• ● •

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

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

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

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

STEEL

ESTABLISHED 1882

Contents

Volume 107—No. 10 **September 2, 1940**

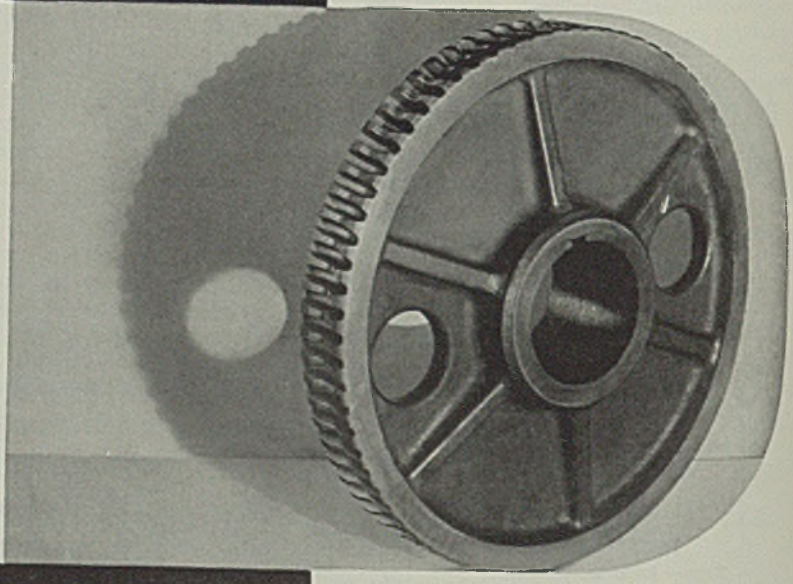
PRODUCTION • PROCESSING • DISTRIBUTION • USE

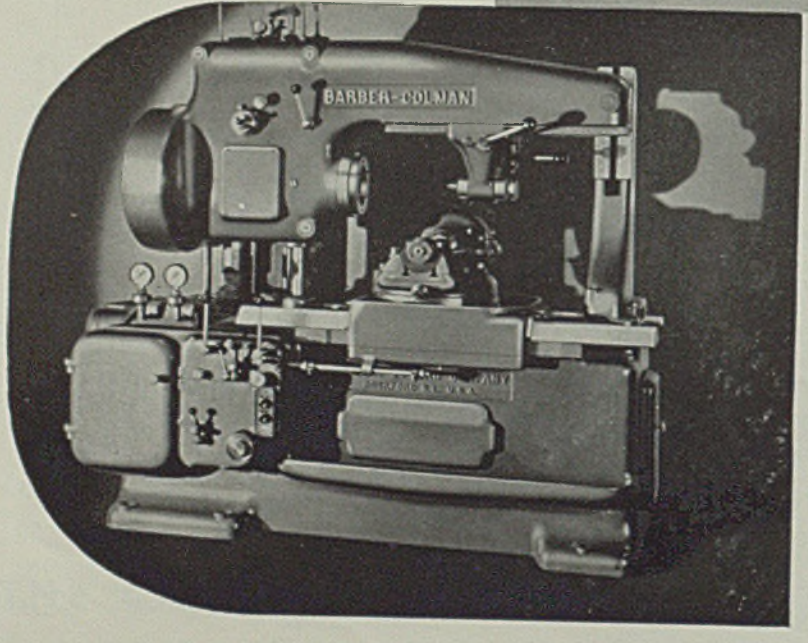
NICKEL
CAST IRONS

FOR GEARS THAT WEAR BETTER AND LAST LONGER

HIGH CARBON,

Nickel alloy, electric furnace cast iron compositions recently developed by Frank Foundries, Moline, Ill., meet all basic requirements for improved gear materials including good strength, ready machinability and wear resistance. Pictured at right is a hobbing machine gear produced from one of these special Nickel-chromium-molybdenum cast irons whose tensile strength is in excess of 40,000 lbs. per square inch and whose Brinell Hardness is approximately 240 in 1.2" sections. These alloy cast irons possess structural characteristics which assure a high degree of wear resistance combined with other properties essential to improved gear performance.





EFFECTIVE LUBRICATION

in this Barber-Colman hydraulic hobbing machine is assured by a combination of good design and the selection of suitable materials. High carbon Nickel Cast iron gears are structurally designed to assist in full lubrication and accordingly to reduce gear wear and assure quiet and satisfactory operation of a unit. Adding Nickel to cast iron induces dense grain in gear castings and markedly increases their resistance to wear.

• • •

NEW GEAR BOOK—

Write for your copy of our new publication "Modern Trends in Nickel Steel and Cast Iron Gear Materials". Available free on request.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK, N. Y.

STEEL
PRODUCTION • PROCESSING • DISTRIBUTION • USE

HIGHLIGHTING
THIS ISSUE

DESPITE controversies and recriminations as to delays in executing the defense program, that program certainly is getting under way. Last week's list of government awards (p. 16) set forth contracts totaling about $75,000,000; the volume of new business under negotiation is swelling rapidly. Most spectacular development last week was the conclusion of arrangements (p. 14) for production of airplane engines in large numbers. The government shows a disposition to safeguard the contractors against possible future headaches. For example, the navy will buy and retain title to some $6,000,000 to $7,000,000 worth of new machine tools required for a new airplane engine plant.

• • •

Draft Industry?

The senate (p. 15) passed the so-called "two-ocean" navy bill. The house (p. 13) passed the excess profits bill with a provision for five-year amortization of investments in defense plants and equipment; it is expected the bill will be radically revised by the senate. The senate won much denunciation (p. 14) by amending the compulsory military training bill so as to authorize the President to extend conscription to industrial plants. The action was hailed widely as a step toward dictatorship. Hope is held that the amendment will be rejected by the house. . . . The government program for training men to augment the skilled labor supply (p. 18) is helping but has not relieved industry of the larger share of this burden.

• • •

Ingot Rate Advances

The steel production rate last week (p. 21) advanced 1 point to 91½ per cent of ingot capacity and some plants are well above 100 per cent of rated capacity. Despite this high output backlogs continue to grow. So far no serious delays in shipments have developed. Greatest delay (p. 79) is in plates, structurals and special analysis steels. Structural awards are heavy, particularly in connection with public work and buildings for the defense program. Reaffirmation of steel prices to the end of the year is having a stabilizing effect. For the first time a base price on hot-rolled alloy plates has been announced. . . . Benedict Crowell (p. 15) becomes special consultant to the war department.

• • •

Eliminate Acid Waste

Many European plants (p. 40) have ceased to waste acid as a result of using the new De Lattre pickling process. The acid may be reused continuously, without dumping pickling liquor or washing water. Speed of pickling is increased, surface quality of pickled products improved, working conditions bettered. Pollution of nearby streams or bodies of water is avoided. . . . Any one of eleven automatic sequences for heating and quenching (p. 50) may be chosen and preset on a new control system at an alloy steel plant in the Chicago district. . . . Physical characteristics of spring wire (p. 56) are improved and closely controlled by a new electric heating and double-quenching process.

• • •

Welding "Must"

Metals and alloys with comparatively low melting temperatures, as brass and aluminum, may be flame shaped efficiently, says H. H. Moss (p. 58), by using a paste which acts as a refractory to protect metal alongside the line of cut. . . . Positioning is a welding "must," says Harold Lawrence (p. 60), in order to get best quality welds at lowest cost. All-position electrodes, he declares, should be used only when the possibilities of positioning have been studied thoroughly and found impossible. . . . Variations in hot blast temperatures at blast furnaces are minimized (p. 64) by a new mixer valve control. . . . A Cleveland sewing machine manufacturer (p. 66) has developed an interesting materials handling system.

Meet Government Specifications with RYERSON CERTIFIED STEELS

• When you're working on orders for defense, government steel specifications are no problem . . . if you buy *Certified* Steel from Ryerson!

Under the Ryerson Certified plan, you get steels made to narrow, close-range specifications. You get accurately identified steel of known analysis . . . steel you can depend on to meet government requirements. It is also easier to pass inspection on the finished job if Ryerson Certified Steel is used. All Ryerson Steels are closely controlled as to chemical content, accuracy and finish without the slightest increase in cost to you.

A special quality control plan on Alloy Steels assures uniform heat treatment response. *Complete* data covering chemical and physical properties, and *exact* heat-treating characteristics are furnished with every bar shipped. You do not have to guess . . . you do not lose time and money in testing and experimenting.

And deliveries are no problem if Ryerson is your source. Enormous stocks . . . over 10,000 kinds, shapes and sizes . . . in ten conveniently located warehouses, are ready for immediate shipment. Practically every order is on its way the day we get it.

Ryerson Certified Steels *cost no more!* Get acquainted now with this worry-free, superior Steel-Service, if you are not already a Ryerson customer. Stock List and any special information sent promptly on request.

Joseph T. Ryerson & Son, Inc., Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.

RYERSON CERTIFIED STEELS

RYERSON

Excess Profits Tax Legislation Faces Delay. Revision in Senate

Upper Chamber Dissatisfied with Measure Passed by House.
Month May Be Required To Iron Out Differences in Congress.
Draft Industry Amendment Called "Step Toward Dictatorship".
Army, Navy Arrange To Purchase 17,000 Aircraft Engines.

WASHINGTON

■ EXCESS profits tax bill passed by the house last week is expected to be drastically revised by the senate before it finally becomes law.

In its present form the bill is distasteful to many influential senators and a determined fight probably will be made. Some observers believe it may be a month before it is finally passed.

The bill passed the house after a stringent gag rule had been imposed, by which no amendments could be offered except by the ways and means committee.

Tax experts who helped draft the measure say that as it passed the house it will yield $300,000,000 the first year and some $700,000,000 thereafter.

The measure would:

Impose on corporations an excess profits tax of 20 to 50 per cent, with the object of preventing "war millionaires."

