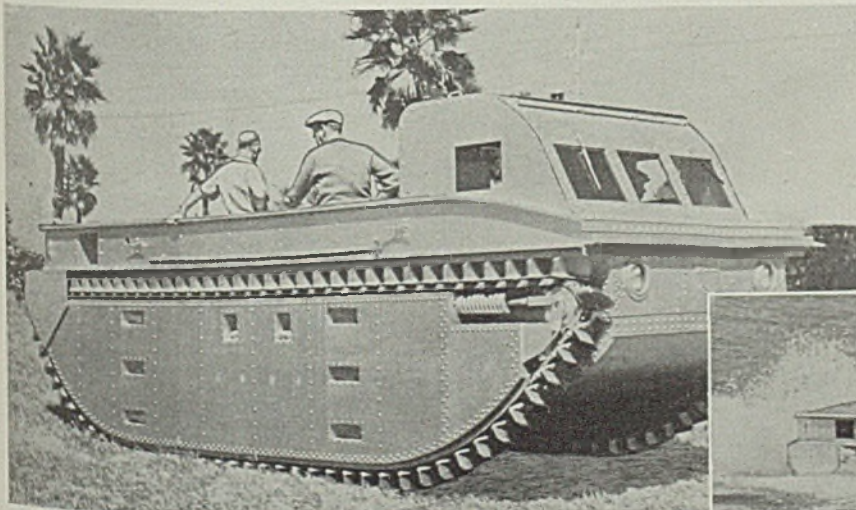
Consumption of bauxite from Arkansas is being increased, he said. Rate of shipment of bauxite from Dutch Guiana is also being increased. New mines are expected to come into operation in Dutch Guiana next month and the increased production of these mines will be used in part to build stocks of bauxite in the United States.

Machinery Exports Total \$43,567,434 for October

■ Exports of machinery from the United States during October reached the record total of \$43,567,434, surpassing by nearly \$2,000,000 the previous high established in December, 1920. All major machinery classes shared in the gains, but shipments of power-driven metalworking machinery showed the largest increase, amounting to \$26,798,995.

Machine tool exports to England, amounting to \$19,902,633 as against \$15,070,249 in September, accounted for the greater part of this total. Comparable shipments to Russia fell to \$130,599 from \$894,999 the preceding month, while consignments to Japan valued at \$1,393,434 showed a gain over the September figure of \$587,632.

Shipments of machine tools to Canada have increased sharply in recent months. Valued at \$635,322 in July, they rose to \$1,582,273 in August, to \$2,181,304 in September, and to \$2,678,330 in October.



Automotive Industry Organizes To Expedite Aircraft Production

DETROIT

■ BECAUSE of its own vast purchasing activities and by virtue of its accepted genius for organizing and pursuing any large manufacturing program, the automotive industry, through a newly established committee for air defense, is well equipped to handle the job of procuring parts and subassemblies for 24,000 new bombing planes to be supplied Great Britain and this country. Co-operating with the committee are parts equipment manufacturers and tool and die suppliers, as well as army air corps advisers and technical consultants.

Last week, the committee filed articles of incorporation with the Michigan secretary of state's office, to give the organization status as a nonprofit corporation. Signers were I. B. Babcock, president, Yellow Truck & Coach Mfg. Co., Pontiac, Mich.; W. P. Brown, president, Briggs Mfg. Co., Detroit; C. C. Carlton, vice president and secretary, Motor Wheel Corp., Lansing, Mich.; Edsel B. Ford, president, Ford Motor Co., Dearborn, Mich.; K. T. Keller, president, Chrysler Corp., Detroit; Alvan Macauley, chairman, Packard Motor Car Co., Detroit; and C. E. Wilson, acting president, General Motors Corp.

The committee has set up permanent headquarters in the Graham-Paige plant at 8505 West Warren avenue, Detroit, and is inviting parts

manufacturers either to visit the headquarters to inspect the wide variety of typical airplane fuselage parts on display, with the idea of determining the supplier's ability to handle work of this type, or to write the committee, advising of facilities available for aircraft parts production.

Thus far, about 500 suppliers have visited the display of fuselage parts set up by the committee and have listed their facilities for production of some of the pieces. A spirit of eager co-operation has been prevalent, which augurs well for the entire program. Undoubtedly there are many plants throughout the country which have not been familiarized with this project and which might have facilities ideally suited to aircraft parts manufacture.

Carlton Heads Committee

The industry's air defense committee is headed by a permanent chairman, C. C. Carlton, now on leave from the vice presidency of Motor Wheel Corp., Lansing, Mich., with W. F. DeGroat, technical adviser, formerly chief engineer for Barkley-Grow division of Aviation Mfg. Corp. Maj. James H. Doolittle has been transferred to the Detroit district to superintend consultations in behalf of the army air corps. W. J. Cronin, secretary of the manufacturers' committee of the Automobile Manufacturers associa-

tion, has been "loaned" to the group as assistant director.

This activity still is in its preliminary stages and many decisions are yet to be reached. The task confronting the motor parts industry is a major one and the work of coordinating suppliers and fabricators with final assembly is going to require considerable time and a large personnel, now being recruited.

Airplane fuselage parts may be classified roughly into aluminum castings, aluminum forgings, steel forgings, screw machine parts of steel and aluminum, welded steel tubing, and press-formed aluminum alloy sheet. Most aluminum parts must be heat treated and given an anodizing treatment to protect them against salt water corrosion.

Will Standardize Design

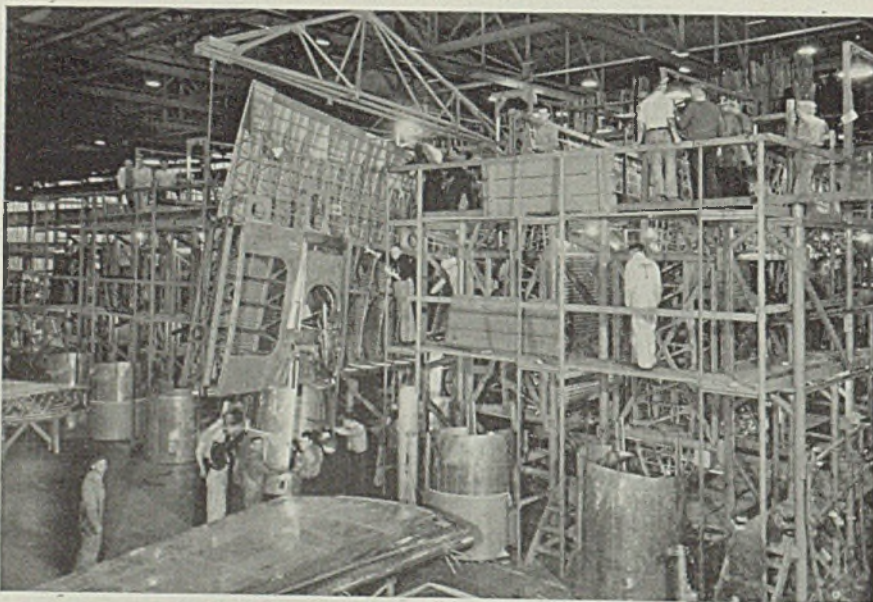
Design of the two types of bombers for which the auto industry will supply major subassemblies has not been fully standardized as yet, but this program is in its final stages.

It is pointed out by air corps advisers that any new design must be submitted to Wright Field, Dayton, O., for laboratory and service tests which require an estimated six weeks at least—too long a time to delay the program no matter how obvious or simple a design revision.

The way the program is working out at present is about as follows: Interested parts suppliers are listing their facilities with the committee which in turn is tabulating all these reports for later submission to companies selected to produce the major subassemblies for the planes which will be built either by present aircraft companies or in assembly plants built by the government.

Briggs Mfg. Co., Murray Corp. of America and Fisher Body Corp. are mentioned among the dozen or more companies likely to figure in supplying wing and fuselage subassemblies. Parts suppliers will deal directly with these companies, and not with aircraft builders or with the government. However, Briggs, Murray and Fisher already have undertaken subcontracts for other airplane programs; hence additional help may be needed for this latest proposal for 24,000 bombers.

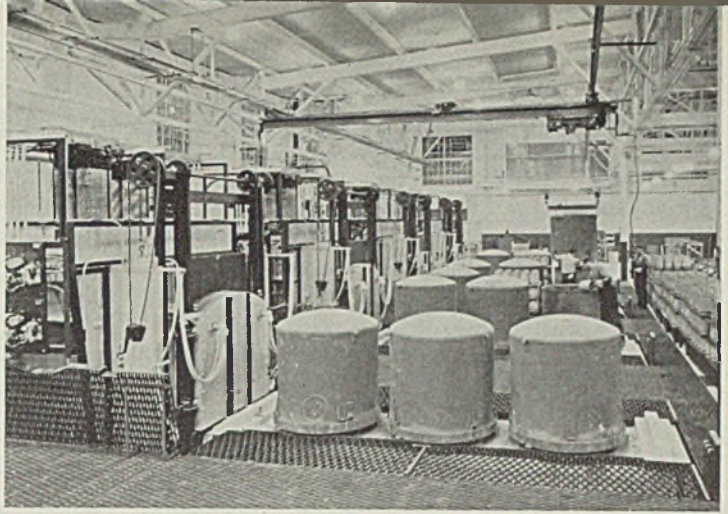
The widespread distribution of orders for materials and items of equipment associated with bomber manufacture is indicated by contracts let recently by one major aircraft builder. The list shows purchases were made in 30 states. Particularly from the metals standpoint, three middle western industrial states, Illinois, Michigan and Ohio, figure most prominently in the picture. In the East, New York, New Jersey, Pennsylvania, Massachusetts, Maryland and Connecticut likewise are the starting points for vital supplies.



■ Automobile and autoparts industries shortly will embark on jobs such as this one—the assembly of bomber wing panels. Taken at Boeing plant No. 2 in Seattle, the photograph shows the panel assemblies locked in a series of massive steel jigs while assembly crews and riveters work on scaffolding at several different levels and on both top and bottom of the wing

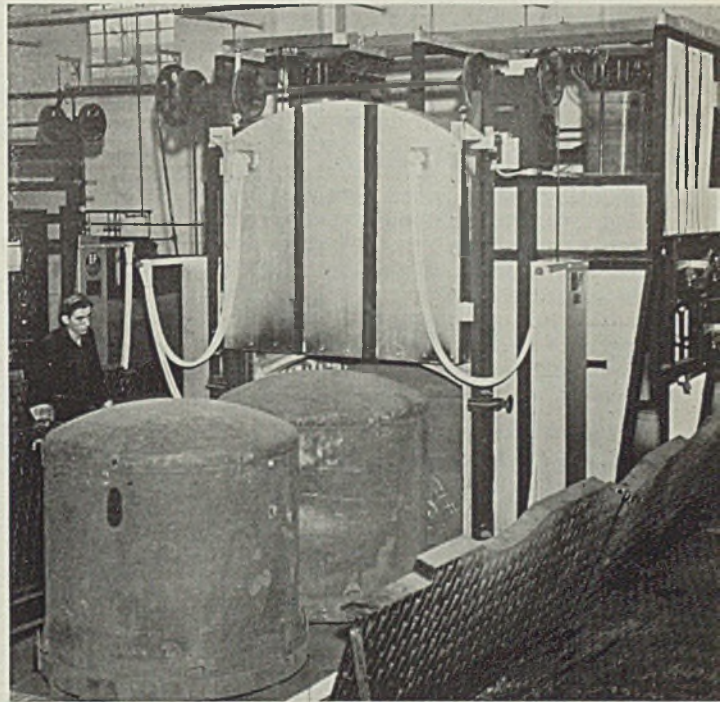
Nitriding Furnaces To Aid Mass Production of Aircraft Engines

■ A battery of seven furnaces for nitriding, which develops one of the hardest steel surfaces known, has been installed at Wright Aeronautical Corp.'s Paterson, N. J. plant. Costing more than \$1,000,000, the furnaces will be used for the mass production of cylinder barrels for aircraft engines. Nitriding is accomplished by the circulation of ammonia vapor through parts made of Nitralloy under a temperature of 1000 degrees Fahr. Nitrogen, liberated from the ammonia by the heat, reacts chemically with the metal to produce the unusually hard, wear-resisting surface

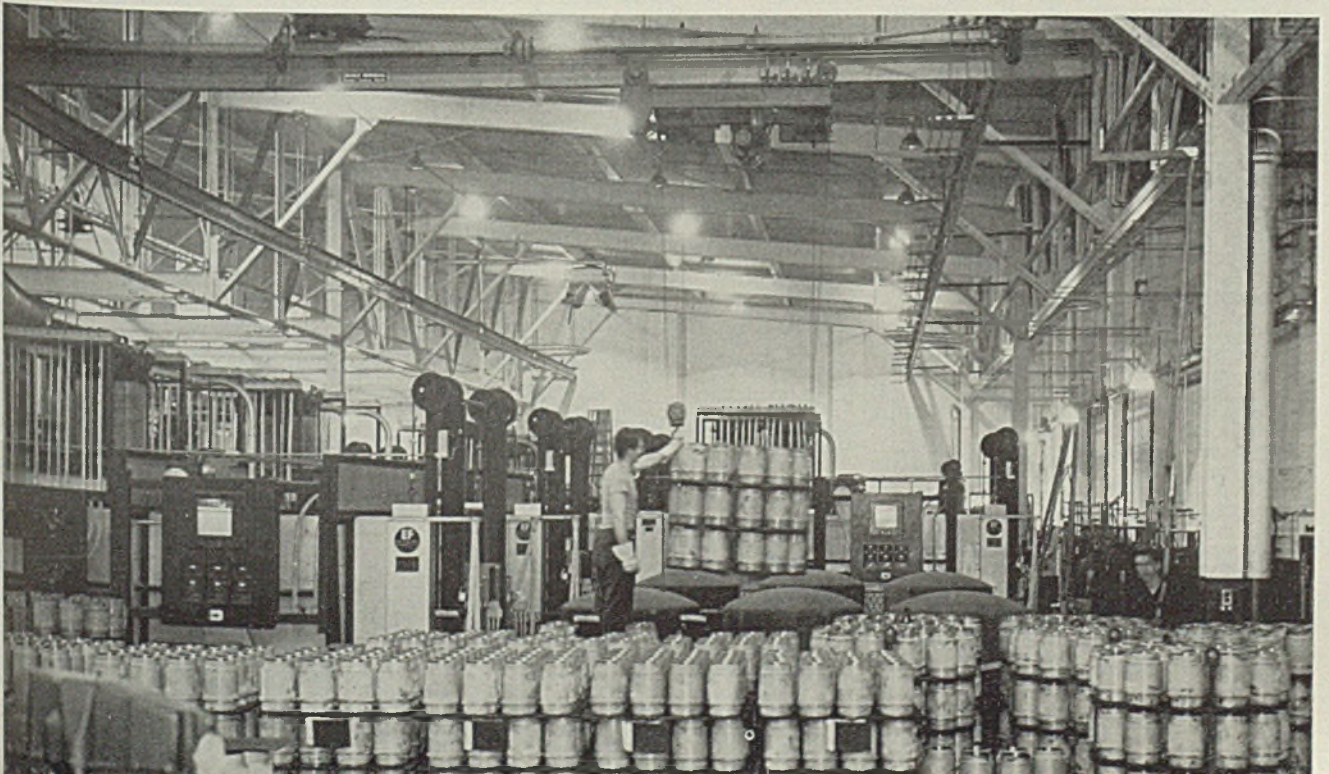


Above, the seven furnaces are housed in a separate room of the company's new No. 2 plant. They weigh more than 300 tons, are capable of treating 35 tons of parts at a time, will turn out more than 2500 cylinder barrels every three days

Center, overhead conveyors expedite the loading of cylinder barrels into the furnaces for the nitriding process, which takes about 50 hours to complete



Below, furnaces are mounted on rails to permit continuous use. Rails provide for the movement of each furnace between two stations, both of which are equipped with three receptacles into which the cylinder barrels are placed. When three receptacles of barrels have been nitrided the furnace is moved along the rail to a new group of containers which have been loaded in the interim. Cylinder bores are finished to a surface accuracy of 0.000002-inch, about 200 times finer than a single strand of a spider web, to minimize friction



Government Awards \$122,417,329

Defense Contracts in Week

■ GOVERNMENT defense contracts last week reported awarded by the war and navy departments aggregated \$122,417,329.57. Approximately five-sixths of the total was awarded by the war department. Continued preparations for accommodation of the vastly expanded army personnel planned are evinced in numerous awards by the quartermaster's corps. Ordnance department also contracted heavily for additional supplies.

Largest contract reported last week was \$73,575,261, awarded by the war department to Remington Arms Co. Inc., Bridgeport, Conn., for procurement of equipment and for operation of a small arms ammunition plant near Kansas City, Mo. Quartermaster's corps agents are purchasing about 2200 acres for the government as plant site. Title to plant and equipment will remain with the government, it was reported, although negotiations for construction are not completed.

War department announced the following:

Ordnance Department Awards

- Adams, S. G., Co., St. Louis, containers, \$6933.60.
- Allegheny Forging Co., Pittsburgh, forgings, \$15,980.
- Allegheny Ludlum Steel Corp., Brackenridge, Pa., \$1100.
- Allen, H. F., Co. Inc., New York, machines, \$1060.
- American Brass Co., Waterbury, Conn., small arms ammunition, artillery ammunition components, bronze and aluminum strips, \$512,165.03.
- American Cutter & Engineering Co., Detroit, tools, \$2781.
- American Machine & Metals Inc., East Moline, Ill., machines, \$6640.
- American Manganese Bronze Co., Philadelphia, bronze, manganese, \$9446.97.
- American White Cross Laboratories Inc., New Rochelle, N. Y., ammunition components, \$14,760.
- Arrow Tool & Reamer Co., Detroit, cutting tools, \$1850.
- Automatic Die & Products Co., Cleveland, machines, \$1502.
- Automatic Machine Products Co., Attleboro, Mass., artillery ammunition components, \$591,294.
- B. G. Corp., New York, spark plugs, \$7084.
- Barker Tool, Die & Gauge Co., Detroit, gages, \$1489.
- Bausch & Lomb Optical Co., Rochester, N. Y., fire control equipment, \$1850.
- Bendix Aviation Corp., Eclipse Aviation division, Bendix, N. J., parts for tanks and combat cars, \$32,521.99; Scintilla Magneto division, Sidney, N. Y., parts for tanks, \$8889.18.
- Bodine Corp., Bridgeport, Conn., drilling machines, \$6875.
- Borg-Warner Corp., Ingersoll Steel & Disc division, Chicago, artillery ammunition components, \$7,614,630.
- Boyt Harness Co., Des Moines, Iowa, small arms materiel, \$4998.16.
- Bridgeport Rolling Mills Co., Bridgeport, Conn., brass, \$4166.

- Briggs & Stratton Corp., Milwaukee, artillery ammunition components, \$2,193,700.
- Brown & Sharpe Mfg. Co., Providence, R. I., cutters, \$3207.14.
- Budd, Edward G., Mfg. Co., Philadelphia, ammunition components, \$130,519.
- Bunell Machine & Tool Co., Cleveland, tools, \$1230.
- Candler-Hill Corp., Detroit, automotive equipment, \$3937.50.
- Chase Brass & Copper Co. Inc., Waterbury, Conn., small arms ammunition, brass, \$53,230.
- Cincinnati Milling Machine & Cincinnati Grinders Inc., Cincinnati, machines, \$8979.
- Cleveland Container Co., Philadelphia, ammunition components, \$226,637.35.
- Cleveland Tractor Co., Cleveland, parts for tractors, \$3778.70.
- Colman, Frederick, & Sons Inc., Detroit, gages, \$1385.
- Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., small arms materiel,

- \$1,014,869.25.
- Continental Motors Corp., Detroit, automotive equipment, \$294,662.85.
- Cowles, S., & Co., New Haven, Conn., small arms materiel, \$1659.46.
- Cushman Motor Works, Lincoln, Nebr., ammunition components, \$582,600.
- Cuyahoga Spring Co., Cleveland, belt clips, \$1180.26.
- Daniels, C. R., Inc., New York, small arms materiel, \$10,742.10.
- Detroit Broach Co., Detroit, machinery, \$4016.20.
- Doehler Die Casting Co., Pottstown, Pa., ammunition components, \$8940.
- du Pont, E. I., de Nemours & Co., Carney's Point works, Carney's Point, N. J., ammunition components, \$233,000; Wilmington, Del., ammunition components, \$1324.50
- Eastman Kodak Co., Rochester, N. Y., fire control equipment, \$5,770,677.71.
- Eclipse Air Brush Co. Inc., Newark, N. J., machines, \$4930.
- Edgecomb Steel Co., Philadelphia, steel, \$99,384.51.
- Fairbanks Morse & Co., Boston, dial scales, \$1702.30.
- Federal Screw Works, Chelsea, Mich., artillery ammunition components, \$2,315,650.
- Fischer, Charles, Spring Co., Brooklyn, N. Y., small arms materiel, \$55,929.20.

Purchases Under Walsh-Healey Act

(In Week Ended Nov. 16)

Iron and Steel Products		Commodity		Amount
Acme Steel Engineering Co., Baltimore	Buoys			\$86,765.00
Air Associates Inc., Bendix, N. J.	Stand assemblies			65,550.00
American Steel & Wire Co., Cleveland	Steel			*24,457.42
Armstrong Bros. Tool Co., Chicago	Motor maintenance equipment			28,259.42
Barco Mfg. Co., Chicago	Hammers			17,154.00
Bethlehem Steel Co., Bethlehem, Pa.	Bar steel			36,938.29
Carnegie-Illinois Steel Corp., Chicago	Steel bars			16,334.95
Case Crane & Kilbourne Jacobs Co., Columbus, O.	Food carts			255,525.00
Chapman Valve Mfg. Co., Indian Orchard, Mass.	Valves			12,515.00
Chicago Bridge & Iron Co., New York	Steel tanks			11,760.00
Columbian Steel Tank Co., Kansas City, Mo.	Steel buildings			37,279.75
Commercial Shearing & Stamping Co., Youngstown, O.	Brackets			126,000.00
Crescent Tool Co., Jamestown, N. Y.	Wrenches			50,621.00
Desmond-Stephan Mfg. Co., Urbana, O.	Motor maintenance equipment			41,741.37
Doehler Die Casting Co., Pottstown, Pa.	Practice bombs			48,074.00
Flour City Ornamental Iron Co., Minneapolis	Bridge equipment			1,169,610.00
Hanson-Whitney Machine Co., Hartford, Conn.	Dies, taps			11,209.62
Hobart Bros., Troy, O.	Welding outfits			74,925.00
Igoc Bros. Inc., Brooklyn, N. Y.	Wire nails			38,977.69
Inland Steel Co., Chicago	Plate steel			*26,259.97
International Engineering Inc., Dayton, O.	Stand assemblies			24,744.91
Kay Mfg. Corp., Brooklyn, N. Y.	Wire bottoms			13,500.00
Merando Co. Inc., Washington	Storage buildings			59,995.00
Milburn, Alexander, Co., Baltimore	Cups, torches			30,549.14
National Tube Co., Washington	Bombs			206,139.00
Norris Stamping & Mfg. Co., Los Angeles	Ammunition boxes			848,812.50
Paulson Tools Inc., Wallingford, Conn.	Chisels			25,265.42
Peck, Stow & Wilcox Co., Southington, Conn.	Motor maintenance equipment			32,303.27
Phoenix Bridge Co., Phoenixville, Pa.	Structural steel			14,045.00
Plomb Tool Co., Los Angeles	Wrenches			33,809.43
Plumb, Fayette R., Inc., Philadelphia	Hatchets			15,202.50
Rainear, C. J., & Co. Inc., Philadelphia	Elbows			26,578.38
Snap-On Tools Corp., Kenosha, Wis.	Motor maintenance equipment			47,709.09
Stewart-Warner Corp., Chicago	Practice bombs			23,688.70
Struthers Wells-Titusville Corp., Warren, Pa.	Forgings			20,928.00
Union Twist Drill Co., S. W. Card Mfg. Co. division, Mansfield, Mass.	Dies, taps			13,046.40
United States Steel Export Co., New York	Structural steel			13,647.30
Valley Iron Works Inc., Yakima, Wash.	Tracks			17,500.00
Viking Construction Corp., New York	Piping			203,740.00
Vollrath Co., Sheboygan, Wis.	Hospital buckets			13,488.00
Walworth Co. Inc., New York	Wrenches			19,638.40
Widin Metal Goods Co., Garwood, N. J.	Pipe, wire			11,640.00
Wire Rope Corp. of America Inc., New Haven, Conn.	Wire rope			28,472.40
Zimmer Splint Co., New York	Litters			155,200.00

*Estimated.

Foot-Burl Co., Cleveland, machines, \$23,710.
 Greenfield Tap & Die Corp., Greenfield, Mass., gages, \$13,245.14.
 Ingersoll-Rand Co., Philadelphia, air compressors, \$2203.
 Jahn, B., Mfg. Co., New Britain, Conn., dies, \$4976.
 Kearney & Trecker Corp., Milwaukee, milling machines, \$11,575.
 Lamson Corp., Syracuse, N. Y., machinery, \$1161.
 Lees-Bradner Co., Cleveland, machines, \$11,730.
 Mack Molding Co. Inc., Wayne, N. J., ammunition components, \$4025.
 McIntosh Hemphill Co., Pittsburgh, glass and steel castings, \$42,241.41.
 Mercury Mfg. Co., Chicago, machinery, \$5330.
 Mercen-Johnson Machine Co., Minneapolis, machinery, \$3433.
 Metal Goods Corp., St. Louis, copper tubing, \$16,937.82.
 N. L. C. Engineering & Equipment Co., Oswego, N. Y., steam boilers and equipment, \$5048.
 Niles-Bement-Pond Co., Pratt & Whitney division, West Hartford, Conn., drills, other machines, \$5342.15.
 Norton Co., Worcester, Mass., grinders, \$2945.
 Ostrander Seymour Co., Chicago, machines, \$1025.
 Precise Tools & Mfg. Co., Farmington,

Mich., gages, \$5780.
 Putnam Tool Co., Detroit, machinery, \$3372.50.
 Revere Copper & Brass Inc., Rome, N. Y., seamless brass tubing, \$20,765.92; New Bedford, Mass., brass, \$14,714.80; Baltimore, small arms ammunition, \$68,991.
 Root, B. M., Co., York, Pa., machines, \$1669.
 Schutte & Koerting Co., Philadelphia, heat treating units, \$41,470.
 Scovill Mfg. Co., Waterbury, Conn., ammunition components, \$162,810.
 Sheffield Gage Corp., Dayton, O., gages, \$8197.
 Shipley, W. E., Machinery Co., Philadelphia, machines, \$51,997.
 Smith, H. A., Machinery Co., Syracuse, N. Y., lathes, \$12,021.
 Sperry Gyroscope Co. Inc., Brooklyn, N. Y., fire control equipment, \$27,500.
 Standard Gage Co. Inc., Poughkeepsie, N. Y., gages, \$2910.29.
 Standard Motor Parts Co., Des Moines, Iowa, piston rings, \$1947.
 Stedfast & Roulston Inc., Boston, multiple machining units, \$8451.
 Stevens-Walden Inc., Worcester, Mass., tools, \$1700.
 Stewart Warner Corp., Chicago, artillery ammunition components, \$1,576,894.96.
 Strong Steel Foundry Co., Buffalo, castings, \$4038.18.

Studebaker Corp., South Bend, Ind., tools, \$25,000.
 Sturtevant, B. F., Co., Springfield, Mass., dust collector systems, \$1474.88.
 Surface Combustion Corp., Toledo, O., machinery, \$68,000.
 Taft Peirce Mfg. Co., Woonsocket, R. I., gages, \$1083.26.
 Threadwell Tap & Die Co., Greenfield, Mass., cutters, \$2400.
 Thurston Mfg. Co., Providence, R. I., cutting tools, mills, \$3948.10.
 Timken-Detroit Axle Co., Detroit, parts for adapters, \$13,488.
 Tools & Gages Inc., Cleveland, gages, \$43,840.
 Tredegar Co., Tredegar Iron Works, Richmond, Va., artillery ammunition, \$45,652.47.
 Tungsten Carbide Tool Co., Detroit, tools, \$1216.
 Ulmer, J. C., Co., Cleveland, gages \$3375.
 Union Gear & Machine Co., Boston, artillery materiel, \$1537.50.
 Union Twist Drill Co., Athol, Mass., cutting tools, hobs, \$3388.50.
 Waco Aircraft Co., Troy, O., automotive equipment, \$2750.
 Waltham Watch Co., Waltham, Mass., fire control equipment, \$62,152.
 Western Cartridge Co., Winchester Repeating Arms Co. division, New Haven, Conn., ammunition components, small arms materiel, \$11,132.70.
 White Motor Co., Cleveland, automotive equipment, \$10,065.52.
 Wood, John, Mfg. Co., Muskegon, Mich., parts for tanks, \$33,705.16.
 Worcester Stamped Metal Co., Worcester, Mass., small arms ammunition, \$4685.
 Wyckoff Drawn Steel Co., Pittsburgh, steel, \$31,758.06.
 Young Radiator Co., Racine, Wis., automotive equipment, \$4328.40.

Purchases Under Walsh-Healey Act (Cont.)

Nonferrous Metals and Alloys

Aluminum Cooking Utensil Co., New Kensington, Pa.
 Aluminum Goods Mfg. Co., Manitowoc, Wis.
 Aluminum Products Co., La Grange, Ill.
 American Brass Co., Waterbury, Conn.
 American Platinum Works, Newark, N. J.
 American Smelting & Refining Co., Denver
 Bridgeport Brass Co., Bridgeport, Conn.
 General Time Instruments Corp., New York
 Moss, Henry, & Co. Inc., Brooklyn, N. Y.
 Mueller Brass Co., Port Huron, Mich.
 Petroff, Peter A., New York
 Revere Copper & Brass Inc., Baltimore
 Scovill Mfg. Co., Waterbury, Conn.

Commodity

Stock pots \$20,343.00
 Filters, pitchers 53,298.00
 Stock pots, pitchers 76,696.25
 Brass 42,149.75
 Sheet silver 62,900.00
 Copper 10,232.00
 Cartridge cases 135,000.00
 Pins 14,584.00
 Brass stencils 25,458.60
 Brass forgings 50,746.30
 Castings 21,614.53
 Jacket cups 95,500.00
 Alloy tubing 11,580.17

Amount

Machinery and Other Equipment

Addressograph-Multigraph Corp., Cleveland
 American Tool Works Co., Cincinnati
 American Water Softener Co., Philadelphia
 Austin-Hastings Co. Inc., Cambridge, Mass.
 Axelson Mfg. Co., Los Angeles
 Brown & Sharpe Mfg. Co., Providence, R. I.
 Bucyrus-Erie Co., South Milwaukee, Wis.
 Buda Co., Harvey, Ill.
 Caterpillar Tractor Co., Peoria, Ill.
 Continental Machines Inc., Minneapolis
 Cooper-Bessemer Corp., Mt. Vernon, O.
 Elmer & Amend, New York
 General Motors Corp., Detroit
 Gorton, George, Machine Co., Racine, Wis.
 Gosiger, C. H., Machine Co., Dayton, O.
 Hardie-Tynes Mfg. Co., Birmingham, Ala.
 Harding Bros. Inc., Elmira, N. Y.
 Hendey Machine Co., Torrington, Conn.
 Hussmann-Ligonier Co., St. Louis
 Ingersoll-Rand Co., New York
 Kneth Butchers Supply Co., North Kansas City, Mo.
 LeBlond, R. K., Machine Tool Co., Cincinnati
 LeTourneau, R. G., Inc., Peoria, Ill.
 Murphy Elevator Co. Inc., Louisville, Ky.
 Pangborn Corp., Hagerstown, Md.
 Paving Supply & Equipment Co., Washington
 Pioneer Air Compressor Co. Inc., New York
 Round, David, & Son, Cleveland
 Servel Inc., Evansville, Ind.
 Sherer-Gillett Co., Marshall, Mich.
 Sherwood Brass Works, Detroit
 Stewart-Warner Corp., Chicago
 Thew Shovel Co., Lorain, O.
 Vickers Inc., Waterbury, Conn.
 Wallace & Tiernan Co., Belleville, N. J.
 Warren Co., Atlanta, Ga.
 Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.
 Yale & Towne Mfg. Co., Philadelphia
 York Ice Machine Corp., Cleveland

Addressing, imprinting machines \$88,460.00
 Lathes 42,098.00
 Water purifiers 20,000.00
 Shapers 32,425.90
 Lathe 13,654.35
 Milling machines 40,765.44
 Dressing machines 12,904.40
 Boring machines 117,427.00
 Tractors 95,894.56
 Machines 19,643.74
 Engine parts 10,667.85
 Centrifuge 16,538.28
 Engine pistons 17,242.00
 Machines 16,589.58
 Lathes 218,911.00
 Air compressors 47,300.00
 Milling machines 93,192.00
 Lathes 18,086.00
 Refrigerators 26,010.00
 Air compressors 31,740.00
 Refrigerators 96,975.00
 Rifling machines 11,973.00
 Construction supplies 12,104.00
 Elevator 13,400.00
 Blast cabinet 32,647.00
 Shovels 20,581.40
 Air compressors 14,414.40
 Hoists 38,077.00
 Refrigerators 10,796.80
 Refrigerators 46,900.00
 Engine parts 18,830.19
 Engine parts 27,465.70
 Crane 14,840.00
 Bearings 13,363.00
 Water purifiers 39,235.00
 Refrigerators 112,200.00
 Machines 15,000.00
 Hoists 38,077.00
 Coolers 55,902.00

Quartermaster Corps Awards

Agostini Bros., New York, cold storage plant, Ft. Story, Virginia, \$93,528.
 American Bantam Car Co., Butler, Pa., trucks, \$1,419,051.15.
 American Sealing Co., Grand Rapids, Mich., 150,000 folding metal chairs, \$247,500.
 Beers Construction Co., Atlanta, Ga., and W. L. Cobb Construction Co., Decatur, Ga., replacement center, Macon, Ga., \$5,434,880.
 Blair, Algernon, Montgomery, Ala., AC hangar and boiler house at Montgomery airport, Alabama, \$114,625; at Selma, Ala., \$116,514; and at Eglin field, Florida, \$120,709.
 Bradbury & Marchant, Albuquerque, N. M., temporary housing, special service school at Fitzsimmons general hospital, Colorado, \$220,880.
 Brenda, Omar, Detroit, sanitary and storm sewers and water distribution system, Selfridge field, Michigan, \$21,132.
 Cage Bros. and F. M. Reeves & Sons Inc., Austin, Tex., construction of replacement center, Camp Wolters, Texas, \$5,546,195.
 Clarin Mfg. Co., Chicago, 150,000 folding metal chairs, \$304,500.
 Cody, Frank T., Hanover, N. H., electric distribution system at Ft. Ethan Allen, Vermont, \$19,285.
 Corson & Gruman Co., Washington, surfacing runways at Bolling field, Washington, \$76,300.
 Currie, Thomas E., Co., Detroit, apron and runway paving at Selfridge field, Michigan, \$80,000.
 Daley, William E., Burlington, Vt., water and sewer lines at Ft. Ethan Allen, Vermont, \$79,539.67.
 Delta Electric Co., Marion, Ind., 4852 electric lanterns, \$8685.08.
 Di Sandro Bros., Providence, R. I., photographic laboratory building at Bolling field, Washington, \$94,744.
 Downy Co., Boston, plumbing and heating at Forts Standish and Warren, Massachusetts, \$13,315.

(Please turn to Page 110)

FINANCIAL

REPUBLIC STEEL DECLARES DIVIDEND ON COMMON

■ **REPUBLIC STEEL CORP.** last week declared a dividend of 40 cents a share on its common stock, the first since 1930. With this dividend and dividends on the 6 per cent cumulative convertible prior preference stock, Series A, and on the 6 per cent cumulative convertible preferred stock, payable Jan. 1, 1941, the corporation will have disbursed a total of \$6,897,375 in dividends for this year.

This total does not include the \$6,300,000 purchase fund for 6 per cent cumulative convertible preferred stock set aside recently. The corporation's earnings the first nine months totaled \$12,633,000, against \$3,898,650 a year ago.

Another Electric Furnace

Republic's directors have authorized the installation of another 50-ton electric furnace at its Canton, O., plant. This is in addition to four other units of the same size installed this year. No other major expansion in iron or steel making facilities is contemplated at present, according to T. M. Girdler, chairman. Commenting on the industry's continued heavy demand and production, Mr. Girdler at a press conference in New York last week reiterated his belief that steelmaking capacity is adequate to meet domestic and foreign requirements in coming months.

Republic is engaged in expansion programs at South Chicago, Ill., and Gary, Ind. At the 118th street and Burley avenue plant in South Chicago a \$100,000 addition will be built for storing wire. A plant, costing \$175,000, is being constructed at the Union Drawn Steel division in Gary. This unit will consist of warehousing and manufacturing facilities, including two furnaces which will be added for heat treating cold-drawn steel.

DIVIDENDS DECLARED

Great Northern Iron Ore Properties, St. Paul, \$1 on certificates of beneficial interest, payable Dec. 18 to record of Dec. 6. Payments in 1940 will total \$1.75 per certificate, compared with \$1.25 in 1939.

American Rolling Mill Co., Middletown, O., regular of \$1.125 per share on the company's 4.5 per cent cumulative convertible preferred stock, payable Jan. 15, 1941, to record of Dec. 16.

CUBAN-AMERICAN MANGANESE TO REDEEM PREFERRED STOCK

Directors of Cuban-American Manganese Corp., a subsidiary of Freeport Sulphur Co., New York,

last week voted to redeem the corporation's preferred stock Jan. 15, 1941, at par of \$2 per share plus accrued dividends of four cents per share. Dividend of 50 cents per share on common was also declared, the first payment on this issue since the company started developing Cuban manganese ores in 1932.

Langbourne M. Williams Jr., president, declared Cuban-American Manganese has repaid all loans made to it by Freeport Sulphur during the years of development. Holders of the corporation's preferred stock, he said, may convert their shares into common up to Jan. 5, 1941, at the rate of one common share for one preferred.

MEETINGS

EXHIBIT WILL SHOW LATE CHEMICAL DEVELOPMENTS

■ **INDUSTRIAL** Chemical Conference, Hotel Stevens, Chicago, Dec. 11-15, will feature a symposium on "Newer Developments in Chemistry and Chemical Engineering." An exposition based on this theme will occupy the hotel's exhibition hall.

HENDERSON AND BATT TO ADDRESS SCRAP INSTITUTE

A forum on national defense activities is scheduled on the program for the annual convention of Institute of Scrap Iron & Steel Inc., Baltimore, Jan. 7-9. Leon Henderson and W. L. Batt, national defense advisory council, will speak.

TOOL ENGINEERS TO GO TO TORONTO IN 1941

For the first time in its history, the American Society of Tool Engi-

neers will go outside the United States for a convention. Toronto, Canada, has been selected for the semiannual meeting, October, 1941. The annual meeting, during the week of March 25, is scheduled for Detroit in conjunction with the 1941 Machine Tool and Progress exposition.

ELECTROCHEMISTS TO VISIT NELA PARK

One of the highlights of the seventy-ninth annual meeting of the Electrochemical Society Inc., Hotel Cleceland, April 16-19, will be a visit to Nela Park, headquarters of General Electric Co's. lamp department.

A. F. A. SELECTS NEW YORK

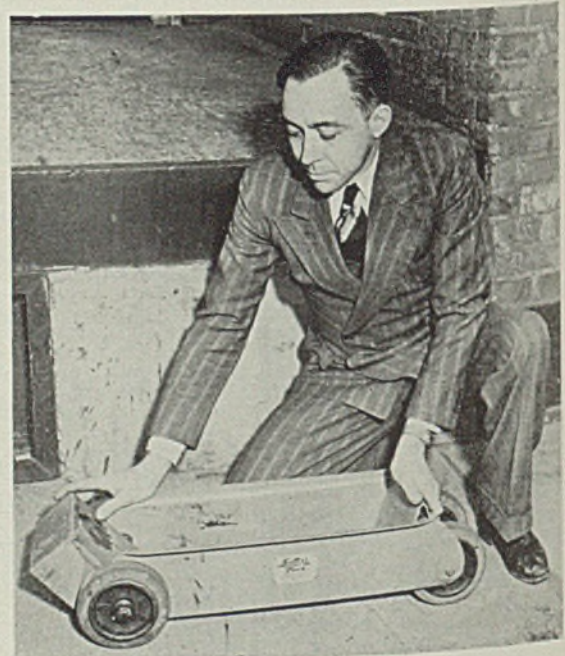
New York has been chosen by the board of directors, American Foundrymen's association for its 1941 convention, May 12-15, at the Pennsylvania hotel. This will be the first convention it has held in New York since 1905.

Convention Calendar

- Dec. 5-6—Society for Advancement of Management. Commemoration conference, Hotel Pennsylvania, New York. E. Buckley, 29 West 39th street, New York, is secretary.
- Jan. 6-10—Society of Automotive Engineers. Annual meeting, Book-Cadillac hotel, Detroit. John A. C. Warner, 29 West 39th street, New York, is secretary.
- Jan. 7-9—Institute of Scrap Iron & Steel, Inc. Annual meeting, Baltimore. E. C. Barringer, Salmon Tower building, 11 West 42nd street, New York, is secretary.
- Jan. 8.—American Washer & Ironer Manufacturers association. Annual meeting, Morrison hotel, Chicago. J. R. Bohnen, 80 East Jackson boulevard, Chicago, is secretary.
- Jan. 17-18—National Slag association. Annual meeting, Tutweller hotel, Birmingham, Ala. T. E. Shaefer, 644 Earle building, Washington, is secretary.

Flat Tire Truck Made of Steel

■ All-steel "flat tire truck" with solid rubber tires, designed by Erwin L. Sutter, Brookline, Mass., machinist, to eliminate danger of changing tires on crowded highways. Device is 30 inches long, 14 inches wide. Deflated tire is run up on the truck, permitting driving of the automobile to service station. Speeds up to 50 miles per hour without injury to car or tire are claimed. NEA photo



Steel Employment Rises To 568,000 in October

Nearly 568,000 employes were on steel payrolls during October, an increase of 3000 over September, according to the American Iron and Steel institute. In October last year, 545,000 were employed.

October payrolls totaled \$90,768,000, against \$82,068,000 in September, and \$83,421,000 in October, 1939. Average hourly earnings were 85.6 cents an hour in October, 85.4 in September and 84.6 in October, 1939. Wage earners worked an average of 39.4 hours a week, compared with 36.5 in September and 38 in October last year.

Appliance Sales in 1940 Establishing New Peaks

Sales of major household appliances this year are expected to surpass all previous records, with shipments to date exceeding aggregate for the period in past years. Estimates, in units, for 1940, against sales in 1939 and 1937, respectively, of the major appliances: Refrigerators, 2,800,000; 1,900,000; and 2,400,000; Ranges, 425,000; 335,000; and 405,000. Ironers, 150,000; 115,000; and 180,000. Washing machines, 1,500,000; 1,300,000; and 1,500,000.

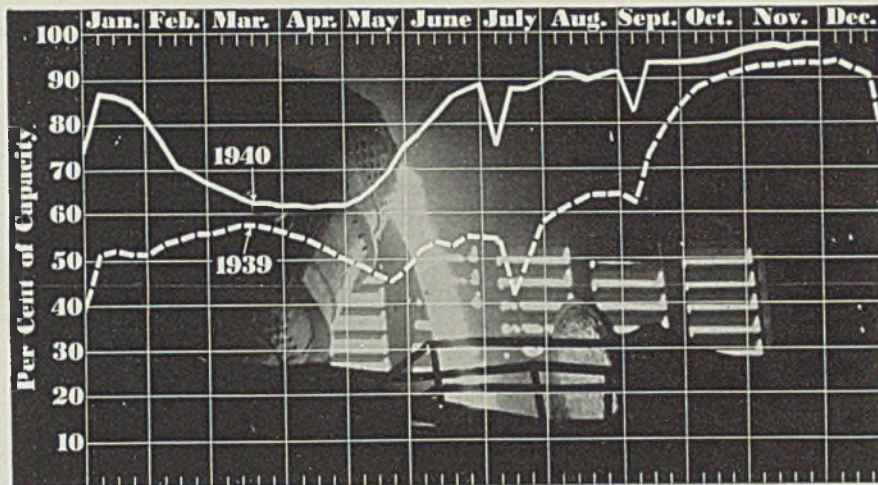
With even greater production planned for 1941, it is reported next year's models will be offered at prices below levels to which they were cut this year. This, it is said, will be necessary to sell the increased output.

Shipments of household washers in October totaled 168,527, according to the American Washer and Ironer Manufacturers association, Chicago. This was an increase of 18 per cent over shipments totaling 142,830 in October, 1939, and 9.5 per cent greater than in the best previous October, in 1936. Aggregate for the month was 13.1 per cent greater than in September, when shipments totaled 149,002 units.

Grant Wage Advance

Reeves Steel & Mfg. Co., Dover, O., has announced a 5-cent hourly increase in wages to about 1000 tonnage, hourly and piecework employes, effective Dec. 1. Adjustments to benefit all other workers also will be made, according to company officials.

Volume of revenue freight transported by motor truck in October increased 15 per cent over the preceding month and 16.4 per cent over October, 1939, according to figures of American Trucking associations. October was the peak month for 1940.



PRODUCTION... Steady

STEELWORKS operations last week held at 97 per cent of capacity. Small increases were made in five districts, declines in two and in the remaining five there was no change. A year ago the rate was 94 per cent; two years ago it was 61 per cent.

Youngstown, O.—Steel production was unchanged last week at 93 per cent, for the third week, 72 open hearths and three bessemer being in operation.

Pittsburgh—Steady at 97 per cent, virtual capacity, with schedule for this week at the same rate.

Wheeling—Regained loss of previous week, up 5 points to 93½ per cent.

Birmingham, Ala.—Rebounded 3 points to 100 per cent as Republic Steel Corp. returned its last furnace to production.

Cincinnati—Declined 6 points to 91½ per cent when two open hearths were taken off for repairs.

St. Louis—Unchanged at 87.5 per cent, 23 open hearths being active.

Detroit—Increase of 1 point to 97 per cent, with only one open hearth idle. Repairs may cause a recession this week.

Buffalo—Lighting of ninth open hearth by Republic Steel Corp. caused an increase of 2½ points to

95½ per cent. Two producers now are at capacity.

New England—Although various shifts were made in operating schedules the rate remained unchanged at 82 per cent.

Chicago—Repairs to furnaces lowered the rate ½-point to 99½ per cent.

Central eastern seaboard—Held at 94 per cent, the holiday having no effect on operations.

Cleveland—Addition of an open hearth by Republic Steel Corp. for the full week and one at mid-week by Otis Steel Co., caused a rise of 3 points to 89 per cent. Further rise is expected this week.

Pig Iron Exports Lower In October; Scrap Higher

Iron and steel scrap exports in October totaled 258,482 gross tons, valued at \$4,625,109, compared with 251,116 tons in September, valued at \$4,318,837. Japan took 147,708 tons, valued at \$2,643,430, compared with 148,332 tons in September, reflecting the effort to get material cleared before the embargo went into effect.

United Kingdom took 55,098 tons, valued at \$985,651, against 75,049 tons in September, probably the result of shortage of ships. Exports of scrap to Canada showed an increase to 44,205 tons, valued at \$806,652, from 22,298 tons in September.

Pig iron exports in October were 48,426 tons, valued at \$1,096,575, compared with 84,677 tons in September. Of this total the United Kingdom took 41,785 tons, valued at \$953,997, against 82,744 tons in September.

District Steel Rates

District	Percentage of Ingot Capacity Engaged In Leading Districts		1939	1938
	Week ended Nov. 30	Change		
Pittsburgh	97	None	94	47
Chicago	99.5	- 0.5	94	56.5
Eastern Pa.	94	None	88	37
Youngstown	93	None	92	65
Wheeling	98.5	+ 5	93	62
Cleveland	89	+ 3	90	72
Buffalo	95.5	+ 2.5	93	49
Birmingham	100	+ 3	94	75
New England	82	None	100	76
Cincinnati	91.5	- 6	80	75
St. Louis	87.5	None	81	51.5
Detroit	97	+ 1	93	84
Average	97	None	94	61

MEN of INDUSTRY

■ E. E. MOORE has been elected vice president, industrial relations, Carnegie-Illinois Steel Corp., Pittsburgh, succeeding D. A. Barrett, who retired Dec. 1 upon completion of 44 years of service with the corporation and predecessor companies.

Mr. Barrett has acted in a supervisory capacity since 1901. From 1904 to 1928 he was superintendent in plants in the Ohio valley and at Vandergrift, Pa., for American Sheet & Tin Plate Co. He became assistant to vice president in 1929, and vice president four years later. When American Sheet & Tin Plate became part of Carnegie-Illinois in 1936 he was elected vice president, industrial relations.

Mr. Moore has been associated with United States Steel Corp. subsidiaries 21 years. In 1932 he became assistant to vice president of Illinois Steel Co. and when that company became part of the present Carnegie-Illinois organization in 1935 he was appointed general superintendent of its South works. Three years later he became general superintendent, Gary works.

H. T. Lintott has been appointed manager of industrial relations, Columbia Steel Co., San Francisco. He succeeds E. M. Stephens, who, since 1939, has been on temporary assignment as manager of industrial relations, Columbia Steel Co., from United States Steel Corp. of Delaware, Pittsburgh. Mr. Lintott is succeeded as chief of the Torrance, Calif., plant by Otto A. Kresse.

George H. Houston, former president, Baldwin Locomotive Works, Philadelphia, has been named to head the newly formed General Machinery Ordnance Corp., Cincinnati, wholly owned subsidiary of General Machinery Corp.

John E. Shook, superintendent, Mercer Tube & Mfg. Co., Sharon, Pa., has been named vice president in charge of operations.

E. H. Mebs, the past ten years metallurgist, Ohio Steel Foundry Co., Lima, O., has resigned to join United States Steel Corp.

Clyde J. Boeringer has been appointed sales engineer, Ajax Electric Co. Inc., Philadelphia, with headquarters in Pittsburgh.

Gaylord G. Thompson, formerly supervisor of the application and control of carbide tools, Gisholt



E. E. Moore



D. A. Barrett

Machine Co., Madison, Wis., has been named tool engineer for McKenna Metals Co., Latrobe, Pa. He will engineer the installation and use of Kennametal hard car-



G. G. Thompson

bide tools and blanks in the north central district, and his headquarters will be Talcot building, Rockford, Ill.

Jay M. Reibel has been appointed advertising manager, American Car & Foundry Co., New York, and its subsidiary and affiliated companies. He succeeds O. Edward Hyde.

R. A. Travisano, since 1933 assistant traffic manager, Worthington Pump & Machinery Corp., Harrison, N. J., has been promoted to traffic manager, succeeding the late H. T. Smith.

C. M. Sayre, engaged in production work with Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., over 18 years, has joined Enterprise Foundry Co., San Francisco, as production manager.

Arthur C. Hoyt has been elected president, R. S. McMannus Steel Construction Co. Inc., Buffalo. Others elected are Avery J. Pratt, former secretary and chief engineer, as vice president in charge of operations; Charles F. Duchscherer as contracting engineer and vice president in charge of sales, and Howard H. John, heretofore assistant secretary, as treasurer and secretary.

Joseph W. Yowell, the past five years associated with Pan-American Airways, a portion of which time was spent at the Pacific division at Alameda, Calif., and also in the Atlantic division at LaGuardia field, has joined the instrument division of Manning, Maxwell & Moore Inc., Bridgeport, Conn.

A. C. Brown, first vice president, Cleveland-Cliffs Iron Co., Cleveland, will assume general supervision of sales of iron ore and coal. This will not alter the status of H. A. Raymond and A. D. Carlton as managers of sales of iron ore and coal. Max H. Barber, formerly superintendent, Mesabi range, and recently elected a vice president, will take the position vacated by Mr. Brown Jan. 1. Walter A. Sterling will succeed Mr. Barber, while Henry C. Bolthouse will become superintendent of Holman-Cliffs, in addition to Hill-Trumbull mine. George E. Tucker has been named acting superintendent of Camisteo mine.

M. J. Sullivan, formerly vice presi-

dent in charge of the Pacific district, American Can Co., has been made executive vice president. Mr. Sulli-



M. J. Sullivan

van's headquarters will be at the general offices, 230 Park avenue, New York.

Scrap Chapters Elect

Officers elected recently by various chapters of the Institute of Scrap Iron and Steel Inc., were announced last week as follows:

Pittsburgh: E. L. Solomon, Max Solomon Co., president; D. L. Wilkoff, D. L. Wilkoff Co., vice president; Herman Caplan, M. W. Slinger & Co., treasurer; H. F. Stocker, H. F. Stocker & Co., secretary. Directors: Abe Cohen, Amos Bowman, Hugh Ruffner, L. W. Landay, Robert Amper, Harry Cohen, H. N. Trimble, William McNamee, William Behm.

Chicago: William Pohn, Pohn Iron & Metal Co., re-elected president. All other officers and directors have also been re-elected. H. S. Lewis, Price Iron & Steel Co., continues as first vice president; Frank Grossman, Grossman Bros. Co., Milwaukee, second vice president; Frank Parker, Iron & Steel Products Inc., third vice president; Henry Rosenthal, Briggs & Turlvas, Blue Island, Ill., treasurer; and Ralph Michaels, Hyman-Michaels Co., secretary.

Boston: President, David Feinburg, David Feinburg Co., Medford, Mass.; first vice president, David Borowsky, care of Jacob Borowsky, Fitchburg, Mass.; second vice president, Joseph Cohen, General Scrap Iron Inc., Phillipsdale, R. I.; treasurer, Ernst Hollander, Ernst Hol-

lander Iron & Metal Corp., Chelsea; secretary, William G. Mitchell, William G. Mitchell Co., Marblehead, Mass.

Capital District: President, Charles Buff, Buff Companies Inc., Schenectady, N. Y.; vice president, Milton Symansky, Symansky Bros., Troy, N. Y.; secretary, Larry Weltman, Symansky Bros.; treasurer, Anthony Santora, Trojan Scrap Iron Corp., Troy.

Died:

HERBERT A. BAKER, 59, since 1936 president of American Can Co., New York, in that city, Nov. 25. He had been associated with American Can since graduation from University of Toronto in 1906. He also was a director, Metal & Thermit Corp., a member of American Chemical society, National Canners' association, and Scientific Research commission.

Llewellyn B. Lesh, 43, general sales manager, Crown Steel Sales Co. Inc., steel warehouse, Chicago, Nov. 18, in Chicago.

W. Riley Workman, sales engineer in the Dallas, Tex., office of Pittsburgh-Des Moines Steel Co., Pittsburgh, in Dallas, Nov. 12.

Harold H. Rubert, 54, who retired four years ago after serving 15 years as treasurer of Advance Stamping Co., Detroit, Nov. 21, in that city.

Newton W. Thomas, 79, superintendent, Browning Crane & Shovel Co., Cleveland, before his retirement in 1932, Nov. 26, at his home in Cleveland Heights, O.

Brig. Gen. W. R. Dunlap, 55, Nov. 23, in Pittsburgh. He was commander of the fifty-third field artillery brigade, Pennsylvania national guard, and was employed by Carnegie-Illinois Steel Corp. on public relations work.

Frank B. Hamerly, 53, vice president in charge of production, Aurora, Ill., plant of Chicago Pneumatic Tool Co., Nov. 27, of a heart attack while inspecting the company's plant in Los Angeles.

William Goudy, one of the founders and president and general manager, National Roll & Foundry Co., Avonmore, Pa., Nov. 28. Born in Jeffersonville, Ind., March 19, 1873, he was a machinist for many years, after which he became master mechanic, Cincinnati Rolling Mill Co. and foreman, Canton Roll & Machine Co. He organized American Roll & Foundry Co. in 1903, and National Roll & Foundry in 1909, becoming superintendent and treasurer. He was named president in 1917.

Depict Virtues, Faults of Salesmen, Purchasing Agents



Chicago industrial purchasing agents and salesmen are rehearsing a four-act play entitled, "The Purchasing-Sales Function," to be presented at the Hotel Sherman, Dec. 12, under the auspices of the Purchasing Agents Association of Chicago. The play was written by Prof. Alvin C. Busse, New York university, and depicts the virtues and faults of both purchasing agents and salesmen, is interspersed with plenty of comedy. The presentation will be preceded by a dinner at which H. L. Brueg-

gemann, of the Acme Steel Co., and president of the purchasing agents association, will preside.

Part of the cast is shown above, left to right: Walter Armstrong, American Bank & Trust Co.; Ernest Dahl, Tallman, Robbins & Co.; Jack Laing, Remington-Rand Inc.; V. K. Church, Horder's Inc.; Helen Carney; George Stack, International Tag & Salesbook Co.; Earl Cornelius, L. C. Smith & Corona Typewriters Inc.; and Director Charles C. Urquhart, National Broadcast- ing Co.

Windows of WASHINGTON



By L. M. LAMM

Washington Editor, STEEL

Iron and Steel Exports Control Will Be Tightened.

White House Studies Ways To Prevent Strikes.

War Resources Administration Proposed by Senator Taft.

Machine Tools To Be Subject To Export Licenses.

WASHINGTON
■ EXPORT licensing order which would prohibit, except under license, the exportation of many iron and steel products is being prepared by the government. When and if this order actually will be promulgated is not known.

Purpose of the order will be to prohibit exports of iron and steel items to Japan; it will be similar to the proclamation issued in connection with scrap exports.

Conference on the strike situation was held at the White House last week by President Roosevelt, Secretary of the Navy Knox, Secretary of War Stimson, Attorney General Jackson and Sidney Hillman, labor member of the national defense commission.

Following the White House conference the President told newsmen that the objective is to keep defense plants running and to prevent them from being damaged by sabotage.

In other quarters it was learned that a definite program of action is being prepared and will be announced soon.

EXTEND CONTROL OVER MACHINE TOOL EXPORTS

Effective Dec. 11 certain additional machine tools will be subject to export licenses. Statement of the division of controls of the state department is as follows:

"Pursuant to the authority vested in the President by the provisions of section 6 of the act of congress approved July 2, 1940, entitled "An act to expedite the strengthening of the national defense," and the President's procla-

mation of the same date, and the regulations issued pursuant thereto, the administrator of export control has determined that, in addition to those types of machine tools for metalworking which now require a license for their exportation, the following types of tools shall also require a license for export on and after the eleventh day of December, 1940:

"All used or rebuilt machine tools of any description; pipe-threading machines; metal-cutting band saws; power-driven hack-saws; keyseating machines; disk grinding machines; car wheel and locomotive wheel presses; burring machines—gear; burnishing machines—gear; planers—crank; bench power presses; saw sharpening machines; filing machines; pipe bending machines; thread chaser grinders; burnishing machines; tool and cutter grinders, universal and plain—hand feed; riveting machines; grinding machines—portable with flexible shaft; centering machines grinders—face milling cutter; arbor presses—hand, air and hydraulic; grinding machines—drill; grinding machines—tap; grinding machines—hob; nibbling machines; grinders—lathe tool; gear lapping machines; gear shaving machines; polishing machines; heat treating furnaces; foundry machines; twist and other drills; reamers; milling cutters; hobs; taps; dies; die heads and shear knives.

"Any of the aforesaid tools may be exported without license if it shall have been laden on board the vessel on which it is to be exported prior to midnight ending the day of Dec. 10, 1940. Shipments to Canada

and Mexico by land conveyance shall have been cleared through a customs house prior to midnight ending the day Dec. 10, 1940, in order to be exported without license."

Senator Taft, Ohio, has introduced a bill to create a war resources administration to co-ordinate all industrial and procurement phases of the defense program under a single administrator.

His bill follows the industrial mobilization plan of 1939, which has never been put into effect.

"This plan," said Senator Taft, "has been developed over a period of years by the country's best military and industrial experts. The work of planning our industrial defense began under the national defense act of 1920. It is based upon field surveys of thousands of manufacturing plants and on consultation with the executives of every strategic industry.

"The American plan has been copied in many respects by the German government in building its war machine. It is thoroughly up to date. It was revised last year and approved by the army and navy. Patriotic groups such as the American Legion, with the interests of national defense at heart, are fully in accord with the principles which the experts have set as best calculated to gear in the full power of America's production and distribution system into our defense effort.

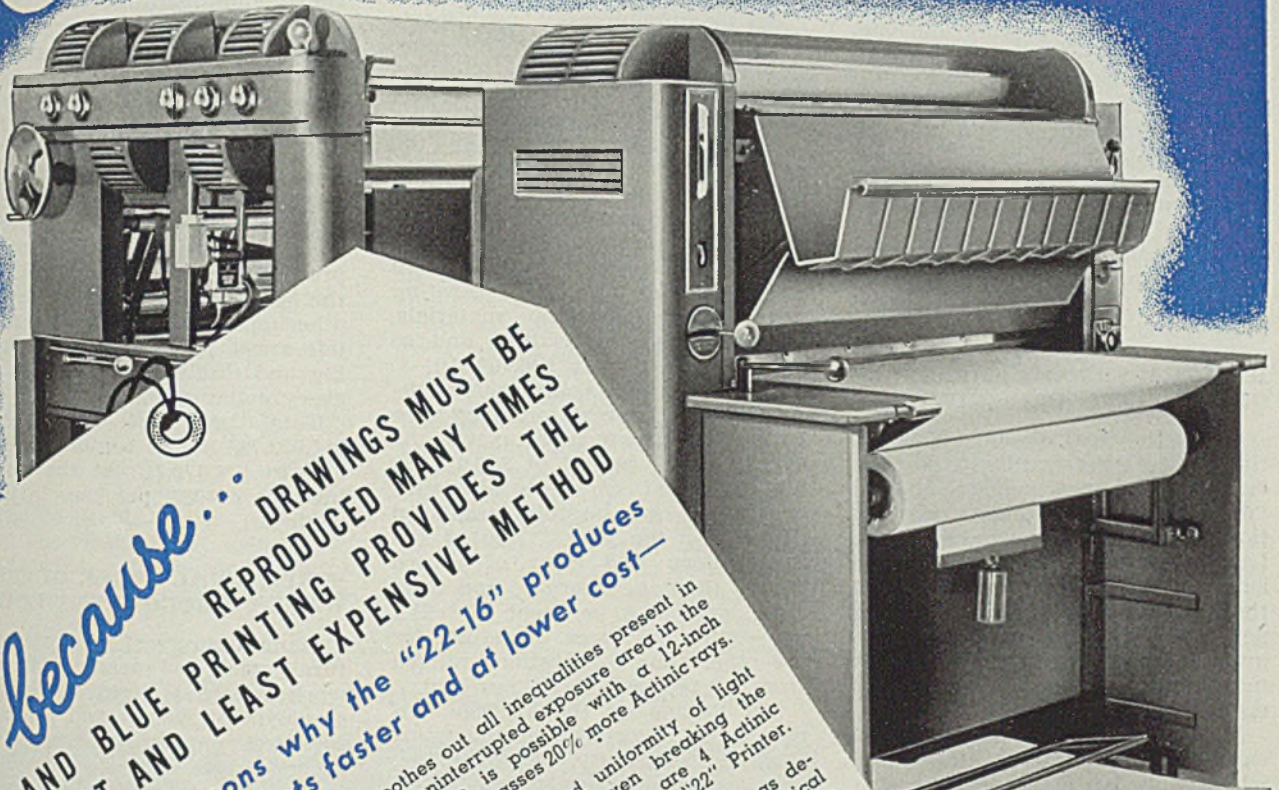
"We now have a national defense advisory commission made up of seven able men without a chairman. This body, however, is purely advisory and it is not perfectly clear whom the members are supposed to advise. Apparently each member reports to the President directly. So in effect we have seven new bureaus to co-ordinate existing bureaus and only the President has the power to co-ordinate the co-ordinators."

STEEL LEADS IN DEFENSE CONSTRUCTION MATERIALS

Steel and lumber lead the list of materials costing \$1,000,000,000 which will be needed to carry out

Cost

OF NATIONAL DEFENSE IS LESSENER BY BLUEPRINTS



because... DRAWINGS MUST BE
AND BLUE PRINTING REPRODUCED MANY TIMES
BEST AND LEAST EXPENSIVE METHOD
Some Reasons why the "22-16" produces
better blueprints faster and at lower cost—

- ✓ **SLIDING CONTACT**—smoothes out all inequalities present in all tracings—24 3/4 inches of uninterrupted exposure area in the Model "22" Printer—more than is possible with a 12-inch cylinder. Polished Trans-Peco glass passes 20% more Actinic rays.
- ✓ **ACTINIC ARC LAMPS**—give unequalled uniformity of light emission—burn for 45 minutes without even breaking the arc and then resume instantaneously—There are 4 Actinic Arc Lamps in the 42" and 5 in the 54" Model "22" Printer.
- ✓ **THREE SPEED LAMP CONTROL**—10, 15 or 20 amperes as desired, avoiding frequent dryer heat changes—the mechanical operating speed remains the same, and the lamp amperage varies according to the tracing being reproduced.
- ✓ **HORIZONTAL WATER WASH**—floats the exposed paper horizontally without tension thus averting wrinkles—bleeding practically eliminated. Tanks are rust resistant copper.
- ✓ **QUICK CHANGE CHEMICAL APPLICATOR SYSTEM**—from Blueprints to negatives in thirty seconds and vice versa—the only method of applying polish to one side and hypo to both sides of the paper. Very economical.
- ✓ **8" ALUMINUM DRYING DRUMS**—Either Gas or Electrically Heated. 5 in the Model "16" Washer and Dryer—gradual drying automatically without distortion—flat as hung wallpaper.
- ✓ **SPEED, QUALITY AND LOW COST**—Blueprints at 15 feet per minute with the Model "22-16"—uniform, contrasty prints with clean-cut, sharp lines—exceptionally low cost per square foot.

**PEASE
MODEL
"22-16"**

OK.

Chief Engineer

**U. S. A.
INDUSTRIAL
PLANTS**

THE C. F. PEASE COMPANY
2688 West Irving Park Road • • • Chicago, Illinois

the government's share of the construction needed under the national defense program, according to the national defense advisory commission in an analysis of the materials necessary for \$2,000,000,000 of contemplated government construction.

Materials to be used and the amount to be spent are as follows: Steel, principally structural shapes, \$240,000,000; lumber, \$140,000,000; cement, brick and hollow tile, \$175,000,000; sand, gravel and crushed stone, \$80,000,000; heating and ventilating materials, \$80,000,000; plumbing, \$65,000,000; electrical wiring and fixtures, \$40,000,000; electrical machinery and apparatus, \$15,000,000; marble, granite slate and other stone, \$18,000,000; wall plaster, wall board and insulating board, \$20,000,000; roofing, \$17,000,000; nonferrous metals, \$7,000,000; terrazo, \$6,000,000; paints and varnishes, \$7,000,000; unclassified, \$125,000,000.

DYKSTRA ADVISES EMPLOYERS ON TRAINING DEFERMENTS

C. A. Dykstra, director of selective service, has cautioned employers and employes not to become "unduly anxious" about occupational deferment of workers from training under the selective service act. "For the greatest interest of the nation," he says, production of necessary materials will be given preference over manpower requirements as the armed forces are increased.

Mr. Dykstra emphasized that occupational deferments, each of which will be determined on an individual basis, rest with the local boards and not with the national headquarters of the selective service system. While the national headquarters is interested in keeping key men at their jobs it cannot interfere with the local boards' jurisdiction.

He suggested that all requests for occupational deferments of registrants employed in key jobs be postponed until such registrants have received questionnaires. Each employer will have five days after the questionnaire is mailed in which to file a deferment request.

State advisors on occupational deferments have been appointed and are located in state headquarters of the selective service system. The state advisors will act as a clearing house for information on occupational deferments within the state and will maintain constant contact with industry.

Mr. Dykstra suggested employers list all registrants employed who do not have dependents and who cannot be immediately replaced if called for training. For these employes, a concise statement on the type of work, skill and estimated time required to make a replace-

ment should be prepared and should accompany a deferment request.

FTC REPORTS ON STEEL CASTINGS MANUFACTURERS

Federal trade commission last week made public its report on steel casting manufacturing corporations in connection with its project for the collection of annual financial reports for groups of industries.

Six manufacturers, whose reports are combined, represent the more important concerns in the industry. Statements combined in the report cover the calendar year 1939.

Total net sales for 1939 by the six corporations amounted to \$53,089,769. Of this total, 98.3 per cent represented domestic sales and 1.7 per cent represented foreign sales. Costs and expenses applying to goods sold, or the total operating outgo (including raw materials, wages, taxes, depreciation, and so forth) in 1939, were \$46,163,610.

Combined net income before deduction of interest on long-term borrowings and income taxes on the average total capital of \$96,917,723 was \$7,150,417, or a rate of return of 7.4 per cent on total employed capital for the year. Two of the corporations had rates of return higher than the average, and their rates were 14.8 per cent and 21.1 per cent. The rates of return for the other four corporations ranged from 3.9 per cent to 6.4 per cent.

Net income on the average corporate net worth investment, or stockholders' equity, of \$76,313,982, before provision for income taxes, was \$5,961,539, which was 7.8 per cent of the stockholders' investment. The rates for individual corporations ranged from 1.4 per cent to 21.1 per cent. The net income on the average corporate net worth investment, or stockholders' equity, after provision for income taxes, was \$4,523,333; and this was 5.9 per cent of the stockholders' investment. The range in rates was from 1.4 per cent to 14.7 per cent.

Stockholders Get 2.3 Per Cent

Combined cash dividends paid or accrued by the six corporations amounted to \$198,579 on the preferred shares and \$1,564,370 on the common shares. These cash dividends represented a return of approximately 2.3 per cent to the stockholders on the average ledger value (not market value) of their equity of \$76,313,982.

Operating ratios for the corporations show that the cost of goods sold by the six manufacturers (exclusive of taxes, research and development, selling and administrative expenses, and so forth) represented 74.3 per cent of the total sales. Of the total cost of goods sold, raw materials represented 23.5

per cent of the sales; production wages and salaries, 31.8 per cent; other costs and expenses (not listed under "expenses"), 11.5 per cent; depreciation and obsolescence applying to plant facilities, 6.5 per cent; and finished goods purchased for resale, 1 per cent. The gross margin was 25.7 per cent of sales.

Of the total expenses, selling expenses represented 4.5 per cent of total sales; advertising, 0.1 per cent; administrative and general office expenses, 3.9 per cent; all taxes (except income taxes and social security payments), 1.8 per cent; all social security and pension fund payments, 1.8 per cent (ratio here is to sales dollar and not payrolls); and research and development expense, 0.6 per cent.

After deduction of the items listed as expenses, together with the provision for bad accounts, from the gross margin on sales plus other operating income, there was left a net profit from manufacturing and trading of 13.1 cents from every dollar of sales.

Total inventories amounted to \$11,922,725 at the beginning of 1939 and to \$16,470,210 at the end, an increase of 38.1 per cent in the inventories.

STRUCTURAL STEEL OUTPUT, WAGES, EMPLOYMENT LOWER

Manufacturers of fabricated structural steel and ornamental metal work reported slight decreases in employment, wages and production for 1939, as compared with 1937, according to preliminary figures compiled from returns of the census of manufactures for 1939.

Wage earners primarily engaged in manufacturing in this industry in 1939 were 35,527, a decrease of 8.5 per cent, compared with 38,814 reported for 1937, and their wages, \$47,632,801, were less than the 1937 figure, \$53,898,058, by 11.6 per cent. These decreases may be partially accounted for by the fact that the 1939 census of manufactures questionnaire, for the first time, called for personnel employed in distribution, construction (additions or major repairs to own plant and equipment), separately from the manufacturing employes of the plants. It is not known how many of the wage earners reported for 1937 were engaged in distribution or in construction work at the plant and how many were engaged in manufacturing. Employes of the plants reported as engaged in distribution and construction activities in 1939 are not included in this preliminary report but will be included in the final report.

Value of products of the industry in 1939 amounted to \$284,604,808, a decrease of 2.8 per cent as compared with \$292,755,904 reported for 1937.

Emergency Lathes, Capable of Turning Shell a Minute, Described

■ FIFTEEN hundred men can "throw as much metal on a given target" in the present war as 20,000 were able to throw in the World war. This is possible only because the 1500 are provided with from \$2,000,000 to \$2,500,000 worth of highly developed and specialized mechanical equipment.

Thus did Tell Berna, general manager, National Machine Tool Builders' association, emphasize the tremendous degree of mechanization of modern warfare, in speaking at a meeting sponsored by the Cleveland Engineering society, Cleveland, Nov. 25.

Most of this equipment, said Mr. Berna, can be manufactured only with the finest machine tools. With "one way limits" of 0.0002-inch common on many essential parts, the same accuracy must be built into machine tools.

Mr. Berna said that about a year ago the association was commissioned, on behalf of the army, to work out designs for simplified, single-purpose lathes for high-production shell turning. Primary re-

quirements were: Low cost; quantity manufacture in shops outside the machine tool industry; appearance to be given little or no consideration; operation by unskilled labor.

Myron S. Curtis, for many years vice president and chief engineer, Potter & Johnston Machine Co., Pawtucket, R. I., has had charge of the design project, as machine tool consultant for the association. With the co-operation of the whole industry, the designs were pushed ahead rapidly and machine and tooling drawings made. Pilot models, built by two companies previously unfamiliar with machine tool making, now are in successful operation.

Mr. Curtis described the lathes, their tooling and operation detail.

Basic feature, which does away with all machining on the frame of the machine except minor drilling and tapping operations, is the application of low melting point "expanding metal" to lock finished bushings in place in cored holes in the casting. These bushings, which carry the spindle, tailstock, tool guiding and operating rods are held exactly

in position in the cored holes which are sealed with clay collars while the fused expanding metal is poured around them through ducts in the casting. This eliminates all planning and horizontal boring operations.

Multiple tools, carried on rugged swinging and sliding cam-operated, bar-supported arms, are employed. Chucks, expanding arbors and tailstocks are actuated hydraulically, and drive and control is electrical, the cycle of operations being carried out automatically through a simple and ingenious system of cam-actuated limit switches. The capability of these machines on the specific jobs for which they have been designed is indicated by the fact that their carbide tools will take cuts at the rate of 240 surface feet per minute at 0.020-inch feed, making possible the machining of a shell a minute in some cases.

Tool Engineers' Society Organizes 19 Regions

■ With formation of several new chapters and addition of over 1000 new members in the past six months, the American Society of Tool Engineers has been organized into regions to facilitate administration.

Each region will consist of two chapters, with 19 regions for the current 38 chapters of the technical society. Directors hereafter will be elected from regions instead of chapters, reducing the total number of directors.

To assist the nation's industries in training apprentice mechanics, chapters are organizing local educational committees to co-operate with manufacturing plants, trade schools, etc., in their area in co-ordinating efforts.

How Shell Forging Could Be Expedited

■ Lack of shell forging equipment and operators apparently is a "bottleneck" in the defense program, according to P. C. Pocock, vice president, Hydraulic Press Mfg. Co., Mt. Gilead, O., interviewed at the recent opening of the company's new plant, devoted exclusively to manufacturing large hydraulic presses. Two large units are being built for new shell forging establishments near Birmingham, Ala. For illustrated description of the new plant see page 46.

If the educational orders now standing would be followed immediately by actual contracts for production work, Mr. Pocock believes, the shell forging problem would be solved within six months. This, he said, is most important for success of the defense program—assurance to manufacturers that equipment will not be idle when available for production.

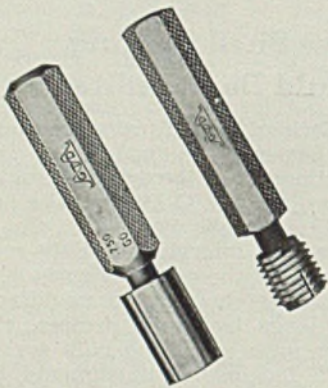
Skeleton of Giant Waterwheel Generator



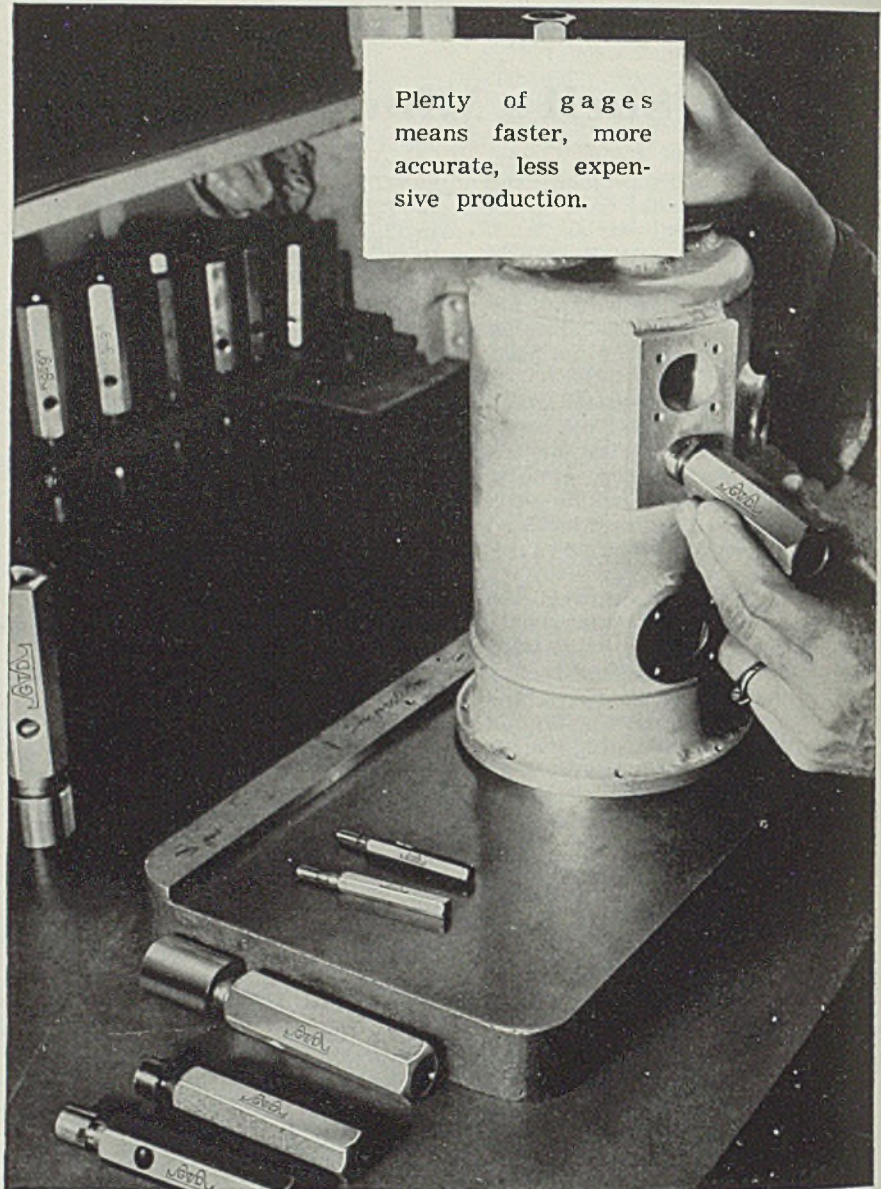
■ Stator frame of first of three giant waterwheel generators being built by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., dwarfs workmen. First of about 150,000 steel laminations that will completely line the steel shell are being inserted. The three generators, for the Grand Coulee dam, will produce 30 per cent more electricity than any existing machine in United States. Almost 300 miles of copper wire, 2250 tons of steel will be used in the three units. Combined output will total 324,000,000 watts, enough to supply illumination sufficient for New York city and Chicago combined

Gyro Pilots

CHECKED WITH
GTD GREENFIELD
GAGES



The "G.T.D. Greenfield" line of gages include plain and threaded, plug and ring gages; plain and thread limit-snap gages, and a large number of special types. All can be furnished with "Greenfield's" exclusive "Rex" Finish for extra long life, if required.



Gyro pilots are extremely intricate and every part must be manufactured with unusual care and precision.

In this picture of the oil sump assembly can be seen 14 different "GTD Greenfield" Gages—reasons why this part will be *right*.

A long-time record for accurate manufacture, the develop-

ment of special methods for giving gages long life (such as our "Rex" surface treatment) and our experienced gage engineering service make "GTD Greenfield" Gages especially interesting to any manufacturer who wants to make the most profitable use of his gage investment. A study of your needs will be made without obligation.

GREENFIELD TAP & DIE CORPORATION, Greenfield, Mass.

Detroit Plant: 2102 West Fort St. Warehouses in New York, Chicago, Los Angeles and San Francisco. In Canada: Greenfield Tap & Die Corp. of Canada, Ltd., Galt, Ont.



TAPS • DIES • GAGES • TWIST DRILLS • REAMERS • SCREW PLATES • PIPE TOOLS

Mirrors of MOTORDOM



By A. H. ALLEN
Detroit Editor, STEEL

Motor Industry To Make Wide Variety of Defense Items.

Winter's First Storms Hamper Automobile Shipments.

Sales of 8-Cylinder Pontiacs Far Ahead of 1940.

Pacific Coast Demand Stimulated by Arms Program.

DETROIT

■ ACCORDING to advices received here, one of the liveliest topics for discussion among industrial and business tycoons outside Detroit who relish chawing over the latest "inside news" of the motor industry is the outlook for 1942 models. Some of the wildest imaginable reports are being circulated as authentic "dope" on what the motor makers are planning for 1942, so far from the facts that they do not even bear repetition.

Many of these stories—and they are not even good stories—no doubt originate in the minds of car dealers who see them as choice missiles to blitzkrieg their competition. When details get back to headquarters here, officials go into a slow burn with every evidence of imminent explosion.

Take this as authentic: There will be 1942 models—plenty of them. Outside of Graham and Hupmobile, there is no prospect of any model being discontinued. Changes in designs may not be pronounced, but changes there will be, as long as the key to successful automobile sales continues to be the obsolescing of previous year's cars. Prices unquestionably will be higher, though this is looking a trifle too far ahead. Already, however, there are signs of the national economy starting to whirl up the inflationary spiral, and the only clamp will be some form of control over wages and material prices. How any type of control can erase the effect of the inevitable law of supply and demand is something else again.

When Company A urgently needs

500 skilled lathe hands, the tendency is to look to Company B which has 500 skilled lathe hands, wave a 20-cent hourly increase in wage rates, and wait for the exodus. No matter how stoutly Company A maintains this is not inflation but merely getting the men in face of dire necessity—inflation it certainly is.

What Auto Industry Will Make

How deep into the defense program has the motor industry ventured? At the moment it appears to the extent of perhaps two and a half billions of dollars—on order. It may prove of interest to list the various car builders and a few affiliated parts companies, together with what type of defense manufacturing they are now embarked upon, or are considering, question marks indicating the latter:

Chevrolet—Trucks, shell forgings.

Olds—Shell forgings.

Buick—Aircraft engines (?), also figuring on undisclosed items.

Cadillac—Crankshafts, camshafts, connecting rods, other elements of Allison aircraft engine.

Pontiac—No program as yet but figuring on undisclosed items.

Chrysler—Medium tanks, cartridge cases, bomb fuse noses, artillery mechanisms, shell forgings.

DeSoto—No program and not likely to figure except for assistance to Chrysler.

Plymouth—Same as DeSoto. (It should be noted that Chrysler has set up a special ordnance division which handles the bulk of the corporation's contracts for defense equipment, and calls on all divisions of the corporation for assistance as needed).

Dodge—Trucks, tank elements (?).

Material appearing in this department is fully protected by copyright, and its use in any form whatsoever without permission is prohibited.

Packard—Rolls-Royce engines, marine engines for navy torpedo boats.

Nash—No program as yet; once was discussing manufacture of revolvers.

Hudson—Aircraft fuselages (?), possibly in co-operation with Ford.

Ford—Pratt & Whitney double-row Wasp engines, Ford in-line aircraft engine (?).

Studebaker—No program as yet; studying possibilities of aircraft engine manufacture, also shell turning equipment.

Saginaw Steering Gear Div. of GM—Browning machine guns, .30 and .50 caliber splitting contract with AC Spark Plug, Frigidaire and Brown-Lipe divisions.

Yellow Truck & Coach Div. of GM—Trucks and special vehicles.

Briggs Mfg. Co.—Aircraft fuselage and wing subassemblies.

American Bantam Car Co.—Small-high-speed scout cars or "pygmy trucks."

Murray Corp. of America—Aircraft fuselage and wing subassemblies.

Autocar, Diamond T, Federal, Mack-International, White Motor, Marmon-Herrington and Reo—All are participating in truck contracts.

Willys—Shell forgings and ammunition parts.

Kelsey-Hayes Wheel Co.—Browning machine guns, .50 caliber.

Graham—Contract machining of aircraft engine parts.

In addition to the above a large number of other parts companies are now at work on various phases of armament aircraft and equipment programs. Shortly to be launched is the industry's aircraft parts program (see p. 30.)

First mentioned in these pages Aug. 26, the small scout car or "pygmy truck" which American Bantam now is building at Butler, Pa., was revealed by word from Washington last week as having load capacity of 500 pounds, standing 40 inches high and carrying a crew of three with machine gun or antitank gun. They will have four-wheel drives and will be powered by motors supplied by Ford and Continental Motors. Budd Mfg. Co. will supply some of the bodies. Another large manufacturer shortly will be awarded contract for an additional number of these army terriers which will be known as "command reconnaissance 4-4's" and are designed to replace motorcycles and sidecars as high-speed scouting

units. Weighing less than 2000 pounds and costing about \$1000 each, a fleet of 3000 will be turned over to the army for maneuvers.

■ **FIRST** heavy snows of the season last week brought prospects of diminished rate of automobile assemblies resulting from icy roads which always hamper shipments of cars. Output still is strong, however, inconvenienced only by such occasions as the recent holiday and the decision of a group of men at a Fisher Body plant in Flint to go hunting for a day. Absence of 150 key men closed the plant and put 1000 out of work for the day. Stoppage of bodies forced the Chevrolet final assembly line to close, and 11,000 more were sent home. Thus 12,000 men lost their bucks for a day because a handful of their co-workers preferred to chase another kind of buck for a day.

Pontiac has released some interesting figures on buying trends so far this year. In the first place, the percentage of 8-cylinder cars has jumped far ahead of the 24.8 per cent proportion of 1940. Now, 35 per cent of new car buyers are taking eights, some dealers reporting nearly 50 per cent of their sales in this class.