Permit defense industries to deduct from taxable income and profits over a five-year period the full cost of expansion necessary to handle defense orders.

Suspend the present 7 and 8 cent limitation imposed on the profits a manufacturer can make on government orders for aircraft and warships.

Two methods of excess tax computation are provided:

Under the "average earnings" method, a corporation's profits would be "excess" and taxable if they exceeded the average of its earnings for the four years, 1936 to 1939, inclusive.

Under the "invested capital" method, a firm will be allowed from a minimum credit of 7 per cent to a maximum of 10 per cent on its invested capital during the 1936-1939 base years, depending on the percentage of earnings of the company on its invested capital during those years.

Because high-earning corporations are expected to elect the "average earnings" method of computing their tax, the range of rates for that method is fixed at from 25 to 50 per cent.

A 20 to 45 per cent range is provided for corporations using the "invested capital" method, which is designed for the less prosperous concerns.

Normal Tax Rate Raised

In addition to this excess profits tax differential, the bill increases normal income tax rate for corporations using the average earnings method from the present 20.9 per cent to 25 per cent.

In another move to shift the tax burden away from corporations earning less than 10 per cent on their invested capital, the formula was modified to increase their untaxed credits.

All corporations will be allowed a flat $5000 exemption, a provision expected to remove from the bill's range 400,000 little concerns.

Corporations organized since 1936 and before Jan. 1, 1940, will be allowed to count as their earnings for the base years before their organization amounts equal to 10 per cent of the first $500,000 of invested capital and 8 per cent of the remainder.

Those corporations formed since Jan. 1, 1940, will obtain a credit of 10 per cent on the first $500,000 of invested capital and 8 per cent on the remainder.

Corporations with deficits during any of the base period years could use "zero" as its "earnings" for one such year, so as not to reduce its average earnings by the amount of the loss.

Title three of the new bill provides for the suspension of the profit limiting provisions of the Vinson act.

Bill provides that certain sections of the Vinson act "shall not apply to contracts or subcontracts for the construction or manufacture of any complete naval vessel or any army or navy aircraft, or any portion thereof, which are entered into or completed in any taxable year to which the excess profits tax provided in subchapter E of chapter 2 of the internal revenue code is applicable or would be applicable if the contractor or subcontractor, as the case may be, were a corporation, and any agreement to pay into the treasury profit in excess of 10 per cent, 12 per cent, or 8 per cent, as the case may be, of the contract prices of any such contracts or subcontracts shall be without effect."

The house passed the bill after only two hours of so-called "debate." Attendance on the floor was small and the measure approved without a record vote. Because of the gag rule and the general procedure followed by the house, its action in passing the bill without much difficulty is not expected to exert much influence on the senate.

The house ways and means com-

mittee offered only two amendments on the floor. One exempts air mail carriers whose earnings are so low that air mail subsidies are required. The other amendment exempts from the excess profits tax American corporations which operate in foreign countries and realize no income from business in the United States.

Senator Pat Harrison, chairman of the senate finance committee, announced hearings on the bill will start Tuesday. They are expected to extend over at least three days, possibly more.

Senate Approves Commandeering of Industry

■ INDUSTRIAL conscription as provided in the Overton-Russell amendment to the compulsory military training bill passed last week by the senate was widely denounced as "a step toward dictatorship."

Wendell L. Willkie, Republican candidate for President, declared the amendment would give the President "absolute and arbitrary control of virtually the entire economic system." It would, he added, "stop normal industrial expansion, increase the depths of the present depression and cause further unemployment."

As approved by the senate the bill would authorize the war and navy departments to commandeer manufacturing firms which the government deemed recalcitrant in signing national defense contracts. The amendment:

"The first and second provisos in section 8(b) of the act approved June 28, 1940 (public No. 671) is amended to read as follows: '*Provided*, that whenever the secretary of war or the secretary of the navy determines that any existing manufacturing plant or facility is necessary for the national defense and is unable to arrive at an agreement with the owner of such plant or facility for its use or operation by the war department or the navy department, as the case may be, the secretary, under the direction of the President, is authorized to institute condemnation proceedings with respect to such plant or facility and to acquire it under the provisions of the act of Feb. 26, 1931 (46 Stat. 1421), except that, upon the filing of a declaration of taking in accordance with the provisions of such act, the secretary may take immediate possession of such plant or facility and operate it either by government personnel or by contract with private firms pending determination of the issue.'"

Only the senate has approved the condemnation amendment. The house compulsory training bill, which will be debated and probably voted on this week, does not have such a provision, and the measure is expected to encounter severe opposition on the floor of the house.

Secretary of the navy, Frank Knox, was reported opposed to the inclusion of the amendment. Mr. Knox has publicly denied manufacturing companies have been recalcitrant in accepting defense orders, despite the slowness of congress in acting on amortization, excess profits tax and profits limitation.

President Roosevelt also last week stated his advisors on the defense commission have informed him they have discerned no signs of a "sit-down strike" by industry (as charged by some New Dealers).

Army, Navy Agree To Buy 17,000 Aircraft Engines

■ CONCLUSION of negotiations for purchase of 17,000 Pratt & Whitney airplane engines for the army and navy within the next two years was confirmed last week by United Aircraft Corp., East Hartford, Conn., officials. Engines will range from 500 to 2000 horsepower.

Commitments have been made for factory expansion totaling 400,000 square feet, the fourth large expansion within the past 18 months. The navy department will provide funds for the installation of $7,000,000 to $8,000,000 worth of machine tools.

Pratt & Whitney's employment has increased, as result of the expansions, from 2700 early in 1939 to more than 10,000 at present. Several thousand more will be required when current expansions are completed. Engine production now is three times the rate early in 1939; by the end of this year production will be four times that in 1939 and when the new facilities are completed production will be eight times that of 1939.

United Aircraft officials also stated negotiations still are underway between the war department and Ford Motor Co. for the manufacture of 4500 Pratt & Whitney engines of 2000-horsepower. United is "in the process" of issuing a manufacturing license to Ford at the nominal basis of royalties of $1 per engine.

The war department has reached an agreement with Wright Aeronautical Corp., Paterson, N. J., and Curtiss-Wright Corp., New York, for the purchase of 20,000 engines and 14,000 propellers for combined army and navy needs for fiscal years 1941 and 1942. The war department will deal exclusively with the companies for both army and navy needs.

The agreement announced by the war department is similar to that announced by the navy department with United Aircraft Corp. for purchase of Pratt & Whitney engines for both services. It provides, however, that the companies will build both the plant additions necessary and will install machine tools at their own expense, whereas the navy will furnish tools at United.

Engines and propellers under this agreement that are required by the navy will be paid for by transfer of navy funds to the army. No estimate of cost was announced.

PRESIDENT SAYS 10,015 PLANES ARE BEING BUILT

Controversy developed last week between the administration and members of congress as to number of airplanes ordered, contracted for and delivered.

President Roosevelt, at his press conference last week, stated military aircraft totaling 10,015 planes is actually being worked on by industry at the present time.

Controversy was caused, it appears, from the fact some spokesmen were talking about combat planes, others training ships; some referred to orders actually given and others to contracts actually signed.

Mr. Roosevelt said aircraft production last September was at the rate of 6000 a year; it is now 10,000 a year and by Jan. 1 will be 13,000 a year. During 1941 the industry will have an annual capacity of 24,000 and in 1942, will be able to build 36,000.

He said 6361 planes have actually

been contracted for by the army and navy. Army has ordered 3054, the remainder are for the navy.

The President told newsmen he and national defense commission members are perfectly satisfied with the airplane program's execution. It has been slowed up he said, because congress has not yet repealed the Vinson-Trammell act, and has not passed the amortization plan.

AIRCRAFT EXPORTS RISE 182 PER CENT ABOVE 1939

Aeronautical exports in the first six months of 1940 totaled $138,388,046, an increase of 182 per cent over the first half of 1939, according to department of commerce. The total is 17 per cent greater than for the full year 1939. Exports in the period this year, by type:

1532 aircraft	$95,261,402
2008 engines	17,704,362
Engine parts, accessories	7,240,847
Propellers and parts	4,398,441
Instruments and parts	1,996,651
Parachutes and parts	537,835
Other equipment	11,248,508
Total	$138,388,046

France and United Kingdom took 68 per cent of the exports:

France	$75,375,565
United Kingdom	18,167,967
Australia	9,538,990
Canada	7,050,759
Sweden	4,928,211
Finland	4,055,237
China	3,708,020
Netherlands Indies	2,578,745
Turkey	1,844,076
Norway	1,441,771
Belgium	1,150,083
Brazil	1,008,207
Total	$130,847,631

APPROVES $29,000,000 FOR AIRCRAFT EXPANSIONS

Reconstruction Finance Corp. has approved loans of $10,500,000 to Boeing Airplane Co., Seattle, and $18,587,855 to Bendix Aviation Corp., South Bend, Ind., for plant expansions.

Boeing loan involves expansion of Boeing plants at Seattle and Wichita, Kans. RFC has arranged for amortization of the expansion over a five-year period.

In return, Boeing agreed to furnish the government 500 four-engine bombers. So long as the loan is outstanding, the government shall have priority in manufacture of aircraft.

Commitment in the Bendix loan was made between Jesse Jones, RFC chairman, and Edwin R. Palmer, vice president and treasurer, Bendix Corp.

RFC is willing to extend credits for plant expansion and equipment and possibly for construction of new aircraft plants.

Details will be decided later, depending upon congressional action on tax and amortization legislation.

BATT APPOINTED DEPUTY DEFENSE COMMISSIONER

Appointment of William L. Batt as deputy commissioner, industrial materials division of the national defense advisory commission, was announced last week by Edward R. Stettinius Jr., commission chairman.

William L. Batt

Mr. Batt has been with the commission since it was organized, as division executive in charge of mining and mineral products.