Forty per cent of all sales are the new "streamliner" body, introduced this year by Buick-Olds-Pon-

Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

	1938	1939	1940
Jan.....	226,952	356,692	449,492
Feb.....	202,597	317,520	422,225
March....	238,447	389,495	440,232
April....	237,929	354,266	452,433
May.....	210,174	313,248	412,492
June....	189,402	324,253	362,566
July.....	150,450	218,494	246,171
Aug.....	96,946	103,343	89,865
Sept....	89,623	192,678	284,581
Oct.....	215,286	324,688	514,374
10 mos..	1,857,806	2,895,059	3,674,434
Nov.....	390,405	368,541	.....
Dec.....	406,960	469,120	.....

Year 2,655,171 3,732,608

Estimated by Ward's Reports

Week ended:	1940	1939†
Nov. 2	118,092	82,690
Nov. 9	120,948	86,200
Nov. 16	121,943	86,700
Nov. 23	102,340	72,520
Nov. 30	128,783	93,638

†Comparable week.

tiac-Cadillac, and of these 70 per cent are the new two-door sedan-coupes which replace last year's sport coupes. In five months of production 37.7 per cent has been sedan-coupes, comparing with 15.1 per cent sport coupes in 1940 models.

As for color preferences, D. U.

Bathrick, Pontiac sales manager, notes that 32 per cent of the 1941 output has been two-tone paint jobs, comparing with 10 per cent last year. In the solid colors, black still leads with 26 per cent, maroon second with 24 per cent, dark blue third with 14 per cent and gray next with 13 per cent. Most popular of the two-tone shades is the green combination.

Pontiac deliveries are continuing their record-breaking pace, for the second ten days of November totaling 9749, which is 33.7 per cent ahead of the same period last year. Used car sales for the period amounted to 13,003.

Business outlook in the Pacific states is the best it has been in ten years, in the opinion of W. F. Hufstader, Buick sales manager, after a junket through this area. He notes the defense program has been particularly stimulating to industrial areas of California, shipping centers of the Pacific northwest and the mining and agricultural regions of the mountain and coast states. New car sales are about 35 per cent ahead of last year over the entire area.

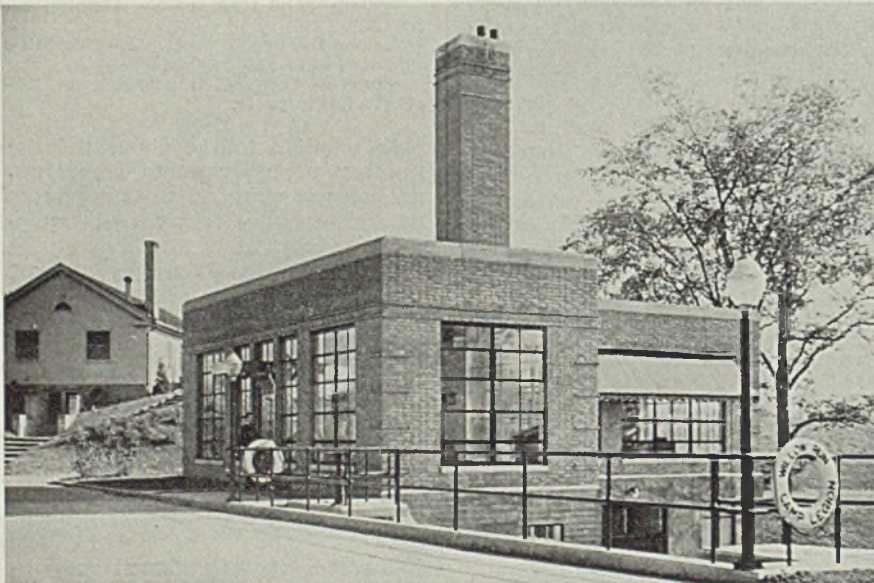
■ **LARGE** consumer of zinc die castings, the automotive industry is vigorously trying to anticipate its requirements through the balance of the model year and to get coverage on metal. However, the zinc situation is best described as tight, and suppliers of castings are not guaranteeing much beyond the first of the year.

Two reasons account for the reduction in zinc stocks and the possibility of price increases after the first of the year. One is the fact that the navy department is specifying electrolytic zinc in its brass and bronze requirements, materials which ordinarily can use a lower grade. Another is the exceptionally large volume of galvanized steel needed for new defense plants, new barracks and other government projects.

Result has been a stampede to cover on zinc. One buyer here, after being told that no prices could be quoted for delivery after the first of the year, instructed the supplier to quote present prices and to note the change which each 1/4-cent increase in zinc would have on the piece price.

General Motors Corp. has purchased the so-called Antioch casting process, developed at Antioch college, Yellow Springs, O., and will set up a department at the Delco-Remy plant in Anderson, Ind., to produce aluminum castings by the process, which involves the use of plaster of paris molds and is claimed to yield castings of superior finish and to close dimensional tolerances.

Newest Ford "Village Industry" Plant



■ Latest of the Ford village industries is this two-story Willow Run plant near Ypsilanti, Mich., where 35 will be employed making ignition and door locks for Ford cars. Powered by two 10-horsepower water wheels, the plant is complete with brass foundry, machinery and assembly benches. Originated as

an experiment in 1918 by Henry Ford, the village industry plan has shown such definite advantages that the Ford Motor Co. now has 17 in operation, with another scheduled for completion Jan. 1. More detailed information concerning the Willow Run plant was included in STEEL, Nov. 25, p. 37.



GEARS *for* DEFENSE

Let's get down to earth. Here are the facts:

**TO SPEED
PRODUCTION**

Gear Shaving **saves 4 months out of every 5*** required to finish gears by grinding.

**TO GET EQUIPMENT
FASTER and CHEAPER**

Gear Shaving **saves 5 dollars out of every 6*** required for equipment to finish gears by grinding. Less equipment—faster delivery.

TO REDUCE COSTS

Gear Shaving **saves 7 dollars out of every 8*** in tool cost per gear compared with grinding.

AND

Gears produced by shaving are **MORE ACCURATE**—readily proven by their greater quietness—than those produced by grinding on a production basis. (Excepting of course ground gears laboriously produced on a "tool room" basis impossible where production quantities are needed.)

*These claims are conservative. Actual experiences in industry show greater savings.

Our engineers are ready and anxious to help you speed defense gear production. Their experience in lowering gear costs, speeding gear production, improving gear accuracy and reducing gear failure for producers of automobiles, machine tools, tractors, electrical equipment, trucks, etc. is yours for the asking.

MICHIGAN TOOL COMPANY
7171 E. McNICHOLS ROAD - DETROIT

More gears are finished on Michigan equipment than on all others combined.

Let's eliminate this bottleneck, too today—

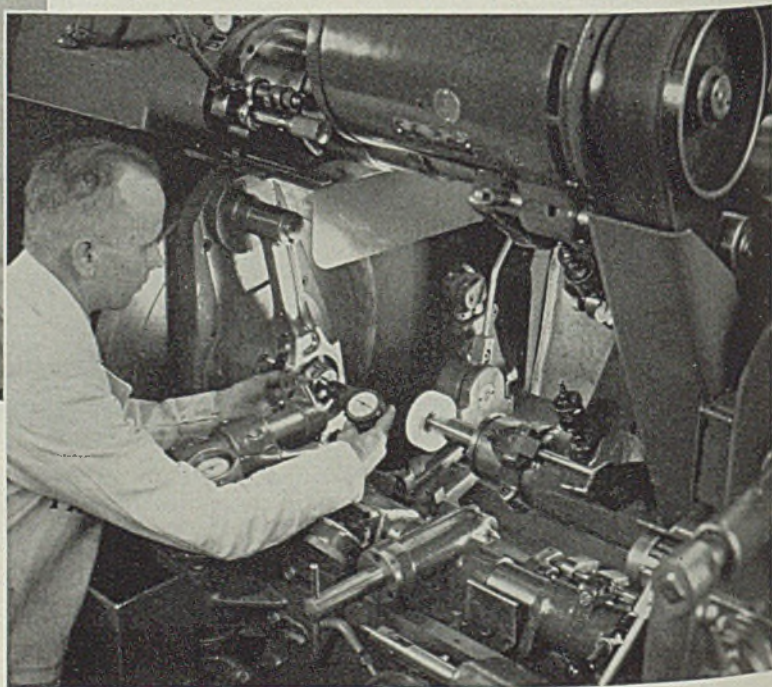
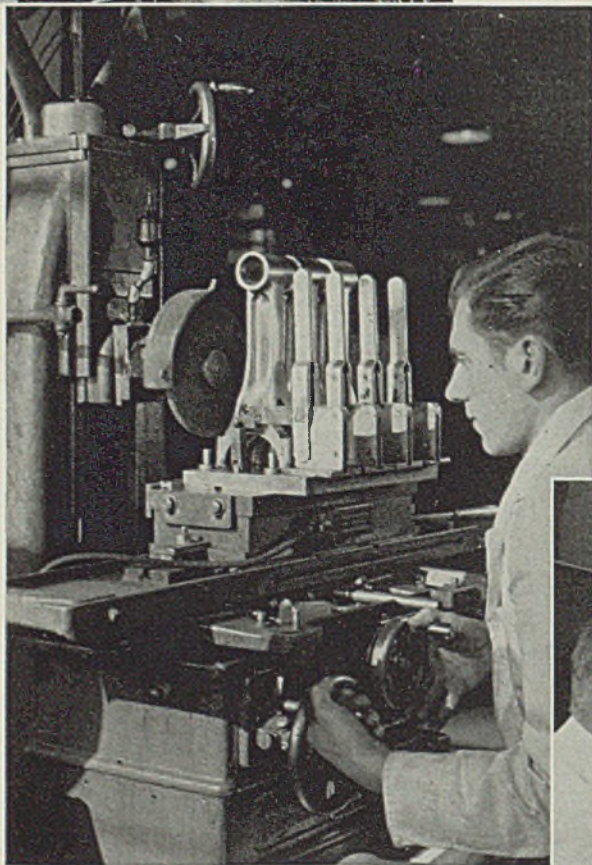
Precision Methods

■ High-speed operation of marine engines without vibration and undue wear demands precision methods in their manufacture which a few years ago would have taxed facilities of the best-equipped tool shops. This is illustrated by routine production and production-gaging work in Packard Motor Car Co.'s marine engine division. The division is now set up to produce three 1350-horsepower engines per day for navy torpedo boats, as outlined in *Mirrors of Motordom*, STEEL, Nov. 18.

Fig. 1—To insure exact uniformity of weight, as well as removal of all rough surfaces, connecting rods are machined all over. This view shows how they are contoured, three being machined at one time in a Keller machine in which the milling cutters are exactly controlled by electrical means from a "feeler" which follows a templet

Fig. 2—Bolt bosses of the connecting rods are finished to exact height and parallelism in a precision surface grinder fitted with quick-acting fixture which locates and holds them in groups of three

Fig. 3—In this Bryant chucking grinder fitted with special work-holding fixture, the big ends of the connecting rods with caps bolted in place are bore and face ground—including the inside faces of the fork. Operator is checking bore diameter by means of dial indicator mounted on the machine



in Armament Production Work

Fig. 4—To make sure that small and large holes are exactly parallel and exactly spaced, the assembled connecting rods are tested on a precision surface plate by means of a vernier height gage carrying a dial indicator



Fig. 5—Operations on the crank case on a radial drilling machine are expedited by an indexing fixture which holds the work firmly and at the same time permits it readily to be tilted and locked in place for drilling operations on the angular surfaces

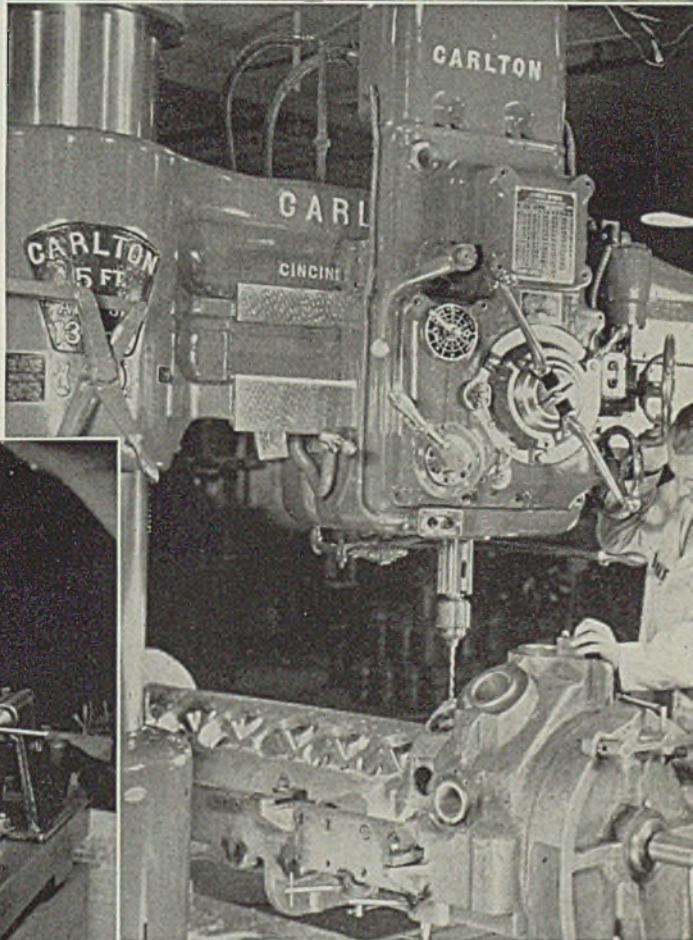
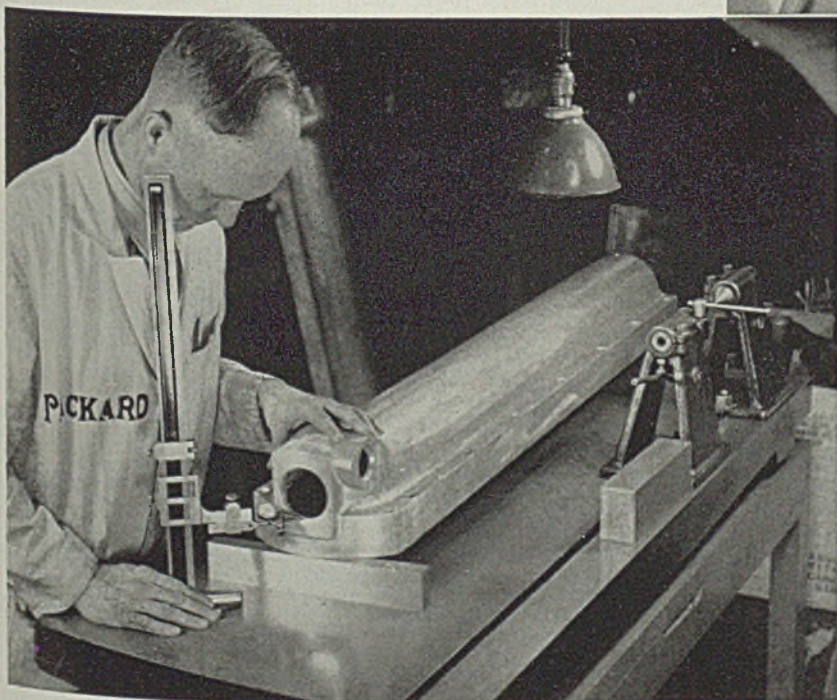


Fig. 6—Valve housing covers ordinarily are not thought of as precision parts, but on Packard marine engines they are. This is borne out by the bore test being made on this aluminum cover, by means of precision height gage working from a surface plate



Industry's Status Again Is Changing

■ A VISITOR at Washington these days does not have to penetrate very far below the surface to sense that an important shift in thinking has occurred in high places. This shift has to do with industrial expansion. As far as industry is concerned, government thinkers have tossed their former ideas about an economy of scarcity out of the window. They are now thinking in terms of an economy of plenty, of superabundance.

Already one hears certain manufacturers blamed for what is termed an over-cautious and timid attitude with respect to industrial expansion. Something is held to be radically wrong when machines and materials that are badly needed right now cannot be delivered in less than 20 weeks.

The thinking in some highly influential government circles, as is sensed by this writer, might be expressed somewhat as follows:

"These are golden months, full of opportunities for all manufacturers who have vision and initiative. Everything that can be produced today is wanted in greater volume. This is true not only with relation to defense but to all peace-time items. It is true particularly because defense expenditures increase the public purchasing power and make for increased consumption of all goods. There is no reason why we should not have everything we want—including both defense materiel and things which make for a higher scale of living. We have everything required for full production of all these things, including labor and materials.

"The government is encouraging private industry to provide the expansion necessary to permit our labor to convert our

materials into the desired products. It is allowing industry to make large profits. It is willing and eager to extend necessary financial assistance for expansion. It will see that the needed materials, parts, equipment and labor are made available. Under these circumstances there is no excuse for manufacturers to be backward about expansion. But such fears as harass some of them cannot be allowed to hold up progress in this country. If they do not build up the productive capacities that are necessary in various fields the government will do it."

In the eyes of Washington, manufacturers fall into two classes. One group includes those regarded as "co-operative." For this group there is entire friendship. Many instances are related at the capitol of favorable treatment that has been extended to such "co-operative" industrialists. For some the government almost jumps through a hoop. The other group includes industrialists regarded as "nonco-operative." Toward them there exists an attitude that conservatively may be described as a little more than merely critical.

Industry is greatly concerned about its status in, say, 1945. At the same time it must be concerned vitally with the fact that just now it is doing business in today's world. The rules, at least for the present, have been revised radically.

This changed attitude at Washington demands the closest attention on the part of every manufacturer. It presents serious problems which must be faced squarely.

EC Krentzberg

The BUSINESS TREND



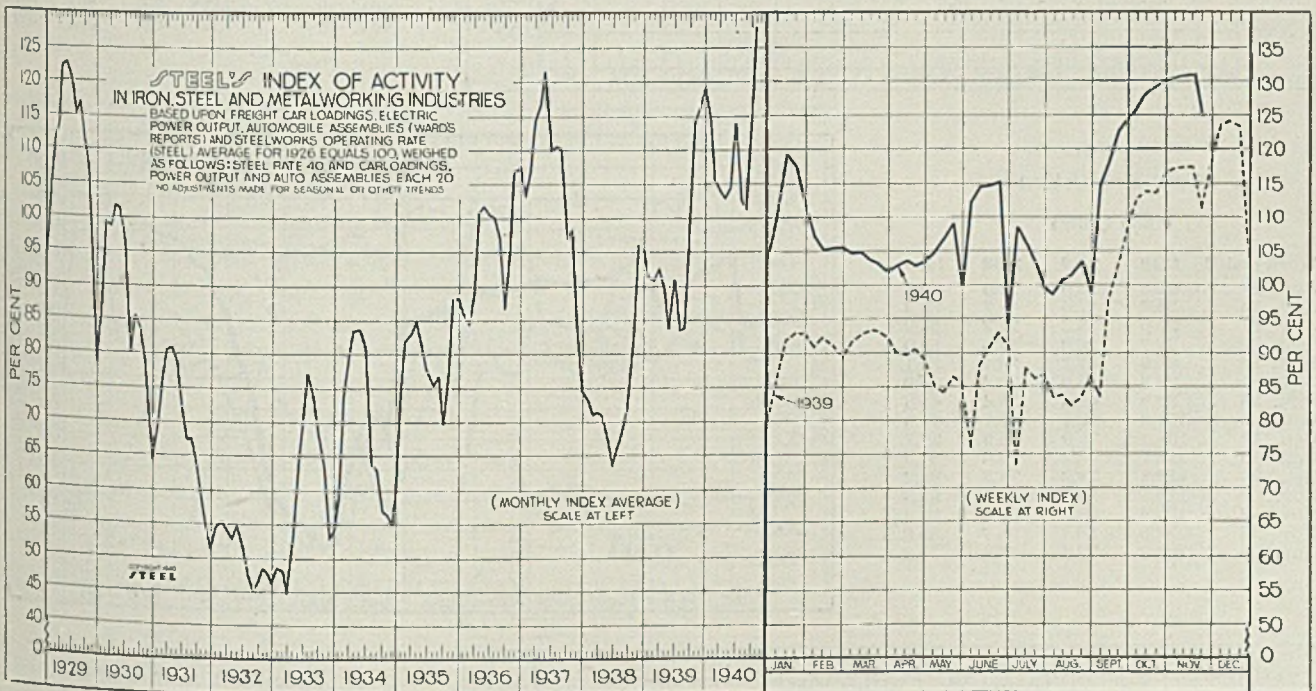
Activity Index Reflects Holiday Interruption

■ ENCOURAGING volume of new orders continues to sustain industrial activity at near-capacity levels. In some lines bookings exceed output, adding to large backlogs. This is especially true in steel, machine tool, aircraft and building material industries.

STEEL'S index of activity declined 5.6 points to 124.7 during the holiday week ended Nov. 23. In the comparable holiday periods of 1939, 1938 and 1937 the index declined 5.9, 6.5 and 12.2 respectively.

The national steel rate advanced 1 point to 97 per

cent average for the week ended Nov. 23. Actual production reached a new peak. Steel producers report November bookings were more than 20 per cent above those of October. Previously, October was the best month this year. While steel consumption has increased substantially in recent months, it is evident much of the new buying by miscellaneous consumers reflects the fear sources of supply might be limited later on because of the national defense and export demands.



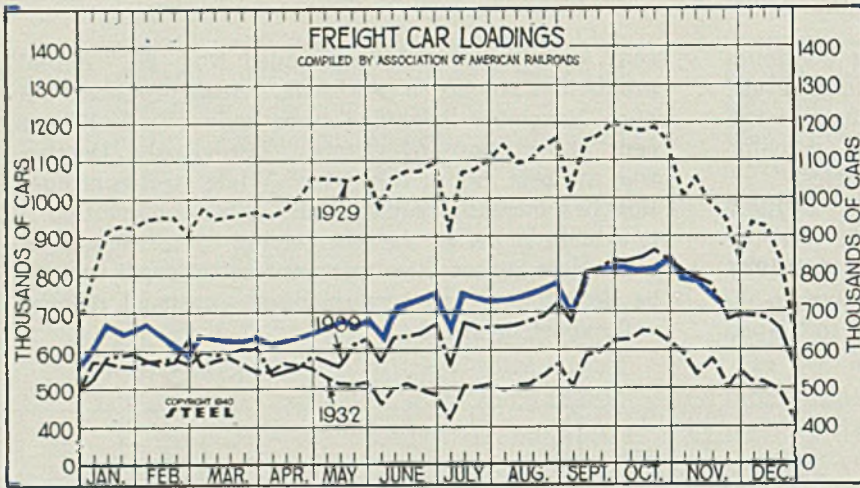
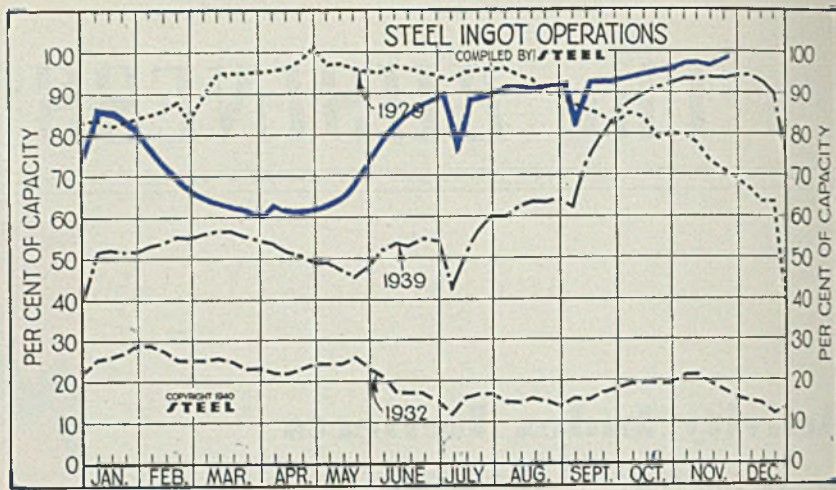
STEEL'S index of activity declined 5.6 points to 124.7 in the week ended Nov. 23:

Week Ended	1940	1939	Mo. Data	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Sept. 7	98.7	83.7	Jan.	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6	104.1
Sept. 14	114.9	97.5	Feb.	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2	111.2
Sept. 21	117.7	103.0	March	104.1	92.6	71.2	114.4	88.7	83.1	78.9	44.5	54.2	80.4	98.6	114.0
Sept. 28	122.8	107.9	April	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0	101.7	122.5
Oct. 5	124.4	112.5	May	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6	101.2	122.9
Oct. 12	126.0	113.9	June	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1	95.8	120.3
Oct. 19	128.3	113.6	July	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3	79.9	115.2
Oct. 26	129.9	116.2	Aug.	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4	85.4	116.9
Nov. 2	130.2	117.1	Sept.	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3	83.7	110.8
Nov. 9	130.3	117.2	Oct.	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2	78.8	107.1
Nov. 16	130.3	117.3	Nov.	.....	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4	71.0	92.2
Nov. 23	124.7	111.4	Dec.	.....	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3	64.3	78.3

Steel Ingot Operations

(Per Cent)

Week ended	1940	1939	1938	1937
Aug. 10	90.5	62.0	40.0	84.0
Aug. 17	90.0	63.5	41.5	81.0
Aug. 24	90.5	63.5	43.5	83.0
Aug. 31	91.5	64.0	44.5	83.0
Sept. 7	82.0	62.0	41.5	72.0
Sept. 14	93.0	74.0	46.0	80.0
Sept. 21	93.0	79.5	48.0	76.0
Sept. 28	93.0	84.0	47.0	74.0
Oct. 5	93.5	87.5	48.5	66.0
Oct. 12	94.5	89.5	51.5	63.0
Oct. 19	95.0	91.0	51.5	53.0
Oct. 26	95.5	92.0	54.5	51.0
Nov. 2	96.5	93.0	57.5	47.0
Nov. 9	96.5	93.0	61.5	39.0
Nov. 16	96.5	93.0	61.5	39.0
Nov. 23	97.0	93.5	62.0	31.5



Freight Car Loadings

(1000 Cars)

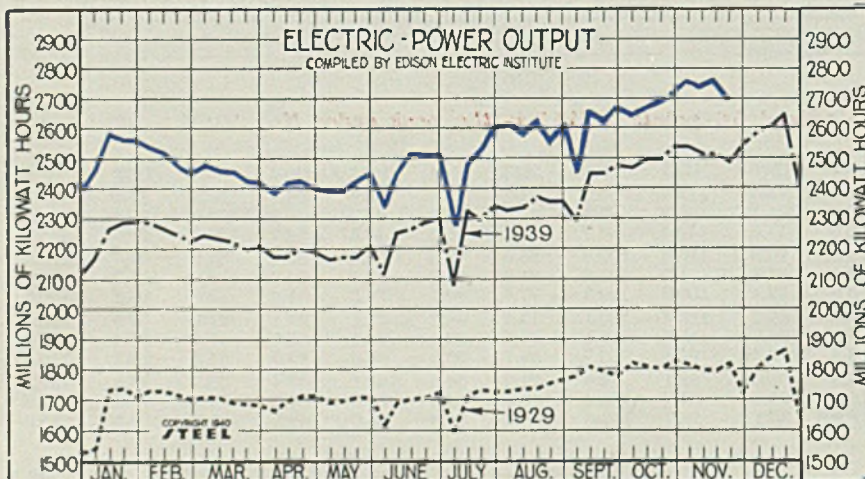
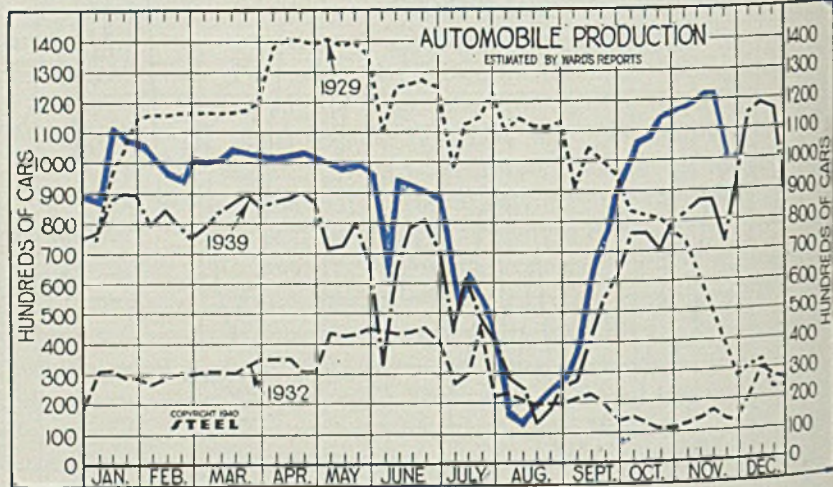
Week ended	1940	1939	1938	1937
Aug. 17	743	674	598	781
Aug. 24	761	688	621	787
Aug. 31	769	722	648	805
Sept. 7	695	667	569	711
Sept. 14	804	806	660	827
Sept. 21	813	815	676	840
Sept. 28	822	835	698	847
Oct. 5	806	835	703	815
Oct. 12	812	845	727	810
Oct. 19	814	861	706	773
Oct. 26	838	834	709	772
Nov. 2	795	806	673	732
Nov. 9	778	786	637	690
Nov. 16	745†	771	657	647
Nov. 23	733	677	562	589

†Revised.

Auto Production

(1000 Units)

Week ended	1940	1939	1938	1937
Aug. 17	20.5	13.0	23.9	93.3
Aug. 24	23.7	17.5	18.7	83.3
Aug. 31	27.6	25.2	22.2	64.2
Sept. 7	39.7	26.9	17.5	59.0
Sept. 14	66.6	41.2	16.1	30.1
Sept. 21	78.8	53.9	20.4	28.0
Sept. 28	95.9	62.8	25.4	45.8
Oct. 5	105.2	76.1	37.7	72.0
Oct. 12	108.0	75.9	50.5	89.7
Oct. 19	114.7	70.1	68.4	91.9
Oct. 26	117.1	78.2	73.3	90.2
Nov. 2	118.1	82.7	80.0	89.8
Nov. 9	120.9	86.2	86.3	85.3
Nov. 16	121.9	86.7	96.7	85.8
Nov. 23	102.3	72.5	84.9	59.0

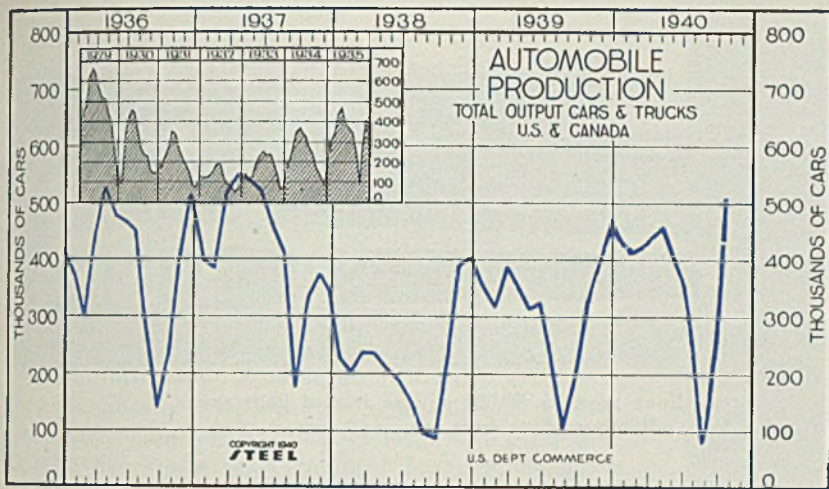


Electric Power Output

(Million KWH)

Week ended	1940	1939	1938	1937
Aug. 17	2,606	2,368	2,139	2,304
Aug. 24	2,571	2,354	2,134	2,296
Aug. 31	2,601	2,357	2,149	2,321
Sept. 7	2,463	2,290	2,048	2,154
Sept. 14	2,639	2,444	2,215	2,281
Sept. 21	2,629	2,449	2,154	2,286
Sept. 28	2,670	2,470	2,139	2,275
Oct. 5	2,641	2,465	2,154	2,280
Oct. 12	2,665	2,495	2,183	2,276
Oct. 19	2,687	2,494	2,214	2,282
Oct. 26	2,711	2,539	2,226	2,283
Nov. 2	2,734	2,537	2,207	2,282
Nov. 9	2,720	2,514	2,209	2,276
Nov. 16	2,752†	2,514	2,270	2,284
Nov. 23	2,695	2,482	2,184	2,085

†Revised.



Automobile Production

(Unit: 1000 Cars)

	1940	1939	1938	1937	1936
Jan.	449.3	357.0	227.1	399.2	377.2
Feb.	421.8	317.5	202.6	383.9	300.8
March	440.2	389.5	238.6	519.0	438.9
April	452.4	354.3	238.1	553.4	527.6
May	412.5	313.2	210.2	540.4	480.5
June	362.6	324.2	189.4	521.1	469.4
July	246.2	218.5	150.4	456.9	451.2
Aug.	89.9	103.3	96.9	405.1	275.9
Sept.	284.6	192.7	89.6	175.6	139.8
Oct.	514.4	323.0	215.3	338.0	230.0
Nov.	.....	370.2	390.4	376.6	405.8
Dec.	.....	469.0	407.0	346.9	519.1
Ave.	.....	311.0	221.3	418.0	384.7

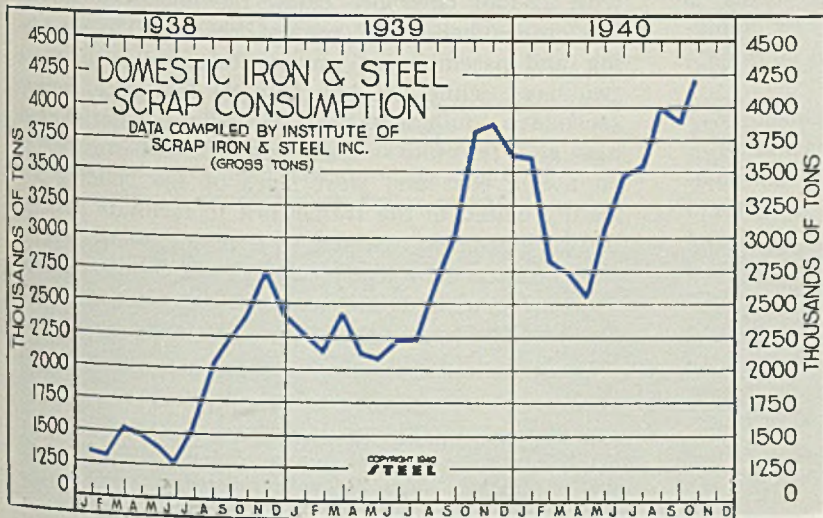
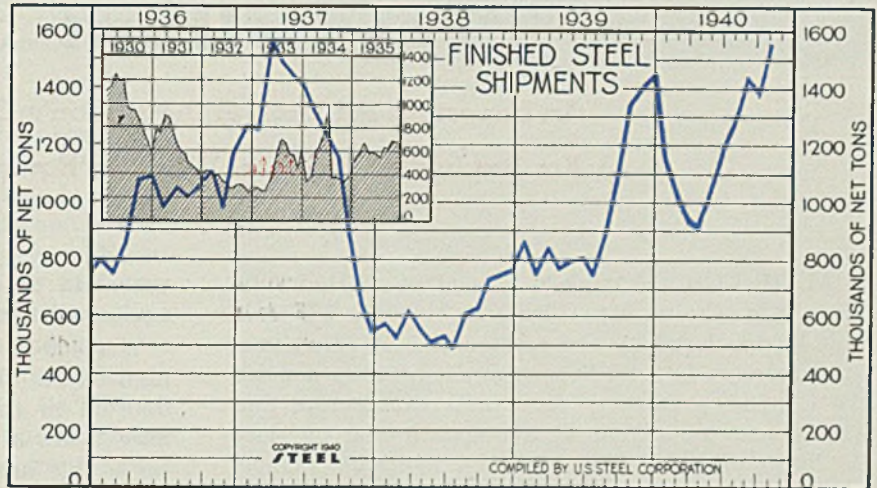
Finished Steel Shipments

U. S. Steel Corp.

(Unit 1000 Net Tons)

	1940	1939	1938	1937	1936
Jan.	1145.6	870.9	570.3	1268.4	795.2
Feb.	1009.3	747.4	522.4	1252.8	747.4
Mar.	931.9	845.1	627.0	1563.1	863.9
Apr.	907.9	771.8	550.5	1485.2	1030.7
May	1084.1	795.7	509.8	1443.5	1087.4
June	1209.7	807.6	525.0	1405.1	978.0
July	1296.9	745.4	484.6	1315.3	1050.1
Aug.	1455.6	885.6	615.5	1225.9	1019.9
Sept.	1392.8	1086.7	635.6	1161.1	1060.7
Oct.	1572.4	1345.9	730.3	876.0	1109.0
Nov.	.....	1406.2	749.3	648.7	947.3
Dec.	.....	1444.0	765.9	539.5	1178.6
Total	.....	11707.3	7315.5	14097.7	11905.0

†After year-end adjustments.



Iron and Steel Scrap Consumption

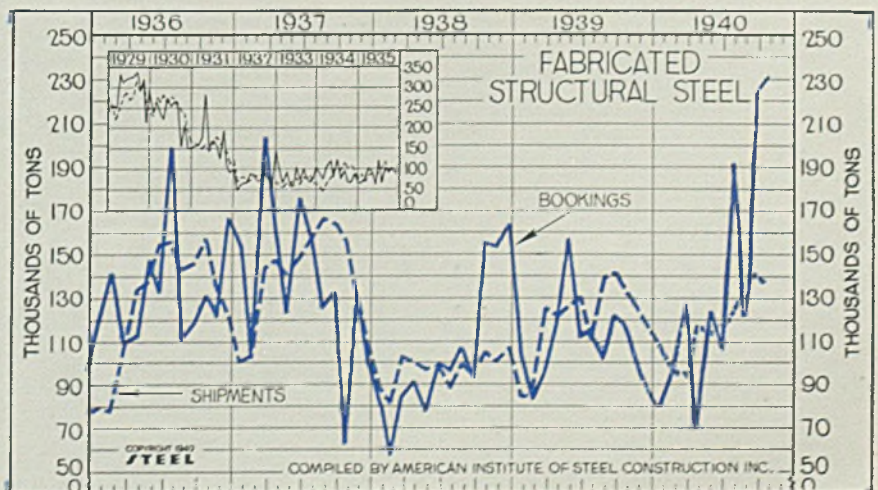
(Gross Tons)

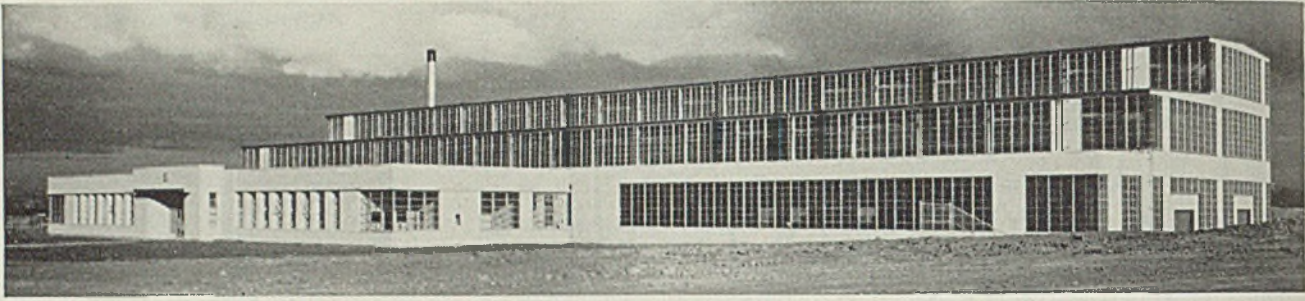
	1940	1939	1938
Jan.	3,581	2,257	1,331
Feb.	2,812	2,124	1,306
Mar.	2,728	2,419	1,543
Apr.	2,548	2,114	1,477
May	3,061	2,079	1,387
June	3,482	2,221	1,257
July	3,526	2,247	1,520
Aug.	3,968	2,675	1,953
Sept.	3,876	3,018	2,218
Oct.	4,233	3,809	2,393
Nov.	.....	3,858	2,732
Dec.	.....	3,613	2,411
Total	.....	32,434	21,528
Mo. Av.	.....	2,703	1,794

Fabricated Structural Steel

(1000 tons)

	Shipments			Bookings		
	1940	1939	1938	1940	1939	1938
Jan.	110.9	84.3	87.8	81.7	101.7	80.3
Feb.	97.2	84.4	81.2	98.9	82.7	57.1
Mar.	95.9	125.3	103.3	128.3	95.1	84.3
Apr.	116.3	120.9	100.0	73.8	118.3	91.2
May	115.6	125.9	96.4	126.8	156.9	77.3
June	119.1	130.1	98.6	109.7	111.6	99.9
July	127.1	110.5	88.0	194.9	114.1	96.0
Aug.	134.9	139.7	98.6	122.5	100.9	106.8
Sept.	142.8	140.8	93.5	225.5	121.4	92.5
Oct.	139.2	133.8	105.0	233.1	118.8	154.8
Nov.	.....	128.2	99.9	.....	99.3	153.1
Dec.	.....	116.2	106.5	.....	84.4	163.4
Total	.....	1440.1	1158.8	.....	1305.0	1256.6





New plant built along simple functional lines provides 60,000 square feet of floor space. This is looking at plant and adjoining office from the southeast

New Press Plant . . .

**An Important Addition to the Nation's Capacity
For Production of Metal Working Equipment**

■ ALTHOUGH the modern new plant of Hydraulic Press Mfg. Co. at Mt. Gilead, O., is only 115 feet wide by 400 feet long and represents only about one-third increase in total floor space, it actually doubles the company's capacity for press manufacture and will permit production of a standard line of plastic injection molding presses and hydraulic pumps, controls and power units to be tripled. This is done by use of new machine tools and by applying straight-line production principles to eliminate back tracking.

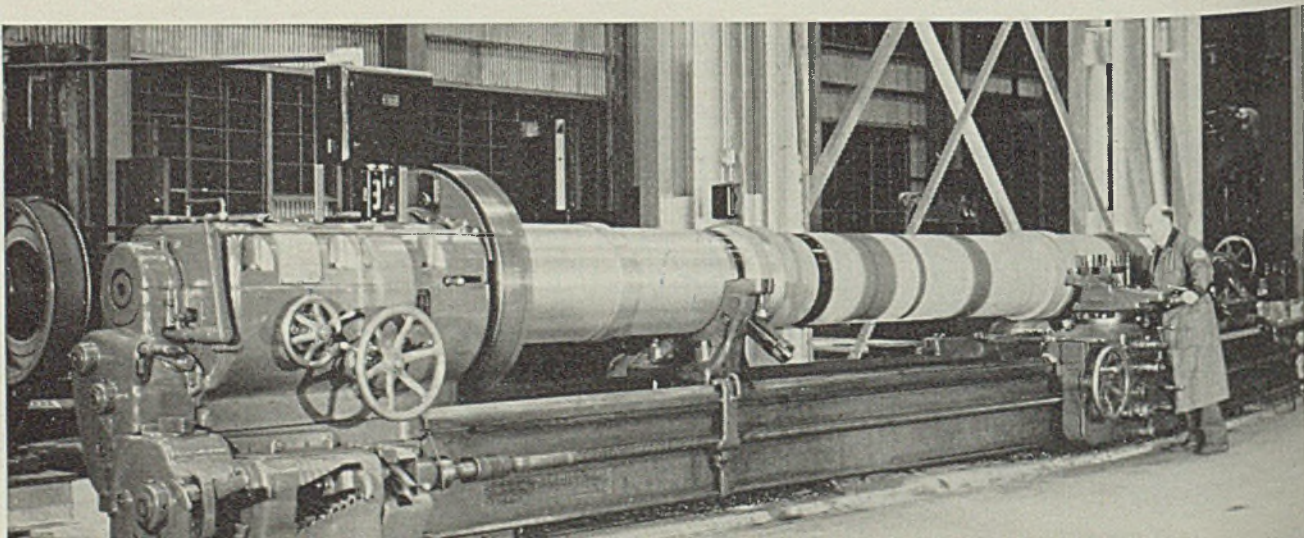
Now in full operation, the addition, planned over a period of several years, is the culmination of a long-range program. As far back as 1937 new machine tools were being purchased for it. Among them were a precision boring mill, a 5-foot radial drill and a 5-inch spindle horizontal boring mill. In the latter part of 1939, purchases included a 36-inch hydraulic open-side planer, five radial drills in sizes from 3 to 7 feet, a No. 2 miller, 4 and 6-inch horizontal boring mills, four engine lathes, five turret lathes, a heavy-duty surface grinder and a universal grinder. Since then other new equipment has been added representing a substantial portion of the \$600,000 in-

vested in the new plant. Some rebuilt modernized equipment also was transferred from the older plant.

The 400-foot long building is in three bays, the high bay at the north being 55 feet wide and being unusual in that it provides 36-foot working clearance below the hooks of two 50-ton cranes which serve this area. Intermediate bay is 40 feet wide with 22-foot clearance below the hooks of two 15-ton cranes here. All major operations in machining and assembly of presses takes place in these two bays, while the low bay, 20 feet wide, houses secondary equipment, tool cribs, light material storage and the like. The sash and asbestos siding on north, east and west sides of the building are merely bolted to the framework to facilitate possible future expansion without loss of materials. Structural work is sufficiently strong for addition of cranes in a second 40-foot bay to be added to the north of the high aisle later.

Production flows from west to east with facilities

Big lathes are needed to handle such units as this strain rod 280 inches long, 22 inches diameter, weighing approximately 28,000 pounds



Presses of exceptional height are assembled in this depressed area. Main floor, 4 feet higher, is seen just beyond railroad siding and track scale recessed in the retaining wall

for handling large castings and other equipment at east end. Rough steel castings weighing as much as 175,000 pounds can be handled with exceptional ease and speed. A depressed floor at the east end 4 feet lower than the main floor permits loading outgoing shipments directly on freight cars from the main production floor level. This depressed section also affords extra head room throughout a 5000-square-foot area for assembly of large size presses.

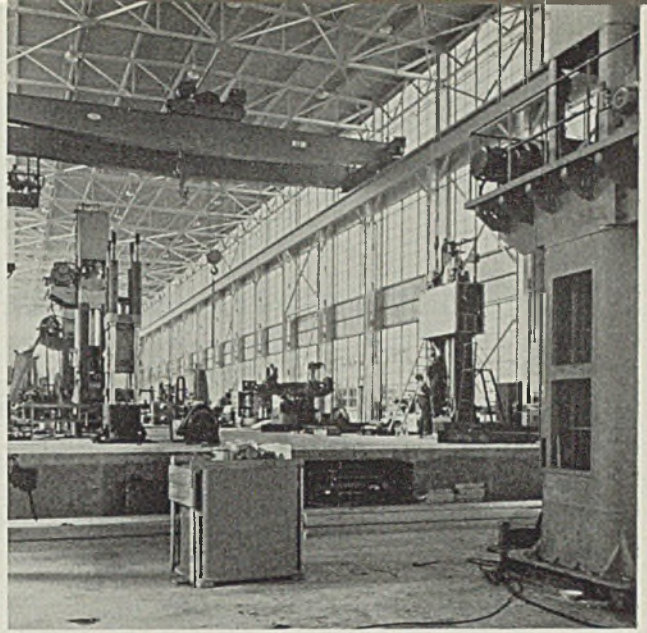
With two shifts now standard practice, adequate lighting for night work is vital. A minimum general illumination of 15-foot-candles is afforded by high-intensity mercury lamps and incandescent lamps in the high and intermediate bays.

Special facilities are afforded for handling large volume of oil required for testing the presses. A 5000-gallon storage tank underground is connected with outlets beside every building column in the assembly and testing area. Likewise air and electric connections are available at outlets on each column.

Two stoker-fed low-pressure boilers of 200-horsepower capacity serve large low-pressure unit heaters with thermostatic control and are positioned for even distribution of heat throughout the entire plant.

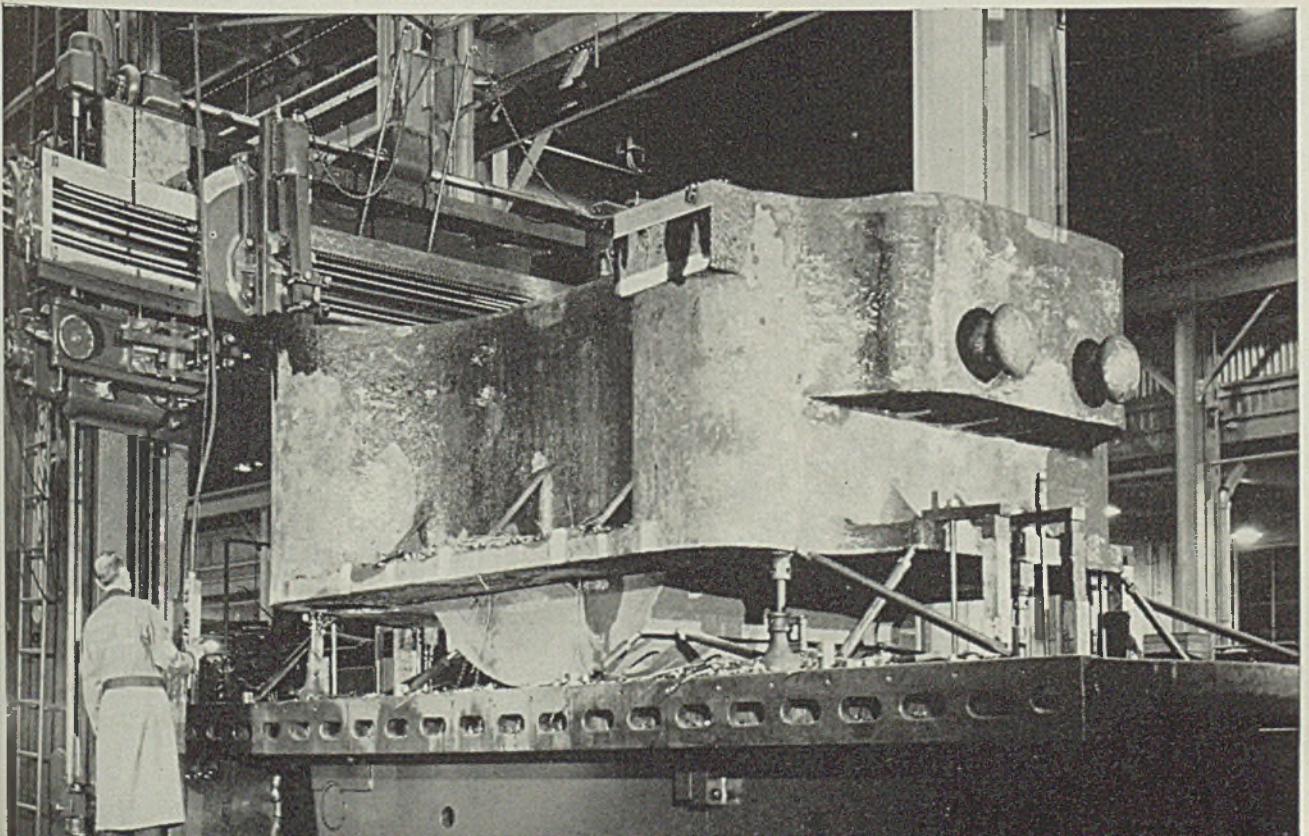
Introduction by Hydraulic Press Mfg. Co. in 1927 of a fast traverse system of press operation and control utilizing a closed hydraulic circuit, and a high-speed reversible radial oil pump was the first of a number of important developments by this com-

This huge casting, being machined on modern double-housing planer with multiple heads, weighs 142,000 pounds. It is the bed for a 5000-pound hydraulic press. Note operating convenience attained through remote control of planer through pendant push button station



pany. Others include double-action presses for the metalworking industry, triple-action presses for deep drawing work in sheet metal, a complete line of plastic injection molding presses, development of a series of presses especially for the aircraft industry and for the Guerin process of blanking and forming by using a rubber pad.

General headquarters of the company have been transferred to a new office building adjoining the new plant which commands a 60-acre site. The new plant is given over entirely to building large hydraulic presses for aircraft, automotive, general metalworking and process industries with the old plant providing enlarged facilities for production of plastic injection molding presses, hydraulic pumps, controls and power units. Of the important units now being built in the new plant are shell forging presses and a 5000-ton press for forming aircraft parts by the Guerin process.



New Processes Resist

Oxidation at High Temperatures

Protective coats formed by heat treating a layer of sprayed metal and a sealer increase service life up to 800 per cent. Three variations fit the process for different service needs

By WILLIAM C. REID

Vice President
Metallizing Engineering Co. Inc.
Long Island City, N. Y.

■ THREE NEW processes have recently been introduced with an identical purpose;

namely, to provide a relatively inexpensive form of protection to ferrous materials against oxidation and scaling at elevated temperatures. All of the processes are applied by means of metallizing equipment. Their use, where indicated, increases the useful life of the material to which they are applied from 100 to 500 per cent for Process 11; 300 to 800 per cent for Process 33; and 500 to 1000 per cent for Process 45.

All three have been in industrial use long enough to indicate that in cases where weight, size, fabrication problems or ultimate cost may prohibit the use of the well known and highly effective heat-resisting alloys, these new processes afford excellent protection in proportion to their cost. For instance, the conventional pressed steel salt and cyanide pots, Fig. 1, of which large numbers have been treated have shown an average increase in useful life of from 200 to 500 per cent, depending upon the operating conditions to which they are exposed. Taking into consideration the replacement cost of the pots alone, plus installation costs, the savings effected are more than attractive.

Melting pots, Fig. 2, for aluminum and magnesium have been processed in quantities sufficient to show an average increase in life of from 200 to 300 per cent using Process 11. These pots are treated on the exterior surfaces only, and up to, but not including the spouts.

Wire annealing retorts and pots, Fig. 3, usually fabricated by welding, show excellent results in service and illustrate one of the outstanding features of the process; that is, the application of protection to localized areas where attack is most severe. The illustration shows Process 33 being applied to a localized area only, consisting of part of the underside of the flange and upper end of the body of the retort. Obviously such a procedure can be highly effective and at the same time most economical. Fig. 4 illustrates a similar retort that (due to local conditions) has been treated over the entire outside surface.

Fabricated annealing pots and boxes that are intended for production use over long periods have been given a life increase of from 400 to 600 per cent. A

graphic illustration of this application is shown in Fig. 5. This small sample pot was treated inside and out over half of its area after which it was heated to 1800 degrees Fahr. for 23 consecutive times, each time quenched in cold running water and immediately returned to the furnace. It will be noticed that the untreated half has completely oxidized, while the processed half has lost no measurable thickness or weight.

The applications so far described come under the general heading of "pots and boxes." They are ideal applications in every respect. In addition to them, there is a large and fertile field that at present has been only partially developed. Items of heavy equipment such as radiant superheater tubes, rotary kilns and furnaces, furnace conveyors, muffles, baffles, furnace castings and structural steel have been protected and represent savings both in design and replacement.

A separate and distinctive field is that of the elimination of contamination in the vitreous enameling industry. By treating oven trucks, racks and bucks, it is possible to avoid the contamination of enamel due to particles of ferrous oxide.

* * *

Application of the processes is relatively simple and any competent operator of metallizing equipment can handle the application without trouble if given suitable instruction. Plants with a metallizing installation are already equipped to do this work. Those without can install the necessary equipment for considerably less than \$1000 and use it not only for producing heat-resistant coatings but also for building up worn bearing surfaces, coating patterns with aluminum and copper, babbitting bearings, and all of the many excellent and daily used applications for metallizing equipment.

Process 11 involves a specific procedure that, when conformed to, produces predictable results in every instance. It is cheaper to apply than Processes 33 and 45, yet affords good protection at temperatures up to 1700 degrees Fahr. and is used effectively at higher temperatures where sulphurous gases are encountered.

It involves the use of a special aluminum plus a sealing and fluxing agent known as Metcoseal, plus a specific heat treatment, which has the effect of causing the aluminum to alloy with the parent metal

to form what is in effect a compound "skin" consisting of five layers. First layer next to the steel base is a high-iron solid solution of iron and aluminum. Second layer is Fe_2Al_3 , an aluminum eutectic. Third is a high-aluminum solid solution of iron and aluminum. Fourth is solid aluminum. Fifth is aluminum oxide.

When the treated article is placed in service, the aluminum continues to oxidize on the surface. At the same time it diffuses into the base metal, the speed of oxidation and diffusion being dependent upon the temperature. At temperatures above 1482 degrees Fahr., surface oxidation is rapid and the aluminum layer soon disappears to leave the residual solid solution layer that provides the protection at high temperatures.

Process 33 involves the use of a special alloy plus a surface sealer. No special heat treatment is required, and the articles can be placed into service immediately. It will effectively protect the parent metal at temperatures up to 1800 degrees Fahr. if sulphurous gases are not present. At lower temperatures it will give proportionately better results and longer life than Process 11.

Process 45 involves the use of a combination coat of a special alloy, aluminum and sealer, but without a specific heat treatment. It is designed to give the

ultimate protection at temperatures over 1800 degrees Fahr. whether or not sulphurous gases are present. Tests have been conducted at temperatures in excess of 2100 degrees Fahr., indicating a life increase of from 300 to 500 degrees over the untreated parent metal.

Individual requirements, life expectancy, cost and appearance all have a bearing upon a decision as to which process will be used for varying purposes. They are all effective when applied properly and used within their limits. The metal to which they are applied has little bearing upon the results obtained, provided cast irons with a high percentage of free graphitic carbon are not used. Such irons are subject to severe grain growth at high temperatures and will invariably spall off the surface, taking the protection with it. Pots, boxes and fabrications that are welded may, with Process 11, show black areas on the welds. Such areas will be susceptible to rapid oxidation. This condition is caused by gas and slag inclusions in the weld which effectively prevent the absorption of aluminum. With Processes 33 and 45 this condition can be completely disregarded.

Another condition that has a profound effect on the results obtained is the ability of the parent metal to retain sufficient strength at high temperatures to prevent its collapse, either partial or complete. This applies particularly to Processes 33 and 45 which will crack and possibly flake off in the event of excessive distortion of the parent metal. Process 11 will conform to any distortion of the parent metal without any possibility of flaking off, but neither it nor the other two processes will have any influence on the prevention of distortion due to inherent or structural weakness of the parent metal.

While Process 11 is not patented, Processes 33 and 45 are protected by patent applications and can be used only by arrangement with the Metallizing Engineering Co. Inc., Long Island City, New York.

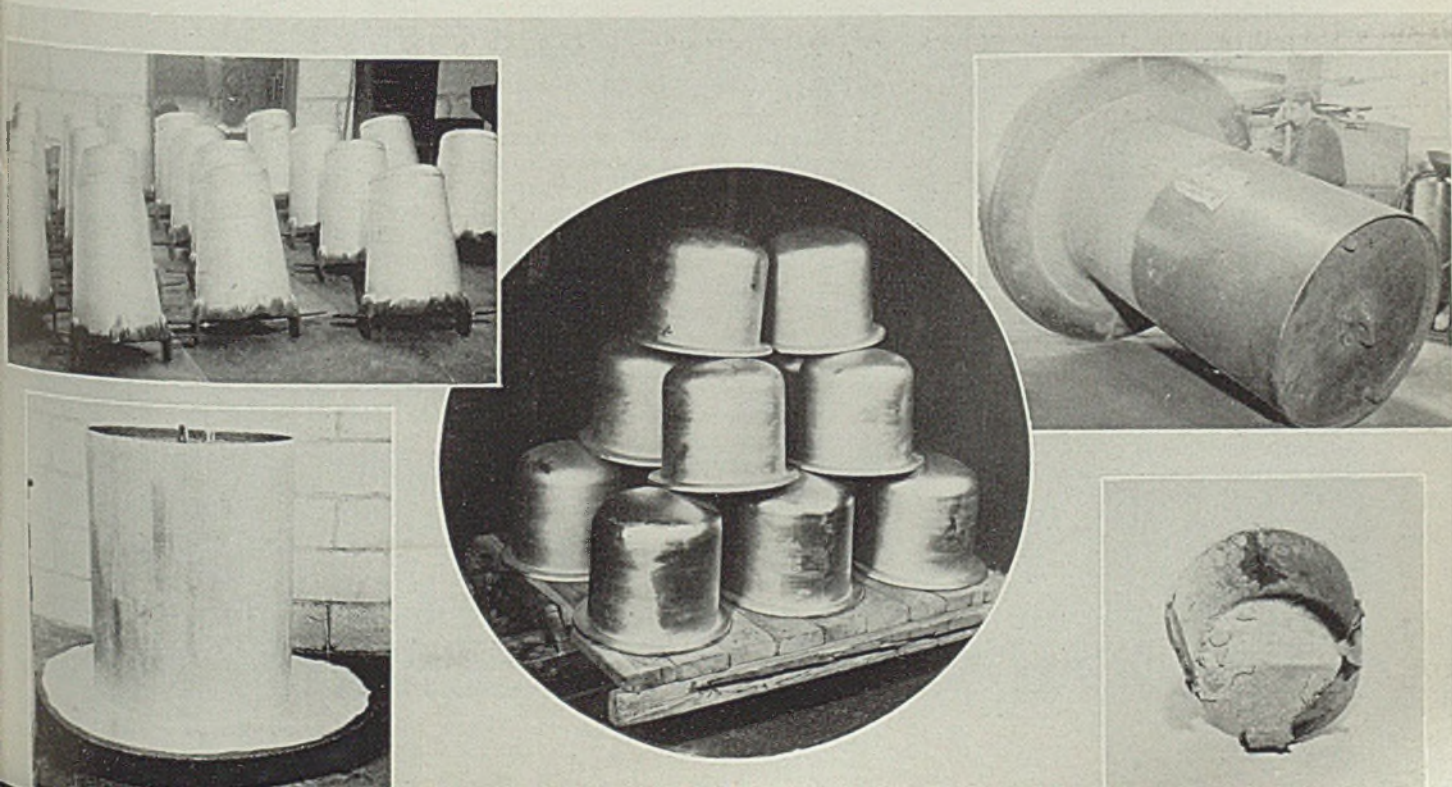
Fig. 1—Pressed steel salt and cyanide pots, center, treated with Process 11 have shown an average increase in useful life of from 200 to 500 per cent

Fig. 2—Melting pots for aluminum and magnesium treated with Process 11 show life increases of from 200 to 300 per cent. The same treatment is effective on melting tools for these metals. Note top left illustration

Fig. 3. (Top Right)—A wire annealing retort treated with Process 33 on the area subject to severe attack

Fig. 4. (Lower Left)—Process 33 applied to the entire outside area of an annealing retort

Fig. 5—Test pot treated with Process 11 on one-half of its surface, lower right. Note attack on untreated surface, while treated surfaces remain in good condition



Bofors Anti-Aircraft Guns

. . . How They Work . . . How They Are Made

■ LONG before the outbreak of war, Great Britain undertook experimental work to ascertain the most effective type of anti-aircraft weapon for use against low-flying aircraft. The well-known Bofors, a Swedish gun, was selected as the best available weapon of this class. The Bofors gun is shortly to be

the body. The head is radiused to receive the blows from a maul, and forms a stop in the guideway through which the picket is driven. A withdrawing bar enables the pickets to be withdrawn from the ground when it is again required to move the gun.

Interposed between the gun

the breech end, to 1 in 30 at the muzzle.

The breech casing forms a chamber for the breech ring, breech block and loading mechanism, and is of a general rectangular shape at the rear, while the front is cylindrical and slotted. Near the rear end of the casing are flanged trunnions, which fit into trunnion bearings carried by the gun mounting.

It is possible to set the gun for single-shot firing or for continuous fire by moving a small lever. With the lever in the continuous position, firing is automatic until the rounds in the magazine are exhausted. The rounds are held together in sets of four by clips, and the clip with its load is lowered into position between guides which form the magazine.

A curved plate locates the nose ends of the shells, while the bases of the shell cases are accommodated by the guides. Curved guides have pawls for feeding the rounds down onto the loading tray.

The loading tray is machined from a stamping of stainless steel and has guides at both sides. These impart to the curved guides of the magazine an up-and-down movement as they recoil and return with the gun barrel. This motion is necessary for the expulsion of the used cartridge cases and for bringing new rounds into position.

As already mentioned, firing is continuous as long as there are rounds in the magazine. With continued loading, therefore, the burst of fire can be maintained indefinitely, the limiting factor being the heat generated in the barrel.

The shock of discharge is absorbed by the recoil system, which not only brings the gun to rest after the recoil and restores it to its firing position, but also provides for the opening of the breech, the ejection of the spent cartridge case, and reloading.

The spent cartridge cases are ejected from the breech at considerable velocity, and are directed to-

(Please turn to Page 69)

In the production of Swedish Bofors guns the barrels form the principal manufacturing problem. This is because they wear much more rapidly than other parts, so that several must be made for each gun. The intricate nature of many parts involves some manufacturing difficulties.

as recounted in this description of a wartime activity in Canada

manufactured in Canada through the co-operation of three firms and the expenditure of eleven million dollars for plant equipment.

The Bofors gun fires shells of 40-millimeter diameter in rapid bursts and at speeds of approximately 120 rounds per minute. It may be regarded as a highly efficient anti-aircraft weapon for duties intermediate between those of the high-altitude guns of the 3.7-inch class and the machine guns of the Vickers, Bren or Lewis type.

The design provides for rapid movement from place to place when towed by a high-speed tractor. In action, the gun is controlled by two members of the crew, one sitting on either side of it. With the help of double cranks, the elevating mechanism is operated from one side and the slewing motion from the other.

The four pneumatic-tired wheels are spring-loaded, and the gun can be brought rapidly into action by lowering it, together with its platform, onto the ground. Four screw-operated jacks provide support for the platform, and spirit levels are fitted to ensure that it is correctly set in the horizontal plane. Four pickets are used to anchor the equipment. Each is about 2 feet in length, and has a T-shaped head riveted to

mounting and the platform is a turntable fitted with ball bearings. A gear ring of large diameter is provided for slewing the gun to give the required direction of fire, and is connected by gearing the double-crank handles at the righthand side. Bolted to the underside of the breech casing is the elevating arc, which is, in turn, geared to the elevating cranks at the lefthand side of the gun for controlling the angle of fire.

The gun assembly proper comprises the barrel, the breech casing and the breech ring and mechanism. The barrel is machined from a heat-treated forging of the chrome-nickel steel, and the rear end has external interrupted threads to enable it to be assembled rapidly in the breech ring. The bore is chambered for accommodation of the round.

Near the middle of the gun barrel is a collar which is screwed into position and holds the recuperator spring in compression. The forward end of the barrel is screwed to receive a funnel-shaped flame-guard, which is screwed against a copper ring and retained by set screws.

There are 16 rifling grooves, with a twist increasing from one turn in a length equal to 45 diameters at

From *Canadian Metals and Metallurgical Industries*.

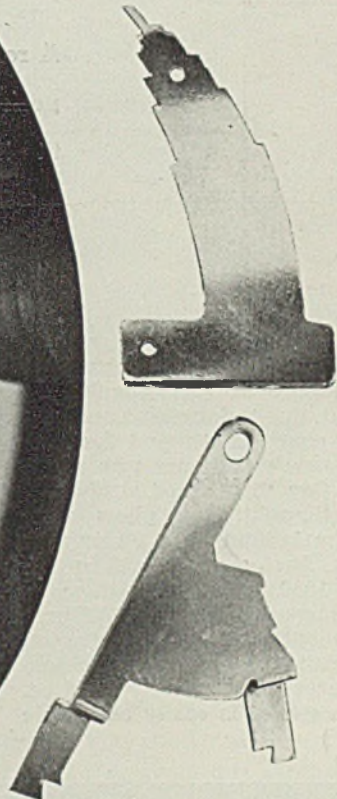
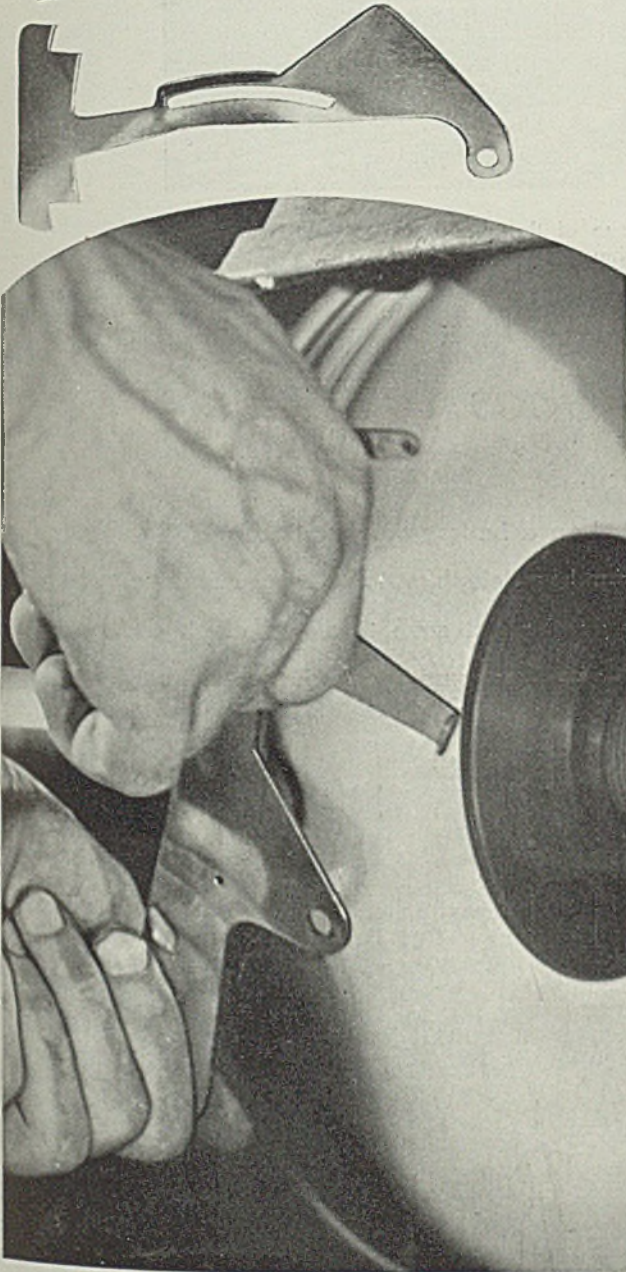
FOR *Speedier* PRODUCTION
OF Stainless PARTS

FROM the press room straight through to the finishing department, this Stainless Strip speeds your production.

Intricate shapes and high precision are more readily obtained because of its uniform temper and absence of hard spots. Tool troubles diminish for the same reason. Faster press speeds and steadier output result from its uniform response to press operations. Even the buffing time is cut down by the satin-smooth finish that brightens quickly on the buffing wheel.

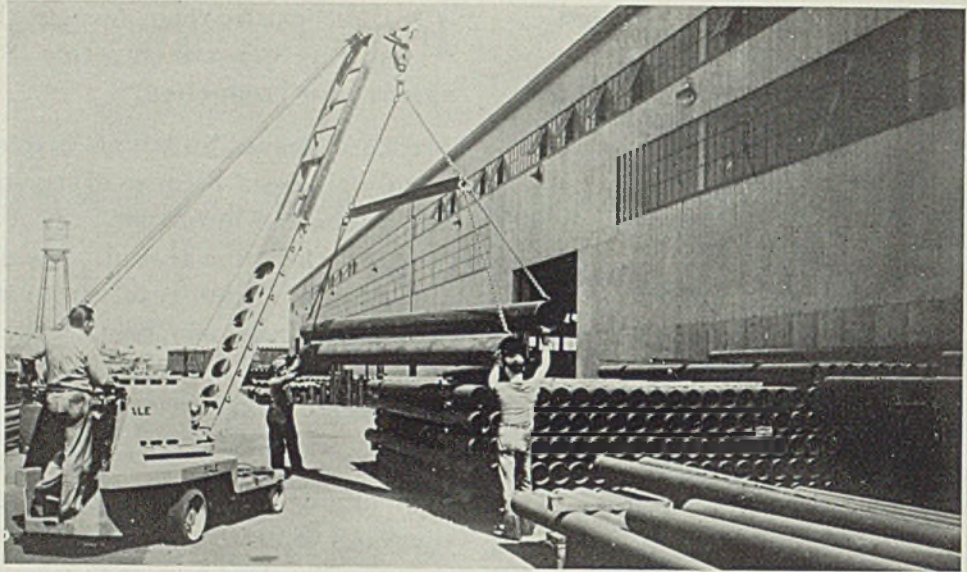
That's why Carpenter Stainless Strip rates so high among production men. It has helped them out of many a tough spot—made possible many a Stainless part that proved too difficult for other Stainless Steels. There is a grade of Carpenter Stainless Strip to provide just the degree of corrosion resistance you need. Specify *Carpenter* to insure smoother, faster production all along the line.

THE CARPENTER STEEL CO. • Reading, Pa.



Carpenter STAINLESS STEELS

BRANCHES AT Chicago, Cleveland, Detroit, Hartford, St. Louis, Indianapolis, New York, Philadelphia



Handling large pipe as shown here is one of the places where the "whirly" really shines

The "Whirly" Goes to Town



A revolving crane mounted on a battery-powered truck, the "whirly" performs like a highly trained bull elephant to do mechanically a multitude of difficult handling tasks that save time and effort. Here a warehouse "roughneck" describes some jobs he has seen it handle

■ SOME time ago, Ducommun Metals & Supply of Los Angeles decided that, due to increased business and the constant demand for new stock, a new warehouse was necessary. After months of study and careful thought, the plans were ready, the building got under way and was finally completed in December, 1939. The warehouse as it stands speaks for itself. There is no wasted space. The entrance, aisles, loading space and all essential features are as they should be. All the material is easily accessible

and placed where it can be packed and shipped with little effort.

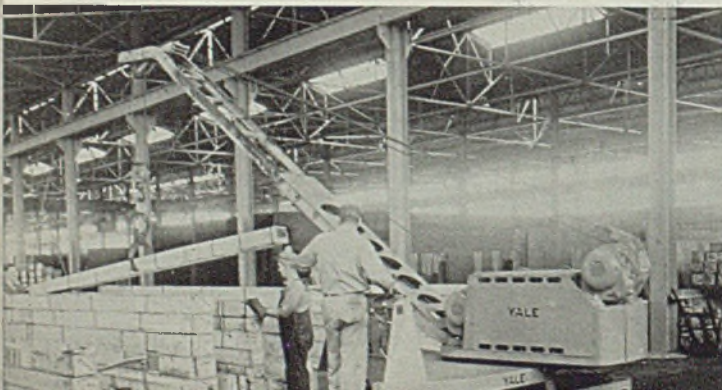
There are five overhead cranes servicing four 600-foot runways, two sheet shears, one plate shear, two bar and angle shears, three abrasive cutters and several power hacksaws. The torch shop has the latest flame cutting machines, and the pipe shop is completely equipped to handle any type of work in that line.

One piece of equipment that stands out is the utility service

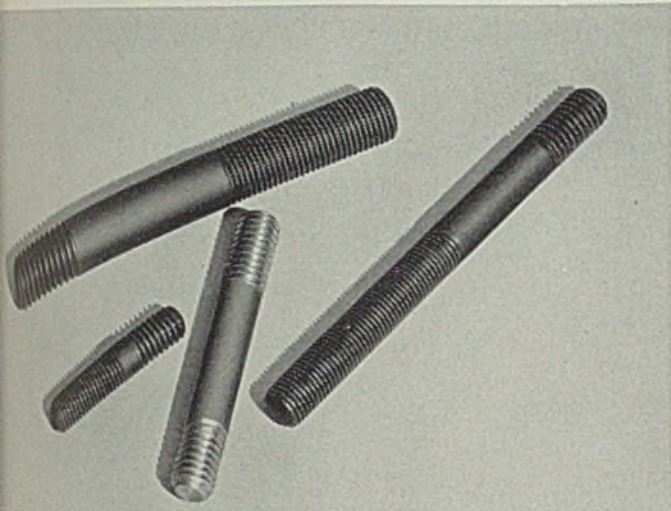
truck, made by Yale & Towne Mfg. Co., Philadelphia. This truck, powered by giant electric batteries, is mounted on a platform equipped with rubber-tired wheels, and has a 78-inch wheelbase that allows an extremely short turning radius. The boom has a reach of 19 feet, can be swung in an arc of approximately 300 degrees, and has a lifting capacity of 6000 pounds at a 7-foot out-reach.

One of the men watching it work

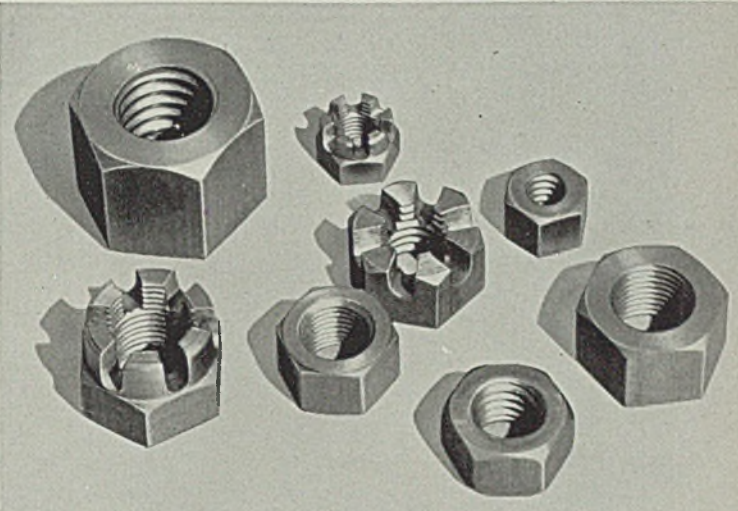
Heavy awkward loads like these long crates, left, are easy work for the "whirly" for that unit can place them accurately and with speed. Loading box cars, right, with large bulky piles of crated material is done quickly and easily. Added safety is provided the workmen since they can stand clear of the load at all times



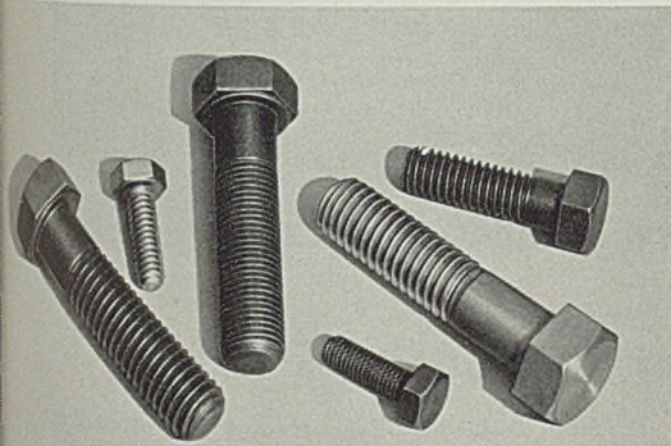
YOU CAN GET EVERY *Fastening* YOU NEED HERE



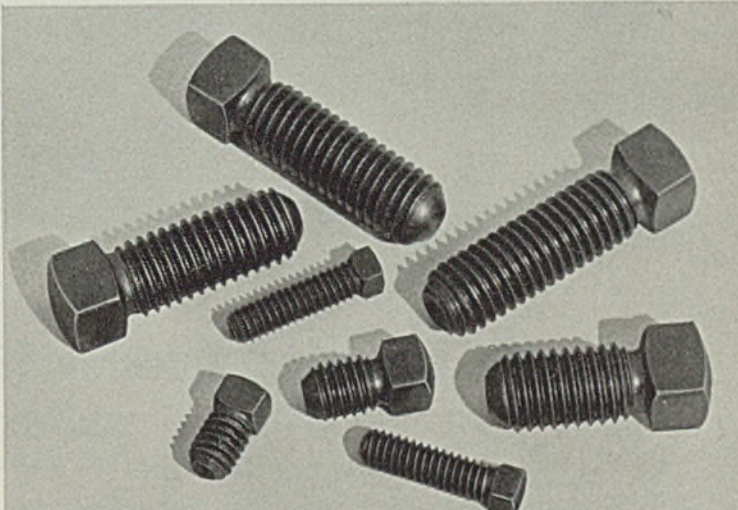
Milled and rough Studs are stocked in popular sizes. When physical requirements and raw materials are specified, made to order in production quantities of carbon or alloy steel, or non-ferrous alloys, from 1/4-inch to 1 1/2-inch diameters, any length.



As one of the largest producers of nuts, we supply Semi-Finished, Castle, Slotted, Cold Punched, Hot Pressed, Cold Forged, Stove Bolt and Machine Screw Nuts in any quantity from stocks. We make nuts from non-ferrous alloys to specifications.



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.

• *Regardless of what kind of fastenings you need, you can get them all from Lamson & Sessions, because we manufacture the most complete line of bolt and nut products in this country. Regardless of the size of your order, Lamson & Sessions can fill it completely and quickly, because our five plants maintain their own warehouse stocks as well as supplying a nation-wide network of responsible jobbers. It is an*

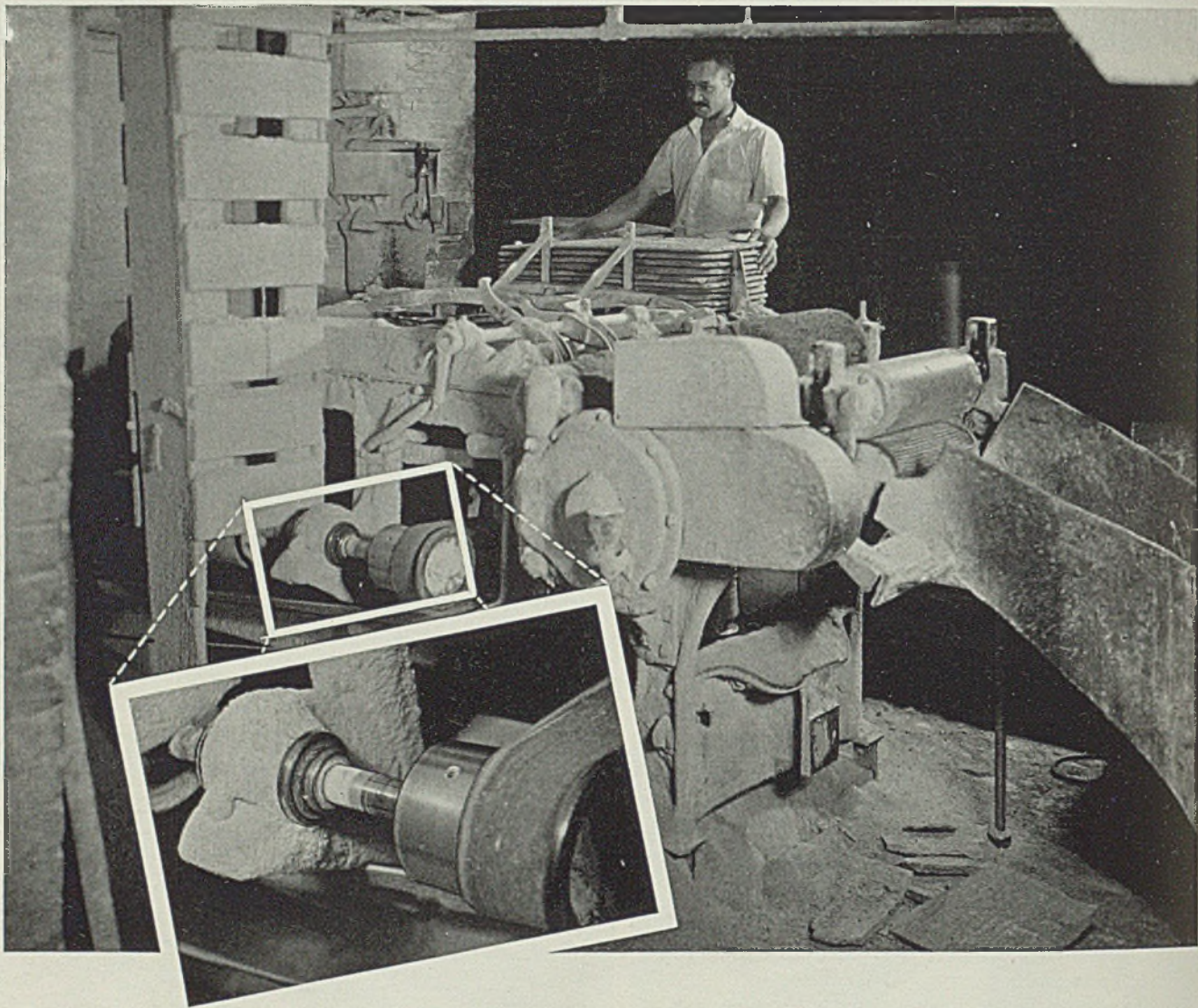
obvious economy of time, effort and expense to order every kind of fastening you need—in one shipment, at one time, on one invoice, from one manufacturer. Specify Lamson products for dependable quality maintained year after year—and dependable service in supplying your needs at all times.

THE LAMSON & SESSIONS CO., Cleveland, Ohio

Your Jobber stocks the Lamson line

75th
ANNIVERSARY
1865-1940

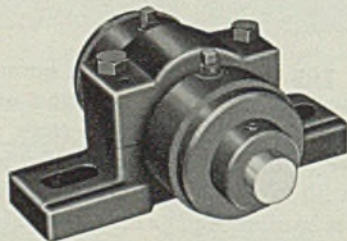
LAMSON & SESSIONS
BOLTS • NUTS • COTTERS • CAP SCREWS • SPECIALS



The Trimming Machine That "DRAGGED ITS FEET"

If you have in your plant one machine that continually holds all the rest back to its own slow pace, you know how the superintendent of this highly efficient paint plant felt. In pressing flaxseed, he managed to waste almost nothing — even using weed seeds under his boilers! Yet the machine used to trim "blankets" of pressed flaxseed was continually slowing production because of frequent need for maintenance or replacement of its plain bearings.

The superintendent knew the job was no picnic for bearings. The machine imposes terrific shock loads on its shafts. The air is heavily laden with flaxseed dust. But he called in his Fafnir distributor.



The Fafnir Double Sealed Pillow Blocks which were installed haven't missed a day's work in three years! Except for greasing two or three times a year, not one cent has been spent on their maintenance. Their deep-groove ball bearings provide high radial and thrust capacity. Their extra dust seals, revolving with the shaft, throw off dust by centrifugal action (note illustration), and inner seals prevent its entrance into the bearing.

The trimming machine no longer "drags its feet". It's in step with the plant's production ... another case to prove that modernization with Fafnirs pays dividends. Distributor stocks in principal cities. The Fafnir Bearing Company, New Britain, Connecticut.

FAFNIR *Ball Bearings*
 THE BALANCED LINE • MOST COMPLETE IN AMERICA

for the first time aptly christened it "The Whirly." As it comes up the aisles of the yard with a length of 12-inch pipe swinging from the boom and swaying from side to side, it resembles exactly the gait of a bull elephant carrying a tent pole and swinging his massive head as he plods through the dust of a circus lot. Like the elephant, too, the "whirly" has unlimited power and diversified usefulness. Where formerly it required three to four hours to load a truck and trailer with heavy pipe, the operator now simply extends the boom, cables are slipped around a lift, the boom swings in a half circle and deposits the pipe on the truck. The operation is repeated and the trailer is loaded. Within 30 minutes from the time it arrived, the truck is loaded and on its way.