After graduation from Purdue in 1907, Mr. Batt worked in the Purdue research laboratories. In 1909 he established a research laboratory for Hess-Bright Ball Bearing Co. in Philadelphia and became president of SKF Industries Inc. in 1924.

Mr. Batt is a past president, American Society of Mechanical Engineers; chairman, American Management association; chairman, Business Advisory council; chairman, engineering and research division of the national research council, National Academy of Sciences.

CROWELL NAMED SPECIAL DEFENSE CONSULTANT

Benedict Crowell, president, Central National bank, Cleveland, has accepted an appointment from Secretary of War Stimson to serve as a special consultant on the war department's defense program for an indefinite period during the present emergency.

Mr. Crowell holds a commission as brigadier general in the ordnance reserve. He was assistant secretary of war and director of munitions during the World war under Newton D. Baker.

Immediately after Mr. Stimson's appointment as secretary of war, Mr. Crowell came to Washington at the secretary's request to conduct a preliminary survey of the war department's defense program and to consult with him concerning it. Crowell will continue the survey.

DEFENSE TOOLING "NOT AN OVERNIGHT PROPOSITION"

DETROIT

Tooling up for defense equipment manufacture is not an overnight proposition, declared C. L. McCuen, General Motors Corp. vice president in charge of engineering, at a press review in Lansing, Mich., last week. It calls, he said, for intense study on the part of engineers who are entirely unfamiliar with the products to be made, as well as considerable time to tool up plants for production.

Nearly a year is required, he explained, to perfect production details on a new automobile model, a product with which the engineers are entirely familiar.

Olds will have three series of models for 1941, each with either 6 or 8-cylinder engines. Bodies are wider by virtue of an increase in rear tread of two and a half inches; wheelbases have been increased on all models. A bank of 4000 hydramatic drives is now on hand, and 50 per cent of all models will be equipped with this transmission.

First price announcement on 1941 models is made by Buick, increases averaging 2.12 per cent. Increases range from $25 to $65. Four models have been reduced slightly.

SENATE PASSES TWO-OCEAN NAVY APPROPRIATION BILL

Senate last week passed the supplemental defense appropriation carrying more than $5,000,000,000. Bill already had passed the house and has been sent back to that body for concurrence in senate amendments.

The bill is the one providing for an increase in the navy by about 200 ships and 19,000 increase in army and navy aircraft. It is one of the unapproved bills responsible for the delay in placing defense orders.

■ Importance of the automobile to farm families is revealed in a study of 17,000 farms by department of agriculture, which discloses 85 per cent own cars. Highest ratio of ownership was found in central and southern California, where 97 per cent own motor vehicles. Kansas and North Dakota are next with 96 per cent. Michigan, Wisconsin, Illinois, Iowa follow with 94 per cent; Oregon, Washington, 92 per cent; New Jersey, 88 per cent; Pennsylvania, Ohio, 86 per cent.

Army and Navy Awards

In Week Total $78,570,012

■ UNITED STATES war department last week announced award of following contracts:

Atlas Powder Co., construction of an ammunition loading plant near Ravenna, O. Plant will be owned by federal government, which has retained Atlas Powder Co. to construct it on a fixed fee basis. Plant will cost about $14,215,000.

Beech Aircraft Corp., Wichita, Kans., 150 training airplanes, 20 transport airplanes, with spare parts, $4,847,217.25.

Ryan Aeronautical Co., San Diego, Calif., 200 training airplanes with spare parts, $2,074,234.

Vultee Aircraft Inc. Downey, Calif., 500 training airplanes with spare parts, $7,488,782.50.

ORNANCE DEPT. AWARDS

Alvey-Ferguson Co. Inc., Oakley, Cincinnati, job-conveyor equipment, $2918.

American Car & Foundry Co., New York, ammunition, $39,200.

Armstrong-Blum Mfg. Co., Chicago, cutting machines, $1757.36.

Austin-Hastings Co. Inc., Cambridge, Mass., planer machines, $53,568.

Barnard Aviation Equipment Co. Inc., Ashley, Pa., fire control equipment, $90,898.98.

Bausch & Lomb Optical Co., Rochester, N. Y., fire control equipment, $133,751.98.

Bell & Howell Co., Chicago, fire control equipment, $322,512.48.

Bethlehem Steel Co., Bethlehem, Pa., ammunition, $7500.

Bliss, E. W., Co., Brooklyn, N. Y., presses, $3656.

Blount, J. G., Co., Everett, Mass., lathes, $5550.

Bridesburg Foundry Co., Philadelphia, castings, $8570.

Brill, J. G., Co., Philadelphia, artillery, $148,060.08.

Brinton, H., Co., Philadelphia, fire control equipment, $19,744.50.

Brown & Sharpe Mfg. Co., Providence, R. I., millers, grinders, $153,057.74.

Bryant Machinery & Engineering Co., Chicago, drilling machines, $6350.

Buss Machine Works, Holland, Mich., surfacers, $2357.50.

Carpenter Steel Co., Reading, Pa., tool steel, $1120.

Chambersburg Engineering Co., Chambersburg, Pa., power hammers, $14,600.

Cincinnati Milling Machine & Cincinnati Grinders Inc., Cincinnati, milling machines, $148,890.25.

Cleveland Automatic Machine Co., Cleveland, tools, $2330.40.

Crucible Steel Co. of America, New York, forgings, $40,587.75.

Du Pont, E. I., de Nemours & Co., Wilmington, Del., powder, $860,000.

Ex-Cell-O Corp., Detroit, drilling machines, grinders, $18,934.90.

Fidelity Machine Co., Philadelphia, inspection machines, $3300.

Gisholt Machine Co., Madison, Wis., lathes, $29,316.

Greenerd Arbor Press Co., Nashua, N. H., arbor presses, $1096.

Hannifin Mfg. Co., Chicago, pneumatic riveters, $1200.

Hercules Powder Co., Wilmington, Del., powder, $451,000.

Imperial Box Co., Chicago, metallic cartons, $3957.72.

Kingsbury Machine Tools Corp., Keene, N. H., drilling machines, $2254.80.

LaPointe Machine Tool Co., Hudson, Mass., broaching machines, $12,672.

LeBlond, R. K., Machine Tool Co., Cincinnati, lathes, $2060.

McMaster Carr Supply Co., Chicago, pickling baskets, $1017.

Motor Wheel Corp., Lansing, Mich., wheels, $2982.20.

National Cylinder Gas Co., Chicago, shape-cutting machines, $3400.

National Forge & Ordinance Co., Irvine, Pa., forgings, $39,685.80.

Niagara Machine & Tool Co., Buffalo, presses, $1616.

Oliver Machinery Co., Grand Rapids, Mich., lathes, $2,184.60.

Peterson Bros. Tool Co., Milford, Mass. gages, $5091.

Pratt & Whitney division, Niles-Bement-Pond Co., West Hartford, Conn., milling machines, gages, die-sinking machine, $108,746.90.

Precise Tool & Mfg. Co., Springfield, Mass., gages, $4861.50.

Prentiss, Henry, & Co. Inc., New York, shapers, grinders, $22,800.50.

Rockwell, Stanley P., Co., Hartford, Conn., furnaces, $39,097.

Root, B. M., Co., York, Pa., wood borers, $4935.

Saginaw Stamp & Tool Co., Saginaw, Mich., trailers, $234,562.

Scovill Mfg. Co., Waterbury, Conn., ammunition parts, $288,200.

Sheffield Gage Corp, Dayton, O., gaging machines, $2900.

Shipley, W. E., Machinery Co., Philadelphia, lathes, $3041.

Sturtevant, B. F., Co., Springfield, Mass., compressors, $2601.14.

Struthers-Wells-Titusville Co., Titusville, Pa., forgings, $36,078.

Taft-Peirce Mfg. Co., Woonsocket, R. I., gages, $1059.88.

Thompson Grinder Co., Springfield, O., grinding machines, $46,200.

Tinius-Olsen Testing Machine Co., Philadelphia, testing machine, $9295.

Tri-Metal Products Corp., Conshohocken, Pa., castings, $2200.

Triplex Machine Tool Corp., New York, power saws, $1001.

Tungsten Electric Corp., Union City, N. J., tool holders, $9140.

U. S. Tool Co. Inc., Ampere, N. J., milling machines, $10,365.

Warner & Swasey Co., Cleveland, lathes, $17,112.

Watson-Stillman Co., Rossells, N. J., hydraulic presses, $4050.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., transformers, $2191.20.

Winchester Repeating Arms Co., division of Western Cartridge Co., New Haven, Conn., ammunition components, $3750.

QUARTERMASTER CORPS AWARDS

Allen & Earley Inc., Tacoma, Wash., storage and dispensing system, McChord Field, Wash., $9698.

Aluminum Cooking Utensil Co., New Kensington, Pa., equipment for field ranges, $358,785.55.

American Seating Co., Grand Rapids, Mich., metal folding chairs, $84,232.50.

Belknap Hardware Co., Louisville, Ky., equipment for field ranges, $124.

Brotherton, Fred J., Inc., Hackensack, N. J., temporary housing Ft. Monmouth, N. J., $127,480.

Dawkins, C. T., Tampa, Fla., gasoline storage and dispensing system, Orlando Airport, Fla., $6682.

Ford J. Twaits-Morrison-Knudsen Co Inc., Los Angeles, temporary housing, Camp Ord, Calif., $2,731,000.

Johns-Manville Sales Corp., New York, equipment for field ranges, $97.50.

Johnson, Wm., Inc., Newark, N. J., equipment for field ranges, $128.75.

Kirk & Blum, Cincinnati, equipment for field ranges, $250,000.

Lalance & Grosjean Corp., Woodhaven, N. Y., equipment for field ranges, $7680.

McCarthy Bros. Construction Co., St. Louis, laundry, bakery at Mount Hope, Panama, $272,050.

National Builders Inc., Minneapolis, recruit reception center, Ft. Snelling, Minn., $114,700.