Reduces Accident Percentage

With the old method of loading by the use of ropes and skids, there was a high percentage of accidents such as crushed hands, wrenched backs and foot injuries. The "whirly" has reduced the accident percentage to the absolute minimum. Its simplicity of construction and ease of operation permit the operator and his helper to remain out of the danger zone when a lift is being made. Its mobility is the chief factor in its efficiency. In the pipe yard stacking the larger sizes of pipe, transporting pipe to the threading machines, spotting heavy barrels of stock where they can be distributed to the best advantage, or loading shipments on the trucks when the overhead crane is not available, the "whirly" has become a most useful piece of equipment.

When a car of heavy tubing encased in long unwieldy crates is spotted on the side track, the task of unloading it is no longer looked upon with dread. Instead of the two days of hard labor formerly required for emptying the car, the "whirly" simply reaches in and lifts the crates a half dozen or more at one time, deposits them on waiting trucks or on blocks where the overhead crane can shift them to the proper department, and the car is unloaded within 5 or 6 hours at the most.

The loading of a car is accomplished with the same ease. By the old method, bars and rollers were used to maneuver a heavy object along a few inches with each strenuous effort. Now the operator simply juggles the controls and the boom reaches in and sets the heaviest lift down at exactly the right spot with seemingly no effort.

During the rush of loading shipments in the late afternoon, it often happens that the accumulation of material in some department is so heavy that the overhead crane can-

not handle all of it within the time limit imposed by trucking regulations. The "whirly" relieves this congestion by moving a part of the material to the department where a crane is available. This speeds up shipments that under former conditions may have been delayed several hours, causing inconvenience to customers and a possible loss of business.

To sum it up in one short phrase, and again comparing it to the bull elephant, the "whirly" combines power, mobility and resourcefulness in one compact unit and is proving indispensable to the efficient operation of the warehouse.

Burning Temperature of Porcelain Enamel Cut

■ A new inorganic finish which further reduces burning temperatures of porcelain enamels is announced by Porcelain Enamel & Mfg. Co., Eastern and Pemco avenues, Baltimore. Known as Pyroflex, it burns at only 1400 degrees, permitting the use of lighter gage enameling stock or black iron.

The finish will withstand heat and will not flake off when bent or flexed. It is applied with one coat only to lighter gage enameling stock, and, in some cases, black iron with a minimum of warping. It also may be applied in a wide range of colors, effects, and graining finishes. No special metal bonding treatment is necessary.

Text and Reference on Engineering Drawing

■ *Technical Drafting*, by Charles H. Schumann, Columbia university; cloth, 793 pages, 6 x 9 inches; published by Harper & Brothers, New York, for \$3.50.

A text and reference book on graphics, this offers a comprehensive and thorough treatment of the vari-

ous aspects of engineering drawings. The first part presents elementary principles of the subject, including many topics not hitherto treated in textbooks.

The second part deals with more advanced work and goes intensively into commercial practice in the various branches of engineering, including welded construction, architectural and topographical drafting as well as the more usual branches. This section also provides problems of the same nature as encountered in a commercial drafting office and confront professional draftsmen. A large number of illustrations supplement the text and an appendix contains numerous tables of value to the draftsman. The index is comprehensive and clear.

Price Control in War Periods Analyzed

■ *Wartime Control of Prices*, by Charles O. Hardy; cloth, 216 pages, 5¼ x 8 inches; published by Brookings Institution, Washington; price \$1.

Investigation of wartime price control was undertaken by the Institute at the request of the war department, which co-operated by giving the author access to its files of materials pertaining to World war experience and by subsequent discussion of the practical problems as they present themselves to the joint army and navy munitions board. The war department, however, has no responsibility for any of the conclusions published.

Part I covers discussion of prices, inflation and possible control, through fiscal and banking policies, indirect control, selective control and the machinery necessary for control. Part II covers price control during the World war as exerted over basic materials and the food and fuel administrations. The final chapter deals with lessons learned through this experience.

"Cracker Barrel" Days vs Modern Packaging

■ Through the medium of new smartly designed packages, Central Screw Co., Chicago, has lifted nuts, bolts and screws out of the "cracker barrel" days and given them—yes, sales appeal.

In addition, the new package even provides faster, easier assembly—stronger, more durable construction—simplified labeling by machine—reduction of box sizes plus savings in time and work that are paying for the entire packaging program. Developed in co-operation with T. Barry Hodge Ltd., Chicago, it provides attractive silent sales-



men, easily identified for quick sales.

A PRODUCT THAT HAS HELPED OTHERS CA

TODAY
INDUSTRY'S
GREATEST
RESPONSIBILITY

*Production
Speed-up!*



TIDE WATER

THERE IS A COMPLETE LINE OF TYCOL LUBRICANTS

HELP YOU

IN CUTTING OPERATIONS



**...a 40% waste wasn't suspected
until revealed and banished by
TYCOL CUTTING OIL**

Operators of this machine shop have been profiting for nearly two years by eliminating the waste which was previously experienced — though its existence was unsuspected. A Tide Water engineer made a plant survey and recommended the use of the proper Tycol Cutting Oils. » » » The shop superintendent states that since Tycol Cutting Oils have been in use he obtains cleaner pipe threads and a much better milling job. Basing his figures on normal operations, he now secures this better quality work at a saving of approximately 40%. » » » Such dollar and cents savings are typical in hundreds of leading industrial plants using Tycol Cutting Oils. Tool life is increased — finishes are finer. Tarnish is a thing of the past. The oil will not turn rancid — nor will it gum or form deposits on machine tool parts. » » » There is a Tycol Grease and Oil scientifically engineered to banish waste in every industrial operation. Write for full details.

**TIDE WATER ASSOCIATED
OIL COMPANY**

EASTERN DIVISION

17 Battery Place • New York, N. Y.

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

TRANSPARENT
NON-TARNISHING
SULPHURIZED

CUTTING OILS

SCIENTIFICALLY ENGINEERED FOR EVERY INDUSTRIAL USE



Self-Locking Nuts

For Aircraft

Economies in time and labor afforded by self-locking nuts over standard castle nuts and cotter keys increase acceptance of such devices for aircraft work. Tests predetermine performance

■ NUTS OF a special type, called self-locking nuts, are rapidly replacing the old established combination of castle nut and cotter key as a means of security in aircraft structures. As in the case of many other mechanical innovations, the change is for economy of time and labor.

While the original cost of the self-locking nut is somewhat greater than that of the standard castle nut and cotter key, there is a great saving in the cost of installation. As thousands of nuts are used in an airplane, this saving is no small consideration. When the castle nut is used, it is necessary to drill the bolt and to insert and clinch the cotter key, while it is necessary only to screw the self-locking nut up to specified tension, thus eliminating the other three final operations and so reducing assembly costs.

A self-locking nut is one that contains a special feature or device to prevent it from coming loose and working off the bolt due to vibration in service. Hence, to be efficient, it must serve both as a normal nut to maintain the assembly or load and as a locking device under operating conditions. Strictly speaking, the term "self-locking" is a misnomer since the special feature does not actually lock the nut in place but serves instead as a form of brake, designed to offer sufficient torque or resistance to turning to prevent it from coming off under any conditions that might be encountered in service.

The friction under the face and in the threads resulting from the pressure when properly assembled is sufficient to prevent any nut, plain or other type, from vibrating or shaking off the bolt so long as

By D. M. WARNER
Materiel Division
Air Corps
Washington, D. C.

that pressure is maintained. But should that pressure be relieved due to shrinkage of assembled parts, wear, elongation of the bolt, or mechanical action, the restraining friction also would be lost and the nut would be free to travel off the bolt if not held in place by means of cotter key or other device. The self-locking nut contains a special feature to provide the necessary friction within itself entirely independent of the assembly or load pressure. There are several types of self-locking nuts on the market under various trade names, including the Elastic Stop Nut, Boots, Drill, and Polliak.

Aircraft Requirements "Stiff"

To be efficient and satisfactory for use in aircraft structures, self-locking nuts must conform to specifications including materials, thread, finish and workmanship requirements for standard nuts and the following special requirements:

Must be interchangeable with a standard nut on a bolt with standard threads of specified tolerances and have equal strength.

Must be a single or inseparable unit of a size, weight and height fairly comparable to that of standard castle nuts.

Must not require the assistance of any additional part or material to be self-locking.

Must not remove the plating or

From Air Corps News Letter, Sept. 1, 1940.

even injure the threads on the bolt. Torque required for installation must not exceed a specified maximum so as not to overstress the bolt when making the assembly.

Must develop a specified minimum torque or braking resistance to turning on or off the bolt, designed to prevent vibrating off in service.

Must withstand repeated assembly operations at room and at specified elevated temperatures simulating service conditions.

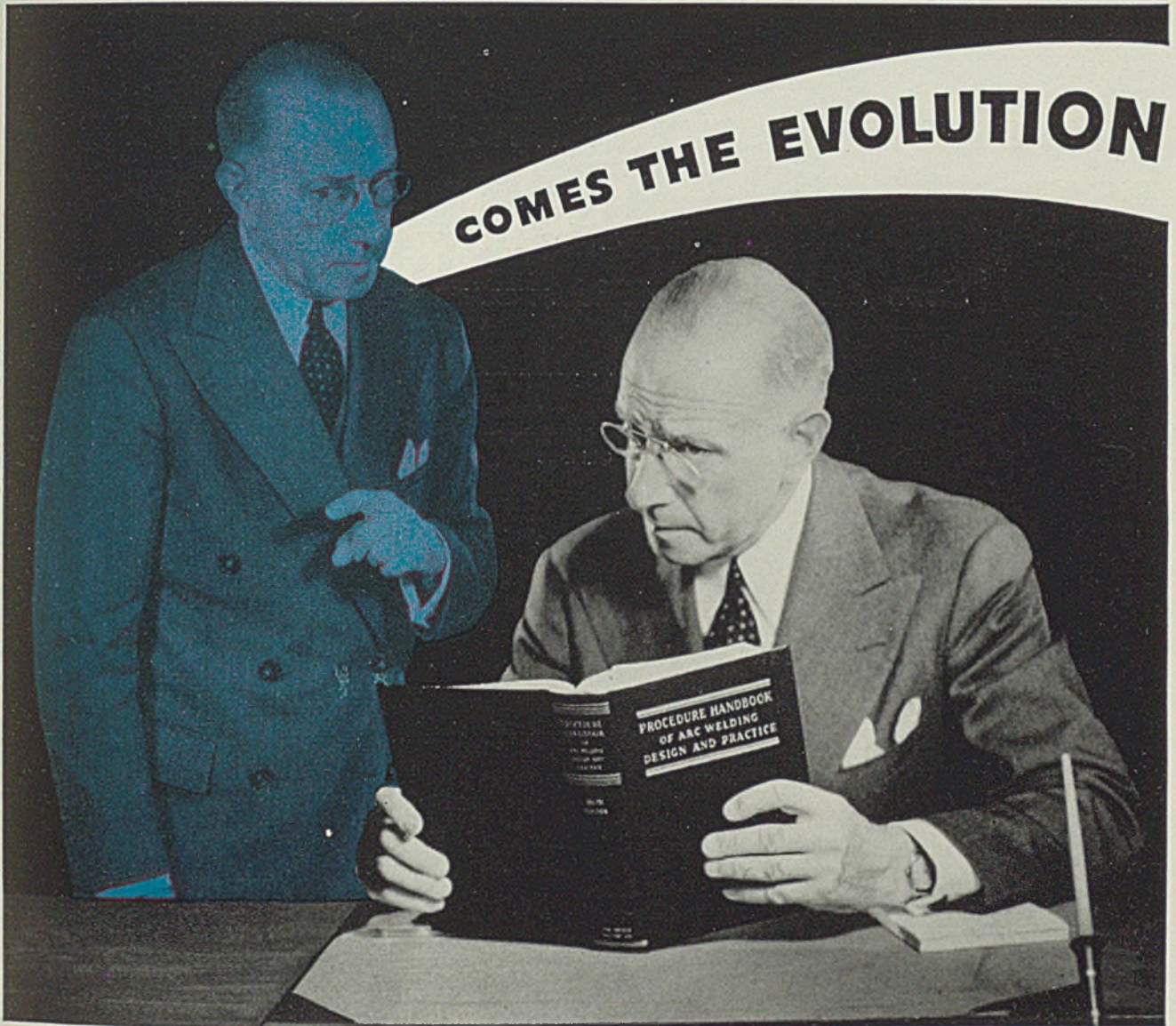
Must show a specified endurance of torsional resistance in repeated assembly operations designed to prove their suitability.

Several special methods of testing self-locking nuts for comparison and for conformity to the above special requirements have been developed by the materials laboratory at Wright Field, Dayton, O. These tests fall under two general classifications, namely: (a) Fatigue tests for stability and endurance of the self-locking device under vibration and (b) tests for measuring its static and operating torsional resistance and for determining its life or endurance in repeated installations and removal operations under various conditions at room and at elevated temperatures.

Fatigue tests under a combination of lateral, skew and axial vibration designed to simulate the most severe service conditions in aircraft are made on self-locking nuts in a rectangular steel box-type machine consisting of like heavy upper and lower units bound together with four vertical steel straps—two at either end—secured by means of the test nuts and bolts applied with normal assembly or other desired wrench torques. The

(Please turn to Page 87)

COMES THE EVOLUTION



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

ALTER EGO: "Now pity a sorer fate if you can: A vagabond soul in a stay-at-home man." Remember that poem?

Meaning what?

ALTER EGO: Meaning you're that way about arc welding. You'd like to improve your product and enjoy the saving in cost—BUT you'd rather sit comfy with the old familiar production process.

But we haven't the time these days to change barrels while going over Niagara Falls.

ALTER EGO: Then don't change barrels. The most rabid redesign enthusiast will tell you that rede-

sign for arc welding is a matter of evolution, not revolution.

You mean we should do it one step at a time—like learning to walk?

ALTER EGO: Exactly, then when you've perfected the production of one part, take the second step—redesign the next part; and before you know it, you and the product are on the way to town.

• •

LINCOLN SUGGESTS: To the man who thinks he hasn't time or who doesn't know how to change over to welding, we offer this suggestion: See how others, with problems like your own, have started out with welded design. The booklet, "How to Changeover to Welded Design for Profits" (gratis) gives the evidence and a start.

LINCOLN "SHIELD-ARC" WELDING THE LINCOLN ELECTRIC COMPANY
Cleveland, Ohio

Authoritative Information on Design • Production • Welding Equipment

PORCELAIN ENAMELING CONTROL

*How the Average Shop Can
Save \$38.15 per 1000 square feet of Ware*

By E. W. DIETTERLE

Century Vitreous Enamel Co.
6641 South Narragansett
Chicago

■ THE MOST important branch of control work—the power to govern—often is completely overlooked. While many persons can learn to make routine control tests, it truly takes a capable engineer to make such tests and to correlate them to get the best performance in the ware while keeping labor and material costs at a minimum.

In many instances where control procedure has been set up, so long as these routine checks are according to plant standards, nothing happens. This is only half of the control job, however. The remaining half is to determine most efficient use of man-hours and materials. Often this is left as a job for the cost department, but how do men in the cost department know if a solution is spent or still useful, if enamel can be reclaimed, if the job can be done better differently?

These things require a man on the

consultation and supervision at all times. There should be a control engineer to handle checking and to govern all factors involved in process efficiency. All too often there is no man whose particular job it is to correlate all operations for maximum efficiency.

Here are outlined various control tests. How they affect performance, costs and estimated savings is detailed for each. These are presented on the basis of man-hours per 1000 square feet of ware under two headings — for ground coat alone and for ground and cover coat in a 2-coat application.

Size of plant definitely divides control work into two distinct types. In small shops a single ceramic engineer probably takes care of all duties pertaining to control. In the larger shops the ceramic engineer must operate as a supervisor with subordinates doing the actual con-

not be obtainable. Average shops, however, will find most of these savings within their reach.

Figures were checked against two distinct enameling setups from which an average was derived. It should be emphasized that porcelain enameling shops with good control systems cannot expect to obtain maximum savings indicated. Likewise, shops with no control supervision or with exceptionally poor systems may show as much as 25 per cent greater savings than those indicated. However, the accompanying figures will give some idea of what can be expected on an average.

Drawing compounds are as important to the enamel room as to the press department for they can cause serious trouble in pickling and in ground coat application. Control operations should check solubility of the drawing compounds in water, solubility in cleanser, emulsification and saponification characteristics and amount of application which should not be in excess. These tests need not be made constantly but only occasionally as long as the drawing compound has once proved satisfactory and has not been changed. Costs, since the work is not in a continuous routine check, can hardly be estimated and so will be considered added to subsequent control operations.

Estimated Savings: Cost of the cleaning solution will be reduced about 20 cents per 1000 square feet of ware in plants where little or no check has been made on drawing compounds. Assuming the ware was not thoroughly degreased after leaving the pickle room, approximately 20 cents per 1000 feet can be saved on ground coat washoff and \$3 per 1000 feet due to labor loss in the ground operation.

Raw stock condition is important as dents and imperfections from handling and pressing operations can cause great losses in ground

CONTROL operations often fail to produce significant results simply because information obtained is not used TO GOVERN processing work—checks on processing in themselves are worthless unless findings are continually used as a guide to obtain maximum efficiency

job who knows what can and what cannot be done—a man who has time to find out these things and to follow them through. Because of the large volume of materials used in an enamel plant, there can be great waste. On the other hand, skimping can cause disastrous results in the finished product—and it will not be detected unless the necessary records are kept available to the proper man.

A plant superintendent or foreman should not attempt work of this type as he should be available for

control work. To include both groups, an average figure of man-hours per 1000 square feet of ware required to perform a distinct control operation will be used. An average estimated saving will be shown—a figure to be expected if the enameling has never before been under control supervision or if it was under a slipshod checking system where precise control already exists, these figures will

Abstracted from Paper presented at fifth annual Porcelain Enamel Institute forum, University of Illinois, Urbana, Ill., Oct. 16, 17, 18, 1940.

ARE YOU
overlooking
A BET?



BETHANIZED WIRE

Have you been fabricating uncoated wire into some complicated shape . . . and then applying zinc to the formed product to avoid cracking or peeling?

If so, you have been overlooking a chance to improve the quality of your product, and at the same time to reduce manufacturing costs.

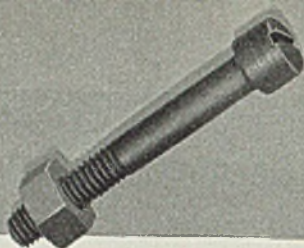
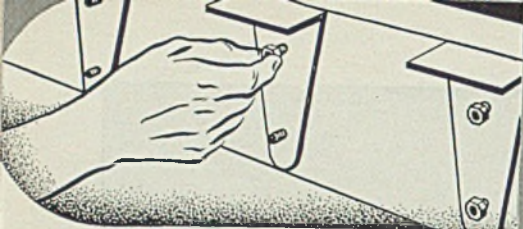
Bethanized wire can be formed into virtually any commercial shape, from brush handles to woven wire fabric, without affecting the flawless condition of its special electrolytic zinc coating. Bethanized wire can be drawn through dies—to a fraction of its size—without impairing the smooth tight character of the bethanized zinc coating.

If you make pail bails, woven wire fabric, conveyor belt, pump chain or any other drastically formed article, bethanized wire has something definite to offer you. The bethanized coating is 99.9+ per cent pure and as ductile as gold leaf. It is uniform in thickness both along and around the wire. It can be applied in any practical predetermined weight (weights double and triple that of Extra-galvanizing are standard bethanized coatings).

Why not investigate the possibilities of using bethanized wire in your own plant? It is saving money and improving products for a steadily growing number of manufacturers.



BETHLEHEM STEEL COMPANY



TIE UP WITH UPSON

and avoid assembly tie-ups

EASY TO ASSEMBLE

You won't experience delays and tie-ups in assembly due to off-size bolts and slow-fitting threads when you use Republic Upson headed and threaded products. These bolts and nuts are made for fast assembly.

Shanks are highly accurate to size — permitting bolts to slide through holes without difficulty. The first bolt tried always fits. There is no need to reach for a second bolt and no reaming.

Because threads are clean and sharp, nuts go on with ease. Bolt heads and nuts are full size. Wrenches fit snugly — prevent slippage.

The next time you need headed and threaded products, order Republic Upson—and see for yourself how well your workmen like them and how they keep assembly work moving.

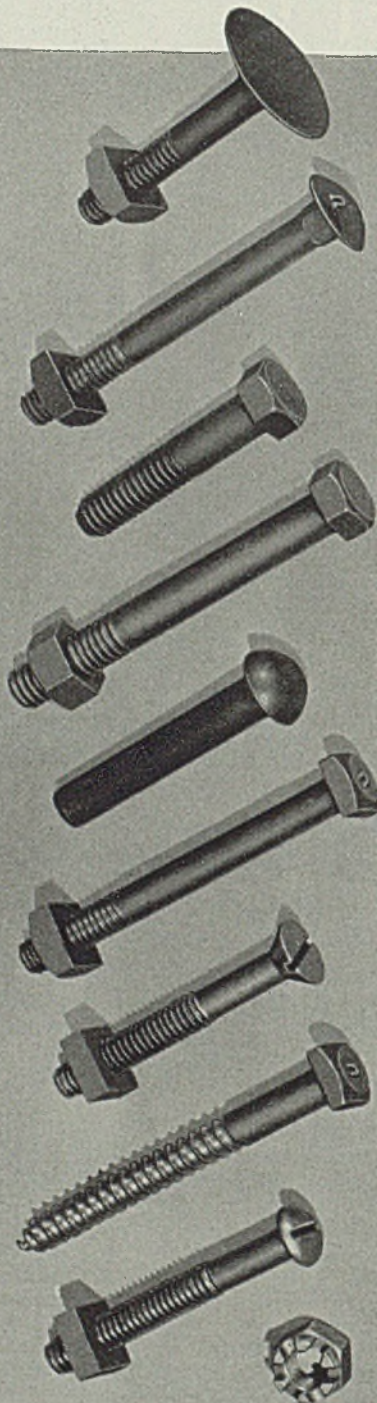
Tie up with Upson—it pays in many ways.

• • •

Write for a copy of Catalog No. 307. It will bring you sizes, weights, specifications and other information on the Republic Upson line. Republic Steel Corporation, Bolt and Nut Division, Cleveland, Ohio.



BERGER MANUFACTURING DIVISION
NILES STEEL PRODUCTS DIVISION
STEEL AND TUBES DIVISION
UNION DRAWN STEEL DIVISION
TRUSCON STEEL COMPANY



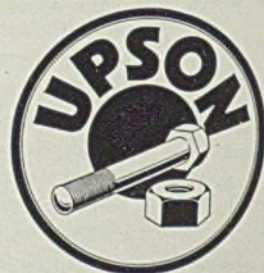
STRONG AND TOUGH

Since the purpose of bolts, nuts and rivets is to hold materials together, with provision for easy dismantling when repairs may be necessary, they must be strong and tough. That Republic Upson headed and threaded products may possess these requisites in needed degrees, Republic produces its own steel processed specifically for bolt making.

Throughout every step of manufacture—from the blast furnace to the final heat treatment—Republic metallurgists check and double-check the qualities of the steel as it moves from operation to operation.

Thus, if your use necessitates a definite strength, toughness or hardness, all you need to do is specify your requirements on your order for Republic Upson bolts and nuts. When you receive the shipment, every item will meet your specifications.

REPUBLIC



HEADED AND THREADED PRODUCTS

OTHER REPUBLIC STEEL PRODUCTS FOR INDUSTRY

Alloy and Carbon Steels, Enduro* Stainless Steel, Republic Double Strength Steel, Toncan* Copper Molybdenum Iron, Pig Iron, Sheets, Strip, Bars (Hot Rolled and Cold Drawn), Pipe, Tubing, Boiler Tubes, Roofing, Wire, Fencing, Conduit, Bins, Shelving, Cabinets, Lockers, Standard Steel Buildings

coat dipping operations. Some form of inspection should be set up.

Control should check work by visual inspection or preferably by a dipping test. While this latter test has not been used in production, it is the only sure means of discovering slightly dented ware which would not otherwise be detected until dipped in ground coat. This inspection would involve a pre-dip tank containing some aqueous solution to be used for ware which will have a cover coat application and where setup involves mass production with great possibility of ware being damaged between press operations and ground dip operation. Such a check would also locate ware not pickled properly.

Any of the grease or other contamination still retained on the surface will prevent the ground coat enamel from draining properly. A large saving can easily result from this installation.

Performance of ordinary visual inspection can be accomplished at press department, pickle room or at the ground-coat dip. The dip test should be done only after the pickle operation for best results. Cost of ordinary inspection involves about 2.00 man-hours per 1000 feet. Cost of a pre-dip setup would require about 1.50 man-hours per 1000 feet.

To estimate savings on this item involves certain assumptions. First, assume that about 13 per cent of finished ware is usually washed off because of dented or dirty stock—an efficiency of about 87 per cent. If it requires 12 man-hours per 1000 feet for ground coat operation, multiplying by 13 percent shows 1.56 man hours lost per 1000 feet. Then to wash off this ground coat enamel from defective ware requires 0.30 man-hours per 1000 feet. If the ground coat enamel is washed down

Cleaner: Control should test for total alkalinity, titrate active and inactive alkali, check soap factor, check surface tension, check cleaning ability, prevent excess carryover, keep low concentrations, proper immersion. These tests should be made every 3 or 4 hours of operation.

The strength of solutions should be recorded. Costs here involve 0.20 man-hours per 1000 feet of ware for testing solutions every 3 hours and

tant saving is made possible by increasing the life of the solution. Also, it is possible to increase the square feet through the acid bath by preventing an overpickle on part of the ware. Another form of waste is the use of live steam to heat the acid bath. Eliminating live steam shows a saving of about 9 cents per 1000 feet. Another 6 cents per 1000 feet can be saved by increasing the life of the solution.

Nickel: Control involves testing

CONTROL and cost information should be tied into shop procedure by an engineer whose job it is to find out —and who has authority to decide —whether a solution is spent or still useful, how enamel can best be reclaimed, whether the job can be done better some other way

allowing time for making additions and periodic examination of the pickled ware.

Estimated savings for a cleaner tank with not enough freeboard and no automatic water valves for keeping the solution at the proper level might be expected to run 20 cents per 1000 feet as result of eliminating wasted cleaner from boiling over or overflowing. Where no distinct control has heretofore been exercised, it would in ordinary circumstances be easy to double the life of a cleaner solution and to show a saving of 20 cents per 1000 feet from this item.

Acid: Control of acid involves testing per cent acidity, testing iron or ferrous sulfate content, watching for grease films, preventing excess carryover, maintaining proper immersion. These tests should be performed every 3 or 4 hours, records

pH, testing nickel concentration, preventing excess carryover, maintaining proper immersion. Performance and costs are mentioned under cleaner.

Estimated Saving: The only method here of showing any sizable saving is to increase the solution life, which can easily be done by installing a filter to eliminate precipitates and scum. A saving of 8 cents per 1000 feet can be expected from this item.

Neutralizer: Control involves testing for alkalinity and checking pick-up at the ground coat dip. Performance and cost are same as for cleanser, mentioned above.

Estimated Saving: As in previous instances, the only saving accomplished is by increasing solution life. Here a suitable filter system will eliminate precipitates in the solution and show a saving of about 1.6 cents per 1000 feet.

Water: When no continuous overflow of water is used, the rinse should be checked at the halfway period of the shift for alkalinity or acidity, depending on the type of rinse. A meter should be available to check water consumption periodically. Performance and cost are same as mentioned under cleaner.

Estimated Saving: If running water is reduced to a minimum and all waste checked, a saving of about 1.6 cents per 1000 feet of ware can be shown.

Mill Room: Control here involves recording of mill formula and the making of a fired sample of each mill charge, as well as checking specific gravity, fineness, aging of enamels, screens of the roto-spray, ball charges, mill lining and workability of bisque cover coat. First four tests should be made on each mill charge. A definite routine of how many times or when to make

DATA presented here show 6 to 7 per cent total payroll man-hours should be allowed for control work, and 4 to 5 per cent more for clerking and supervision of control work. This total of 10 to 12 per cent will show average savings equivalent to 7.5 man-hours for each man-hour used for control

the drain, there is an additional loss of 56 cents per 1000 feet.

Pickle room tests, like all other control operations, are not absolutely foolproof for there are so many ways of making tests and so many different types of tests used in the industry that it remains for the individual plant to choose its own standards. It would be hopeless to try to cover all the different tests.

and costs kept as mentioned under cleaner.

Estimated Saving: With present day pickle room practice improving, it is believed most plants could work their acid solutions much longer than they do. Acid baths have been used until the iron content tested 20 per cent ferrous sulfate with still no signs of trouble, no copper heading or fish scale. Thus an impor-

TABLE I—Cost Analysis

	Cost Man-Hrs. Per 1000 sq. ft.	Saving of Material in \$ per 1000 sq. ft. as result of control	Column 3 converted to Man Hrs. by dividing by \$.80 hourly wage rate	Saving of Man- Hrs. as result of control	Saving Man-Hours Per 1000 sq. ft. Total of Column 4 and 5 for Cover Coat Ware (Ground Incl.)	Ground Coat Ware only
Drawing Compound . . . . .	....	0.20	....	....	....	....
.....	....	0.20	....	....	....	....
.....	....	3.00	4.25	....	4.25	4.25
Raw Stock	1.50	0.56	0.70	1.56	....	....
.....	....	....	....	0.30	2.56	2.56
Pickle	0.20	0.20	....	....	....	....
Cleaner . . . . .	....	0.20	....	....	....	....
.....	....	0.20	0.50	....	0.50	0.50
Acid . . . . .	....	0.09	....	....	....	....
.....	....	0.07	0.20	....	0.20	0.20
Nickel . . . . .	....	0.08	0.10	....	0.10	0.10
Neutralizer . . . . .	....	0.016	0.02	....	0.02	0.02
Water . . . . .	....	0.016	0.02	....	0.02	0.02
Mill Room	0.05	....	....	0.56	0.56	0.16
Ground	0.30	0.40	....	....	....	....
.....	....	0.32	....	....	....	....
.....	....	0.20	1.13	....	1.13	1.13
Furnaces	0.02	0.20	0.25	....	0.25	0.08
Driers . . . . .	....	1.20	1.50	....	1.50	1.00
Cover Coat Setup	1.00	....	....	....	....	....
Spraying	0.20	10.00	12.50	....	12.50	....
Washoff . . . . .	....	0.16	0.20	4.00	4.20	....
Inspect Rework	0.70	....	....	5.00	5.00	....
Performance	0.13	....	....	10.00	10.00	....
Time Study	0.13	....	....	....	....	....
.....	....	1.40	....	7.50	7.50	....
Ceramic Engineer	0.13	0.40	....	....	....	....
.....
Total	0.96	6.71	17.20	21.37	28.92	10.02

control tests on the last five items is not possible but should be carried out as often as is reasonable. Cost of these control tests involves about 0.05 man-hours per 1000 feet of ground coat ware and about 0.10 man-hours per 1000 feet of cover coat ware.

Estimated Saving: Grinding time of mill charges can be reduced about 25 per cent by controlling the frit charge, ball charge and ball sizes—a saving of about 0.16 man-hours for ground coat and 0.40 man-hours for cover coat, per 1000 feet. Only other saving that can be made is to reclaim the enamel washed out of mills, spray barrels, enamel containers, rotosprays and magnetic separators.

Ground-Coat Enamel: Control usually involves a check on dipping, weights, water content, specific gravity, setup, lumps and contamination. The dipping weight should be checked for each new vat of enamel and at least every hour of operation thereafter. Water content should be checked for each new vat of enamel as well as the specific gravity and length of drain. For combating lumps or contamination in the enamel, the ground coat should be sieved through a screen while it is being put in the vat and a recirculating system for screening the enamel while in operation also should be used. Cost of these control duties on ground coat is about 0.30 man-hours per 1000 feet.

Estimated Saving: Largest saving that can be made on ground coat is reducing excess weight of applica-

tion — accomplished by several means. Too high a burning temperature will necessitate a heavy coat of enamel to cover the ware properly. Excess enamel also may be used through carelessness or because the enamel is not in proper working condition. A saving of about 40 cents per 1000 feet can be obtained. Ground-coat enamel washed off conveyor carriers and drainboards can be reclaimed at a saving of about \$0.32 per 1000 feet. Another sure way of making a saving is to use a ground coat formula with nepheline cyanite, which lowers the cost per pound of the milled enamel to permit a saving of about 20 cents per 1000 feet of ware.

Furnaces: Control here involves a check on burning temperatures, burning time, combustion, contamination from scale and dirt. Temperatures should be checked every 15 minutes with a constant type of load on a continuous furnace and checked also whenever the load is decreased or increased or whenever the ware is hung differently as that changes the baffling and may allow the heat to escape more or less freely. Quality of burning is easily checked by the appearance of the fired ware as it emerges from the furnace. Combustion is checked by flue gas analysis every three or four weeks unless the gas mixture is changed. Whenever contamination is found as result of firing conditions, it should be eliminated by a cleanup program as soon as possible.

Cost of watching furnace temperature and burning is low since it re-

quires only a small portion of the burner's time. Checking combustion requires about 0.06 man-hours per 1000 feet of ware.

Estimated Saving: A close check-up on fuel combustion of furnaces results in a saving of 20 cents per 1000 feet.

Driers: Control here involves checking temperature and contamination. Temperature can be controlled automatically and needs only be checked from winter to summer to compensate for various heat demands.

Contamination of ware from wheels and rails should be checked occasionally. Cost of these operations is too small to be included.

Estimated Saving: The only sizable saving in connection with driers is by eliminating the use of direct heat and by employing secondary heat such as waste heat from the furnaces. This can easily save \$1.20 per 1000 feet of ware.

Cover-Coat Enamel for Sprayers: Control involves checking specific gravity setup, water content and spraying qualities of enamel. These tests should be made on a spray barrel of enamel immediately prior to its use. Cost is about 1.00 man hours per 1000 feet of ware.

Estimated Saving: While no direct saving can be assigned to this work, it definitely is important in quality spraying. Improperly prepared enamel can cause considerable loss of time and increased washoff through faulty spraying.

Cover-Coat Spray: Control of spray weight and overspray here are important. Spray weight or application should be checked at least every half hour and whenever a new spray barrel is placed in production. Waste or overspray depends on efficiency of the operator or on the setting of the automatic spray machine. Cost of controlling spray weights is about 0.20 man-hours per 1000 feet of ware.

Estimated Saving: The important saving of \$10 per 1000 feet of ware can be made by reclaiming overspray enamel instead of dumping it out. Any shop should go after this item as it really amounts to something.

Washoff: Control involves keeping records of ware damaged by sprayers, brushes and furnace. From these records, the causes can be determined and eliminated. Cost required for checking on this operation is so small it need not be charged to the performance.

Estimated Saving: Assuming that 10 per cent of all ware sprayed is returned for washoff, it would require about 0.08 man-hours to remove the bisque enamel, and the enamel wasted would be equivalent to about 4.00 man-hours per 1000 feet. These savings are based on

If you want to speed up
your business and lead the rest



then find out today
what G-E
Fluorescent Lighting
can do for you —

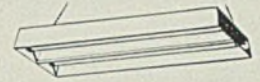
THERE are two ways to speed up production schedules in your plant... regardless of the kind of plant it is. One is to train new employees and buy new equipment and enlarge your plant. The other way—while you're waiting to do all this—is to put in G-E Fluorescent Lighting! Does that sound too simple? It is simple. People can see faster and work more efficiently when they have plenty of light. And with G-E Fluorescent Lighting you can have more light than you ever had before! Light that in color, quality, and coolness, in over-all diffusion, is the closest practical approach to actual daylight ever devised!

When can you get it? Now, tomorrow! Your G-E MAZDA lamp distributor can show you a full line of approved fluorescent fixtures, ready to hang up and use with G-E MAZDA F (Fluorescent) lamps. And that's vitally important. If you want the full benefits of General Electric lighting knowledge and leadership, be sure you actually get G-E MAZDA lamps. They assure maximum light output for current consumed and they're made to stay brighter longer! If you want to speed up your business, phone your G-E lamp man or your power company today, or mail the coupon for the inside story of the most exciting new kind of light developed in the past 61 years!

**COMPLETE FIXTURES
NOW AVAILABLE**



Industrial unit, 100 watts, using two 40-watt, 48-inch G-E MAZDA F lamps.



Industrial unit, 75 watts, using two 30-watt, 36-inch G-E MAZDA F lamps.



Industrial unit, 100 watts, using two 40-watt, 48-inch G-E MAZDA F lamps.



This label identifies Fleur-O-Lier fixtures, made by over 35 experienced manufacturers, and certified by Electrical Testing Laboratories as meeting 50 specifications set up by MAZDA lamp manufacturers, when equipped with ballasts and starters certified by E. T. L.

The certified fluorescent fixtures shown above are only a few of the many complete fixtures now available through G-E MAZDA lamp distributors. G. E. does not make fixtures but is glad to recommend Fleur-O-Liers and RLM Industrial Fixtures.



**PRICES REDUCED ON
G-E MAZDA LAMPS**

On June 1, 1940, General Electric announced sweeping price reductions on Fluorescent and many other types of G-E MAZDA lamps for home and business, including Mercury Vapor and Silvered Bowl MAZDA lamps.

G-E MAZDA Lamps are recommended for use only with equipment providing good power factor, such as Fleur-O-Liers, or RLM Industrial Fixtures.

A WORD OF ADVICE

Be sure you get G-E MAZDA F lamps, made to assure maximum light output and stay brighter longer. Remember, unless they have the G-E monogram they're not G-E MAZDA lamps!

G-E MAZDA LAMPS
GENERAL ELECTRIC

General Electric Company, Dept. 166-S-L
Nela Park, Cleveland, Ohio
Please mail, without obligation, complete information about
G-E Fluorescent lighting for your plant.

Name _____

Name of firm _____

Address _____

the assumption that the washoff is reduced to 5 per cent.

The next three operations listed usually are not considered control work. However, they are controllable items.

Rework Inspection: Control involves checking performance of ware, type of rejects, thickness. It includes making classification of rejects, recording the ware passed and the ware rejected, and use of a thickness gage. Cost is about 0.70 man-hours per 1000 feet of ware.

Estimated Savings: By reducing amount of rework one-half, a saving of 5.00 man-hours will be obtained in patching ware as usually only 10.00 man-hours could be expected.

Enamel Shop Performance: Control here means checking pounds of ground coat used per square foot, also pounds used per square foot of cover coat, fuel used, good ware, rejects, scrap and quality. These items can easily be taken care of by producing the necessary data for computation. Cost is about 0.40 man-hours per 1000 feet.

Time Study: Control involves bonus system or piece rates. Cost in man-hours to check the above items would be about 0.40 for bonus and about 1.40 man-hours per 1000

square feet for piece work rates in determining the efficiency of the operation. At least a 10 per cent saving should result from such a system, and this would save about 7.50 man-hours per 1000 square feet.

Ceramic Engineer: Cost involves 0.40 man-hours per 1000 square feet for supervision and control.

Summary: All these cost figures are summarized in Table I. Remember that the data concerning estimated savings refers to a plant operating with no distinct control, or having control but disregarding efficiency of operations.

Figures presented here are not guesses because these figures would have to be increased 25 per cent on each control item mentioned in a number of instances known to date.

However, with such data in mind, an attempt has been made to establish an average figure — one that could be obtained in many instances — as was previously pointed out.

Table I considers two types of ware: Ground-coat ware, such as linings, is a finished product obtained in one firing. Cover-coat ware receives one ground coat and two applications of cover coat before completion. Considering only the cover-coat data—it requires 6.7 man-hours

per 1000 square feet of ware for control work, which in turn produces a saving of 50.29 man-hours. Thus 7.5 man-hours are saved for each man-hour used for control.

The time required for doing control work on shop performance, time study and supervision of (2.60 man-hours) is really the only time that need be added directly to a payroll as nearly all other hours charged to control already are on the payroll in some form or other. Therefore, by subtracting 2.60 hours for purpose of clerking and control supervision, one should still attain a net saving of 47.69 man-hours per 1000 square feet of ware. Converting this to dollars using 80 cents per hour wage rate, a saving of \$38.15 per 1000 square feet of ware is shown. . . This square foot value refers to blank square feet and not surface square feet.

From the data shown above, 6 to 7 per cent of the total man-hours on the payroll should be allowed for control work, and 4 to 5 per cent for clerking and supervision of control work. This makes a total of 10 to 12 per cent for the complete setup as detailed above. It appears a paying proposition any way you look at it.

Modern Cave Dwellers Please Note

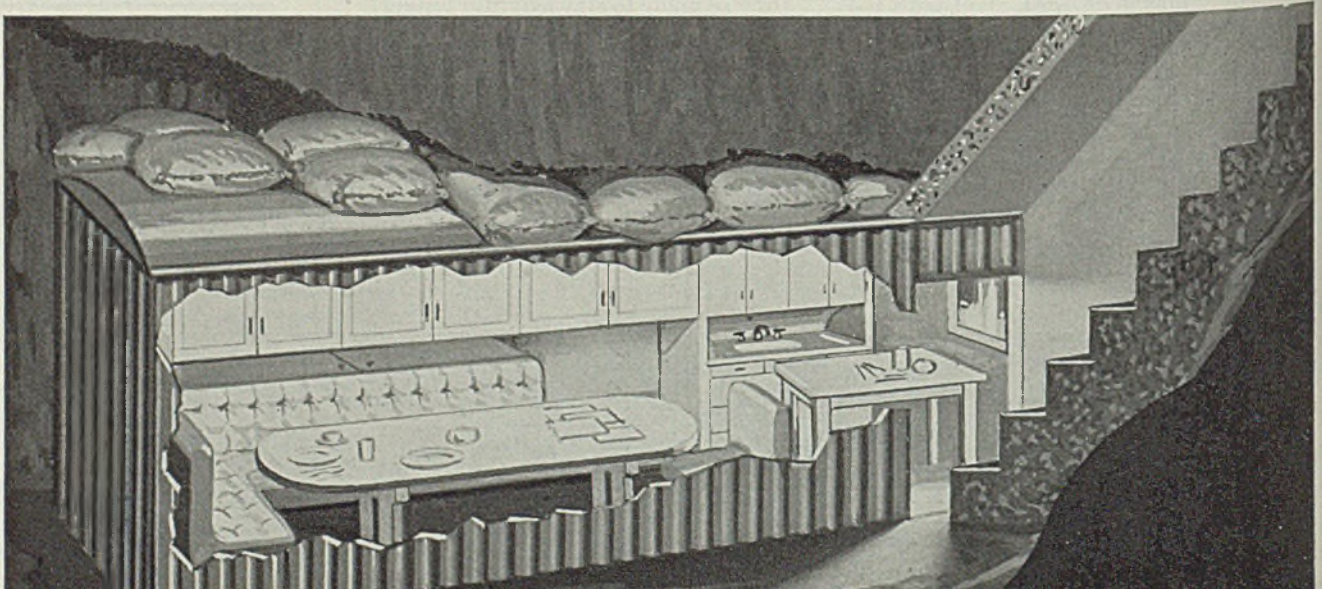
■ ACCOMPANYING illustration shows phantom view of an all-steel air raid shelter developed by Wean Engineering Co. Inc., Warren, O. Units are installed underground as shown and topped with either sandbags or an independently supported slab of reinforced concrete over the roof. Standard units measuring 8 x 12 feet contain about 3500 pounds of corrugated sheet steel approximately $\frac{3}{8}$ -inch thick. Units are made in sections, largest piece of which will not weigh more than 100

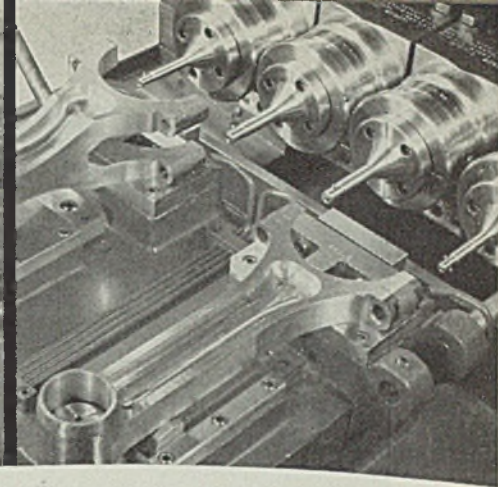
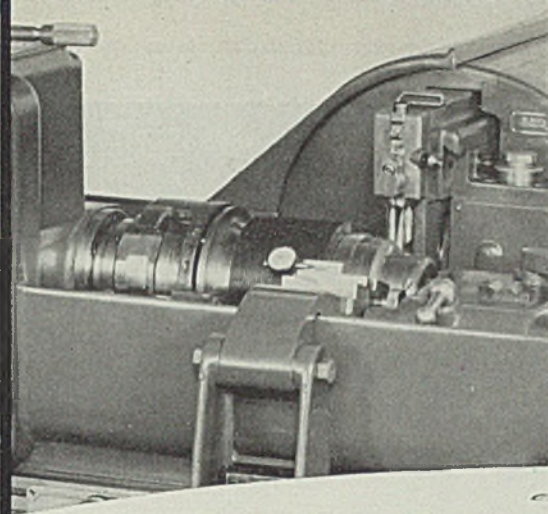
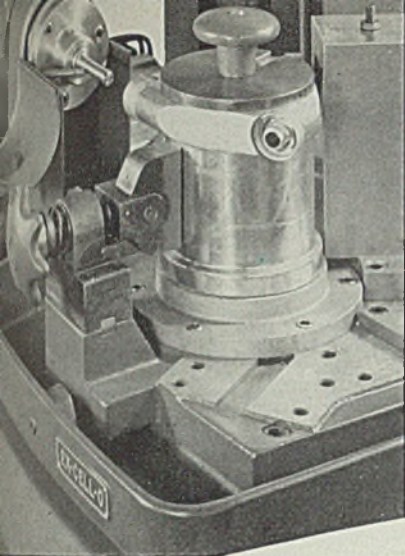
pounds, so sections can be handled and assembled by hand without the use of any mechanical equipment. Units are set on a 2-inch plank floor.

Service facilities include those available for use in automobile trailers. As shown in the accompanying illustration, these include a small folding table, a sleeping bunk that could be changed into a davenport, miscellaneous chairs, as well as kitchen and toilet facilities. A small heating unit of a type that would not give off fumes would be

used. Of course the shelter proper is available without service facilities if desired.

It is believed that the 8 x 12-foot unit is ample for an average small family. For larger requirements, the units would be available in multiple lengths, maintaining the 8-foot width. Also double width multiple assemblies could be made employing a center row of supporting columns. These then would be 16 feet wide with length some multiple of 12 feet.





Ex-Cell-O Boring precision machine

Precision... COMES INTO ITS OWN!

IN a practical way, an Ex-Cell-O Precision Machine represents a basic requirement of modern industry—*extreme accuracy in measurement*. Without exceedingly fine measurements—as available with every Ex-Cell-O machine—and the interchangeability of parts that such precision allows, today's mass production of manufactured products would be impossible . . . the vital high production speed on which the success of our nation's defense

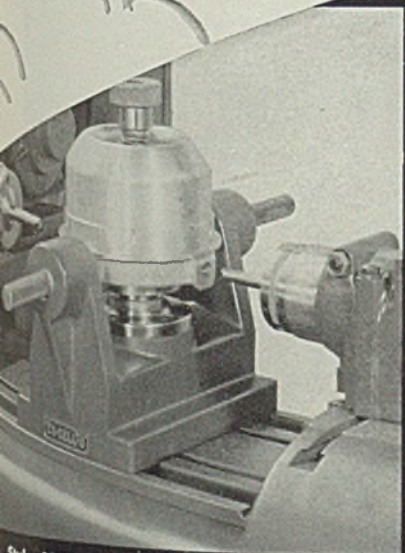
program now depends could not possibly be attained. Ex-Cell-O is a pioneer in constantly developing high standards of precision performance with machine tools. This is why today—in quantity production of vital parts for airplanes, automobiles, tractors, and almost every other major product requiring metal parts held to close possible limits—Ex-Cell-O Precision Machines and Tools are being widely used in all the important industries. If your problem is one that involves the making of precision metal parts on a high-speed, economical basis, you will find it well worth-while to consult Ex-Cell-O

EX-CELL-O CORPORATION • 1228 OAKMAN BLVD. • DETROIT, MICH

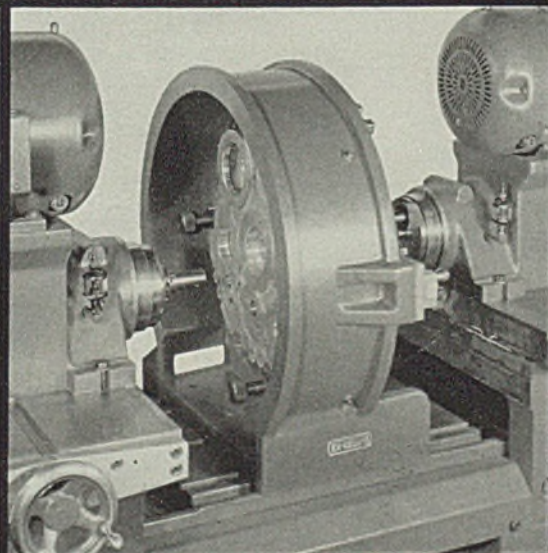


Airplane slud being ground from the solid on battery of Ex-Cell-O Style 33 Precision Automatic Thread Grinders.

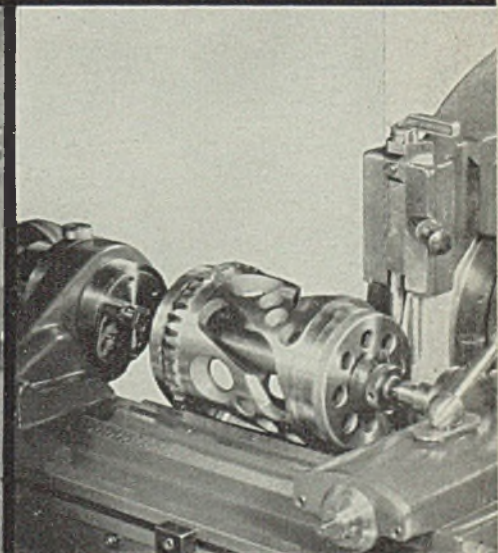
Turning and chamfering aluminum piston for liquid cooled aircraft engine on an Ex-Cell-O Precision Boring Machine.



Style 1212 Precision Boring Machine finish boring holes in aluminum piston assembly for hydromatic propellers.



Ex-Cell-O Machine rough and finish boring, chamfering and facing magnesium alloy rear case for aircraft engine.



A 12 pitch thread being ground from the solid on rotating propeller cam on 31 Ex-Cell-O Precision Thread Grinder.

EX-CELL-O Precision

MACHINES AND TOOLS

EX-CELL-O CORPORATION
1228 Oakman Blvd., Detroit, Michigan

Please send bulletins on Thread Grinding and Precision Boring.

Name _____ Title _____

Company _____

Address _____

Don't let anybody talk you out of using **MO-MAX** Molybdenum Tungsten high speed steels.

WE thought we knew all about **MO-MAX** steels a long time before we began to use them. I regret the delay. One day our tool engineer had some of our pieceworkers supplied with **MO-MAX** bits. That settled it. With less time out for changing tools — cutting more metal between grinds — the pieceworkers and we both wanted more **MO-MAX**. Now nearly all our high speed tools are made of these steels. We found **MO-MAX** suitable for any application for which other high speed steels have been successful and our new tools average twenty per cent higher in efficiency. Nobody is going to talk us out of that gain. Don't let anybody stop you.



MO-MAX
TRADE MARK REG. U. S. PAT. OFF.

**MOLYBDENUM-TUNGSTEN
HIGH SPEED STEELS**

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

CD-218

STEEL

Anti-Aircraft Guns

(Concluded from Page 50)

ward the front of the gun by a system of troughing.

From the manufacturing standpoint, the intricate character of many of the components of the 40-millimeter gun presents unusual difficulties.

In one factory the machine tools are grouped according to type in separate sections for milling, drilling, turning, boring, planing, etc. In the gun-barrel section, however, the output required makes it essential for production to be carried out on the flow system. The barrel naturally wears much more rapidly than the other units which comprise the gun assembly, and must be renewed from time to time. Several barrels are therefore manufactured for each gun, and the forgings are passed from machine to machine in regular sequence for the various boring, turning, honing, rifling and other operations.

Barrel Boring and Turning: The barrel of the 40-millimeter gun is machined from a forging of alloy steel containing 2 to 3 per cent nickel, 0.5 per cent chromium and 0.5 per cent molybdenum. When the forgings arrive at the factory, they have already been rough-turned and heat-treated. A length of 10 inches is allowed on each end of the forging for testing. In addition to passing analysis tests, the material is required to have a minimum tensile strength of 40 tons per square inch, with a minimum elongation of 15 per cent on the standard test length, and not less than 20 foot-pounds impact value.

The forgings are cut to length in the stores, where power saws are installed. The finished length of the barrel, excluding the flash guard, is about 7 feet 6 inches. Suitable machining allowances are left on each end.

The most important requirement of the gun barrel is a straight bore of accurate diameter. During machining, the bore is held carefully to the permitted limits at each stage, and is used as the datum for external operations on the forging. In the first instance, a hole of 1.4 inches diameter is bored through the solid forging; twin-spindle horizontal boring machines are used.

The boring bar is fed into the work at a speed of 12 inches per hour, while the work speed is 125 revolutions per minute. Soluble oil coolant is forced through the bar at sufficient pressure to flush the cuttings from the bore. After roughing the bore to a diameter of 1.4 inches the forging is rough turned.

Testing the Bore for Alignment: Before further boring, the bearing diameters required for holding the work in position on the bor-

ing machine are turned and the bore tested for alignment. For this operation, a lathe is used. The work is held in a chuck and is supported at the other end by a running steady. A length of steel tubing is used, which is pivoted on a pin held in the tool-box on the cross slide. The end of the tube which engages the bore has a ball-shaped piece welded to it, and the weight of the tube keeps the ball in engagement with the bore. The outer end of the tube is flattened to provide for application of a dial gage.

In operation, the work is revolved slowly, and the tube is set so the ball end engages the bore at various points along its length. Any errors of alignment will cause the tube to pivot about the supporting pin when the work is revolving and the movement will be indicated by the finger of the dial gage. The maximum error in alignment permitted is between 0.010 and 0.015-inch.

When it is found necessary to correct the alignment of the bore, a power press is used. This machine carries two roller supports for the ends of the forging, and these enable it to be turned, as required, during operation.

Draw Boring: The boring operations on the forging after correcting the alignment are done by the draw boring method, whereby the boring tools are pulled through the work. The cutting tools are steadied by a pilot which follows them through the bore. Before it is pos-

sible to commence draw boring, it is necessary to open out the bore at the starting end for the accommodation of the pilot.

Honing the Barrel: For the honing operation, the work is held stationary and a combined rotating and reciprocating motion is imparted to the hone in the bore. The hone is carried by a slide mounted on the ways of the machine, and the movements are controlled by a lever, arranged conveniently near the point at which it enters the work.

Finishing the Exterior of the Barrel: The external form of the barrel is completed either by grinding or by turning, but before this operation is carried out it is semi-finish turned.

Other important operations are the machining of the breech end of the barrel and the formation of the chamber for the shell case at the breech end of the barrel. Very careful gaging is required to check the chamber. The final, principal operation is the machining of 16 rifling grooves in the bore, the helix angle of which is not constant but increases from one turn in 45 diameters at the breech end to one turn in 30 diameters at the muzzle.

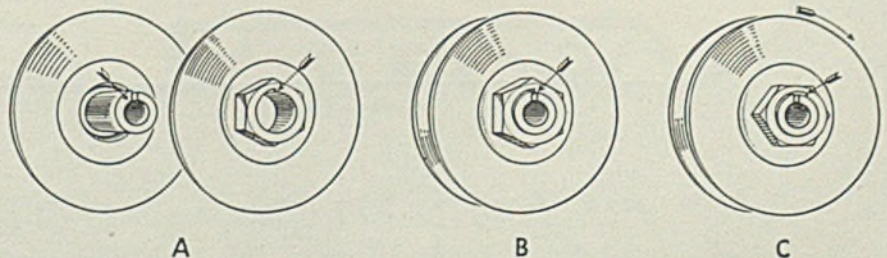
There are many interesting operations involved in the production of the other components of the Bofors gun, but the barrel is of major importance and its manufacture is the biggest item, in view of the fact that as many as ten barrels are supplied with each gun.

Fastens Pulley to Shaft Without Keys

By using a spiral locking principle on its adjustable pitch diameter pulley, Herman & Bartels Co., Dayton, O., has eliminated the necessity of threading for variable pitch adjustment, doing away with all keys and set screws for fastening the pulley to the motor shaft. Assembling, pitch adjusting and fastening are all accomplished in one simple operation.

As illustrated, the assembly opera-

Assembling, pitch adjusting and fastening are all done in one operation by use of this new pulley design. Photo courtesy New Jersey Zinc Co., 100 Front street, New York



tion consists merely of slipping one half of the pulley over the hub which is an integral part of the other half, see A. It will be noticed that the outer circumference of the hub and the inner circumference of the pulley are true spiral surfaces, having a fixed rise per degree of curvature, B. The one half is slid on the hub to the desired point indicated by hub calibrations for the proper working diameter, C. This half is then given a twist to the right which causes the two spiral surfaces to wedge against each other.

As the tightening increases, the pulley hub is actually slightly deformed inward to form a chucking grip on the motor shaft and securely lock the entire assembly.

Successful Bidders...



IF you are one of the successful bidders for a big defense or supply order, you are faced with the problem of expanding production with unseasoned workers. It takes time to train men . . . and time is not to be had.

How can you help these new men to maintain output of uniform quality which will win inspector-approval? What can you do to avoid mistakes and re-runs that may wreck tight production schedules?

A speedy, time-proved route to uniform production is through automatic control and recording instruments. Foxboro instruments provide a positive control which assures uniform quality to any pre-determined standard. With the proper instruments as a guide, all operators are able to control the quality of their work at every stage of the process. Cumulative errors are avoided—uniformity and quality of finished products are assured.

Take advantage now of the vast experience of Foxboro engineers to provide the right instruments for your requirements. They have at their disposal the most complete line of indicating, recording and controlling instruments to handle any operation from the simplest to the most complex. The Foxboro Company, 118 Neponset Avenue, Foxboro, Mass., U.S.A. Branch offices in 25 principal cities.



recording • controlling •

Here's Your Answer!

**How to Maintain Quality Output
with Unseasoned Operators!**

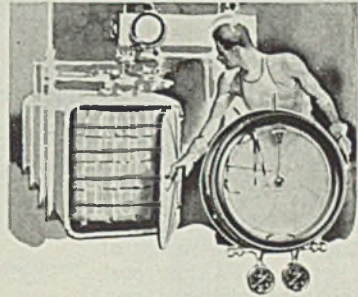
for example



A Metal Products maker writes: "Before we installed Foxboro Recording Pyrometers, we never knew whether our goods received proper heat treatment. Now we are absolutely certain every minute."



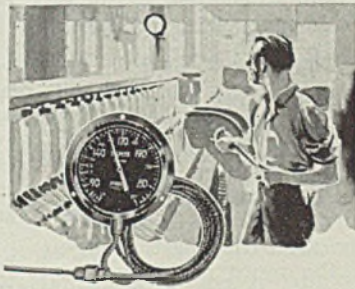
A Steel Mill obtained marked increase in pickling uniformity by installing Foxboro Non-Recording Pyrometer Controllers. The superintendent states: "We would not consider operating again by hand control."



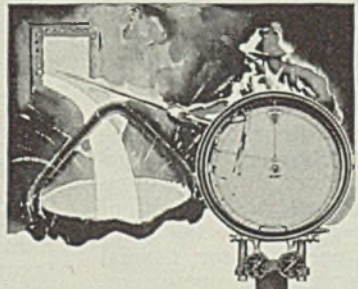
From a Food Packer: "The Foxboro Recorder-Controller is responsible for the outstanding achievement of dispensing with manual control . . . with the result that absolute uniformity is maintained."



A Solvents producer says: "We installed Foxboro Potentiometer Recorders for our furnace process. It has controlled temperature to within 3°C. and resulted in improved quality and less production loss."



A Textile maker writes: "We recently ordered additional Foxboro Indicating Thermometers. We would appreciate it if you would get these to us early, as they are of great assistance in keeping our cloth uniform."



A Foundry comments: "Our experience with your Air Weight Controller has been of great benefit. We have been able to run identical heats for 16 months, and have no fear of pouring off iron at any time."

IN thousands of other instances also, Foxboro is helping manufacturers to get better quality and cut costs. If *your* problems involve temperature, pressure, flow or liquid level, we can help you. Discuss it with our engineers.

FOXBORO

REG. U. S. PAT. OFF.

indicating instruments



Dephosphorization

Inexpensive method is developed for reducing phosphorus content of bessemer steel by separating the siliceous slag from the metal at end of blowing period and then adding basic materials

■ BLAST FURNACES burdened on bessemer iron usually operate on a mixture of three or four ores and the finished steel has a natural phosphorus content in the range of 0.085 to 0.100 per cent. A low cost method for dephosphorizing a portion of the bessemer tonnage for uses to which the normal grade of steel is not adapted has been sought by the industry for many years. The Wheeling Steel Corp. has developed a process operating along these lines at Benwood, W. Va. plant and during the past three years about 250,000 tons of low-phosphorus steel has been produced and applied to products where a low phosphorus content is required.

The silicon content of the iron used in connection with an unmelted dephosphorizing addition requires an upward adjustment of about 0.25 per cent above the minimum of 1.00 per cent for normal practice during regular operations. An increase of 0.35 to 0.50 per cent silicon is required on starting up turns after the week-end shutdown period. This is in connection with small converters making 6 to 8.5 ton heats. Larger vessels should be able to operate with a lower silicon iron.

A mixture of 40 to 50 per cent direct metal and 50 to 60 per cent cupola metal is charged for each blow; the metal analyzes as follows:

Element, %	Direct Metal	Cupola Metal
Silicon	1.50-1.70	1.15-1.25
Manganese	0.60-0.65	0.45-0.55
Phosphorus	0.085-0.095	0.090-0.100
Sulphur	0.020-0.040	0.055-0.065

The charge of controlled iron is poured into the converter and after turning up to start the blow the scrap is added. When making a heat of normal phosphorus content the average scrap charge is 1500 pounds

By GORDON M. YOCOM
Superintendent
Steelworks and Rolling Mills
Wheeling Steel Corp.
Benwood, W. Va.

for the 6.5-ton heats. When making a dephosphorized heat the scrap charge is reduced 1000 pounds to provide the excess metal temperature for melting the 500 pounds of dephosphorizing mixture. The scrap addition is reduced 600 pounds for a 350-pound dephosphorizing addition.

Blow Terminated Early

The dephosphorized heats are blown young, i. e. the vessel is turned down from one to six seconds after the first change appears. When the silicon is in the lower range of the specification the blow is terminated immediately after the first change because of the more rapid change taking place at this period with low silicon iron. When the silicon is in the high side of the range the blow is terminated about six seconds after the first change appears because the higher silicon iron tends to drag out the change point to a considerable degree. With the average iron of medium silicon content the blow is stopped from three to four seconds after the first change point. These slight variations may appear rather small and unimportant but nevertheless they tend to compensate for some of the variations in the iron and result in a more uniform degree of oxidation in the blown metal.

The converter slags are always

From a paper presented before the Iron and Steel division, American Institute of Mining and Metallurgical Engineers, Hotel Cleveland, Cleveland, Oct. 21.

thick and viscous and analyze as follows:

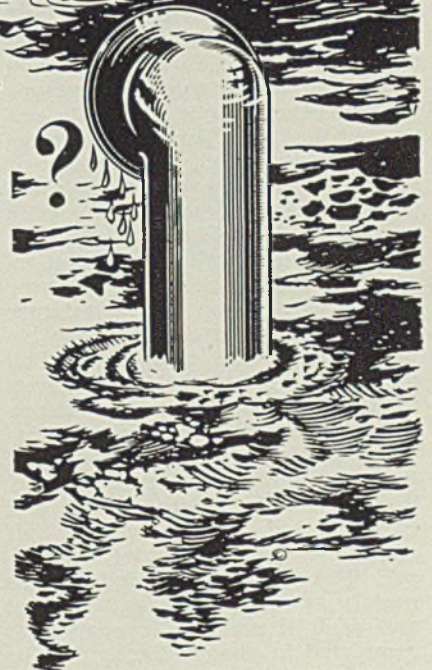
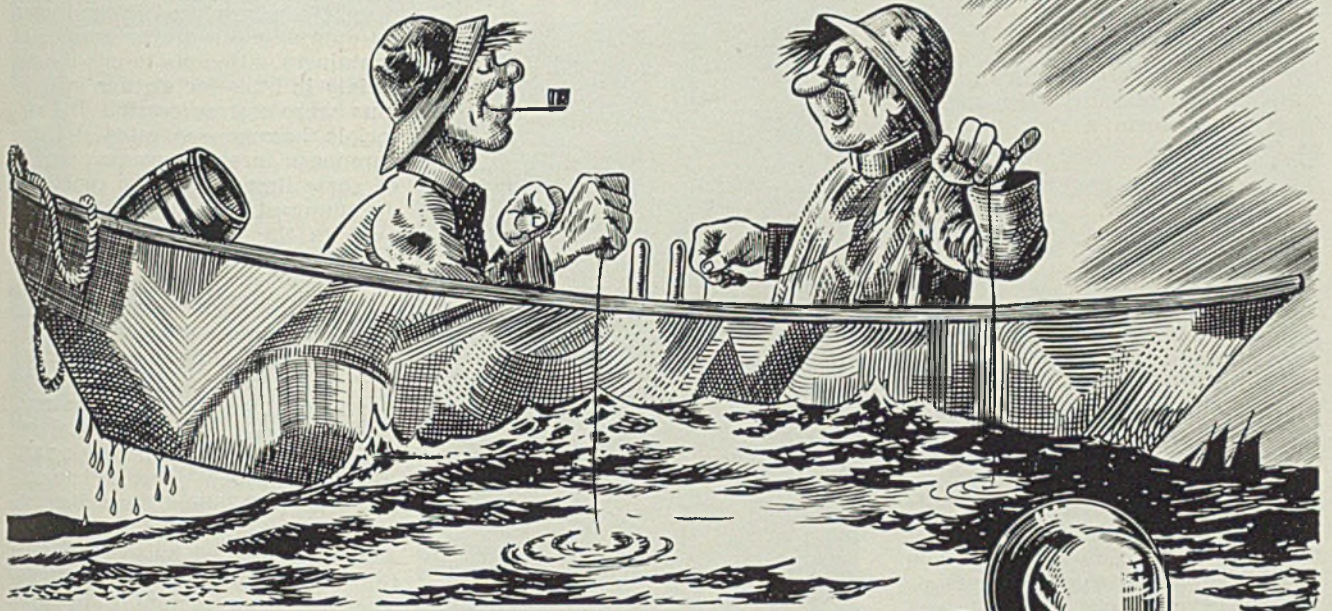
Compound	Per cent
SiO ₂	63-68
FeO	12-18
MnO	12-18
Fe ₂ O ₃	1-2
Al ₂ O ₃	2-3

The controlled ratio of Si to Mn in the iron along with the young blowing practice produce a slag of uniform composition, with the iron and manganese oxide contents in a desirable range. A lower manganese oxide automatically causes an increase in the iron oxide, and vice-versa. The slag remains thick, or heavy, because a proper proportion of acids to basis is maintained. This relation does not vary due to the control over the metalloids in the iron from which these oxides are formed.

After the vessel is turned down a block of wood attached to a long rod is inserted in the nose of the vessel. The block is 4 x 4 inches square and slightly longer than the distance across the nose at a point a few inches above the pouring lip. A light rod is attached to the block at an angle sufficient to allow the slag man to stand far enough to one side to avoid the heat. The only manual labor required is the lifting of the block over to the inside of the nose and dropping it into place. The nose is kept built up to a U-shape at this point to provide a shoulder for each end of the block to rest against when the vessel is in the pouring position. When the vessel is lowered to pour the blown metal into the ladle the thick slag floats forward against the block which prevents the slag from entering the steel ladle.

Having affected a complete separation of slag and metal in an inex-

COAT OF CAMOUFLAGE



Dictionaries of the English language published before 1914 do not contain the word "camouflage." It seems that the word was lifted from the French, and means to conceal, disguise or hide. When ships sailed through submarine infested waters, they wore coats of camouflage in an effort to escape U-boats. Applied to ships, camouflage coats were surrealist dreams. Painters armed themselves with brushes and paint and went hog-wild; this must have been the dawn of modern art. Once a ship was painted to resemble nothing in the heavens above nor the earth beneath nor the waters down under the earth, a submarine commander who viewed it through his periscope was stumped: he wouldn't know if the vessel were a mile away or 100 yards distant, or if it were coming or going. Men who went down to the sea in ships placed great faith in camouflage; it was a protective coating that meant a measure of security against human enemies under the deep. With HANLON-GREGORY HOT DIP GALVANIZING, ferrous metals gain more than a measure of security: they gain ABSOLUTE PROTECTION for years and years. Metals galvanized by the HANLON-GREGORY HOT DIP process wear more than a protective coating; the zinc becomes an INSEPARABLE PART of the base metal, and corrosion doesn't have a chance. If you care to drop us a line, we can tell you about cases where galvanizing has been protecting ferrous metal since before "camouflage" became part of our language.

HANLON-GREGORY
PITTSBURGH



GALVANIZING CO.
PENNA.

pensive manner, the dephosphorization proceeds rapidly and uniformly from heat to heat without delays or interruptions in the cycle. The dephosphorizing material is added to the stream of metal as it is being poured from the converter into the steel ladle. The mixture used consists of:

Material	Per cent
Impure lime	50
Roll scale, (dried)	30
Flux, (dried)	20

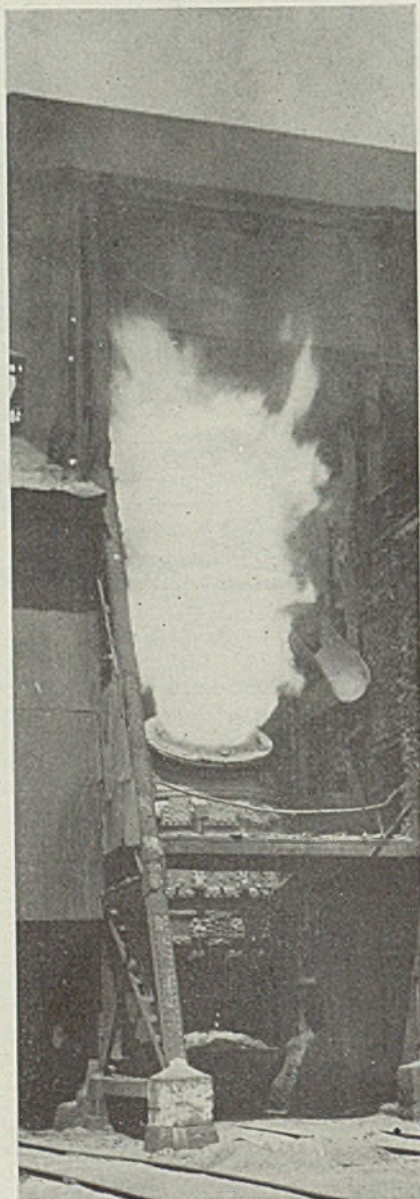
This mixture is added in the cold state. Such a mixture when melted together to form a slag, analyzes as follows:

Compound	Per Cent
CaO	48
Fe ₂ O ₃	28
SiO ₂	7
Al ₂ O ₃	7

The dry mixture is held in a hopper and runs down a pipe chute directed towards the stream. The rate of flow of the mixture is controlled by a sliding valve located at the bottom of the hopper. The flow is adjusted, manually, to coincide with the stream of metal. The blown metal is poured alternately fast and slow to maintain the proper boiling action in the ladle. This reaction should be as vigorous as possible without permitting the metal to boil up over the ladle. This induces an action causing an intimate contact of slag and metal and reduces the phosphorus to the lowest degree. A mild reaction with the slag merely lying on top of the metal as a blanket results in a higher phosphorus content. The addition of the mixture is begun immediately upon the appearance of the manganese boil from the first shovelful of ferromanganese added. The ferromanganese and mixture are being added concurrently for a few seconds and the addition of the mixture continues for a few more seconds and is completed when about one-half of the blown metal has left the vessel. The mixture is added just as rapidly as the metal will take it up and melt it and the operation is completed in about 30 seconds. The phosphorus is reduced from 0.095 or 0.100 per cent to 0.020 to 0.040 per cent in that time. The slag is thin and fluid and has a low melting point and after the ladle is filled the reaction subsides to a slight ebullition and by the time the ladle has reached the pouring platform the slag has risen to the top and the reaction has ceased.

The most satisfactory ladle lining developed consists of a hard burned grade of dense clay brick set up with a thin buttered joint of a chrome base material containing a vegetable bonding material. Sodium silicate can not be used as a bond in this process. The dense hard brick resists slag penetration, does not spall, and retains some heat. The

joint material does not stand up with the brick but there is no tendency to leave skull metal in the joints of an otherwise clean ladle and satisfactory joint patches are obtained. This type of lining normally handles two to four regular heats followed by six to eight dephosphorized heats before being taken out of service for a patch. The ladle



Bessemer converter in operating position blowing an ordinary heat of soft-carbon steel

reaction of the dephosphorized heats causes an uneven attack of the lining and the thin sections are patched with a rather dry rammed mix of ground ganister and clay. Experiments are being made with a patching mortar made up of several neutral materials and a special binder. This may permit a reduction in the amount of dephosphorizer required for neutralizing acid contamination.

The mixture of 50 per cent lime,

30 per cent roll scale, and 20 per cent fluorspar is made up in metal containers shortly before using. The ingredients are not mixed in the containers. The lime is on the bottom, the fluorspar is next, and the roll scale on top. The roll scale is slightly damp at times and contact with the lime is avoided until ready for use. Each container holds 50 pounds of material and any desired weight can be placed in the hopper by dumping the proper number of containers. Attempts to mix the materials in bulk for storage in large bins were not successful. The materials become separated and any dampness present causes slaking of some lime. When the containers are dumped into the feed hoppers next to the vessels a satisfactory mixing is obtained.

Ladle Reaction Important

The vigorous but controlled reaction in the ladle is an important feature of the process. At the temperature of molten steel the reactions between slag and metal are almost instantaneous if the slag and metal are brought properly into contact with each other. The action employed in this method is a gaseous stirring promoted by the cold addition to the abnormally hot metal. The use of a molten addition to metal of normal temperature produces a milder and less effective reaction.

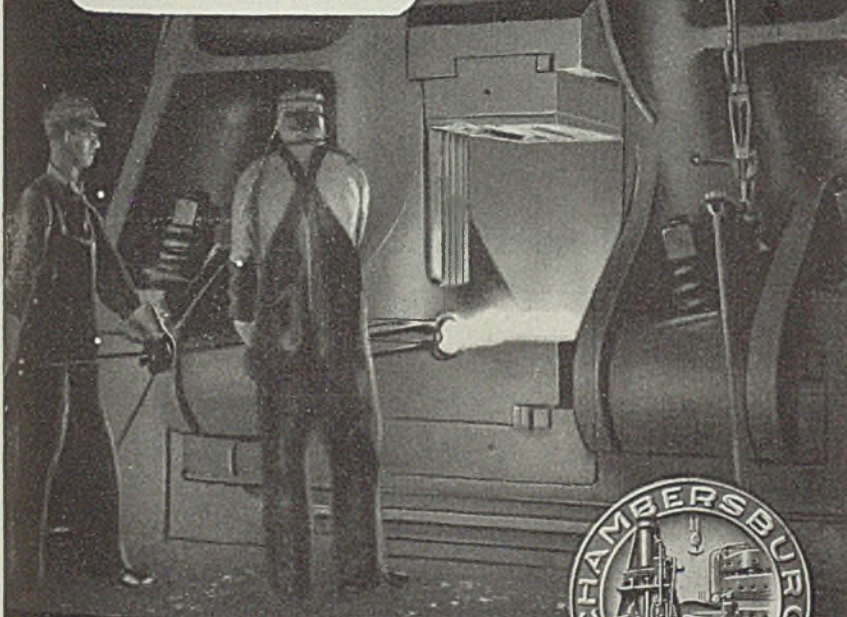
Experiments with this mixture added as a molten slag in an equal amount produced 0.040 to 0.050 per cent phosphorus steel, when the blown metal was poured into the ladle in the regular manner, as compared to 0.020 to 0.040 per cent phosphorus when the cold mixture is used. In order to produce a more vigorous reaction and obtain lower phosphorus the blown metal must literally be dumped into the ladle in heavy surges, when using the molten material. It is less difficult to control the reaction by chemical rather than by mechanical means.

The use of a cold addition produces a self-regulated ladle reaction obtained automatically with little assistance from the operators. The reaction is the same for every heat and no boil-overs occur unless the blown metal is poured too rapidly before the reaction gets well under way.

The gaseous stirring has the effect of bringing the gases dissolved in the steel toward equilibrium and induces a regular rimming action in the molds. The ingots have excellent rolling quality and a first quality product is obtained with manganese as low as 0.18 per cent in the steel. The beneficial effect of the dephosphorizing treatment on the rolling quality is used to advantage in the regular steel. The regular steel is treated with a 100-pound addition of the mixture because of its

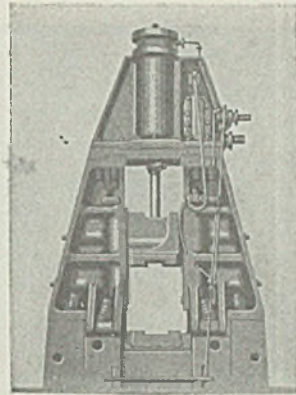
First -
 come *Forgings*
 - for Defense

TO the peaceful activities of industrial production, the Chambersburg Hammers of America's great forge shops are now adding the tremendous burdens of defense preparation. For first in the production of the vital parts of battleships, cruisers, torpedo boats, submarines, airplanes, tanks, combat cars, artillery and all the other essentials of modern mechanized warfare, come the forgings - combining utmost strength, with relatively low weight. The same skill and experience that made Chambersburg's contribution to peacetime mechanization so valuable is now being devoted with increased intensity to defense.



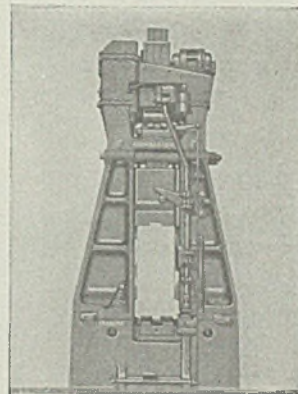
CHAMBERSBURG ENGINEERING CO.
CHAMBERSBURG PENNA.

CHAMBERSBURG
HAMMERS • PRESSES
CECOSTAMPS



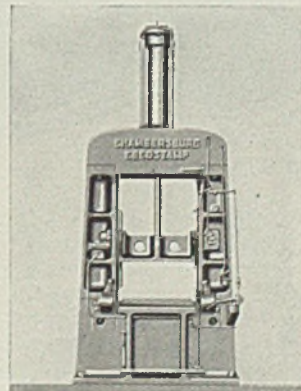
**STEAM DROP
 HAMMERS**

Standard of the industry. Greater production, greater steam or air economy, and greater accuracy. The Chambersburg patented Side Valve is featured.



**BOARD DROP
 HAMMERS**

Frame-to-anvil construction, front rod design, simplicity of motor drive, and increased board life characterize this efficient Board Drop Hammer.



CECOSTAMP

Modern drop stamp for forming light weight, high strength sheet metal parts, and for small-quantity short-run work.



*Whitey
Sez:*

"In the business world there is no reference so powerful as a list of customers whose patronage has been continuous over a long period of years . . . The MAURATH list starts with the inception of our company and builds with the constant betterment of a product universally known and used."

MAURATH, INC., CLEVELAND
BUILDER OF BETTER WELDING ELECTRODES IN ALL ANALYSES

beneficial effect on the rimming action in the molds and the final surface quality.

The hot working and rolling quality of the dephosphorized steel is superior to the untreated normal phosphorus product. The steel is never red-short in the low and medium ranges of manganese. A large tonnage is produced in the 0.18 to 0.25 per cent manganese range but the surface quality is consistently good. The surface condition generally termed as "spongy surface" or "open surface" does not develop even with the hotter heats. The untreated normal phosphorus steel usually requires a manganese content of 0.40 to 0.45 per cent in order to produce a surface quality comparable with that of the low manganese dephosphorized product. This property is valuable as it permits the application of low metalloid steel to cold reduced grades where a low manganese content has obvious advantages. Skelp of 0.25 per cent manganese and low phosphorus is regularly processed into butt-weld pipe without biting off at the tongs.

Subjected to Heavy Reductions

The dephosphorized steel ingots are softer than the regular product, at normal rolling temperature of 2250 degrees Fahr., and will withstand heavier reductions in the breakdown passes without cracking. Blooming mill tonnage and ingot to billet yields were increased with the introduction of the dephosphorized steel.

The treated steel rolls and spreads in a manner similar to soft open-hearth steel. With respect to spread in rolling, the low phosphorus steel lies midway between the regular bessemer and open-hearth steels. For example, when rolling a skelp section, 4 inches wide and 0.100-inch thickness of normal phosphorus grade the same roll setting will make a 4.030-inch width in the low phosphorus bessemer and a 4.060-inch width in the soft open-hearth steel.

The dephosphorized bessemer steel gives a good account of itself when applied to galvanized sheet products demanding a high standard of flatness, a large and uniform size of spangle, where a drawing quality of forming to drawing standard is satisfactory. All of the available ingot capacity above skelp requirements is so applied. This application averages 10,000 tons per month.

The advantages of this method of dephosphorization may be summed up as follows:

1. The controlled ratio of silicon to manganese in the iron (A) permits the utilization of a cross section of the available bessemer ores, rather than a few selected ores of higher cost or scarcity, (B) pro-

duces an ideal converter slag for slag and metal separation; the crux of the dephosphorization operation, and (C) improves the quality and uniformity of regular steels.

2. The essential ingredients for dephosphorization are provided at lowest cost, and the extra cost of preparing a molten addition is avoided.

3. Quality specifications for the softer grades of steel are met with regularity and uniformity.

4. Both low and normal phosphorus steels can be made in the same shop at any time with no interruptions in the operation.

5. The advantage of a low phosphorus steel is obtained, as well as other desirable improvements over the normal phosphorus product.

6. The extra cost of the method is low and the cost differential between open hearth and bessemer steel is not destroyed.

7. The product has a combination of properties of its own that is different from the steels made by the usual processes, which make it valuable for certain applications.

8. Higher ingot to billet yields.

9. The application of the method requires no extensive changes in equipment and can be introduced in a bessemer plant in a short time with no interruptions in production.

Disadvantages and limitations of the method which have developed, are:

1. Lower yields are obtained in the converting mill due to the use of iron of higher metalloid content. The loss in blowing the controlled iron is 9.75 per cent as against about 8.5 per cent for the normal iron of lower metalloid content. Only 3 per cent of scrap is melted in the converters, as against 7 or 8 per cent for the normal practice.

2. The method is limited to the production of soft steels. Grades of over 0.20 per cent carbon with 0.75 per cent manganese are difficult to make without introducing a re-ladling operation.

Industry Approves

Washroom Revisions

■ Revision of the simplified practice recommendation covering Metal Partitions for Toilets and Showers, as submitted early this year, has been accorded the required degree of acceptance by the industry, according to the division of simplified practice of national bureau of standards, Washington. It will be promulgated as of Dec. 1, 1940, and will be identified as recommendation R101-40.

This revision adds three sizes of partitions, for toilet and shower inclosures that have come to be recognized by the industry as standard. They are 36 x 60, 42 x 60, and 60 x 60 inches in depth and height, respectively. A recommendation has been added that panels fastened to building walls be spaced

away from the wall to permit air circulation and prevent rusting of the panels. Also for the consumer's guidance, there has been added a note to the effect that walls to which partitions fasten are not furnished with metal panels unless specified, and details as to the finish of inclosures have been enlarged upon. Until printed copies are available, this recommendation may be obtained without charge, in mimeographed form, from the division of simplified practice, National bureau of standards.

New Templets Facilitate Tool Designer's Job

■ To speed up production, Detroit Stamping Co., 359 Midland avenue, Detroit, is offering gratis to any accredited tool designer, a newly developed, handy toggle-clamp templet kit.

It contains 18 templets drawn to actual dimensions which enable one to select the proper toggle clamp for each particular condition. They range from light up to air-operated heavy-duty models.

To be accredited, it is necessary that one actually be employed as a tool designer or in related work, and that the request be made on a company letterhead.

No "Bottlenecks" in U.S. Optical Industry

■ United States is completely independent of Europe in regard to eye-examining instruments, spectacle lenses and industrial safety equipment, says George B. Wells, president, American Optical Co., Southbridge, Mass.

Emphasizing that no "bottlenecks" exist in the manufacture of these products, he pointed out that American ophthalmic and safety products are now considered superior in quality to those manufactured abroad. Manufacturing facilities are so extensive, he added, that production can be stepped up to meet all needs made necessary by the present national defense program.

He also referred to recent ophthalmic developments which substantiate the claim that Germany no longer leads the world in optics. Specifically he cited such developments as lenses for the control of glare and dangerous invisible rays, and new eye-examining devices that assist the modern oculist and optometrist in making more accurate eye examinations than ever before.

He also reported there will be no shortage of the special ophthalmic glass used in making spectacle lenses and the complex lenses needed for eye-examining instruments.

Here's What They

"... the 1940 Yearbook of Industry issue is a fine job, both in its editorial contents and its advertising pages. It should be an invaluable reference to the industry for some time to come."

"... I have just been looking through your January 1st issue of STEEL and want to compliment you on not only its makeup but also its editorial contents. I can realize, more than ever before, the truth of the statements of your field representatives to the effect that your Annual Issue is kept through the year as a buyer's reference."

"... I looked it over very thoroughly as have all the other executives of our company. You are to be congratulated on this very excellent number."

"... I am quite confident that any manufacturer would like to keep this as a reference book because of the interesting technical information it contains. The book was widely circulated in our own organization and favorably commented upon. From an advertising point of view it is an attractive buy and an issue in which we like to be represented. Congratulations on a splendid job."

"... your 1940 Yearbook of Industry issue certainly covers the field. It has plenty of useful information in it and undoubtedly will be kept by many for information purposes during the year."

"... in my estimation it is really the highspot of a year's consistently fine editorial service."

"... I have thoroughly examined the January 1st issue of STEEL and apparently several other citizens throughout the country have done so because we have received a few inquiries from our ad, which, incidentally, was swell. I would suggest that you furnish a good-sized nail with your next Yearbook so that your recipients can firmly secure it to their desks, as I have had to run this one down about sixteen different times in order to have it in my desk for reference from time to time."

"... will be retained and used throughout the year by a large majority of your subscribers."

"... it is truly a yearbook of the industry and well repays a careful study because it outlines to anyone the current state of the art, the prospects for the coming year and, through the medium of the advertising, brings together in one issue the news of what manufacturers are offering industry in the way of improved equipment. I like particularly the careful way in which this issue is departmentalized, which makes it easy to use during the remainder of the year as a reference medium."

"... we wish to offer our congratulations on your very fine achievement in publishing the recent annual issue. To us the outstanding feature was the care that had been given to make readily available the remarkable amount of information it contained. The very fine editorial arrangement was supplemented by a good index, and of no less importance is the arrangement worked out by your bindery so that the book can readily be opened and will lie open at any point."

"... we feel that your Yearbook issue gets better each year."

"... we are pleased to extend to you our congratulations for the advancement shown in the last Annual Review Issue compared to previous issues. While you have not had to apologize for any of the previous issues, at the same time, it is pleasing to note from year to year, the issues improve in appearance and interest."

"... I want to congratulate you not only on the appearance and the typography but also on the character of the articles you had in the last issue. It was a splendid piece of work from every standpoint."

"... it seems to grow better each year and is an accomplishment in which we feel you can take just pride."

... **STEEL's** January 6, 1941 Yearbook of Industry Issue will offer even greater values to the reader ... advertising values in this issue are the best yet.

Said in 1940.

1946
DAR
Technicznych
Wychowankow

"...what I noticed more than anything else was the fact that I didn't locate a single second rate ad in the whole issue. A few outstanding ads can usually be seen in any good trade publication, but 402 pages, each and every page well above average, plus the outstanding pages is an accomplishment."

"...I looked through your Yearbook issue very carefully and want to compliment you on it. It is hard for anyone who is not a publisher to appreciate the details and extreme care exercised in its preparation. But, in the finished book we can easily see that there has been very commendable work done."

"...I was impressed with the fact that this issue is, in truth, a real reference book of industry, and that the editorial content was such that it would be referred to many times by individuals and companies. I was impressed with the orderly presentation of the amount of material, and the comprehensiveness of the undertaking."

"...it is very evident that a comprehensive view of all phases of the industry it serves is represented on its pages and in a manner that makes it usable and at the same time attractive."

"...we enjoyed your Yearbook very much and we believe that it is a very profitable one not only for the readers but for the advertisers. We have received some favorable comment on our advertisement and trust that it will do us a lot of good."

"...on the day of the arrival of the annual issue of STEEL, the 'Yearbook of Industry' issue, I went through it quite carefully and want to say that I think an excellent job was done in presenting a comprehensive review of the year's developments in industry. I want to compliment you particularly on the extensive index which was included and which made it so easy to find subjects of special interest to the reader."

"... your 1940 Yearbook of Industry was a real surprise and we believe it outdoes anything you have previously published. We believe the manner in which you departmentized this edition has proven of real assistance to your readers. This edition is evidence of the big lift you have given your publication during the past ten years. Congratulations!"

"... we wish to advise that the January issue of STEEL, your 1940 edition Yearbook of Industry, was received several weeks ago and we wish to assure you that it is a very interesting number and has a number of fine items. This issue will be passed along to a number of different departments which I know each and every one will enjoy, as some of the departments have already been looking forward to receiving this copy."

"...my general impression of your Yearbook issue was in its favor and it might interest you to know that STEEL is as well received in this office by the people who read it as any magazine that comes to us. Several of our men have at different times made enthusiastic comments, particularly on the editorial content of STEEL."

"...extreme interest has been taken in reading the various editorial comments and descriptive articles in your Yearbook issue and wish to compliment you on the excellent character and composition of the issue."

"...regarding the Yearbook, I thought this was the finest issue of any trade publication I had ever seen. It was excellent both editorially and typographically and we were well pleased with the position and appearance of our full page advertisement."

"... the 1940 Yearbook of Industry issue is a splendid piece of work and certainly will demand a wealth of attention from the readers of STEEL. I am very sincere in this expression."

STEEL

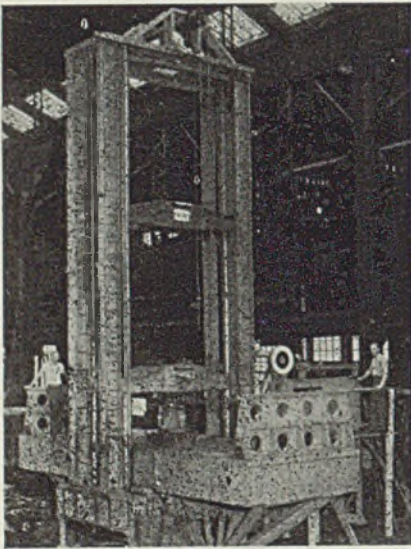
A Penton Publication

CLEVELAND



Testing Machine

■ Riehle Testing Machine division, American Machine & Metals Inc., East Moline, Ill., has developed a 100-ton materials testing machine, so powerful that it can bend two parallel 12-inch steel I-beams, yet so accurately controlled that it can crack a nut without crushing the kernel. It is 34 feet high, 21 feet wide and 24½ feet from front to back. The transverse table is 8 feet

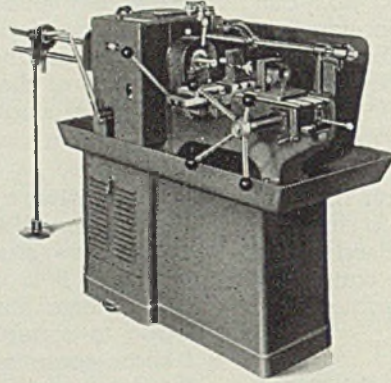


wide. Though it can exert a maximum of 700,000 pounds pressure, the mechanism has recorded a maximum error of 0.06 of 1 per cent. The machine is designed for routine testing and as a primary standard for the verification of calibrating instruments.

Versatile Lathe

■ Oster Mfg. Co., 2057 East Sixty-first place, Cleveland, announces a new Rapiduction lathe for simple turning operations. It has a capacity of 1½ inches (round) for cutting-off, boring, tapping, reaming, facing and threading operations. Its spindle head is totally enclosed. Running on ball bearings the spindle is driven by a steel worm and bronze worm gear. Mul-

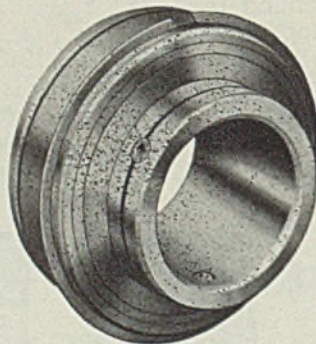
iple V-belts from the motor to worm shaft provide the drive, speed changes being obtained through quick-change sheaves giving speeds from 140 to 1000 revolutions per minute. The coolant pump, mounted in the base, also is driven by a V-belt from the motor. Mounted on the carriage with key and T-bolts, the tool post is provided with longitudinal adjustment for the length of the carriage. Power is furnished by a 2-horsepower 1800/3600 revolutions per minute, 2-speed



induction motor with reverse or electric braking optional. The machine has a swing of 13 inches over its bed and 6 inches over the cross slide. The floor space required for the unit is 33 x 70 inches. If bar feed is used, it extends 94 inches beyond the pan. A variety of chucking equipment is obtainable with the machine.

Ball Bearings

■ Stephens-Adamson Mfg. Co., Aurora, Ill., has introduced style A extended inner ring bearings for machine applications on straight shafts. They feature Sealmaster centrifugal labyrinth seals which keep out dirt and retain lubricant. Each bearing is fitted with a snap ring against bearing location, and



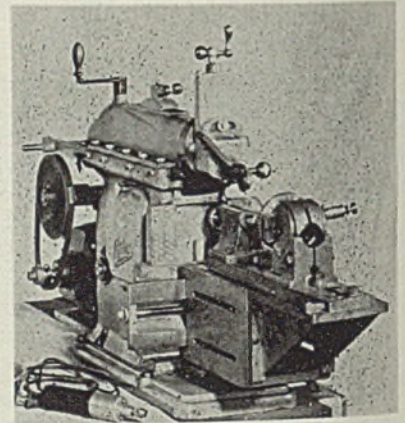
permits through bore in the housing, eliminating counter boring to a shoulder. While knurled cup-point set screws are furnished as standard, the one-half dog-point set screws with lock wire can be fur-

nished upon request. Annular grease groove with two holes in the outer diameter of the outer race permits regreasing.

Equipment for Finishing Shape Die Equipment

■ Carboloy Co. Inc., P. O. Box 239—R. Pk. A., Detroit, announces a complete line of equipment for finishing and servicing drawing dies for producing special shapes of bar and rod. With the equipment, shape dies in low-priced cored or preformed state are offered for rapid finishing to the shape desired by the user. The line comprises standard hexagon and square rough cored dies in a wide range of sizes.

These require a minimum of stock removal for finishing to the usual sizes, the cored shapes being virtually identical to the usual forms of drawing dies—with a 16-degree ap-



proach angle and a 30-degree back relief angle. Essentially, the equipment consists of a die-bearing sizing machine, a die shaping machine, a hand polishing tool and an adaptation of a bench shaper for machining the required laps.

The illustration shows the bench shaper and an electric hand finishing tool for final polishing of dies. All three of the machines have the same basic action—a short high speed reciprocating stroke. In all cases an electric motor drive actuates an eccentric which in turn imparts a reciprocating motion to the vertical spindle. To rough and finish die bearings, laps of the same shape as the bearing, but with 0.010-inch taper, are used. Laps for producing entrance, approach, bell and back relief angles also are of the same shape as the cross-sections they are to produce, but are smaller in size.

The finishing or polishing hand tool also employs laps, reciprocated at high speed through an electric motor driven eccentric with a short stroke—about ½ inch. A special adaptation of an Atlas bench

CUTTER Life Begins ~~at...~~ with **SUNOCO** EMULSIFYING CUTTING OIL

Now's the time Sunoco Emulsifying Cutting Oil can really do a job for you. Its high heat absorbing and excellent lubricating properties make possible more pieces per cutter grind . . . reduced rejects per machine . . . and the maintenance of accuracy and fine finish. That's why leading machine tool manufacturers choose . . . use . . . and recommend Sunoco Emulsifying Cutting Oil.


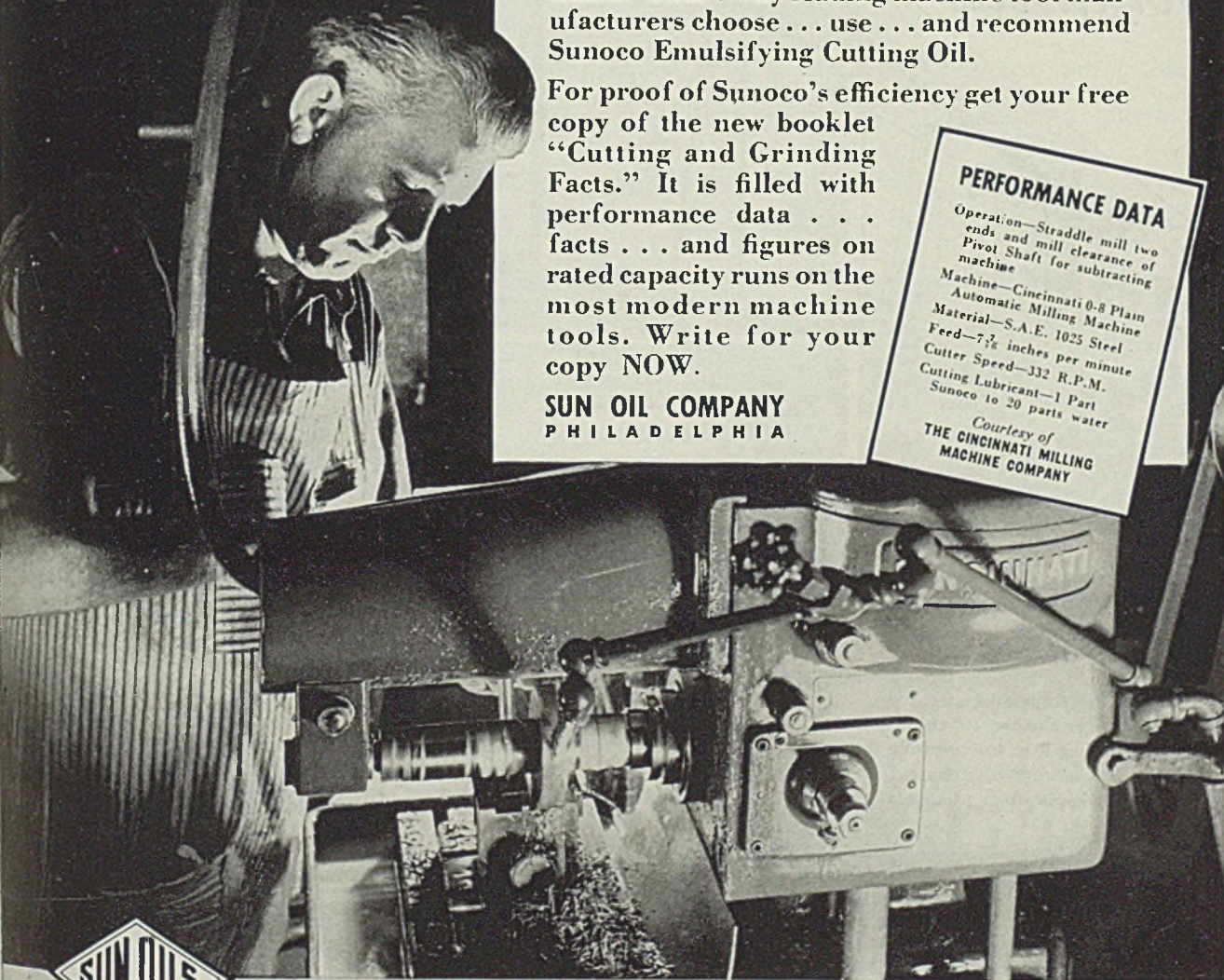
For proof of Sunoco's efficiency get your free copy of the new booklet "Cutting and Grinding Facts." It is filled with performance data . . . facts . . . and figures on rated capacity runs on the most modern machine tools. Write for your copy NOW.

SUN OIL COMPANY
PHILADELPHIA

PERFORMANCE DATA

Operation—Straddle mill two ends and mill clearance of pivot shaft for subtracting machine
Machine—Cincinnati 0-8 Plain Automatic Milling Machine
Material—S.A.E. 1025 Steel
Feed— $7\frac{1}{2}$ inches per minute
Cutter Speed—332 R.P.M.
Cutting Lubricant—1 Part Sunoco to 20 parts water

Courtesy of
THE CINCINNATI MILLING
MACHINE COMPANY



PETROLEUM PRODUCTS FOR ALL INDUSTRIES

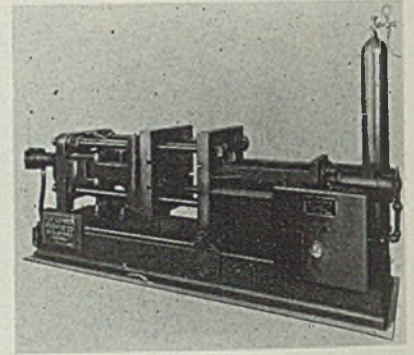
shaper has been worked out for machining laps. The swivel plate on this shaper is mounted at an angle so that in the normal position a 0.010-inch taper is produced on the laps being shaped.

Die-Casting Machine

■ Kux-Lohner Machine Co., 2145 Lexington street, Chicago, has introduced a high pressure die casting machine for producing die castings from either aluminum or brass alloys. Built in two sizes, HP-12 and HP-18, it is of the hand ladling type in which the molten metal is ladled by hand from a crucible

into a well at the back of the stationary die half, and from there, injected into the die under pressure of up to 10,000 pounds per square inch. The die space between the bars is 12 inches square on the smaller machine and 18 inches square on the larger machine. Castings up to 7 pounds in brass and 2½ pounds in aluminum can be made. Both are built to withstand high injection and die locking pressures. Parts subjected to wear and strains are of alloy steels. Dies are opened and closed by a powerful toggle arrangement. The toggle bearings on the die plates are extremely wide and extend to all

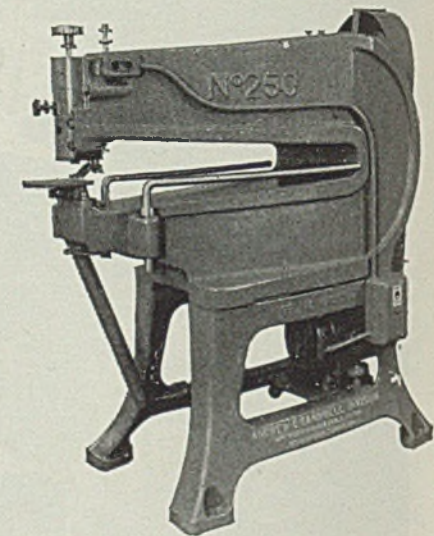
four corners of the die plates. Both machines also are hydraulic in operation, with rams for opening and closing the dies and injecting the metal, all operated from a central motor driven, hydraulic pump unit mounted on an oil storage tank. The machines are built close to the floor. In each unit the ladling well is approximately table height. An electric timing device controls the solidifying period of the casting. Operation of two hand levers, one controlling the die opening and clos-



ing, the second controlling the injection plunger, puts the machine through its complete cycle. A gas accumulator bottle which is to be charged with nitrogen gas is provided for intensifying the speed of the shot.

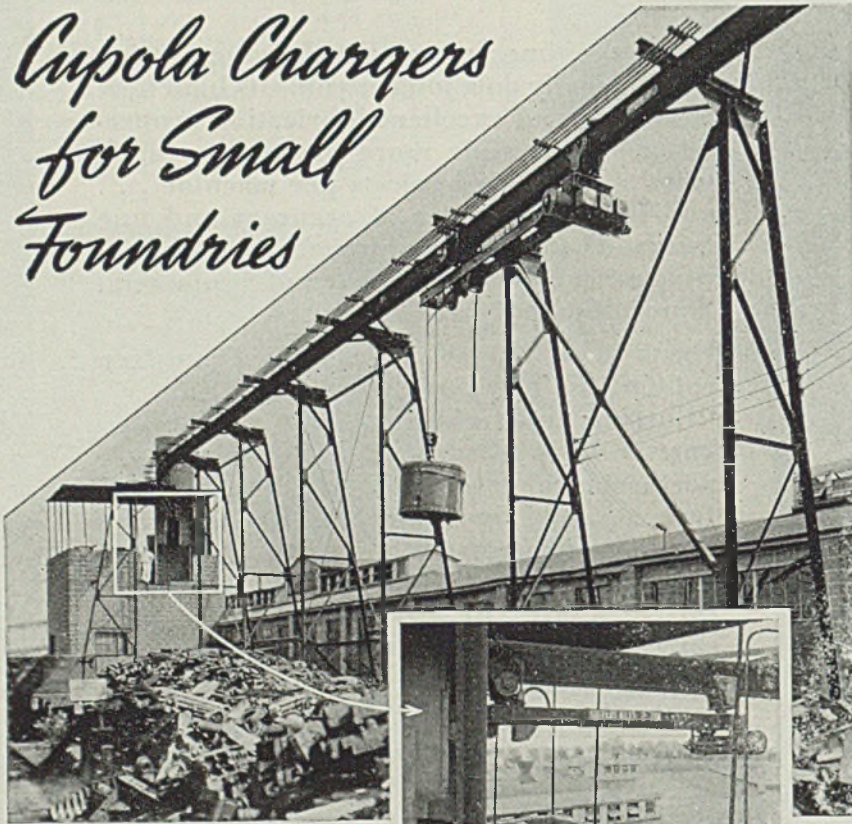
Nibbling Machine

■ A. C. Campbell division, American Chain & Cable Co. Inc., Bridgeport, Conn., has introduced a new No. 250 nibbling machine capable of handling wider stock. It will operate at three standard speeds, and



its adjustable stroke permits handling various widths of material. The machine is designed to cut mild steel up to ¼-inch thick and 3/16-inch in stainless steel up to 72 inches wide, or double the throat depth of the machine which is 36

Cupola Chargers for Small Foundries



● Mechanical cupola charging systems are now available for small foundries with daily melts of 15 to 30 tons.

No need for an expensive cupola enclosure or charging floor. An inexpensive runway to carry the charger and an operator's platform

at the cupola door is all the construction necessary.

Foundrymen who seek better metal at lower costs—no matter what the daily tonnage may be—can obtain complete information by writing to Montour Falls.

A
COMPLETE
LINE OF
CRANES &
HOISTS

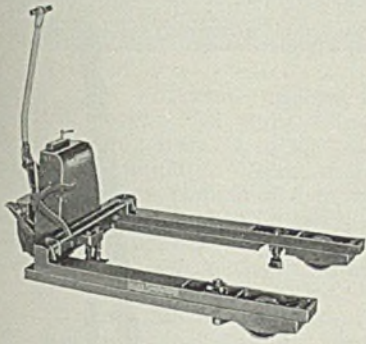
SHEPARD NILES
CRANE & HOIST CORP.

358 SCHUYLER AVENUE... MONTOUR FALLS, N. Y.

inches. Three speeds are provided by the V-belt drive. They are 350 revolutions per minute on the slow speed, 500 revolutions per minute on the medium and 800 revolutions on the high speed.

Hydraulic Lift Trucks

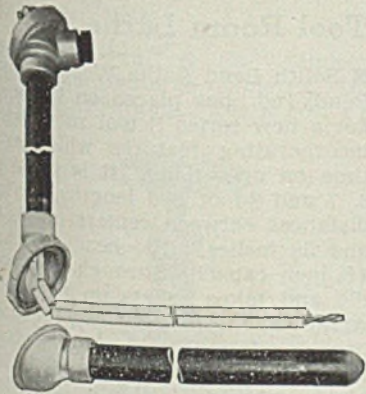
■ Lewis-Shepard Sales Corp., 295 Walnut street, Watertown, Mass., announces open-end hydraulic lift trucks for handling extra heavy machines. They are made in capacities of 3500 to 15,000 pounds. Each features a hydraulic foot lift elevator, 78 x 60-inch platform, rubber tires and trailer hitch. The truck has unusual stability for transport-



ing heavy loads because of its wide frame, and also for all ordinary purposes the load only has to be elevated an inch or two. The trailer hitch permits tractors to haul this truck when loaded.

Thermocouple Fitting

■ Leeds & Northrup Co., 4934 Stenton avenue, Philadelphia, has placed on the market a universal union for angle-type couples to facilitate



thermocouple replacement. The two halves of this union fit snugly together in a ground joint making it vapor and fume tight. By unscrewing a single clamping nut, which cannot fall off, the thermocouple's hot leg can be detached; or it can be rotated to any angle

between 90 and 180 degrees, and locked firmly in place.

Fluorescent Luminaire

■ Westinghouse Electric & Mfg. Co., Dept. 7-N-20, East Pittsburgh, Pa., has placed on the market a new ornamental CL-160 fluorescent luminaire for general commercial lighting installations. Available with three types of diffusing media for different light distribution requirements, it uses 4-40 watt, 48-inch fluorescent lamps, either white or daylight or combinations of both.

With a louver bottom, 30 per cent of the light is directed downward,

70 per cent upward; with a clear ribbed glass bottom panel, 25 per cent of the light is down, 75 per cent up; and with a decorated ribbed glass, 22 per cent of the light is down, 78 per cent up. A rectangular steel ceiling plate supported by knurled rings, slips down over stems to afford access for installation. One-piece seamless brass stems have an adjustment permitting easy levelling of the fixture. The frame is heavy steel. Side panels are curved Monax glass. Bottom panel may be equipped with either louvers, or the two types of ribbed glass.

Lamp starters are of the glow

Lubricate Ball and Roller Bearings —As Makers Recommend

Use NON-FLUID OIL—that's the advice of leading makers, MOST of whom use NON-FLUID OIL for initial packing of ball and roller bearings, proof that NON-FLUID OIL safeguards against bearing failures.

NON-FLUID OIL outlasts grease and lubricates dependably all year 'round. Thus assures most satisfactory service at lowest maintenance cost.

Used successfully in leading iron and steel mills. Send for testing sample today—prepaid—NO CHARGE.

NEW YORK & NEW JERSEY LUBRICANT CO.

Main Office: 292 MADISON AVENUE, NEW YORK

WAREHOUSES:

Chicago, Ill.

St. Louis, Mo.

Providence, R. I.

Detroit, Mich.

Atlanta, Ga.

Charlotte, N. C.

Greenville, S. C.

TRADE MARK REGISTERED IN
NON-FLUID OIL
U.S. PAT. OFFICE & FOREIGN COUNTRIES

MODERN STEEL MILL LUBRICANT

Better Lubrication at Less Cost per Month

switch type. Current limiting devices with built-in capacitors provide 90-99 per cent power factor.

Galvanometer

■ General Electric Co., Schenectady, N. Y., has introduced a new galvanometer, more than three times as sensitive as previous units for factory and laboratory testing; permanent installations for testing instruments, material and apparatus for production. Its sensitivity is obtained by an arrangement of two fixed mirrors inside the case, one on each end. The

galvanometer element and optical system are mounted in a case of cast-aluminum alloy. The scale, of translucent compound, is double-marked 50-0-50 and 0-100 in 1 millimeter divisions

Mobile Crane

■ Osgood Co., Marion, O., announces a new Mobil-Crane—a one-man one-motor pneumatic tired machine for moving heavy materials. It is mounted on a pneumatic tired truck frame and will travel in a storage yard wherever an industrial truck can be used. The unit

has four speeds, forward and backward, and will lift and carry loads up to 15 tons, and swing its load in a full circle. Speeds up to 5 miles per hour with load can be obtained. Illustration shows the crane setting an 80-foot 9500-pound stack, an operation requiring precise control, reserve strength and power. Booms of 45, 50 and 55 feet are standard equipment, however, longer booms can be furnished. It can be equipped to load and unload any kind of material, with hook, sling, magnet or clamshell bucket. Steering is accomplished by hydraulic control. Front and rear wheels are equipped with air brakes

A BUYER'S GUIDE

CHECK LIST	ACCURATE SPRINGS
ENGINEERING CONSULTATION	✓
CORRECT DESIGN	✓
CAREFUL PRODUCTION	✓
CLOSE INSPECTION	✓
RIGID ACCURACY	✓
TOP QUALITY	✓
DEPENDABLE SERVICE	✓
LOW ULTIMATE COST	✓
RESPONSIBILITY	✓
ONE SOURCE OF SUPPLY FOR SPRINGS, WIREFORMS, STAMPINGS	✓

FOR USERS OF SPRINGS

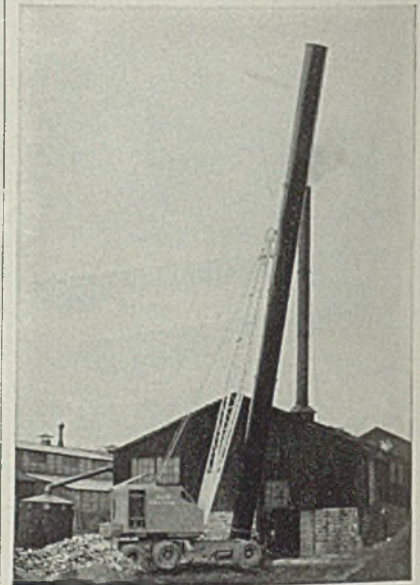
THESE are the things it pays to check before you buy springs. Actually, they are all part of Accurate's code of operations—highest quality and accuracy of product, backed by real service. That's what you're looking for! Why not get it? Write Accurate today for your copy of the Accurate Handbook of Spring Data.



3823 West Lake Street

ACCURATE SPRING MFG. CO.

Chicago, Ill.



of the internal expanding type. The tandem rear wheel assembly is mounted in a large bearing bolted to the frame. This gives a knee-action effect when traveling over obstacles.

Tool Room Lathe

■ South Bend Lathe Works, South Bend, Ind., has placed on the market a new series S tool room lathe incorporating features which save time on operations. It is made in 6, 7 and 8-foot bed lengths, having distances between centers of 34, 46 and 58 inches. The headstock has 1½-inch capacity through the spindle and takes collets up to 1-inch. Arrangement of controls reduces operator fatigue and assures maximum production. Large diameter hand wheels facilitate precision adjustments on close tolerance work. Adjustable micrometer collars on the cross feed screw and the compound rest screw are large in diameter with clear-cut graduations. Attachments include hand wheel draw-in collet chuck, telescopic taper attachment, micrometer carriage stop, thread dial indi-

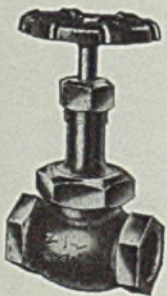
cator and chip pan. The telescopic taper attachment is permanently attached to the lathe carriage. Its cross feed screw eliminates the necessity of disconnecting the cross feed nut when the taper attachment is to be



used. The enclosed underneath motor drive provides eight spindle speeds ranging from 21 to 725 revolutions per minute. Both motor and driving mechanism are in the cabinet leg under the headstock. Back gears provide slow spindle speeds and ample power for machining large diameters. A bolt tension release lever and wrenchless bull gear lock permit rapid changing of spindle speeds. A quick change gear mechanism provides a series of 48 power longitudinal carriage feeds 0.0015 to 0.0841-inch, a series of 48 power cross feeds 0.0006 to 0.0312-inch, and a series of 48 right and left-hand screw threads from 4 to 224 per inch. Power carriage feeds are operated by a worm drive and a series of steel gears in the apron. Power feeds are controlled by a multiple disk friction clutch. The latter is constructed so it will not stick or slip under heavy cuts.

Globe Valve

■ Reading-Pratt & Cady division, American Chain & Cable Co. Inc., Reading, Pa., announces a new Fig-



ure 531-P bronze globe valve equipped with a full-plug seat and disk for throttling services on high temperature and high pressure steam lines. It also is suitable for use on high pressure lines carrying

boiler scales and other gritty substances. Its body is of a special hard bronze, while the disk and seat are of stainless steel.

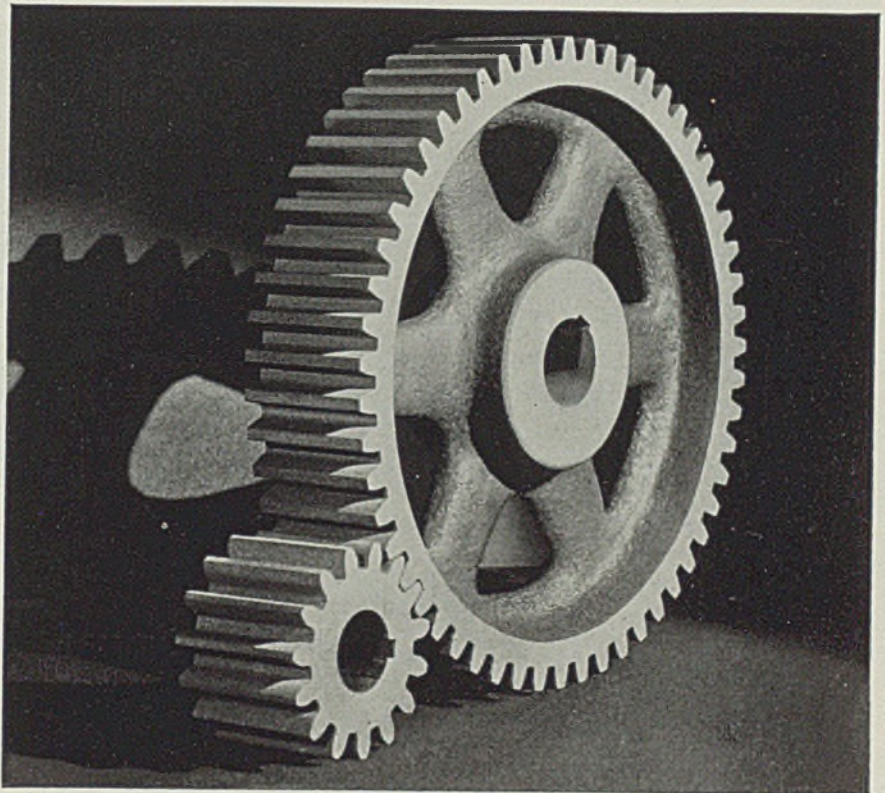
Oil Valve

■ Hauck Mfg. Co., 124 Tenth street, Brooklyn, N. Y., announces an improved Micro-Cam oil valve for regulating the oil flow to any type burner. It assures positive, speedy and uniformly graduated control. By means of the indicator dial, previously determined settings can be easily repeated with full assurance

of duplicating results. The valve produces a straight line discharge.

The free opening in the V-slot minimizes possibility of clogging. The cam's knife edge easily cuts away any grit, dirt or carbon that may pass into the valve. Fading away of flame from the burners is eliminated. The valve body and cam are of drop-forged alloy steel, hardened and ground.

The cam may be operated manually or included in an automatic temperature control system, operating with any high or low pressure oil burners. The unit will pass any grade of oil of any viscosity.



"STEEL MUSCLED" FOR HARD WORK

☆ Horsburgh & Scott Gears are rugged and dependable for industry's hardest tasks . . . gears that stand supreme in quality of materials and in workmanship . . . and here are three of the reasons why: 1. Patterns designed for strength. 2. Accurate machining and cutting to specifications. 3. Finest materials used . . . for example, unless otherwise specified, steel gears are made from .40 carbon steel which has a higher tensile strength and wears much longer than commonly used .15-.20 carbon steel.

Send note on Company Letterhead for 488-Page Catalog 41

THE HORSBURGH & SCOTT CO.

GEARS AND SPEED REDUCERS

5112 HAMILTON AVENUE • CLEVELAND, OHIO, U. S. A.

Seeks Approval on Revision of Gage Blanks

■ In accordance with the recommendation of the American Gage Design committee, United States department of commerce, national bureau of standards, Washington, is submitting to producers, distributors and users of gage blanks for written acceptance a draft of the recommended revision of gage blanks, Commercial Standard CS8-33.

The revision proposes new standards for thread setting plug gages, taper thread ring gages, dial indicators and master disks. Standard

designs without complete specification for dimensions also are proposed for spline plug and ring gages, taper plug and ring gages, flush-pin gages, special snap gages and flat plug gages. Adjustable length gages are completely revised, while the remainder of the changes are mainly minor.

Measuring Facilitated By New Slide Rule

■ A new slide rule for the welding and sheet metal industry which measures any angle from 0 to 90 degrees in steps of one degree on

diameters from 1 to 20 inches is announced by Interstate Sales Co., 1123 Broadway, New York. Known as the Wolfe Angle meter, it fits into a pocket easily, measuring 12 by 4½ inches when folded. It enables a man on the job quickly to lay out, directly on the pipe or flat material, any angle cut within its scope. It is simple to use and can be applied in making templets.

Hydraulic Shuttle Promotes Safety

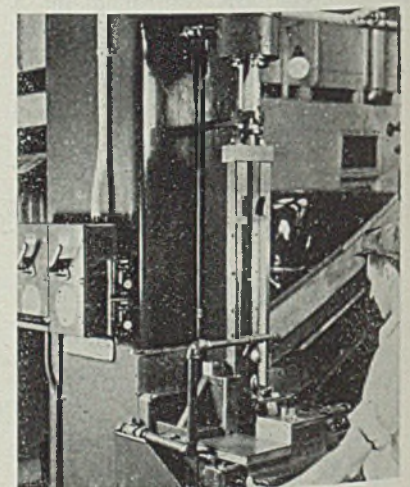
■ Use of a hydraulic fixture shuttle to increase ease of loading and unloading with greater safety for the operator is a feature of a broaching installation now used at Ford Motor Co., Dearborn, Mich., for machining four bolt bosses at one time on a universal joint yoke flange.

The shuttle is incorporated in a Colonial Broach 6-ton open side utility press and is synchronized, in operation, with the ram travel. At the end of the cutting stroke the fixture and part are shuttled backward away from the broaches to permit unloading and reloading during the return stroke of the broaches.

The operation consists of rough and finish broaching all four bosses at one time, approximately at a rate of 150 pieces per hour. Stroke is 36 inches with a cutting speed of 30 feet per minute and return speed of 60 feet per minute.

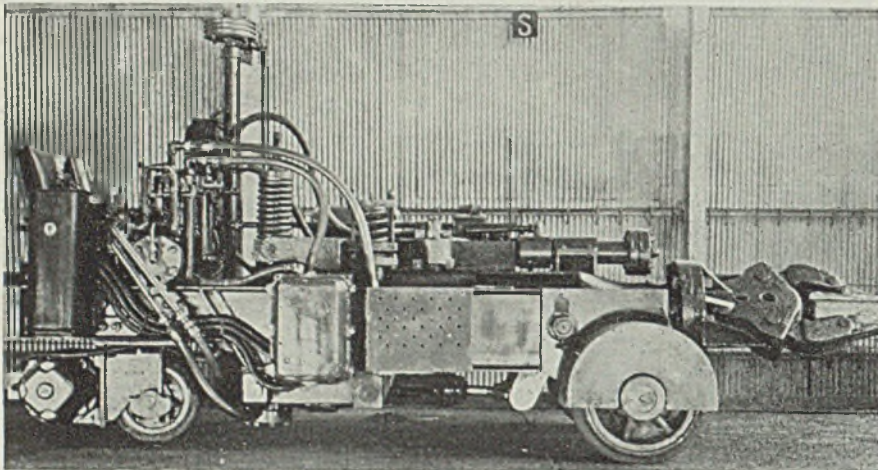
The forged steel yoke flange is located in the fixture from cross holes in the part and the front side of the flange, equalizers being used for the latter.

With the setup enough clearance



View above shows shuttle which is synchronized with ram travel (center part of fixture table) in broaching position. Photo courtesy Colonial Broach Co., 147 Jos. Campau street, Detroit

is provided between fixture and broaches, avoiding danger of injury to the operator's hands.



6,000 lb. Capacity Auto Floor Manipulator for Serving Press or Hammer.

BROSIUS AUTO FLOOR CHARGING MACHINES

Built in Three General Types and in Capacities
Ranging from 2000 lbs. to 20,000 lbs.

1. Manipulators, for Forge Shop service. They charge and draw, convey over the floor, and manipulate under hammer or press.
2. Box Chargers for serving Open Hearth and Electric Furnaces.
3. Tongs Chargers for handling pieces up to 20,000 lbs. for charging and drawing heating furnaces, serving mill tables, hammers, etc.

EDGAR E. BROSIUS, Inc.

*Designers and Manufacturers of Special Equipment for
Blast Furnaces and Steel Mills*

PITTSBURGH SHARPSBURG BRANCH PA.

*Brosius Equipment is covered by patents allowed and
pending in the United States and Foreign Countries.*

Self-Locking Nuts

(Concluded from Page 58)

lower unit is bolted to a heavy steel base supported on sponge rubber pads while the upper is vibrated to the desired vertical, transverse and longitudinal amplitudes by means of a unit consisting of a transverse shaft with eccentric loads at either end, set 90 degrees apart and rotated at 3400 revolutions per minute.

Fatigue tests on self-locking nuts, under axial impact vibration designed to simulate conditions under which nuts operate, are made in a machine consisting of a flat steel bar mounted as a beam across two rigid fulcrum posts, 4 feet apart, and vibrated up and down by means of an eccentrically loaded shaft unit secured transversely at the center and rotated at the desired revolutions per minute. The beam is bolted down to the posts on narrow transverse cleats a few inches in from either end, thus leaving the ends free to vibrate up and down as cantilevers. The test nuts are assembled to the desired wrench torque on bolts anchored in the two posts and passed up through the cantilever ends of the beam which alternately apply and release the axial impact loads at the frequency and through the amplitude desired.

Tested on a Rock Drill

A severe type of lateral vibration impact test was made on bolts and self-locking nuts assembled under no load in a heavy commercial air-driven hand rock-drill at the suggestion of a manufacturer. The drill was supported by its handle bar across a rigid frame with tool extending downward through a hole in a plank which served as a guide. The test nut was assembled on a quarter-inch aircraft bolt passed through the center hole in the transverse tool-locking bolt and screwed up to contact but under no load. Thus assembled, the rock-drill operated at full speed on 90 pounds of air pressure, bounced and vibrated with terrific violence. This test was effective, but not considered representative of conditions in aircraft.

Tests on self-locking nuts to determine their static and prevailing torsional resistance to turning on aircraft bolts under no load and the endurance of their torsional properties over a series of assembly operations are made in a special autographic reverse testing machine. This machine consists essentially of a driving unit, a torque weighing unit, and a unit for recording the torsional resistance developed. It is adjustable to accommodate the size and resistance of the various nuts.

The nut is screwed onto the bolt

until contact is made with the self-locking feature or to some other predetermined degree when this cannot be done. It is then assembled in the holding devices between the driving and weighing units and tested through a series of fifteen installations and removal operations of five turns each at room or at elevated temperatures as required. For tests at elevated temperatures, the bolt and nut assembly is tested inside of a conventional cylindrical electric furnace interposed between the driving and torque-weighting units. The heat is controlled by means of a standard equipment and

a thermocouple extending to the nut through the holding device.

This machine makes a continuous graphical record of the torque developed in either direction through the complete series of operations. The static and prevailing or ambient torsional resistance of the nut are measured at the specified points on this graph at the conclusion of the test.

None of the above vibration tests have been approved, but the tests for torsional resistance and endurance have proved satisfactory and are specified for all self-locking nuts procured for use in army aircraft.

SET UP YOUR MACHINES AND STEP UP PRODUCTION with MUREX VERTEX

THE ALL-POSITION REVERSE POLARITY ELECTRODE THAT TAKES MORE CURRENT AND SPATTERS LESS

You can speed up work with Murex Vertex electrodes and still get the sort of welds that enhance the appearance of any welded structure.

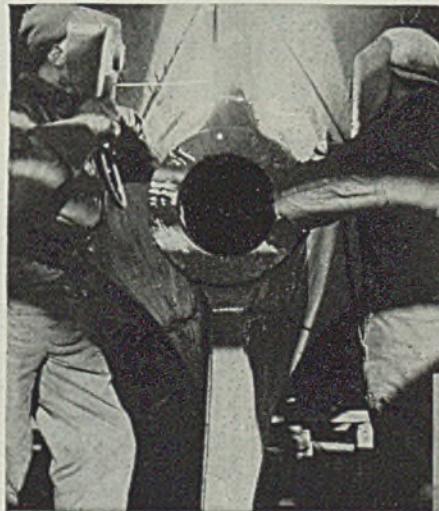
Welders, too, like the way this rod performs; its soft arc action; the ease with which it handles in all positions; the small amount of spatter.

Investigate Murex Vertex. Write for full information, and ask to have one of our welding engineers call to demonstrate.

METAL & THERMIT CORPORATION, 120 BROADWAY, NEW YORK, N. Y.

Albany • Chicago • Pittsburgh • So. San Francisco • Toronto

"Murex Electrodes—Thermit Welding—Thermit Metals & Alloys."



Vertex provides speedy construction of tugs, built by Ira Bushey & Sons Co., Brooklyn, N. Y.



In building drill rigs and other equipment, Brauer Machine & Supply Co., Oklahoma City, finds Vertex economical.



Neat appearance of Vertex welds lends sales appeal to shovels, produced by Hanson Clutch & Machinery Co., Toledo, O.





HEAVY COATED

Electrodes

A COMPLETE LINE FOR EVERY WELDING APPLICATION



Investigate Thermit Welding, too—in use since 1902 for heavy repair work, crankshafts, etc.

New Alloy May Allow Higher Temperatures

■ A new alloy of columbium and iron may make it possible to extend further the temperature at which steam turbines are operated. According to E. R. Parker of General Electric research laboratory, Schenectady, N. Y., samples of the alloy containing 3 per cent columbium and 97 per cent iron reveal exceptionally good rupture strength at 1100 degrees Fahr. No carbon is contained—instead, the iron con-

tains the columbium as a finely dispersed stable compound of iron and columbium.

Mr. Parker's investigations indicate that at temperatures of 1100 degrees and above, the strongest metals are alloys containing a finely dispersed stable phase, such as the iron-columbium compound in the columbium alloy. He has produced columbium-iron alloy in different ways. He has mixed the correct proportions of the powdered metals, sintered them, and swaged the fused mass into a metal capable of being treated and machined

in the usual way. He has also cast and forged the alloy. His investigations have shown the cast alloy to equal the sintered material in its properties, so that commercial production of the alloy is not expected to offer difficulties.

Steel Processing Text In Second Edition

■ *Working, Heat Treating and Welding of Steel*, by Harry L. Campbell, second edition; cloth, 230 pages, 6 x 9 inches; published by John Wiley & Sons Inc., New York; price \$2.25.

The purpose of this textbook is to present concisely the principles and practice relating to processing steel. It has been planned to assist in the introductory study of certain prescribed phases of the metallurgy of steel. An attempt has been made to exclude all unnecessary terms and discussions rightfully belonging to more advanced studies.

The reader first is introduced to the steelmaking processes. Then follow discussions on methods for testing steel, chemical composition and classification of steel. Processes for working, heat treating and welding receive considerable attention. Because of increasing use of steel products and tremendous waste due to corrosion, methods of protecting steel from atmospheric corrosion are reviewed.

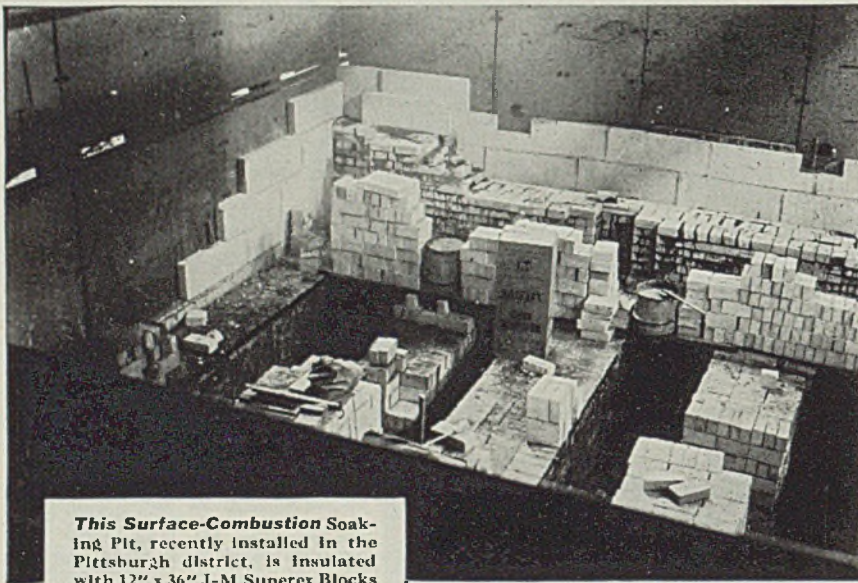
A series of laboratory assignments is appended to serve as a guide to the laboratory instruction usually given as part of this course of study.

New Aluminum Alloys Feature Good Properties

■ Two aluminum alloys possessing excellent machinability, brilliant appearance and high resistance to corrosion are being marketed by Frontier Bronze Corp., Niagara Falls, N. Y. Known as Nos. 40 and 40E, these metals exceed physical requirements of specific grades of ASTM specification B26-37T, United States army specifications Nos. 57-72 and 57-72.5a, and navy specification 46ALe. They also conform to air corps specification No. 11324.

Number 40 has a tensile strength of 35,000 to 40,000 pounds per square inch, and a yield strength of 30,000 to 35,000 pounds per square inch. Its elongation in 2 inches is 0.5-3.0 per cent. It has a brinell hardness of 80 to 90. Number 40E has a tensile strength of 32,000 to 36,000 pounds per square inch, and a yield strength of 22,000 to 28,000 pounds per square inch. It has an elongation in 2 inches of 4.0 to 7.0 per cent, and a brinell hardness of 70 to 80. Both are readily weldable.

Does Your Insulation Investment Pay a **FULL** Return?



This Surface-Combustion Soaking Pit, recently installed in the Pittsburgh district, is insulated with 12" x 36" J-M Superex Blocks (shown above) and with JM-20 and Sil-O-Cel C-22 Brick.

HOW much money you spend on fuel depends to a large extent on the answers to these two questions:

Are you using the *correct insulating materials?*

Are they applied in the *correct thicknesses?*

To assure every saving possible with insulation, it will pay you to call in a J-M Insulation Engineer. Let him study your requirements

... his specialized technical training and experience will help you trace down and correct sources of heat waste that may otherwise go unnoticed.

From the complete line of J-M Insulations, he can recommend exactly the *material* you need for greatest efficiency ... exactly the *thickness* you need for maximum returns on your investment.

For full details on this helpful service and facts about the complete line of J-M Industrial Insulations, write to Johns-Manville, 22 East 40th Street, New York, N. Y.

JM Johns-Manville

INDUSTRIAL INSULATIONS FOR EVERY TEMPERATURE ... FOR EVERY SERVICE

Superex ... 85% Magnesia ... JM-20 Brick ... Sil-O-Cel C-22 Brick ... Sil-O-Cel Natural Brick ... J-M No. 500 Cement ... Sil-O-Cel C-3 Concrete ... Marinite

COPPER ALLOY BULLETIN

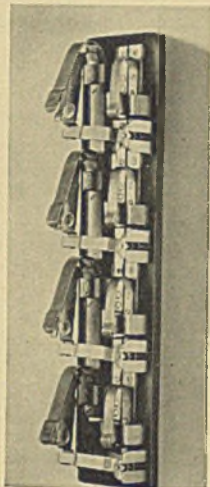
REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by the Bridgeport Brass Co. "Bridgeport" Headquarters for BRASS, BRONZE and COPPER

Range Switch Parts Complete More Than Six Million Cycles

Striking proof of the superior spring quality of Bridgeport's phosphor bronze is given by the results of life tests on the switch control for electric ranges illustrated in the accompanying photograph. All spring parts in this switch are fabricated from phosphor bronze supplied by Bridgeport.

The switch was tested for a period of more than six months, and 6,408,000 cycles were completed without any sign of failure in the switch parts. Bridgeport's up-to-the-minute rolling mill facilities and careful laboratory control of processing are outstanding factors in establishing this exceptional performance record for phosphor bronze. Fabricators of spring parts for electrical or mechanical equipment can give their products greater life expectancy and the ability to withstand severe service by utilizing the superior toughness and resilience of Bridgeport Phosphor Bronze.



Tuttle and Kift

Low-Melting Alloy Used As Tube-Bending Filler

Thin-walled tubes of copper or brass can be bent successfully and without rippling by filling the tubes with Cerrobend, a low-melting alloy of bismuth, lead, tin, and cadmium, it is claimed. Cerrobend is said to be free from many of the disadvantages that have characterized previously employed filling materials. When substances such as resin, pitch, or sand are employed, it is said to be difficult to remove all traces of the filler from the inside of the tube after the bending operation is completed. Cerrobend, however, can be successfully removed, it is said, and tests are reported to prove that no alloying takes place between Cerrobend and the metal of the tube.

Cerrobend melts at about 160° F., and is said to have the unusual property of expanding instead of contracting as it cools. For this reason, it conforms closely to the interior of the tube, which can be bent much like a solid bar, it is reported. It can, of course, be used over and over again, so that costs are low.

Copper and Copper Alloys Vital In Carrying Out Defense Program

**Unique Combination of Strength, Toughness, Ductility
And Corrosion Resistance Accounts for Their Wide Use**

Copper and its alloys are playing an essential role in the progress of the current defense program, particularly in the manufacture of ammunition. Strength, toughness, freedom from brittleness, and the ability to withstand sudden severe shocks which would destroy ordinary materials are important factors in the use of the copper alloys. They are exceptionally ductile and easy to fabricate rapidly. Moreover, they have high resistance to the effects of corrosion and weathering, and can therefore be stored for long periods of time without deterioration.

Probably the most important application of the copper alloys in defense is the use of cartridge brass for ammunition. Cartridge brass contains approximately 70% copper and 30% zinc. Specifications are very rigid, calling for a brass of exceptional purity. In particular, cartridge brass must be free from any appreciable amount of such impurities as iron and lead. In addition, the metal must be rolled to accurate gage and must be free from foreign inclusions, gas pockets, and surface defects. It must be annealed with a uniform grain structure and at a temperature which results in maximum ductility.

Other Copper Alloys

Another copper alloy, Commercial Bronze, containing approximately 90% copper and 10% zinc, is used for bullet jackets. (In some Government specifications, this alloy is referred to as Gilding Metal. It is more common practice in the brass industry, however, to use the term Gilding Metal to describe the 95-5 alloy.) The 90-10 alloy is also very ductile and consequently easy to fabricate into drawn work.

For the manufacture of time fuses (such as are used for shrapnel shells) brass rod, containing about 60% copper, 2% lead, and the remainder zinc, is commonly used. Time fuses are usually made from hot forgings. Pure copper is extensively used in the form of rings which are fitted into grooves in shrapnel shells. These rings or rotating shell bands seal off the powder fumes and provide a soft metal contact between the shell and the rifling of the gun. They are made either from sections of copper tubing or by blanking, cupping, and drawing the copper into the required form. The 90-10 alloy is used for this purpose also.

Communication Wire

Copper alloys also aid in maintaining telephone communication in the field. Bronze communication wire, consisting mainly of copper with a small percentage of tin, is widely used for this purpose, because it is stronger than pure copper wire and will stand considerable abuse without breaking.

While other materials have frequently been suggested for copper and its alloys in many industrial applications where physical demands are not especially severe, no adequate substitute for the copper alloys in armaments has ever been discovered. The unusual combination of properties possessed by the copper alloys is unlikely to be duplicated in other materials.

Memos on Brass—No. 16

Common High Brass, having a nominal composition of 66% copper and 34% zinc, is the most widely used copper alloy for general fabricating purposes. Its popularity is the result of the balance it achieves between initial cost and ease of fabrication. Copper-zinc alloys with a higher copper content are more expensive; those with a lower copper content are less ductile, and therefore less suited for cold working.



Mutual-Sunset Lamp Manufacturing Company

Brass knuckles are being soldered to each end of a Bridgeport seamless brass tube to form the extension arm of a bridge lamp. For this application, Bridgeport furnishes brass of extra strength and rigidity.

COPPER ALLOY BULLETIN

ALLOYS OF COPPER

This is the eighteenth of a series of articles on the properties and applications of copper alloys, and continues the subject of modifications of the copper-zinc alloys.

ADDITIONS OF TIN TO COPPER-ZINC ALLOYS

One of the elements commonly added to the copper-zinc alloys is tin. The principal reason for this addition is the improved resistance to corrosion, particularly where brass is subject to attack by sea water. Years ago common Muntz metal was found beneficial for protecting the bottoms of sailing vessels. Muntz metal sheathing was used in preference to copper because the gradual dezincification of the Muntz metal prevented the growth of barnacles. The addition of tin to Muntz metal decreased the rate of corrosive attack, while preventing formation of marine growths.

Admiralty Condenser Tubes

Ultimately this effect of tin was used advantageously in condenser tubing. Experience had shown the advantages of the 70-30 copper-zinc alloy over the 60-40, and the addition of 1% tin to the former alloy brought about an equally satisfactory improvement. The alloy containing 70% copper, 29% zinc, and 1% tin was originally the mixture adopted by the British Admiralty for condenser tubing, and hence became known as Admiralty. This alloy was first manufactured in this country by Bridgeport.

The addition of tin seems to prevent dezincification. This effect was first noted in the alpha plus beta Muntz metal and was ascribed chiefly to the added resistance of the beta crystals. When added to the 70-30 alloy, tin proved equally helpful to the alpha crystals.

Tin in Other Alloys

Some attempts have been made to improve the corrosion resistance of red brass by the addition of tin, but since the red brass has little inherent tendency toward dezincification, any beneficial effect due to the tin is not readily apparent.

Tin is added to the richer copper-zinc alloys because of its effect on the color and because of the slightly increased strength it gives to the alloy. Such additions are not common because very similar effects can be produced by a simple increase in the zinc content. The presence of tin tends to whiten slightly the normal golden color of the 85-90% copper alloy, and is useful in the jewelry trade when exact matches of color are necessary.

Switch Contacts Emit Arc-Extinguishing Gas

A novel means for extinguishing arcs in switches and circuit breakers designed to open under load, without the use of mechanical devices, is described in a recent patent. The arc is extinguished, it is claimed, by the emission of gas from the contacts under the heat of the arc.

The contacts, according to the patent, may consist of copper or copper alloys. The contacts are made porous by mixing a quantity of finely divided particles of the copper or alloy with an organic binder, such as soap. The mixture is compressed into a composite mass, and heat is used to volatilize the soap and bond the metal. The contact is immersed in oil or water, and the liquid fills the voids in the sponge-like mass. When the circuit is interrupted, the vapor formed by the heat of the arc acts quickly to extinguish it, it is claimed.

Pressures Given for Cold Squeezing Steps

Suggested pressures for use in determining needed press capacity for typical cold squeezing operations were listed as follows in a recent issue of *Modern Industrial Press*.

OPERATION	TONS PER SQUARE INCH
Coining bronze	90-100
Embossing brass	175-215
Cold forging brass	15-30
Swaging brass	60-70
Swaging copper	70-80

Bronze, Rubber Used In Flexible Bearings

Flexibility in a new type of bearing is obtained by bonding a ring of neoprene or rubber between inner and outer rings of brass or bronze, it is reported. It is said that the bearings can be made in sizes to specification, and in lengths up to four feet, which can then be cut to length as required.

Bridgeport will refer readers to the manufacturer of the bearing.

NEW DEVELOPMENTS

Vertical screw-cutting machines, which were developed abroad, have been placed on the market in this country, it is reported. Outstanding advantages claimed for the vertical machines are reduction in floor space and feeding of stock by its own weight. It is said that the machines also operate more quietly. (No. 140)

A **comparator-densitometer** is described as a simple, compact device for measuring the density of lines on spectrogram plates. It is said that the instrument provides means for projecting spectrogram on a viewing screen, and for quickly identifying the spectral lines of 70 elements. (No. 141)

A **scrap cutter** is designed for cutting punch press scrap to predetermined lengths, can be used also for cutting finished products to length, according to the maker. It is said that the cutter can be set to operate at any given number of strokes of the press. (No. 142)

A **tap and reamer aligner** is said to be accurately machined to permit quick, perfect alignment of tap or reamer over drilled hole. (No. 143)

A **stripping compound** removes baked enamels, varnishes, lacquers, paints, and synthetic finishes from metal, it is claimed. Action, it is said, depends on an emulsifying effect that floats away the coating, leaving a clean, bright metal surface. Compound is reported to contain no caustics. It is furnished in concentrated form for dilution with water. (No. 144)

A **sulphur-carbon compound** is described as suitable for checking impressions of forging dies and die-casting dies. It is said that the new material is very light, does not shrink, shows the finest markings of the form or die. It can also be used in place of wood patterns, it is claimed. (No. 145)

A **polisher's brick** is recommended by the maker for removing oil or grease from wheels before they are reset with abrasive. It is said that the brick is suitable for use on wheels employed for finish polishing. (No. 146)

A **production marker** is said to be designed for high-speed identification of round tubular or solid metal parts, such as shells, venturi tubes, and many other products. It is said that the machine is motor-driven, and is automatic except for hand feeding of parts to gravity chute. Speeds up to 7,000 pieces per hour are possible, it is claimed. (No. 147)

A **cut-off machine** is said to assist in high-speed production of parts of the type made on automatic screw machines. The machine, it is claimed, can perform the following operations or combinations: stock feed to fixed or swinging stop, form and cut off with two cross slide tools, and one or two end operations, such as threading or drilling. (No. 148)

This column lists items manufactured or developed by many different sources. Further information on any of them may be obtained by writing Bridgeport Brass Company, which will gladly refer readers to the manufacturer or other source.

PRODUCTS OF THE BRIDGEPORT BRASS COMPANY

Executive Offices: BRIDGEPORT, CONN.—Branch Offices and Warehouses in Principal Cities

SHEETS, ROLLS, STRIPS—Brass, bronze, copper, Duronze,* for stamping, deep drawing, forming and spinning.

CONDENSER, HEAT EXCHANGER, SUGAR TUBES—For steam surface condensers, heat exchangers, oil refineries, and process industries.

*Trade-name.

PHONO-ELECTRIC* ALLOYS—High-strength bronze trolley, messenger wire and cable.

WELDING ROD—For repairing cast iron and steel, fabricating silicon bronze tanks.

LEDRITE* ROD—For making automatic screw machine products.



Established 1865

COPPER WATER TUBE—For plumbing, heating, underground piping.

DURONZE ALLOYS—High-strength silicon bronzes for corrosion-resistant connectors, marine hardware; hot rolled sheets for tanks, boilers, heaters, flues, ducts, flashings.

BRASS, BRONZE, DURONZE WIRE—For cap and machine screws, wood screws, rivets, bolts, nuts.

FABRICATING SERVICE DEPT.—Engineering staff, special equipment for making parts or complete items.

BRASS AND COPPER PIPE—"Plumrite" for plumbing, underground and industrial services.

BRIDGEPORT BRASS

Former Steel Trends

Remain Unchanged

But sales volume increase is milder.

Producers do good job in supplying.

More profit margin in current sales.

■ RATE of gain of steel sales is less pronounced, November showing smaller margin over October than in other recent months. In many cases the volume has leveled off which is welcome to producers. Yet orders are still coming in generally more briskly than shipments. More steelmakers now expect some slight and perhaps temporary recession in demand, either in December or in first quarter. But very lively business for many months to come is still in sight.

Trends show no change, deliveries becoming more extended, though more mildly; production at virtually full practical capacity; sales, steady to larger; shipments gaining slightly as more efficiency is attained. Consumers have contracted for about 25 per cent of their first quarter needs at prices prevailing at time of delivery. January books are quite completely filled. Last week wide plates were booked for May delivery.

Steel ingot production remained at 97 per cent as an average for last week, highest since May, 1929.

In choosing what inquiries they will accept steelmakers are cutting down cross shipping to the vanishing point, honoring only orders from near consumers. Not in years have steel transactions been so localized, with profits accordingly larger. Consumers who had ordered from far afield are often changing source of supply and perhaps using slightly different analyses and descriptions.

Steelmakers claim never before in a tight situation have they rendered better service to consumers, rationing steel equitably, making delivery when promised and not letting down on quality. Only unexpected British orders, which are of a priority character, upset schedules, often delaying deliveries a week. Steelmakers give credit to consumers for co-operation.

Some mill men complain of lack of standardization of specifications, a feature particularly embarrassing at this time. Companies have to pass up many vital needs because of a slight difference of analysis called for as compared with stocks on hand at mills. Hence the studies on the part of the industry and government bodies to simplify and standardize are particularly timely now.

While first quarter prices are awaited it is recalled that last year they were announced on Nov. 28, with

MARKET IN TABLOID ★

Demand

Rate of increase less.

Prices

Firm; first quarter prices expected momentarily.

Production

Unchanged at 97 per cent.

most prices reaffirmed. Hot-rolled sheets and strip were raised \$2 in base price but reduction in some extras partially offset. Silvery pig iron was raised \$1. Naming of prices and official opening of books will probably cause a new flurry of buying.

Awards of locomotives the past week numbered 32, including diesels and switching, the largest for some time. The Northern Pacific bought eight 4-8-4 type from the Baldwin Locomotive Works and six 4-6-6-4 from the American Locomotive Co. The Union Pacific plans to buy 15 large freight locomotives. The New York Central has placed 1000 50-ton box cars with its subsidiary, Dispatch Shops Inc., East Rochester, N. Y.

Automobile production reached a new high for the year of 128,783 units, as estimated for the week ended Nov. 30, up 26,443, following a reduction of 9603 the previous week because of the holiday. Same week of 1939 produced 93,638. Detroit predicts that automobile prices will be higher on 1942 models. Car makers are now paying full prices for steel and not securing concessions that have characterized many years.

Pig iron shipments in November are estimated the largest for any month since March, 1937, which was prior to an announced substantial price rise.

Apparently the greatest scarcity has centered in wire rods, a complaint common to several sections of the country. This harmonizes with frequent reports that deliveries on finished wire products are furthest extended.

Ingot production last week gained in five districts, dropped in two and was unchanged in five. Wheeling gained 5 points to 98½ per cent, Cleveland 3 points to 89, Buffalo 2½ points to 95½, Birmingham 3 points to 100 and Detroit 1 point to 97. Chicago dipped ½-point to 99½ and Cincinnati 6 points to 91½. Unchanged were Pittsburgh at 97, eastern Pennsylvania at 94, New England at 82, St. Louis at 87½ and Youngstown at 93.

Two of STEEL'S price composites were higher last week because of advances in steel scrap of 25 to 75 cents per ton. Thus the iron and steel group improved 6 cents to \$38.13 and the scrap composite gained 41 cents to \$21.13. Finished steel remained at \$56.60.

COMPOSITE MARKET AVERAGES

	Nov. 30	Nov. 23	Nov. 16	One Month Ago Oct., 1940	Three Months Ago Aug., 1940	One Year Ago Nov., 1939	Five Years Ago Nov., 1935
Iron and Steel....	\$38.13	\$38.07	\$38.07	\$38.07	\$37.70	\$37.50	\$33.15
Finished Steel....	56.60	56.60	56.60	56.60	56.60	55.90	53.70
Steelworks Scrap..	21.13	20.71	20.71	20.56	18.71	20.06	12.92

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	Nov. 30, 1940	Oct. 1940	Aug. 1940	Nov. 1939	Pig Iron	Nov. 30, 1940	Oct. 1940	Aug. 1940	Nov. 1939
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c	Bessemer, del. Pittsburgh	\$24.34	\$24.34	\$24.34	\$24.34
Steel bars, Chicago	2.15	2.15	2.15	2.15	Basic, Valley	22.50	22.50	22.50	22.50
Steel bars, Philadelphia	2.47	2.47	2.47	2.47	Basic, eastern, del. Philadelphia	24.34	24.34	24.34	24.34
Iron bars, Chicago	2.25	2.25	2.15	2.15	No. 2 foundry, Pittsburgh	24.21	24.21	24.21	24.21
Shapes, Pittsburgh	2.10	2.10	2.10	2.10	No. 2 foundry, Chicago	23.00	23.00	23.00	23.00
Shapes, Philadelphia	2.215	2.215	2.215	2.215	Southern No. 2, Birmingham	19.38	19.38	19.38	19.38
Shapes, Chicago	2.10	2.10	2.10	2.10	Southern No. 2 del. Cincinnati	23.06	23.06	23.06	23.06
Plates, Pittsburgh	2.10	2.10	2.10	2.10	No. 2X, del. Phila. (differ. av.)	25.215	25.215	25.215	25.215
Plates, Philadelphia	2.15	2.15	2.15	2.275	Malleable, Valley	23.00	23.00	23.00	23.00
Plates, Chicago	2.10	2.10	2.10	2.10	Malleable, Chicago	23.00	23.00	23.00	23.00
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.00	Lake Sup., charcoal, del. Chicago	30.34	30.34	30.34	30.34
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05	Gray forge, del. Pittsburgh	23.17	23.17	23.17	23.17
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50	Ferromanganese, del. Pittsburgh	125.33	125.33	125.33	105.33
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10	Scrap				
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05	Heavy melt. steel, Pitts.	\$22.25	\$21.30	\$18.75	\$21.90
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50	Heavy melt. steel, No. 2, E. Pa.	19.75	19.75	18.35	19.25
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.60	Heavy melting steel, Chicago	20.50	19.85	18.15	17.45
Tin plate, per base box, Pitts.	\$5.00	\$5.00	\$5.00	\$5.00	Rails for rolling, Chicago	24.50	24.05	22.00	20.50
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55	Railroad steel specialties, Chicago	24.00	23.25	21.05	21.50
Semifinished Material					Coke				
Sheet bars, Pittsburgh, Chicago	\$34.00	\$34.00	\$34.00	\$34.00	Connellsville, furnace, ovens	\$5.00	\$5.00	\$4.50	\$5.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00	Connellsville, foundry, ovens	6.00	6.00	5.75	6.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00	Chicago, by-product fdry., del.	11.75	11.75	11.25	11.25
Wire rods No. 5 to 3/4-inch, Pitts.	2.00	2.00	2.00	1.92	STEEL IRON, RAW MATERIAL, FUEL AND METALS PRICES				

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

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

Sheet Steel		Granite City, Ill. <th>3.60c</th> <th>Plates ..</th> <th>21.50 22.00 25.50 30.50</th> <th>Gulf ports <th>2.45c</th> </th>	3.60c	Plates ..	21.50 22.00 25.50 30.50	Gulf ports <th>2.45c</th>	2.45c
Hot Rolled		Middletown, O.	3.50c	Sheets ..	26.50 29.00 32.50 36.50	Birmingham	2.10c
Pittsburgh	2.10c	Youngstown, O.	3.50c	Hot strip	17.00 17.50 24.00 35.00	St. Louis, del.	2.34c
Chicago, Gary	2.10c	Pacific Coast ports	4.05c	Cold stp.	22.00 22.50 32.00 52.00	Pacific Coast ports	2.75c
Cleveland	2.10c	Black Plate, No. 29 and Lighter		Steel Plate			
Detroit, del.	2.20c	Pittsburgh	3.05c	Pittsburgh	2.10c	Tin and Terne Plate	
Buffalo	2.10c	Chicago, Gary	3.05c	New York, del.	2.29c	Tin Plate, Coke (base box)	
Sparrows Point, Md.	2.10c	Granite City, Ill.	3.15c	Philadelphia, del.	2.15c	Pittsburgh, Gary, Chicago	\$5.00
New York, del.	2.34c	Long Ternes No. 24 Unassorted		Boston, delivered	2.46c	Granite City, Ill.	5.10
Philadelphia, del.	2.27c	Pittsburgh, Gary	3.80c	Buffalo, delivered	2.33c	Mfg. Terne Plate (base box)	
Granite City, Ill.	2.20c	Pacific Coast	4.55c	Chicago or Gary	2.10c	Pittsburgh, Gary, Chicago	\$4.30
Middletown, O.	2.10c	Enamelling Sheets		Cleveland	2.10c	Granite City, Ill.	4.40
Youngstown, O.	2.10c	No. 10	No. 20	Birmingham	2.10c	Bars	
Birmingham	2.10c	Pittsburgh	2.75c	Coatesville, Pa.	2.10c	Soft Steel	
Pacific Coast ports	2.65c	Chicago, Gary	2.75c	Sparrows Point, Md.	2.10c	(Base, 20 tons or over)	
Cold Rolled		Granite City, Ill.	2.85c	Claymont, Del.	2.10c	Pittsburgh	2.15c
Pittsburgh	3.05c	Youngstown, O.	2.75c	Youngstown	2.10c	Chicago or Gary	2.15c
Chicago, Gary	3.05c	Cleveland	2.75c	Gulf ports	2.45c	Duluth	2.25c
Buffalo	3.05c	Middletown, O.	2.75c	Pacific Coast ports	2.65c	Birmingham	2.15c
Cleveland	3.05c	Pacific Coast	3.40c	Steel Floor Plates			
Detroit, delivered	3.15c	Corrosion and Heat-Resistant Alloys		Pittsburgh	3.35c	Cleveland	2.15c
Philadelphia, del.	3.37c	Pittsburgh base, cents per lb.		Chicago	3.35c	Buffalo	2.15c
New York, del.	3.39c	Chrome-Nickel		Gulf ports	3.70c	Detroit, delivered	2.25c
Granite City, Ill.	3.15c	No. 302	No. 304	Pacific Coast ports	4.00c	Philadelphia, del.	2.47c
Middletown, O.	3.05c	Bars	24.00 25.00	Structural Shapes			
Youngstown, O.	3.05c	Plates	27.00 29.00	Pittsburgh	2.10c	Boston, delivered	2.41c
Pacific Coast ports	3.70c	Sheets	34.00 36.00	Philadelphia, del.	2.21 1/2 c	Bethlehem	2.10c
Galvanized No. 24		Hot strip	21.50 23.50	New York, del.	2.27c	Chicago	2.10c
Pittsburgh	3.50c	Cold strip	28.00 30.00	Cleveland, del.	2.30c	Detroit, delivered	2.25c
Chicago, Gary	3.50c	Straight Chromes		Buffalo	2.10c	Cleveland	2.15c
Buffalo	3.50c	No. No. No. No.		Rail Steel			
Sparrows Point, Md.	3.50c	18.50 19.00 22.50 27.50		(Base, 5 tons or over)			
Philadelphia, del.	3.67c	Chrome-Nickel		Pittsburgh	2.15c	Chicago or Gary	2.15c
New York, delivered	3.74c	Pittsburgh base, cents per lb.		Chicago	2.25c	Detroit, delivered	2.25c
Birmingham	3.50c	Chrome-Nickel		Cleveland	2.10c	Cleveland	2.15c
Galvanized No. 24		No. No. No. No.		STEEL			

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., Brm., Young., Sparrows Pt., Pitts. 2.15c
Gulf ports 2.50c
Pacific Coast ports 2.60c

Rail Steel Bars, Base
Pittsburgh, Gary, Chicago, Buffalo, Cleveland, Brm. 2.05c
Gulf ports 2.40c
Pacific Coast ports 2.50c

Wire Products

Pitts.-Cleve.-Chicago-Brm. base per 100 lb. keg in carloads
Standard and cement coated wire nails \$2.55
Polished fence staples 2.55c
Armenian 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) 56
Galv. barbed wire, 80-rd spools, base column 70
Twisted barbless wire, column 70

To Manufacturing Trade
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, Chi. 2.70c
Chicago, Massillon, Canton, Bethlehem 2.80c
Detroit, delivered

Alloy
S.A.E. Diff. S.A.E. Diff.
2000 .035 3100 .070
2100 .075 3200 .135
2300 .170 3300 .380
2500 .255 3400 .320
4100 0.15 to 0.25 Mo. .055
4600 0.20 to 0.30 Mo. 1.50-2.00 Nl.
5100 0.80-1.10 Cr. .045
5100 Cr. spring flats .015
6100 bars 1.20
6100 spring flats .085
Cr. N., Van. 1.50
Carbon Van. .085
3200 spring flats .015
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, Brm. 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
1/2 x 6 and smaller .68 off
Do., 3/8 and 1/2 x 6-in. and shorter .66 off
Do., 3/4 to 1 x 6-in. and shorter .64 off
1 1/8 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 72.5-10 off; with nuts attached 72.5 off; bulk 82 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.
1/2-inch and less 66 70
3/8-1-inch 63 65
1 1/8-1 1/2-inch 61 62
1 1/2 and larger 60
Hexagon Cap Screws
Upset 1-in., smaller 70.0 off
Square Head Set Screws
Upset, 1-in., smaller 75.0 off
Headless set screws 64.0 off

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
1 1/2" O.D. 13 \$ 9.72 \$23.71
1 3/4" O.D. 13 11.06 22.93
2" O.D. 13 12.38 19.35
2 1/4" O.D. 13 13.79 21.68
2 3/4" O.D. 12 15.16
2 7/8" O.D. 12 16.58 26.57
3" O.D. 12 17.54 29.00
3 1/2" O.D. 12 18.35 31.36
3 3/4" O.D. 11 23.15 39.81
4" O.D. 10 28.66 49.90
5" O.D. 9 44.25 73.93
3" O.D. 7 68.14
Seamless
Hot Cold
Gage Rolled Drawn
1" O.D. 13 \$ 7.82 \$ 9.01
1 1/4" O.D. 13 9.26 10.67
1 1/2" O.D. 13 10.23 11.79
1 3/4" O.D. 13 11.64 13.42

Piling

Pitts., Chgo., Buffalo 2.40c

Rivets, Washers

F.o.b. Pitts., Cleve., Chgo., Bham.
Structural 3.40c
3/8-inch and under .65-10 off
Wrought washers, Pitts., Chi., Phila., to jobbers and large nut, bolt mfrs. l.c.l. \$5.40; c.i. \$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 2 1/2 and 1 1/2 less, respectively. Wrought pipe, Pittsburgh base.
Butt Weld Steel
In. Blk. Galv.
1/2 63 1/2 54
3/4 66 1/2 58
1-3 68 1/2 60 1/2

Lap Weld Steel
2 61 52 1/2
2 1/2-3 64 55 1/2
3 1/2-6 66 57 1/2
7 and 8 65 55 1/2
Iron
2 30 13
2 1/2 34 19
1 1/2 38 21 1/2
2 37 1/2 21

Line Pipe Steel
1 to 3, butt weld 67 1/2
2, lap weld 60
2 1/2 to 3, lap weld 63
3 1/2 to 6, lap weld 65
7 and 8, lap weld 64
Iron
1/2 butt weld 25 7
1 and 1 1/2 butt weld 29 13
1 1/2 butt weld 33 15 1/2
2 butt weld 32 1/2 15
1 1/2 lap weld 23 1/2 7
2 lap weld 25 1/2 9
2 1/2 to 3 1/2 lap weld 26 1/2 11 1/2
4 lap weld 28 1/2 15
4 1/2 to 8 lap weld 27 1/2 14
9 to 12 lap weld 23 1/2 9

Blk. Galv.
25 7
29 13
33 15 1/2
32 1/2 15
23 1/2 7
25 1/2 9
26 1/2 11 1/2
28 1/2 15
27 1/2 14
23 1/2 9

Coke

Price Per Net Ton
Beehive Ovens
Connellsville, fur. \$4.75- 5.00
Connellsville, fdry. 5.25- 6.00
Connell. prem. fdry. 6.00- 6.50
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. 12.50
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 \$29.00

2" O.D. 13 13.04 15.03
2 1/4" O.D. 13 14.54 16.76
2 1/2" O.D. 12 16.01 18.45
2 3/4" O.D. 12 17.54 20.21
3" O.D. 12 18.59 21.42
3 1/2" O.D. 11 19.50 22.48
3 3/4" O.D. 11 24.62 28.37
4" O.D. 10 30.54 35.20
4 1/2" 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—Pat Net Ton
6-in., & over, Brm. \$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
Std. fltgs., Brm., base \$100.00

Semifinished Steel

Rerolling Billets, Slabs (Gross Tons)
Pittsburgh, Chicago, Gary, Cleve., Buffalo, Youngs., Brm., Sparrows Point \$34.00
Duluth (billets) 36.00
Detroit, delivered 36.00
Forging Quality Billets
Pitts., Chi., Gary, Cleve., Young, Buffalo, Brm. 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 3/4-inch incl. (per 100 lbs.) \$2.00
Do., over 3/4 to 1 1/4-inch incl. 2.15
Worcester up \$0.10; Galveston up \$0.25; Pacific Coast up \$0.50.
Skelp
Pitts., Chi., Youngstown, Coatesville, Sparrows Pt. 1.90c

Coke

Price Per Net Ton
Beehive Ovens
Connellsville, fur. \$4.75- 5.00
Connellsville, fdry. 5.25- 6.00
Connell. prem. fdry. 6.00- 6.50
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. 12.50
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 \$29.00

Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25 sil.; 50c diff. below 1.75 sil. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	\$24.00	\$24.50	\$23.50	\$25.00
Birmingham, Ala.	19.38	.....	18.38	24.00
Birdsboro, Pa.	24.00	24.50	23.50	25.00
Buffalo	23.00	23.50	22.00	24.00
Chicago	23.00	23.00	22.50	23.50
Cleveland	23.00	23.00	22.50	23.50
Detroit	23.00	23.00	22.50	23.50
Duluth	23.50	23.50	.....	24.00
Erie, Pa.	23.00	23.50	22.50	24.00
Everett, Mass.	24.00	24.50	23.50	25.00
Granite City, Ill.	23.00	23.00	22.50	23.50
Hamilton, O.	23.00	23.00	22.50	.....
Neville Island, Pa.	23.00	23.00	22.50	23.50
Provo, Utah	22.00	.....	.....	.....
*Sharpville, Pa.	23.00	23.00	22.50	23.50
Sparrow's Point, Md.	24.00	.....	23.50	.....
Swedeland, Pa.	24.00	24.50	23.50	25.00
Toledo, O.	23.00	23.00	22.50	23.50
Youngstown, O.	23.00	23.00	22.50	23.50

†Subject to 38 cents deduction for 0.70 per cent phosphorus or higher. *One producer quotes \$2 higher on bessemer, \$1.50 higher on other grades.

Delivered from Basing Points:	Akron, O., from Cleveland	Baltimore from Birmingham	Boston from Birmingham	Boston from Everett, Mass.	Boston from Buffalo	Brooklyn, N. Y., from Bethlehem	Canton, O., from Cleveland	Chicago from Birmingham	Cincinnati from Hamilton, O.	Cincinnati from Birmingham	Cleveland from Birmingham	Mansfield, O., from Toledo, O.	Milwaukee from Chicago	Muskegon, Mich., from Chicago, Toledo or Detroit	Newark, N. J., from Birmingham	Newark, N. J., from Bethlehem	Philadelphia from Birmingham	Philadelphia from Swedeland, Pa.	Pittsburgh district from Neville Island	Saginaw, Mich., from Detroit	St. Louis, northern
	24.39	24.78	24.12	24.50	24.50	26.50	24.39	23.22	23.24	23.06	23.32	24.94	24.10	26.19	25.15	25.53	24.46	24.84	.....	25.31	23.50
	24.39	23.89	23.89	24.00	24.00	27.00	24.39	23.22	24.11	22.06	22.82	24.44	24.60	26.69	26.03	23.96	24.34	.....	{Neville base, plus 69c, 84c, and \$1.24 freight.	25.31	23.50
	24.39	23.89	23.89	24.00	24.00	27.00	24.39	23.22	24.11	22.06	22.82	24.44	24.60	26.69	26.03	23.96	24.34	.....		25.31	23.50

	No. 2 Fdry.	Malleable	Basic	Bessemer
St. Louis from Birmingham	23.12	.....	22.62	.....
St. Paul from Duluth	25.63	25.63	.....	26.13

†Over 0.70 phos.

Low Phos.
Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., \$28.50, base; \$29.74 delivered Philadelphia.

Gray Forge	Charcoal
Valley furnace	Lake Superior fur.
Pitts. dist. fur.	do., del. Chicago
	Lyles, Tenn.

†Silvery
Jackson county, O., base; 6-6.50 per cent \$28.50; 6.51-7—\$29.00; 7-7.50—\$29.50; 7.51-8—\$30.00; 8-8.50—\$30.50; 8.51-9—\$31.00; 9-9.50—\$31.50; Buffalo, \$1.25 higher.

Bessemer Ferrosilicon
Jackson county, O., base; Prices are the same as for silveries, plus \$1 a ton.
†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.
Manganese differentials in silvery iron and ferrosilicon, 2 to 3%, \$1 per ton add. Each unit over 3%, add \$1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices	Ladle Brick (Pa., O., W. Va., Mo.)
	Dry press
	Wire cut
	Magnesite
	Domestic dead-burned grains, net ton f.o.b.
	Chewelah, Wash., net ton, bulk
	net ton, bags
	Basic Brick
	Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.
	Chrome brick
	Chem. bonded chrome
	Magnesite brick
	Chem. bonded magnesite
	Fluorspar
	Washed gravel, duty pd., tide, net ton
	Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail
	Do. barge
	No. 2 lump
	Fire Clay Brick
	Super Quality
	Pa., Mo., Ky.
	First Quality
	Pa., Ill., Md., Mo., Ky.
	Alabama, Georgia
	New Jersey
	Second Quality
	Pa., Ill., Ky., Md., Mo.
	Georgia, Alabama
	New Jersey
	Ohio
	First quality
	Intermediate
	Second quality
	Malleable Bung Brick
	All bases
	Silica Brick
	Pennsylvania
	Joliet, E. Chicago
	Birmingham, Ala.

Ferroalloy Prices

Ferromanganese, 78-82%, carlots, duty pd.	112.00	Do., ton lots	11.75c	Do., spot	145.00	Silicon Metal, 1% iron, contract, carlots, 2 x 1/4-in., lb.	14.50c
Ton lots	130.00	Do., less-ton lots	12.00c	Do., contract, ton lots	145.00	Do., 2% Spot 1/4c higher	13.00c
Less ton lots	133.50	67-72% low carbon:		Do., spot, ton lots	150.00		
Less 200 lb. lots	138.00	Car-loads	Car-loads	15-18% ti., 3-5% carbon, carlots, contr., net ton	157.50		
Do., carlots del. Pitts.	125.33	17.50c	18.25c	Do., spot	160.00	Silicon Briquets, contract carloads, bulk, freight allowed, ton	\$74.50
Spiegel Eisen, 19-21% dom. Palmerton, Pa., spot	36.00	1% carb.	18.50c	Do., contract, ton lots	160.00	Ton lots	84.50
Do., 26-28%	49.50	0.10% carb.	20.50c	Do., spot, ton lots	165.00	Less-ton lots, lb.	4.00c
Ferrosilicon, 50%, freight allowed, c.l.	74.50	0.20% carb.	19.50c	Alifer, contract carlots, f.o.b. Niagara Falls, lb.	7.50c	Less 200 lb. lots, lb.	4.25c
Do., ton lot	87.00	Spot 1/4c higher	20.25c	Do., ton lots	8.00c	Spot 1/4c higher	
Do., 75 per cent	135.00	Ferromolybdenum, 55-65% molyb. cont., f.o.b. mill, lb.	0.95	Do., less-ton lots	8.50c	Manganese Briquets, contract carloads, bulk freight allowed, lb.	5.50c
Do., ton lots	151.00	Spot 1/4c higher	0.80	Spot 1/4c lb. higher		Ton lots	6.00c
Silicomanganese, c.l., 3 per cent carbon	113.00	Calcium molybdate, lb. molyb. cont., f.o.b. mill	0.80	Chromium Briquets, contract, freight allowed, lb. carlots, bulk	7.00c	Less-ton lots	6.25c
2 1/2% carbon	118.00	Ferrotitanium, 40-45%, lb., con. ti., f.o.b. Niagara Falls, ton lots	\$1.23	Do., ton lots	7.50c	Spot 1/4c higher	
2% carbon, 123.00; 1%, 133.00		Do., less-ton lots	1.25	Do., less-ton lots	7.75c	Zirconium Alloy, 12-15%, contract, carloads, bulk, gross ton	102.50
Contract ton price \$12.50 higher; spot \$5 over contract.		20-25% carbon, 0.10 max., ton lots, lb.	1.35	Do., less 200 lbs.	8.00c	Do., ton	108.00
Ferrotungsten, stand., lb. con. del. cars	1.90-2.00	Do., less-ton lots	1.40	Spot, 1/4c higher		35-40%, contract, carloads, lb., alloy	14.00c
Ferrovandium, 35 to 40%, lb., cont.	2.70-2.80-2.90	Spot 5c higher		Tungsten Metal Powder, according to grade, spot shipment, 200-lb. drum lots, lb.	\$2.50	Do., ton lots	15.00c
Ferrophosphorus, gr. ton, c.l., 17-18% Rockdale, Tenn., basis, 18%, \$3 unitage, 58.50; electric turn., per ton, c. i., 23-26% f.o.b. Mt. Pleasant, Tenn., 24% \$3 unitage	75.00	Ferrocolumbium, 50-60%, contract, lb. con. col., f.o.b. Niagara Falls	\$2.25	Do., smaller lots	2.60	Do., less-ton lots	16.00c
Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb., contained cr., del. carlots	11.00c	Do., less-ton lots	2.30	Vanadium Pentoxide, contract, lb. contained	\$1.10	Spot 1/4c higher	
		Spot is 10c higher		Do., spot	1.15	Molybdenum Powder, 99%, f.o.b. York, Pa.	\$2.60
		Technical molybdenum trioxide, 53 to 60% molybdenum, lb. molyb. cont., f.o.b. mill	0.80	Chromium Metal, 98% cr., contract, lb. con. chrome, ton lots	80.00c	200-lb. kegs, lb.	2.75
		Ferro-carbon-titanium, 15-18%, ti., 6-8% carb., carlots, contr., net ton	\$142.50	Do., spot	85.00c	Do., 100-200 lb. lots	3.00
				88% chrome, cont. tons	79.00c	Do., under 100-lb. lots	
				Do., spot	\$4.00c	Molybdenum Oxide Briquets, 48-52% molybdenum, per pound contained, f.o.b. producers' plant	80.00c

Sheets, Strip

Sheet & Strip Prices, Pages 92, 93

Pittsburgh—Sheet production continues to gain slowly, as mills begin to work on heavy backlogs which have only recently begun to mount. Releases from automotive buyers are larger and miscellaneous buying both for production needs and for stock continues heavy. Galvanized sheet production is steady at 82 per cent. Revisions on long terne and roofing terne extras were announced last week by Carnegie-Illinois Steel Corp.