Owen-Ames-Kimball Co., Grand Rapids, Mich., temporary buildings, Camp Custer, Mich., $2,025,350.

Presto Gas Mfg. Co., Chicago, equipment for field ranges, $21,907.76.

Stapf, John, Harrisburg, Pa., radio transmitter building, Middletown Air Depot, Pa., $3875.

Sullivan, D. A., & Sons Inc., Northampton, Mass., buildings at Fort Devens, Mass., $254,548.

Unique Mfg. Co., Chicago, equipment for field ranges, $720.

Wark & Co., Philadelphia, warehouse, $700,000.

Whittenburg Construction Co., Louisville, Ky., temporary housing, Fort Knox, Ky., $473,000.

Wuest Bros., Louisville, Ky., equipment for field ranges, $507.

CORPS OF ENGINEERS AWARDS

Armco International Corp., Middletown, O., road construction equipment, $55,710.

Bethlehem Steel Co., Bethlehem, Pa., wire rope, $11,236.44.

Caterpillar Tractor Co., Peoria, Ill., road construction equipment, $154,126.53.

Huber Mfg. Co., Marion, O., road construction equipment, $4012.

Iowa Mfg. Co., Cedar Rapids, Iowa, road construction equipment, $6848.

LeTourneau, R. G., Inc., Peoria, Ill., road construction equipment, $78,444.60.

Nelson, N. P., Iron Works Inc., Passaic, road construction equipment, $4185.

United States navy department last week announced the following contract awards:

Agutter, J. J., & Co., Seattle, improvement of fire protection system, $85,618.

Duke Mfg. Co., St. Louis, kitchen equipment, $62,972.

New England Foundation Co., Boston, shipbuilding ways, $665,000.

Rathgeb-Walsh Inc., Port Chester, N. Y., buildings, $51,558.

White, I. J., Co., New York, bakery equipment, $22,985.

BUREAU OF SUPPLIES AND ACCOUNTS AWARDS

American Brass Co., Waterbury, Conn., copper-nickel alloy tubing, $27,216.95.

American Gas Accumulator Co., Elizabeth, N. J., lighting units, $99,954.70.

American Hoist & Derrick Co., St. Paul, wire-rope clips, $5466.25.

American Tool Works Co., Cincinnati, engine lathe, $9159.

B. G. Corp., New York, spark plugs, $7500.

Babcock & Wilcox Tube Co., Beaver Falls, Pa., steel tubing, $18,802.66.

Bates Mfg. Co., New York, paper fasteners, $12,318.75.

Boyle Mfg. Co., Los Angeles, steel barrels, $31,120.

Brown & Sharpe Mfg. Co., Providence, R. I., milling machines, $8338.

Bullard Co., Bridgeport, Conn., turret lathe, $26,478.07.

Cincinnati Milling Machine & Cincinnati Grinders Inc., Cincinnati, milling machines, $75,411.

Crane Co., Washington, valves, $32,768.

Daetsch & Woodward Inc., Brooklyn, N. Y., shoe lasts, $14,774.40.

Electric Hoist & Motor Co., Milwaukee, electric trolley, $5445.

Electric Industrial Equipment & Supply Corp., Baltimore, electric cable, $9193.48.

Electric Products Co., Cleveland, welding control panels, $33,882.

Fairbanks, Morse & Co., Chicago, diesel engine, $144,661.57.

Friez, Julian P., & Sons division of Bendix Aviation Corp., Baltimore, radio equipment, $67,893.60.

General Electric Co., Schenectady, N. Y., blading material, $57,142.30.

Graybar Electric Co. Inc., Washington, cable, $7895.71.

Gurley, W. & L. E., Troy, N. Y., theodolites, $6,750.

Henney Motor Co., Freeport, Ill., ambulances, $37,453.28.

IDL Mfg. & Sales Corp., New York, desk baskets, clips, etc., $10,044.85.

Jaeger Watch Co. Inc., New York, aircraft clocks, $115,407.

Jerguson Gage & Valve Co., Somerville, Mass., water gage glasses, $18,620.

Kearney & Trecker Corp., Milwaukee, milling machines, $57,968.40.

Keuffel & Esser Co., Hoboken, N. J., theodolites, $14,960.

Kraft Chemical Co., Chicago, white lead, $13,600.

Le Blond, R. K., Machine Tool Co., Cincinnati, gap lathe, $5578.

Marietta Hollow Ware & Enameling Co., Marietta, Pa., kettles, $7080.

Metal Door & Trim Co., La Porte, Ind., flame-tight doors, $9969.

Milton Mfg. Co., Milton, Pa., steel nuts, $63,143.50.

Oliver Machinery Co., New York, double tilting saws, $7156.

Permutit Co., New York, feed water heater, $6352.

Pheoll Mfg. Co., Chicago, screws and nuts, $64,985.96.

Reed & Prince Mfg. Co., Worcester, Mass., wood screws, $26,418.61.

Sandusky Foundry & Machine Co., Sandusky, O., shaft sleeves, $119,979.24.

Sellers, Wm., & Co. Inc., Philadelphia, boring machine, planers, $192,648.

Sengbusch Self-Closing Inkstand Co., Milwaukee, inkstands, $10,412.

Shipley, W. E., Machinery Co., Philadelphia, bench lathes, $7484.50.

Steuart Motor Co., Detroit, motor trucks, $8511.64.

Stott, Chas. G., Co. Inc., Washington, paper clips, pens, pins, $5115.13.

Struthers Wells-Titusville Corp., Titusville Forge division, Titusville, Pa., propeller shafts, $82,362.

United States Motor Corp., Oshkosh, Wis., diesel engine driven generators, $7674.

Warner & Swasey Co., Cleveland, turret lathes, $15,411.

Weil, J. H., & Co., Philadelphia, paper fasteners, etc., $5020.70.

Wolverine Tube Co., Detroit, condenser tubes, $34,099.

ORDNANCE PROCUREMENT AWARDS

Carnegie-Illinois Steel Corp., Pittsburgh, for increased facilities, $2,275,000.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., equipment, $10,865,200.

Canadian Contracts for Week Total $10,957,688

TORONTO, ONT.

■ War contracts placed by the department of munitions and supply, Ottawa, are responsible for almost full-time production schedules for practically all industrial concerns in Canada. Orders on behalf of Canadian government are being awarded at a rate exceeding $2,000,000 per day.

John Inglis Co. Ltd., Toronto, which has been producing Bren guns for several months now is arranging for manufacture of Browning machine guns. Through the cooperation of the Dominion, the company is building plant addition to cost $400,000.

Employes in Canadian aircraft plants have increased 20 per cent

(*Please turn to Page* 100)

Purchases Under Walsh-Healey Act

(In week ended August 17)

Iron and Steel Products

	Commodity	Amount
American Brake Shoe & Foundry Co., Chicago	Forgings	$160,500.00
Barnes Mfg. Co., Mansfield, O.	Strainer nozzle	15,336.60
Bethlehem Steel Export Corp., New York	Fabricated plates	1,585,665.00
Bethlehem Steel Co., San Francisco	Steel, forgings, bars	1,109,490.95
Bootz, Wm. R., Evansville, Ind.	Grates, valves	16,458.00
Bryant Heater Co., Cleveland	Heater cases	13,833.00
Camden Forge Co., Camden, N. J.	Forgings	134,877.00
Carnegie-Illinois Steel Corp., Denver	Metalwork	26,845.00
Chicago Hardware Foundry Co., Chicago	Cast iron griddles	18,480.00
Cole, R. D., Mfg. Co., Newnan, Ga.	Buoys	12,650.00
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.	Pistol parts	40,330.00
Copperweld Steel Co., Glassport, Pa.	Wire, rein. fabric	266,315.00
Consolidated Expanded Metal Companies, Wheeling, W. Va.	Expanded metal	19,451.95
Crucible Steel Co. of America, New York	Steel, forgings	222,690.28
Eastern Steel Tank Corp., Brooklyn, N. Y.	Water tanks	16,936.00
Farrel-Birmingham Co. Inc., Ansonia, Conn.	Cast-iron platens	39,600.00
General Electric Co., Federal & Marine department, Schenectady, N. Y.	Howitzers	201,090.04
Globe Machine & Stamping Co., Cleveland	Mess trays	29,736.00
Heppenstall Co., Pittsburgh	Forgings	166,344.75
Hobart Mfg. Co., Troy, O.	Telescope mounts	*52,600.00
Katzinger, Edward, Co., Chicago	Pans	12,165.02
Latrobe Electric Steel Co., New York	Tool steel	56,605.75
Lukens Steel Co., Coatesville, Pa.	Steel	*20,441.65
Lyman Gun Sight Corp., Middlefield, Conn.	Rifle parts	11,000.00
Nashville Bridge Co., Nashville, Tenn.	Structural steel	13,907.00
National Forge & Ordnance Co., Irvine, Pa.	Forgings	65,500.00
Russell, Daniel, Boiler Works Inc., Boston	Float buoys	49,032.00
Smith Devices, Philadelphia	Grips, wedges	13,325.50
Struthers Wells-Titusville Corp., Titusville, Pa.	Forgings	85,613.60
United Shoe Machinery Corp., Boston	Guns	1,316,485.60
Upson-Walton Co., Cleveland	Wire rope	17,750.10
Variety Aircraft Corp., Dayton, O.	Stand assemblies	177,500.00
Wire Rope Mfg. & Equipment Co., Seattle	Wire rope	20,448.00
TOTAL		$6,009,003.79