Cleveland—Hot-rolled sheets seem the most widely bought flat-rolled products for tanks, trucks, cantonment stovepipes, etc. This accounts for delivery having been shoved ahead from four weeks, a month ago, to eight weeks now. Practically no sheets or strip can be bought for this year, the average being late January.

Chicago—Sheets and strip buying remain good, but is slightly less than a week ago. Deliveries on hot rolled sheets range from four to ten weeks, cold-rolled ten to eleven weeks. Hot strip is somewhat easier, with deliveries from two to six weeks; cold-rolled six to ten weeks. Galvanized sheets are offered in five to ten weeks, and enameling stock in ten to eleven weeks.

Boston—Sheet inventories are depleted beyond expectations and replacement orders are confronted with lengthening deliveries which until recently have been relatively better than on most products. Construction requirements for galvanized, including corrugated, have slackened, but considerable volume remains to be bought for defense building. Stainless is moving well. Fabricators of small household tanks are beginning to taper off following a brisk season. Consumption by stamping, metal-working and miscellaneous industrial users is steady.

New York—Some large sheet sellers who recently could offer deliveries within four weeks now find six weeks the best they can do on either hot or cold-rolled sheets and seven and eight weeks on galvanized sheets. Some smaller producers still have tonnage available within a month, but they are becoming the rare exceptions. While some consuming lines are tapering seasonally, this trend is far less noticeable than normally, as many fabricators are maintaining higher operating rates than usual in an effort to build up inventories of manufactured products.

Orders for narrow cold strip are in large volume and exceed shipments. While consumption is heavier, inventories in most instances are mounting moderately with fab-

Name Your Insulation Problem . . .

Carey

CAN GIVE YOU THE ANSWER FOR TOP EFFICIENCY AND ECONOMY



Is Your Problem —

- to cut fuel and power costs?
- to manufacture more economically?
- to modernize for greater efficiency?
- to provide efficient air conditioning?
- to insulate for below-zero temperatures?
- to insulate for temperatures up to 2500° F.?
- to facilitate the long distance transmission of steam by proper insulation of pipe lines?

● All these problems and scores of others are everyday routine with the CAREY organization. CAREY'S 67 years of experience in meeting industry's insulation requirements assures a practical, prompt and economical solution of YOUR insulation problems. You're always SAFE with CAREY.



INDUSTRIAL BUILDING AND MAINTENANCE PRODUCTS OF
ASPHALT—ASBESTOS—MAGNESIA

WRITE TODAY
FOR INSULATION
CATALOG—
ADDRESS
DEPT. 71

BUILT-UP AND PREPARED ASPHALT ROOFINGS
ROOF PAINTS, COATINGS, CEMENTS
HEAT INSULATIONS
ASBESTOS-CEMENT PRODUCTS
CORRUGATED SIDING & ROOFING
INDUSTRIAL FLOORING • BUILDING INSULATION
EXPANSION JOINTS • WATERPROOFING MATERIALS

THE PHILIP CAREY COMPANY • Lockland, Cincinnati, Ohio
Dependable Products Since 1873
BRANCHES IN PRINCIPAL CITIES

ricators while stocks of finished materials made of strip in distributors' hands are known to be accumulating in some instances.

Philadelphia—Specifications for first quarter delivery of sheets and strip continue to accumulate as buyers seek to anticipate future needs. New business cannot be accommodated before January, with early February shipment required on certain grades and sizes. Army barracks construction results in frequent inquiries for moderate tonnages of galvanized sheets for duct work.

Buffalo—Mill backlogs of sheet

and strip are expanding but deliveries are not extended to the degree witnessed in other items. Popular grades range from three to five weeks with other sizes eight or ten weeks. Consumers still strive to add to inventories.

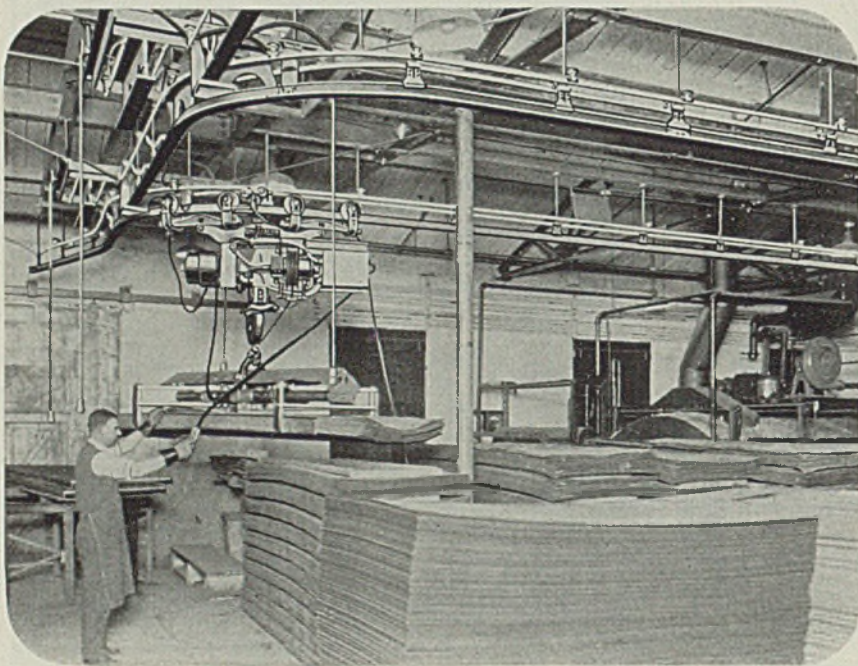
St. Louis—Production of sheets and strip continues at the high rate which has obtained since mid-October. Deliveries are also on a large scale, but despite this fact, backlogs continue to grow, and deliveries on certain items are further prolonged.

Cincinnati—Sheet mills are filled for December, with heavy bookings

for first quarter. In the last three weeks orders have averaged 150 per cent of mill capacity. In contrast to earlier conditions, some speculative purchasing may be traced in recent business. Although shipments are more and more extended, regular consuming interests have not been seriously pinched for material.

Birmingham, Ala.—Miscellaneous buying in sheets continues brisk, with some inclination to build up inventories. Demand is fairly evenly divided between manufacturers' and roofing sheets. Not a great deal of strip is being produced.

Toronto, Ont.—Demand for black and galvanized sheets continues heavy with bookings steadily swelling backlogs for delivery into second quarter, 1941. Refrigerator and stove makers are taking substantial tonnages against contracts and are placing additional business.



SIMPLE SHEET-HANDLING SYSTEM

MOVES UP TO 5 TONS QUICKLY and EASILY

Heavy loads of sheet steel are easily handled with a Cleveland Tramrail System. Motor-operated grabs, for floor or cab-controlled carriers, eliminate danger to workmen and to highly finished sheets. Aisle space is saved and piles may be higher, thus greatly increasing storage capacity of a given area.

It is worth your while to investigate the many cost-cutting possibilities of Cleveland Tramrail.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
1125 Depot Street Wickliffe, Ohio



CLEVELAND TRAMRAIL

OVERHEAD MATERIALS HANDLING EQUIPMENT

Other products: CLEVELAND CRANES and STEELWELD MACHINERY

Plates

Plate Prices, Page 22

Pittsburgh—No change reported in the plate situation, backlogs continuing to mount, with heavy buying. Carnegie-Illinois Steel Corp. is expanding its plate fabricating facilities by installing equipment at its Farrell, Pa., works. Formerly a tin plate mill, this plant has been idle for some time. American Bantam Car Co., Butler, Pa., is reported buying light armor plate for an order for army scout cars.

Cleveland—Wide plates show greatest delivery delays. May is the best promised by some producers. Many repeat orders come in from consumers who had thought themselves completely covered.

Chicago—New business placed by the heavy construction industries, including car builders, fabricators of tanks, boilers and heavy machinery, are keeping plate mill backlogs substantial. Deliveries range from two to three weeks on lighter gages to the end of January on the heavier sizes.

Boston—Demand for plates from miscellaneous sources is active and shipyard specifications tend upward. Small tank and boiler shops are generally fairly active, but plate orders from structural shops still lag. Railroads are specifying for maintenance needs, which are slightly higher. Deliveries are being extended steadily. Except for shipbuilding and scattered other exceptions, most contracts placed in this district for defense needs call for lighter products.

New York—Plate sellers here are virtually out of the market for the remainder of the year, this even applying to universal mill products. Some have nothing to offer before the middle of January and on wider

sizes before February. With the market highly active, deliveries are expected to become still more extended.

Commercial building requirements are easier but this is being far more than offset by increased specifications from tank and boiler shops, railroads and oil companies.

Philadelphia—Plates are moving actively for railroad use, although brisk demand continues from tank and boiler fabricators, shipyards, warehouses and miscellaneous consumers. Some producers offer universal mill plates within four to five weeks and sheared material in five to six weeks, although many sizes of the latter require eight weeks or more.

Birmingham, Ala.—Buying continues heavy and deliveries are considerably delayed. Recent car orders call for considerable tonnage. In addition much plate tonnage is in demand for miscellaneous use.

Seattle—Important tonnages of plates are being placed and other contracts are pending at local ship building plants. For six freighters to be constructed by Seattle-Tacoma Shipbuilding Co. at the Tacoma plant, 14,400 tons of plates will be furnished by Bethlehem and Columbia Steel Co. Shops are well supplied with orders, small jobs increasing.

San Francisco—Plate awards totaled 3450 tons and brought the aggregate for the year to 190,183 tons, compared with 90,426 tons for the same period a year ago. Four penstocks for the Shasta dam, Central Valley project, Coram, Calif., requiring approximately 5000 tons, will be bid Jan. 2.

Toronto, Ont.—Canadian plate demands are gaining rapidly, with all current new business going to the United States. Contracts for 18 large freighters will be placed soon for which several thousand tons of plate will be required.

Plate Contracts Placed

14,400 tons, six freighters, Tacoma plant of Seattle-Tacoma Shipbuilding Co., to Bethlehem Steel Co. and Columbia Steel Co.

1895 tons, fabricated high-strength, low alloy plates and eyebolts, bolts and cap screws, Panama, schedule 4486, to Lukens Steel Co., Coatesville, Pa., \$223,629.85; bids Nov. 15, Washington.

1500 tons or more, reported, Richfield Oil Co. storage tanks at Seattle, to Chicago Bridge & Iron Co., Chicago.

100 tons, or more, 1,500,000-gallon water tank, San Antonio, Tex., to Chicago Bridge & Iron Co., Chicago.

100 tons or more, 500,000-gallon elevated steel tank, Fort Dix, N. J., to Pittsburgh-Des Moines Steel Co., Pittsburgh, \$44,490; bids Nov. 14, constructing quartermaster.

Unstated tonnage, 300,000-gallon water tank and tower, Ontario, N. Y., to Chicago Bridge & Iron Co., Chicago.

Plate Contracts Pending

5000 tons, four penstocks, specification 941, Shasta dam, Coram, Calif.; bids Jan. 2.

150 tons, 30-inch welded water line for Spokane, Wash.; bids in.

Unstated tonnage, one steel barge and equipment, United States engineer, St. Paul, Minn., Calumet Shipyard & Dry Dock Co., Chicago, low, \$67,430.85; bids Nov. 20, Inv. 33.

Unstated tonnage, one steel hull for drill barge, Panama, schedule 4462, Bethlehem Steel Export Corp., New York, low \$233,000, only bidder, Nov. 19, Washington.

Unstated tonnage, four tank lighters, about 45-foot, navy, delivery Sewalls Point, Va., American Car & Foundry Co., New York, low; schedule 900-3836.

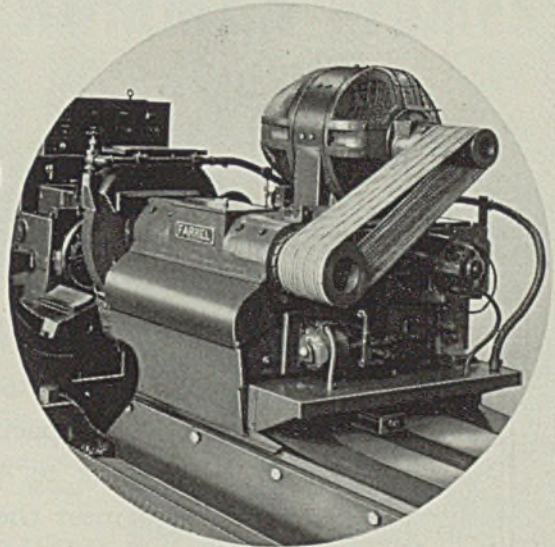
Bars

Bar Prices, Page 92

Pittsburgh—Backlogs are beginning to pile up heavily on bar mills, and the problem of securing enough semifinished steel to maintain mills at capacity operation is still present. Inventories by mills and warehouses in this district are moving downward as demand exceeds supply.

Cleveland—In a few cases bars can still be bought for this year, but as a rule producers are sold out. Volume of orders still increases, but

**Spindle
Design and
Construction
Contribute
to Close
Accuracy
and Fine
Finish
of**



FARREL ROLL GRINDERS

Contributing substantially to the high precision and fine finish for which Farrel Heavy Duty Roll Grinders are noted are the construction and mounting of the grinding wheel spindle. Heavy, rigid and smooth-running, the wheel spindle is one of the outstanding design features of the machine.

For rigidity under working load the spindle is made as large as possible in diameter. It is made of high grade alloy steel, carefully machined, heat treated and ground to extremely close limits of accuracy. It is mounted in special bronze alloy, or steel-backed, babbitt-lined bearings of the sleevetype,

split longitudinally to fit a wedge by means of which the running clearance is closely controlled.

Thrust on the spindle is taken by a hardened steel disc and two babbitted rings at the center of the spindle, which permits free expansion of the spindle bearings and minimizes deflection of the spindle under thrust load.

Vibrationless, multiple V-belt drive, continuous automatic lubrication and other Farrel features combine to assure the smooth-running spindle needed to deliver continuously close accuracy and fine finish of ground rolls.

For full particulars of the Farrel Heavy Duty Roll Grinder send for a copy of Bulletin No. 111



FARREL-BIRMINGHAM COMPANY, Inc.
ANSONIA, CONN.

New York • Buffalo • Pittsburgh • Akron • Chicago • Los Angeles

more slowly. Some look for slight let-down in sales in December, though less than usual. A widely diversified company can make its promptest deliveries in bar flats, quarter inch or thicker, in four to six weeks.

Chicago—Demand for steel bars continues unabated. Mills are quoting longer deliveries, as far as next spring, as consumers seek coverage. Alloy and carbon grades are in greatest demand.

Boston—Few bar sizes of any finish are available for delivery during the remainder of the year and deliveries on most grades are lengthening, notably on alloys. Although

most consumers are well covered, pressure for shipment continues and additional spot requirements are increasing in connection with defense contracts. However, heaviest demand for latter needs is yet to come when production on small arms and other armaments develops in expected volume. Bar consumption is mounting and consumer inventories are not generally high, which accounts in part for delivery pressure.

New York—Except for light rounds and flats, bar sellers are unable to offer much for shipment before February. This also is largely true of cold-drawn bars and in alloys. Shipments range 15 to 20

weeks with nearer the outside figure general. Shipments on special heat treated bars range from 30 weeks to almost a year, in some cases.

Philadelphia—Mill backlogs are increasing, with delivery delays aggravated by extension of forward coverage. Bar consumption for defense is expanding. Railroad requirements are fairly heavy, with demand from other directions unusually well diversified.

Birmingham, Ala.—Mills are comfortably booked in both merchant and reinforcing bars. Production remains at somewhat better than 80 per cent.

Buffalo—No further steel bars are available for delivery before January. Backlogs are mounting as consumers increase bookings for first quarter. Demand is diversified, with aircraft specifications growing. Bethlehem is preparing to put its new mill on a triple shift. The flow of Canadian orders is sustained.

Toronto, Ont.—Rolling mill schedules for the remainder of the year have been filled and bar orders are for delivery in January or later. Demand is increasing from practically all sources with war requirements leading. Automobile makers are taking substantial tonnages, and other manufacturers show interest in future requirements.

GLOBE

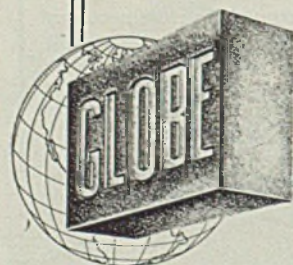
SUPERIOR LADLE BRICK

Recent additions to our plant have increased our annual capacity of "GLOBE" Superior Ladle Brick to 42,000,000 brick per year . . . to meet the demand made necessary because of years of fully satisfactory service to the steel industry.

"GLOBE" Superior Ladle Brick, either wire cut or dry pressed, will improve your metal . . . eliminate dirty steel . . . reduce lost time due to refractory replacement . . . and lower per ton brick costs.

Whether you need a few hundred or several thousand ladle brick, we can supply your requirements immediately.

May we have an opportunity to quote on your next order?



SERVING THE STEEL INDUSTRY SINCE 1873

The **GLOBE** Brick Co.

EAST LIVERPOOL, OHIO

Pipe

Pipe Prices, Page 93

Pittsburgh—Little buying has been reported in oil country tubular goods. Demand is heavier than supply in standard pipe, and the difference is being supplied out of stock, depleting available material held in consigned stocks. Pressure tubing demand is better. Mechanical tubing backlogs continue to rise.

Cleveland—Orders for merchant pipe exceed shipments. Surprisingly short deliveries can still be given, especially to jobbers, a week or ten days. Line pipe is in slow demand in line with the season, with late January the best delivery obtainable.

Boston—Continued activity in the construction field, industrial plant expansions indirectly connected with the defense program and cantonment work notably, has sustained demand for merchant steel pipe, which holds above usual seasonal requirements. Housing needs are also bolstering tonnage. Replacements of merchant pipe are more in evidence on the part of distributors at firmer prices, which reflects a stronger trend in resale quotations.

Birmingham, Ala.—Pipe output remains relatively high, due in large

measure to government requirements and a large miscellaneous tonnage, mostly of small sizes for municipal and public and private utility use.

Seattle—Unstated tonnages are pending for water and sewer systems at Bremerton, Sand Point and Seattle, and other housing authority projects. About 300 tons are pending in several Seattle extension jobs, general contracts placed. H. G. Purcell, Seattle, will furnish 100 tons of 6-inch for Everett, Wash., and 250 tons of 8-inch for Sixteenth avenue N. E., Seattle.

San Francisco—Few inquiries of size for cast iron pipe are in the market. So far this year 43,757 tons have been booked, compared with 35,586 tons for the corresponding period in 1939.

Cast Pipe Placed

250 tons, 8-inch, Sixteenth avenue N. E., Seattle, improvement, to H. G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.

100 tons, 6-inch, for Everett, Wash., to H. G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.

Rails, Cars

Track Material Prices, Page 93

Domestic freight car orders over the past week have brought the total awards so far this year up to about 59,000, exceeding the 57,775 placed during all of last year. With substantial lists still pending, bookings for all of 1940 may even exceed the 64,523 placed in 1936, the highest yearly total since 1929, when awards involved 106,105 cars.

Southern Pacific has distributed orders for 2700 tons of angle bars 1000 tons of spikes and 360 tons of bolts. Some carbuilders are seeking government orders for fabricating airplane assemblies to engage excess capacity.

Locomotives Placed

Bessemer & Lake Erie, five Texas type locomotives, to Baldwin Locomotive Works, Eddystone, Pa., and two 0-8-0 switch engines to American Locomotive Co., New York.

Great Northern two 2200-horsepower diesel-electric locomotives to Electro-Motive Corp., La Grange, Ill.

Kewanee, Green Bay & Western one 660-horsepower diesel locomotive to American Locomotive Co., New York.

Norfolk & Western, five 4-8-4 passenger locomotives to own shops.

Northern Pacific, eight 4-8-4 locomotives to Baldwin Locomotive works, Eddystone, Pa., and six 4-6-6-4 to American Locomotive Co., New York.

Southern Railway, four diesel-electric locomotives, 4000-horsepower, to Electro Motive Corp., La Grange, Ill.

Terminal Railway, Alabama state docks, one 0-6-0 type switch engine, to American Locomotive Co., New York.

Locomotives Pending

Navy, delivery Washington, one diesel-electric operated locomotive and spare parts; bids Dec. 3, bureau of supplies and accounts, schedule 4223.

New York Central, diesel-electric locomotives, contemplated.

Union Pacific, five to 15 steam locomotives; bids expected soon.

Car Orders Placed

Detroit, Toledo & Ironton, 300 gondolas to Greenville Steel Car Co., Greenville, Pa.

E. I. du Pont de Nemours & Co., two 50-ton tank cars, to American Car & Foundry Co., New York.

Illinois Terminal, 250 box cars, to American Car & Foundry Co., New York.

Norfolk Southern, 250 box cars, to Magor Car Corp., Passaic, N. J., and 50 fifty-ton gondolas to American Car & Foundry Co., New York, with action on 50 hoppers yet to be announced.

New York Central 1000 fifty-ton box cars, to its subsidiary, Despatch Shops Inc., East Rochester, N. Y.

Panama railroad, 35 flat cars, 30 box cars, 15 gondola cars, to Magor Car Corp., Passaic, N. J.

Seaboard Air Line, 200 hopper cars to Bethlehem Steel Co., in addition to 500 box cars to Pullman-Standard Car Mfg. Co. as reported last week.

Solvay Process Corp., Syracuse, N. Y., five 70-ton nickel-clad tank cars and four 40-ton multiple unit tank cars, to American Car & Foundry Co., New York; also 27 thirty-ton chlorine tank cars and 700 one-ton chlorine contain-

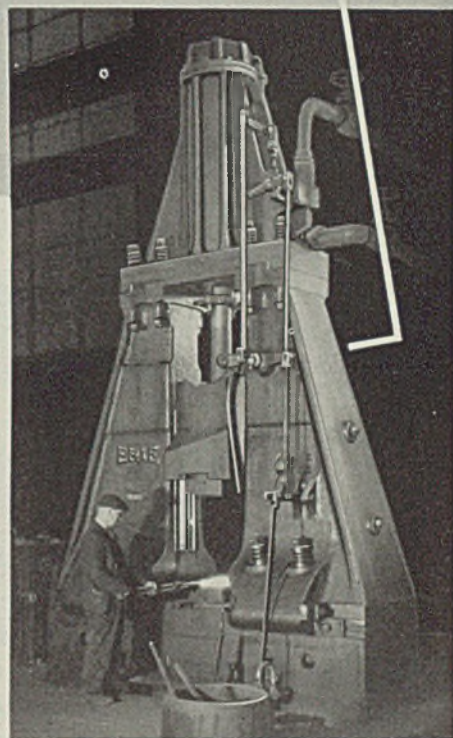
in ERIE HAMMER Frames

Plenty OF BACKBONE
TO STAND
THE GAFF

Wham! The ram strikes the piece of glowing metal. Wham . . . Wham, day after day, year after year, impact forces measured in thousands of tons develop heavy stresses in every direction in the hammer frames.

To withstand these shock loads and to hold the dies in match, Erie Drop Hammers have the strongest frames ever used on a hammer. Erie frames have a massive box section reinforced by heavy ribs running down the outside corners that add strength and rigidity. Heavy horizontal ribs, inside and outside, carry the thrust of the ram into the front and back walls.

These are some of the main reasons why Erie Hammers are nationally known for their ability to stand the gaff under heavy production schedules. They are important facts to remember when buying your next hammer.

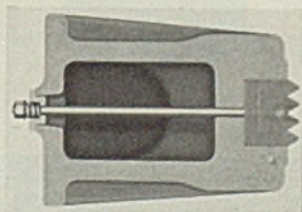


ERIE FOUNDRY COMPANY ERIE, PENNSYLVANIA, U.S.A.

DETROIT 338 Centre Bldg. FRANCE Fenwick, S. A.
CHICAGO 849 Washington Blvd. CANADA John Bortman & Sons Co. Ltd.
INDIANAPOLIS 335 Postal Station Bldg. ENGLAND Barton, Grubb & Co., Ltd.



The great ruggedness of the combined I-beam and box frame construction of Erie Hammers is evident in this cross-section view.



ERIE BUILDS Dependable HAMMERS

ers, to American Welding Co., subsidiary of American Car & Foundry Co., New York.

Car Orders Pending

Navy department, for White Plains, Md., two box cars, General American Transportation Corp., Chicago, low; schedule 3911.

Rail Orders Placed

Seaboard Air Line, 12,300 tons, to Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

Wire

Wire Prices, Page 33

Pittsburgh—Problem of securing

sufficient wire rods is unsolved, with wire backlogs building up and wire mills running at less than capacity because of insufficient raw material. Jobbers, in particular, are attempting to buy far in advance.

Cleveland—Deliveries on wire fence can still be promised with fair promptness despite brisk demand for munitions and other plants which require close guarding. On most products the situation is tense and only far forward delivery can be promised.

Chicago—Demand for wire and wire products continues heavy with

mills booked far ahead and able to promise only deferred deliveries. Difficulty is principally in obtaining sufficient semifinished steel. Wire finishing and heat treating facilities are also a bottleneck.

Boston—Limited in some instances by available supply of rods of special analysis, wire mill finishing departments are at capacity with deliveries lengthening. Incoming orders are heavy, more tonnage being placed for first quarter shipment at open prices. Mills will enter the new year with large backlogs, although an early announcement on prices might ease pressure for deliveries.

New York—Tight situation in wire rods is becoming a more serious factor in production and delivery of some wires of special analysis. Integrated mill producers of rods are out of the market in some instances, absorbing all production in own finishing departments. Meanwhile incoming orders, now entirely for next quarter, continue ahead of shipments with November volume about on par with October.

WHAT'S THE IDEA?

Many improvements fail to materialize—many new products fall short of their profit possibilities because somewhere along the line a special shape or shell is not as practical or as economical as it should be.

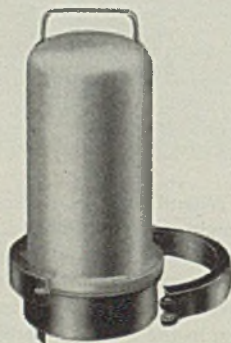
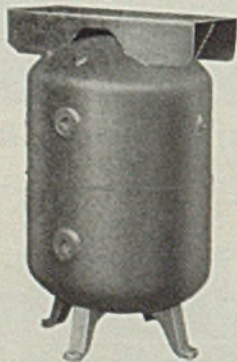
Hackney engineering and manufacturing facilities have created many special shapes and shells

FOR MORE than 35 years Pressed Steel Tank Company engineers have been co-operating with manufacturers in the solution of their problems calling for the development or construction of shapes, shells and containers for gases, liquids and solids.

The cold drawing of seamless containers from metal plates was pioneered by Pressed Steel Tank Co. Where welding is desirable, the superiority of the Hackney methods have been recognized. Because of Hackney's designing and manufacturing facilities the practical solutions to thousands of problems have been obtained at lower cost.

Why not let a Hackney engineer help you work out your idea?—there is no obligation and valuable time and cost savings may be effected.

New vertical air receiver with saddle for attaching compressor



New three-part container for dispensing grease

PRESSED STEEL TANK COMPANY

208 S. LaSalle St., Room 1511 Chicago
1387 Vanderbilt Concourse, N. Y.
688 Roosevelt Bldg., Los Angeles
1461 So. 66th St., Milwaukee

Hackney
MILWAUKEE

DEEP DRAWN SHAPES AND SHELLS

Shapes

Structural Shape Prices, Page 92

Pittsburgh—Shape inquiries are slightly less as the heaviest part of construction work for the defense program has been outlined. Backlogs continue high and placements are heavy, running slightly ahead of shipments last week.

Cleveland—Shapes are classed with plates for far forward delivery. Bids were opened Nov. 28 on 1000 tons of fabricated shapes for 44 buildings for the shell loading plant, Ravenna, O., 1200 tons having been let previously to Bethlehem for 17 buildings, with more to be needed for 200 buildings.

New York—Structural buying continues, though at a somewhat lighter rate, much defense work having been covered. Considerable remains to be bid as soon as engineering specifications have been completed.

Boston—With structural steel requirements for shipyard expansion

Shape Awards Compared

	Tons
Week ended Nov. 30	33,970
Week ended Nov. 23	11,377
Week ended Nov. 16	29,373
This week, 1939	23,914
Weekly average, year, 1940	28,156
Weekly average, 1939	22,411
Weekly average, Oct.	48,298
Total to date, 1939	1,091,811
Total to date, 1940	1,351,476

Includes awards of 100 tons or more.

leading, current awards are headed by 1700 tons for a fitting shop, navy yard, Boston. Incidentally shape needs for shipbuilding fabrication are substantial and mounting, the navy closing Dec. 12 on shapes for delivery at several yards.

Orders for fabricated structural steel placed in October, as reported by the American Institute of Steel Construction, totaled 233,115 net tons, compared with 225,494 tons in September and 118,841 tons in October, 1939. Aggregate orders for ten months this year were 1,395,248 tons, compared with 1,121,350 tons in the corresponding period last year. Shipments in October were 139,221 tons, against 142,834 tons in September and 133,849 in October, 1939. Ten months' shipments this year totaled 1,199,045 tons; in the same period last year, 1,195,657 tons.

Philadelphia—Structural inquiries have slackened moderately the past ten days, following placing of large tonnages for major defense projects. Recent awards of the latter type include 1650 tons for a turret shop, New York Shipbuilding Corp., Camden, N. J. and 400 tons for a research laboratory here for Frankford arsenal. Plain shape deliveries usually hold at a minimum of eight weeks.

Seattle—Bids were opened Nov. 25 by Bonneville project for 896 transmission towers involving 1210 tons of shapes and bids are in to Puget Sound navy yard for 183 tons required for proposed Transportation building. Seattle-Tacoma Shipbuilding Co. is reported to have placed 9600 tons of structurals with Bethlehem and Columbia Steel Co. for six freighters to be built at the Tacoma plant.

Toronto, Ont.—While there was some falling off in structural awards for the past week, prospective business continues large, with upwards of 25,000 tons pending.

Shape Contracts Placed

9600 tons, six freighters, Seattle-Tacoma Shipbuilding Co., to Bethlehem Steel Co. and Columbia Steel Co.

4200 tons, Mississippi river bridge, Jefferson Barraeks, Mo., 4200 tons to Bethlehem Steel Co., Bethlehem, Pa., and 1150 tons to Stupp Brothers Bridge & Iron Co., St. Louis, through Massman Construction Co.; bids Oct. 28.

3000 tons, extension to repair shop, two hangars and aircraft store house, naval air base, Alameda, Calif., to Columbia Steel Co., San Francisco.

1800 tons, two cracking towers, Bayway, N. J., and Baton Rouge, La., for Standard Oil Co. of N. J., to American Bridge Co., Pittsburgh.

1700 tons, shop building, navy yard, Boston, to American Bridge Co., Pittsburgh; Sawyer Construction Co., Boston, contractor.

1650 tons, turret shop, New York Shipbuilding Corp., Camden, N. J., to Bethlehem Steel Co., Bethlehem, Pa.

1200 tons, 17 buildings, shell loading

plant, Ravenna, O., to Bethlehem Steel Co., Bethlehem, Pa.

1100 tons, movable traffic separators, Lincoln Park, Chicago, to A. J. O'Leary & Co., Chicago; bids Nov. 4.

1000 tons, airplane repair dock, Duncan Field, war department, San Antonio, Tex., to North Texas Iron & Steel Co., Fort Worth, Tex.

850 tons, air corps hangars and boiler houses, Eglin field, Valparaiso, Fla., and Selma airport, Montgomery municipal airport, Alabama, to International Steel Co., Evansville, Ind.; Algerion Blair, Montgomery, contractor; Ceco Steel Co., Birmingham, awarded concrete bars and mesh.

750 tons, plant building, Westinghouse Electric & Mfg. Co., Cleveland, through Austin Co., Cleveland, to Ingalls Iron Works, Birmingham, Ala.

650 tons, Manhattan work shaft, Battery-

Brooklyn tunnel, New York, to American Bridge Co., Pittsburgh, through D. Angelo Construction Co., New York.

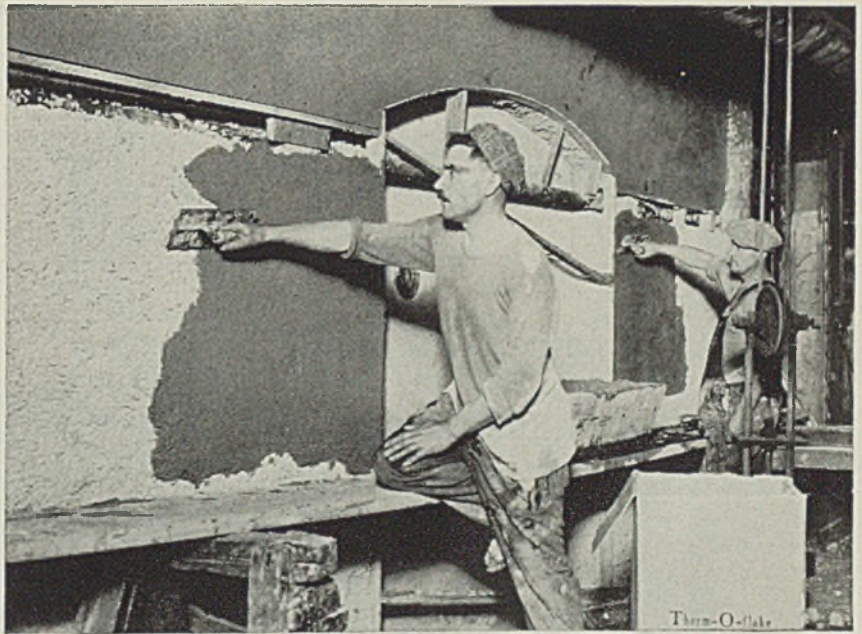
460 tons, plant addition, SKF Industries Inc., Philadelphia, to American Bridge Co., Pittsburgh.

400 tons, repairs, Williamsburg bridge, New York, to American Bridge Co., Pittsburgh.

400 tons, research laboratory, Frankford arsenal, Philadelphia, to Lehigh Structural Steel Co., Allentown, Pa.

378 tons, two buildings, Westclox, division of General Time Instruments Corp., La Salle, Ill., V. Jobst, Peoria, Ill., contractor, to Mississippi Valley Structural Steel Co., Decatur, Ill.

350 tons, shop addition, Houde Engineering Corp., Buffalo, N. Y., to R. S. McMannus Steel Construction Co., Buffalo.



Therm-O-flake COATING

SUPERIOR HIGH TEMPERATURE INSULATION

Keeps heat inside, with a coating of plastic insulation.

One inch thickness equivalent to about nine inches of fire brick wall in insulation value.

More economical in cost and installation, on existing furnaces, than walls of insulation brick.

Easily applied and largely reclaimable for re-use, after removal.

Most widely used material for high temperature insulation, up to 2000°F.

Write for Information and Prices

Other Therm-O-Flake Products

Made from Exfoliated Vermiculite

Granules, Brick, Block, Concrete



JOLIET, ILL.

320 tons, four-story factory building, Hoover Sweeper Co., North Canton, O., to Burger Iron Co., Akron, O.; Warren-Hoffman Co., Canton, O., contractor.

304 tons, crossing at Sunol, Alameda county, Calif., to Judson-Pacific Co., San Francisco.

300 tons, California state bridge, Arcadia, Calif., to American Bridge Co., Pittsburgh.

275 tons, building addition, Pratt & Whitney Co., Hartford, Conn., to Bethlehem Steel Co., Bethlehem, Pa.; James Stewart & Co., New York, contractor.

235 tons, shop building, Air Pre-heater Corp., Wellsville, N. Y., to R. S. Mannus Steel Construction Co., Buffalo; L. C. Whitford Co., Wellsville, contractor.

230 tons, motor test building, aircraft

plant, Ford Motor Co., Dearborn, Mich., to American Bridge Co., Pittsburgh.

225 tons, bridge, Lycoming county, Pennsylvania, to Lackawanna Steel Construction Corp., Buffalo.

225 tons, grade crossing elimination, Macedon-Cator Four Corners, Wayne county, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.; Cefali & Dean, South Wales, N. Y., contractor, \$95,218.50; bids Oct. 2, Albany.

200 tons, highway bridge LR-54036, Globe Mills, Pa., for state, to American Bridge Co., Pittsburgh.

200 tons, mess hall, Scott Field, war department, Belleville, Ill., to Duffin Iron Co., Chicago.

200 tons, addition to plant of Judson Steel Corp., Emeryville, Calif., to Judson-Pacific Co., San Francisco.

200 tons, Pajaro River bridge, San Benito

county, Calif., to Judson-Pacific Co., San Francisco.

178 tons, stop log guides and trash racks, spillway, Cherokee dam, Tennessee Valley authority, Knoxville, to Arthur J. O'Leary & Son Co., Chicago; bids Nov. 18.

140 tons, Salinas River bridge, Nacimiento, Calif., for Southern Pacific Co., to Columbia Steel Co., San Francisco.

100 tons, shapes and bars, two-story addition, National Grinding Wheel Co. Inc., North Tonawanda, N. Y., to Ernst Iron Works, Buffalo, and Reecon Co., Buffalo; Laur & Mack Contracting Co. Inc., Niagara Falls, N. Y., contractor.

Unstated, three sets of frames for Coulee dam, to Valley Iron Works, Yakima, Wash.

Unstated tonnage, 225-ton gantry crane, power house, Watts Bar Dam, Tennessee Valley authority, Knoxville, to Lakeside Bridge & Steel Co., Milwaukee; bids Nov. 6.

Shape Contracts Pending

18,000 tons, 72 air corps hangars, various locations, for war department.

8000 tons, transmission towers, Grand Coulee dam, between dam and Covington, Wash., invitation 1522, American Bridge Co., Pittsburgh, low.

7000 tons, mill building for round and shaped wire and strip production, office building and laboratory, and new building to house spring, rail bond and flat coiled spring operations and copper wire facilities expansion (two new structures), American Steel & Wire Co., South Works, Worcester, Mass.

5500 tons, seven warehouses, Hill Field, Ogden, Utah; Al Johnson Construction Co., Foshay Tower, Minneapolis and James Leck Co., 211 South Eleventh street, Minneapolis, low on general contract at \$1,492,000.

5000 tons, elevated highway approaches, Battery-Brooklyn tunnel, New York, Lieb Construction Co., New York, low on contract B 13 and P. T. Cox Construction Co., New York, low on contract B 15; bids Nov. 29.

1650 tons, plant and shop building including crane runway, General Electric Co., Pittsfield, Mass.

1500 tons, public schools Nos. 40,147 and 156, New York; bids Dec. 9.

1500 tons, three buildings, Mare Island, Calif., navy yard; bids Dec. 11.

1400 tons, state bridge, St. Louis county, Missouri.

1200 tons, Farmers & Mechanics Savings Bank building, Minneapolis.

1100 tons, state hospital buildings Nos. 3 and 4, Deer Park, L. I., N. Y.

1100 tons, bakery and office building, Streitman Bakery Co., Cincinnati.

1050 tons, Hamilton avenue bridge over Gowanus canal, Brooklyn, N. Y., for city.

700 tons, transit shed, garage, etc., for navy, Oakland, Calif.

730 tons, Bendix Aviation Corp. plant, South Bend, Ind.; Austin Co., Cleveland, general contractor.

650 tons, building addition for May Co., Baltimore.

625 tons, 425 tons structurals and 200 tons joists, warehouse, Sears, Roebuck & Co., Cleveland; bids Nov. 19.

600 tons, building addition, Union Carbide Co., Niagara Falls, N. Y.

500 tons, three buildings, naval supply depot, Oakland, Calif.; bids opened.

350 tons, state highway bridge, Portsmouth, N. H.

Direct Subway Entrance to all Points of Interest

New York's Popular

HOTEL

LINCOLN

44th to 45th Sts. at 8th Ave.

OUR CHOICEST ROOMS from \$3

1400 ROOMS each with
Bath, Servidor, and Radio.
Four fine restaurants ac-
claimed for cuisine.

MARIA KRAMER
PRESIDENT

John L. Horgan
Gen. Mgr.

HOTEL EDISON
SAME OWNERSHIP



IN THE CENTER OF MID-TOWN NEW YORK

Reinforcing

Reinforcing Bar Prices, Page 93

Pittsburgh—On several fair ton-nages recently placed rail bar price has been below billet steel. In spite of announcements to the contrary, some lower priced contracts have been placed. However, the price is above the former rail bar differential. Tonnage continues heavy, with bookings exceeding shipments.

Chicago—Reinforcing bar interests are busy. The seasonal influence is not as great as in normal years, due to new plant construc-

tion and additions. Considerable business is pending for various national defense plants. Mills are in a position to handle more business for reinforcing bars, but engineering departments are unable to keep ahead on specifications.

New York—More reinforcing steel tonnage is being figured, requirements for the Classon Point housing project, New York, closing Dec. 20, being outstanding. While concrete bars continue to strengthen, shading has not entirely disappeared and a recent purchase of rail steel bars in the east went well below the newly listed quotation.

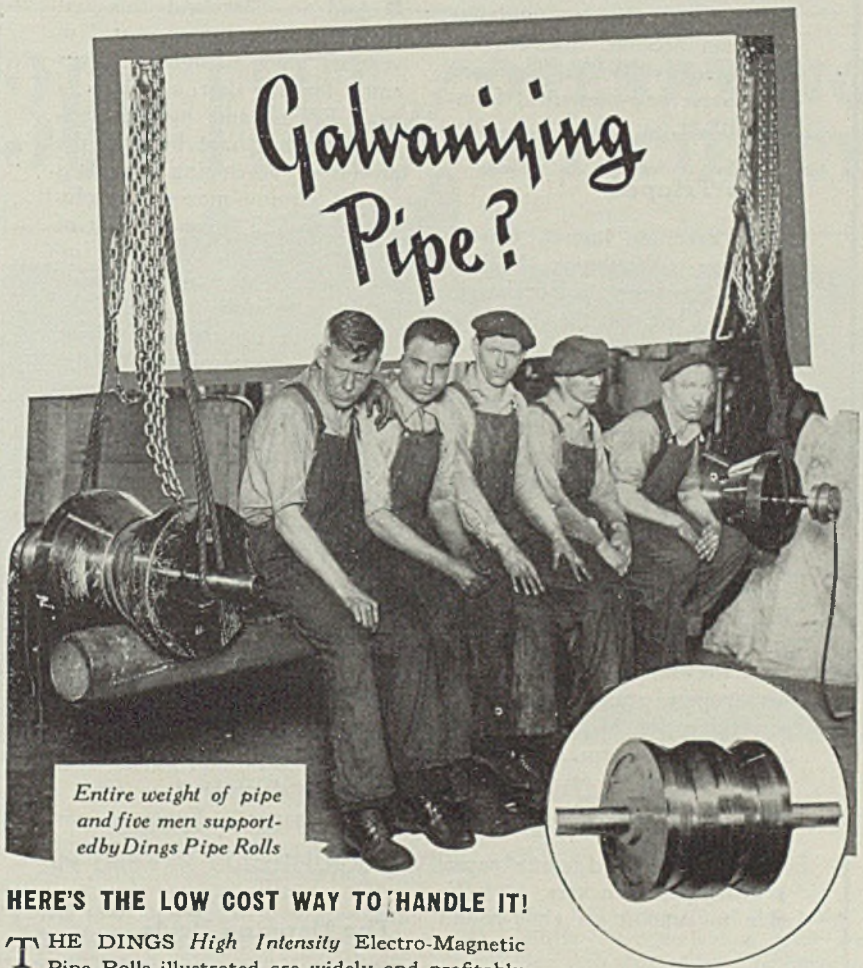
Philadelphia—Number of inquir-

- 350 tons, administration and school building, Willowbrook state hospital, Staten Island, N. Y., Federal Shipbuilding Co., New York, low.
- 352 tons, state highway bridges, Livingston county, New York; bids Dec. 18.
- 325 tons, storage building, Atlantic Refining Co., Philadelphia.
- 325 tons, ammunition research laboratory and range, Philadelphia, for government.
- 300 tons, hangar and boiler house, Indiantown Gap, Pa., for government.
- 300 tons, warehouse, Bakelite Corp., Bound Brook, N. J.
- 300 tons, temporary hangar, municipal airport, Frederick, Md., for war department.
- 300 tons, trash racks for Parker dam, Earp, Calif., specification 1453-D; bids opened.
- 275 tons, factory building, Aero Supply Mfg. Co., Corry, Pa.
- 270 tons, government hangar, Frederick, Md.; August Stang, Philadelphia, low.
- 235 tons, I-beam bridge for state, Westchester county, New York; bids Dec. 18.
- 250 tons, bridge crane extension, Pittsfield, Mass., for General Electric Co.
- 250 tons, store and bowling alleys for Franklin Realty Co., Baltimore.
- 240 tons, final repair shop, Pontiac, Mich., for Yellow Truck & Coach Mfg. Co.
- 225 tons, warehouse and office building, Galsworthy Inc., Newark, N. J.
- 210 tons, transport building, Bremerton, Wash., for navy.
- 200 tons, bridge, Portage county, Ohio, for state.
- 200 tons, new building, Doehler Die Casting Co., Batavia, N. Y.
- 190 tons, building, Bell Telephone Co., Bellevue, Pa.
- 185 tons, highway bridge, route 29, section 2E, Union county, New Jersey.
- 185 tons, state highway bridge, route 29, section 2-E, Mountainside, N. J.; bids Dec. 13, E. Donald Sterner, state highway commissioner, Trenton, N. J.
- 180 tons, high school, Great Neck, N. Y., John Eisle Co., New York, low.
- 150 tons, airport hangar, Buffalo, for American Airlines Inc.
- 140 tons, state bridge, Big Walnut creek, Franklin county, Ohio.
- 120 tons, warehouse addition, Aluminum Goods Mfg. Co., Manitowoc, Wis.
- 110 tons, girders for Baldwin Locomotive Works, Eddystone, Pa.
- 110 tons, grade elimination, Genesee county, New York, Mohawk Paving Co. Inc., Buffalo, low.
- 107 tons, joists, nurses' home and school, Mercy hospital, Canton, O.; bids Nov. 27.

Tin Plate

Tin Plate Prices, Page 92

Pittsburgh—There has been no change in the tin plate production picture, and no announcement has as yet been made regarding prices for next year. This announcement is expected sometime within the next two weeks, since it would be almost impossible to hold it off much longer. Operations are steady at about 45 per cent of capacity.



Entire weight of pipe and five men supported by Dings Pipe Rolls

HERE'S THE LOW COST WAY TO HANDLE IT!

THE DINGS High Intensity Electro-Magnetic Pipe Rolls illustrated are widely and profitably used for handling pipe during galvanizing operations. They are built to withstand the high heat of the galvanizing bath and have an extra large safety factor. Coil covers are of unusually thick bronze to resist wear. Double coils with two outside pole pieces and a strong center pole insure that the pipe will stay in position—no guides are required. Two sizes are standard: 15" diameter by 8" wide for pipe up to 4"; 18" diameter by 8" wide for pipe up to 6". Other sizes made to order. Double rolls are also available for handling two pipes at the same time—control of each is independent if desired. For complete information on Dings Pipe Rolls for all pipe handling jobs, write today.

Dings
MAGNETIC SEPARATION
HIGH INTENSITY

DINGS MAGNETIC SEPARATOR COMPANY
663 Smith Street, Milwaukee, Wis.

Foundry Men:

Find out about Magnetic Drums for removing iron from foundry sand—ask for Catalogue 660, just off the press!

Behind the Scenes with STEEL

Doctors of Electricity

■ It sounds goofy, but the latest thing in treating power cables is to give them a shot in the arm. Experts were recently busy, down in the power manholes in New York City, with hypodermic syringes, injecting an antiseptic, germ-destroying "remedy" into the lines. Apparently the oil which is used in high-tension cables to minimize oxidation became "diseased," so the electricity doctors diagnosed the trouble and prescribed formula SBS-11.

Ickes Tripped

■ As everyone knows, Harold L. Ickes (Westbrook Pegler's friend) has been tossing charges right and left that the American press is controlled by big finance. Says Frank E. Tripp, G. M. of Gannett Newspapers: "Call *any* reputable newspaper, and say that you have ten pages of advertising you will give the paper if it will let you dictate or even modify the editorial or news policy . . ." To make the deal binding, Tripp promises to buy the Secretary a swell crab dinner at Herzogs (wherever that is), print the entire story in the Gannett papers, and—this is really something for Mr. Tripp—vote for a Fourth Term.

A Light Smoke?

■ One strip of cigarette paper, say the paper makers, must be able to support an eight-pound load.

What A Man!

■ The selectmen of Franklin, Mass., recently approved an order to repair and open a street and the police photographer was assigned to take pictures of the road and a 50-ton bridge that was involved. With his camera all focused and set to shoot, the photographer suddenly looked up and realized the bridge was not there. Tracing down an acetylene torch found on the scene

Police Chief Walter Burke discovered the bridge neatly cut up and piled in a back yard some four miles away. The owner of the acetylene torch and of the back yard turned out to be one and the same. More details should be available after the hearing December 27.

Fuelless Engine

■ And in Cleveland this last week the story of a great "invention" came to light. Apparently for the last 22 years a local Edison and his business-agent brother have been in the process of developing a fuelless engine, a prime mover so revolutionary that to "give one hint of its true nature or its possible impact on this mechanized world" would be to place the life of the inventor in jeopardy. At least, so says the inventor, who is also trying to explain how 1200 people voluntarily contributed some \$225,000 to the cause.

Blame The Dentist

■ One researcher tells us that if you wake up Monday A. M. with a taste in your mouth reminiscent of a rat's convention, it's because of positive and negative ions in your mouth. That ain't the way we heard it, but he says the silver amalgam and gold furnish the poles, and mouth acids are the "electrolyte" to form a perfect battery. You can now measure your hang-overs with a galvanometer.

The Dancing Bride

■ A big Chicago newspaper, printing the story of the destruction of the "Narrows Bridge" at Tacoma, described the phenomenon preceding its collapse as follows: *The bride . . . undulated up and down . . . like something alive.* They caught the error in the second edition, but the circulation department is still getting requests for reprints of the story of the "Dancing Bride."

SHRDLU.

ies is fairly steady, and although most work involves small lots several large tonnages are in prospect. A large part of the principal construction for defense material plants is off the boards, but a steady flow of small industrial expansion work continues.

Seattle—While no important projects were awarded last week, rolling mills are working to capacity on backlogs. Considerable tonnage in small lots is being placed. Demand for merchant bars continues unabated for general consumption and replenishing jobbers' stocks.

Reinforcing Steel Awards

- 4000 tons, ammunition loading plant, Atlas Powder Co., Portage county, Ohio, to Republic Steel Corp., Cleveland, through Paterson-Letch Co., Cleveland.
- 3150 tons, Federal office building, No. 2, Arlington, Va., to Sweet's Steel Co., Williamsport, Pa. through George F. Driscoll Co., Brooklyn, N. Y.
- 2900 tons, Panama, schedule 4506, to Bethlehem Steel Co., Bethlehem, Pa.
- 2150 tons, hospital buildings and nurses' quarters, Forts Clayton and Gulick, Canal Zone, to Carnegie-Illinois Steel Corp., Pittsburgh; MacDonald Construction Co., St. Louis, contractor.
- 2000 tons, superstructure Ford Motor Co. aircraft engine plant, Dearborn, Mich.; Ford company to roll and furnish to contractor.
- 1430 tons, United States engineer office, San Francisco, invitation 868-41-86, to Pacific States Steel Corp., San Francisco.
- 1100 tons, Heath street housing project, Jamaica district, Boston, to Northern Steel Co., Boston, through John Bowen Co., Boston.
- 700 tons, hangars and miscellaneous buildings, Panama, to Bethlehem Steel Co., Bethlehem, Pa.; N. P. Severin Co., Chicago, contractor.
- 650 tons, bars and mesh, grade crossing and highway project, Schenectady and Albany counties, New York, to Truscon Steel Co., Youngstown, O.; Fred Berlanti & Son, Inc., Harrison, N. Y., contractor, two contracts, bids Oct. 16, Albany.
- 500 tons, Bancroft hall addition, naval academy, Annapolis, Md., to Bethlehem Steel Co., Bethlehem, Pa.; Irwin & Leighton, Philadelphia, contractor.
- 500 tons, veterans hospital, Marlon, Ill., to Laclede Steel Co., St. Louis, through Ring Construction Co., Minneapolis, general contractor.
- 360 tons, warehouse, Norfolk & Western

Concrete Bars Compared

	Tons
Week ended Nov. 30	18,077
Week ended Nov. 23	13,792
Week ended Nov. 16	8,780
This week, 1939	4,815
Weekly average, year 1940	9,865
Weekly average, 1939	9,197
Weekly average, Oct.	12,417
Total to date, 1939	459,827
Total to date, 1940	473,539

Includes awards of 100 tons or more.

railway, Sewalls Point, Va., to Bethlehem Steel Co., Bethlehem, Pa., through Virginia Steel Co.; John T. Pettyjohn, contractor.

325 tons, miscellaneous buildings, Canal Zone, CQM-6708-41-9, to Truscon Steel Co., through McDonald Construction Co., contractor.

325 tons, housing project, Pawtucket, R. I., to Truscon Steel Co., Youngstown, O.; Chain Construction Corp., New York, contractor.

300 tons, housing project, Little Rock, Ark., to Jones & Laughlin Steel Corp., Pittsburgh, through Arkansas Foundry Co., Little Rock.

275 tons, federal works agency office building, Washington, to Sweet's Steel Co., McCloskey & Co., Philadelphia, contractor.

208 tons, grade elimination, PSCC No. 4775, Schenectady county, New York, to Truscon Steel Co., Youngstown, O., through Fred Berlanti & Son, contractors.

200 tons, miscellaneous buildings, Chrysler Corp., Macomb county, Michigan, to Truscon Steel Co., Youngstown, O., through O. W. Burke Co., contractor.

200 tons, aerial camera manufacturing plant, Fairchild Aviation Corp., Jamaica, N. Y., to Jones & Laughlin Steel Corp., Pittsburgh, through Fireproof Products Co.; White Construction Co., contractor.

169 tons, Pajaro river bridge, San Benito county, California, for state, to Gilmore Fabricators Inc., San Francisco.

120 tons, Terrace Village recreation buildings, Pittsburgh, to Jones & Laughlin Steel Corp., Pittsburgh, through W. N. Dambach Inc. and Navarro Corp.

115 tons, building, American Radiator & Standard Sanitary Corp., Trenton, N. J., to Truscon Steel Co., Youngstown, O.; Karno-Smith Co., Trenton, contractor.

100 tons, ammunition loading plant, (first lot), Wilmington, Ill., to Truscon Steel Co., Youngstown, O., through Sanderson & Porter, contractors.

100 tons, warehouse, National Distillers Products Corp., Cincinnati, to Truscon Steel Co., Youngstown, O.

100 tons, miscellaneous buildings, Packard Motor Co., Detroit, to Truscon Steel Co., Youngstown, O., through O. W. Burke Co., contractor.

100 tons, buildings, New England Aviation School Inc., East Boston, Mass., to Northern Steel Co., Boston; B. R. Switzer Co., Charlestown, Mass., contractor.

Reinforcing Steel Pending

3000 tons, United States government office building, Arlington, Va.

2000 tons, New York Shipbuilding Corp. shipways, Camden, N. J.; Merritt-Chapman & Scott, contractors.

1800 tons, estimated, Panama, schedule 4506, Bethlehem Steel Export Corp., New York, low.

1200 tons, navy yard warehouse, Philadelphia; Day & Zimmerman, contractors.

800 tons, Hamilton avenue bridge, Brooklyn, N. Y.; bids Dec. 10.

400 tons, naval torpedo station administration building, Newport, R. I.; O. D. Purlington Co., contractor.

300 tons, Streltman Biscuit Co. bakery, Cincinnati; bids Dec. 2.

375 tons, office and factory building, General Tire & Rubber Co., Akron, O.; bids Nov. 15.

360 tons, Washington state bridges, Yakima county; N. Florito, Seattle,

general contractor.

330 tons, three state concrete bridges, King county, Wash.; Neuklrck Bros., Seattle, general contractor.

300 tons, defense housing project, Hartford, Conn.

293 tons, mesh and bars, highway project, including bridge, route 29, section 2-E, Rahway river to Westfield avenue, Mountainside, N. J.; bids Dec. 13, E. Donald Sterner, state highway commissioner, Trenton.

235 tons, sections 6-C and 6-D, route 187, Allegheny and Westmoreland counties, Pennsylvania; bids to state highway department, Harrisburg, Pa., Dec. 13.

124 tons, addition to Lake Forest hospital, Lake Forest, Ill., bids Nov. 25.

120 tons, expanded steel mesh, U. D. engineer, Providence, R. I.; bids in Nov. 27.

115 tons, building for University of Nevada, Reno, Nev.; bids opened.

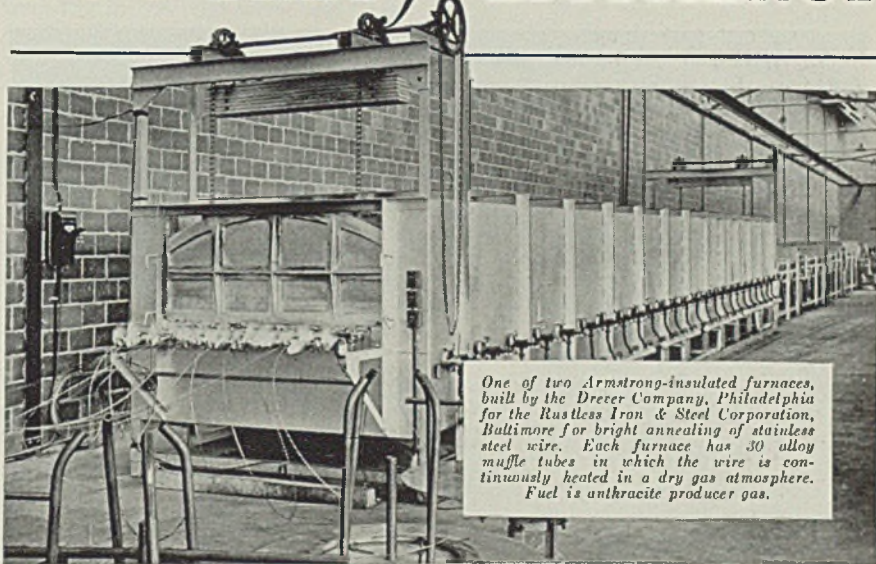
109 tons, bridge at shell loading plant, Savanna, Ill., quartermaster corps, war department; bids Dec. 10.

100 tons, state highway bridge, Franklin, Conn.; bids Dec. 9.

100 tons, Beverly-West Calumet sewer, Chicago, invitation 53607, public letting, U. S. treasury department, Chicago; bids Nov. 29.

Pullman-Standard Car Mfg. Co., Butler, Pa., has installed two Hagan furnaces and one more is on order with George J. Hagan Co., Pittsburgh. These units are being used in shell production for United States and Great Britain.

300 FEET of OPERATING EFFICIENCY



One of two Armstrong-insulated furnaces, built by the Drever Company, Philadelphia for the Rustless Iron & Steel Corporation, Baltimore for bright annealing of stainless steel wire. Each furnace has 30 alloy muffle tubes in which the wire is continuously heated in a dry gas atmosphere. Fuel is anthracite producer gas.

ARMSTRONG'S BRICK KEEP FUEL COSTS DOWN—AID EXACT TEMPERATURE CONTROL—IN DREVER CONTINUOUS WIRE ANNEALING FURNACES

TWO new Drever gas fired annealing furnaces—each occupying, with reeling equipment, an area approximately 10' wide by 300' long—are serving efficiently in the Rustless Iron & Steel Corporation Plant, Baltimore, to continuously bright anneal all analyses of stainless steel wire. For close control of temperatures, and maximum fuel economy, Armstrong's EF-26 Insulating Fire Brick is used directly exposed in each furnace. Smaller quantities of Armstrong's N-20 and N-16 Brick were also used.

This installation is a typical example of the way Armstrong's Brick effectively serve the steel industry. Armstrong makes

a complete high temperature line, including cements. Five individual brick are available—each adapted for a specific service at from 1600° to 2600° F. All Armstrong's Brick constantly meet high standards for crushing strength, thermal conductivity, tensile strength, spalling resistance, and other qualities—to assure satisfactory performance in almost any type of furnace.

Armstrong engineers will be glad to recommend the proper brick and cements for your installation. Write today for all the facts to the Armstrong Cork Company, Building Materials Division, 985 Concord Street, Lancaster, Pennsylvania.



Armstrong's HIGH TEMPERATURE INSULATION

Color now aids the easy and accurate identification of the five types of Armstrong's Brick

Pig Iron

Pig Iron Prices, Page 94

Pittsburgh—There has been no change in the number of active stacks in this district. Production in November was slightly less than in October, in spite of the fact that one more stack was active at the close of the month than at the beginning. December tonnage will probably be up again. It is possible that one or more furnaces will be blown in during the month.

Cleveland—November shipments were the largest for any month since March, 1937. December shipments probably will equal or surpass November. More foundries in northern Ohio are working six full days, choosing to pay overtime rather than enlarge working force. Buying is light because of heavy purchasing last summer.

Chicago—No significant change is observed in the merchant pig iron situation, foundries operating at approximately the same rate as in recent weeks. Small tonnages can be obtained during the balance of this quarter. No tightness has been noted in ferroalloys, producers having expanded their capacity recently.

Boston—Pig iron shipments are heavy, consumers ordering fully against fourth quarter commitments. Buying is confined to scattered small lots for prompt delivery by foundries which failed to cover fully for estimated requirements, but sellers resist efforts to build up inventories into first quarter much beyond actual needs.

New York—Recent specifications have done nothing to dispel the opinion of pig iron sellers earlier in the month that November releases will be the heaviest so far

this year, in fact perhaps the heaviest for the entire year in view of the probability of some holiday let-down next month. Prices are generally expected to be reaffirmed for first quarter, although books have not been officially opened and inquiry for first quarter is beginning to accumulate. Whether consumers will have much inventory at the close of the year is a question. The general opinion seems to be, however, that with the exception of certain larger consumers, buyers will not have much in their yards.

Philadelphia—Pig iron shipments continue heavy as specifications hold at the year's peak. While the active movement reflects consumers' desire to obtain protection on future needs, the upturn in foundry operations in recent weeks is important.

Buffalo—November shipments are estimated 15 to 20 per cent larger than in October, with current demand for merchant iron around the best levels on record. Despite increased shipments little has been added to foundry inventory as the melt has been heavy. An influx of orders is expected after books officially open for first quarter delivery.

Cincinnati—Pig iron shipments for November were 10 to 15 per cent higher than in October, resembling closely the volume a year ago. New business is in small lots, mills declining to accept first quarter contracts until books are opened. Some Southern furnaces, except for obligations to established customers, are virtually out of the market. Supplies of by-product, foundry coke are proving adequate.

St. Louis—Shipments during the first three weeks of November are considerably ahead of the same period in October, and total for the month will doubtless be the largest so far this year.

All classes of melters are anxious to get in tonnages owed on contracts, and there is every indication that tonnage on books of producers will be liquidated before the end of December.

Toronto, Ont.—Demand for pig iron is gaining, with blast furnace operators confining commitments to immediate delivery. Some booking has been carried to the end of this year but no orders run into 1941. Foundry and malleable are moving about 4000 tons weekly with basic adding another 1000 tons.

Ferroalloys

Ferroalloy Prices, Page 94

New York—Heavy shipments of ferroalloys are expected to extend throughout the remainder of the year. November saw the best movement so far, with the possible exception of June and July, when



AN INSIDE JOB FOR PAGE HI-TENSILE "F"

★ It is easy to like PAGE HI-TENSILE "F" when it comes to welding interior such as pontoons or stacks. You will better 20 inches a minute working on $\frac{1}{8}$ " sheet. You will get welds of exceptionally high strength and ductility—PAGE HI-TENSILE "F" being especially recommended for high speed, single pass welding—horizontal, vertical or overhead.

PAGE HI-TENSILE "F" is a mild steel general purpose electrode of the shield-arc type. Well suited for welding Cro-Man-Sil, Cor-Ten, H. T. 50 and other alloy steels. There is an exceptionally smooth bead and low spatter loss. The weld metal has tensile strength, elongation, density, fatigue and impact resistance equal to or better than solid rolled mild steel bars. Get the interesting facts from your local Page Distributor.

BUY ACCO QUALITY in Page Welding Electrodes; Page Wire Fence; Tru-Lay Preformed Wire Rope; Reading-Pratt & Cady Valves; Campbell Abrasive Cutting Machines; American Chains; Wright Hoists, Cranes and Trolleys.

PAGE STEEL AND WIRE DIVISION • MONESSEN, PENNSYLVANIA

PAGE HI-TENSILE "C"

A shield-arc electrode that betters welds with equivalent bare electrodes by 15,000 lbs. to 25,000 lbs. in tensile strength per sq. in.—by as much as 20% in ductility—by as much as 15,000 lbs. per sq. in. fatigue resistance. Suitable for use for flat, vertical or overhead welding.

PAGE HI-TENSILE "G"

A shield-arc electrode for high speed flat fillet and general horizontal welding. Otherwise has characteristics parallel to HI-TENSILE "F".

AMERICAN CHAIN & CABLE COMPANY, Inc.

AMERICAN CHAIN DIVISION
AMERICAN CABLE DIVISION
ANDREW G. CAMPBELL DIVISION
FORD CHAIN BLOCK DIVISION

HAZARD WIRE ROPE DIVISION
MANLEY MANUFACTURING DIVISION
OWEN SILENT SPRING COMPANY, INC.
PAGE STEEL AND WIRE DIVISION

READING-PRATT & CADY DIVISION
READING STEEL CASTING DIVISION
WRIGHT MANUFACTURING DIVISION

In Canada:
DOWNING CHAIN COMPANY, LTD.
In England:
BRITISH WIRE PRODUCTS, LTD.
THE PARSONS CHAIN COMPANY, LTD.

deliveries were stimulated by the price advance, effective on most products July 1.

Some moderate importations of ferromanganese and spiegeleisen have been noted recently. With normal European sources virtually cut off by the war, it is believed that most of the ferromanganese recently imported is foreign material which had been held in this country in bond, possibly for a number of months. With regard to spiegeleisen, it is suggested that some may be coming in at this time from Canada.

Scrap

Scrap Prices, Page 96

Pittsburgh—No. 1 heavy melting steel is up to a \$22.50 top this week as at least one mill has been unable to get enough scrap to satisfy demand at a lower figure. This has necessitated higher offers to reach farther out for material. Government scrap stock pile plans are regarded here as impracticable, although local interests believe some plan which would bring in scrap from distant points without necessity of raising prices is the best solution.

Cleveland—Trade in steel and iron scrap is quiet, normal tonnages moving against contracts. Steel mills are not interested but foundries are taking cast material at the market. Railroad lists closing this week offer normal tonnages.

Chicago—No. 1 heavy melting steel has advanced 25 cents a ton, to \$20.25 to \$20.75. All other important grades of material have advanced proportionately, some even 50 cents or more a ton. The new price on heavy melting steel has been established by recent mill sales and purchases by brokers against current commitments. The market is exceedingly strong and supplies of most important grades scarce.

Boston—More scrap tonnage is being moved by barge to mid-Atlantic seaboard points than in recent months, partially offsetting slower export movement and strengthening prices for dock delivery. Considerable is going to the Baltimore district, No. 2 cast and stove plate being included in recent shipments, in addition to heavy melting steel. Prices paid for this material at dock are firm and in the case of heavy melting steel slightly stronger. Buying by New England consumers is maintained with prices generally unchanged but firm.

New York—Buying is more active and shipments are heavier, prices on several grades are firmer. Heavy melting steel grades are unchanged but borings and turnings, rails for

rolling, stove plate and grate bars are up about 50 cents per ton. Foundry grades are notably firm on heavier movement. Buying for export is slow and shipments by barge canal to Buffalo have stopped for the season.

Philadelphia—Prices are firm but unchanged, with strength in cast grades outstanding. Additional sales of heavy melting steel have been made within the prevailing ranges on both grades. Steelmaking scrap continues to come out in sufficient tonnage to meet steelworks' demands and in some instances permits moderate additions to mill stocks. Dealers, however, are unable to increase yard supplies appreciably.

Buffalo—With mills striving to build up stockpiles for the winter, a record-breaking influx of scrap from upper lake areas is taking place. One of the principal mill consumers, with eight boats carrying 40,000 tons arriving in the past week and 25,000 tons additional on track, has put an embargo on shipments from local dealers, due to a bottleneck in unloading facilities. Heaviest shipments are arriving from the Duluth and Detroit sections.

Detroit—Strength has developed in the local scrap market, with the leading consumer in a buying mood. Heavy shipments of scrap by boat in the last few days have bolstered sentiment. Prices are unchanged, and it may be several weeks before strength bring in higher quotations.

Cincinnati—The tendency of the iron and steel scrap market is to creep higher, in spite of attempts at stabilization. Heavy melting steel is currently up 25 cents, at \$17.75 to \$18.25 and at this quotation all available tonnage is being absorbed. Consumer purchasing has been steady, without tonnage contracts.

St. Louis—Iron and steel scrap is strong and higher. Price advances, ranging from 25 cents to as high as \$1 per ton have been made. Consumers are in the market and would take heavy tonnages at prices within their views. Dealers and brokers are searching for scrap to deliver on contracts.

Birmingham, Ala.—Demand for scrap is steady, with foundries taking considerable No. 1 cast. Steel-making grades are in strong demand.

Seattle—Rolling mills are heavy buyers. Receipts are fair but there is no lack of materials at tidewater. Exporters are marking time with no outlet. Since the embargo Portland dealers have been unable to move their scrap except in small lots, as there is no steelmaking market there. In Seattle mills are taking all attractive tonnages.

Toronto, Ont.—Price strength continues as demand increases.

While prices are unchanged some dealers have been paying above the market. Cast and stove plate are in more active demand, with orders pouring in from consumers outside the Toronto area, creating much greater effort on the part of local dealers.

San Francisco—Buying of heavy melting steel continues strong and since the embargo on shipments to Japan and other foreign countries, no further weakness in prices is noted.

Warehouse

Warehouse Prices, Page 95

Cleveland—About a third of current sales are those normally made by mills, builders and manufacturers often being willing to pay jobber prices because of bonuses paid to complete work in a hurry.

Chicago—Except for a brief easing over the Thanksgiving holiday, warehouse orders and inquiries have been holding at the rate of previous weeks. Buying is well diversified, both as to industry and product.

Boston—Warehouse buying continues active, number of individual purchases during November being ahead of the previous month. Dollar volume with many jobbers was also heavier, due to the relatively brisk demand for alloys and specialties. Lengthening deliveries continue a major difficulty in keeping warehouse stocks in balance.

New York—Volume with steel warehouses during November was on par with that of October, one of the best in recent years. Mill deliveries are an increasing difficulty and on alloys especially, stock sizes are becoming broken.

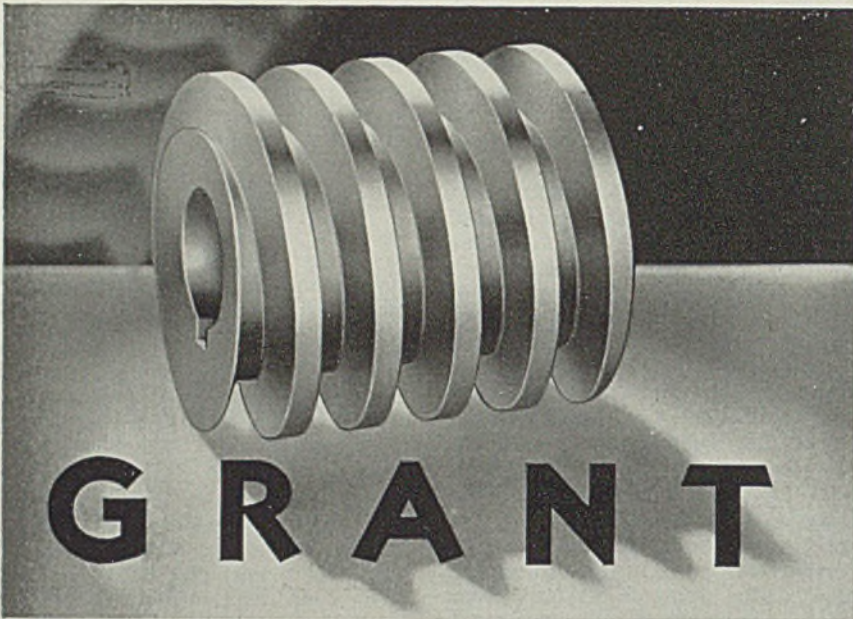
Philadelphia—Business holds at the year's peak, with prospects good for maintenance of active demand through December. Cutting, handling and trucking facilities of most warehouses are fully engaged, frequently involving overtime hours.

Buffalo—Sales continue to hit new peaks with November volume estimated 10 per cent above October. All demands are being filled but mills are being pressed for replenishment deliveries.

Cincinnati—Warehouse sales were high in November, and early-December specifications point to continuance of activity, countering any year-end letdown. Tonnage of sheets and structurals is particularly high.

St. Louis—Warehouse interests report no letup from the high level of activity. There is a steady flow of orders, with quantities measurably greater than usual. Car lot shipments are more frequent.

Seattle—Warehousemen report a steady volume and demand increased during the last 30 days.

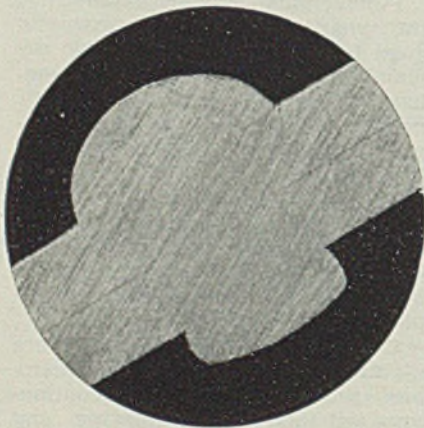


If it's a special gear, Grant will make it for you quickly, correctly. If it's a stock gear, Grant has it ready to send to you.

GRANT GEAR WORKS-Boston

1500 (AVERAGE) **rigid joints per hour**
3200 (MAXIMUM)

Handled on the RIVITOR, your riveting job's approach to this maximum is governed by the ease with which the work can be handled.



This is a $\frac{1}{4}$ " dia. rivet joint section showing the preferred type of joint accomplished on the RIVITOR

Exactly how a preferred type of solid rivet joint is accomplished at these rates is shown in our new RIVITOR Bulletin R-1 in addition to complete specifications of standard type RIVITORS. Typical toolings are illustrated and described some of which serve as an assembly unit (besides holding the work for the actual riveting operation) to still further increase production. *Your copy of the Bulletin will be sent promptly. Address*

THE TOMKINS-JOHNSON CO.
 611 North Mechanic Street Jackson, Michigan

Sheets are particularly active for ship repair and rebuilding jobs. No price changes are contemplated. Jobbers report increasing delays in shipments from eastern mills.

Steel in Europe

Foreign Steel Prices, Page 95

London—(By Cable)—Practically no further commercial iron and steel orders can be placed in Great Britain for delivery before the end of the year. Imports of iron ore are somewhat slower but the scrap position is good. Foundry and hematite pig iron supplies are tighter but some arrivals of American hematite have eased the situation. Sheet export demand is substantial but little tonnage is available. Tin plate trade is quiet.

Iron Ore

Iron Ore Prices, Page 96

Cleveland—What is expected to be the third largest iron ore shipping season on record on the Great Lakes is due to come to a close Thursday or Friday as concerns the Duluth-Superior harbor. The steamer PIONEER will clear Thursday with the last cargo from the Duluth, Missabe & Iron Range Railway Co. dock at Duluth. The E. J. BERWIND and MARYLAND are due to leave the Great Northern docks in Superior, Friday.

Defense Awards

(Concluded from Page 27)

Elliott & Watrous, Mystic, Conn., wharf, Ft. Kearney, Rhode Island, \$32,120.
 Evans Construction Co., Springfield, Ill., mess hall at Scott field, Illinois, \$209,965.
 Fischer, H. L., Inc., New York, temporary housing, Ft. Hancock, New Jersey, \$488,360.
 Franceschi Construction Co., San Francisco, temporary housing at Ft. Barry, California, \$241,400.
 Gorsuch, James A. Jr., Jeffersonville, Ind., 7000 fire pots, other parts for tent stoves, \$82,250.
 Griffiths, John, & Son Construction Co., Chicago, replacement center, Camp Grant, Illinois, \$3,808,725.
 Johnson, Al, Construction Co., and James Leck Co., Minneapolis, warehouses, Utah general depot, Ogden, Utah, \$1,705,000.
 Johnson, E. M., Jersey City, N. J., temporary housing at Raritan arsenal, New Jersey, \$218,000.
 Kenworthy & Taylor, Boston, electric distribution at harbor defenses, Boston, \$10,535.
 Louisville Tin & Stove Co., Louisville, Ky., spark arrestors, stove pipes, \$38,693.40.
 MacDonald Building Co., Tacoma, Wash., temporary housing at Forts Casey and Flagler, Washington, \$307,082.
 Marine Electric Co., Louisville, Ky., electric distribution and street lighting system at Bowman field, Kentucky, \$18,750.
 Mead & Mount Construction Co., Denver, engine test building at Hill field, Utah, \$248,000.



I BUY ON
QUALITY AND PERFORMANCE



I BUY ON PRICE

We both get
what we want in
PARKER-KALON
Cold-forged Products

MANUFACTURED by an improved process developed by Parker-Kalon, these superior cold-forged Socket Screws, Wing Nuts, Cap Nuts and Thumb Screws excel in the accuracy, uniformity and strength that critical users insist on. And yet, because of Parker-Kalon's unmatched production facilities, they cost no more than ordinary products! Write for free samples and prices. No obligation.

PARKER-KALON CORPORATION
194-200 Varick Street New York, N.Y.



PARKER-KALON

Cold-forged

SOCKET SCREWS WING NUTS
CAP NUTS THUMB SCREWS

SOLE ONLY THROUGH REPUTABLE DISTRIBUTORS

- Naerl Bros. & A. Coluccio, Seattle, sanitary sewerage system and water distribution system for buildings, Ft. Lewis, Washington, \$183,263.
- Nepage Electric Co., Seattle, electric distribution system, Ft. Lewis, Washington, \$56,120.
- Padgitt Bros. Co., Dallas, Tex., 3000 trunk lockers, \$8400.
- Pitman Bros. Construction Co., New Orleans, temporary housing including utilities at Meridian municipal airport, Mississippi, \$46,648.
- Ritter Bros., Harrisburg, Pa., temporary housing, Carlisle barracks, Pennsylvania, \$319,650.
- Ryberg Bros., Salt Lake City, Utah, alterations and additions to post hospital, Ft. Douglas, Utah, \$39,792.
- Scheu Products Co., Upland, Calif., 25,000 bases for grates, \$25,375.
- Short & Thompson, Hopewell, Va., roads and walks at Ft. Story, Virginia, \$6600.
- Shwayder Bros. Inc., Denver, 8750 trunk lockers, \$24,500.
- Simpson Construction Co., Chicago, mess halls at Chanute field, Illinois, \$403,400.
- Sultenfuss, William I., Tampa, Fla., radio transmitter building and garage at MacDill field, Florida, \$16,383.
- Wheeling Corrugating Co. Inc., Louisville, Ky., stovepipe tent hoods, \$5797.77.
- Whittenberg Construction Co.; Struck Construction Co.; Highland Construction Co. Inc.; George M. Eady Co., Louisville, Ky., construction of cantonment and replacement center, Ft. Knox, Kentucky, \$4,833,913.
- Wilkinson, J., & Co., Boston, extension of electrical service at Ft. Philip Kearney, Rhode Island, \$5048.
- Woodcock, O. P., Jacksonville, Fla., temporary housing including utilities at Jacksonville municipal airport, Florida, \$57,200.

Signal Corps Awards

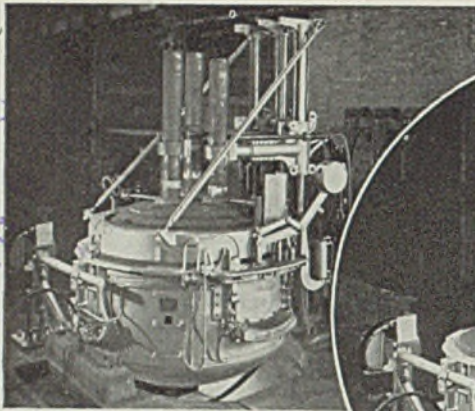
- American Automatic Electric Sales Co., Chicago, timing and telephone sets, \$129,025.56.
- Air Communications Inc., Kansas City, Mo., parts for marker-beacon receiving equipments, \$164,214.80.
- Airplane & Marine Direction Flinder Corp., Clearfield, Pa., radio receivers, \$29,329.04.
- Akeley Camera Inc., New York, theodolites, \$334,504.
- Bunnell, J. H., & Co., New York, equipment for radio sets, \$368,580.40.
- Continental Electric Co. Inc., Newark, N. J., power units, \$225,298.
- Magnavox Co. Inc., Ft. Wayne, Ind., loudspeakers, \$21,120.
- Molded Insulation Co., Philadelphia, switchboxes, \$72,223.68.
- Murdock, Wm. J., Co., Chelsea, Mass., headsets, \$202,480.
- Technical Devices Corp., Bloomfield, N. J., interphone amplifiers, \$67,379.71.
- Wallace & Tiernan Products Inc., Belleville, N. J., parts for signal lamp equipment, \$20,899.

Chemical Warfare Service Awards

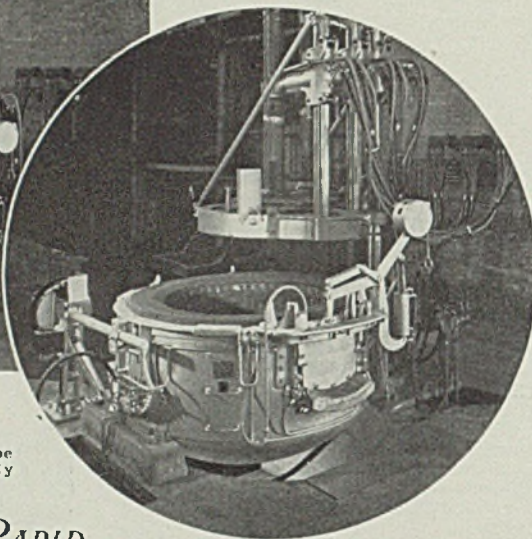
- American Blower Co., Baltimore, unit heaters, \$1338.
- Brown Instrument Co., Philadelphia, instruments and panel board, \$6107.80.
- Clarage Fan Co., Kalamazoo, Mich., unit heaters, \$2310.
- Clarke Equipment Co., Clarke Tractor division, Battle Creek, Mich., fork truck, \$2673.26.
- Dayton Dowd Co., Quincy, Ill., caustic pumps, \$1501.
- Edge Moor Iron Works, Edge Moor, Del., storage tanks, \$5500.
- Filtros Inc., East Rochester, N. Y., filter plates, \$1625.10.
- Frick Co. Inc., Waynesboro, Pa., condensing and refrigerating installation, refrigerating equipment, catalyser boxes, \$41,880.
- Mercury Mfg. Co., Chicago, gasoline

Greater Tonnage
Per Edge of Blade

AMERICAN
SHEAR KNIFE CO.
HOMESTEAD - PENNSYLVANIA



(Above)—LECTROMELT steel furnace in normal operating position.



(Right)—LECTROMELT top charge type furnace with roof raised and rotated ready for charging by drop bottom bucket

MOORE RAPID

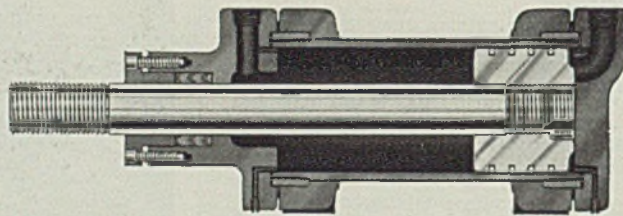
Lectromelt

FURNACES

LECTROMELT furnaces are built in sizes ranging from 25 pounds to 50 tons. Both door charge and top charge types are available. Rugged and durable construction. Rapid and economic operation.

PITTSBURGH LECTROMELT FURNACE CORP.

PITTSBURGH, PA.



High Efficiency

HYDRAULIC CYLINDERS

Hannifin patented no-tie-rod design means stronger, simpler hydraulic cylinders, easier to apply, for any type of hydraulic power operation. Mirror finish honing produces a cylinder bore that is straight, round, perfectly smooth, for efficient piston seal and minimum fluid slip.