Nonferrous Metals and Alloys

Aluminum Co. of America, Washington	Aluminum alloy	60,500.00
Aluminum Cooking Utensil Co., New Kensington, Pa.	Steam kettles	14,642.50
Aluminum Goods Mfg. Co., Manitowoc, Wis.	Aluminum platters	48,197.00
Aluminum Products Co., La Grange, Ill.	Aluminum pots	$25,776.75
American Brass Co., Waterbury, Conn.	Brass reworking	60,424.40
International Minerals & Metals Corp., New York	Electrolytic copper	53,645.00
International Nickel Co. Inc., New York	Forgings	13,108.00
Penn. Flexible Metallic Tubing Co., Philadelphia	Bronze hose	25,650.00
Revere Copper & Brass Inc., Baltimore	Brass pipe, disks	1,035,640.39
Riverside Metal Co., Riverside, N. J.	Bronze blanks	78,750.00
TOTAL		$1,416,344.04

Machinery and Other Equipment

Adams, J. D., Co., c/o Brooks Equipment & Mfg Co., Knoxville, Tenn.	Graders	$22,010.48
American Tool Works Co., Cincinnati	Engine lathes	30,146.00
Bay City Shovels Inc., Bay City, Mich.	Shovel	15,250.00
Bullard Co., Bridgeport, Conn.	Vertical lathes	26,142.80
Caterpillar Tractor Co., Peoria, Ill.	Tractors	24,134.60
Cincinnati Milling Machines & Cincinnati Grinders Inc., Cincinnati	Milling machines	41,794.00
Clyde Iron Works Inc., Duluth	Deck winches	18,444.00
Copeland Refrigeration Corp., Sidney, O.	Elect. refrigerators	19,752.15
Detroit Bevel Gear Co., Detroit	Gears	17,052.00
Dexter Folder Co., Pearl River, N. Y.	Folders	*16,820.00
Enterprise Tool & Gear Corp., Detroit	Gears	52,012.50
General Motors Corp., Diesel Engine division, Cleveland	Propelling mach.	3,676,026.00
Gleason Works, Rochester, N. Y.	Cutting machine	44,810.00
Harris, R. L., Inc., Knoxville, Tenn.	Wagon drills	17,148.00
Hendey Machine Co., Torrington, Conn.	Lathes	18,800.00
International Harvester Co., Washington	Tractors	132,137.94
Intertype Corp., Brooklyn, N. Y.	Typesetting machine	15,518.98
Landis Tool Co., Waynesboro, Pa.	Grinding machines	23,670.00
Lodge & Shipley Machine Tool Co., Cincinnati	Engine lathes	25,509.00
Mine Safety Appliances Co., Pittsburgh	Power presses	18,289.00
Modern Tool & Die Co., Philadelphia	Gages	18,225.00
Orton Crane & Shovel Co., Chicago	Wagon cranes	15,070.00
Pratt & Whitney division Niles-Bement-Pond Co., West Hartford, Conn.	Reproducing mach.	37,941.00
Sier-Bath Co. Inc., New York	Gears	24,667.20
Taylor Parker Co., Norfolk, Va.	Twist drills	16,292.88
Van Dyck Churchill Co., New York	Turning mach.	77,565.00
Warner & Swasey Co., Cleveland	Turret lathes	41,487.50
TOTAL		$4,486,707.03
GRAND TOTAL		$11,912,054.86

*Estimated.

90,000 in Training for Defense Jobs Under Government Program

■ UNCLE SAM'S defense labor training program, now two months old, is proceeding fairly satisfactorily, but has not produced nor is expected to produce any miracles in equipping this nation with an adequate supply of fully skilled manpower.

As of Aug. 31, it is estimated 90,000 trainees were enrolled in training courses in public vocational schools. Twenty thousand have been placed in jobs. This represents a gain of 10,000 trainees and 17,000 placed since July 31.

Executives of metalworking companies who have hired the emergency-trained men generally express satisfaction with their calibre and with the rudimentary training they have been given in the vocational schools. They point out, however, that further training in the shops will be necessary before the new men become efficient workers, and that the burden of training skilled workers continues to rest on industry.

One advantage of the government program is the service performed by the state employment services in selecting the men to be given the emergency training. This relieves company personnel directors of the task of interviewing large numbers of applicants and to a large extent weeds out unqualified applicants.

Aptitude Tests Given

Requirements for trainees may vary from locality to locality, but the following may be considered representative. The applicant must be between 18 and 35 years of age and in good health. Graduates of technical high schools are preferred. He must be able to score satisfactorily in a general intelligence test. In addition he is given certain special tests designed to evaluate his physical and mental fitness for skilled work. These may include: Minnesota spatial relations, to test ability to judge space and distance in various directions; Minnesota manual dexterity, to test dexterity in manual operations and to reveal any clumsiness, tendencies to fumble and similar obstacles in mastering the trades; tele-binocular tests, a thorough eye and vision examination.

The interest evidenced by the applicant also is considered in making the selections.

In some cases as many as nine of ten applicants for the training have been turned down; the one selected is likely to become, with further training, a satisfactory worker.

This method of selection not only saves time for industry but also lessens its liability to unemployment compensation taxes which might result if the company itself hired starters who would later prove unsatisfactory and would have to be dismissed.

The vocational training program was launched for the double purpose of alleviating unemployment and making persons with some skill available for work in the defense program.

Program contemplated the training of 50,000 WPA workers who were to be paid regular WPA wages during the training period. A hundred thousand others were to be taken either from the unemployed lists of state employment services or from persons who have jobs but want to improve their skill. Some $17,000,000 was made available for the program which got underway quickly but quietly under the direction of Sidney Hillman, of the national defense advisory commission, John W. Studebaker, United States commissioner of education, and others.

Co-operation of state boards of education, local vocational schools, employers' organizations, the state employment services, WPA, and other local groups was requested. The response was almost unanimous.

The co-operation of local employers' groups and local vocational schools served to fit the training program to the needs of the locality in which applicants were trained. In many cases local employers aided in obtaining the machines on which the applicants are being trained. Associated Industries of Cleveland, for example, conducted a survey of its members to ascertain which had equipment which could be made available.

Although the program was voluntary there were thousands of applicants for the training in industrial cities. Many of these, of course, were refused as unfit for the program.

Courses offered varied. They were selected to fill the needs of the communities' industries, present and potential. Vocational high schools offered instruction for aircraft mechanics, machinists, auto mechanics, sheet metal workers, welders, cabinet makers, pattern makers, electricians, blacksmiths, riveters, lathe operators, punch press operators, drill press operators, draftsmen, and for assembly line operatives.

Engineering schools offered courses in drafting, testing, theories underlying many electrical appliances such as radio; instrument manufacturing; machine tool manufacturing; scientific bases of welding, as well as specifications writing and blue printing; supervisory or clerical jobs involving a combination of engineering and commerce required in industry; personnel supervision, and designing.

Courses usually consisted of 200 hours of instruction.

Chrysler Director Helps

Coincident with the vocational training program was the movement sponsored by the national youth administration to direct training of 100,000 young men from 18 to 25 for industry. John Haien, director of youth training for Chrysler Corp., Detroit, was named director of mechanical and manual training of the NYA, and is spending part of his time in Washington, at the same time retaining his post with Chrysler.

Under his direction, the NYA program is being carried on in two sections. The first is the forming of a group of resident work training centers in rural sections throughout the country where young men between the ages of 17 and 21 will live together and be taught how to work with their hands. Work shops provided in connection with these group projects will be fitted with tools and a regular plan of training and production worked out. About 100 boys will work together in each of these groups for six-month periods.

The second phase is the organization of nonresident groups in various industrial areas. In these, the period of training will be the same as in the resident groups, with work shops provided and training given in hand tool work.

He is well qualified to direct this enterprise, as he has originated similar works among sons of employes of Chrysler Corp. At present,

---

■ Twenty thousand young men given rudimentary training under the government's defense labor training program have been absorbed by industry. Metalworking executives report they have been carefully selected and with further specialized training should soon develop into efficient workers.

In this article, the second of a series on what is being done to train the estimated 1,250,000 skilled workers needed for America's defense program, the government's plan is evaluated. It can perform no miracles, but, with the cooperation of local industrial groups, is providing a valuable contribution to our national defense.

there are more than 6000 sons of Chrysler employes participating in youth activities, including craft educational work.

Government arsenals and navy yards, of course, have in the past carried on their own training programs. The greatly expanded arms program, however, found these plants just as short of skilled men as private industry.

When the war department decided it was necessary to place operations on a 24-hour, 6-day basis, requirements for arsenal workers were eased. Applicants could be as old as 62 instead of 45 years and need have only two instead of four years' apprenticeship. Still the needed skilled men were not available.

Few Meet Arsenal Requirements

The Frankford arsenal at Philadelphia is an example. There 3000 trained workers were urgently needed; if these were found, jobs would be created for 7000 semiskilled workers.

Appeals for trained men were broadcast and thousands of men responded; only a handful had the training required. These were mainly mechanics and few were tool or instrument makers, lens grinders or possessed other skills needed.

Arsenal heads made preparations to search farther afield for trained men and there were hints that if the needed workers were not found soon, that some system of government priority for workers might be instituted.

Best estimates of the number of additional skilled workers needed by the end of this year range from 750,000 to more than 1,250,000. The American Society of Tool Engineers has just concluded a survey which indicates 110,800 tool engineers, 408,800 tool and die-makers and 741,000 skilled mechanics are needed immediately or for expansions planned during remainder of year.

For immediate production requirements, the society's survey shows, there are needed: 32,570 tool engineers; 127,750 tool and diemakers; 408,816 skilled mechanics.

To take care of definitely planned expansions, the following additional men would be needed: 78,208 tool engineers; 281,060 tool and diemakers; 332,160 skilled mechanics.

Fifty-three per cent of all metalworking plants have definite plans to increase productive capacity during the remainder of the year.

Although the shortage of skilled help is general throughout the country, considerable variation in the type of shortages was found. Needing tool engineers were 25 per cent of the plants in New England, 31 per cent in the Middle Atlantic states and 25 per cent in the East North Central states. Tool and die men were needed by 57 per cent of plants in New England, 62 per cent in the Middle Atlantic states and 51 per cent in the East North Central states. Skilled mechanics were wanted in 43 per cent of New England plants, 69 per cent of Middle Atlantic plants and 64 per cent in East North Central.