Built in a full range of types and sizes, with any length stroke. Seven standard mountings, with or without cushion. Write for Bulletin 35-S.

HANNIFIN MANUFACTURING COMPANY

621-631 South Kolmar Avenue

Chicago, Illinois

HANNIFIN

hydraulic

CYLINDERS

tractors, \$2641.70.
Nash Engineering Co., South Norwalk, Conn., compressors, \$2204.
Pennsylvania Pump & Compressor Co., Philadelphia, compressor units, \$2049.
Robertson, H. H., Co., Pittsburgh, coated metal roofing, \$5500.
Unlon Iron Works, Erie, Pa., boiler tubes, \$2772.
United Carr Fastener Corp., Cambridge, Mass., metal cloth fasteners, \$4044.

Navy department announced the following:

Bureau of Supplies and Accounts Awards

Ajax Mfg. Co., Cleveland, horizontal forging machine, \$16,600.
Aldrich Pump Co., Allentown, Pa., centrifugal type pumps, \$21,222.
Allis-Chalmers Mfg. Co., Milwaukee, shafts and couplings, \$537,280.
American Automatic Electric Sales Co., Chicago, automatic telephone equipment, \$339,116.02.
American Brass Co., Waterbury, Conn., condenser tubes; rolled, plate and angle naval brass, \$31,373.14.
American Tool Works Co., Cincinnati, radial drills, \$10,984.
Arter Grinding Machine Co., Worcester, Mass., grinding machines, \$18,381.
Autocar Co., Ardmore, Pa., tractor trucks, \$94,770.
Baker Hamilton & Pacific Co., San Francisco, ship scrapers, \$10,942.89.
Batteryless Telephone Equipment Co. Inc., Pittsburgh, marker buoy cables, \$17,839.80.
Bernz, Otto, Co. Inc., Rochester, N. Y., gasoline firepots, \$5033.82.
Bethlehem Steel Co., Bethlehem, Pa., steel, \$19,374.85.
Central Iron & Steel Co., Harrisburg, Pa., plate steel, \$7025.51.
Chambersburg Engineering Co., Chambersburg, Pa., forging hammer, \$11,500.
Chicago Pneumatic Tool Co., Philadelphia, rotary air drills, \$12,680.60.
Crane Co., Chicago, lavatories and seats, \$13,606.25.
Crucible Steel Co. of America, New York, steel welding electrodes, \$5544.
Disston, Henry, & Sons Inc., Tacony, Philadelphia, files and rasps, \$43,676.89.
Dravo Corp., Neville Island branch, Pittsburgh, non-self propelled crane vessels, \$3,582,000.
Duquesne Smelting Corp., Pittsburgh, bearing bronze, \$11,212.50.
Elgin National Watch Co., Elgin, Ill., stop watches, \$12,080.
Emerson Electric Mfg. Co., St. Louis, electric desk and wall fans, \$34,829.74.
Farquhar, A. B., Co. Ltd., York, Pa., mooring buoys, \$29,775.
Ferguson, F., & Son, Hoboken, N. J., solid manganese bronze propellers, \$12,475.
Fog Nozzle Co., Los Angeles, fog making nozzles, \$17,625.
General Electric Co., Schenectady, N. Y., electric desk and bracket fans, \$30,543.75.
Graver Tank & Mfg. Co. Inc., East Chicago, Ind., mooring buoys, \$61,400.
Hall-Scott Motor Car Co., New York, gasoline marine engines, \$516,788.30.
Heald Machine Co., Worcester, Mass., internal universal grinder, \$10,310.
Henny Motor Co., Freeport, Ill., gasoline motor field ambulances, \$71,365.
Hertner Electric Co., Cleveland, motor generators, \$11,531.12.
Highway Trailer Co., Edgerton, Wis., semi-trailers, \$17,840.38.
Independent Pneumatic Tool Co., Chicago, rotary air drills, \$10,257.
Ingersoll-Rand Co., New York, rotary air drills, \$11,643.66.
Lands Tool Co., Waynesboro, Pa., grinding machines, \$10,064.
Lodge & Shipley Machine Tool Co., Cincinnati, precision lathe, \$5830.
Lynch, Edward A., Machinery Co., Philadelphia, upright drilling machines.

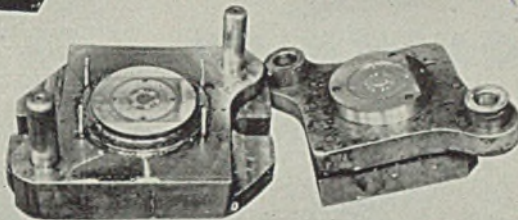
\$15,113.
 McCambridge Co., Philadelphia, lavatories, water-closets, and seats, \$15,604.93.
 Mine Safety Appliances Co., Pittsburgh, manifold, aviator's breathing systems, \$67,500.
 Monarch Machine Tool Co., Sidney, O., electrically operated lathes, \$36,730.
 Nicholson File Co., Providence, R. I., files and rasps, \$169,532.38.
 Niles-Bement-Pond Co., Pratt & Whitney division, West Hartford, Conn., radial drills, \$12,035.
 Northern Engraving & Mfg. Co., La-Crosse, Wis., oil aircraft thermometers; oil and fuel pressure gages, \$9000.
 Pike Trailer Co., Los Angeles, semi-trailers, \$7105.
 Pittsburgh Steel Co., Pittsburgh, steel tubing, \$30,390.42.
 Prentiss, Henry, & Co. Inc., New York, boring, drilling and milling machines, \$92,522.
 Risdon Mfg. Co., Naugatuck, Conn., brass spur grommets, \$52,000.
 Roebing's, John A., Sons Co., Trenton, N. J., galvanized steel thimbles, \$16,001.45.
 Scott, Palmer, & Co. Inc., New Bedford, Mass., aircraft rescue boats, \$96,125.
 Seabrook Yacht Corp., Houston, Tex., aircraft rescue boats, \$126,804.48.
 Seagrave Corp., Columbus, O., pumping fire engine, \$5500.
 Shipley, W. E., Machinery Co., Philadelphia, bench lathes, \$8463.60.
 Smith, S. Morgan, Co., York, Pa., controllable pitch propellers, \$57,950.
 Southwest Welding & Mfg. Co., Alhambra, Calif., mooring buoys, \$183,200.
 Tidewater Supply Co. Inc., Norfolk, Va., horizontal boring, drilling and milling machines, \$139,208.
 United Wire & Supply Corp., Cranston, R. I., silver brazing alloy, \$18,406.27.
 Upson-Walton Co., Cleveland, wire rope, anchor shackles, \$43,451.19.
 Warner & Swasey Co., Cleveland, turret lathes, \$18,872.
 Yale & Towne Mfg. Co., Automatic Transportation Co. division, Chicago, tilting and tiering trucks, electric truck, \$38,850.

Bureau of Yards and Docks Awards

American Automatic Electric Sales Co., Chicago, telephone systems for main station and base fields at naval air station, Pensacola, Fla., \$106,654.
 Clinton Construction Co. of California, San Francisco, aviation storage facilities at naval supply base, Oakland, Calif., \$1,800,000.
 Early, Fred J., Co., San Francisco, miscellaneous repairs and improvements at naval direction tender station, Farallon Islands, California, \$1546.
 Euclid Crane & Hoist Co., Euclid, O., one electric overhead traveling bridge crane for foundry building No. 147 at Puget Sound navy yard, Bremerton, Wash., \$9460.
 Griffith Co., Los Angeles, resurfacing station roads at naval radio station, Chollas heights, Calif., \$4350.
 Harnischfeger Corp., Milwaukee, three electric overhead traveling bridge cranes for Puget Sound navy yard, Bremerton, Wash., \$28,065.
 Industrial Brownhoist Corp., Bay City, Mich., locomotive cranes at Charleston, S. C.; New York and Washington navy yards, \$120,095.
 Kullman, H. A., & Co., Philadelphia, boiler and accessories at navy yard, Norfolk, Va., \$145,723.
 Melhorn, W. B., San Diego, Calif., repairs to shower enclosures at eleventh naval district hospital, San Diego, \$1339.
 Montgomery Elevator Co., Moline, Ill., freight elevator for building No. 237 at Mare Island, California, navy yard, \$3727.
 Norair Engineering Corp., Washington,

**LUX CLOCK MANUFACTURING CO.
 MAKES ACCURATE CLOCK PARTS**

with **JESSOP'S WINDSOR SPECIAL
 AIR HARDENING DIE STEEL**



Male and female subpress die for blanking synchronous motor field plates from 2% silicon steel, .050" thick. Photo courtesy Lux Clock Mfg. Co., Waterbury, Conn.

The tool illustrated is one of three dies made of Jessop's WINDSOR SPECIAL Air Hardening Die Steel by the Lux Clock Mfg. Co., Waterbury, Conn., for use in the production of clock parts. According to Mr. Fred Lux, Works Manager, these dies were heat treated without any change that they were able to measure . . . WINDSOR SPECIAL is a new die steel recently developed by Jessop for use where the initial cost of the tool or die must be held to a minimum. In addition to its non-deforming qualities, it is easily machined, extremely tough and has a wide hardening range. Write today for a free copy of our new folder which gives working data and physical properties.

Jessop Steel Co., 584 Green St., Washington, Pa., Est. 1901.



Jessop Steels of America
 CARBON-HIGH SPEED, SPECIAL ALLOY
 STAINLESS and COMPOSITE STEELS

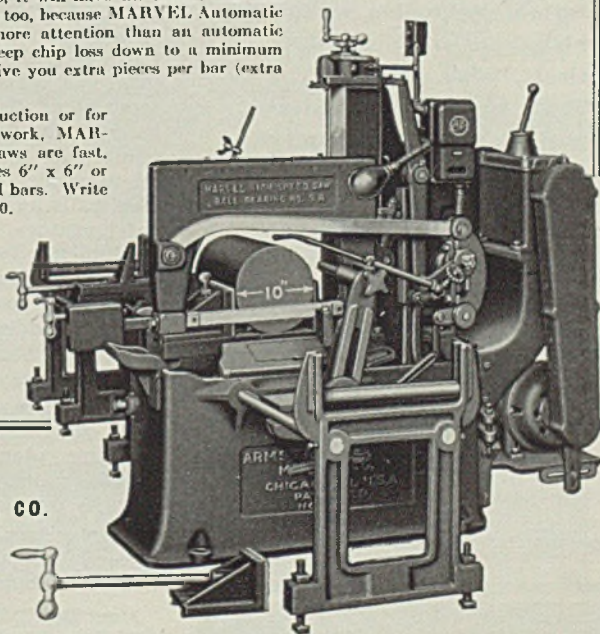
MARVEL SAWS

CUT-OFF METAL THE ECONOMICAL WAY

● The most economical method of cutting-off identical pieces from bar steel is with a MARVEL Automatic Production Saw. It will give you more pieces per hour, per machine and per dollar cost than any other cutting-off method. Figured in cost per piece, it will have the lowest tool cost and the lowest labor cost too, because MARVEL Automatic Saws operate with no more attention than an automatic screw machine. They keep chip loss down to a minimum and on many jobs will give you extra pieces per bar (extra profits.)

For fast automatic production or for single-cut miscellaneous work, MARVEL 6A or 9A Hack Saws are fast, accurate tools. Capacities 6" x 6" or 10" x 10" single or nested bars. Write today for Bulletin No. 600.

BUY
 FROM YOUR
 LOCAL
 DISTRIBUTOR



ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"
 5700 Bloomingdale Ave.,
 Chicago, U. S. A.

Eastern Sales Office:
 199 Lafayette St., New York

TURNINGS ARE MORE EXPENSIVE THAN THE STEEL FROM WHICH THEY COME!

... not in scrap value, of course, but in their cost of manufacture . . . But, you say, we don't intend to manufacture turnings! Yet, you do if you attempt to economize by making ring dies, bushings, forming rolls, etc., from solid steel.

With a complete stock of BISCO alloy and tool steel tubing on hand—and with both local and distant deliveries so modernly dependable, it becomes more economical to select your exact requirements from the BISSETT line of tubing and also secure the exact size needed in both inside and outside diameters nearest your individual requirements. . . . In addition to BISCO Non-shrink, oil-hardening tool steel tubing, we furnish from stock stainless steels, alloy steels, etc. A copy of our stock list will be mailed promptly upon request.

THE BISSETT STEEL CO.

900 EAST 67th STREET, CLEVELAND, OHIO

extension to steam main at naval research laboratory, Washington, \$13,980. Ohio Locomotive Crane Co., Bucyrus, O., locomotive cranes at Norfolk, Va.; Charleston, S. C.; and New York navy yards, \$191,610. Orton Crane & Shovel Co., Chicago, locomotive cranes at Mare Island, California; and Philadelphia navy yards; naval ammunition depot, Mare Island, \$289,455; hammerhead cranes at navy yards at Brooklyn, N. Y., and Philadelphia, \$238,824. Reliance Engineering Co., Charlotte, N. C., renewal of steam lines at naval fuel depot, Yorktown, Va., \$22,617. Salem Foundry & Machine Works Inc., Salem, Va., alterations to passenger elevator at Norfolk navy yard, Portsmouth, Va., \$4740.

New Model Appliances Prohibited by Canada

TORONTO, ONT.

■ Demand for finished and semi-finished steel is mounting rapidly and is exceeding supply by a wider margin. This is despite a 50 per cent increase in production since last year. New manufacturing plants, now under construction, soon will start production, and will cause the Dominion to lean even more heavily on the United States for raw steel.

Meanwhile, Canada is attempting to further increase its steel output. Negotiations are well advanced for reopening the London Rolling Mills and the Walker Foundry Co., both at London, Ont. New equipment will be installed at the plants which have been idle for several years.

British Columbia government is considering the establishment of a copper smelter and an iron and steel plant in that province. Details are scant, but it is reported preliminary plans include a new blast furnace.

The department of munitions and supply has announced an order-in-council prohibiting, except under license, the manufacture of new models of any appliance or equipment which involves, either directly or indirectly, the use of machine tools, dies, jigs, gages, molds, patterns or templates. Purpose of the order is to conserve for the war effort both equipment and skilled labor. The "new model" order includes vehicles, railway rolling stock, bicycles, refrigerators, cooking and heating equipment, typewriters, glass and other containers, and virtually all appliances used in the Dominion. The order does not affect production of present models.

C. D. Howe, minister of munitions and supplies, has announced deliveries of training planes for the air training plan will be completed in ten months instead of the 25 months originally planned.

War orders announced last week totaled 2273, valued at \$6,270,777. Orders include:

Munitions: Defense Industries Ltd., Montreal, Que., \$64,863; Anaconda Amer-

ican Brass Ltd., New Toronto, Ont., \$48,474.

Machinery: Plessisville Foundry, Plessisville, Que., \$32,718; Canadian Ingersoll-Rand Co. Ltd., Montreal, \$211,465; Rudel Machinery Co., Ltd. \$5179; John Bertram & Sons Co. Ltd., Dundas, Ont., \$5200; P. Payette Co., Penetanguishene, Ont., \$41,190; Richardson Road Machinery Co. Ltd., Saskatoon, Sask., \$18,100.

Hardware: Dominion Merchants Co. Ltd., Montreal, \$5082; Dominion Wire Rope & Cable Co. Ltd., \$20,382.

Electrical equipment: Canadian Marconi Co. Ltd., Montreal, \$87,424; Canadian General Electric Co. Ltd., Ottawa, Ont., \$24,637; Canadian Westinghouse Co. Ltd., Ottawa, \$62,794; Exide Batteries of Canada Ltd., Toronto, \$8078.

Aircraft: Aviation Electric Ltd., Montreal, \$24,500; Canadian Wright Ltd., Montreal, \$93,830; Northern Electric Co. Ltd., Ottawa, \$7379.



OUR AIM is to render service. A little more complete... more hospitable... more pleasing... than even the most exacting guest expects.

CHAS. H. LOTT
Manager

Every Room Outside
with Private Bath
Single from \$2.50
Double from \$4.00

DETROIT LELAND HOTEL

CASS AT BAGLEY AVE.
GARAGE IN CONNECTION

Mechanical transport: Arlington Cycle & Sports Ltd., Montreal, \$190,338; Canadian Car & Foundry Co. Ltd., Montreal, \$22,505; Dominion Holst & Shovel Co. Inc., Montreal, \$5560; Laurentide Equipment Co. Ltd., Montreal, \$37,543; Ross Cycle & Sports, Toronto, \$189,660; Ford Motor Co. of Canada Ltd., Windsor, Ont., \$12,330.

Instruments: Ontario Hughes-Owens Co. Ltd., Ottawa, \$22,112.

Shipbuilding: Halifax Shipyards Ltd., Halifax, N. S., \$8642; Pictou Foundry & Machine Co. Ltd., Pictou, N. S., \$21,274; Turner Boat Works, Vancouver, B. C., \$5670.

Miscellaneous: Gillette Safety Razor Co. of Canada Ltd., Montreal, \$24,000; Metal Stampings Ltd., Toronto, \$100,000; Safety Supply Co. Ltd., Toronto, \$28,625; Moffats Ltd., Weston, Ont., \$7250; Stamped & Enameled Ware Ltd., Hespeler, Ont., \$6125; Beatty Bros. Ltd., Fergus, Ont., \$5206; Dominion Rubber Co. Ltd., Ottawa, \$70,000; B. F. Goodrich Rubber Co. of Canada Ltd., Kitchener, Ont., \$17,500; British Admiralty, England, \$7000; Canadian Dental Trade Association, Toronto, \$48,000; Canadian Kodak Co. Ltd., Toronto, \$6377; La France Fire Engine & Foamite Ltd., Toronto, \$18,127; General Steel Wares Ltd., Toronto, \$13,317; Howard Furnace Co., Toronto, \$13,358; Frost Steel & Wire Co. Ltd., Hamilton, Ont., \$15,859; W. J. Walsh Plumbing Co., Hamilton, \$65,100; Prince Albert Plumbing & Heating, Prince Albert, Sask., \$43,254; Wood Mfg. Co. Ltd., Montreal, \$38,783; Allward & Guinleck, Toronto, \$12,700; Public utilities commission, London, \$14,000; John Flood & Son, St. John, N. B., \$9000.

Construction projects: Bird Construction Co. Ltd., Winnipeg, Man., \$208,500; Standard Construction Co., Halifax, N. S., \$330,000; George C. Abbott Ltd., Toronto, \$92,000; Canadian Comstock Co. Ltd., Toronto, \$399,080.

Equipment

Seattle—Dealers report a steady volume of business. United States engineer, Bonneville, Oreg., has called bids Dec. 17 for four turbines and accessories for power plant, to cost \$2,700,000, with \$1,500,000 now available, designed to deliver 74,000 horsepower at full gate opening, first delivery 610 days. These will be the last four units of the 16 to be installed. Dec. 18 is the date for opening bids for two 20-ton gas-electric traveling cranes for Puget Sound navy yard. Bonneville Project announces the following awards; Bonneville-The Dalles transmission line to Fritz Ziebarth, \$248,989, also Yakima-Ellensburg line, \$39,452; St. Johns-Astoria line, to J. E. Chandler, Arcadia, Cal., \$125,855; portable rock plant to Balzer Machinery Co., \$7100; switchboards for Ampere station to Westinghouse and cable to Pacific Wire Rope Co. Same office has called bids Dec. 5 for hardware, etc. for Covington-Coulee 230 kv line, Spec. 1565. Tacoma will receive bids Dec. 9 for a 3500-kva and a 1000-kva transformer and two 1600-ampere network protectors. Seattle has opened bids for 11,000 feet of wire cable, and a year's supply of gray iron and steel castings.

Nonferrous Metals

New York—A reduction of 15 points in the price of lead on Thursday followed a period of light demand which was satisfied without drawing on large supplies of foreign metal in this country. Offerings of zinc for nearly delivery are extremely scarce while those of copper are tight.

Copper—Sales increased steadily while premiums quoted by custom smelters on electrolytic copper declined. Sales averaged about 5000

tons daily, reflecting a larger flow of red metal scrap to smelters and freer bookings at 12.00c for future delivery. Custom smelters booked business down to 12.12½c, Connecticut, only 1/8-cent over the mine producers' firm 12-cent level.

Lead—Consumers' needs over the balance of the year are rather fully covered which accounts for the let-up in demand and the subsequent price reduction of 15 points to 5.50c, East St. Louis.

Zinc—Shortage of available supplies has become serious in some


AVAILABLE — AN EXECUTIVE WHO KNOWS METAL BY MUSCLE AND MIND

Look at one section of his record:

Started with one of the country's largest steel and iron manufacturing concerns as a common laborer, working 12 hours a day, 7 days a week. Six months later, became labor boss. Rose through mechanical department—inspection department—planning department—stores department—purchasing department. Made General Sales Manager of company, where his ability won him country-wide recognition. Knows export procedure and markets.

★ This man has the power and drive to get things done. His native intelligence is supplemented by an education in business administration, political science, economics and finance, both in this country and abroad. He can lead, guide and direct others—formulate plans and policies—organize procedure—co-ordinate activities of individuals and departments. He is 43—married—Protestant—in excellent health.

For a personal talk with him, write Box 368, STEEL, Penton Bldg., Cleveland, Ohio

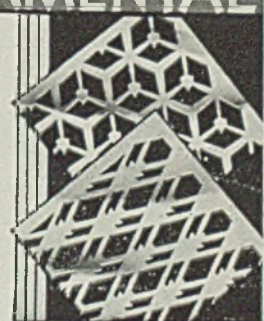


ANY METAL
•
ANY PERFORATION

INDUSTRIAL & ORNAMENTAL Perforated Metals

Making holes is our entire business and we've made billions and billions of them—little ones, big ones, round, square, oblong and slot holes besides shapely ones in many beautiful designs.

Our service is at your command.



The
Harrington & King
PERFORATING Co.

5634 FILLMORE ST., CHICAGO

114 LIBERTY ST., NEW YORK

instances, forcing some consumers to curtail operations. Despite the large premiums quoted on the commodity exchange, leading producers continued to quote prime western at 7.25c, East St. Louis.

Tin—Navy department bought 90 long tons of grade A tin on Friday, Nov. 22, and an additional like amount on Friday, Nov. 29. The average price at which this metal was obtained was about 50.25c. The domestic market held steady at 50.30c until Friday when Straits

Nonferrous Metal Prices

Nov.	Copper			Straits Tin, New York		Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99% Spot, N. Y.	Anti-mony Amer. Spot, N. Y.	Nickel Cathodes
	Electro, del. Conn.	Lake, del. Midwest	Casting, refinery	Spot	Futures						
23	12.00	12.00	12.12 1/2	50.37 1/2	50.20	5.80	5.65	7.25	17.00	14.00	35.00
25	12.00	12.00	12.12 1/2	50.30	50.10	5.80	5.65	7.25	17.00	14.00	35.00
26	12.00	12.00	11.87 1/2	50.30	50.12 1/2	5.80	5.65	7.25	17.00	14.00	35.00
27	12.00	12.00	11.87 1/2	50.30	50.15	5.80	5.65	7.25	17.00	14.00	35.00
28	12.00	12.00	11.87 1/2	50.30	50.15	5.65	5.50	7.25	17.00	14.00	35.00
29	12.00	12.00	11.87 1/2	50.20	50.10	5.65	5.50	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)	19.23

Copper, hot rolled	20.62
Lead, cut to jobbers	8.90
Zinc, 100 lb. base	12.50

Tubes	
High yellow brass	21.98
Seamless copper	21.12

Rods	
High yellow brass	14.76
Copper, hot rolled	17.12

Anodes	
Copper, untrimmed	17.87

Wire	
Yellow brass (high)	19.48

OLD METALS

Nom. Dealers' Buying Prices	
No. 1 Composition Red Brass	
New York	8.00-8.25
Cleveland	8.62 1/2-9.12 1/2
Chicago	8.25-8.50
St. Louis	8.37 1/2

Heavy Copper and Wire	
New York, No. 1	9.62 1/2-9.87 1/2
Cleveland, No. 1	9.37 1/2-9.87 1/2
Chicago, No. 1	9.50-9.75
St. Louis	9.37 1/2-9.50

Composition Brass Turnings	
New York	7.62 1/2-7.87 1/2

Light Copper	
New York	7.62 1/2-7.87 1/2
Cleveland	7.37 1/2-7.87 1/2
Chicago	7.50-7.75
St. Louis	7.37 1/2-7.50

Light Brass	
Cleveland	4.12 1/2-4.87 1/2
Chicago	3.62 1/2-3.87 1/2
St. Louis	4.87 1/2

Lead	
New York	4.75-4.85
Cleveland	4.00-4.25
Chicago	4.37 1/2-4.62 1/2
St. Louis	3.62 1/2-3.87 1/2

Zinc	
New York	3.87 1/2-4.12 1/2
Cleveland	3.25-3.50
St. Louis	3.50-3.75

Aluminum	
Mis., cast, Cleveland	9.25-9.50
Borings, Cleveland	6.50
Clips, soft, Cleveland	14.25
Misc. cast, St. Louis	7.75-8.00

SECONDARY METALS

Brass ingot, 85-5-5-5, less carloads	13.25
Standard No. 12 aluminum	15.00-15.50

spot closed at 50.20c on light sales. Unusually heavy sales featured the Far Eastern market list week with the month's running total 6090 tons.

Sprage & Henwood Inc., Scranton, Pa., and E. J. Longyear Co., Minneapolis, have been appointed sales agents for Carboloy "Sinta-Set" diamond impregnated core-bits, according to an announcement by W. C. Weslow, manager of the newly formed mining division of Carboloy Co. Inc., Detroit.

BRONZE BRASS ALUMINUM Castings

■ In the final analysis, every casting bought is bought for its quality. When quality is established, workmanship and price follow in order of importance. When quality, workmanship and price are equally pleasing, buyers find it a pleasure to do business. The SHOOP BRONZE CO. includes in all its advertising the slogan "You'll like our quality, workmanship and price. Send us your inquiries." That this has been no empty talk, SHOOP BRONZE points to its sales record, where complaints, rejections and cancellations are conspicuous by their absence. If YOU are contemplating the purchase of castings, mill bearings, bushings, anti-acid metal, hydraulic pump work or pickle crates, you will do yourself a favor by first writing to

THE Shoop BRONZE CO.

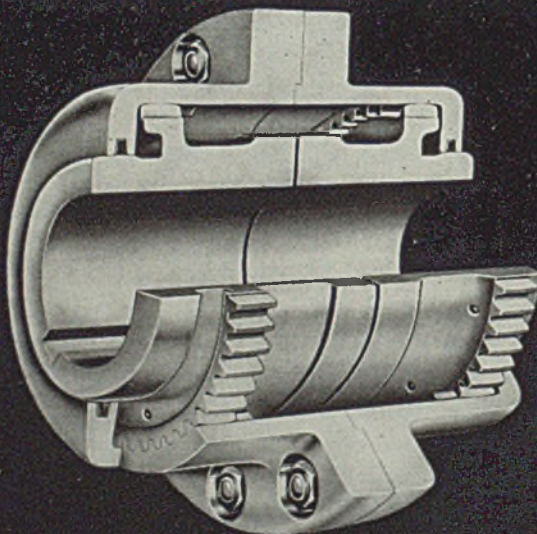
344-360 WEST SIXTH AVE.

Phone Tarentum 371

TARENTUM, PA.

(Pittsburgh District)

POOLE



A COPY OF CATALOG GIVING FULL DESCRIPTION AND ENGINEERING DATA SENT UPON REQUEST.

FLEXIBLE COUPLINGS

POOLE FOUNDRY & MACHINE COMPANY

WOODBERRY, BALTIMORE, MD.

Construction and Enterprise

Illinois

CHICAGO—Dreis & Krump Mfg. Co., sheet metal working machinery, will increase production facilities 20 per cent by one-story addition now under construction, 120,000 square feet floor space, costing about \$27,500, for warehouse purposes, releasing present warehouse for manufacturing.

CHICAGO—Pioneer Gen-E Motor Corp. has bought building No. 2 of former Grigsby-Grunow Co. plant on Dickens avenue, 199 x 416 feet, double size of present plant at 466 West Superior street. Additional space needed for government defense work.

CHICAGO—Kal Machine Works Inc., 220 North Carpenter street, has been incorporated with 25 shares no par value to manufacture sewing machines, by Samuel T. Gurman, 11 South LaSalle street.

CHICAGO—Cardox Corp., 307 North Michigan avenue, has bought 30 acres near Monee, Ill., on which it will build

■ Additional Construction and Enterprise leads may be found in the list of Shapes Pending on page 104 and Reinforcing Bars Pending on page 107 of this issue.

plant for manufacture of mining and fire extinguishing equipment.

CHICAGO—Russakov Co., 850 North Ogden avenue, will add a second story 150 x 160 feet for manufacture of sheet metal specialties for defense purposes.

CHICAGO—Ceco Steel Products Corp., 1926 South Fifty-second avenue, Cicero, Ill., is building an addition of 65,000 square feet at 5701 West Twenty-sixth street, costing about \$125,000, for manufacture of metal doors and windows, metal lath and similar products.

CHICAGO—Gear Specialties Inc., 2635 West Medill avenue, manufacturer of small gears for electrical appliances, is building a one-story addition to cost about \$20,000.

CHICAGO—Truscon Steel Co., Youngstown, O., is expanding its Chicago facilities at 4401 West Sixteenth street at cost of \$20,000.

CHICAGO—Alto Mfg. Co., 1647 Wolf-ram street, manufacturer of tools, dies and metal stampings, is building a \$5000 plant addition.

CHICAGO—Hills-McCanna Co., 2349 West Nelson avenue, is building a \$2000 addition for expanded manufacture of brass castings and lubricators.

CHICAGO—Thompson-Bremer Co., 1640 West Hubbard street, manufacturer of lock washers, is building a one-story addition to double capacity, at cost of \$45,000. (Noted Oct. 14.)

CHICAGO—Dearborn Chemical Co., 310 South Michigan avenue, manufacturer of water-treating chemicals and cleaning compounds, is building an addition to its plant at 1029 West Thirty-fifth street, costing \$60,000.

CHICAGO—National Aluminate Corp., 6221 West Sixty-sixth place, manufacturer of sodium aluminate and other water-treating chemicals, is adding a second story to its plant at cost of \$50,000 increasing floor space more than 16,000 square feet.

CHICAGO—Belke Mfg. Co., 947 North Cicero avenue, manufacturer of plating equipment, rubber-lined tanks, etc., will

build a plant addition at 944 North Cicero avenue, costing about \$25,000.

CHICAGO—Diamond T Motor Car Co., 4517 West Twenty-sixth street, has started construction of a second 72,000-square foot addition, costing \$175,000, for production of army trucks on a \$19,000,000 order.

CHICAGO—Metal Novelties Mfg. Co., 1415 West Carroll street, has been incorporated to manufacture light metal stampings. Operations have been started in plant of about 3000 square feet.

CHICAGO—Marine Oil Terminal Co., 1725 West Thirty-first street, plans construction of petroleum storage plant at Cicero avenue and sanitary district canal, including tanks, pumps and accessories, at cost of \$250,000.

KANKAKEE, ILL.—American-Marietta Co., manufacturer of varnishes and synthetic resins, will build two additions as part of \$200,000 expansion program.

LEMONT, ILL.—Village board has applied for WPA funds for sewage treatment and water filtration plants estimated to cost about \$200,000. Marr, Green & Opper, 400 North Michigan avenue, Chicago, are engineers.

PEORIA, ILL.—Pabst Brewing Co., 917 West Juneau avenue, Milwaukee, plans

It Pays to Use Dependable Wire Rope

When a wire rope fails, the equipment on which it is used is temporarily out of business, production stops, time is lost and labor is wasted... The best recommendation for "HERCULES" (Red-Strand) Wire Rope is its performance record, by which it continues to make and hold friends—year after year... In order to



be suitable for all purposes, "HERCULES" is made in a wide range of both Round Strand and Flattened Strand constructions—all of which are available in either the Standard or Pre-formed type... If you will tell us how you use Wire Rope, we shall be glad to suggest the construction and type we consider best for your conditions.

Made of Acid Open-Hearth Steel Wire

A. LESCHEN & SONS ROPE CO.

NEW YORK
CHICAGO
DENVER

90 West Street
810 W. Washington Blvd.
1554 Wacker Street



SAN FRANCISCO
PORTLAND
SEATTLE

520 Fourth Street
914 N. W. 14th Avenue
3410 First Avenue South

SUPERIOR INGOT MOLDS STOOLS

Tool Steel and Special Molds

SUPERIOR MOLD & IRON COMPANY

(Pittsburgh District)

PENN., PA.

Phone: Jeannette 700

erection of second story to bottling plant here, to cost \$100,000, with equipment.

ROCKFORD, ILL.—Rockford sanitary district, H. A. Riedesel, superintendent, has applied for WPA funds to finance an addition to its sewage disposal plant, estimated to cost \$80,000, Greeley & Hansen, 6 North Michigan avenue, Chicago, are consulting engineers.

New York

BROOKLYN, N. Y.—Department of sanitation, municipal building, New York, will build a sewage disposal plant at the foot of Sixty-ninth street at cost of about \$17,000,000.

BUFFALO—Houde Engineering Corp., 537 East Delavan avenue, is having plans made for a factory addition costing \$500,000.

JAMESTOWN, N. Y. — Jamestown

Metal Equipment Co., O. A. Lenna, president, 1088 Allen street, will take bids after Jan. 1 on revised plans for one-story 240 x 700-foot factory estimated to cost about \$275,000. E. B. Card, care owner, is chief engineer. (Noted Oct. 21.)

ROCHESTER, N. Y.—Pfauder Co., 89 East avenue, manufacturer of tanks, stills, etc., is having plans made by Kaelber & Waasdorp, 34 Alexandria street for a two-story plant 80 x 120 feet.

ROME, N. Y.—Rome Cable Corp., Ridge street, has let general contract to B. McCarey, Mayflower apartments, for 35 x 137 and 28 x 140-foot additions to its plant, to cost about \$45,000.

WELLSVILLE, N. Y.—Air Pre-Heater Corp., Main and Dyke streets, will build a plant addition 85 x 220 feet, to cost about \$75,000. General contract to L. C. Whitford Co., Wellsville.

New Jersey

JERSEY CITY, N. J.—Colgate-Palmolive-Peet Co., 105 Hudson street, is taking bids for three-story 42 x 49-foot lye treatment plant on Grand street. A. E. Windle, 105 Hudson street, is engineer.

Ohio

AKRON, O.—Knapp Foundry Co., 1215 Sweitzer avenue, is erecting a warehouse building 52 x 66 feet at 99 Steiner avenue.

AKRON, O.—Goodyear Tire & Rubber Co. will build two structures at airport dock, chemigum plant, two stories 100 x 150 feet and press building 44 x 280 feet. Clemmer Construction Co., 131 East Thornton street, is erecting the latter.

DAYTON, O.—Durlon Co. has awarded general contract to B. G. Danis Co., for an addition of 20,000 square feet to main plant and several auxiliary buildings, at cost of about \$75,000.

DOVER, O.—Norman J. Urquhart, inventor of new type ore reduction furnace, and associates, will incorporate in Pennsylvania, probably as Combustion Processes Co., to manufacture and sell the new furnace. Test furnace now operating at plant of Wagner Foundry & Machine Shop, Dover.

CLEVELAND—George H. Porter Steel Treating Co., 1265 East Fifty-fifth street, is building an addition to steel treating department 63 x 106 feet. Jesse D. Myers is president.

MENTOR, O.—Village has voted \$100,000 bonds for construction of trickle filter type sewage disposal plant to cost \$300,000. P. W. Elwell, 5005 Euclid avenue, Cleveland, is engineer.

PLYMOUTH, O.—Village, J. H. Rhine, village clerk, will ask bids soon for municipal power plant, including diesel engine, switchboard and accessories. Plans by Carl J. Simon & Associates, Evans-Central building, Van Wert, O.

WARREN, O.—American Welding & Mfg. Co., Griswold avenue, has given general contract to W. B. Gibson Co., 238 Chestnut street NE, for new manufacturing plant.

WARREN, O.—Standard Transformer Co., Dana avenue, will build one-story addition 90 x 130 feet, including ten-ton crane, at total cost of about \$50,000. Keleh & O'Brien, Union Savings & Trust building, are architects.

YELLOW SPRINGS, O.—Delco Products division General Motors Corp., 329 East First street, Dayton, O., will take bids soon on a one and two-story 60 x 120-foot foundry costing about \$50,000.

Pennsylvania

CORRY, PA.—Defense Plant Corp., Washington, will build \$115,000 plant on West Main street, to be occupied by Aero Supply Mfg. Corp., 611 West Main street, for national defense work.

JEANETTE, PA.—Elliott Co., steam power specialty manufacturer, is building an addition of 21,600 square feet to its welding and steel plate departments at cost of about \$150,000. Two 20-ton overhead cranes and an additional furnace will be included.

PHILADELPHIA—Edward G. Budd Mfg. Co., Twenty-fifth street and Hunting Park avenue, has let general contract for a press shop to Wark Co., 1700 Sansom street. Ballinger Co., 1055 Twelfth street, is engineer.

PITTSBURGH—Union Electric Steel Corp., H. W. Weitzel in charge, 89 Bell avenue, will build a one-story 90 x 240-foot plant addition. General contract to Frank Bryan Inc., 1263 Chartiers avenue, McKees Rocks, Pa.

LAWRENCE COPPER & BRONZE

Quality Castings

FOR BLAST FURNACES
ELECTRIC FURNACES
ROLLING MILLS

Prompt Delivery Assured

BESSEMER BLDG.—PITTSBURGH, PA.
Phone ATLantic 6963 Plant—Zelienople, Pa.



YOUR HOME in Philadelphia

All the creature comforts graciously administered, plus the thrilling atmosphere of a great and famous hotel.

All dressed up for the Winter. A streamlined lobby—a smartly refurnished Cocktail Lounge offering a delightful interlude on the way to the beautiful Burgundy Room, the Hunt Room, famous Bar Cafe in the club manner—await you. Reasonable rates.

BELLEVUE-STRATEORD

IN PHILADELPHIA
CLAUDE H. BENNETT, General Manager

YORK, PA.—General Electric Co., Schenectady, N. Y., will build a warehouse 100 x 200 feet costing about \$45,000. General contract to Industrial Constructors, Broad street and Allegheny avenue, Philadelphia.

YORK, PA.—York-Hoover Corp., Elm and Albemarle streets, will build a one-story 112 x 144-foot plant addition. General contract to C. A. Stambach & Sons, New York.

Michigan

BAY CITY, MICH.—Dow Chemical Co. will add two buildings to plant on Pater-son avenue, 83 x 343 feet and 80 x 142 feet, to cost about \$200,000.

SOUTH HAVEN, MICH.—Black River Foundry Co., care A. B. Chase, president Home Realty & Investment Co., will start building operations soon on 20-acre site, first unit to be brass foundry 150 x 320 feet.

Indiana

ANDERSON, IND.—Delco-Remy division General Motors Corp., O. V. Badgely, general manager, 2401 Columbus avenue, has given general contract to A. J. Glaser Construction Co., Muncie, Ind., for a boiler room and power house, costing about \$75,000. (Noted Nov. 18.)

BURNS CITY, IND.—Navy department, Washington, plans naval powder storage plant near here, to cost \$5,000,000.

HAMMOND, IND.—LaSalle Steel Co. is building three additions on 150th street, to cost about \$50,000. One unit is for a heat treating plant, one for warehouse and one for service.

UNION CENTER, IND.—War department, Twentieth and Constitution avenue, Washington, plans ammunition plant on 13,000-acre site here. Giffels & Vallet Inc., 1000 Marquette building, Detroit, are architects. Estimated cost \$5,000,000.

Maryland

HAGERSTOWN, MD.—Fairchild Aviation Inc., 88-06 Van Wyck boulevard, Jamaica, N. Y., is having plans drawn by Albert Kahn, New Center building, Detroit, for a three-story 110 x 300-foot airplane plant.

District of Columbia

WASHINGTON—Bureau of supplies and accounts, navy department, will receive bids as follows: Dec. 10, schedule 4302, seven motor-driven horizontal milling machines for various deliveries; schedule 4214, three motor-driven vertical shapers for Corpus Christi, Tex.; schedule 4215, four motor-driven vertical milling machines for various deliveries; schedule 4217, seven motor-driven milling machines for various deliveries; schedule 4218, four motor-driven turret lathes and equipment for various deliveries; schedule 4245, five motor-driven turret lathes for Portsmouth, N. H.; schedule 4250, eleven gasoline engine-driven telescopic fork type high lift trucks for various deliveries; schedule 4256, low-lift electric lifting truck for Brooklyn, N. Y.; schedule 4259, three motor-driven high-speed horizontal shapers for Wickford, R. I., Jacksonville, Fla., Corpus Christi, Tex.; schedule 4266, eleven motor-driven round column upright drilling machines for Portsmouth, N. H.; schedule 4270, three motor-driven universal geared head turret lathes for Portsmouth, N. H.; Dec. 17, schedule 4265, six motor-driven turret lathes for various vessel deliveries; schedule 4268, two motor-driven light duty engine lathes for Sewalls Point, Va.; schedule 4272, six motor-driven radial drills for various deliveries.

Missouri

ST. LOUIS, MO.—Monsanto Chemical

Co., 1702 South Second street, has given general contract to William H. & Nelson Cunliffe Co., 3320 Lindell boulevard, for an eight-story 60 x 82-foot brick and steel building at 8011 Idaho avenue for use of phosphate division.

ST. LOUIS—Clark's Super Gas Co., 8530 West National avenue, Milwaukee, has applied to board of public service for permit to construct a gasoline storage, blending and terminal plant at the foot of Victor street, including four steel tanks and a building, to cost about \$50,000.

ST. LOUIS—Hussman-Ligonier Co., 2401 North Leffingwell avenue, manufac-

turer of mechanical refrigerating equipment, will build a one-story 58 x 137-foot plant addition at 2818 Benton street, to cost about \$40,000 with equipment. General contract to William H. & Nelson Cunliff Co., 3320 Lindell boulevard.

Oklahoma

VINITA, OKLA.—City will vote soon on \$160,000 bond issue to finance electric power distribution system.

Wisconsin

WEST ALLIS, WIS.—Wehr Steel Co. will build a \$30,000 plant addition at 5234 West Mobile street.

4

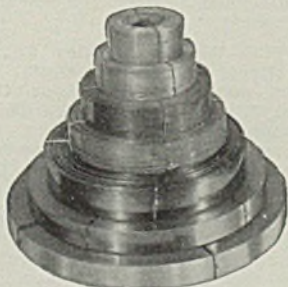
**1500 KW, 250 VOLT
SYNCHRONOUS
MOTOR GENERATOR SETS**

for immediate shipment

These are Westinghouse units—compound wound, .8 P.F., 514 r.p.m. 3 phase, 60 cycle. Unlike ordinary used equipment, these motor-generator sets are in first class electrical and mechanical condition. The cost of each is only a fraction of similar new equipment.

For complete details, write or wire to:

ELECTRIC GENERATOR & MOTOR CO.
4519 Hamilton Ave. Cleveland, Ohio



WIRE

SHAPED

Square - Keystone - Flat - Round
Half Round - Special

STOCK

High Carbon - Low Carbon - Alloy
Tempered and Untempered

Also Wire Screen Cloth

THE SENECA WIRE & MFG. COMPANY

Established 1905

FOSTORIA, OHIO

Warehouses and Representatives in practically all principal cities.



Minnesota

INTERNATIONAL FALLS, MINN.—Border electric co-operative, Einar Johnson, president, will take bids soon for 119 miles rural transmission lines to serve 376 customers. General Engineering Corp., 2944 Cedar avenue, Minneapolis, is consulting engineer.

Iowa

BURLINGTON, IOWA—Day & Zimmerman Inc., Packard building, Philadelphia, holder of contract for operation of a shell loading plant for the war department at \$20,000,000, has awarded construction contract to A. Guthrie & Co. Inc., 424 Endicott building, St. Paul, and Al Johnson Construction Co., 608 Foshay Tower, Minneapolis, at \$10,500,000.

CHARLES CITY, IOWA—Salsbury Laboratories plans chemical plant, two

stories 40 x 120 feet and one story 80 x 120 feet, costing over \$40,000.

CAMP DODGE, IOWA—WPA has approved sewage disposal project with 250,000 gallons capacity and storm sewers, for national guard camp, at cost of about \$274,000.

LE CLAIRE, IOWA—City plans \$30,000 bond issue to aid financing water-works system to cost about \$70,000.

Montana

MISSOULA, MONT.—Missoula county, W. J. Babington, clerk, takes bids to Dec. 9 for pumping unit, including deep well turbine pump, electric motor, pneumatic storage tank and accessories.

California

HAWTHORNE, CALIF.—Northrop Aircraft Inc. is building an addition 60 x 175 feet, to cost \$21,000, at 1001 East Broadway.

LOS ANGELES—Aluminum Co. of America has obtained building permit for heat treating building No. 9 at 5151 Magnolia street, 120 x 320 feet, to cost \$57,600.

LOS ANGELES—Air Associates, 1100 Air Way, Glendale, Calif., will erect a warehouse and manufacturing building at Los Angeles airport, 50,000 square feet.

SAN PEDRO, CALIF.—Thomas Machine Works, 1050 Seaside avenue, will erect a boat shop building and marine ways at Fish Harbor at estimated cost of \$20,000.

SAN PEDRO, CALIF.—Bethlehem Steel Co. will build at government expense of about \$2,750,000 a shipyard and seven buildings on Terminal Island, in Los Angeles harbor, including mould loft 90 x 400 feet, shop building 69 x 150 feet, three-story warehouse 130 x 230 feet, two-story outfitting building 90 x 210 feet, machine shop 85 x 140 feet, two two-story service buildings 50 x 140 feet and a paint shop. A double shipway will also be built.

Washington

BELLINGHAM, WASH.—Chamber of commerce announces funds have been subscribed for establishment of plywood plant 165 x 800 feet, including \$100,000 for building and \$500,000 for machinery and equipment.

SEATTLE—Webster-Brinkley Co., 651 Alaska street, machinery manufacturer, has been purchased by George Gunn, president, Kirsten Pipe Co., and Thomas J. Bannan, president Western Gear Works, who will be president and vice president. Additional equipment will be installed in anticipation of government work.

SEATTLE—Navy has awarded to J. A. McEachren Co. contract for warehouse 150 x 260 feet, costing \$60,000 at Seattle-Tacoma Shipbuilding Co. plant.

WENATCHEE, WASH.—Peter Janni & Sons have opened a magnesium deposit near Northport, at head of Grand Coulee Lake, and will open a quarry. Plans are being drawn for a plant to use flotation process developed by Dean Drucker of Washington State College, Pullman, Wash.

Canada

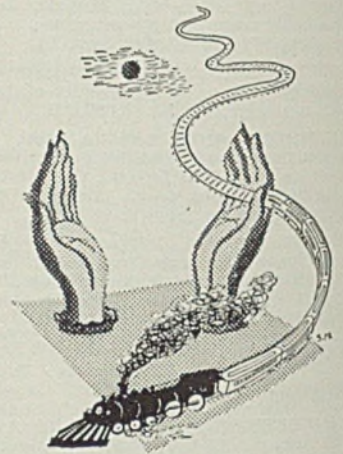
LEASIDE, ONT.—Self Priming Pump & Engineering Co. Ltd., Slough, England, plans to establish manufacturing plant on Vanderhoof Drive, containing about 30,000 square feet floor space. B. Bercovitz, C. P. R. building, Toronto, Ont., is Canadian representative.

TORONTO, ONT.—Dominion Bridge Co. Ltd., 1139 Shaw street, will build a plant addition at 289 Sourauren avenue. H. W. Short is engineer.

WINDSOR, ONT.—Defense Industries Ltd., 1135 Beaver Hall Hill, Montreal, Que., a government-owned company, has given contract to Allan Construction Co. Ltd., 44 Wyandotte street East, for chemical plant on Sandwich street, to cost \$35,000.

LONGUEUIL, QUE.—Dominion Engineering Works Ltd., First avenue, Lachine, Que., will build \$100,000 plant addition. Foundation and steel awarded; other contracts pending.

MOUNT ROYAL, QUE.—Canadian Marconi Co. will build second addition to plant here at cost of \$70,000. Building will be 71 x 274 feet. General contract to Richard & E. J. Ryan Ltd. J. C. Meadowcroft, 1154 Beaver Hall Square, Montreal, is architect.



DOUBLY HANDY

Opening through its own passageway directly into Grand Central Terminal, the Hotel Roosevelt offers you perfect convenience on your arrival in New York... And because of its location at the heart of Manhattan's great mid-town section, it affords the same kind of convenience for all outside activities... Doubly handy and doubly enjoyable... Large outside rooms, with both tub and shower—4.00 up.

HOTEL ROOSEVELT

BERNAM G. HINES, Managing Director
MADISON AVENUE AT 45th ST., NEW YORK
Direct Entrance from Grand Central Terminal

STEEL

An advertisement for KRON Dial Scales. It features two illustrations of dial scales: one is a smaller, more delicate scale, and the other is a larger, more robust platform scale. The text "KRON Dial Scales" is prominently displayed in the center, with "THE KRON CO. BRIDGEPORT CONN." at the bottom. The entire advertisement is framed within a dark, vertical border.

WHERE-TO-BUY

A classified list of advertisers according to products. ☞ Index to advertisements gives page number of any advertiser.

- ABRASIVES (Blast Cleaning)**
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., 4839 Harrison St., Pittsburgh, Pa.
- ABRASIVES (Polishing)**
Abrasive Co., Tacony & Fraley Sts., Philadelphia, Pa.
Carborundum Co., The, Niagara Falls, N. Y.
Norton Co., Worcester, Mass.
- ACCUMULATORS**
Elmes, Chas. F., Engineering Wks., 283 N. Morgan St., Chicago, Ill.
Logemann Brothers Co., 3126 Burling St., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.
- ACETYLENE**
Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
- ACID-PROOF LININGS**
Atlas Mineral Products Co. of Pa., The, Mertztown, Pa.
Calicote Co., 750 Rockefeller Bldg., Cleveland, O.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.
- ACIDS (Pickling)**
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Ampero Metal, Inc., Dept. S-129, 3830 W. Burnham St., Milwaukee, Wis.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.
- AIR COMPRESSORS—See COMPRESSORS (Air)**
- AIR CONDITIONING EQUIPMENT**
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Worthington Pump & Machinery Corp., Harrison, N. J.
- AIRLESS BLAST CLEANING EQUIPMENT**
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
- ALKALI CLEANING COMPOUNDS**
Coviles Detergent Co., The, Heavy Chemical Dept., 7018 Euclid Ave., Cleveland, O.
Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.
- ALLOYS—See FERROALLOYS**
- ANGLES, CHANNELS—See BEAMS, CHANNELS, ANGLES**
- ANGLE IRON BENDERS**
Excelstor Tool & Machine Co., Ridge & Jefferson Ave., E. St. Louis, Ill.
- ANNEALING BOXES—See BOXES (Annealing)**
- ANNEALING COVERS**
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
- AXLES**
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
- Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
- BABBITT METAL**
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
- BALING PRESSES**
Logemann Brothers Co., 3126 Burling St., Milwaukee, Wis.
- BALL TRANSFERS**
Mathews Conveyor Co., 114 Tenth St., Ellwood City, Pa.
- BALLS (Brass or Bronze)**
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
- BALLS (Special Alloy Metals)**
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
- BAND FILES (Metal)**
Continental Machines, Inc., 1324 So. Washington Ave., Minneapolis, Minn.
- BAND SAWS (Metal Cutting)**
Continental Machines, Inc., 1324 So. Washington Ave., Minneapolis, Minn.
- BANDS—See HOOPS AND BANDS**
- BANDS (Iron and Steel)**
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn.
Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
- BAR BENDERS**
Kardong Bros. Inc., 346 Buchanan St., Minneapolis, Minn.
- BAR DRAWER AND STRAIGHTENING MACHINES**
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
- BARGES (Steel)**
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Dravo Corp. (Engin'g Works Div.), Neville Island, Pittsburgh, Pa.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Maryland Dry Dock Co., Baltimore, Md.
- BARRELS (Steel)**
Petroleum Iron Works Co., Sharon, Pa.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
- BARS (Alloy)**
Ampero Metal, Inc., Dept. S-129, 3830 W. Burnham St., Milwaukee, Wis.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co., McKeesport, Pa.
LaSalle Steel Co., Dept. 10-A, P. O. Box 6800-A, Chicago, Ill.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
- BARS (Brass, Bronze or Copper)**
American Brass Co., The, Waterbury, Conn.
Copperweld Steel Co., Warren, O.
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
- BARS (Concrete Reinforcing)**
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Industrial Equipment Corp., Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., The, Youngstown, O.
- BARS (Iron)—See IRON (Bar)**
- BARS (Steel) (*Also Stainless)**
*Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
*Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
*Copperweld Steel Co., Warren, O.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
- Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn.
Bridgeport, Conn.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Weirton Steel Co., Weirton, W. Va.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., The, Youngstown, O.
- BATERIES (Storage)**
Electric Storage Battery Co., The, 19th St. and Allegheny Ave., Philadelphia, Pa.
Graybar Electric Co., Graybar Bldg., New York City.
- BATTERY CHARGING APPARATUS**
Cutler-Hammer, Inc., 1267 St. Paul Ave., Milwaukee, Wis.
- BEAMS, CHANNELS, ANGLES, ETC. (*Also Stainless)**
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Inland Steel Co., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., The, Youngstown, O.
- BEARINGS (Ball)**
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
New Departure Div., General Motors Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Torrington Co., The, Torrington, Conn.
- BEARINGS (Babbitt)**
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
- BEARINGS (Brass, Bronze)**
Ampero Metal, Inc., Dept. S-129, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
Lawrence Copper & Bronze, Bessemer Bldg., Pittsburgh, Pa.

» » » WHERE-TO-BUY « « «

BEARINGS (Brass, Bronze)—Con. National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa. Shenango-Penn Mold Co., Dover, O. Shoop Bronze Co., The, 344-60 W. 6th Ave., Tarentum, Pa.

BEARINGS (Journal) Bantam Bearings Corp., South Bend, Ind. Bower Roller Bearing Co., 3040 Hart St., Detroit, Mich. Fafnir Bearing Co., New Britain, Conn. Hyatt Bearings Division, General Motors Sales Corp., Harrison, N. J.

National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa. Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill. SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa. Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Needle) Torrington Co., The, Torrington, Conn.

BEARINGS (Non-Metallic) American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City. Ryerson, Jos. T. & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.

BEARINGS (Oilless) Rhoades, R. W., Metaline Co., P. O. Box 1, Long Island City, N. Y.

BEARINGS (Quill) Bantam Bearings Corp., South Bend, Ind.

BEARINGS (Radial) American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa. Bantam Bearings Corp., South Bend, Ind. Bower Roller Bearing Co., 3040 Hart St., Detroit, Mich. Fafnir Bearing Co., New Britain, Conn. Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J. Link-Belt Co., 519 No. Holmes Ave., Indianapolis, Ind. New Departure Div., General Motors Corp., Bristol, Conn. Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill. SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa. Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roll Shoe) American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City. Bantam Bearings Corp., South Bend, Ind. Fafnir Bearing Co., New Britain, Conn. Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J. Morgan Construction Co., Worcester, Mass.

National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa. Ryerson, Jos. T. & Son, Inc., 16th & Rockwell Sts., Chicago, Ill. Shoop Bronze Co., The, 344-60 W. 6th Ave., Tarentum, Pa.

SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa. Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roller) American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa. Bantam Bearings Corp., South Bend, Ind. Bower Roller Bearing Co., 3040 Hart St., Detroit, Mich. Fafnir Bearing Co., New Britain, Conn. Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J. Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind. Norma-Hoffmann Bearings Corp., Stamford, Conn. Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill. SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa. Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Rolling Mill) American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City. American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa. Bantam Bearings Corp., South Bend, Ind.

Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J. Morgan Construction Co., Worcester, Mass. Norma-Hoffmann Bearings Corp., Stamford, Conn. Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill. SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa. Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Thrust) American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City. Bantam Bearings Corp., South Bend, Ind. Fafnir Bearing Co., New Britain, Conn. Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind. Norma-Hoffmann Bearings Corp., Stamford, Conn. Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill. SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa. Timken Roller Bearing Co., The, Canton, O.

BELTING (Chain and Link) Baldwin-Duckworth Div. of Chain Belt Co., 326 Plainfield St., Springfield, Mass. Link-Belt Co., 220 So. Belmont Ave., Indianapolis, Ind.

BELTING (Metal, Conveyor, High and Low Temperature) Cyclone Fence Co., Waukegan, Ill.

BELTING (Rubber) Garlock Packing Co., The, S 3-40, Palmyra, N. Y.

BENCHES Challenge Machinery Co., Grand Haven, Mich.

BENCH PLATES Challenge Machinery Co., Grand Haven, Mich.

BENDING AND STRAIGHTENING MACHINES Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O. Alliance Machine Co., The, Alliance, O. Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O. Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill. Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill. Kardong Bros., Inc., 346 Buchanan St., Minneapolis, Minn. Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis. Morgan Engineering Co., The, Alliance, O.

BENZOL AND TOLUOL RECOVERY PLANTS Koppers Co., Engineering and Construction Div., 300 Koppers Bldg., Pittsburgh, Pa. Koppers Co., Tar & Chemical Div., 901 Koppers Bldg., Pittsburgh, Pa. Western Gas Div., Koppers Co., Fort Wayne, Ind. Youngstown Sheet & Tube Co., The, Youngstown, O.

BILLETS (Alloys and Carbon Steel) Alan Wood Steel Co., Conshohocken, Pa. Andrews Steel Co., The, Newport, Ky. Carnegie-Illinois Steel Corp., Pittsburgh-Chicago. Flrth-Sterling Steel Co., McKeesport, Pa. Republic Steel Corp., Dept. ST, Cleveland, O. Stanley Works, The, New Britain, Conn. Bridgeport, Conn. Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala. Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O. Washburn Wire Co., Phillipsdale, R. I. Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

BILLETS (Forging) Alan Wood Steel Co., Conshohocken, Pa. Andrews Steel Co., The, Newport, Ky. Carnegie-Illinois Steel Corp., Pittsburgh-Chicago. Copperweld Steel Co., Warren, O. Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa. Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.

Laclede Steel Co., Arcade Bldg., St. Louis, Mo. Midvale Co., The, Nicetown, Philadelphia, Pa. Republic Steel Corp., Dept. ST, Cleveland, O. Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa. Stanley Works, The, New Britain, Conn. Bridgeport, Conn. Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala. Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O. Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

BILLETS AND BLOOMS (Also Stainless) *Alan Wood Steel Co., Conshohocken, Pa. Andrews Steel Co., The, Newport, Ky. Bethlehem Steel Co., Bethlehem, Pa. Carnegie-Illinois Steel Corp., Pittsburgh-Chicago. *Copperweld Steel Co., Warren, O. *Flrth-Sterling Steel Co., McKeesport, Pa. Inland Steel Co., 38 So. Dearborn St., Chicago, Ill. Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa. Laclede Steel Co., Arcade Bldg., St. Louis, Mo. Pittsburgh Steel Co., 1643 Grant Bldg., Pittsburgh, Pa. *Republic Steel Corp., Dept. ST, Cleveland, O. Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa. Stanley Works, The, New Britain, Conn. Bridgeport, Conn. Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala. Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O. Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill. Youngstown Sheet & Tube Co., The, Youngstown, O.

BINS (Storage) Petroleum Iron Works Co., Sharon, Pa. BLAST CLEANING EQUIPMENT (Sand) American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind. Pangborn Corp., Hagerstown, Md. BLAST FURNACE CLEANING (Gas) McKee, Arthur G., & Co., 2422 Euclid Ave., Cleveland, O. BLAST FURNACE HOT BLAST STOVE McKee, Arthur G., & Co., 2422 Euclid Ave., Cleveland, O. BLAST FURNACE SPECIALTIES Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa. Brassert, H. A., & Co., 1st National Bk. Bldg., Pittsburgh, Pa. Broslus, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa. Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa. McKee, Arthur G., & Co., 2422 Euclid Ave., Cleveland, O.

BLAST FURNACE STOCK HOUSE McKee, Arthur G., & Co., 2422 Euclid Ave., Cleveland, O. BLAST FURNACES—See FURNACES (Blast) BLOCKS (Chain) Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa. BLOWERS General Electric Co., Schenectady, N. Y. Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O. North American Mfg. Co., The, 2901 E. 75th St., Cleveland, O. Sawyer Electrical Mfg. Co., 5745 Lenox St., Los Angeles, Cal. Stewart Furnace Div., Chicago Flexible Shaft Co., 1106 So. Central Ave., Chicago, Ill. Sturtevant, B. F., Co., Hyde Park, Boston, Mass. Truffo Fan Co., 600 Mercer St., Harmony, Pa.

BLOWPIPES (Oxy-Acetylene) Linde Air Products Co., The, 30 E. 42nd St., New York City. BLUE PRINTING MACHINES Pease, C. F., Co., The, 2688 W. Irving Park Blvd., Chicago, Ill. BLUE PRINTING SUPPLIES AND EQUIPMENT Pease, C. F., Co., The, 2688 W. Irving Park Blvd., Chicago, Ill. BOILER HEADS Bethlehem Steel Co., Bethlehem, Pa. BOILER TUBES—See TUBES (Boiler) BOILERS Babcock & Wilcox Co., The, Refractorles Div., 85 Liberty St., New York City. Oil Well Supply Co., Dallas, Texas. BOLT AND NUT MACHINERY Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O. Landis Machine Co., Inc., Waynesboro, Pa. National Machinery Co., The, Tiffin, O. BOLTS (Also Stainless) Bethlehem Steel Co., Bethlehem, Pa. Carnegie-Illinois Steel Corp., Pittsburgh-Chicago. Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O. Columbia Steel Co., San Francisco, Calif. *Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa. Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O. *Republic Steel Corp., Upon Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O. Russell, Burdshall & Ward Bolt & Nut Co., Port Chester, N. Y. Ryerson, Jos. T. & Son, Inc., 16th and Rockwell Sts., Chicago, Ill. Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

BOLTS (Carriage and Machine) Bethlehem Steel Co., Bethlehem, Pa. Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O. Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa. Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O. Republic Steel Corp., Upon Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O. Russell, Burdshall & Ward Bolt & Nut Co., Port Chester, N. Y. Ryerson, Jos. T. & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.

BOLTS (Special) Bethlehem Steel Co., Bethlehem, Pa. Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O. Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa. Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O. Republic Steel Corp., Upon Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O. Russell, Burdshall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS (Stove, Recessed Head) American Screw Co., Providence, R. I. Chandler Products Co., Euclid, O. Continental Screw Co., New Bedford, Mass. Corbin Screw Corp., New Britain, Conn. Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O. National Sewing & Mfg. Co., 2440 E. 70th St., Cleveland, O. Phenol Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill. Russell, Burdshall & Ward Bolt & Nut Co., Port Chester, N. Y. Scovill Mfg. Co., Waterbury, Conn.

STEEL

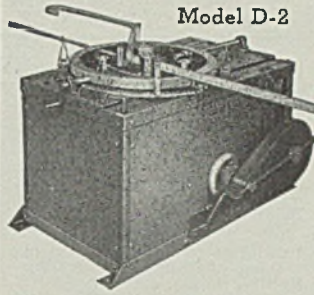
**WIRE STRAIGHTENING
and
CUTTING MACHINERY**

HIGH SPEED Machines for round wire, flat wire, welding wire, all kinds of wire.

The F. B. Shuster Company
New Haven, Conn.

Straightener Specialists Since 1866

KARDONG FOUR-WAY BENDER



The Model D-2 Kardong Bender is a Four Direction Horizontal bender. With this bender when binding large bars it is not necessary to turn bars over to make reverse or second bends or 180 degree hook bends. The Model D-2 is equipped to bend bars around collars from 2 inch to 6 inch in diameter. Also made to bend up to 8 inch in diameter. Capacity of Model D-2 1 1/4 inch Square Bars. The Model D-2 is a production bender for concrete reinforcing steel for shop or fabricating plant. Ask for our catalog of our complete line of reinforcing bar benders.

KARDONG BROTHERS, INC.
MINNEAPOLIS, MINN. ★

OHIO
LOCOMOTIVE CRANES
CRAWLER CRANES
SHOVELS
THE OHIO LOCOMOTIVE CRANE CO.
BUENA VISTA, OHIO

The **WEINMAN PUMP & SUPPLY CO.**
210 Boulevard of the Allies Pittsburgh, Penna.
Designers and Builders of
**HYDRAULIC & LUBRICATING OIL EQUIPMENT
FOR STEEL MILLS AND HEAVY INDUSTRIES**

HAGAN INDUSTRIAL FURNACES
for all purposes
GEORGE J. HAGAN CO.
PITTSBURGH, PA.
Detroit Chicago San Francisco

SHAW-BOX CRANE & HOIST DIVISION
MANNING, MAXWELL & MOORE, INC. MUSKEGON, MICHIGAN
MANUFACTURERS OF "SHAW-BOX" ELECTRIC AND HAND OPERATED CRANES, "LOAD LIFTER," AND "BUGGIT" ELECTRIC HOISTS — A STYLE AND SIZE FOR EVERY NEED. . . . **BEFORE BUYING — WRITE "SHAW-BOX!"**

"COWLES"
ROTARY SLITTING KNIVES
for Modern Requirements
Highest Quality Long Service
The Product of Many Years Specialization
MADE BY TOOLMAKERS
COWLES TOOL COMPANY
Cleveland, Ohio

**SPRING COTTERS
RIVETED KEYS
SCREW EYES, HOOKS
and WIRE SHAPES**

HINDLEY MFG. CO.
Valley Falls, R. I.

DESIGNING AND COMBUSTION ENGINEERS
SPECIALIZING IN
OPEN HEARTH FURNACES

LOFTUS ENGINEERING
509 OLIVER BLDG. PITTSBURGH, PA. CORPORATION TELEPHONE ATLANTIC 4480

WALDRON Flexible **COUPLINGS**
A TYPE AND SIZE FOR EVERY PURPOSE

The Only Coupling With The
WALFLEX SEAL
Prevents Dust Entering or Oil Leaving The Coupling

Many other design refinements that give it added life for longer service. Heat treated Forged Steel parts. Economical in first cost; dependable in operation.

Write for literature and name of sales representatives in your territory.

JOHN WALDRON CORP.
New Brunswick, New Jersey

CHIPPING CHISELS
For Steel Plants

BUILT UP TO A STANDARD **NOT DOWN TO A PRICE**

Especially tough striking surfaces on our standard and special chisels give them a longer lease on a profitable life. Made from finest alloy steel, truly designed and perfectly tempered, they are quality performers. Personal attention given to your chipping chisel requirements.

SEND FOR BULLETIN
Also a complete line of Chipping Hammer Bushings
STEEL CONVERSION & SUPPLY CO.
P. O. BOX 537 (CASTLE SHANNON) PITTSBURGH, PA.

WHERE TO BUY

CASTINGS (Steel)—Con.

*Midvale Co., The.
Nietown, Philadelphia, Pa.
National-Erie Corp., Erie, Pa.
National Roll & Foundry Co., The.
Avenmore, Pa.
Ohio Steel Fdry. Co., Lima, O.,
Springfield, O.
Oil Well Supply Co., Dallas, Texas.
Pittsburgh Rolls Div. of Blaw-Knox
Co., Pittsburgh, Pa.
Standard Steel Works Co.,
Paschall P. O., Philadelphia, Pa.
Steel Founders' Society of America,
920 Midland Bldg., Cleveland, O.
Strong Steel Fdry. Co., Hertel &
Norris Ave., Buffalo, N. Y.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.
Union Steel Casting Div. of Blaw-
Knox Co., 62nd and Butler Sts.,
Pittsburgh, Pa.
United Engineering & Fdry. Co.,
First National Bank Bldg.,
Pittsburgh, Pa.
Western Gas Div., Koppers
Co., Fort Wayne, Ind.
West Steel Casting Co.,
805 E. 70th St., Cleveland, O.
Youngstown Alloy Casting Corp.,
103 E. Indiana Ave.,
Youngstown, O.

CASTINGS (Wear Resisting)
American Brake Shoe & Fdry. Co.,
The, 230 Park Ave.,
New York City.
Shenango Penn Mold Co., Dover, O.

**CASTINGS (Worm and Gear
Bronze)**
Ampeco Metal, Inc., Dept. S-129,
3830 W. Burnham St.,
Milwaukee, Wis.
Codman, A. W., Mfg. Co.,
2816 Smallman St.,
Pittsburgh, Pa.

National Bearing Metals Corp.,
923 Shore Ave., Pittsburgh, Pa.

CEMENT (Acid Proof)
Atlas Mineral Products Co. of Pa.,
Mertztown, Pa.
Pennsylvania Salt Mfg. Co.,
Dept. E., Pennsalt Cleaner Div.,
Philadelphia, Pa.
Sauerlesen Cements Co.,
Sharpsburg, Pa.

CEMENT (High Temperature)
Carborundum Co., The,
Perth Amboy, N. J.
Johns-Manville Corp., 22 E. 40th St.,
New York City.
Norton Company, Worcester, Mass.

**CEMENT (High Temperature Hy-
draulic)**
Atlas Lumnite Cement Co.,
Dept. S-8, Chrysler Bldg.,
New York City.

CENTRAL STATION EQUIPMENT
Westinghouse Electric & Mfg. Co.,
Dept. 7-N, East Pittsburgh, Pa.

CHAIN (Conveyor and Elevator)
Baldwin-Duckworth Div. of Chain
Belt Co., 326 Plainfield St.,
Springfield, Mass.
Chain Belt Co., 1660 W. Bruce St.,
Milwaukee, Wis.
Link-Belt Co., 220 S. Belmont Ave.,
Indianapolis, Ind.

CHAIN (Draw Bench)
Chain Belt Co., 1660 W. Bruce St.,
Milwaukee, Wis.
Link-Belt Co., 220 S. Belmont Ave.,
Indianapolis, Ind.

CHAIN (Malleable)
Chain Belt Co., 1660 W. Bruce St.,
Milwaukee, Wis.
Lake City Malleable Co.,
5026 Lakeside Ave., Cleveland, O.
Link-Belt Co., 220 S. Belmont Ave.,
Indianapolis, Ind.

CHAIN (Power Transmission)
Link-Belt Co., 220 S. Belmont Ave.,
Indianapolis, Ind.

CHAIN (Roller)
Baldwin-Duckworth Div. of Chain
Belt Co., 326 Plainfield St.,
Springfield, Mass.
Chain Belt Co., 1660 W. Bruce St.,
Milwaukee, Wis.
Link-Belt Co., 220 S. Belmont Ave.,
Indianapolis, Ind.

CHAIN (Sling)
American Chain & Cable Co. Inc.,
Bridgeport, Conn.

CHAIN (Sprocket)
Chain Belt Co., 1660 W. Bruce St.,
Milwaukee, Wis.
Link-Belt Co., 220 S. Belmont Ave.,
Indianapolis, Ind.

CHAIN (Steel-Finished Roller)
Chain Belt Co., 1660 W. Bruce St.,
Milwaukee, Wis.
Link-Belt Co., 220 S. Belmont Ave.,
Indianapolis, Ind.

CHAIN (Welded or Weldless)
American Chain & Cable Co. Inc.,
Bridgeport, Conn.

CHARGING MACHINES (Cupola)
Atlas Car & Mfg. Co., The,
1140 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The,
Alliance, O.

**CHARGING MACHINES (Open
Hearth)**
Morgan Engineering Co., The,
Alliance, O.

**CHARGING MACHINES AND
MANIPULATORS (Autofloor
Type)**
Broslus, Edgar E., Inc., Sharps-
burg Branch, Pittsburgh, Pa.

CHECKER BRICK
Loftus Engineering Corp.,
509 Oliver Bldg., Pittsburgh, Pa.

CHISELS (Chipping)
Steel Conversion & Supply Co.,
P. O. Box 537 (Castle Shannon),
Pittsburgh, Pa.

CHROME ORE
Samuel, Frank, & Co., Inc.,
Harrison Bldg., Philadelphia, Pa.

**CHROMIUM METAL AND
ALLOYS**
Chromium Mining & Smelting Corp.,
Ltd., 700 Bank of Commerce
Bldg., Hamilton, Ont.
Electro Metallurgical Sales Corp.,
30 E. 42nd St., New York City.

CHROMIUM PLATING PROCESS
United Chromium, Inc.,
51 E. 42nd St., New York City.

**CHUCKING MACHINES (Multiple
Spindle)**
National Acme Co., The, 170 E.
131st St., Cleveland, O.

CHUCKS (Automatic Closing)
Tomkins-Johnson Co., 611 N.
Mechanic St., Jackson, Mich.

CLAMPS (Drop Forged)
Williams, J. H., & Co.,
400 Vulcan St., Buffalo, N. Y.

CLEANING EQUIPMENT (Metal)
Detroit Rex Products Co.,
13029 Hillview Ave.,
Detroit, Mich.

CLEANING SPECIALTIES
American Chemical Paint Co.,
Dept. 310, Ambler, Pa.
Cowles Detergent Co., The,
Heavy Chemical Div.,
7018 Euclid Ave., Cleveland, O.
Detroit Rex Products Co.,
13029 Hillview Ave.,
Detroit, Mich.
Pennsylvania Salt Mfg. Co.,
Dept. E., Pennsalt Cleaner Div.,
Philadelphia, Pa.

CLIPS (Packaging)
Consumer's Steel Products,
6454 E. McNichols Rd.,
Detroit, Mich.

CLUTCHES (Friction)
Jones, W. A. Fdry. & Mach. Co.,
4437 Roosevelt Rd., Chicago, Ill.

CLUTCHES (Magnetic)
Cutler-Hammer, Inc., 1267 St. Paul
Ave., Milwaukee, Wis.
Dings Magnetic Separator Co.,
663 Smith St., Milwaukee, Wis.

COAL OR COKE
Atlas Wood Steel Co.,
Conshohocken, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Cleveland-Cliffs Iron Co., Union
Commerce Bldg., Cleveland, O.
Columbia Steel Co.,
San Francisco, Calif.
Hanna Furnace Corp., The,
Ecorse, Detroit, Mich.
Koppers Co., Gas & Coke Div.,
300 Koppers Bldg.,
Pittsburgh, Pa.
Koppers Coal Co., 300 Koppers
Bldg., Pittsburgh, Pa.
New England Coal & Coke Co.,
Boston, Mass.
Shenango Furnace Co.,
Oliver Bldg., Pittsburgh, Pa.
Syder, W. F., Co.,
Oliver Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.
Youngstown Sheet & Tube Co., The
Youngstown, O.

**COAL, COKE, ORE AND ASH
HANDLING MACHINERY**
Atlas Car & Mfg. Co., The,
1140 Ivanhoe Rd., Cleveland, O.
Hagan, Geo. J., Co., 2400 E.
Carson St., Pittsburgh, Pa.
Industrial Brownholst Corp.,
Bay City, Mich.
Koppers Co., Engineering & Con-
struction Div., 901 Koppers
Bldg., Pittsburgh, Pa.
Koppers-Rheolaveur Co., 300 Kop-
pers Bldg., Pittsburgh, Pa.
Link-Belt Co., 300 W. Pershing Rd.,
Chicago, Ill.

If you use Springs . . .
RAYMOND can make them!



NEED A NEW SPRING? **Ask Raymond!**

RAYMOND SPRINGS
DIVISION OF ASSOCIATED SPRING CORPORATION
RAYMOND MFG. CO., CORRY, PA.

EUREKA FIRE BRICK WORKS

1100 B. F. Jones Law Bldg. PITTSBURGH, PA. AT 0642-0613

Patent Covered Hot Tops and Bottom Plugs
for Ingot Molds for Alloy Steels

High Grade Clay and Fire Brick for Furnaces, Boilers, Cupolas,
Coke Ovens, etc. Edg. Pressed Brick for accurate sizing.

Difficult Shapes a Specialty

Works: Mt. Braddock, Fayette Co., Pa. Dunbar, Pa.—2581

H. A. BRASSERT & COMPANY

Consulting Engineers
for IRON, STEEL, FUEL and
HEAVY METALLURGICAL
INDUSTRIES . . .

First Nat'l. Bank Bldg. 60 E. 42nd St. 310 S. Michigan Ave
PITTSBURGH NEW YORK CHICAGO

NO MORE LOOSE FASTENINGS

. . . when ordinary nuts are replaced
with Stop Nuts. Widely used on mechani-
cal and electrical equipment . . . for safety
and economy.



Catalog contains a graphic explanation
of the Elastic Stop principle, presents
test and application data, and lists the
complete line of nuts • Write for a copy.

ELASTIC STOP NUT CORPORATION
2340A VAUXHALL ROAD • UNION, NEW JERSEY



Elastic Stop SELF-LOCKING
NUTS

» » » **WHERE-TO-BUY** « « «

- DIES (Cast)**
 Farrel-Birmingham Co., Inc.,
 110 Main St., Ansonia, Conn.
 322 Vulcan St., Buffalo, N. Y.
 Forgings & Castings Corp.,
 1350 Jarvis St., Ferndale, Mich.
- DIES (Punching, Stamping, Blanking)**
 Columbus Die, Tool & Mach. Co.,
 955 Cleveland Ave.,
 Columbus, O.
 Niagara Machine & Tool Works,
 637-697 Northland Ave., Buffalo,
 N. Y.
 Zeh & Hahnemann Co., 56 Ave-
 nue A, Newark, N. J.
- DOLOMITE—FLUX AND REFRACTORIES**
 Basic Dolomite, Inc.,
 Hanna Bldg., Cleveland, O.
- DOORS & SHUTTERS (Steel, Fire, and Rolling)**
 Kinneer Mfg. Co., 1780-1800 Fields
 Ave., Columbus, O.
- DRAGLINES (Crawler)**
 Northwest Engineering Co.,
 28 E. Jackson Blvd.,
 Chicago, Ill.
- DRAFT GAGES (Indicating, Recording)**
 Hays Corp., The, 960 Eighth Ave.,
 Michigan City, Ind.
- DRAFTING ROOM EQUIPMENT**
 Pease, C. F., Co., The, 2688 W.
 Irving Park Blvd., Chicago, Ill.
- DRILL HEADS (Multiple)**
 Es-Cel-O Corp., 1223 Oakman
 Bldg., Detroit, Mich.
- DRILL RODS—See RODS (Drill)**
- DRILLING MACHINES (Radial)**
 Cleveland Punch & Shear Works
 Co., The, 3917 St. Clair Ave.,
 Cleveland, O.
- DRILLS (Twist)—See TWIST DRILLS**
- DRIVES (Chain)**
 Chain Belt Co., 1660 W. Bruce St.,
 Milwaukee, Wis.
 Link-Belt Co., 220 S. Belmont Ave.,
 Indianapolis, Ind.
 Simonds Gear & Mfg. Co., The,
 25th St., Pittsburgh, Pa.
- DRIVES (Cut Herringbone Gear)**
 Farrel-Birmingham Co., Inc.,
 110 Main St., Ansonia, Conn.
 322 Vulcan St., Buffalo, N. Y.
 Horsburgh & Scott Co., The,
 5112 Hamilton Ave., Cleveland, O.
 Lewis Foundry & Machine Div. of
 Blaw-Knox Co., Pittsburgh, Pa.
 Mackintosh-Hemphill Co., 9th and
 Bingham Sts., Pittsburgh, Pa.
 Mesta Machine Co.,
 P. O. Box 1466, Pittsburgh, Pa.
 United Engineering & Fdry Co.,
 First National Bank Bldg.,
 Pittsburgh, Pa.
- DRIVES (Multi-V-Belt)**
 Allis-Chalmers Mfg. Co.,
 Milwaukee, Wis.
- DRIVES (Reciprocating)**
 Ajax Flexible Coupling Co.,
 4 English St., Westfield, N. Y.
- DRUMS (Steel)**
 Petroleum Iron Works Co.,
 Sharon, Pa.
 Pressed Steel Tank Co.,
 1461 So. 66th St., Milwaukee, Wis.
- DRYERS (Compressed Air)**
 Ruemelin Mfg. Co., 3860 N. Palmer
 St., Milwaukee, Wis.
- DRYERS (Rotary)**
 Link-Belt Co., 300 W. Pershing
 Rd., Chicago, Ill.
- DUST ARRESTING EQUIPMENT**
 Kirk & Blum Mfg. Co., The,
 2838 Spring Grove Ave.,
 Cincinnati, O.
 Panborn Corp., Hagerstown, Md.
 Ruemelin Mfg. Co., 3860 N. Palmer
 St., Milwaukee, Wis.
- ECONOMIC SERVICE**
 Brookmire Corp.,
 551 Fifth Ave., New York City.
- ECONOMIZERS**
 Babcock & Wilcox Co., The,
 Refractories Div., 85 Liberty St.,
 New York City.
- ELECTRIC WELDING—See WELDING**
- ELECTRIC WIRING—See WIRE AND CABLE**
- ELECTRICAL EQUIPMENT**
 Allen-Bradley Co., 1320 So. Second
 St., Milwaukee, Wis.
- Allis-Chalmers Mfg. Co.**
 Milwaukee, Wis.
 Electric Controller & Mfg. Co.,
 2698 E. 79th St., Cleveland, O.
 General Electric Co.,
 Schenectady, N. Y.
 Graybar Electric Co. Graybar
 Bldg., New York City.
- ELECTRODES (Carbon and Graphite)**
 National Carbon Co., W. 117th St.
 at Madison Ave., Cleveland, O.
- ELEVATING AND CONVEYING MACHINERY—See CONVEYORS**
- ENGINEERS AND CONTRACTORS**
 Atlas Car & Mfg. Co., The,
 1140 Ivanhoe Rd., Cleveland, O.
 Brassert, H. A., & Co.,
 1st National Bank Bldg.,
 Pittsburgh, Pa.
 McKee, Arthur G., & Co.,
 2422 Euclid Ave., Cleveland, O.
 Morgan Engineering Co., The,
 Alliance, O.
 Pennsylvania Industrial Engineers,
 2413 W. Magnolia St.,
 Pittsburgh, Pa.
 Swindell-Dressler Corp., P. O. Box
 1888, Pittsburgh, Pa.
 Wean Engineering Co., Warren, O.
- ENGINEERS (Consulting)**
 Brassert, H. A., & Co.,
 1st National Bank Bldg.,
 Pittsburgh, Pa.
 Koppers Co., Engineering and Con-
 struction Div., 901 Koppers
 Bldg., Pittsburgh, Pa.
 Lindemuth, Lewis B.,
 140 Cedar St., New York City.
 Loftus Engineering Corp.,
 509 Oliver Bldg., Pittsburgh, Pa.
 McKee, Arthur G., & Co.,
 2422 Euclid Ave., Cleveland, O.
 Wean Engineering Co., Warren, O.
- ENGINES (Diesel)**
 Cooper-Bessemer Corp.,
 Mt. Vernon, O.
- ENGINES (Gas, Oil)**
 Fairbanks, Morse & Co., Dept. 96,
 600 So. Michigan Ave.,
 Chicago, Ill.
 Worthington Pump & Machinery
 Corp., Harrison, N. J.
- ENGINES (Steam)**
 Oil Well Supply Co., Dallas, Texas.
- EXCAVATORS**
 Northwest Engineering Co.,
 28 E. Jackson Blvd.,
 Chicago, Ill.
- FANS (Crane Cab)**
 Graybar Electric Co., Graybar
 Bldg., New York City.
 Trufo Fan Co., 600 Mercer St.,
 Harmony, Pa.
- FANS (Exhaust Ventilating)**
 Graybar Electric Co., Graybar
 Bldg., New York City.
 Kirk & Blum Mfg. Co., The,
 2838 Spring Grove Ave.,
 Cincinnati, O.
 Sturtevant, B. F., Co.,
 Hyde Park, Boston, Mass.
 Trufo Fan Co., 600 Mercer St.,
 Harmony, Pa.
- FANS (High Temperature)**
 Garden City Fan Co., 332 S. Michi-
 gan Ave., Chicago, Ill.
- FANS (Portable)**
 Graybar Electric Co., Graybar
 Bldg., New York City.
 Perkins, B. F., & Son, Inc.,
 Holyoke, Mass.
 Trufo Fan Co., 600 Mercer St.,
 Harmony, Pa.
- FANS (Wall)**
 Graybar Electric Co., 420 Lexing-
 ton Ave., New York City.
 Trufo Fan Co., 600 Mercer St.,
 Harmony, Pa.
- FENCE (Chain Link)**
 Cyclone Fence Co., Waukegan, Ill.
 Page Steel & Wire Div. of Ameri-
 can Chain & Cable Co., Inc.,
 Monessen, Pa.
- FENCING (Wire)**
 American Steel & Wire Co.,
 Rockefeller Bldg., Cleveland, O.
 Bethlehem Steel Co.,
 Bethlehem, Pa.
 Carnegie-Illinois Steel Corp.,
 Pittsburgh-Chicago.
 Columbia Steel Co.,
 San Francisco, Calif.
 Jones & Laughlin Steel Corp.,
 Jones & Laughlin Bldg.,
 Pittsburgh, Pa.
 Pittsburgh Steel Co.,
 1643 Grant Bldg., Pittsburgh, Pa.
- FENCING (Wire) Con.**
 Tennessee Coal, Iron & Railroad Co.,
 Brown-Marx Bldg.,
 Birmingham, Ala.
- FERROALLOY (Briquets)**
 Electro Metallurgical Sales Corp.,
 30 E. 42nd St., New York City.
- FERROALLOYS**
 Cleveland-Cliffs Iron Co., Union
 Commerce Bldg., Cleveland, O.
 Electro Metallurgical Sales Corp.,
 30 E. 42nd St., New York City.
 International Nickel Co., Inc., The,
 67 Wall St., New York City.
 Ohio Ferro-Alloys Corp.,
 Citizens Bldg., Canton, O.
 Titanium Alloy Mfg. Co., The,
 Niagara Falls, N. Y.
- FERROCHROME**
 Electro Metallurgical Sales Corp.,
 30 E. 42nd St., New York City.
 Ohio Ferro-Alloys Corp.,
 Citizens Bldg., Canton, O.
 Samuel, Frank & Co., Inc.,
 Harrison Bldg., Philadelphia, Pa.
- FERROMANGANESE**
 Bethlehem Steel Co.,
 Bethlehem, Pa.
 Carnegie-Illinois Steel Corp.,
 Pittsburgh-Chicago.
 Electro Metallurgical Sales Corp.,
 30 E. 42nd St., New York City.
 Jones & Laughlin Steel Corp.,
 Jones & Laughlin Bldg.,
 Pittsburgh, Pa.
 Ohio Ferro-Alloys Corp.,
 Citizens Bldg., Canton, O.
 Samuel, Frank & Co., Inc.,
 Harrison Bldg., Philadelphia, Pa.
- FERROPHOSPHORUS**
 Samuel, Frank & Co., Inc.,
 Harrison Bldg., Philadelphia, Pa.
- FERROSILICON**
 Electro Metallurgical Sales Corp.,
 30 E. 42nd St., New York City.
 Ohio Ferro-Alloys Corp.,
 Citizens Bldg., Canton, O.
 Samuel, Frank & Co., Inc.,
 Harrison Bldg., Philadelphia, Pa.
 Southern Ferro Alloys Co.,
 2108 Chestnut St., Chattanooga,
 Tenn.
- FERROTITANIUM**
 Titanium Alloy Mfg. Co., The,
 Niagara Falls, N. Y.
- FERROVANADIUM**
 Electro Metallurgical Sales Corp.,
 30 E. 42nd St., New York City.
- FILES AND RASPS**
 Simonds Saw & Steel Co.,
 Fitchburg, Mass.
- FILING CABINETS (Blueprint, Drawing and Tracing)**
 Pease, C. F., Co., The, 2688 W.
 Irving Park Blvd., Chicago, Ill.
- FILTER CLOTH (Asbestos)**
 Johns-Manville Corp.,
 22 E. 40th St., New York City.
- FIRE CLAY—See REFRACTORIES**
- FIRE DOORS & SHUTTERS—See DOORS & SHUTTERS**
- FITTINGS (Electric Steel)**
 Reading-Pratt & Cady Div. of
 American Chain & Cable Co.,
 Inc., Bridgeport, Conn.
- FLAME HARDENING**
 Air Reduction, 60 E. 42nd St.,
 New York City.
 Lindo Air Products Co., 30 E.
 42nd St., New York City.
 National-Erie Corp., Erie, Pa.
- FLANGES (Welded Steel)**
 King Fifth Wheel Co., 5027 Beau-
 mont Ave., Philadelphia, Pa.
- FLOOR RESURFACING**
 Flexrock Co., 2330 Manning St.,
 Philadelphia, Pa.
 United Maintenance Sales Co.,
 311 Ross St., Pittsburgh, Pa.
- FLOORING (Monolithic)**
 Carey, Philip Co., The, Dept. 71,
 Lockland, Cincinnati, O.
 Johns-Manville Corp.,
 22 E. 40th St., New York City.
- FLOORING (Steel)**
 Alan Wood Steel Co.,
 Conshohocken, Pa.
 Blaw-Knox Co., Blawnox, Pa.
 Carnegie-Illinois Steel Corp.,
 Pittsburgh-Chicago.
 Columbia Steel Co.,
 San Francisco, Calif.
 Dravo Corp. (Machinery Div.),
 300 Penn Ave., Pittsburgh, Pa.
 Inland Steel Co.,
 38 So. Dearborn St., Chicago, Ill.
 Republic Steel Corp.,
 Dept. ST, Cleveland, O.
 Ryerson, Jns. T. & Son, Inc.,
 16th & Rockwell Sts., Chicago, Ill.
- Tri-Lok Co., 5515 Butler St.,
 Pittsburgh, Pa.**
- FLUE DUST CONDITIONERS**
 Brosius, Edgar E., Inc.,
 Sharpsburg Branch,
 Pittsburgh, Pa.
- FLUE GAS ANALYZERS**
 Hays Corp., The, 960 Eighth Ave.,
 Michigan City, Ind.
- FLUORSPAR**
 Hillside Fluor Spar Mines, 33 S.
 Dearborn St., Chicago, Ill.
 Samuel, Frank & Co., Inc.,
 Harrison Bldg., Philadelphia, Pa.
- FLUXES (Soldering, Welding & Tinning)**
 American Chemical Paint Co.,
 Dept. 310, Ambler, Pa.
 Kester Solder Co., 4222 Wright-
 wood Ave., Chicago, Ill.
- FORGING BILLETS—See BILLETS**
- FORGING MACHINERY**
 Ajax Manufacturing Co.,
 1441 Chardon Rd., Cleveland, O.
 Alliance Machine Co., The,
 Alliance, O.
 Erie Foundry Co., Erie, Pa.
 Industrial Brownhoist Corp.,
 Bay City, Mich.
 Morgan Engineering Co., The,
 Alliance, O.
 National Machinery Co., The,
 Tiffin, O.
- FORGING ROLLS**
 Ajax Manufacturing Co.,
 1441 Chardon Rd., Cleveland, O.
- FORGINGS (Brass, Bronze, Copper)**
 American Brass Co., The,
 Waterbury, Conn.
 Ampco Metal, Inc., Dept. S-129,
 3830 W. Burnham St.,
 Milwaukee, Wis.
 Bridgeport Brass Co.,
 Bridgeport, Conn.
- FORGINGS (Drop)**
 (*Also Stainless)
 American Forge Div. of The Ameri-
 can Brake Shoe & Fdry Co.,
 2621 So. Hoyne Ave., Chicago, Ill.
 *Atlas Drop Forge Co.,
 Lansing, Mich.
 *Bethlehem Steel Co.,
 Bethlehem, Pa.
 Oil Well Supply Co., Dallas, Texas.
 Williams, J. H., & Co.,
 400 Vulcan St., Buffalo, N. Y.
- FORGINGS (Hollow Bored)**
 Atlas Drop Forge Co.,
 Lansing, Mich.
 Bay City Forge Co., W. 19th and
 Cranberry Sts., Erie, Pa.
 National Forge & Ordnance Co.,
 Irvine, Warren Co., Pa.
- FORGINGS (Iron and Steel)**
 (*Also Stainless)
 American Forge Div. of American
 Brake Shoe & Fdry Co., The,
 2621 S. Hoyne Ave., Chicago, Ill.
 *Atlas Drop Forge Co.,
 Lansing, Mich.
 Bay City Forge Co., W. 19th and
 Cranberry Sts., Erie, Pa.
 Bethlehem Steel Co.,
 Bethlehem, Pa.
 Carnegie-Illinois Steel Corp.,
 Pittsburgh-Chicago.
 Columbia Steel Co.,
 San Francisco, Calif.
 Forgings & Castings Corp.,
 1350 Jarvis St., Ferndale, Mich.
 Heppenstall Co.,
 47th & Hatfield Sts.,
 Pittsburgh, Pa.
 Mesta Machine Co.,
 P. O. Box 1466, Pittsburgh, Pa.
 *Midvale Co., The,
 Nicetown, Philadelphia, Pa.
 National Forge & Ordnance Co.,
 Irvine, Warren Co., Pa.
 Oil Well Supply Co., Dallas, Texas.
 Standard Steel Works Co.,
 Paschall P. O., Philadelphia, Pa.
 Tennessee Coal, Iron & Railroad
 Co., Brown-Marx Bldg., Birming-
 ham, Ala.
 Williams, J. H., & Co.,
 400 Vulcan St., Buffalo, N. Y.
- FORGINGS (Upset)**
 American Forge Div. of The Ameri-
 can Brake Shoe & Fdry Co., 2621
 So. Hoyne Ave., Chicago, Ill.
 Atlas Drop Forge Co.,
 Lansing, Mich.
 Bethlehem Steel Co.,
 Bethlehem, Pa.
- FROGS AND SWITCHES**
 Atlas Car & Mfg. Co., The,
 1140 Ivanhoe Rd., Cleveland, O.
 Bethlehem Steel Co.,
 Bethlehem, Pa.
 Carnegie-Illinois Steel Corp.,
 Pittsburgh-Chicago.

FURNACE INSULATION—See INSULATION**FURNACES (Blast)**

Brassert, H. A., & Co.,
1st National Bank Bldg.,
Pittsburgh, Pa.
McKee, Arthur G., & Co.,
2422 Euclid Ave., Cleveland, O.

FURNACES (Brazing)

Hevil Duty Electric Co., 4100 W.
Highland Blvd., Milwaukee, Wis.

FURNACES (Electric Heating)

Ajax Electrothermic Corp.,
Ajax Park Trenton, N. J.
Electric Furnace Co., The,
Salem, O.
General Electric Co.,
Schenectady, N. Y.
Hagan, Geo. J., Co.,
2400 E. Carson St., Pittsburgh, Pa.
Hevl Duty Electric Co., 4100 W.
Highland Blvd., Milwaukee, Wis.
Pittsburgh Lectromelt Furnace Corp.,
P. O. Box 1257, Pittsburgh, Pa.
Salem Engineering Co.,
714 So. Broadway, Salem, O.
Swindell-Dressler Corp., P. O. Box
1888, Pittsburgh, Pa.
Westinghouse Electric & Mfg. Co.,
Dept. 7-N, East Pittsburgh, Pa.

FURNACES (Electric Melting)

Ajax Electrothermic Corp.,
Ajax Park, Trenton, N. J.
American Bridge Co.,
Frick Bldg., Pittsburgh, Pa.
General Electric Co.,
Schenectady, N. Y.
Pittsburgh Lectromelt Furnace Corp.,
P. O. Box 1257, Pittsburgh, Pa.
Swindell-Dressler Corp., P. O. Box
1888, Pittsburgh, Pa.

FURNACES (Forging)

Ajax Electrothermic Corp.,
Ajax Park, Trenton, N. J.
Amsler-Morton Co., The,
Fulton Bldg., Pittsburgh, Pa.
Electric Furnace Co., The,
Salem, O.
Hagan, Geo. J., Co.,
2400 E. Carson St.,
Pittsburgh, Pa.
Pennsylvania Industrial Engineers,
2413 W. Magnolia St.,
Pittsburgh, Pa.
Salem Engineering Co.,
714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago
Flexible Shaft Co., 1106 So.
Central Ave., Chicago, Ill.
Surface Combustion Corp.,
2375 Dorr St., Toledo, O.

FURNACES (Galvanizing)

Salem Engineering Co.,
714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago
Flexible Shaft Co., 1106 So.
Central Ave., Chicago, Ill.

FURNACES (Gas or Oil)

Electric Furnace Co., The,
Salem, O.
Hagan, Geo. J., Co., 2400 E. Car-
son St., Pittsburgh, Pa.
Pennsylvania Industrial Engineers,
2413 W. Magnolia St.,
Pittsburgh, Pa.
Salem Engineering Co.,
714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago
Flexible Shaft Co., 1106 So.
Central Ave., Chicago, Ill.
Surface Combustion Corp.,
2375 Dorr St., Toledo, O.

FURNACES (Heat Treating, Annealing, Carburizing, Hardening, Tempering)

Ajax Electrothermic Corp.,
Ajax Park, Trenton, N. J.
American Gas Furnace Co.,
Elizabeth, N. J.
Amsler-Morton Co., The,
Fulton Bldg., Pittsburgh, Pa.
Carborundum Co., The,
Perth Amboy, N. J.
Electric Furnace Co., The,
Salem, O.
General Electric Co.,
Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Car-
son St., Pittsburgh, Pa.
Hevl Duty Electric Co., 4100 W.
Highland Blvd., Milwaukee, Wis.
Kemp, C. M., Mfg. Co., 405 E.
Oliver St., Baltimore, Md.
Leeds & Northrup Co., 4957 Sienton
Ave., Philadelphia, Pa.
Pennsylvania Industrial Engineers,
2413 W. Magnolia St.,
Pittsburgh, Pa.
Salem Engineering Co.,
714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago
Flexible Shaft Co., 1106 So.
Central Ave., Chicago, Ill.

Surface Combustion Corp.,
2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box
1888, Pittsburgh, Pa.
Wean Engineering Co., Warren, O.
Westinghouse Electric & Mfg. Co.,
Dept. 7-N, East Pittsburgh, Pa.
Wilson, Lee, Engineering Co.,
1370 Blount St., Cleveland, O.

FURNACES (Laboratory)

Ajax Electrothermic Corp.,
Ajax Park, Trenton, N. J.
Hevl Duty Electric Co., 4100 W.
Highland Blvd., Milwaukee, Wis.

FURNACES (Non-Ferrous Melting)

Ajax Electrothermic Corp.,
Ajax Park, Trenton, N. J.

FURNACES (Open Hearth)

Amsler-Morton Co., The,
Fulton Bldg., Pittsburgh, Pa.
Brassert, H. A., & Co.,
1st National Bank Bldg.,
Pittsburgh, Pa.
Criswell, James, Co.,
Keenan Bldg., Pittsburgh, Pa.
Lindemuth, Lewis B.,
140 Cedar St., New York City.
McKee, Arthur G., & Co.,
2422 Euclid Ave., Cleveland, O.

FURNACES (Recuperative)

Electric Furnace Co., The,
Salem, O.
Hagan, Geo. J., Co., 2400 E. Car-
son St., Pittsburgh, Pa.
Salem Engineering Co.,
714 So. Broadway, Salem, O.
Surface Combustion Corp.,
2375 Dorr St., Toledo, O.

FURNACES (Rivet Heating)

Ajax Electrothermic Corp.,
Ajax Park, Trenton, N. J.
Hagan, Geo. J., Co., 2400 E. Carson
St., Pittsburgh, Pa.
Salem Engineering Co., 714 So.
Broadway, Salem, O.
Surface Combustion Corp.,
2375 Dorr St., Toledo, O.

FURNACES (Sheet and Tin Mill)

Electric Furnace Co., The,
Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson
St., Pittsburgh, Pa.
Kemp, C. M., Mfg. Co., 405 E.
Oliver St., Baltimore, Md.
Pennsylvania Industrial Engineers,
2413 W. Magnolia St.,
Pittsburgh, Pa.
Salem Engineering Co.,
714 So. Broadway, Salem, O.
Surface Combustion Corp.,
2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co.,
1370 Blount St., Cleveland, O.

FURNACES (Steel Mill)

Ajax Electrothermic Corp.,
Ajax Park, Trenton, N. J.
Criswell, James, Co.,
Keenan Bldg., Pittsburgh, Pa.
Electric Furnace Co., The,
Salem, O.
General Electric Co.,
Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson
St., Pittsburgh, Pa.
Kemp, C. M., Mfg. Co., 405 E.
Oliver St., Baltimore, Md.
Pennsylvania Industrial Engineers,
2413 W. Magnolia St.,
Pittsburgh, Pa.
Salem Engineering Co.,
714 So. Broadway, Salem, O.
Surface Combustion Corp.,
2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box
1888, Pittsburgh, Pa.
Wilson, Lee, Engineering Co.,
1370 Blount St., Cleveland, O.

GAGE BLOCKS

Dearborn Gage Co.,
22036 Beech St., Dearborn, Mich.

GAGES

Brown & Sharpe Mfg. Co.,
Providence, R. I.
Greenfield Tap & Die Corp.,
Greenfield, Mass.
McKenna Metals Co.,
200 Lloyd Ave., Latrobe, Pa.
Sheffield Gage Corp.,
1517 E. Third St., Dayton, O.

GAGES (Indicating and Recording)

General Electric Co.,
Schenectady, N. Y.
Sheffield Gage Corp.,
1517 E. Third St., Dayton, O.

GALVANIZING (Hot Dip)

Acme Galvanizing, Inc.,
Milwaukee, Wis.
Acme Steel & Malleable Iron
Works, Buffalo, N. Y.
American Hot Dip Galvanizers
Assoc., Inc., 903 American Bank
Bldg., Pittsburgh, Pa.
American Tinning & Galvanizing
Co., Erie, Pa.
Atlantic Steel Co., Atlanta, Ga.
Buffalo Galvanizing & Tinning
Works, Inc., Buffalo, N. Y.
Cattle, Jos. P., & Bros., Gaul and
Liberty Sts., Philadelphia, Pa.
Commercial Metals Treating, Inc.,
Toledo, O.
Diamond Expansion Bolt Co., Inc.,
Garwood, N. J.
Fanner Mfg. Co., The,
Cleveland, O.
John Finn Metal Works,
San Francisco, Calif.
Gregory, Thomas, Galvanizing
Works, Maspeth, N. Y.
Hanlon-Gregory Galvanizing Co.,
5515 Butler St., Pittsburgh, Pa.
Hubbard & Co., Oakland, Calif.
Independent Galvanizing Co.,
Newark, N. J.
International Stacey Corp.,
Columbus, O.
Isaacson Iron Works, Seattle, Wash.
Joslyn Co. of California,
Los Angeles, Calif.
Joslyn Mfg. & Supply Co.,
Chicago, Ill.
Koven, L. O., & Bro., Inc.,
Jersey City, N. J.
Lehigh Structural Steel Co.,
Allentown, Pa.
Lewis Bolt & Nut Co.,
Minneapolis, Minn.
Missouri Rolling Mill Corp.,
St. Louis, Mo.
National Telephone Supply Co.,
The, Cleveland, O.
Riverside Foundry & Galvanizing
Co., Kalamazoo, Mich.
San Francisco Galvanizing Works,
San Francisco, Calif.
Sanitary Tinning Co., The,
Cleveland, O.
Standard Galvanizing Co.,
Chicago, Ill.
Wilcox, Crittenden & Co., Inc.,
Middletown, Conn.
Witt Cornice Co., The,
Cincinnati, O.

GALVANIZING PLANTS FOR SHEETS

Erie Foundry Co., Erie, Pa.
Wean Engineering Co., Warren, O.

GAS HOLDERS

Bartlett-Hayward Div., Kop-
pers Co., Baltimore, Md.
Bethlehem Steel Co.,
Bethlehem, Pa.
Petroleum Iron Works Co.,
Sharon, Pa.
Western Gas Div., Koppers Co.,
Fort Wayne, Ind.

GAS PRODUCER PLANTS

Koppers Co., Engineering and Con-
struction Div., 901 Koppers
Bldg., Pittsburgh, Pa.
Morgan Construction Co.,
Worcester, Mass.
Wood, R. D. Co., 400 Chestnut
St., Philadelphia, Pa.

GAS RECOVERY COKE OVEN AND GAS PLANTS

Bartlett-Hayward Div., Kop-
pers Co., Baltimore, Md.
Koppers Co., Engineering and Con-
struction Div., 901 Koppers
Bldg., Pittsburgh, Pa.

GAS SCRUBBERS

Bartlett-Hayward Div., Kop-
pers Co., Baltimore, Md.
Prassert, H. A., & Co.,
1st National Bank Bldg.,
Pittsburgh, Pa.
Western Gas Div., Koppers Co.,
Fort Wayne, Ind.

GASKETS (Asbestos, Metal or Rubber)

Garlock Packing Co., The,
S 3-40, Palmyra, N. Y.
Johns-Manville Corp.,
22 E. 40th St., New York City.

GEAR BLANKS

Ampco Metal, Inc., Dept. S-129,
3330 W. Burnham St.,
Milwaukee, Wis.
Bay City Forge Co., W. 19th and
Cranberry Sts., Erie, Pa.
Bethlehem Steel Co.,
Bethlehem, Pa.
King Fifth Wheel Co., 5027 Beau-
mont Ave., Philadelphia, Pa.
National-Erie Corp., Erie, Pa.
Standard Steel Works Div. of The
Baldwin Locomotive Works,
Philadelphia, Pa.
Waldron, John, Corp.,
New Brunswick, N. J.

GEAR MACHINERY (Generating)

Farrrel-Birmingham Co., Inc.,
110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
National Broach & Machine Co.,
5600 St. Jean, Detroit, Mich.

GEAR MACHINERY (Lapping, Finishing, Checking)

Michigan Tool Co., 7171 E.
McNichols Rd.,
Detroit, Mich.

GEARS (Non-Metallic)

Abart Gear & Machine Co.,
4825 W. 16th St., Chicago, Ill.
Chicago Rawhide Mfg. Co.,
1308 Elston Ave., Chicago, Ill.
Pittsburgh Gear & Machine Co.,
2680-2700 Smallman St.,
Pittsburgh, Pa.

GEARS (Steel Laminated)

Waldron, John, Corp.,
New Brunswick, N. J.

GEARS (Worm)

Abart Gear & Machine Co.,
4825 W. 16th St., Chicago, Ill.
Cleveland Worm & Gear Co.,
3270 E. 80th St., Cleveland, O.
Horsburgh & Scott Co., The,
5112 Hamilton Ave., Cleveland, O.
Michigan Tool Co.,
7171 E. McNichols Rd.,
Detroit, Mich.
Pittsburgh Gear & Machine Co.,
2680-2700 Smallman St.,
Pittsburgh, Pa.
Simonds Gear & Mfg. Co., The,
25th St., Pittsburgh, Pa.

GEARS AND GEAR CUTTING

Abart Gear & Machine Co.,
4825 W. 16th St., Chicago, Ill.
Farrrel-Birmingham Co., Inc.,
110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
General Electric Co.,
Schenectady, N. Y.
Grant Gear Works,
2nd & B. Sts., Boston, Mass.
Horsburgh & Scott Co., The,
5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co.,
1120 W. Monroe St., Chicago, Ill.
Jones, W. A., Fry, & Mach. Co.,
4437 Roosevelt Rd., Chicago, Ill.
Lewis Foundry & Machine Div. of
Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and
Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466,
Pittsburgh, Pa.
Michigan Tool Co.,
7171 E. McNichols Rd.,
Detroit, Mich.
National-Erie Corp., Erie, Pa.
Pittsburgh Gear & Machine Co.,
2680-2700 Smallman St.,
Pittsburgh, Pa.
Simonds Gear & Mfg. Co.,
25th St., Pittsburgh, Pa.
United Engineering & Fdry. Co.,
First National Bank Bldg.,
Pittsburgh, Pa.

GENERATING SETS

Electric Generator & Motor Co.,
4519 Hamilton Ave., Cleveland, O.
Fairbanks, Morse & Co., Dept. 96,
600 So. Michigan Ave.,
Chicago, Ill.
General Electric Co.,
Schenectady, N. Y.
Harnischfeger Corp., 4411 W. Na-
tional Ave., Milwaukee, Wis.
Reliance Electric & Eng. Co.,
1081 Ivanhoe Rd., Cleveland, O.
Westinghouse Electric & Mfg. Co.,
Dept. 7-N, East Pittsburgh, Pa.

GENERATORS (Acetylene—Portable and Stationary)

The
Linde Air Products Co., The,
30 E. 42nd St., New York City.

GENERATORS (Electric)

Allis-Chalmers Mfg. Co.,
Milwaukee, Wis.
General Electric Co.,
Schenectady, N. Y.
Harnischfeger Corp., 4411 W. Na-
tional Ave., Milwaukee, Wis.
Lincoln Electric Co., The,
Cleveland, O.
Reliance Electric & Eng. Co.,
1081 Ivanhoe Rd., Cleveland, O.
Westinghouse Electric & Mfg. Co.,
Dept. 7-N, East Pittsburgh, Pa.

GRABS—FOR SHEETS, COILS, INGOTS

J-B Engineering Sales Co.,
1743 Orange St., New Haven,
Conn.

GRATING

Blaw-Knox Co., Blawnox, Pa.
Dravo Corp., (Machinery Div.),
300 Penn Ave., Pittsburgh, Pa.
Tri-Lok Co., 5515 Butler St.,
Pittsburgh, Pa.

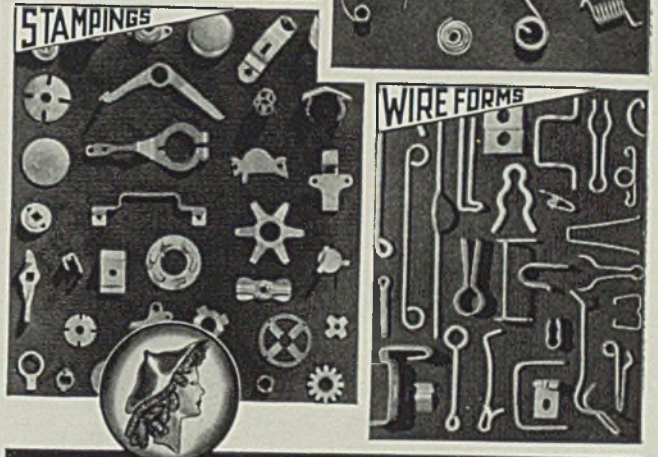
WHERE-TO-BUY

- GREASE (Lubricating)**—See LUBRICANTS (Industrial)
- GREASE RETAINERS AND SEALS**
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.
- GRINDERS (Foundry Core)**
Milwaukee Foundry Equipment Co., 328 W. Pierce St., Milwaukee, Wis.
- GRINDERS (Pedestal, High Speed)**
Sawyer Electrical Mfg. Co., 5715 Leneve St., Los Angeles, Cal.
- GRINDERS (Precision Thread)**
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Jones & Lamson Machine Co., Springfield, Vt.
- GRINDERS (Single Slide Internal)**
Bryant Chucking Grinder Co., Springfield, Vt.
- GRINDERS (Surface)**
Brown & Sharpe Mfg. Co., Providence, R. I.
Hald Machine Co., Worcester, Mass.
Norton Company, Worcester, Mass.
- GRINDERS (Swing Frame)**
Fox Grinders, Inc., Oliver Bldg., Pittsburgh, Pa.
- GRINDER CENTERS**
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.
- GRINDING COMPOUNDS**
Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia, Pa.
- GRINDING MACHINES (Automotive Reconditioning)**
Hald Machine Co., Worcester, Mass.
Landis Tool Company, Waynesboro, Pa.
- GRINDING MACHINES (Centerless, Internal and External)**
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Hald Machine Co., Worcester, Mass.
- GRINDING MACHINES (Chuckling)**
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Hald Machine Co., Worcester, Mass.
Landis Tool Company, Waynesboro, Pa.
- GRINDING MACHINES (Crank Pin, Cam, Piston & Valve)**
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Landis Tool Company, Waynesboro, Pa.
Norton Company, Worcester, Mass.
- GRINDING MACHINES (Oscillating)**
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Landis Tool Company, Waynesboro, Pa.
- GRINDING MACHINES (Plain and Universal)**
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Landis Tool Company, Waynesboro, Pa.
Norton Co., Worcester, Mass.
- GRINDING MACHINES (Roll)**
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Farrel-Birmingham Co., Inc., 119 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Landis Tool Co., Waynesboro, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Norton Co., Worcester, Mass.
- GRINDING MACHINES (Rotary Surface)**
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Hald Machine Co., Worcester, Mass.
- GRINDING MACHINES (Tool and Cutter)**
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
- Kearney & Trecker Corp., 5926 National Ave., Milwaukee, Wis.
Landsis Tool Co., Waynesboro, Pa.
Norton Co., Worcester, Mass.
Sellers, Wm. & Co., Inc., 1622 Hamilton St., Philadelphia, Pa.
- GRINDING MACHINES (Swing Frame)**
Excelsior Tool & Machine Co., Ridge & Jefferson Aves., E. St. Louis, Ill.
- GRINDING (Shear Knife)**
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.
- GRINDING WHEELS**
Abrasive Co., Tacony & Fraley Sts., Philadelphia, Pa.
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Norton Co., Worcester, Mass.
- GRINDING WHEELS (Segmental)**
Abrasive Co., Tacony & Fraley Sts., Philadelphia, Pa.
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Norton Company, Worcester, Mass.
- GUIDE SHOES**
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.
- GUIDES (Mill)**
Ameco Metal, Inc., Dept. S-129, 3830 W. Burnham St., Milwaukee, Wis.
National-Erie Corp., Erie, Pa.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.
- GUNS (Blast Furnace Mud)**
Balley, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc., Sharpshurg Branch, Pittsburgh, Pa.
- GUNS (Steam, Hydraulic, Electric)**
Balley, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc., Sharpshurg Branch, Pittsburgh, Pa.
- HAMMER BUSHINGS**
Steel Conversion & Supply Co., P. O. Box 537 (Castle Shannon), Pittsburgh, Pa.
- HAMMERS (Drop)**
Alliance Machine Co., The, Alliance, O.
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., 119 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
- HAMMERS (Steam)**
Alliance Machine Co., The, Alliance, O.
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
- HANGERS**
Grinnell Co., Inc., Providence, R. I.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
- HANGERS (Shaft)**
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Division, General Motors Sales Corp., Harrison, N. J.
New Departure Div., General Motors Corp., Bristol, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
- HEADING MACHINERY**
Ajax Mfg. Co., 1441 Chardon Rd., Cleveland, O.
National Machinery Co., Tiffin, O.
- HEATERS (Air)**
Airtherm Manufacturing Co., 726 S. Spring Ave., St. Louis, Mo.
Babeock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
- HEATERS (Electric Space)**
Cutler-Hammer, Inc., 1267 St. Paul Ave., Milwaukee, Wis.

MADE TO SOLVE YOUR PROBLEMS

Call on Hubbard's long experience and skill in developing and manufacturing parts like these, to accomplish the results you are after in those various design and production problems.

Send in your drawings, or describe your problem. Your inquiry will bring real assistance and the advantages of long experience.



M. D. Hubbard Spring Company

421 Central Ave., Pontiac, Mich.

ACID AND ALKALI PROOF LININGS AND MORTARS

ACID PROOF CONSTRUCTION

THE CEILCOTE COMPANY

Consulting and Research Engineers

750 ROCKEFELLER BLDG.

CLEVELAND, OHIO

HOBART... the Fastest Selling Arc Welder on the Market.

Improve your product with better welds—
cut your labor costs with Hobart's exclusive Remote Control and 1,000 combinations of welding heat. A **FREE** Complete Line Trial on your own work.

Write for complete line. Ask for 30 Days Complete Line Trial on your own work.

HOBART BROS., Dept. ST-12 Troy, Ohio

HOT DIP GALVANIZING

ENTERPRISE GALVANIZING CO.
2525 E. Cumberland St., Philadelphia, Pa.

STRATEGICALLY LOCATED FOR EXPORT SHIPMENT

GKS WELDED STEEL PARTS.

GKS welded and preformed steel parts, ranging in sizes from small light weight stampings to large heavy steel machine bases, are manufactured according to your specifications. Write today for further information on the manufacture of your duplicate steel parts.

GEORGE KOCH SONS - EVANSVILLE, IND.

- HEATERS (Unit)**
Airtherm Manufacturing Co.,
726 S. Spring Ave., St. Louis, Mo.
Dravo Corp. (Machinery Div.),
300 Penn Ave., Pittsburgh, Pa.
Grinnell Co., Inc., Providence, R. I.
- HEAT TREATING**
Commercial Metals Treating, Inc.,
Toledo, O.
- HELMETS (Blast Cleaning)**
Pangborn Corp., Hagerstown, Md.
- HITCHINGS (Mine Car)**
American Chain & Cable Co., Inc.,
Bridgeport, Conn.
- HOBS**
Brown & Sharpe Mfg. Co.,
Providence, R. I.
Michigan Tool Co.,
7171 E. McNichols Rd.,
Detroit, Mich.
- HOISTS (Chain)**
Ford Chain Block Div. of American
Chain & Cable Co., Inc., 2nd
& Diamond Sts., Philadelphia, Pa.
Wright Mfg. Div. of American
Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co.,
4530 Tacony St., Philadelphia, Pa.
- HOISTS (Electric)**
American Engineering Co.,
2484 Aramingo Ave.,
Philadelphia, Pa.
American MonoRail Co., The,
13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland
Crane & Engineering Co.,
1125 Depot St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National
Ave., Milwaukee, Wis.
Industrial Brownhoist Corp.,
Bay City, Mich.
Northern Engineering Works,
2609 Atwater St., Detroit, Mich.
Shaw-Box Crane & Hoist Div.,
Manning, Maxwell & Moore, Inc.,
406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp.,
358 Schuyler Ave.,
Montour Falls, N. Y.
Wright Mfg. Div. of American
Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co.,
4530 Tacony St., Philadelphia, Pa.
- HOISTS (Monorail)**
American Engineering Co.,
2484 Aramingo Ave.,
Philadelphia, Pa.
American MonoRail Co., The,
13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland
Crane & Engineering Co.,
1125 Depot St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National
Ave., Milwaukee, Wis.
Northern Engineering Works,
2609 Atwater St., Detroit, Mich.
Shaw-Box Crane & Hoist Div.,
Manning, Maxwell & Moore, Inc.,
406 Broadway, Muskegon, Mich.
Shepard-Niles Crane & Hoist Corp.,
358 Schuyler Ave.,
Montour Falls, N. Y.
Yale & Towne Mfg. Co.,
4530 Tacony St., Philadelphia, Pa.
- HOISTS (Pneumatic)**
Curtis Pneumatic Machinery Co.,
1996 Kienlen Ave., St. Louis, Mo.
Northern Engineering Works,
2609 Atwater St., Detroit, Mich.
- HOOKS (Chain)**
American Chain & Cable Co., Inc.,
Bridgeport, Conn.
- HOOPS AND BANDS**
American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago,
Columbia Steel Co.,
San Francisco, Calif.
Laclede Steel Co., Arcade Bldg.,
St. Louis, Mo.
Ryerson, Jos. T. & Son, Inc.,
16th & Rockwell Sts., Chicago, Ill.
Stanley Works, The,
New Britain, Conn.
Bridgeport, Conn.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.
Youngstown Sheet & Tube Co., The,
Youngstown, O.
- HOSE (Flexible Metal)**
American Metal Hose Branch of
American Brass Co., The,
Waterbury, Conn.
- HUMIDIFIERS (Industrial)**
Grinnell Co., Inc., Providence, R. I.
- HYDRAULIC MACHINERY**
Alliance Machine Co., The,
Alliance, O.
Allis-Chalmers Mfg. Co.,
Milwaukee, Wis.
- Baldwin Southwark Div., Baldwin
Locomotive Works,
Philadelphia, Pa.
Bethlehem Steel Co.,
Bethlehem, Pa.
Chambersburg Engineering Co.,
Chambersburg, Pa.
Elmes, Chas. F., Engineering
Works, 243 N. Morgan St.,
Chicago, Ill.
Farrel-Birmingham Co., Inc.,
110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Hannifin Mfg. Co., 621-631 So. Kol-
mar Ave., Chicago, Ill.
Morgan Engineering Co., The,
Alliance, O.
National-Erie Corp., Erie, Pa.
Schloemann Engineering Corp.,
Empire Bldg., Pittsburgh, Pa.
Wood, R. D., Co., 400 Chestnut St.,
Philadelphia, Pa.
- HYDRAULIC PRESSES—See
PRESSES (Hydraulic)**
- HYDRAULIC UNITS**
Barnes, W. F. & John, Co.,
201 So. Water St., Rockford, Ill.
Ex-Cell-O Corp., 1228 Oakman
Blvd., Detroit, Mich.
- INDICATORS (Temperature)**
Brown Instrument Div. of Min-
neapolis Honeywell Regulator Co.,
4462 Wayne Ave.,
Philadelphia, Pa.
Foxboro Co., The, 118 Neponset
Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton
Ave., Philadelphia, Pa.
- INDICATORS (Blast Furnace
Stock Line)**
Broslus, Edgar E., Inc., Sharp-
sburg Branch, Pittsburgh, Pa.
- INGOT MOLDS**
Bethlehem Steel Co.,
Bethlehem, Pa.
Shenango-Penn Mold Co.,
Oliver Bldg., Pittsburgh, Pa.
Superior Mold & Iron Co., Penn. Pa.
Valley Mould & Iron Corp.,
Hubbard, O.
- INHIBITORS**
American Chemical Paint Co.,
Dept. 310, Ambler, Pa.
- INSTRUMENTS (Electric
Indicating and Recording)**
Brown Instrument Div. of Min-
neapolis Honeywell Regulator
Co., 4462 Wayne Ave.,
Philadelphia, Pa.
Foxboro Co., The, 118 Neponset
Ave., Foxboro, Mass.
General Electric Co.,
Schenectady, N. Y.
Graybar Electric Co., Graybar
Bldg., New York City.
Leeds & Northrup Co., 4957 Stenton
Ave., Philadelphia, Pa.
Westinghouse Electric & Mfg. Co.,
Dept. 7-N, East Pittsburgh, Pa.
- INSULATING BLOCK**
Armstrong Cork Co.,
985 Concord St., Lancaster, Pa.
Illinois Clay Products Co.,
214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp.,
22 E. 40th St., New York City.
- INSULATING BRICK**
Armstrong Cork Co.,
985 Concord St., Lancaster, Pa.
Illinois Clay Products Co.,
214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp.,
22 E. 40th St., New York City.
- INSULATING CONCRETE**
Atlas Lumite Cement Co., Dept.
S-8, Chrysler Bldg.,
New York City.
Illinois Clay Products Co.,
214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th
St., New York City.
- INSULATING POWDER AND
CEMENT**
Ajax Electrothermic Corp.,
Ajax Park, Trenton, N. J.
Armstrong Cork Co.,
985 Concord St., Lancaster, Pa.
Babeock & Wilcox Co., The,
Refractories Div., 85 Liberty St.,
New York City.
Illinois Clay Products Co.,
214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th
St., New York City.
- INSULATION (Building)**
Carey, Philip, Co., The Dept. 71,
Lockland, Cincinnati, O.
Johns-Manville Corp., 22 E. 40th
St., New York City.
- INSULATION (Furnace, Boiler
Settlings, Ovens, Steam Pipe, Etc.)**
Armstrong Cork Co.,
985 Concord St., Lancaster, Pa.
Illinois Clay Products Co.,
214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp.,
22 E. 40th St., New York City.
- IRON (Bar)**
Ryerson, Jos. T. & Son Co.,
16th & Rockwell Sts., Chicago, Ill.
- IRON ORE**
Alan Wood Steel Co.,
Conshohocken, Pa.
Cleveland-Cliffs Iron Co., Union
Commerce Bldg., Cleveland, O.
Hanna Furnace Corp., The,
Ecorse, Detroit, Mich.
Shenango Furnace Co.,
Oliver Bldg., Pittsburgh, Pa.
Snider, W. P. & Co.,
Oliver Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The,
Youngstown, O.
- JIGS AND FIXTURES**
Columbus Die, Tool & Mach. Co.,
955 Cleveland Ave., Columbus, O.
Harnischfeger Corp., 4411 W. National
Ave., Milwaukee, Wis.
- KETTLES (Galvanizing)**
Petroleum Iron Works Co.,
Sharon, Pa.
- KEYS (Machine or Woodruff)**
Moltrup Steel Products Co.,
Beaver Falls, Pa.
- KILNS (Rotary Sintering)**
Smidth, F. L., & Co.,
225 Broadway, New York City.
- KNIVES**
American Shear Knife Co.,
3rd and Ann Sts., Homestead, Pa.
Cowles Tool Co.,
2086 W. 110th St., Cleveland, O.
- LABORATORY WARE**
Norton Company, Worcester, Mass.
- LADLES**
Hollands Mfg. Co.,
342-352 E. 18th St., Erie, Pa.
Petroleum Iron Works Co.,
Sharon, Pa.
- LAMPS (Industrial)**
General Electric Co., Dept. 166-S-L,
Nela Park, Cleveland, O.
- LAPPING MACHINES**
Cincinnati Milling Machine
and Cincinnati Grinders, Inc.,
Oakley Sta., Cincinnati, O.
Ex-Cell-O Corp., 1228 Oakman
Blvd., Detroit, Mich.
National Broach & Machine Co.,
5600 St. Jean, Detroit, Mich.
Norton Company, Worcester, Mass.
- LAPPING PLATES**
Challenge Machinery Co.,
Grand Haven, Mich.
- LARRIES (Coal)**
Atlas Car & Mfg. Co., The,
1140 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co.,
Findlay, O.
- LATHE CENTERS**
McKenna Metals Co.,
200 Lloyd Ave., Latrobe, Pa.
- LATHE DOGS (Drop Forged)**
Williams, J. H., & Co.,
400 Vulcan St., Buffalo, N. Y.
- LATHES**
Jones & Lamson Machine Co.,
Springfield, Vt.
LeBlond, R. K., Machine Tool Co.,
Cincinnati, O.
Monarch Machine Tool Co.,
Sidney, O.
South Bend Lathe Works, 817 E.
Madison St., South Bend, Ind.
Warner & Swasey Co., 5701 Car-
negie Ave., Cleveland, O.
- LATHES (Automatic)**
Brown & Sharpe Mfg. Co.,
Providence, R. I.
Jones & Lamson Machine Co.,
Springfield, Vt.
Monarch Machine Tool Co.,
Sidney, O.
- LATHES (Engine)**
Monarch Machine Tool Co.,
Sidney, O.
South Bend Lathe Works, 817 E.
Madison St., South Bend, Ind.
- LATHES (Roll Turning)**
Continental Roll & Steel Fdry. Co.,
E. Chicago, Ind.
Hyde Park Foundry & Machine Co.,
Hyde Park, Pa.
- Lewis Foundry & Machine Div. of
Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and
Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co.,
P. O. Box 1466, Pittsburgh, Pa.
United Engineering & Fdry. Co.,
First National Bank Bldg.,
Pittsburgh, Pa.
Warner & Swasey Co.,
5701 Carnegie Ave., Cleveland, O.
- LATHES (Railroad Car & Driving
Wheel)**
Sellers, Wm., & Co., Inc.,
1622 Hamilton St.,
Philadelphia, Pa.
- LATHES (Turret)**
Brown & Sharpe Mfg. Co.,
Providence, R. I.
Bullard Company, The,
Bridgeport, Conn.
Jones & Lamson Machine Co.,
Springfield, Vt.
Warner & Swasey Co.,
5701 Carnegie Ave., Cleveland, O.
- LAYOUT SURFACE PLATES**
Challenge Machinery Co.,
Grand Haven, Mich.
- LEAD (Chemical, Corroding,
Desilvered)**
St. Joseph Lead Co.,
250 Park Ave., New York City.
- LEAD (Tellurium)**
National Lead Co.,
111 Broadway, New York City.
- LEVELING MACHINES**
Erie Foundry Co., Erie, Pa.
Hyde Park Foundry & Machine Co.,
Hyde Park, Pa.
McKay Machine Co.,
Youngstown, O.
Mesta Machine Co., P. O. Box 1466,
Pittsburgh, Pa.
Sutton Engineering Co., Park Bldg.,
Pittsburgh, Pa.
Voss, Edward W., 2882 W. Liberty
Ave., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.
- LIFT TRUCKS—See TRUCKS
(Lift)**
- LIFTING MAGNETS—See
MAGNETS (Lifting)**
- LIGHTING (Industrial)**
General Electric Co., Dept. 166-5-1,
Nela Park, Cleveland, O.
Graybar Electric Co., Graybar
Bldg., New York City.
- LINERS (Pump and Cylinder)**
Shenango-Penn Mold Co., Dover, O.
- LOCOMOTIVE CRANES—See
CRANES (Locomotive)**
- LOCOMOTIVES (Diesel-Electric)**
Atlas Car & Mfg. Co., The,
1140 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co.,
Findlay, O.
Plymouth Locomotive Works,
Div. Fate-Root-Heath Co.,
Plymouth, O.
Whitcomb Locomotive Co.,
Rochelle, Ill.
- LOCOMOTIVES (Diesel Mechanical)**
Brookville Locomotive Co.,
Brookville, Pa.
Plymouth Locomotive Works,
Div. Fate-Root-Heath Co.,
Plymouth, O.
Whitcomb Locomotive Co.,
Rochelle, Ill.
- LOCOMOTIVES (Electric Trolley)**
Atlas Car & Mfg. Co., The,
1140 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co.,
Findlay, O.
General Electric Co.,
Schenectady, N. Y.
Whitcomb Locomotive Co.,
Rochelle, Ill.
- LOCOMOTIVES (Gasoline-Electric)**
Atlas Car & Mfg. Co., The,
1140 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co.,
Findlay, O.
General Electric Co.,
Schenectady, N. Y.
Whitcomb Locomotive Co.,
Rochelle, Ill.
- LOCOMOTIVES (Gasoline Me-
chanical)**
Brookville Locomotive Co.,
Brookville, Pa.
Differential Steel Car Co.,
Findlay, O.
Whitcomb Locomotive Co.,
Rochelle, Ill.
- LOCOMOTIVES (Oil-Electric)**
Atlas Car & Mfg. Co., The,
1140 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co.,
Findlay, O.

WHERE - TO - BUY

- LOCOMOTIVES (Storage Battery)**
Atlas Car & Mfg Co., The.
1140 Ivanhoe Rd., Cleveland, O.
General Electric Co.,
Schenectady, N. Y.
Whitcomb Locomotive Co.,
Rochelle, Ill.
- LUBRICANTS (Industrial)**
American Lanolin Corp.,
Railroad St., Lawrence, Mass.
Gulf Oil Corp. of Penna.,
Gulf Refining Co., 3813 Gulf
Bldg., Pittsburgh, Pa.
New York & New Jersey Lubricant
Co., 292 Madison Ave.,
New York City.
Penola, Inc., 34th & Smallman Sts.,
Pittsburgh, Pa.
Pure Oil Co., The.
35 E. Wacker Dr., Chicago, Ill.
Shell Oil Co., Inc.,
50 W. 50th St., New York City.
Socony Vacuum Oil Co., Inc.,
26 Broadway, New York City.
Sun Oil Co., Dept. 1, 1608 Walnut
St., Philadelphia, Pa.
Tide Water Associated Oil Co.,
17 Battery Place, New York City.
- LUBRICATING SYSTEMS**
Farval Corp., The.
370 E. 80th St., Cleveland, O.
- MACHINE WORK**
Continental Roll & Steel Fdry Co.,
E. Chicago, Ind.
Farrel-Birmingham Co., Inc.,
110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Federal Shipbuilding & Dry Dock
Co., Kearney, N. J.
Hyde Park Foundry & Machine Co.,
Hyde Park, Pa.
Lewis Foundry & Machine Div. of
Blaw-Knox Co., Pittsburgh, Pa.
Moran Engineering Co., The.
Alliance, O.
- MACHINERY (Special)**
Alliance Machine Co., The.
Alliance, O.
Atlas-Chalmers Mfg. Co.,
Milwaukee, Wis.
Atlas Car & Mfg. Co., The.
1140 Ivanhoe Rd., Cleveland, O.
Baldwin Southward Div., Baldwin
Locomotive Works,
Philadelphia, Pa.
Barnes, W. F. & John, Co.,
201 So. Water St., Rockford, Ill.
Birdsboro Steel Fdry. & Mach. Co.,
Birdsboro, Pa.
Brosius, Edgar E., Inc., Sharps-
burgh Branch, Pittsburgh, Pa.
Cleveland Punch & Shear Works
Co., The, 3917 St. Clair Ave.,
Cleveland, O.
Columbus Die, Tool & Mach. Co.,
855 Cleveland Ave., Columbus, O.
Continental Roll & Steel Fdry. Co.,
E. Chicago, Ind.
Elmes, Chas. F., Engineering
Works, 243 N. Morgan St.,
Chicago, Ill.
Farrel-Birmingham Co., Inc.,
110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Hannifin Mfg. Co., 621-631 So.
Kolmar Ave., Chicago, Ill.
Lewis Foundry & Machine Div. of
Blaw-Knox Co., Pittsburgh, Pa.
Moran Engineering Co., The.
Alliance, O.
National Broach & Machine Co.,
5600 St. Jean, Detroit, Mich.
National-Erie Corp., Erie, Pa.
National Roll & Fdry. Co., The,
Avonmore, Pa.
Niagara Machine & Tool Works,
637 Northland Ave.,
Buffalo, N. Y.
Oil Well Supply Co., Dallas, Texas.
Sellers, Wm., & Co., Inc.,
1622 Hamilton St.,
Philadelphia, Pa.
Shuster, F. B., Co., The,
New Haven, Conn.
United Engineering & Fdry Co.,
First National Bank Bldg.,
Pittsburgh, Pa.
- MACHINERY (Used & Rebuilt)**
Emerman, Louis E., & Co.,
1761 Elston Ave., Chicago, Ill.
Marr-Galbreath Machinery Co.,
53 Water St., Pittsburgh, Pa.
West Penn Machinery Co.,
1208 House Bldg., Pittsburgh, Pa.
- MAGNESIA (Electrically Fused)**
Norton Co., Worcester, Mass.
- MAGNETIC SEPARATORS—See
SEPARATORS (Magnetic)**
- MAGNETS (Lifting)**
Cutter-Hammer, Inc., 1267 St. Paul
Ave., Milwaukee, Wis.
Dings Magnetic Separator Co.,
663 Smith St., Milwaukee, Wis.
Electric Controller & Mfg. Co.,
2608 E. 79th St., Cleveland, O.
Ohio Electric Mfg. Co., The,
5906 Maurice Ave., Cleveland, O.
- MAGNETS (Separating)**
Dings Magnetic Separator Co.,
663 Smith St., Milwaukee, Wis.
Ohio Electric Mfg. Co., The,
5906 Maurice Ave., Cleveland, O.
- MANDRELS (Expanding)**
Nicholson, W. H., & Co.,
177 Oregon St., Wilkes-Barre, Pa.
- MANGANESE METAL AND
ALLOYS**
Electro Metallurgical Sales Corp.,
30 E. 42nd St., New York City.
- MANGANESE ORE**
Samuel, Frank & Co., Inc., The,
Harrison Bldg., Philadelphia, Pa.
- MANIPULATORS**
Alliance Machine Co., The,
Alliance, O.
Continental Roll & Steel Fdry. Co.,
E. Chicago, Ind.
Morgan Engineering Co., The,
Alliance, O.
- METAL (Perforated)—See
PERFORATED METAL**
- METAL BLAST ABRASIVES
(Shot and Grit)**
American Foundry Equipment Co.,
The, 509 So. Byrkit St., Mishawaka,
Ind.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co.,
4839 Harrison St., Pittsburgh Pa.
- METAL CLEANERS**
American Chemical Paint Co.,
Dept. 310, Ambler, Pa.
Cowles Detergent Co., The,
Heavy Chemical Div.,
7018 Euclid Ave., Cleveland, O.
Pennsylvania Salt Mfg. Co., Dept.
E. Pennsalt Cleaner Div.,
Philadelphia, Pa.
- METAL FINISHES**
American Nickeloid Co.,
1310 Second St., Peru, Ill.
- METAL SPECIALTIES AND
PARTS—See STAMPINGS**
- METAL STAMPINGS—See
STAMPINGS**
- METALS (Nonferrous)**
American Brass Co., The,
Waterbury, Conn.
International Nickel Co., Inc., The,
67 Wall St., New York City.
Titanium Alloy Mfg. Co., The,
Niagara Falls, N. Y.
- MICROMETERS**
Brown & Sharpe Mfg. Co.,
Providence, R. I.
- MILLING CUTTERS**
Brown & Sharpe Mfg. Co.,
Providence, R. I.
Ex-Cell-O Corp., 1228 Oakman
Bldg., Detroit, Mich.
McKenna Metals Co.,
200 Lloyd Ave., Latrobe, Pa.
- MILLING MACHINES**
Brown & Sharpe Mfg. Co.,
Providence, R. I.
Cincinnati Milling Machine
and Cincinnati Grinders Inc.,
Oakley Sta., Cincinnati, O.
Kearney & Trecker Corp., 5926 National
Ave., Milwaukee, Wis.
National Broach & Machine Co.,
5600 St. Jean, Detroit, Mich.
Sellers, Wm., & Co., Inc.,
1622 Hamilton St.,
Philadelphia, Pa.
- MILLING MACHINES (Milling
and Centering Combined)**
Jones & Lamson Machine Co.,
Springfield, Vt.
- MILLS (Blooming, Universal, Plate,
Sheet, Tin, Bar, Strip, Etc.)—See
ROLLING MILL EQUIPMENT**
- MOLDING MACHINERY (Foundry)**
Milwaukee Foundry Equipment Co.,
3238 W. Pierce St.,
Milwaukee, Wis.
- MOLDS (Ingot)—See INGOT
MOLDS**
- MOLYBDENUM**
Climax Molybdenum Co.,
500 Fifth Ave., New York City.
- MONEL METAL (All Commercial
Forms)**
International Nickel Co., Inc., The,
67 Wall St., New York City.
- MONORAIL SYSTEMS**
American MonoRail Co., The,
13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland
Crane & Engineering Co.,
1125 Depot St., Wickliffe, O.
Northern Engineering Works,
2609 Atwater St., Detroit, Mich.
Shepard Niles Crane & Hoist Corp.,
358 Schuyler Ave.,
Montour Falls, N. Y.

RYERSON CERTIFIED STEELS

represent the highest quality obtainable in each class and type of material. All kinds from standard carbon grades to special alloys in stock for immediate shipment. Write for Stock List. Joseph T. Ryerson & Son, Inc. Plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.

RYERSON

BELMONT IRON WORKS
PHILADELPHIA NEW YORK EDDYSTONE

Engineers - Contractors - Exporters
STRUCTURAL STEEL—BUILDINGS & BRIDGES
RIVETED—ARC WELDED
BELMONT INTERLOCKING CHANNEL FLOOR
Write for Catalogue
Main Office—Phila., Pa. New York Office—44 Whitehall St.

FIRTH-STERLING

TOOL STEELS - STAINLESS STEELS - SINTERED CARBIDES
FOR COMPLETE SHOP TOOLING - McKEESPORT, PA.

SUPERIOR STEEL CORPORATION

HOT AND COLD ROLLED STRIP STEEL
AND SUPERIOR STAINLESS STEELS

Successfully serving steel consumers
for almost half a century

EXECUTIVE OFFICES — GRANT BLDG., PITTSBURGH, PA.
GENERAL OFFICES AND WORKS — CARNEGIE, PA.

THE JACKSON IRON & STEEL CO.

MANUFACTURERS OF

"JISCO"

PIG IRON SPECIALTIES

JACKSON, OHIO

Just published . . . new reference book "Handbook of Special Steels—Their Properties, Uses, Fabricators." Write for it!



ALLEGHENY LUDLUM STEEL CORPORATION

OLIVER BUILDING

PITTSBURGH, PA.

Sales Offices and Complete Stocks in all Principal Cities

LOOKING FOR GOOD USED MACHINERY?

Turn to STEEL'S "Used and Rebuilt Equipment" section. Many good values are listed each week.

WHERE-TO-BUY

- PIPE ROLLS (Magnetic)**
Dings Magnetic Separator Co.,
663 Smith St., Milwaukee, Wis.
- PIPE STRAIGHTENING MACHINERY**
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
- PIPE TOOLS**
Greenfield Tap & Die Corp., Greenfield, Mass.
- PIPING CONTRACTORS**
Grinnell Co., Inc., Providence, R. I.
Power Piping Co., Beaver and Western Ave., Pittsburgh, Pa.
- PISTON RINGS**
American Hammered Piston Ring Div., Koppers Co., Baltimore, Md.
- PISTON RODS**
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Heppenstall Co., 47th and Hatfield Sts., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Forge and Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.
- PLANERS AND SHAPERS**
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The 3917 St. Clair Ave., Cleveland, O.
Sellers, Wm., & Co., Inc., 1622 Hamilton St., Philadelphia, Pa.
- PLATE CASTORS**
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.
- PLATES (Sheared or Universal) (Also Stainless)**
*Alan Wood Steel Co., Conshohocken, Pa.
*Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
*American Rolling Mill Co., The 480 Curtis St., Middletown, O.
*Bethlehem Steel Co., Bethlehem, Pa.
*Carnegie-Illinois Steel Corp., Pittsburgh, Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2325 E. Cumberland St., Philadelphia, Pa.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Worth Steel Co., Claymont, Del.
Youngstown Sheet & Tube Co., The Youngstown, O.
- PLATES (Stainless Clad)**
Granite City Steel Co., Granite City, Ill.
- PLATES (Steel-Floor)—See FLOORING (Steel)**
- PLATES (Terne and Tin)—See TIN PLATE**
- PLUGS (Expansion)**
Hubbard, M. D., Spring Co., 421 Central Ave., Pontiac, Mich.
- PLUGS (Rolling Mill)**
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.
- POLES (Tubular Steel)**
National Tube Co., Frick Bldg., Pittsburgh, Pa.
- POLISHING MACHINERY (Tube and Bar)**
Medart Co., The, 3520 de Kalb St., St. Louis, Mo.
- POTS (Case Hardening)**
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
- POTS (Melting)**
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
- PREHEATERS**
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
- PRESSED METAL PARTS**
American Forge Div. of American Brake Shoe & Fdry. Co., The, 2621 S. Hoyne Ave., Chicago, Ill.
Stanley Works, The, Pressed Metal Div., New Britain, Conn.
- PRESSES**
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.
- PRESSES (Bending)**
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.
- PRESSES (Extrusion)**
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.
- PRESSES (Forging)**
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
Erie Foundry Co., Erie, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National Machinery Co., The, Tiffin, O.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
- PRESSES (Forming and Braking)**
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Crane & Engineering Co., The Steelweld Machinery Div., Wickliffe, O.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.
- PRESSES (Hydraulic)**
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Hannliff Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National-Erie Corp., Erie, Pa.
Progressive Welding Co., 3031 E. Outer Drive, Detroit, Mich.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

CHROM-X

REG. TRADE MARK

NEW EXOTHERMIC AGENT FOR ALLOYING STEEL AND IRON WITH CHROMIUM IN OPEN HEARTH OR ELECTRIC FURNACES AND BY LADLE ADDITIONS.

CHROMIUM

MINING AND SMELTING CORPORATION LTD.

700 BANK OF COMMERCE BLDG. HAMILTON, ONTARIO
SMELTER - SAULT STE. MARIE, ONTARIO
CABLE ADDRESS: "SUPERAL"

Stampings and Press Work

10 Gauge and Lighter to 20" x 40"—Hot Pressings
Legs and Base Units for Stoves, Refrigerators and
Institutional Equipment

OIL TEMPERED (Flat) SPRINGS

DAVIS BRAKE BEAM COMPANY

Laurel Ave. & P.R.R.

Johnstown, Pa.

Let Us Send You This New Catalog!

For your files—a listing of available standard Stampings (Washers, Dies, Clips, Holders, and Specialties for which we have dies in the Whitehead plant). Complete with illustrations, specifications, prices.

Send for yours now.

FREE ON REQUEST

WHITEHEAD STAMPING CO.

1667 W. Lafayette Blvd.

Detroit, Mich.



Pickling of Iron and Steel—By Wallace G. Imhoff

This book covers many phases of pickling room practice and construction and maintenance of pickling equipment.

Price Postpaid \$5.15 (25¢d.)

THE PENTON PUBLISHING CO.
Book Department
1213 W. 3rd St. Cleveland, O.

520-S

QUALITY

- Blast Furnace Copper Castings
- Phosphorized Copper
- Roll Neck Bearings
- Hot Metal Ladle Car Bearings
- Housing Nuts
- Locomotive and Car Journal Bearings
- Machinery Castings
- Acid Resisting Castings
- Babbitt Metals

NATIONAL BEARING METALS CORP.

PITTSBURGH, PA.

CLEARING, ILL. (Chicago District) — MEADVILLE, PA.

PRESSES (Pneumatic)
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

PRESSES (Punching, Drawing, Coining, Blanking, etc.)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Progressive Welder Co., 3031 E. Outer Drive., Detroit, Mich.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Riveting)
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

PRESSES (Scrap Bundling and Rolling)
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

PRESSES (Stamping)
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Welding)—See WELDERS

PRESSES, BRIQUETING (Turnings & Borings)
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

PRESSURE VESSELS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

PRODUCER GAS SYSTEMS—See GAS PRODUCER PLANTS

PUG MILLS (For Blast Furnaces and Sintering Plants)
Bailey, Wm. M. Co., 702 Magee Bldg., Pittsburgh, Pa.

PULLEYS (Magnetic)
Cutler-Hammer, Inc., 1267 St. Paul Ave., Milwaukee, Wis.
Dings Magnetic Separator Co., 663 Smith St., Milwaukee, Wis.

PULVERIZERS
American Pulverizer Co., 1539 Macklind Ave., St. Louis, Mo.

PUMP HOUSES
Dravo Corp. (Contracting Div.), Neville Island, Pittsburgh, Pa.

PUMPS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Oil Well Supply Co., Dallas, Texas.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Boiler Feed)
Worthington Pump & Machinery Corp., Harrison, N. J.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Centrifugal)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Brown & Sharpe Mfg. Co., Providence, R. I.
Fairbanks, Morse & Co., Dept. 96, 600 So. Michigan Ave., Chicago, Ill.
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Fuel Injection)
Ex-Cell-O Corp., 1225 Oakman Blvd., Detroit, Mich.

PUMPS (Hydraulic)
Brown & Sharpe Mfg. Co., Providence, R. I.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Vickers, Inc., 1400 Oakman Blvd., Detroit, Mich.

Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.
Wood, R. D. Co., 400 Chestnut St., Philadelphia, Pa.

PUMPS (Reciprocating)
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Rotary)
Brown & Sharpe Mfg. Co., Providence, R. I.
Vickers, Inc., 1400 Oakman Blvd., Detroit, Mich.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Vacuum)
Worthington Pump & Machinery Corp., Harrison, N. J.

PUNCHES (Multiple)
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

PUNCHING AND SHEARING MACHINERY
Beatty Machine & Mfg. Co., 944 150th St., Hammond, Ind.
Chambersburg Engineering Co., Chambersburg, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Continental Roll & Steel Fdry Co., E. Chicago, Ind.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PYROMETER TUBES
Norton Company, Worcester, Mass.

PYROMETERS
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

RAIL BREAKERS
National Roll & Foundry Co., The, Avonmore, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

RAILS (New and Relaying)
Industrial Equipment Corp., Pittsburgh, Pa.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.

RAILS (Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago, Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Ryerson, Jos. T. & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

REAMERS
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.
Greenfield Tap & Die Corp., Greenfield, Mass.

REBUILT EQUIPMENT
Marr-Galbreath Machinery Co., 53 Water St., Pittsburgh, Pa.
West Penn Machinery Co., 1208 House Bldg., Pittsburgh, Pa.

RECEIVERS
Petroleum Iron Works Co., Sharon, Pa.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

RECORDERS (Combustion)
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

RECORDERS (Pressure, Speed, Temperature, Time)
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

REDUCERS (Speed)—See SPEED REDUCERS

REDUCTION GEARS
Abart Gear & Machine Co., 4825 W. 16th St., Chicago, Ill.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
National-Erie Corp., Erie, Pa.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

REFRACTORIES (Dolomite)
Basic Dolomite, Inc., Hanna Bldg., Cleveland, O.

REFRACTORIES (Fire Clay)
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Eureka Fire Brick Co., 1100 B. F. Jones Law Bldg., Pittsburgh, Pa.
Globe Brick Co., The, East Liverpool, O.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.

REFRACTORIES (For High Frequency Furnaces)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Carborundum Co., The, Perth Amboy, N. J.
Norton Company, Worcester, Mass.

REFRACTORIES (Silicon Carbide)
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.

REFRACTORY CONCRETE
Atlas Lumnite Cement Co., Dept. S-3, Chrysler Bldg., New York City.
Johns-Manville Corp., 22 E. 40th St., New York City.

REGULATORS (Pressure)
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.

REGULATORS (Temperature)
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

REINFORCEMENT FABRIC (Electric Welded)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

RESISTORS (Edgewound)
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.

RESISTORS (Graphite Disc)
Allen-Bradley Co., 1320 So. 2nd St., Milwaukee, Wis.

RHEOSTATS (Plating)
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.

RINGS (Steel)
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
King Fifth Wheel Co., 5027 Beaumont Ave., Philadelphia, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

RINGS (Weldless) (*Also Stainless)
Midvale Co., The, Nicetown, Philadelphia, Pa.

RIVETERS (Hydraulic—Portable and Stationary)
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

RIVETERS (Pneumatic)
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

RIVETING MACHINERY
Chambersburg Engineering Co., Chambersburg, Pa.
Shuster, F. B., Co., The, New Haven, Conn.
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.
Wood, R. D. Co., 400 Chestnut St., Philadelphia, Pa.

RIVETS (*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scianton Rd., Cleveland, O.
*Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.
*Townsend Co., New Brighton, Pa.

RODS (Brass, Bronze, Copper, Nickel Silver, Silicon-Bronze)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.

RODS (Drill)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.

RODS (Rounds, Flats and Shapes) (*Also Stainless)
*Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago, Columbia Steel Co., San Francisco, Calif.
*Copperwell Steel Co., Warren, O.
*Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., Inc., Steel & Tube Div., Canton, O.
Washburn Wire Co., Phillipsdale, Pa.
Youngstown Sheet & Tube Co., The, Youngstown, O.

RODS (Steel and Iron)
Firth-Sterling Steel Co., McKeesport, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.

RODS (Welding)—See WELDING RODS

RODS (Wire)—See WIRE PRODUCTS

ROLLER LEVELERS (Backed-up)
Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.

ROLLING DOORS & SHUTTERS—See DOORS AND SHUTTERS

ROLLING MILL BEARINGS—See BEARINGS (Rolling Mill)

ROLLING MILL EQUIPMENT
Alliance Machine Co., The, Alliance, O.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
Morgan Engineering Co., The, Alliance, O.
National Roll & Foundry Co., Avonmore, Pa.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

ROLLING MILLS (Consulting, Contracting Engineers)
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.

» » » WHERE-TO-BUY « « «

- ROLLS (Bending and Straightening)**
 Baldwin Southward Div., Baldwin Locomotive Works, Philadelphia, Pa.
 Hannflin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
- ROLLS (Sand and Chilled)**
 Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
 Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
 Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
 Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
 Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
 Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
 National Roll & Foundry Co., The Avonmore, Pa.
 Ohio Steel Fdry. Co., Lima, O.
 Springfield, O.
 Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh, Pa.
 United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
- ROLLS (Steel and Iron)**
 Bethlehem Steel Co., Bethlehem, Pa.
 Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
 Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
 Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
 Farrell-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
 322 Vulcan St., Buffalo, N. Y.
 Hyde Park Fdry. & Machine Co., Hyde Park, Pa.
 Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
 Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
 Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
 Midvale Co., The, Nicetown, Philadelphia, Pa.
 National Roll & Fdry. Co., The, Avonmore, Pa.
 Ohio Steel Fdry. Co., Lima, O.
 Springfield, O.
 Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh, Pa.
 United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
- ROLLS (Tinning Machine)**
 American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.
- ROOFING AND SIDING (Corrugated and Plain)**
 American Rolling Mill Co., The, 480 Curtis St., Middletown, O.
 Andrews Steel Co., The, Newport, Ky.
 Bethlehem Steel Co., Bethlehem, Pa.
 Carey, Philip Co., The, Dept. 71, Lockland, Cincinnati, O.
 Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
 Columbia Steel Co., San Francisco, Calif.
 Granite City Steel Co., Granite City, Ill.
 Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
 Johns-Manville Corp., 22 E. 40th St., New York City.
 Jones & Laughlin Steel Corp., Pittsburgh, Pa.
 Jones & Laughlin Bldg., Pittsburgh, Pa.
 New Jersey Zinc Co., 160 Front St., New York City.
 Republic Steel Corp., Dept. ST, Cleveland, O.
 Ryerson, Jos. T., & Sons, Inc., 16th and Rockwell Sts., Chicago, Ill.
 Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
 Weirton Steel Co., Weirton, W. Va.
 Youngstown Sheet & Tube Co., The, Youngstown, O.
- ROOFING (Plastic and Liquid)**
 Carey, Philip Co., The, Dept. 71, Lockland, Cincinnati, O.
 Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.
- ROOFING & SIDING**
 Johns-Manville Corp., 22 E. 40th St., New York City.
- RUBBER GOODS (Mechanical)**
 Garlock Packing Co., The, S 3-40, Palmyra, N. Y.
- RUST PREVENTIVES**
 Alrose Chemical Co., 80 Clifford St., Providence, R. I.
 American Chemical Paint Co., Dept. 310, Ambler, Pa.
 American Lanolin Corp., Railroad St., Lawrence, Mass.
 Flood Co., The, 6217 Carnegie Ave., Cleveland, O.
 Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.
- RUST PROOFING PROCESS**
 American Chemical Paint Co., Dept. 310, Ambler, Pa.
 Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
 Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.
- SAFE ENDS (Boiler Tube)**
 National Tube Co., Frick Bldg., Pittsburgh, Pa.
- SAFETY DEVICES**
 Kimball Safety Products Co., 7314 Wade Park Ave., Cleveland, O.
- SAFETY DEVICES (Electric)**
 Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
- SALT TABLETS**
 Morton Salt Co., 310 So. Michigan Ave., Chicago, Ill.
- SAND CONDITIONING AND PREPARING MACHINERY**
 Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
- SAWING MACHINES (Hot and Cold)**
 Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
 Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
 Morgan Engineering Co., The, Alliance, O.
 United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
- SAWING MACHINES (Contour)**
 Continental Machines, Inc., 1324 So. Washington Ave., Minneapolis, Minn.
- SAWS (Band-Metal Cutting)**
 Huther Bros. Saw & Mfg. Co., 1190 University Ave., Rochester, N. Y.
 Simonds Saw & Steel Co., Fitchburg, Mass.
- SAWS (Hack)**
 Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
 Simonds Saw and Steel Co., Fitchburg, Mass.
- SAWS (Hot and Cold)**
 Huther Bros. Saw & Mfg. Co., 1190 University Ave., Rochester, N. Y.
- SAWS (Inserted Tooth, Cold)**
 Huther Bros. Saw & Mfg. Co., 1190 University Ave., Rochester, N. Y.
 Simonds Saw & Steel Co., Fitchburg, Mass.
- SAWS (Metal Cutting)**
 Brown & Sharpe Mfg. Co., Providence, R. I.
 Simonds Saw & Steel Co., Fitchburg, Mass.
 Youngstown Sheet & Tube Co., The, Youngstown, O.
- SCAFFOLDING (Tubular)**
 Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
- SCALES**
 Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
 Fairbanks, Morse & Co., Dept. 96, 600 So. Michigan Ave., Chicago, Ill.
 Kron Co., The, Bridgeport, Conn.
 Toledo Scale Co., 3216 Monroe St., Toledo, O.
- SCALES (Monorail)**
 American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
 Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
 Fairbanks, Morse & Co., Dept. 96, 600 So. Michigan Ave., Chicago, Ill.
 Kron Co., The, Bridgeport, Conn.
 Shenard Niles Crane & Hoist Corp., 388 Schuyler Ave., Mountour Falls, N. Y.
 Toledo Scale Co., 3216 Monroe St., Toledo, O.
- SCHOOLS**
 International Correspondence Schools, Box 9380, Scranton, Pa.
- SCRAP BALING PRESSES—See BALING PRESSES**
- SCREENS AND SIEVES**
 Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
 Chicago Perforating Co., 2443 W. 24th Pl. Chicago, Ill.
 Erdle Perforating Co., 171 York St., Rochester, N. Y.
 Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.
 Koppers Co., Engineering & Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
 Ludlow-Saylor Wire Co., The, Newstead Ave. & Wabash R. R., St. Louis, Mo.
 Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
- SCREENS (Vibrating)**
 Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
- SCREW EXTRACTORS**
 Greenfield Tap & Die Corp., Greenfield, Mass.
- SCREW MACHINE PRODUCTS**
 Barnes, Wallace Co., The, Div. Associated Spring Corp., Bristol, Conn.
 Hindley Mfg. Co., Valley Falls, R. I.
 National Acme Co., The, 170 E. 131st St., Cleveland, O.
- SCREW MACHINES (Automatic, Single and Multiple Spindle)**
 Brown & Sharpe Mfg. Co., Providence, R. I.
 Cone Automatic Machine Co., Windsor, Vt.
 National Acme Co., The, 170 E. 131st St., Cleveland, O.
- SCREW PLATES**
 Greenfield Tap & Die Corp., Greenfield, Mass.
- SCREW STOCK—See STEEL (Screw Stock)**
- SCREWS**
 Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
 Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
 Parker-Kalon Corp., 194-200 Varlek St., New York City.
 Townsend Co., New Brighton, Pa.
- SCREWS (Cap, Set, Safety-Set)**
 Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
 Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
 National Acme Co., The, 170 E. 131st St., Cleveland, O.
- SCREWS (Cold Headed)**
 Central Screw Company, 3517 Shields Ave., Chicago, Ill.
 Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
 Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
 Townsend Co., New Brighton, Pa.
- SCREWS (Conveyor)**
 Lee Spring Co. Inc., 30 Main St., Brooklyn, N. Y.
- SCREWS (Drive)**
 Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
 Parker-Kalon Corp., 194-200 Varlek St., New York City.
 Townsend Co., New Brighton, Pa.
- SCREWS (Hardened Self-Tapping)**
 Central Screw Company, 3517 Shields Ave., Chicago, Ill.
 Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
 Parker-Kalon Corp., 194-200 Varlek St., New York City.
- SCREWS (Machine)**
 Central Screw Company, 3517 Shields Ave., Chicago, Ill.
 Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
- SCREWS (Machine, Recessed Head)**
 American Screw Co., Providence, R. I.
 Chandler Products Co., Euclid, O.
 Continental Screw Co., New Bedford, Mass.
 Corbin Screw Corp., New Britain, Conn.
 Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
 National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
 Parker-Kalon Corp., 194-200 Varlek St., New York City.
- SCREWS (Self Locking)**
 Shakeproof Lock Washer Co., 2525 N. Keeler Ave., Chicago, Ill.
- SCREWS (Sheet Metal, Recessed Head)**
 American Screw Co., Providence, R. I.
 Chandler Products Co., Euclid, O.
 Continental Screw Co., New Bedford, Mass.
 Corbin Screw Corp., New Britain, Conn.
 Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
 National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
 Parker-Kalon Corp., 194-200 Varlek St., New York City.
 Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
 Russell, Burdshall & Ward Bolt & Nut Co., Port Chester, N. Y.
- SCREWS (Socket, Cold Forged)**
 Parker-Kalon Corp., 194-200 Varlek St., New York City.
- SCREWS (Thread-Cutting)**
 Shakeproof Lock Washer Co., 2525 N. Keeler Ave., Chicago, Ill.
- SCREWS (Thumb)**
 Central Screw Company, 3517 Shields Ave., Chicago, Ill.
 Parker-Kalon Corp., 194-200 Varlek St., New York City.
- SCREWS (Wood, Recessed Head)**
 American Screw Co., Providence, R. I.
 Chandler Products Co., Euclid, O.
 Continental Screw Co., New Bedford, Mass.
 Corbin Screw Corp., New Britain, Conn.
 Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
 National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
 Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
- SEAMLESS STEEL TUBING—See TUBES**
- SEPARATORS (Magnetic)**
 Cutler-Hammer, Inc., 1267 St. Paul Ave., Milwaukee, Wis.
 Dins Magnetic Separator Co., 663 Smith St., Milwaukee, Wis.
 Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland, O.
 Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.
- SHAFT HANGERS—See HANGERS (Shaft)**
- SHAFTING**
 Bliss & Laughlin, Inc., Harvey, Ill.
 Jones & Laughlin Steel Corp., Pittsburgh, Pa.
 Jones & Laughlin Bldg., Pittsburgh, Pa.
 LaSalle Steel Co., Dept. 10A, P. O. Box 6800-A, Chicago, Ill.
 Maltrup Steel Products Co., Beaver Falls, Pa.
 Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
 Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
 Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
 Union Drawn Steel Div. Republic Steel Corp., Massillon, O.
 Wisconsin Steel Co., 150 No. Michigan Ave., Chicago, Ill.
 Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.
- SHAKERS**
 Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
- SHAPERS**
 Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.
- SHAPES (Steel)—See STEEL (Structural)**
- SHAPES, SPECIAL (Steel)**
 Bliss & Laughlin, Inc., Harvey, Ill.
 Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
 Columbia Steel Co., San Francisco, Calif.
 Jones & Laughlin Steel Corp., Pittsburgh, Pa.
 Laclede Steel Co., Arcade Bldg., St. Louis, Mo.

SHAPES, SPECIAL (Steel)—Con.
 Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
 Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
 Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
 Union Drawn Steel Div. Republic Steel Corp., Massillon, O.
 Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
 Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

SHEAR BLADES

American Shear Knife Co., 3rd and Ann Sts., Homestead, Pa.
 Cleveland Punch & Shear Works, The, 3917 St. Clair Ave., Cleveland, O.
 Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.

SHEARS

Beatty Machine & Mfg. Co., 944 150th St., Hammond, Ind.
 Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.
 Cleveland Punch & Shear Works, The, 3917 St. Clair Ave., Cleveland, O.
 Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
 Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
 Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
 Lewis Fdry. & Mach. Div. of Blaw-Knox Co., Pittsburgh, Pa.
 Morgan Engineering Co., The, Alliance, O.
 Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
 United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

SHEET BARS

Andrews Steel Co., The, Newport, Ky.
 Bethlehem Steel Co., Bethlehem, Pa.
 Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
 Columbia Steel Co., San Francisco, Calif.
 Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
 Republic Steel Corp., Dept. ST, Cleveland, O.
 Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
 Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
 Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEET LIFTERS AND CARRIERS

American MonoRoll Co., The, 13102 Athens Ave., Cleveland, O.
 Cullen-Friedt Co., 1308 S. Kilbourn Ave., Chicago, Ill.
 Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
 J-B Engineering Sales Co., 1743 Orange St., New Haven, Conn.

SHEET METAL PRODUCTS—See STAMPINGS

SHEET METAL WORKERS MACHINES

Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
 Excellor Tool & Machine Co., Ridge & Jefferson Aves., E. St. Louis, Ill.
 Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.

SHEET STEEL PILING (New and Used)

Bethlehem Steel Co., Bethlehem, Pa.
 Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
 Foster, L. B. Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
 Industrial Equipment Corp., Pittsburgh, Pa.

SHEETS (Acid Resisting)

International Nickel Co., Inc., The, 67 Wall St., New York City.

SHEETS (Black)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
 Andrews Steel Co., The, Newport, Ky.
 Granite City Steel Co., Granite City, Ill.
 Great Lakes Steel Corp., Ecorse, Detroit, Mich.

Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
 Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
 Ryerson, Jos. T. & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
 Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
 Wheeling Steel Corp., Wheeling, W. Va.

SHEETS (Brass, Bronze, Copper, Nickel Silver, Silicon-Bronze)

American Brass Co., The, Waterbury, Conn.
 Ampco Metal, Inc., Dept. S-129, 3830 W. Burnham St., Milwaukee, Wis.
 Bridgeport Brass Co., Bridgeport, Conn.

SHEETS (Corrugated)

American Rolling Mill Co., The, 480 Curtis St., Middletown, O.
 Andrews Steel Co., The, Newport, Ky.
 Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
 Bethlehem Steel Co., Bethlehem, Pa.
 Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
 Columbia Steel Co., San Francisco, Calif.
 Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
 Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
 Republic Steel Corp., Dept. ST, Cleveland, O.
 Ryerson, Jos. T. & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
 Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
 Weirton Steel Co., Weirton, W. Va.
 Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Deep Drawing and Stamping)

Alan Wood Steel Co., Conshohocken, Pa.
 American Rolling Mill Co., The, 480 Curtis St., Middletown, O.
 Andrews Steel Co., The, Newport, Ky.
 Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
 Bethlehem Steel Co., Bethlehem, Pa.
 Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
 Granite City Steel Co., Granite City, Ill.
 Great Lakes Steel Corp., Ecorse, Detroit, Mich.
 Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
 Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
 Republic Steel Corp., Dept. ST, Cleveland, O.
 Ryerson, Jos. T. & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
 Wheeling Steel Corp., Wheeling, W. Va.
 Weirton Steel Co., Weirton, W. Va.
 Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Electrical)

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
 American Rolling Mill Co., The, 480 Curtis St., Middletown, O.
 Andrews Steel Co., The, Newport, Ky.
 Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
 Granite City Steel Co., Granite City, Ill.
 Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
 Republic Steel Corp., Dept. ST, Cleveland, O.
 Ryerson, Jos. T. & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
 Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Galvanized)

American Rolling Mill Co., The, 480 Curtis St., Middletown, O.
 Andrews Steel Co., The, Newport, Ky.
 Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
 Bethlehem Steel Co., Bethlehem, Pa.
 Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
 Columbia Steel Co., San Francisco, Calif.
 Granite City Steel Co., Granite City, Ill.

Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
 Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
 Republic Steel Corp., Dept. ST, Cleveland, O.
 Ryerson, Jos. T. & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
 Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
 Wheeling Steel Corp., Wheeling, W. Va.
 Youngstown Sheet & Tube Co., The, Youngstown, O.
 Weirton Steel Co., Weirton, W. Va.

SHEETS (Hot Rolled and Hot Rolled Annealed)

Alan Wood Steel Co., Conshohocken, Pa.
 American Rolling Mill Co., The, 480 Curtis St., Middletown, O.
 Andrews Steel Co., The, Newport, Ky.
 Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
 Bethlehem Steel Co., Bethlehem, Pa.
 Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
 Columbia Steel Co., San Francisco, Calif.
 Granite City Steel Co., Granite City, Ill.
 Great Lakes Steel Corp., Ecorse, Detroit, Mich.
 Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
 Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
 Republic Steel Corp., Dept. ST, Cleveland, O.
 Ryerson, Jos. T. & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
 Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
 Wheeling Steel Corp., Wheeling, W. Va.
 Weirton Steel Co., Weirton, W. Va.
 Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Long Terne)

Andrews Steel Co., The, Newport, Ky.
 Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
 Republic Steel Corp., Dept. ST, Cleveland, O.
 Ryerson, Jos. T. & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
 Weirton Steel Co., Weirton, W. Va.
 Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Perforated)

Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.

SHEETS (Reinforced)

Erdle Perforating Co., 171 York St., Rochester, N. Y.

SHEETS (Roofing)—See ROOFING AND SIDING

SHEETS (Stainless)

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
 American Rolling Mill Co., The, 480 Curtis St., Middletown, O.
 Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
 Columbia Steel Co., San Francisco, Calif.
 Republic Steel Corp., Massillon, O.
 Ryerson, Jos. T. & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.

SHEETS (Stainless Clad)

Granite City Steel Co., Granite City, Ill.

SHEETS (Tin)—See TIN PLATE

SHEETS (Tin Mill Black)

Andrews Steel Co., The, Newport, Ky.
 Bethlehem Steel Co., Bethlehem, Pa.
 Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
 Columbia Steel Co., San Francisco, Calif.
 Granite City Steel Co., Granite City, Ill.
 Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
 Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
 Republic Steel Corp., Dept. ST, Cleveland, O.
 Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
 Weirton Steel Co., Weirton, W. Va.

SHEETS—HIGH FINISH (Automobile, Metal Furniture, Enameling)

American Rolling Mill Co., The, 480 Curtis St., Middletown, O.
 Andrews Steel Co., The, Newport, Ky.
 Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
 Bethlehem Steel Co., Bethlehem, Pa.
 Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
 Columbia Steel Co., San Francisco, Calif.
 Great Lakes Steel Corp., Ecorse, Detroit, Mich.
 Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
 Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
 Republic Steel Corp., Dept. ST, Cleveland, O.
 Ryerson, Jos. T. & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
 Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
 Wheeling Steel Corp., Wheeling, W. Va.
 Weirton Steel Co., Weirton, W. Va.
 Youngstown Sheet & Tube Co., The, Youngstown, O.

SHOVELS (Power)

Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

SIEVES—See SCREENS AND SIEVES

SIGNALING & INTER-COMMUNICATION EQUIPMENT

Graybar Electric Co., Graybar Bldg., New York City.

SILICO-MANGANESE

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
 Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
 Samuel, Frank & Co., Inc., Harrison Bldg., Philadelphia, Pa.

SILICON METAL AND ALLOYS

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
 Reverse Copper & Brass, Inc., 230 Park Ave., New York City.

SKELP (Steel)

Alan Wood Steel Co., Conshohocken, Pa.
 Bethlehem Steel Co., Bethlehem, Pa.
 Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
 Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
 Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.

SLAG GRANULATING MACHINES (Blast Furnace and Open Hearth)

Brosius, Edzar E., Inc., Sharpshurg Branch, Pittsburgh, Pa.

SMALL TOOLS

Brown & Sharpe Mfg. Co., Providence, R. I.
 Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.

SOAKING PITS

Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
 Criswell, James, Co., Keenan Bldg., Pittsburgh, Pa.
 Salem Engineering Co., 714 S. Broadway, Salem, O.
 Surface Combustion Corp., 2375 Dorr St., Toledo, O.

SOLDER

Kester Solder Co., 4222 Wrightwood Ave., Chicago, Ill.

SOLENOIDS (Electric)

Cutler-Hammer, Inc., 1267 St. Paul Ave., Milwaukee, Wis.

SOLVENT (Degreasing)

Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.
 Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

WHERE-TO-BUY

SPECIAL MACHINERY—See MACHINERY (Special)

SPEED REDUCERS

Abart Gear & Machine Co.,
4825 W. 16th St., Chicago, Ill.
Cleveland Worm & Gear Co.,
3270 E. 80th St., Cleveland, O.
Farrel-Birmingham Co., Inc.,
110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Grant Gear Works,
2nd & B. Sts., Boston, Mass.
Horsburgh & Scott Co., The,
5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co.,
1120 W. Monroe St., Chicago, Ill.
Jones, W. A., Fdry. & Mach. Co.,
4437 Roosevelt Rd., Chicago, Ill.
Chicago, Ill.
Link-Belt Co., 2045 W. Hunting
Park Ave., Philadelphia, Pa.
Michigan Tool Co.,
7171 E. McNichols Rd.,
Detroit, Mich.
New Departure Div., General
Motors Corp., Bristol, Conn.

SPELTER (Zinc)

St. Joseph Lead Co., 250 Park Ave.,
New York City.

SPIEGELEISEN

Electro Metallurgical Sales Corp.,
30 E. 42nd St., New York City.
New Jersey Zinc Co.,
160 Front St., New York City.
Samuel, Frank & Co., Inc., The,
Harrison Bldg., Philadelphia, Pa.

SPIKES (Screw)

Bethlehem Steel Co.,
Bethlehem, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Columbia Steel Co.,
San Francisco, Calif.
Republic Steel Corp., Dept. ST,
Cleveland, O.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.
Youngstown Sheet & Tube Co., The,
Youngstown, O.

SPINDLES (Grinding)

Bryant Chucking Grinder Co.,
Springfield, Vt.
Eck-Cell-O Corp., 1228 Oakman
Bldg., Detroit, Mich.
Heald Machine Co.,
Worcester, Mass.

SPICE BARS (Rail)

Bethlehem Steel Co.,
Bethlehem, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Columbia Steel Co.,
San Francisco, Calif.
Inland Steel Co.,
33 So. Dearborn St., Chicago, Ill.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.

SPRINGS

(Also Stainless)
Accurate Spring Mfg. Co.,
3823 W. Lake St., Chicago, Ill.
American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Barnes, Wallace Co., The,
Div., Associated Spring Corp.,
Bristol, Conn.
Duer Spring & Mfg. Co.,
Pittsburgh, Pa.
Hubbard, M. D., Spring Co.,
421 Central Ave., Pontiac, Mich.
Lee Spring Co., Inc.,
30 Main St., Brooklyn, N. Y.
Raymond Mfg. Co., Div. Associated
Spring Corp., 280 So. Centre St.,
Corry, Pa.
Standard Steel Works Div. of The
Baldwin Locomotive Works,
Philadelphia, Pa.
Washburn Wire Co., 118th St.
& Harlem River, New York City.
Wickwire Spencer Steel Co.,
500 Fifth Ave., New York City.

SPRINGS (Oil Tempered—Flat)

Davis Brake Beam Co., Laurel Ave.,
& P. R. R., Johnstown, Pa.

SPRINKLERS (Automatic)

Grinnel Co., Inc., Providence, R. I.