Typical of varying local conditions were Michigan and Ohio. Less than 7 per cent of Ohio plants need tool engineers, compared with 25 per cent in Michigan. In contrast, 66 per cent of Ohio plants need additional tool and diemakers, compared to less than 38 per cent in Michigan. Skilled mechanics are needed by 86 per cent of Ohio's metalworking plants, compared with only 50 per cent required in Michigan.

The society's questionnaires also revealed what metalworking plant executives believed the reasons for the present shortage. Three leading causes:

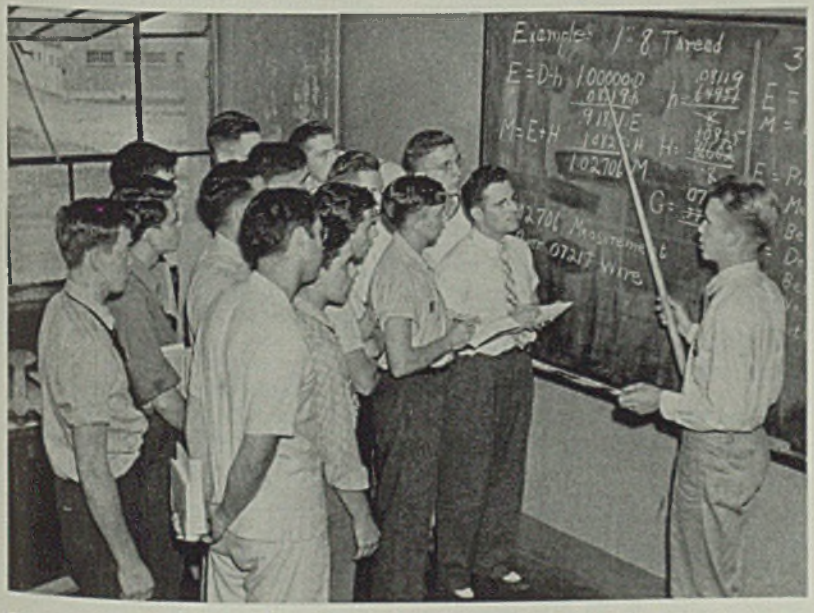
1—Educational system has not kept pace with machine age.

2—Union labor's restrictive attitude toward use of apprentices by industry.

3—Slowing down and interruption of industrial training programs through depression years.

Survey also revealed 30 per cent of plants now have some type of apprentice training program, while 41 per cent train some men for their own particular requirements. Virtually all the larger organizations have training programs.

Youth Learns Armament Manufacture at Arsenal



■ Serious shortage of skilled workers has forced Rock Island arsenal, Illinois, to expand its apprentice training program. An instructor, above, is illustrating the mathematics of armament manufacture to a class of students. Meanwhile veteran mechanics are making the arsenal a beehive of activity. Acme photo

LABOR

STEEL EMPLOYMENT, PAYROLLS GAIN IN JULY

■ NUMBER employed in the steel industry rose during July to a total of 549,000, representing an increase of 14,000 over June, when 535,000 employes were at work, according to the American Iron and Steel institute.

Employment in July was more than 20 per cent greater than in July, 1939, when steel employment totaled 453,000.

Payrolls also increased during July to $82,215,000, which compares with $77,388,000 in June and with $59,900,000 in July a year ago.

Wage-earning employes in the industry averaged 85.6 cents per hour in July, against 85.9 cents in both June of this year and July, 1939.

Number of hours worked per week by wage earners averaged 36.5 in July, compared with 35.9 in June and 31.0 in July of last year.

CIO LOSES BARGAINING VOTE AT IRON MINES

An independent union won over the Steel Workers' Organizing committee, CIO affiliate, in a national labor relations board election at two Pickands, Mather & Co. mines at Iron River, Mich., last week. The independent union polled 209 votes to 106 for the SWOC.

Public opposition to SWOC's at-

tempts to unionize Iron county was declared editorially by the *Iron River Reporter*. The newspaper pointed out that Iron county is a "district of low quality ores," and that several fully equipped mines are idle despite the high rate of ore shipments in general and an anticipated continued high rate of steel production.

Should the union's attempt be successful, the newspaper warns, producers could turn from Iron county to other mining districts with the least loss and inconvenience. The community, which depends largely on mining operations, then would suffer greatly.

MACHINES COMPENSATE FOR LACK OF WORKERS

United States has an available labor supply of 55,000,000 persons of which about 45,000,000 are employed. These figures compare with a combined total labor supply of Germany and Italy of 56,000,000 persons. With the labor supply of Austria, Czechoslovakia and Poland added, the axis powers have available from 80,000,000 to 85,000,000 workers; with France and Belgium included, the total is almost 110,000,000 persons, according to a booklet published by Farrel-Birmingham Co. Inc., Ansonia, Conn., entitled *The Great Reliance for National Defense.*

"The only factor that compensates for our relative inferiority in man-hours is the tremendous productivity per man-hour of our highly mechanized industries," the booklet states. "Figures currently available show the installed horsepower of our industrial equipment to be twice the per capita figures of Germany and Italy. The mechanization of America . . . is the only factor which serves partially to compensate for our inferiority in labor supply."

LABOR-DEFENSE CONTRACT TO PROTECT JOBS, SENIORITY

Quality Aluminum Casting Co., Waukesha, Wis., signed a two-year contract containing a special "war clause" with CIO's automobile workers' union last week. Jobs and seniority rights of employes called or who volunteer for active army service will be protected.

The "war clause" provides for re-employment within 60 days after honorable discharge from active military service, if the worker is physically fit.

Employe's seniority rights will accumulate during the military service tenure. Men who replace other employes while the latter are in the army service will be informed of the conditions attendant upon their receiving the job.

FINANCIAL

YOUNGSTOWN SHEET & TUBE SELLS $10,000,000 NOTES

■ Youngstown Sheet & Tube Co., Youngstown, O., has completed a private sale of $10,000,000 serial notes, dated Aug. 15, to eight banks and one insurance company. The notes were sold at 100.

Company will apply proceeds of the sale toward redemption, Oct. 1, at 101½, of $10,000,000 of the outstanding $30,000,000 Youngstown Sheet & Tube convertible 4 per cent debentures, due Sept. 1, 1948. Debentures totaling $5,400,000 are being paid and redeemed in anticipation of all sinking fund requirements under the indenture.

The notes are in seven series, one maturing each Aug. 15, from 1941-47 inclusive. Principal amount of each of the first six series is $1,500,000; the seventh is $1,000,000. Interest rates vary by maturities from 0.5 per cent to 2.25 per cent.

McKEESPORT TIN PLATE NETS $287,993 IN FIRST HALF

McKeesport Tin Plate Corp., McKeesport, Pa., reports net income in first half, 1940, was $287,993, equal to 40 cents per share on common. This compared with $234,678 net profit, equal to 32 cents per common share, earned in the period last year.

In accordance with established practice in preparing its interim statements, the corporation has deferred a portion of its selling, general and administrative expenses incurred during off-season months. Portion so deferred, totaling $101,512, will be charged to operations during the remainder of the year ending Dec. 31, 1940. In like period of 1939 deferred portion was $168,037.

Income account for six months ended June 30:

Net sales	$7,886,182
Costs and expenses	7,448,554
Profit	437,628
Other income	35,356
Total income	472,984
Interest and amortization	123,595
Federal, state income taxes	62,550
Net profit	287,993

WARNER & SWASEY OFFERING OVERSUBSCRIBED FIRST DAY

Subscriptions in excess of the amount of Warner & Swasey Co. stock offered the public in Cleveland last week were received by 12:30 the first day, according to Hamilton Wilson, underwriters' representative. The Cleveland turret lathe and astronomical instrument manufacturer, making its first public offering, placed 276,580 shares of common stock on the market at $23 per share.

Approximately 90,000 shares were absorbed in the Cleveland market. The issue was also well received, according to report, in New England, New York and the Twin Cities.

Thirty-five thousand shares were offered by the company itself, with net proceeds to be added to its general fund. Remaining 241,580 shares were to be sold for the account of certain stockholders, largely heirs of the Warner and Swasey estates or relatives who are offering, in the aggregate, less than half their holdings.

Company's preferred stock will be retired shortly, either through an offer of exchange for the common, or through redemption out of treasury cash.

PROPOSED TAXES WILL AFFECT EARNINGS "SUBSTANTIALLY"

Second half earnings of Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., are likely to be substantially affected by accruals for proposed retroactive new taxes, according to A. W. Robertson, chairman. The new taxes, said Mr. Robertson last week, were not and could not be taken into account for the first half, and must be provided from the second six months' earnings.

He pointed out Westinghouse may find it necessary to set aside as much as $500,000 per month, in addition to the regular monthly accruals of more than $1,000,000, for the rest of this year to cover the proposed taxes.

Mr. Robertson also reported the company's total payroll for first half, 1940, was $51,000,000. Employes currently on the payroll total more than 52,000. Average monthly earnings per employe have increased from $147 to $169 in the past year, he declared.

DIVIDENDS DECLARED

American Rolling Mill Co., Middletown, O., regular quarterly of $1.12½ per share on the company's 4½ per cent cumulative convertible preferred, payable Oct. 15 to record of Sept. 16. This will be the first regular dividend to be paid after distribution on Aug. 30 of $1.12½ per share, representing all accumulated and unpaid dividends.

Detroit Steel Corp., Detroit, 50 cents per share on capital stock, payable Sept. 25 to record of Sept. 14. Previous payment, 25 cents per share, was made June 25. The corporation's directors voted to consider future dividend action on the basis of then current conditions and prospects, rather than to make regular quarterly payments. Except for second and third quarters in 1938, the company has for several years paid

25 cents quarterly, with occasional extras.

Carpenter Steel Co., Reading, Pa., 50 cents per share on capital stock, payable Sept. 20 to record of Sept. 10.

Wheeling Steel Corp., Wheeling, W. Va., regular quarterly of $1.25 per share on $5 preferred and $1.50 per share on $6 preferred stock, both payable Oct. 1 to record of Sept. 13.

Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., $1.50 per share on common, payable Sept. 20 to record of Sept. 9. Previous payments of 75 cents each were made June 21 and March 21.

"Depression Baby" Ends Decade of Production

■ Great Lakes Steel Corp., Michigan's "depression baby," last week ended its first decade of production. First heat was tapped at the mill Aug. 23, 1930.

Subsidiary of National Steel Corp., Pittsburgh, Great Lakes Steel employed 830 men in 1930. This increased to 7493 in 1939. Payroll rose from $1,938,000 to $13,700,000, production from 500,000 tons the first year to more than 2,000,000 in 1939.

George R. Fink, president, received many congratulations.

Canada Sets New Pig Iron Record in July

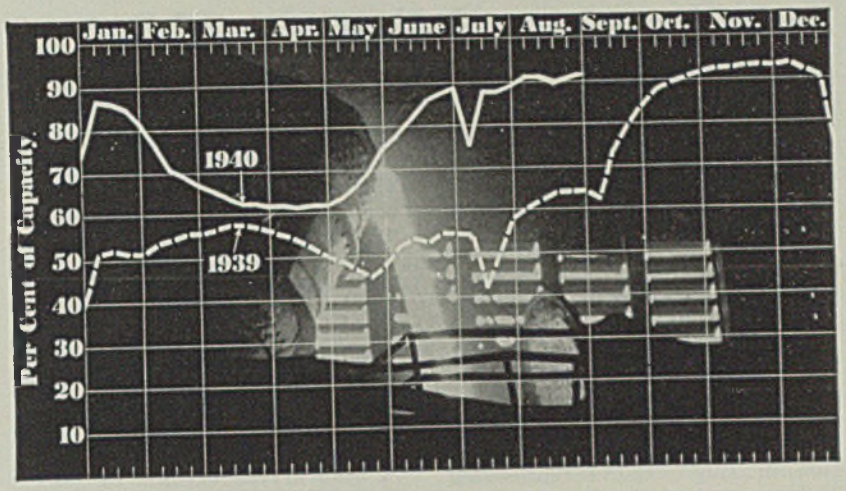
■ Canadian pig iron production for July at 95,924 gross tons set a new monthly record. Steel ingots and castings and ferroalloy production failed to reach former records, though ingot output was larger than in June. Production for seven months set a new high record in ingots, pig iron and ferroalloys. Canadian Furnace Co., Port Colborne, Ont., blew in a relined furnace and Algoma Steel Corp., Sault Ste. Marie, Ont., blew in a third stack, leaving only one idle. Nine out of ten Canadian stacks are now in production.

Comparisons of steel, iron and ferroalloy production are as follows:

	Steel ingots	Pig iron	Ferro-alloys
July, 1940	164,501	95,924	9,257
June, 1940	160,594	88,656	10,128
July, 1939	107,810	59,587	6,475
7 mos., 1940	1,085,063	645,551	67,501
7 mos., 1939	664,725	356,108	37,379

TIN PLATE SCRAP EXPORTS

Four export licenses for 567 gross tons of tin plate scrap, valued at $9927 were issued in July. State department reports 51 such licenses were issued in the seven months ending July 31 for 3533 gross tons, valued at $66,384.70. In all cases the tin plate scrap was destined for Japan.



PRODUCTION . . . Up

■ STEELWORKS operations last week advanced 1 point to 91½ per cent. Six districts reported gains, three declined and three held the rate of the preceding week. A year ago the rate was 64 per cent; two years ago, 44½ per cent.

Detroit—Advanced 1 point to 93 per cent, open hearths under repair holding production down.

St. Louis—Addition of one open hearth by an East Side interest raised the rate 2½ points to 80 per cent, the best since January when 83 per cent was reached for two weeks.

Birmingham, Ala.—Steady at 88 per cent, which has been maintained since the beginning of August.

Cincinnati—Down 1 point to 77 per cent on slight interruptions for repairs.

New England — Furnace repair brought the rate down 5 points to 80 per cent.

Central eastern seaboard — Unchanged at 89 per cent, with heavier orders indicating an increase soon.

Chicago—Rose 1 point to 99 per cent on increases by three plants. With five producers exceeding 100 per cent of rated capacity production is practically at the top.

Wheeling—Production last week declined 1 point to 98 per cent. A further slight drop is expected this week, on account of the holiday. Wheeling Steel Corp. has blown in a blast furnace at Martins Ferry, O.

Pittsburgh—Further rise of 3½ points to 86½ per cent in effect to meet deliveries. Labor Day interruption probably will lower the average rate this week.

Buffalo—Sustained at 90½ per cent. Backlogs indicate maintenance of this rate, except as furnace repair may interrupt.

Cleveland—Enlarged production by all interests caused a rise of 3½ points to 90 per cent, the highest of the year.

Youngstown, O.—With two bessemers and 66 open hearths in production the rate last week advanced 1 point to 84 per cent. Sharon Steel Corp. added one open hearth. Labor Day idleness will bring a reduction to about 75 per cent this week.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended Aug. 31	Change	Same week 1939	Same week 1938
Pittsburgh	86.5	+ 3.5	59	32
Chicago	99	+ 1	54	40
Eastern Pa.	89	None	44	33
Youngstown	84	+ 1	56	45
Wheeling	98	— 1	86	54
Cleveland	90	+ 3.5	80	41
Buffalo	90.5	None	60.5	49
Birmingham	88	None	75	56
New England	80	— 5	70	50
Cincinnati	77	— 1	66	65
St. Louis	80	+ 2.5	63.5	45
Detroit	93	+ 1	90	67
Average	91.5	+ 1	64	44.5

Steel Circus

■ U. S. S. Mechanical Circus is being exhibited by Columbia Steel Co., United States Steel Corp. subsidiary, at Pacific coast state fairs. The company reports that it is complete with "big top," wild animals, trapeze performer and ring master.

The mechanical ring master calls attention to the various attractions within the tent and puts the mechanical performers through their paces. These include "nail-driving monkeys, a lion who fights his own reflection in a stainless steel mirror, a wire rope jumping tiger, a bull worrying a section of U. S. S. fence, and Charles the Great, an equine sensation, who answers questions about galvanized roofing sheets."

July Iron, Steel Exports 14.2 Per Cent of Domestic Production

■ REGISTERING the third marked increase in as many months, exports of iron and steel, excluding scrap, set a new high in July, with 707,809 gross tons, valued at $39,511,996, bureau of foreign and domestic commerce reports.

Exports in June were 617,678 tons, valued at $38,794,157, while those in July, 1939 were 163,598 tons valued at $12,141,748.

Compared with steel ingot production in July, exports represented 14.2 per cent of the domestic steel output. In June this proportion had been 12.5 per cent; in July, 1939, only 5.1 per cent.

In the first seven months of 1940 a total of 3,478,423 tons of iron and steel, valued at $237,482,208, was exported, more than three times as much in quantity and nearly three times as much in value as in the comparable period of 1939—1,086,873 tons valued at $82,396,045.

Continued large purchases of ingots, blooms, etc., again made the United Kingdom the month's leading export market, with a total of 376,066 tons of iron and steel; followed by Canada taking 69,969 tons.

Exports of scrap, 327,129 gross tons, valued at $5,459,356, were slightly higher in July than in June, when the trade amounted to 318,369 tons, valued at $5,261,321.

Seven months' cumulative exports show the 1940 trade in scrap to be well under the levels set in 1939, exports in the January-July period of the earlier year having amounted to 2,139,018 tons valued at $31,342,427, against the 1940 figure of 1,808,234 tons valued at $30,587,934.

Leading purchaser of iron and steel scrap in July was the United Kingdom, taking 140,365 tons. Japan ranked second with 113,926 tons; Canada third, 57,104 tons.

JULY MACHINERY EXPORTS DECLINE 15 PER CENT

Industrial machinery exports from the United States declined 15 per cent in July, to $31,093,954 from $36,682,663 in June, according to the machinery division, department of commerce.

Power-driven metalworking machinery was responsible for a large part of the drop, declining 20 per cent from $18,564,300 in June to $14,906,312 in July. Lathe exports last month were valued at $2,377,133, compared with $3,869,946 in June. Shipments of drilling machines amounted to $844,539, compared with $1,176,998. Rolling machinery exports were $1,006,770, against $2,884,832 in June. Exports of milling machines, $1,903,285, and of grinding machines, $2,316,361, were substantially the same as in the preceding month.

Shipments of metalworking machinery, other than power-driven, were $582,087, little changed from June's $596,917.