SPROCKETS

Chain Belt Co., 1660 W. Bruce St.,
Milwaukee, Wis.

SPRUE CUTTERS

Shuster, F. B., Co., The,
New Haven, Conn.

STACKS (Steel)—See BRIDGES, ETC.

STAINLESS STEEL—See BARS, SHEETS, STRIP, PLATES, ETC.

STAMPINGS

Accurate Spring Mfg. Co.,
3823 W. Lake St., Chicago, Ill.
American Tube & Stamping Plant,
(Stanley Wks.), Bridgeport, Conn.
Barnes, Wallace Co., The, Div.
Associated Spring Corp.,
Bristol, Conn.
Davis Brake Beam Co., Laurel Ave.
& P. R. R., Johnstown, Pa.
Erdle Perforating Co.,
171 York St., Rochester, N. Y.
Hubbard, M. D., Spring Co.,
421 Central Ave., Pontiac, Mich.
Kirk & Blum Mfg. Co., The,
2838 Spring Grove Ave.,
Cincinnati, O.
Pressed Steel Tank Co., 1461 So.
66th St., Milwaukee, Wis.
Raymond Mfg. Co., Div. Associated
Spring Corp., 280 So. Centre St.,
Corry, Pa.
Shakeproof Lock Washer Co.,
2525 N. Keeler Ave.,
Chicago, Ill.
Stanley Works, The,
Bridgeport, Conn.
New Britain, Conn.
Toledo Stamping & Mfg. Co.,
90 Fearing Blvd., Toledo, O.
Whitehead Stamping Co., 1667 W.
Lafayette Blvd., Detroit, Mich.

STAPLES (Wire)

American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Columbia Steel Co.,
San Francisco, Calif.
Republic Steel Corp., Dept. ST,
Cleveland, O.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.
Wickwire Brothers,
189 Main St., Cortland, N. Y.
Youngstown Sheet & Tube Co., The,
Youngstown, O.

STARTERS (Electric Motor)

Electric Controller & Mfg. Co.,
2698 E. 79th St., Cleveland, O.

STEEL (Alloy)

Alan Wood Steel Co.,
Conshohocken, Pa.
American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co.,
Bethlehem, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern
St., Reading, Pa.
Columbia Steel Co.,
San Francisco, Calif.
Copperweld Steel Co., Warren, O.
Crucible Steel Company of America,
405 Lexington Ave.,
New York City.
Firth-Sterling Steel Co.,
McKeesport, Pa.
Heppenstall Co., 47th & Hatfield
Sts., Pittsburgh, Pa.
Jessop Steel Co., 584 Green St.,
Washington, Pa.
Midvale Co., The, Nicetown,
Philadelphia, Pa.
National Forge & Ordnance Co.,
Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST,
Cleveland, O.
Ryerson, Jos. T., & Son, Inc.,
16th & Rockwell Sts.,
Chicago, Ill.
Simonds Saw & Steel Co.,
Fitchburg, Mass.

Stanley Works, The,
New Britain, Conn.
Bridgeport, Conn.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.
Timken Roller Bearing Co., The,
Steel & Tube Div., Canton, O.
Vanadium-Alloys Steel Co.,
Latrobe, Pa.
Washburn Wire Co.,
Phillipsdale, R. I.
Wisconsin Steel Co., 180 No. Michi-
gan Ave., Chicago, Ill.

STEEL (Alloy, Cold Finished)

American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co.,
McKeesport, Pa.
LaSalle Steel Co., Dept. 10A,
P. O. Box 6800-A,
Chicago, Ill.
Moltrup Steel Products Co.,
Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty
St., Indianapolis, Ind.
Union Drawn Steel Div. of Republic
Steel Corp., Massillon, O.

GREY IRON, SEMI-STEEL & ALLOY IRON

CASTINGS

Wood Patterns a Specialty
Commercial and Industrial
Stokers

THE CANTON PATTERN & MFG. CO.
CANTON, OHIO

SMALL ELECTRIC STEEL CASTINGS

(Capacity 500 Tons Per Month)

WEST STEEL
CLEVELAND



CASTING CO.
OHIO, U. S. A.

"He Profits Most
Who Serves Best"

Better Steel
Castings

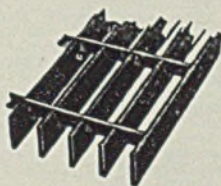


Certified Steel Abrasives

FOR USE IN BLAST CLEANING EQUIPMENT

SAMSON STEEL SHOT
ANGULAR STEEL GRIT

PITTSBURGH CRUSHED STEEL CO., PITTSBURGH, PA.
STEEL SHOT & GRIT CO., BOSTON, MASS.



TRI-LOK

Gratings and Treads
Steel—Aluminum—Brass
No Rivets, Bolts or Welds
Manufactured by

The Tri-Lok Co., Pittsburgh, Pa.
National Distributors

DRAGO CORPORATION, Machinery Division
300 Penn Ave. Pittsburgh, Pa.



WORKERS WHO Sweat NEED Salt
• USE MORTON'S SALT TABLETS •
Morton Salt Co., Chicago, Illinois

HOT-DIP GALVANIZING PRACTICE

450-S.F.

By W. H. Spowers Jr.

• This 200-page book, gives full and carefully reasoned explanations of the why and wherefore of galvanizing. All the latest methods and processes are described and very copiously illustrated by a large number of diagrams and photographs. 45 Illustrations—4 Tables—7 Charts—61-page Bibliography. Price Post-paid \$4.00.

THE PENTON PUBLISHING COMPANY

Penton Building

Book Department

Cleveland, Ohio

STEEL (Alloy, Cold Finished)—Con.
Wyckoff Drawn Steel Co.,
First National Bank Bldg.,
Pittsburgh, Pa.
Wisconsin Steel Co., 180 No. Michi-
gan Ave., Chicago, Ill.

STEEL (Clad—Corrosion Resisting)
(*Also Stainless)
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern
St., Reading, Pa.
*Copperweld Steel Co., Warren, O.
*Granite City Steel Co.,
Granite City, Ill.
Jessop Steel Co., 584 Green St.,
Washington, Pa.
Superior Steel Corp., Carnegie, Pa.

STEEL (Cold Drawn)
American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co.,
McKeesport, Pa.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Moltrup Steel Products Co.,
Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty
St., Indianapolis, Ind.
Sutton Engineering Co.,
Park Bldg., Pittsburgh, Pa.
Union Drawn Steel Div. of Republic
Steel Corp., Massillon, O.
Wisconsin Steel Co., 180 No. Michi-
gan Ave., Chicago, Ill.
Wyckoff Drawn Steel Co.,
First National Bank Bldg.,
Pittsburgh, Pa.

STEEL (Cold Finished)
American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co.,
Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co.,
McKeesport, Pa.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
LaSalle Steel Co., Dept. 10A,
P. O. Box 6800-A, Chicago, Ill.
Moltrup Steel Products Co.,
Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty
St., Indianapolis, Ind.
Ryerson, Jos. T., & Son, Inc.,
16th & Rockwell Sts., Chicago, Ill.
Union Drawn Steel Div. of Republic
Steel Corp., Massillon, O.
Wisconsin Steel Co., 180 No. Michi-
gan Ave., Chicago, Ill.
Wyckoff Drawn Steel Co.,
First National Bank Bldg.,
Pittsburgh, Pa.

STEEL (Corrosion Resisting)
Allegheny Ludlum Steel Corp.,
Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The,
480 Curtis St., Middletown, O.
American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Andrews Steel Co., The,
Newport, Ky.
Bethlehem Steel Co.,
Bethlehem, Pa.
Bisset Steel Co., The,
900 E. 67th St., Cleveland, O.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern
St., Reading, Pa.
Crucible Steel Company of America,
405 Lexington Ave.,
New York City.
Firth-Sterling Steel Co.,
McKeesport, Pa.
Granite City Steel Co.,
Granite City, Ill.
Inland Steel Co.,
38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc.,
627-629 Sixth Ave.,
New York City.
Jesseop Steel Co., 584 Green St.,
Washington, Pa.
Midvale Co., The, Nicetown,
Philadelphia, Pa.
National Forge & Ordnance Co.,
Irvine, Warren Co., Pa.
National Tube Co.,
Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST,
Cleveland, O.
Ryerson, Jos. T., & Son, Inc.,
16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.
Youngstown Sheet & Tube Co., The,
Youngstown, O.

STEEL (Die)
Crucible Steel Company of America,
405 Lexington Ave.,
New York City.

Jessop, Wm., & Sons, Inc.,
627-629 Sixth Ave.,
New York City.
Jesseop Steel Co.,
584 Green St., Washington, Pa.
Vanadium-Alloys Steel Co.,
Latrobe, Pa.

STEEL (Drill)
Crucible Steel Company of America,
405 Lexington Ave.,
New York City.

STEEL (Electric)
Allegheny Ludlum Steel Corp.,
Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co.,
Bethlehem, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.

Crucible Steel Company of America,
405 Lexington Ave.,
New York City.
Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co.,
McKeesport, Pa.
Inland Steel Co.,
38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc.,
627-629 Sixth Ave.,
New York City.
Jesseop Steel Co.,
584 Green St., Washington, Pa.
Latrobe Electric Steel Co.,
Latrobe, Pa.
National Forge & Ordnance Co.,
Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST,
Cleveland, O.
Timken Roller Bearing Co., The,
Steel & Tube Div., Canton, O.

STEEL (High Speed)
Allegheny Ludlum Steel Corp.,
Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co.,
Bethlehem, Pa.
Carpenter Steel Co., 139 W. Bern
St., Reading, Pa.
Crucible Steel Company of America,
405 Lexington Ave.,
New York City.
Firth-Sterling Steel Co.,
McKeesport, Pa.
Jessop, Wm., & Sons Co.,
627-629 Sixth Ave.,
New York City.
Jesseop Steel Co., 584 Green St.,
Washington, Pa.
Latrobe Electric Steel Co.,
Latrobe, Pa.
Vanadium-Alloys Steel Co.,
Latrobe, Pa.

STEEL (High Tensile, Low Alloy)
Alan Wood Steel Co.,
Conshohocken, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Columbia Steel Co.,
San Francisco, Calif.
Great Lakes Steel Corp.,
Ecorse, Detroit, Mich.
Inland Steel Co.,
38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Republic Steel Corp., Dept. ST,
Cleveland, O.
Ryerson, Jos. T., & Son, Inc.,
16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.
Youngstown Sheet & Tube Co., The,
Youngstown, O.

STEEL (Nitriding)
Allegheny Ludlum Steel Corp.,
Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co.,
McKeesport, Pa.

STEEL (Rustless)—See STEEL,
(Corrosion Resisting)

STEEL (Screw Stock)
American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co.,
Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
LaSalle Steel Co., Dept. 10A,
P. O. Box 6800-A, Chicago, Ill.
Moltrup Steel Products Co.,
Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty
St., Indianapolis, Ind.
Republic Steel Corp., Dept. ST,
Cleveland, O.
Ryerson, Jos. T., & Son, Inc.,
16th & Rockwell Sts., Chicago, Ill.
Union Drawn Steel Div. of Republic
Steel Corp., Massillon, O.
Wisconsin Steel Co., 180 No. Michi-
gan Ave., Chicago, Ill.

Wyckoff Drawn Steel Co.,
First National Bank Bldg.,
Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The,
Youngstown, O.

STEEL (Spring)
American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Washburn Wire Co.,
118th St. & Harlem River,
New York City.
Phillipsdale, R. I.

STEEL (Stainless)—See STEEL
(Corrosion Resisting)

STEEL (Strip, Copper Coated)
American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Stanley Works, The,
New Britain, Conn.
Bridgeport, Conn.
Thomas Steel Co., The, Warren, O.

STEEL (Strip, Hot and Cold
Rolled)
(*Also Stainless)
Allegheny Ludlum Steel Corp.,
Oliver Bldg., Pittsburgh, Pa.
*American Rolling Mill Co., The,
480 Curtis St., Middletown, O.
American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
American Tube & Stamping Plant,
(Stanley Wks.), Bridgeport, Conn.
Andrews Steel Co., The,
Newport, Ky.
Bethlehem Steel Co.,
Bethlehem, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Columbia Steel Co.,
San Francisco, Calif.
Enterprise Galvanizing Co.,
2525 E. Cumberland St.,
Philadelphia, Pa.
*Firth-Sterling Steel Co.,
McKeesport, Pa.
Great Lakes Steel Corp.,
Ecorse, Detroit, Mich.
Inland Steel Co.,
38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc.,
627-629 Sixth Ave.,
New York City.
Jesseop Steel Co.,
584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Republic Steel Corp., Dept. ST,
Cleveland, O.
*Ryerson, Jos. T., & Son, Inc.,
16th & Rockwell Sts., Chicago, Ill.
Seneca Wire & Mfg. Co.,
Fosteria, O.
*Stanley Works, The,
New Britain, Conn.
Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co.,
118th St. & Harlem River,
New York City.
Phillipsdale, R. I.
Weirton Steel Co., Weirton, W. Va.
Wickwire Spencer Steel Co.,
500 Fifth Ave., New York City.
Wisconsin Steel Co., 180 No. Michi-
gan Ave., Chicago, Ill.

STEEL (Strip, Tin Coated)
American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. &
Harlem River, New York City.

STEEL (Strip, Zinc Coated)
American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. &
Harlem River, New York City.

STEEL (Structural)
(*Also Stainless)
American Bridge Co.,
Frick Bldg., Pittsburgh, Pa.
Belmont Iron Works, 22nd St. and
Washington Ave., Philadelphia,
Pa.
Bethlehem Steel Co.,
Bethlehem, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Columbia Steel Co.,
San Francisco, Calif.
Enterprise Galvanizing Co.,
2525 E. Cumberland St.,
Philadelphia, Pa.

Inland Steel Co.,
38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg.,
St. Louis, Mo.
*Republic Steel Corp., Dept. ST,
Cleveland, O.
Ryerson, Jos. T., & Son, Inc.,
16th & Rockwell Sts.,
Chicago, Ill.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Wisconsin Steel Co., 180 No. Michi-
gan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., The,
Youngstown, O.

STEEL (Tool)
Allegheny Ludlum Steel Corp.,
Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co.,
Bethlehem, Pa.
Bisset Steel Co., The,
900 E. 67th St., Cleveland, O.
Carpenter Steel Co., 139 W. Bern
St., Reading, Pa.
Copperweld Steel Co., Warren, O.
Crucible Steel Company of America,
405 Lexington Ave.,
New York City.
Darwin & Miller, Inc.,
1260 W. 4th St., Cleveland, O.
Firth-Sterling Steel Co.,
McKeesport, Pa.
Forgins & Castings Corp.,
1350 Jarvis St., Ferndale, Mich.
Jessop, Wm., & Sons Co.,
627-629 Sixth Ave.,
New York City.
Jesseop Steel Co.,
584 Green St., Washington, Pa.
Latrobe Electric Steel Co.,
Latrobe, Pa.
Midvale Co., The, Nicetown,
Philadelphia, Pa.
National Branch & Mach. Co.,
5600 St. Jean St., Detroit, Mich.
Republic Steel Corp., Dept. ST,
Cleveland, O.
Ryerson, Jos. T., & Son, Inc.,
16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.
Vanadium Alloys Steel Co.,
Latrobe, Pa.

STEEL BUILDINGS—See
BRIDGES, BUILDINGS, ETC.

STEEL DOORS & SHUTTERS—
See DOORS & SHUTTERS

STEEL FABRICATORS—See
BRIDGES, BUILDINGS, ETC.

STEEL FLOATING AND
TERMINAL EQUIPMENT
Dravo Corp. (Engr'g Works
Div.), Neville Island,
Pittsburgh, Pa.

STEEL PLATE CONSTRUCTION
American Bridge Co.,
Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div.,
Koppers Co., Baltimore, Md.
Belmont Iron Works,
22nd St., and Washington Ave.,
Philadelphia, Pa.
Bethlehem Steel Co.,
Bethlehem, Pa.
Federal Shipbuilding & Dry Dock
Co., Kearney, N. J.
Jones & Laughlin Steel Corp.,
Pittsburgh, Pa.
Petroleum Iron Works Co.,
Sharon, Pa.
Western Gas Div., Koppers Co.,
Fort Wayne, Ind.

STELLITE
Haynes Stellite Co., Harrison and
Lindsay Sts., Kokomo, Ind.

STOKERS
Babcock & Wilcox Co., The,
Refractories Div., 85 Liberty St.,
New York City.
Canton Pattern & Mfg. Co., The,
Andrews Pl. S. W., Canton, O.

STOOLS
Superior Mold & Iron Co., Penn. Pa.
STOPPERS (Cinder Notch)
Bailey, Wm. M., Co.,
702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edzar E., Inc.,
Sharpsburg Branch,
Pittsburgh, Pa.

STOPPERS (Rubber)
Rhoades, P. W., Metals Co.,
P. O. Box 1, Long Island City,
N. Y.

STORAGE BATTERIES—See
BATTERIES (Storage)

» » » **WHERE-TO-BUY** « « «

STRAIGHTENING MACHINERY
Cleveland Punch & Shear Works
Co., The, 3917 St. Clair Ave.,
Cleveland, O.
Elmes, Chas. F., Engineering
Works, 243 N. Morgan St.,
Chicago, Ill.
Lewis Foundry & Machine Div. of
Blaw-Knox Co., Pittsburgh, Pa.
Lewis Machine Co.,
3450 E. 76th St., Cleveland, O.
Loemann Brothers Co.,
3125 Burling St., Milwaukee,
Wis.
Medart Co., The,
3520 de Kalb St., St. Louis, Mo.
Shuster, F. B., Co., The,
New Haven, Conn.
Sutton Engineering Co.,
Park Bldg., Pittsburgh, Pa.
Voss, Edward W., 2832 W. Liberty
Ave., Pittsburgh, Pa.

SULPHURIC ACID
Cleveland-Cliffs Iron Co., The,
Union Commerce Bldg.,
Cleveland, O.
New Jersey Zinc Co.,
160 Front St., New York City.
Pennsylvania Salt Mfg. Co., Dept.
E, Pennsalt Cleaner Div.,
Philadelphia, Pa.

SWITCHES (Electric)
Cutter-Hammer, Inc., 1267 St. Paul
Ave., Milwaukee, Wis.
Electric Controls & Mfg. Co.,
2638 E. 79th St., Cleveland, O.
General Electric Co., Dept. 166-S-L,
Nela Park, Cleveland, O.
General Electric Co.,
Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
Dept. 7-N, East Pittsburgh, Pa.

TACHOMETERS
Brown Instrument Div. of Minne-
apolis Honeywell Regulator Co.,
4462 Wayne Ave.,
Philadelphia, Pa.
Foxboro Co., The, 118 Neponset
Ave., Foxboro, Mass.

TANK LININGS
Celcote Co., 750 Rockefeller
Bldg., Cleveland, O.
National Carbon Co., W. 117th St.
and Madison Ave., Cleveland, O.

TANKS (Pickling)
Atlas Mineral Products Co. of Pa.,
Mertzon, Pa.
National Carbon Co., W. 117th St.
and Madison Ave., Cleveland, O.

**TANKS (Storage, Pressure,
Brewed, Welded)**
American Bridge Co.,
Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div.,
Koppers Co., Baltimore, Md.
Bethlehem Steel Co.,
Bethlehem, Pa.
Kirk & Blum Mfg. Co., The,
2838 Spring Grove Ave.,
Cincinnati, O.
Petroleum Iron Works Co.,
Sharon, Pa.
Pressed Steel Tank Co.,
141 So. 66th St., Milwaukee, Wis.
Western Gas Div., Koppers Co.,
Fort Wayne, Ind.

**TANKS (Wood or Steel, Rubber or
Lead Lined)**
Kirk & Blum Mfg. Co., The,
2838 Spring Grove Ave.,
Cincinnati, O.

TANTALUM CARBIDE
Carboloy Co., Inc., The,
1141 E. 8 Mile Rd., Detroit, Mich.

TAPS AND DIES
Greenfield Tap & Die Corp.,
Greenfield, Mass.
Ladle Machine Co., Inc.,
Waynesboro, Pa.
National Acme Co., The, 170 E.
131st St., Cleveland, O.

TERMINALS (Locking)
Shakers Lock Washer Co.,
255 N. Keeler Ave.,
Chicago, Ill.
Thompson-Bremer & Co.,
1640 W. Hubbard St.,
Chicago, Ill.

TERNE PLATE—See TIN PLATE

TESTING MACHINERY (Materials)
Baldwin Southward Div., Baldwin
Locomotive Works,
Philadelphia, Pa.
National Broach & Machine Co.,
560 St. Jean, Detroit, Mich.

THERMOMETERS
Brown Instrument Div. of Min-
neapolis Honeywell Regulator Co.,
4462 Wayne Ave.,
Philadelphia, Pa.
Foxboro Co., The, 118 Neponset
Ave., Foxboro, Mass.
Leeds & Northrup Co., 4557 Sten-
ton Ave., Philadelphia, Pa.

THREAD CUTTING TOOLS
Landsi Cutting Co., Inc.,
Waynesboro, Pa.

TIE PLATES
Bethlehem Steel Co.,
Bethlehem, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Columbia Steel Co.,
San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn
St., Chicago, Ill.
Republic Steel Corp., Dept. ST,
Cleveland, O.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

TIN PLATE
Bethlehem Steel Co.,
Bethlehem, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Columbia Steel Co.,
San Francisco, Calif.
Granite City Steel Co.,
Granite City, Ill.
Inland Steel Co., 38 So. Dearborn
St., Chicago, Ill.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Republic Steel Corp., Dept. ST,
Cleveland, O.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp.,
Wheeling, W. Va.
Youngstown Sheet & Tube Co., The,
Youngstown, O.

TIN PLATE MACHINERY
Kemp, C. M., Mfg. Co., 405 E.
Oliver St., Baltimore, Md.
Wean Engineering Co., Warren, O.

TONGS (Chain Pipe)
Williams, J. H., & Co., 400 Vulcan
St., Buffalo, N. Y.

TONGS (Rail Handling)
Cullen-Friestedt Co., 1308 S.
Kilbourn Ave., Chicago, Ill.

TOOL BITS (High Speed)
Allegheny Ludlum Steel Corp.,
Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co.,
McKeesport, Pa.
Haynes Stellite Co., Harrison and
Lindsay Sts., Kokomo, Ind.
Jessop Steel Co.,
584 Green St., Washington, Pa.
Michigan Tool Co.,
7171 E. McNichols Rd.,
Detroit, Mich.

TOOL HOLDERS
Williams, J. H., & Co.,
400 Vulcan St., Buffalo, N. Y.

TOOL3 (Pneumatic)
Cleveland Punch & Shear Works
Co., The, 3917 St. Clair Ave.,
Cleveland, O.

**TOOLS (Precision, Lathe, Metal
Cutting, etc.)**
Brown & Sharpe Mfg. Co.,
Providence, R. I.
Carboloy Co., Inc., The,
1141 E. 8 Mile Rd., Detroit, Mich.
Ex-Cell-O Corp., 1228 Oakman
Blvd., Detroit, Mich.
McKenna Metals Co.,
200 Lloyd Ave., Latrobe, Pa.

TOOLS (Tantalum Carbide)
Carboloy Co., Inc., The,
1141 E. 8 Mile Rd., Detroit, Mich.

TOOLS (Tipped, Carbide)
Ex-Cell-O Corp., 1228 Oakman
Blvd., Detroit, Mich.
McKenna Metals Co.,
200 Lloyd Ave., Latrobe, Pa.

**TORCHES AND BURNERS
(Acetylene, Blow, Oxy-Acetylene)**
Air Reduction, 60 E. 42nd St.,
New York City.
Linde Air Products Co., The,
30 E. 42nd St., New York City.

TOWBOATS
Dravo Corp. (Engin'g Works Div.),
Neville Island, Pittsburgh, Pa.

TOWERS (Transmission)
American Bridge Co.,
Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co.,
Bethlehem, Pa.

TOWERS (Tubular Hoisting)
Dravo Corp., (Machinery Div.),
300 Penn Ave., Pittsburgh, Pa.

TOY PARTS
Townsend Co., New Brighton, Pa.

TRACK ACCESSORIES
Bethlehem Steel Co.,
Bethlehem, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Columbia Steel Co.,
San Francisco, Calif.
Foster, L. B., Co., Inc.,
P. O. Box 1647, Pittsburgh, Pa.
Industrial Equipment Corp.,
Pittsburgh, Pa.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.

TRACK BOLTS
Bethlehem Steel Co.,
Bethlehem, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Columbia Steel Co.,
San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn
St., Chicago, Ill.
Lansom & Sessions Co., The,
1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upton Nut
Div., Dept. ST, 1912 Scranton
Rd., Cleveland, O.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.
Youngstown Sheet & Tube Co., The,
Youngstown, O.

TRAILERS (Arch-Girder)
Yale & Towne Mfg. Co.,
4530 Tacony St., Philadelphia, Pa.

TRAMRAILS
American MonoRail Co., The,
13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleve-
land Crane & Engineering Co.,
1125 Depot St., Wickliffe, O.
Harnischfeger Corp., 4411 W. Na-
tional Ave., Milwaukee, Wis.
Yale & Towne Mfg. Co.,
4530 Tacony St., Philadelphia, Pa.

**TRANSMISSIONS—VARIABLE
SPEED**
Link-Belt Co., 2045 W. Hunting
Park Ave., Philadelphia, Pa.

TRAPS (Compressed Air)
Nicholson, W. H., & Co.,
177 Oregon St., Wilkes-Barre, Pa.

TRAPS (High Pressure Steam)
Nicholson, W. H., & Co.,
177 Oregon St., Wilkes-Barre, Pa.

TRAPS (Steam)
Nicholson, W. H., & Co.,
177 Oregon St., Wilkes-Barre, Pa.

TREADS (Safety)
Alan Wood Steel Co.,
Conshohocken, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Dravo Corp. (Machinery Div.),
300 Penn Ave., Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn
St., Chicago, Ill.
Republic Steel Corp., Dept. ST,
Cleveland, O.
Ryerson, Jos. T., & Son, Inc.,
16th & Rockwell Sts.,
Chicago, Ill.
Tri-Lok Co., 5515 Butler St.,
Pittsburgh, Pa.

TROLLEYS
American MonoRail Co., The,
13102 Athens Ave., Cleveland, O.
Ford Chain Block Div. American
Chain & Cable Co., Inc., 2nd
& Diamond Sts., Philadelphia, Pa.
Northern Engineering Works,
2609 Atwater St., Detroit, Mich.
Wright Mfg. Div. of American
Chain & Cable Co., Inc.,
York, Pa.
Yale & Towne Mfg. Co.,
4530 Tacony St., Philadelphia, Pa.

**TRUCKS AND TRACTORS
(Electric Industrial)**
Atlas Car & Mfg. Co., The,
1140 Ivanhoe Rd., Cleveland, O.
Baker-Raulang Co., The,
2167 W. 25th St., Cleveland, O.
Yale & Towne Mfg. Co., 4530
Tacony St., Philadelphia, Pa.

**TRUCKS AND TRACTORS
(Gasoline Industrial)**
Baker-Raulang Co., The,
2167 W. 25th St., Cleveland, O.

TRUCKS (Dump-Industrial)
Atlas Car & Mfg. Co., The,
1140 Ivanhoe Rd., Cleveland, O.

TRUCKS (Hydraulic Lift)
Atlas Car & Mfg. Co., The,
1140 Ivanhoe Rd., Cleveland, O.

TRUCKS (Lift)
Atlas Car & Mfg. Co., The,
1140 Ivanhoe Rd., Cleveland, O.
Baker-Raulang Co., The,
2167 W. 25th St., Cleveland, O.
Yale & Towne Mfg. Co., 4530
Tacony St., Philadelphia, Pa.

TRUCK CRANES
Northwest Engineering Co.,
28 E. Jackson Blvd.,
Chicago, Ill.

TUBE MILL EQUIPMENT
Mackintosh-Hemphill Co., 9th and
Bingham Sts., Pittsburgh, Pa.

TUBES (Boiler)
Allegheny Ludlum Steel Corp.,
Oliver Bldg., Pittsburgh, Pa.
Babcock & Wilcox Tube Co., The,
Beaver Falls, Pa.
Bethlehem Steel Co.,
Bethlehem, Pa.
Bisset Steel Co., The,
900 E. 67th St., Cleveland, O.
Columbia Steel Co.,
San Francisco, Calif.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Michigan Steel Tube Products Co.,
9450 Buffalo St., Detroit, Mich.
National Tube Co., Frick Bldg.,
Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Pittsburgh Steel Co., 1643 Grant
Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th
& Rockwell Sts., Chicago, Ill.
Steel & Tubes Division, Republic
Steel Corp., Cleveland, O.
Timken Roller Bearing Co., The,
Steel & Tube Div., Canton, O.
Youngstown Sheet & Tube Co., The,
Youngstown, O.

**TUBES (Brass, Bronze, Copper,
Nickel Silver)**
American Brass Co., The,
Waterbury, Conn.
Bridgeport Brass Co.,
Bridgeport, Conn.
Revere Copper & Brass, Inc.,
230 Park Ave., New York City.

TUBES (High Carbon)
Ohio Seamless Tube Co., Shelby, O.
Steel & Tubes Division, Republic
Steel Corp., Cleveland, O.

**TUBING (Alloy Steel)
(*Also Stainless)**
*Babcock & Wilcox Tube Co., The,
Beaver Falls, Pa.
Bisset Steel Co., The,
900 E. 67th St., Cleveland, O.
Columbia Steel Co.,
San Francisco, Calif.
Michigan Steel Tube Products Co.,
9450 Buffalo St., Detroit, Mich.
*National Tube Co., Frick Bldg.,
Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Pittsburgh Steel Co., 1643 Grant
Bldg., Pittsburgh, Pa.
Steel & Tubes Division, Republic
Steel Corp., Cleveland, O.
Timken Roller Bearing Co., The,
Steel & Tube Div., Canton, O.

**TUBING (Copper, Brass,
Aluminum)**
American Brass Co., The,
Waterbury, Conn.
Bundy Tubing Co.,
10951 Fern Ave., Detroit, Mich.
Revere Copper & Brass, Inc.,
230 Park Ave., New York City.
Shenango-Penn Mold Co., Dover, O.

TUBING (Seamless Flexible Metal)
American Metal Hose Branch of
Waterbury, Conn.

TUBING (Seamless Steel)
Babcock & Wilcox Tube Co., The,
Beaver Falls, Pa.
Columbia Steel Co.,
San Francisco, Calif.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
National Tube Co., Frick Bldg.,
Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Pittsburgh Steel Co., 1643 Grant
Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th
& Rockwell Sts., Chicago, Ill.
Steel & Tubes Division, Republic
Steel Corp., Cleveland, O.
Standard Tube Co., The, 14600
Woodward Ave., Detroit, Mich.
Timken Roller Bearing Co., The,
Steel & Tube Div., Canton, O.
Youngstown Sheet & Tube Co., The,
Youngstown, O.

TUBING (Square, Rectangular)
Ohio Seamless Tube Co., Shelby, O.
Steel & Tubes Division, Republic
Steel Corp., Cleveland, O.

TUBING (Welded Steel)
St. Louis Tubing Co.,
10951 Fern Ave., Detroit, Mich.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg.,
St. Louis, Mo.
Michigan Steel Tube Products Co.,
9450 Buffalo St., Detroit, Mich.
Ohio Seamless Tube Co., Shelby, O.
Republic Steel Corp.,
Dept. ST, Cleveland, O.
Revere Copper & Brass, Inc.,
230 Park Ave., New York City.
Steel & Tubes Division, Republic
Steel Corp., Cleveland, O.
Youngstown Sheet & Tube Co., The,
Youngstown, O.

TUBULAR PRODUCTS
Michigan Steel Tube Products Co.,
9450 Buffalo St., Detroit, Mich.
Ohio Seamless Tube Co., Shelby, O.
Steel & Tubes Division, Republic
Steel Corp., Cleveland, O.

**TUMBLING BARRELS (Coke
Testing)**
Brostus, Edgar E., Inc., Sharps-
burg Branch, Pittsburgh, Pa.

TUNGSTEN CARBIDE
Bissett Steel Co., The,
900 E. 67th St., Cleveland, O.
Haynes Stellite Co., Harrison and
Lindsay Sts., Kokomo, Ind.
Michigan Tool Co.,
7171 E. McNichols Rd.,
Detroit, Mich.

**TUNGSTEN CARBIDE
(Tools and Dies)**
Carboloy Co. Inc., The,
11141 E. 8 Mile Rd., Detroit, Mich.
Firth-Sterling Steel Co.,
McKeesport, Pa.
McKenna Metals Co.,
200 Lloyd Ave., Latrobe, Pa.

TUNGSTEN METAL AND ALLOYS
Electro Metallurgical Sales Corp.,
30 E. 42nd St., New York City.

TURBINES (Steam)
Allis-Chalmers Mfg. Co.,
Milwaukee, Wis.
General Electric Co.,
Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
Dept. 7-N, East Pittsburgh, Pa.

TURBO BLOWERS—See BLOWERS

TURNTABLES
American Bridge Co.,
Frick Bldg., Pittsburgh, Pa.
Atlas Car & Mfg. Co., The,
1140 Ivanhoe Rd., Cleveland, O.

**TURRET LATHES—See LATHES
(Turret)**

TWIST DRILLS
Cleveland Twist Drill Co.,
1242 E. 49th St., Cleveland, O.
Greenfield Tap & Die Corp.,
Greenfield, Mass.

VACUUM CLEANERS
Sturtevant, B. F. Co.,
Hyde Park, Boston, Mass.

**VALVE CONTROL
(Motor Operated Units)**
Cutler-Hammer, Inc., 1267 St. Paul
Ave., Milwaukee, Wis.

VALVES (Blast Furnace)
Bailey Wm. M., Co.,
702 Magee Bldg., Pittsburgh, Pa.
Brostus, Edgar E., Inc., Sharps-
burg Branch, Pittsburgh, Pa.

VALVES (Brass, Iron and Steel)
Crane Co., 836 S. Michigan Ave.,
Chicago, Ill.
Reading-Pratt & Cady Div. of Ameri-
can Chain & Cable Co. Inc.,
Bridgeport, Conn.

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

**VALVES (Control—Air and
Hydraulic)**
Foxboro Co., The, 118 Neponset
Ave., Foxboro, Mass.
Hannifin Mfg. Co., 621-631 So.
Kolmar Ave., Chicago, Ill.
Nicholson, W. H., & Co.,
177 Oregon St., Wilkes-Barre, Pa.

VALVES (Electrically Operated)
Foxboro Co., The, 118 Neponset
Ave., Foxboro, Mass.
Nicholson, W. H., & Co.,
177 Oregon St., Wilkes-Barre, Pa.

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

VALVES (Gate)
Bartlett-Hayward Div., Koppers
Co., Baltimore, Md.
Crane Co., The, 836 S. Michigan
Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of
American Chain & Cable Co. Inc.,
Bridgeport, Conn.
Western Gas Div., Koppers Co.,
Fort Wayne, Ind.

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

VALVES (Hydraulic)
Birdsboro Steel Fdry. & Mach. Co.,
Birdsboro, Pa.
Elmes, Chas. F., Engineering
Works, 243 N. Morgan St.,
Chicago, Ill.
Vickers, Inc., 1400 Oakman Blvd.,
Detroit, Mich.
Wood, R. D., Co., 400 Chestnut St.,
Philadelphia, Pa.

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

**VALVES (Open Hearth Control—
Oil, Tar, Steam & Air)**
Nicholson, W. H., & Co.,
177 Oregon St., Wilkes-Barre, Pa.

VALVES (Proportioning)
North American Mfg. Co., The,
2901 E. 75th St., Cleveland, O.

VALVES (Steam and Water)
Reading-Pratt & Cady Div. of
American Chain & Cable Co. Inc.,
Bridgeport, Conn.

**VALVES AND FITTINGS—See
PIPE FITTINGS**

VANADIUM
Electro Metallurgical Sales Corp.,
30 E. 42nd St., New York City.

**VIADUCTS (Steel)—See BRIDGES,
ETC.**

**WALKWAYS—See FLOORING—
STEEL**

WASHERS (Iron and Steel)
Hubbard, M. D., Spring Co.,
421 Central Ave., Pontiac, Mich.
Thompson-Bremer & Co.,
1640 W. Hubbard St.,
Chicago, Ill.

WASHERS (Lock)
American Nut & Bolt Fastener Co.,
Pittsburgh, Pa.
Beall Tool Co., East Alton, Ill.
Butcher & Hart Mfg. Co.,
Toledo, O.
Eaton Mfg. Co., Massillon, O.
National Lock Washer Co., The,
Newark, N. J.
Shakeproof Lock Washer Co.,
2525 N. Keeler Ave., Chicago, Ill.
Thompson-Bremer & Co., 1640 W.
Hubbard St., Chicago, Ill.
Washburn Co., The, Worcester,
Mass.

WASHERS (Spring)
American Nut & Bolt Fastener Co.,
Pittsburgh, Pa.
Beall Tool Co., East Alton, Ill.
Butcher & Hart Mfg. Co., Toledo, O.
Eaton Mfg. Co., Massillon, O.
National Lock Washer Co., The,
Newark, N. J. and
Milwaukee, Wis.
Philadelphia Steel & Wire Corp.,
Germantown, Philadelphia, Pa.
Positive Lock Washer Co.,
Newark, N. J.
Shakeproof Lock Washer Co.,
2525 N. Keeler Ave., Chicago, Ill.
Thompson-Bremer & Co., 1640 W.
Hubbard St., Chicago, Ill.

WELDERS (Electric—Arc)
Harnischfeger Corp., 4411 W. Na-
tional Ave., Milwaukee, Wis.
Hobart Bros.,
Dept. ST-124, Troy, O.
Lincoln Electric Co., The,
Cleveland, O.
Progressive Welder Co., 3031 E.
Outer Drive, Detroit, Mich.

WELDERS (Electric-Resistance)
Federal Machine & Welder Co.,
Dana St., Warren, O.
Taylor-Winfield Corp., Warren, O.

WELDING
Bartlett-Hayward Div. Koppers
Co., Baltimore, Md.
Koch, George, Sons, Inc.,
2112 Pennsylvania St.,
Evansville, Ind.
Lincoln Electric Co., The,
Cleveland, O.
Western Gas Div., Koppers Co.,
Fort Wayne, Ind.

**WELDING (Welded Machine Steel
Bases)**
Kirk & Blum Mfg. Co., The,
2838 Spring Grove Ave.,
Cincinnati, O.

**WELDING AND CUTTING
APPARATUS AND SUPPLIES
(Electric)**
General Electric Co.,
Schenectady, N. Y.
Harnischfeger Corp., 4411 W. Na-
tional Ave., Milwaukee, Wis.
Hobart Bros.,
Dept. ST-124, Troy, O.
Lincoln Electric Co., The,
Cleveland, O.
Wilson Welder & Metals Co.,
60 E. 42nd St., New York City.
Westinghouse Electric & Mfg. Co.,
Dept. 7-N, East Pittsburgh, Pa.

**WELDING AND CUTTING
APPARATUS AND SUPPLIES
(Oxy-Acetylene)**
Air Reduction, 60 E. 42nd St.,
New York City.
Linde Air Products Co., The,
30 E. 42nd St., New York City.

WELDING RODS (Alloys)
American Agile Corp.,
5806 Hough Ave., Cleveland, O.
Harnischfeger Corp., 4411 W. Na-
tional Ave., Milwaukee, Wis.
Lincoln Electric Co., The,
Cleveland, O.
Maurath, Inc., 7311 Union Ave.,
Cleveland, O.
Metal & Thermit Corp.,
120 Broadway, New York City.
Page Steel & Wire Div. of Ameri-
can Chain & Cable Co. Inc.,
Monessen, Pa.

WELDING RODS (Bronze)
American Brass Co., The,
Waterbury, Conn.
Revere Copper & Brass, Inc.,
230 Park Ave., New York City.

WELDING RODS OR WIRE
Air Reduction, 60 E. 42nd St.,
New York City.
American Agile Corp.,
5806 Hough Ave., Cleveland, O.
American Brass Co., The,
Waterbury, Conn.
American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Bridgeport Brass Co.,
Bridgeport, Conn., 4411 W. Na-
tional Ave., Milwaukee, Wis.

Hobart Bros.,
Dept. ST-124, Troy, O.
Lincoln Electric Co., The,
Cleveland, O.
Linde Air Products Co., The,
30 E. 42nd St., New York City.
Maurath, Inc., 7311 Union Ave.,
Cleveland, O.
Metal & Thermit Corp.,
120 Broadway, New York City.
Page Steel & Wire Div. of Ameri-
can Chain & Cable Co. Inc.,
Monessen, Pa.
*Pittsburgh Steel Co., 1643 Grant
Bldg., Pittsburgh, Pa.
Revere Copper & Brass, Inc.,
230 Park Ave., New York City.
Ryerson, Jos. T. & Son, Inc., 16th
and Rockwell Sts., Chicago, Ill.
Seneca Wire & Mfg. Co.,
Fostoria, O.
Washburn Wire Co.,
Phillipsdale, R. I.
Wickwire Brothers, 189 Main St.
Cortland, N. Y.
Wickwire Spencer Steel Co.,
500 Fifth Ave., New York City.

Wilson Welder & Metals Co.,
60 East 42nd St., New York City.
Youngstown Sheet & Tube Co., The,
Youngstown, O.

WHEELS (Car and Locomotive)
Bethlehem Steel Co.,
Bethlehem, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Columbia Steel Co.,
San Francisco, Calif.
Midvale Co., The, Nicetown,
Philadelphia, Pa.
Standard Steel Works Div. of The
Baldwin Locomotive Works,
Philadelphia, Pa.

WHEELS (Track)
National-Erie Corp., Erie, Pa.

WINCHES (Electric)
American Engineering Co.,
2484 Aramingo Ave.,
Philadelphia, Pa.
Shepard Niles Crane & Hoist Corp.,
358 Schuyler Ave.,
Montour Falls, N. Y.

**WIRE (Alloy Steel)
(*Also Stainless)**
*American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Columbia Steel Co.,
San Francisco, Calif.
Firth-Sterling Steel Co.,
McKeesport, Pa.
*Page Steel & Wire Div. of Ameri-
can Chain & Cable Co. Inc.,
Monessen, Pa.
Pittsburgh Steel Co., 1643 Grant
Bldg., Pittsburgh, Pa.
*Republic Steel Corp.,
Dept. ST, Cleveland, O.
Seneca Wire & Mfg. Co.,
Fostoria, O.
Wickwire Spencer Steel Co.,
500 Fifth Ave., New York City.

**WIRE (Annealed, Bright,
Galvanized)**
American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co.,
Bethlehem, Pa.
Columbia Steel Co.,
San Francisco, Calif.
Laclede Steel Co., Arcade Bldg.,
St. Louis, Mo.
Page Steel & Wire Div. of Ameri-
can Chain & Cable Co. Inc.,
Monessen, Pa.
Pittsburgh Steel Co., 1643 Grant
Bldg., Pittsburgh, Pa.
Republic Steel Corp.,
Dept. ST, Cleveland, O.
Seneca Wire & Mfg. Co.,
Fostoria, O.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.
Wheeling Steel Corp.,
Wheeling, W. Va.
Wickwire Brothers,
189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co.,
500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The,
Youngstown, O.

WIRE (Barb)
Bethlehem Steel Co.,
Bethlehem, Pa.
Pittsburgh Steel Co., 1643 Grant
Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.
Youngstown Sheet & Tube Co., The,
Youngstown, O.

WIRE (Cold Drawn)
Page Steel & Wire Div. of
American Chain & Cable Co. Inc.,
Monessen, Pa.
Pittsburgh Steel Co., 1643 Grant
Bldg., Pittsburgh, Pa.
Washburn Wire Co., 118th St. &
Harlem River, New York City.

WIRE (High Carbon)
American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Firth-Sterling Steel Co.,
McKeesport, Pa.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg.,
St. Louis, Mo.
Page Steel & Wire Div. of Ameri-
can Chain & Cable Co. Inc.,
Monessen, Pa.
Pittsburgh Steel Co., 1643 Grant
Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST,
Cleveland, O.
Seneca Wire & Mfg. Co.,
Fostoria, O.
Washburn Wire Co.,
118th St. and Harlem River,
New York City.

WHERE - TO - BUY

WIRE (Music)

American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Washburn Wire Co.,
118th St. and Harlem River,
New York City.
Wickwire Spencer Steel Co.,
500 Fifth Ave., New York City.

WIRE (Round, Flat, Square, Special Shapes)

American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Columbia Steel Co.,
Los Angeles, Calif.
Page Steel & Wire Div., of
American Chain & Cable Co.,
inc., Monessen, Pa.
Republic Steel Corp., Dept. ST,
Cleveland, O.
Seneca Wire & Mfg. Co.,
Fostoria, O.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.
Washburn Wire Co.,
118th St. and Harlem River,
New York City.
Wickwire Spencer Steel Co.,
500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The
Youngstown, O.

WIRE (Spring)

American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co.,
Bethlehem, Pa.
Firth-Sterling Steel Co.,
McKeesport, Pa.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg.,
St. Louis, Mo.
Page Steel & Wire Div. of
American Chain & Cable Co.,
inc., Monessen, Pa.
Pittsburgh Steel Co.,
1643 Grant Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.
Washburn Wire Co., 118th St. &
Harlem River, New York City.

WIRE (Stainless)

Allsheny Ludlum Steel Corp.,
Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co.,
McKeesport, Pa.
Page Steel & Wire Div. of Ameri-
can Chain & Cable Co. Inc.,
Monessen, Pa.
Pittsburgh Steel Co., 1643 Grant
Bldg., Pittsburgh, Pa.
Keystone Steel & Wire Co.,
Peoria, Ill.

WIRE (Threaded)

Townsend Co., New Brighton, Pa.

WIRE (Welding)—See WELDING RODS OR WIRE

WIRE AND CABLE (Electric)

American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Graybar Electric Co., Graybar
Bldg., New York City.

WIRE CLOTH

Cyclone Fence Co., Waukegan, Ill.
Seneca Wire & Mfg. Co.,
Fostoria, O.
Wickwire Brothers,
189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co.,
500 Fifth Ave., New York City.

WIRE DRAWING COMPOUND

Cowles Detergent Co., The,
Heavy Chemical Div.,
7018 Euclid Ave., Cleveland, O.

WIRE FORMS, SHAPES AND SPECIALTIES

American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Columbia Steel Co.,
San Francisco, Calif.
Firth-Sterling Steel Co.,
McKeesport, Pa.
Hubbard, M. D., Spring Co.,
421 Central Ave., Pontiac, Mich.
Ludlow-Saylor Wire Co., The,
Newstead Ave. & Wabash R. R.,
St. Louis, Mo.
Seneca Wire & Mfg. Co.,
Fostoria, O.
Townsend Co., New Brighton, Pa.

WIRE FORMING MACHINERY

Nilson, A. H., Machine Co., The,
Bridgeport, Conn.

WIRE MILL EQUIPMENT

Lewis Foundry & Machine Div. of
Blaw-Knox Co., Pittsburgh, Pa.
Lewis Machine Co.,
3450 E. 76th St., Cleveland, O.

Morgan Construction Co.,
Worcester, Mass.
Shuster, F. B. Co., The,
New Haven, Conn.

WIRE NAILS—See NAILS

WIRE PRODUCTS (*Also Stainless)

Accurate Spring Mfg. Co.,
3823 W. Lake St., Chicago, Ill.
American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Hubbard, M. D., Spring Co.,
421 Central Ave., Pontiac, Mich.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Leschen, A. & Sons Rope Co.,
5909 Kennerly Ave.,
St. Louis, Mo.
Ludlow-Saylor Wire Co., The,
Newstead Ave. & Wabash R. R.,
St. Louis, Mo.
Pittsburgh Steel Co.,
1643 Grant Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST,
Cleveland, O.
Seneca Wire & Mfg. Co.,
Fostoria, O.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.
Townsend Co., New Brighton, Pa.
Washburn Wire Co.,
118th St. and Harlem River,
New York City.
Wickwire Brothers,
189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co.,
500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The
Youngstown, O.

WIRE ROPE AND FITTINGS (*Also Stainless)

American Cable Div. of American
Chain & Cable Co. Inc.,
Wilkes-Barre, Pa.
American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co.,
Bethlehem, Pa.
Broderick & Bascom Rope Co.,
4203 N. Union St., St. Louis, Mo.
Hazard Wire Rope Div. of American
Chain & Cable Co. Inc.,
Wilkes-Barre, Pa.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Leschen, A. & Sons Rope Co.,
5909 Kennerly Ave.,
St. Louis, Mo.
Macwhyte Co., 2912 14th Ave.,
Kenosha, Wis.
Wickwire Spencer Steel Co.,
500 Fifth Ave., New York City.

WIRE ROPE SLINGS

American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Broderick & Bascom Rope Co.,
4203 N. Union St., St. Louis, Mo.
Leschen, A. & Sons Rope Co.,
5909 Kennerly Ave.,
St. Louis, Mo.
Macwhyte Co., 2912 14th Ave.,
Kenosha, Wis.

WIRE STRAIGHTENING AND CUTTING MACHINERY

Lewis Foundry & Machine Div. of
Blaw-Knox Co., Pittsburgh, Pa.
Lewis Machine Co.,
3450 E. 76th St., Cleveland, O.
Shuster, F. B. Co., The,
New Haven, Conn.
Williams, J. H., & Co.,
225 Lafayette St., Buffalo, N. Y.

WRENCHES (Drop Forged)

Williams, J. H., & Co.,
400 Vulcan St., Buffalo, N. Y.

ZINC

New Jersey Zinc Co.,
160 Front St., New York City.
St. Joseph Lead Co.,
250 Park Ave., New York City.

ZINC ALLOYS

New Jersey Zinc Co.,
160 Front St., New York City.
St. Joseph Lead Co.,
250 Park Ave., New York City.

ZINC (Rolled Sheets, Strips, Coils)

New Jersey Zinc Co.,
160 Front St., New York City.
St. Joseph Lead Co.,
250 Park Ave., New York City.

ZIRCONIUM METAL AND ALLOYS

Electro Metallurgical Sales Co.,
30 E. 42nd St., New York City.



The I. C. S. student
stands out in the
**INDUSTRIAL
WORLD!**

For nearly half a century, students of the International Correspondence Schools have stood out from the great mass of industrial workers—for two reasons:

First, because I.C.S. naturally attracted those workers who were most ambitious to better their positions in Industry—whose vision was superior to the "norm."

Second, because I.C.S. enabled these workers to acquire sound, practical training, and thus to raise themselves above the common level.

Yet the fact is, countless thousands of men employed in Industry might have become better, more efficient, more valuable workers if *Management* had given them more encouragement to seek the training they lacked!

Today, the International Correspondence Schools have current employee-training agreements with more than 2000 progressive business and industrial concerns. Many of these agreements have been in effect for 20 years.

To each of these organizations, I.C.S. (after an analysis of that concern's needs) provides a training program, designed to provide a permanent source of soundly trained, modernized manpower—familiar with that concern's methods, equipment, organization, products, customer-requirements and policies.

With the encouragement of Management, thousands of workers have enrolled for training courses under the terms of these agreements—and willingly assumed the cost of their training!

For complete information on this important phase of I.C.S. activity, mail the attached coupon. (You incur no obligation by doing so, of course.)

**International
Correspondence
Schools**

SCRANTON, PENNSYLVANIA

INTERNATIONAL CORRESPONDENCE SCHOOLS

Box 9380, Scranton, Penna.

• Please send full information on I.C.S. group training activities to:

Name _____ Position _____

Company _____

Address _____

USED and REBUILT EQUIPMENT MATERIALS

IF YOU WANT TO BUY OR SELL
good used or rebuilt equipment or materials—Place an advertisement in this
section. Write STEEL, Penton Bldg., Cleveland, Ohio

FOR SALE

NEW PICKLING TANKS
23' 0" x 5' 0" x 3' 0"—8-inch Timbers
23' 0" x 5' 0" x 2' 0"—6-inch Timbers
Strip Wringer & Dryer
The above equipment never used.
For further information write
RELIANCE STEEL CORPORATION
1170 Ivanhoe Road Cleveland, Ohio

FOR SALE

18" Canton Portable Alligator Shears.
12" ram x 15' stroke Hydraulic Accumulator, 1500 lbs. pressure.
500 Ton Bethlehem Steel Shell Press, 10-shell capacity.
6 x 12" HPM Vertical Triplex Pump, 700 lbs. pressure, 200 GPM.
Address Box 365
STEEL, Penton Bldg., Cleveland.

SHEET BAR SHEAR

1—1 1/4" x 36" Mesta vertical open throat sheet bar shear with gauge. Cuts four 1 1/4" x 8" cold soft steel sheet bars, 30 cuts per minute, 4 1/2" stroke, 18" throat. Arr'd. motor drive—weight 58,000 lbs.

JOHN D. CRAWBUCK CO., PITTSBURGH, PA.
Phone Atlantic 6345

AIR COMPRESSOR

676 Cu. ft. Ingersoll-Rand, XRE, 2-stage, direct Syn. motor drive 3/60/440 V. with starting panel, exciter and air tank. Very fine condition.

HYDRAULIC PRESS

150-Ton Chambersburg, self-contained, 2-column, 30" stroke, 72" x 36" bed, daylight 48", for direct motor drive. Excellent condition.

ELECTRIC MELTING FURNACE

3-Ton Swindell, current 3/60/22,000 V. Very good. Immediate shipments.

MARR-GALBREATH MACHINERY CO.
55 Water St. Pittsburgh, Pa.

The cost of an advertisement in this section is moderate. Write STEEL, Penton Bldg., Cleveland.

—REBUILT—

BLOWERS - FANS - EXHAUSTERS

Connersville-Roots positive blowers
Centrifugals for gas and oil burning.
Sand blast, grinder and dust exhausters.
Ventilating fans and roof ventilators.

GENERAL BLOWER CO.

404 North Peoria St. Chicago, Ill.

MILL MOTOR

300 HP 230V-DC 500 RPM
G. E., Type MFC, form A Comp. wound, interpole, pedestal brgs., with magnetic reversing control panel, master controller and spare armature, condition equals new.

JOHN D. CRAWBUCK CO., PITTSBURGH, PA.
Phone Atlantic 6345

Rails—"1 Ton or 1000"

NEW RAILS—5000 tons—All Sections—All sizes.
RELAYING RAILS—25,000 tons—All Sections—All sizes, practically as good as New.
ACCESSORIES—Every Track Accessory carried in stock—Angle and Splice Bars, Bolts, Nuts, Frogs, Switches, Tie Plates
Buy from One Source—Save Time and Money
Phone, Write, or Wire

L. B. FOSTER COMPANY, Inc.
PITTSBURGH NEW YORK CHICAGO

FOR SALE

4 Practically new Monel pickle crates and hangers, welded construction, 126 in. x 45 in., suitable for weights up to 15,000 pounds. Write for dimensions. Bargain for quick buyer. Address Box 344, STEEL, Penton Bldg., Cleveland.

Boring Mills 42" Bullard, 72" Niles, B.D.
Blair, 22-P Logemann, Pump and motor.
Draw Bench, 30,000 lbs. W-F, 22" draw, M.D.
Grinder, Knife 10" Bridgeport, M.D.
Grinder, Knife 30" x 76" Farrel, M.D.
Press, Forging 150 ton United Steam Hyd.
Pipe Mchs, 2-4-6-8-12" Williams, M.D.
Shears Plate, 10' x 1 1/2"—48" x 1 1/2"—98" x 1 1/2", M.D.
Sheet Levellers, 48"-60"-84" McKay, 17 roll, M. D.

WEST PENN MACHINERY CO.
1208 House Bldg. Pittsburgh, Pa.

800-TON HYDRAULIC PRESS

MORGAN ENGINEERING COMPANY
Model No. 95. 800-ton capacity; 2 rams. Bed area approx. 48" x 15' 20" stroke; 42" day-light. Complete with pump and fittings. First-class condition.

BARGAIN PRICE BEFORE MOVING
FALK MILL SUPPLY CO., INC.
18 Ward St. Rochester, N. Y.

FOR RENT OR SALE

Modern 10" Rolling Mill including 16" break down rolls For Rent or Sale with all necessary equipment in New York Metropolitan District. Address Box 330, STEEL, Penton Bldg., Cleveland.

FOR SALE

20 Steel Gondolas 50 Ton 40' long
20 Ton American Steam Locomotive Crane
300 KW Skinner Uniflow Generator
120, 180 and 240 HP Fairbanks Diesels
150 KW Worthington 2300 Volt Diesel

WHAT DO YOU NEED—OR WANT TO SELL?

MISSISSIPPI VALLEY EQUIPMENT CO.
511A Locust Street St. Louis, Mo.

WANTED

SECOND-HAND
GALVANIZING EQUIPMENT

P. O. Box 1991
Birmingham, Alabama

Do You Want to Sell
USED or SURPLUS
Machinery? . . .

■ STEEL can help you contact prospects by placing your advertisement before 60,000 readers in the metalworking and metal-producing industries.

■ Place your advertisement in the "Used and Rebuilt Machinery" section of STEEL.

■ Rates are moderate. Send in your copy today. Write STEEL, Penton Building, Cleveland, Ohio.



CONTRACT WORK

PATTERN EQUIPMENT

WOOD or METAL

Made Right and Delivered
When Promised.

THE WELLMAN BRONZE & ALUMINUM COMPANY
6011 SUPERIOR AVE.
CLEVELAND, OHIO

Send Your Inquiries for
ACID PROOF CONSTRUCTION
TO THE
SAUEREISEN CEMENTS Co.
PITTSBURGH (15), PENNA.
Manufacturers of Insa-Lute, Technical and
Industrial Cements . . . Compounds

Send your inquiries for
SPECIAL ENGINEERING WORK
to the
A. H. NILSON MACHINE COMPANY,
BRIDGEPORT, CONN.
designers and builders of wire and ribbon
stock forming machines.
We also solicit your bids for cam milling

KIRK & BLUM

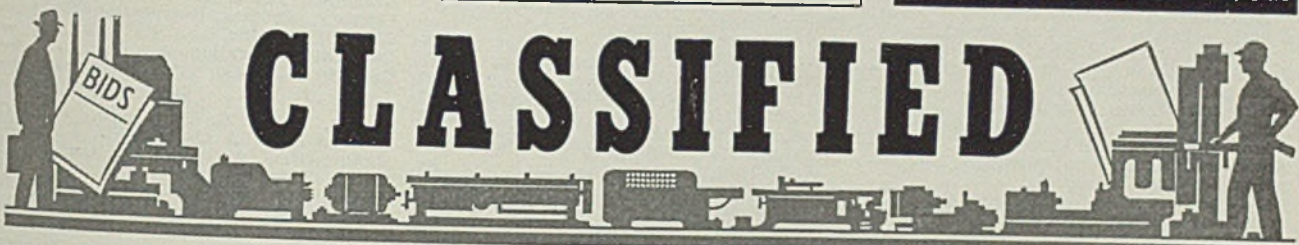
**WELDED MACHINE BASES,
PEDESTALS and FRAMES**

LATHE PANS

GEAR and BELT GUARDS

*Pressed Steel Louver Panels
and Cover Plates*

THE KIRK & BLUM MFG. CO.
2822 Spring Grove Ave., Cincinnati, Ohio



CLASSIFIED

Positions Wanted

TWENTY YEARS' EXPERIENCE Structural and plate shop superintendent available January 1st as superintendent of plant, or estimating sales representative. Moderate salary until proven results. Address Box 372, STEEL, Penton Bldg., Cleveland.

METALLURGIST NOW EMPLOYED in responsible position desires change. Experienced in acid open-hearth and electric furnace operation, supervision of heat treating and flame hardening department and chemical laboratory. Address Box 366, STEEL, Penton Bldg., Cleveland.

OPEN HEARTH OR STEEL PLANT Executive, technically trained and practically experienced in manufacture of alloy and carbon steel, killed and rimming grades, acid and basic practice, broad steel plant training in foundry, rolling, forging, etc. Address Box 373, STEEL, Penton Bldg., Cleveland.

ROLL DESIGNER, THOROUGHLY Acquainted with latest methods of rolling alloy, tool, noncorrosive, aircraft, and mild steel rods, bars, shapes, and strips. Also roll slitting and rolling electric ingots direct. Twenty years' experience. Address Box 370, STEEL, Penton Bldg., Cleveland.

Accounts Wanted

ACCOUNTS WANTED - DETROIT - Graduate Metallurgist, Established clientele in Detroit area, wants one additional account. Office, telephone and stenographic services. Address Box 362, STEEL, Penton Bldg., Cleveland.

LET ME REPRESENT YOU ON A Commission Basis in Chicago territory; 15 years' experience. Reply Box 374, STEEL, Penton Bldg., Cleveland.

Representatives Wanted

SALES AGENTS WANTED - TO Represent modern electric foundry located in mid-west on commercial steel castings; straight commission on all business developed. Address Box 356, STEEL, Penton Bldg., Cleveland.

CLASSIFIED RATES

All classifications other than "Positions Wanted," set solid, minimum 50 words, 5.00, each additional word .10; all capitals, minimum 50 words, 6.50, each additional word .13; all capitals, leaded, minimum 50 words 7.50, each additional word .15. "Positions Wanted," set solid, minimum 25 words 1.25, each additional word .05; all capitals, minimum 25 words 1.75, each additional word .07; all capitals, leaded, minimum 25 words 2.50, each additional word .10. Keyed address takes seven words. Cash with order necessary on "Positions Wanted" advertisements. Replies forwarded without charge.

Classified pages are 3 columns, each column 2 1/4 inches wide.

Forms close Wednesday preceding publication date.

Bids Wanted

Federal Works Agency, Public Buildings Administration, Washington, D. C., Nov. 26, 1940.—Sealed proposals in duplicate will be publicly opened in this office at 1 P. M., Standard Time, Dec. 17, 1940, for construction of the F. C. C. Radio Monitoring Station, Allegan, Mich. Upon application, one set of drawings and specifications will be supplied free to each general contractor interested in submitting a proposal. The above drawings and specifications MUST be returned to this office. Contractors requiring additional sets may obtain them by purchase from this office at a cost of \$5 per set, which will not be returned. Checks offered as payment for drawings and specifications must be made payable to the order of the Treasurer, U. S. Drawings and specifications will not be furnished to contractors who have consistently failed to submit proposals. One set upon request, and when considered in the interests of the Government, will be furnished, in the discretion of the Commissioner, to builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any sub-contractor or material firm interested, and to quantity surveyors, but this privilege will be withdrawn if the sets are not returned after they have accomplished their purpose. W. E. Reynolds, Commissioner of Public Buildings, Federal Works Agency.

Castings

OHIO

THE WEST STEEL CASTING CO., Cleveland. Fully equipped for any production problem. Two 1 1/2 ton Elec. Furnaces. Makers of high grade light steel castings, also alloy castings subject to wear or high heat.

PENNSYLVANIA

NORTH WALES MACHINE CO., INC., North Wales. Grey Iron, Nickel, Chrome, Molybdenum Alloys, Semi-steel. Superior quality machine and hand molded sand blast and tumbled.

For Sale

WARREN, OHIO LOCALITY

4 Acres land with one story building approximately 52,000 sq. ft. modern daylight, brick and steel construction, saw tooth roof, steam heat. R. R. siding. 3 cranes 5/10 ton capacity. Offices fully equipped. Address Box 369, STEEL, Penton Bldg., Cleveland.

Employment Service

SALARIED POSITIONS
\$2,500 to \$25,000

This thoroughly organized advertising service of 30 years' recognized standing and reputation, carries on preliminary negotiations for positions of the caliber indicated above, through a procedure individualized to each client's personal requirements. Several weeks are required to negotiate and each individual must finance the moderate cost of his own campaign. Retaining fee protected by refund provision as stipulated in our agreement. Identity is covered and, if employed, present position protected. If your salary has been \$2,500 or more, send only name and address for details. R. W. Bixby, Inc., 110 Delward Bldg., Buffalo, N. Y.

◆ ◆ ADVERTISING INDEX ◆ ◆

Where-to-Buy Products Index carried in first issue of month.

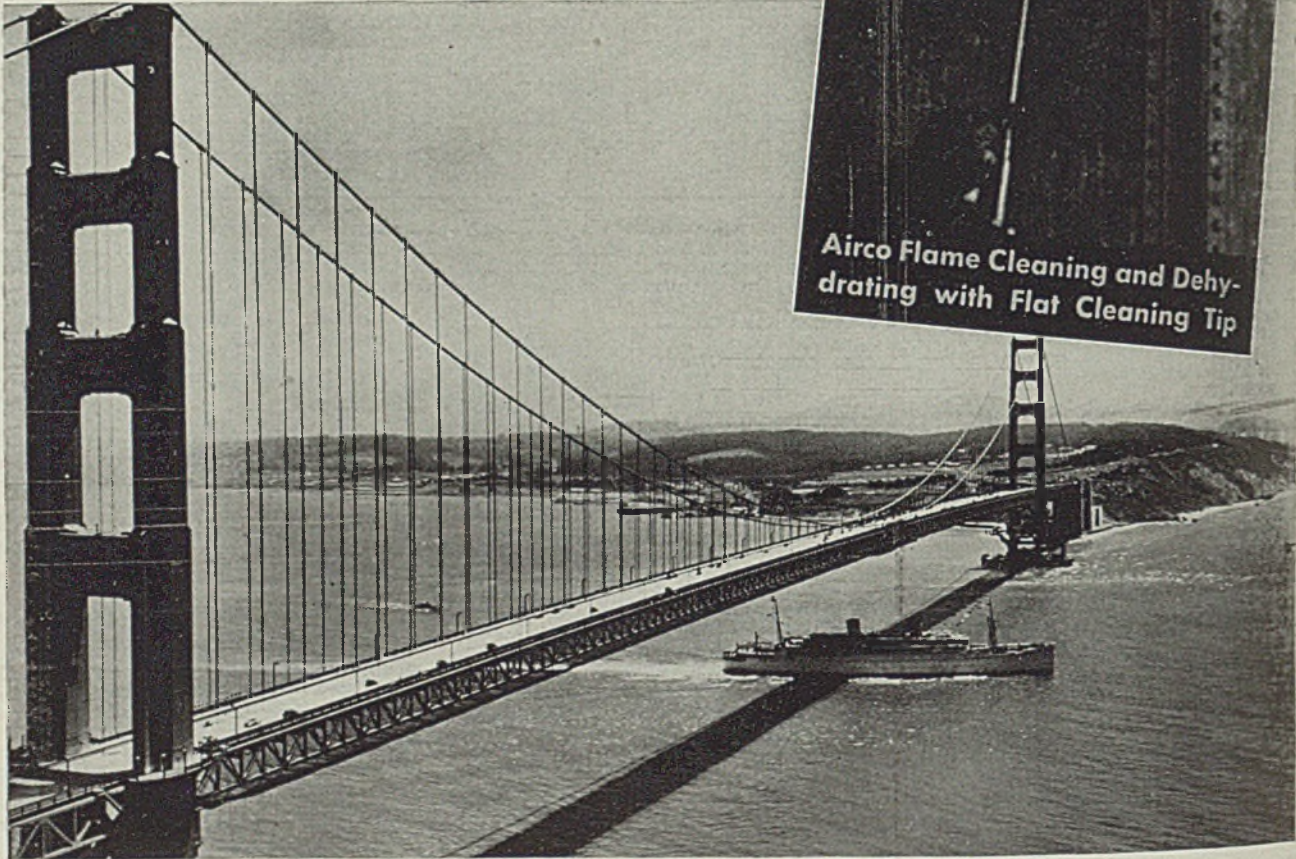
	Page		Page		Page
A					
Abart Gear & Machine Co.	—	Brown Instrument Co., The	—	Farrel-Birmingham Co., Inc.	99
Abrasive Co., Division of Simmonds Saw & Steel Co.	—	Bryant Chucking Grinder Co.	—	Farval Corp., The	—
Accurate Spring Mfg. Co.	84	Buffalo Galvanizing & Tinning Works	—	Federal Machine & Welder Co.	—
Acme Galvanizing, Inc.	—	Bullard Co., The	—	Finn, John, Metal Works	—
Acme Steel & Malleable Iron Works.	—	Bundy Tubing Co.	—	Firth-Sterling Steel Co.	131
Air Reduction	146	C			
Airtherm Mfg. Co.	—	Cadman, A. W., Mfg. Co.	—	Flexrock Co.	—
Ajax Electrothermic Corp.	—	Canton Pattern & Mfg. Co., The	137	Flood Co., The	—
Ajax Flexible Coupling Co.	—	Carboloy Co., Inc.	—	Ford Chain Block Division of American Chain & Cable Co., Inc.	—
Ajax Manufacturing Co.	—	Carborundum Co., The	—	Foster, L. B., Co.	142
Alan Wood Steel Co.	—	Carey, Phillip, Co., The	97	Foxboro Co., The	70, 71
Allegheny Ludlum Steel Corp.	131	Carnegie-Illinois Steel Corp.	—	Fox Grinders, Inc.	—
Allen-Bradley Co.	—	Carpenter Steel Co., The	51	Fuller Brush Co.	—
Allis-Chalmers Mfg. Co.	—	Cattie, Joseph P., & Bros., Inc.	—	G	
Alrose Chemical Co.	—	Cellcote Co., The	129	Garden City Fan Co.	—
American Agile Corp.	—	Central Screw Co.	—	Garlock Packing Co., The	—
American Brass Co., The	—	Chain Belt Co.	8	General Blower Co.	142
American Bridge Co.	—	Challenge Machinery Co., The	—	General Electric Co.	—
American Chain & Cable Co., Inc., American Chain Division	—	Chambersburg Engineering Co.	75	General Electric Co., Lamp Dept.	65
American Chain & Cable Co., Inc., Ford Chain Block Division	—	Chandler Products Co.	—	Globe Brick Co., The	100
American Chain & Cable Co., Inc., Page Steel & Wire Division	108	Chicago Perforating Co.	—	Granite City Steel Co.	—
American Chain Division of American Chain & Cable Co., Inc.	—	Chicago Rawhide Mfg. Co.	—	Grant Gear Works	119
American Chemical Paint Co.	—	Chromium Mining and Smelting Corp., Ltd.	133	Graybar Electric Co.	—
American Engineering Co.	—	Cincinnati Grinders, Inc.	—	Great Lakes Steel Corp.	—
American Flexible Coupling Co.	—	Cincinnati Milling Machine Co.	—	Greenfield Tap & Die Corp.	36
American Forge Division of the American Brake Shoe & Foundry Co.	—	Cincinnati Shaper Co., The	2	Gregory, Thomas, Galvanizing Works	—
American Foundry Equipment Co., The	—	Clark Controller Co.	—	Grinnell Co., Inc.	—
American Gas Association	—	Cleveland Cap Screw Co.	—	Gulf Oil Corporation	—
American Hot Dip Galvanizers Association	—	Cleveland-Cliffs Iron Co.	—	Gulf Refining Co.	—
American Lanolin Corp.	—	Cleveland Crane & Engineering Co.	—	H	
American Monorail Co.	—	Cleveland Hotel	—	Hagan, George J., Co.	123
American Pulverizer Co.	—	Cleveland Punch & Shear Works Co.	14	Halden Machine Co., The	—
American Roller Bearing Co.	—	Cleveland Tramrail Division, Cleveland Crane & Engineering Co.	98	Hanlon-Gregory Galvanizing Co.	73
American Rolling Mill Co., The	—	Cleveland Twist Drill Co., The	68	Hanna Furnace Corp.	—
American Screw Co.	—	Cleveland Worm & Gear Co., The	—	Hannifin Mfg. Co.	112
American Shear Knife Co.	111	Climax Molybdenum Co.	—	Harnischfeger Corp.	—
American Steel & Wire Co.	—	Columbian Steel Tank Co.	—	Harrington & King Perforating Co.	115
American Tinning & Galvanizing Co.	—	Columbia Steel Co.	—	Hays Corp., The	—
Ampco Metal, Inc.	—	Columbus Die, Tool & Machine Co.	—	Heald Machine Co.	—
Amsler-Morton Co., The	—	Commercial Metals Treating, Inc.	—	Heppenstall Co.	—
Andrews Steel Co., The	—	Cone Automatic Machine Co., Inc.	—	Hevl Duty Electric Co.	—
Apollo Steel Co.	—	Continental Machines, Inc.	—	Hillside Fluor Spar Mines	—
Armstrong-Blum Mfg. Co.	113	Continental Roll & Steel Foundry Co.	—	Hindley Mfg. Co.	123
Armstrong Cork Co.	107	Continental Screw Co.	—	Hobart Bros.	129
Atlantic Stamping Co.	—	Copperweld Steel Co.	—	Hodell Chain Co., The	—
Atlantic Steel Co.	—	Corbin Screw Corp.	—	Horsburgh & Scott Co.	85
Atlas Car & Mfg. Co.	—	Cowles Tool Co.	123	Hubbard & Co.	—
Atlas Drop Forge Co.	—	Crawback, John J., Co.	142	Hubbard, M. D., Spring Co.	129
Atlas Lumnite Cement Co.	—	Crane Co.	—	Huther Bros. Saw Mfg. Co.	—
B					
Babcock & Wilcox Co.	—	Criswell, James, Co.	—	Hyatt Bearings Division, General Motors Sales Corporation	—
Balley, Wm. M., Co.	—	Crucible Steel Company of America	—	Hyde Park Foundry & Machine Co.	—
Baker-Raulang Co.	—	Cullen-Friedstedt Co.	—	I	
Baldwin-Duckworth Division of Chain Belt Co.	—	Curtis Pneumatic Machinery Co.	—	Illinois Clay Products Co.	103
Baldwin Southwark Division of The Baldwin Locomotive Works	—	Cutler-Hammer, Inc.	—	Illinois Development Council	—
Bantam Bearings Corp.	—	D			
Barnes, Wallace, Co., The, Division of Associated Spring Corporation	—	Damascus Steel Casting Co.	—	Independent Galvanizing Co.	—
Basic Dolomite, Inc.	—	Darwin & Milner, Inc.	—	Industrial Brownhoist Corp.	—
Bay City Forge Co.	—	Davis Brake Beam Co.	133	Industrial Equipment Corp.	—
Beatty Machine & Mfg. Co.	—	Dearborn Gage Co.	—	Inland Steel Co.	141
Bellevue-Stratford Hotel	118	Detroit Leland Hotel	114	International Correspondence Schools	—
Belmont Iron Works	131	Diamond Expansion Bolt Co., Inc.	—	International Nickel Co., Inc.	—
Berger Manufacturing Div., Republic Steel Corp.	62	Differential Steel Car Co.	—	International-Stacey Corp.	—
Bethlehem Steel Co.	1, 61	Dings Magnetic Separator Co.	105	Isaacson Iron Works	—
Birdsboro Steel Foundry & Machine Co.	—	Dravo Corp., Engineering Works Div.	—	J	
Bissett Steel Co., The	114	Dravo Corp., Machinery Division	137	Jackson Iron & Steel Co., The	131
Blanchard Machine Co.	—	Duer Spring & Mfg. Co.	—	James, D. O., Mfg. Co.	—
Blaw-Knox Co.	—	E			
Blaw-Knox Division, Blaw-Knox Co.	—	Elastic Stop Nut Corp.	125	J-B Engineering Sales Co.	113
Bliss & Laughlin, Inc.	—	Electric Controller & Mfg. Co.	—	Jessop Steel Co.	—
Bower Roller Bearing Co.	—	Inside Front Cover			
Brassert, H. A., & Co.	125	Electric Furnace Co., The	15	Jessop, Wm., & Sons, Inc.	88
Bridgeport Brass Co.	89, 90	Electric Generator & Motor Co.	113	Johns-Manville Corp.	—
Broderrick & Bascom Rope Co.	—	Electric Storage Battery Co.	—	Johnson Bronze Co.	—
Brooke, E. & G., Iron Co.	—	Electro Alloys Co., The	—	Jones & Lamson Machine Co.	—
Brookville Locomotive Co.	—	Electro Metallurgical Co.	—	Jones & Laughlin Steel Corp.	—
Brossius, Edgar E., Inc.	86	Elmes, Charles F., Engineering Works	—	Jones, W. A., Foundry & Machine Co.	—
Brown & Sharpe Mfg. Co.	11	Enterprise Galvanizing Co.	129	Joslyn Co. of California	—
F					
		Equipment Steel Products Division of Union Asbestos & Rubber Co.	—	Joslyn Mfg. & Supply Co.	—
		Erdle Perforating Co., The	—	K	
		Erie Bolt & Nut Co.	—	Kantlink Spring Washers	123
		Erie Foundry Co.	101	Kardong Brothers, Inc.	—
		Etna Machine Co., The	—	Kearney & Trecker Corp.	—
		Eureka Fire Brick Works	125	Kemp, C. M., Mfg. Co.	—
		Ex-Cell-O Corp.	57	Kester Solder Co.	—
		Excelsior Tool & Machine Co.	—	Kimball Safety Products Co.	—
		F			
		Fafnir Bearing Co., The	54	King Fifth Wheel Co.	—
		Fairbanks, Morse & Co.	—	Kinnear Mfg. Co.	143
		Fanner Mfg. Co.	—	Kirk & Blum Mfg. Co.	129
		G			
		H			
		I			
		J			
		K			

♦ ♦ ADVERTISING INDEX ♦ ♦

Where-to-Buy Products Index carried in first issue of month.

	Page		Page	Page
L				
Laclede Steel Co.	—	Ohio Seamless Tube Co., The	—	Superior Mold & Iron Co. 117
Lake City Malleable Co.	—	Ohio Steel Foundry Co., The	—	Superior Steel Corp. 131
Lamson & Sessions Co., The	53	Oxweld Acetylene Co.	—	Surface Combustion Corp.
Landis Machine Co., Inc.	—			Sutton Engineering Co.
Landis Tool Co.	—	P		Swindell-Dressler Corp.
Lang Machinery Co.	—	Page Steel & Wire Division of Ameri-	108	T
Lansing Stamping Co.	—	can Chain & Cable Co., Inc.	108	Tennessee Coal, Iron & Railroad Co. ...
LaSalle Steel Co.	—	Pangborn Corp.	—	Thomas Steel Co., The
Latrobe Electric Steel Co.	—	Parker-Kalon Corp.	111	Thompson-Bremer & Co.
Lawrence Copper & Bronze	118	Parkin, Wm. M., Co.	—	Tide Water Associated Oil Co. 56, 57
LeBlond, R. K., Machine Tool Co., The	—	Pease, C. F., Co., The	33	Timken Roller Bearing Co.
	Back Cover	Penn Galvanizing Co.	—	Timken Steel & Tube Division, The
Leeds & Northrup Co.	—	Pennsylvania Industrial Engineers	—	Timken Roller Bearing Co.
Lee Spring Co., Inc.	—	Pennsylvania Salt Mfg. Co.	—	Tinnerman Products, Inc.
Lehigh Structural Steel Co.	—	Penola, Inc.	—	Toledo Scale Co.
Leschen, A., & Sons Rope Co.	117	Perkins, B. F., & Son, Inc.	—	Toledo Stamping & Mfg. Co.
Lewis Bolt & Nut Co.	—	Petroleum Iron Works Co., The	—	Tomkins-Johnson Co. 110
Lewis Foundry & Machine Division of	—	Pheoll Mfg. Co.	—	Torrington Co., The
Blaw-Knox Co.	—	Pittsburgh Crushed Steel Co.	137	Townsend Co.
Lewis Machine Co., The	—	Pittsburgh Gear & Machine Co.	—	Tri-Lok Co., The
Lincoln Electric Co., The	59	Pittsburgh Lectromelt Furnace Corp.	112	Truscon Steel Co. 62
Lincoln Hotel	104	Pittsburgh Rolls Division of Blaw-	—	
Linde Air Products Co., The	—	Knox Co.	—	U
Lindemuth, Lewis B.	—	Pittsburgh Steel Co.	—	Union Carbide & Carbon Corp.
Link-Belt Co.	—	Plymouth Locomotive Works, Div.	—	Front Cover
Loftus Engineering Corp.	—	The Fate-Root-Heath Co.	—	Union Drawn Steel Div. Republic
Logemann Bros. Co.	123	Poole Foundry & Machine Co.	116	Steel Corp. 12, 13, 62
Lovely Flexible Coupling Co.	—	Pressed Steel Car Co., Inc.	—	United Chromium, Inc.
Ludlow-Saylor Wire Co., The	—	Pressed Steel Tank Co.	102	United Engineering & Foundry Co.
		Prest-O-Lite Co., Inc., The	—	United Maintenance Sales Co.
		Progressive Welder Co.	—	United States Steel Corp., Subsidiaries
		Pure Oil Co., The	—	American Bridge Co.
				American Steel & Wire Co.
Mc		R		Atlas Lumnite Cement Co.
McKay Machine Co.	—	Raymond Mfg. Co., Division of Asso-	125	Carnegie-Illinois Steel Corp.
McKee, Arthur G., Co.	—	ciated Spring Co. p.	125	Columbia Steel Co.
McKenna Metals Co.	—	Reliance Electric & Engineering Co.	—	Cyclone Fence Co.
		Republic Steel Corp. 12, 13, 62	—	Federal Shipbuilding & Dry Dock Co.
		Revere Copper and Brass, Inc.	—	National Tube Co.
		Rhoades, R. W., Metalline Co., Inc.	—	Oil Well Supply Co.
		Riverside Foundry & Galvanizing Co.	—	Scully Steel Products Co.
		Roosevelt Hotel	120	Tennessee Coal, Iron & Railroad Co.
		Ruemelin Mfg. Co.	—	United States Steel Export Co.
		Russell, Burdall & Ward Bolt & Nut	—	Universal Atlas Cement Co.
		Co.	—	Virginia Bridge Co.
		Rustless Iron & Steel Corp.	—	United States Steel Export Co.
		Ryerson, Joseph T., & Son, Inc.	131	
				V
M				Valley Mould & Iron Corp.
Mackintosh-Hemphill Co.	—	S		Vanadium-Alloys Steel Co.
Macwhyte Co.	—	St. Joseph Lead Co.	—	Vickers, Inc.
Marr-Galbreath Machinery Co.	142	Salem Engineering Co.	—	Voss, Edward W.
Mathews Conveyor Co.	—	Samuel, Frank, & Co., Inc.	—	
Maurath, Inc.	76	San Francisco Galvanizing Works	—	W
Medart Co., The	—	Sanitary Tinning Co., The	—	Waldron, John, Corp. 123
Mesta Machine Co.	—	Sauerensen Cements Co.	143	Warner & Swasey Co. 5
Metal & Thermit Corp.	87	Sawyer Electrical Mfg. Co.	—	Washburn Wire Co. 9
Michigan Tool Co.	39	Seovill Mfg. Co.	—	Wean Engineering Co., Inc.
Midvale Co., The	—	Scully Steel Products Co.	—	Inside Back Cover
Millwaukee Foundry Equipment Co.	—	Sellers, William, & Co., Inc.	119	Weinman Pump & Supply Co., The ... 122
Mississippi Valley Equipment Co.	142	Seneca Wire & Mfg. Co., The	—	Weirton Steel Co. 15
Missouri Rolling Mill Corp.	—	Shafer Bearing Corporation	—	Wellman Bronze & Aluminum Co. 143
Moltrup Steel Products Co.	—	Shakeproof Lock Washer Co.	—	Westinghouse Electric & Mfg. Co.
Monarch Machine Tool Co., The	18	Shaw-Box Crane & Hoist Division,	—	West Penn Machinery Co. 142
Monarch Steel Co.	—	Manning, Maxwell & Moore, Inc.	123	West Steel Casting Co. 137
Morgan Construction Co.	—	Shell Oil Co., Inc. 3	—	Wheeling Steel Corporation
Morgan Engineering Co.	—	Shenango Furnace Co., The	—	Whitcomb Locomotive Co., The
Morrison Metalweid Process, Inc.	—	Shenango-Penn Mold Co.	—	Whitehead Stamping Co. 132
Morris Paper Co.	109	Shepard Niles Crane & Hoist Corp.	82	Wickwire Brothers, Inc.
Norton Salt Co.	137	Shoop Bronze Co., The	116	Wickwire Spencer Steel Co. 10
		Shuster, F. B., Co., The	123	Wilcox, Crittenden & Co., Inc.
		Simonds Gear & Mfg. Co.	—	Williams, J. H., & Co., Inc.
		Simonds Saw & Steel Co.	—	Wilson, Lee, Engineering Co.
		Sinton Hotel	—	Inside Back Cover
		SKF Industries, Inc. 7	—	Wisconsin Steel Co.
		Snyder, W. P., & Co.	—	Witt Cornice Co., The
		Socony-Vacuum Oil Co., Inc.	—	Wood, R. D., Co.
		Southern Bend Lathe Works	—	Worthington Pump & Machinery Corp.
		Southern Ferro Alloys Co.	—	Worth Steel Co.
		Standard Galvanizing Co.	—	Wyckoff Drawn Steel Co.
		Standard Steel Works	—	
		Stanley Works, The	—	Y
		Steel & Tubes Division, Republic Steel	62	Yale & Towne Mfg. Co.
		Corp.	62	Youngstown Alloy Casting Corp.
		Steel Conversion & Supply Co.	123	Youngstown Sheet & Tube Co., The
		Steel Founders' Society of America	—	Youngstown Welding & Engineering
		Steelweld Machinery Division, Clevel-	—	Co., The
		and Crane & Engineering Co.	—	
		Stewart Furnace Division, Chicago	—	Z
		Flexible Shaft Co.	—	Zeh & Hahnemann Co.
		Strong Steel Foundry Co.	—	
		Sturtevant, B. F., Co.	—	
		Sun Oil Co. 81	—	

400% LONGER PAINT LIFE after flame cleaning



... ON THE WORLD'S LONGEST SUSPENSION BRIDGE

"Paint on bridge surfaces Airco Flame Cleaned and Dehydrated before repainting last June 10 (1939) is still in good condition, whereas the original paint required chipping and spotting after three months exposure. Flame cleaning and dehydration was not used before the original paint was applied." So reports Mr. R. G. Cone, Chief Engineer of the Golden Gate Bridge and Highway District.

Rust and scale are removed by this Airco process. It de-


hydrates as it cleans, leaving steel surfaces warm, dry and conducive to a lasting paint job. The apparatus used is standard, portable and flexible. It is easily and safely operated by available personnel. If you have trouble obtaining a lasting paint job on new or used structural steel — Flame Clean by the Airco Method before you paint. Write for full details.

AIR REDUCTION

General Offices: 60 East 42nd St., New York, N. Y.
DISTRICT OFFICES IN PRINCIPAL CITIES



Send for your copy of the interesting new booklet "Flame Cleaning and Dehydrating Structural Steel the Airco Way."

 *Anything and Everything for* GAS WELDING or CUTTING and ARC WELDING 