UNITED STATES EXPORTS OF IRON AND STEEL PRODUCTS

Gross Tons

ARTICLES	July 1940	June 1940	Jan. thru July 1940
Pig iron	70,790	30,915	201,726
Ferromanganese and spiegeleisen	150	777	10,247
Other ferroalloys	2,552	3,087	8,409
Ingots, blooms, etc.:			
Not containing alloy	273,862	206,403	893,982
Alloy, incl. stainless	4,772	9,525	22,980
Steel bars, cold fin.	2,276	2,815	23,843
Bars, iron	1,324	1,362	9,684
Bars, concrete	8,472	10,257	88,374
Other steel bars:			
Not containing alloy	39,651	29,434	221,072
Stainless steel	19	33	548
Alloy, not stainless	1,727	3,006	15,832
Wire rods	21,162	28,036	124,346
Boiler plate	880	754	6,392
Other plates, not fab.:			
Not containing alloy	33,840	48,551	247,495
Stainless steel	29	107	265
Alloy, not stainless	176	125	1,525
Skelp, iron or steel	13,012	11,290	44,433
Sheets, galv. iron	777	1,102	5,621
Sheets, galv. steel	13,811	13,200	97,639
Sheets "black" steel:			
Not containing alloy	41,021	48,852	267,528
Stainless steel	87	154	1,069
Alloy, not stainless	31	509	3,599
Sheets, black iron	2,553	2,239	19,405
Strip steel, cold-rolled:			
Not containing alloy	5,400	4,317	29,974
Stainless steel	76	49	397
Alloy, not stainless	56	35	259
Strip steel, hot-rolled:			
Not containing alloy	12,437	10,028	75,905
Stainless steel	2	1	45
Alloy, not stainless	21	58	318
Tin plate, taggers' tin	30,078	33,386	294,627
Terne plate (including long ternes)	369	688	3,497
Tanks, except lined	2,082	2,546	16,276
Shapes, not fabricated	24,507	26,777	131,222
Shapes, fabricated	4,359	9,123	43,080
Plates, fabricated	642	1,560	9,504
Metal lath	75	31	826
Frames and sashes	150	59	1,059
Sheet piling	1,673	3,105	8,543
Rails, 60 lbs.	12,367	2,227	52,615
Rails under 60 lbs.	921	2,635	12,847
Rails, relaying	3,249	180	9,327
Rail fastenings	900	429	5,752
Switches, frogs, crsgs.	115	139	2,091
Railroad spikes	494	239	3,057
Railroad bolts, nuts, etc.	124	187	1,379
Boiler tubes, seamless	1,973	1,378	12,304
Boiler tubes, welded	162	269	1,305
Pipe:			
Seamless casing and oilline	8,615	7,083	72,972
Do., welded	916	1,040	20,619
Seamless black	4,402	3,455	20,380
Pipe fittings:			
Mall.-iron screwed	737	306	3,176
Cast-iron screwed	200	369	1,720
Pipe and fittings for:			
Cast-iron pressure	6,246	5,727	33,493
Cast-iron soil	4,872	1,513	12,238
Pipe, welded:			
Black steel	4,220	4,938	24,045
Black wrought-iron	2,186	616	5,140
Galv. steel	4,361	4,432	31,076
Galv. wrought-iron	750	1,217	4,917
All other pipe, fittings	1,866	1,111	9,510
Wire:			
Plain iron or steel	8,204	7,655	51,871
Galvanized	5,253	5,953	32,670
Barbed	3,580	3,658	19,149
Woven-wire fencing	279	308	2,578
Woven-wire scr'n cloth:			
Insect	77	57	501
Other	150	171	1,236
Wire rope and cable	1,012	683	6,039
Wire strand	280	38	883
Electric welding rods	363	344	2,094
Card clothing	1	2	9
Other wire	1,486	1,034	10,235
Wire nails	5,524	5,707	33,366
Horseshoe nails	173	86	657
Tacks	112	45	490
Other nails, staples	687	605	3,286
Ordinary bolts, machine screws	2,192	1,675	10,108
Castings:			
Gray iron (incl. semisteel)	289	394	2,591
Malleable-iron	308	225	1,539
Steel, not alloy	84	70	1,069
Alloy, incl. stainless	105	65	868
Car wheels, tires, and axles:			
Wheels and tires	663	1,350	7,256
Axles, no wheels	36	245	1,211
Axles with wheels	17	31	829
Horseshoes and calks	9	25	216
Forgings, n.e.s.:			
Not containing alloy	2,191	2,898	13,864
Alloy, incl. stainless	137	568	2,577
Total	707,809	617,678	3,478,423
Scrap, iron and steel	326,546	317,202	1,796,089
Scrap, tin plate	150	158	2,842
Tin plate circles, strips, cobbles, etc.	101	457	2,691
Waste-waste tin plate	226	319	5,132
*Terneplate clippings and scrap	106	233	1,481
Total scrap	327,129	318,369	1,808,234
GRAND TOTAL	1,034,938	936,047	5,286,657
Iron ore	258,201	278,689	626,678

*New class.

IRON AND STEEL IMPORTS CONTINUE TO DECLINE

July imports of iron and steel products, excluding scrap, fell to 3390 gross tons valued at $351,826, from 5504 tons valued at $530,343 imported in June, according to bureau of foreign and domestic commerce. July, 1939, imports totaled 27,516 tons valued at $1,285,390.

For the first seven months of 1940 imports totaled 42,178 tons valued at $4,851,403, 22 per cent by quantity and 43 per cent by value of the 189,707 tons valued at $11,311,696 imported in the comparable period of 1939.

Canada in July supplied 1962 tons, Sweden 470 tons, British India 350 tons and Norway 309 tons. Pig iron

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

Gross Tons

	1940 Exports	1940 Imports	1939 Exports	1939 Imports
Jan.	583,521	8,274	362,672	27,664
Feb.	671,301	6,740	359,690	19,149
Mar.	663,980	5,096	474,360	25,369
April	612,906	6,674	394,008	44,083
May	783,964	7,759	532,641	28,142
June	936,047	5,505	588,856	32,587
July	1,034,938	3,542	513,664	30,851
Aug.	.....	.....	477,078	28,328
Sept.	.....	.....	575,613	29,874
Oct.	.....	.....	591,856	19,189
Nov.	.....	.....	605,555	15,216
Dec.	.....	.....	600,437	14,709
Total	.....	.....	6,076,429	315,161

UNITED STATES IMPORTS FOR CONSUMPTION OF IRON AND STEEL PRODUCTS
(Gross Tons)

ARTICLES	July 1940	June 1940	Jan. through July 1940
Pig iron	1,067	643	6,842
Sponge iron	.....	.....	609
Ferromanganese (1)	319	1,346	8,263
Spiegeleisen	662	2,260	9,163
Ferrochrome (2)	.....	.....	1
Ferrosilicon (3)	103	126	766
Other ferroalloys (4)	25	.....	215
Steel ingots, blooms, etc.	.....	.....	3
Billets, solid or hollow	.....	31	437
Concrete reinforc. bars	.....	1	8
Hollow bar, drill steel	27	32	844
Bars, solid or hollow	26	80	1,744
Iron slabs	.....	.....	.....
Bar iron	.....	.....	194
Wire rods	18	78	3,944
Boiler and other plate (including skelp)	2	1	9
Sheets, skelp, saw plate	13	9	102
Die blocks blanks, etc.	.....	.....	12
Tin plate, taggers' tin and terneplate	15	6	72
Structural shapes	4	.....	691
Sashes and frames	.....	16	16
Sheet piling	.....	.....	.....
Rails, track material	531	531	1,416
Cast-iron pipe, fittings	.....	.....	419
Mall. iron pipe fittings	.....	.....	2
Welded pipe	31	.....	31
Other pipe	151	135	2,159
Cotton ties	11	.....	13
Other hoops and bands	.....	.....	599
Barbed wire	42	.....	86
Round iron, steel wire	20	18	806
Teleg., telephone wire	.....	.....	.....
Flat wire, steel strips	256	101	1,612
Wire rope and strand	41	56	467
Other wire	.....	.....	1
Nails, tacks, staples	1	8	104
Bolts, nuts, and rivets	3	3	127
Horse and mule shoes	.....	.....	3
Castings and forgings	22	23	398
Total	3,390	5,504	42,178
Iron and steel scrap	152	1	1,412
GRAND TOTAL	3,542	5,505	43,590

(1) Manganese content; (2) chrome content; (3) silicon content; (4) alloy content.

ORIGIN OF JULY IMPORTS
Gross Tons

	Iron ore	Pig iron	Manganese ore	Ferromanganese
United Kingdom	100	.....	.....	.....
Spain	5,510	.....	.....	.....
Brazil	36,375	.....	4,194	.....
Canada	33,841	717	.....	.....
Mexico	771	.....	50	.....
Cuba	17,400	.....	8,058	.....
Chile	152,900	.....	.....	.....
Iran	2,500	.....	.....	.....
British India	.....	350	2,738	.....
Philippine Is.	.....	.....	1,825	.....
Netherland Indies	.....	.....	236	.....
Soviet Russia	.....	.....	11,583	.....
South Africa	.....	.....	5,750	.....
Gold Coast	.....	.....	3,183	.....
Norway	.....	.....	.....	284
Japan	.....	.....	.....	35
Total	249,397	1,067	37,681	319

	Sheets, skelp and sawplate	Structural steel	Steel bars	Hoops and bands
United Kingdom	13	.....	25	.....
Belgium	.....	4	.....	.....
Japan	.....	.....	1	.....
Total	13	4	26	.....

was the chief commodity imported in July in point of tonnage, 1067 tons, including 717 tons from Canada and 350 tons from British India. Receipts of spiegeleisen, 662 tons, were all from Canada and of the 319 tons of ferromanganese imported 284 tons were from Norway and 35 from Japan. Canada contributed 444 tons and Mexico 86 tons of the 531 tons of railway track material imports. Sweden supplied the entire 256 tons of flat wire and steel strip.

Iron and steel scrap receipts amounted to 152 tons valued at $2286, compared with 1 ton valued at $9 imported in June. Canada supplied 151 tons and Mexico 1 ton of the July scrap imports. In July, 1939, scrap imports totaled 3385 tons, valued at $33,568.

FARM EQUIPMENT EXPORTS IN SMALLER VOLUME

July farm equipment exports were valued at $6,563,090, compared with $7,179,482 in June, a decline of 8 per cent. In July, 1939, the exports were $6,991,805, the July figure this year representing a loss of 6 per cent. A small increase in exports of tractors, parts and accessories was more than offset by decreased shipments of all other classes, the machinery division, department of commerce, reports.

July exports of tillage implements totaled $446,401 compared with $460,124 in July, 1939, a decline of 3 per cent. July exports of tractors, parts and accessories totaled $3,763,260, a gain of 5 per cent over $3,567,968 in July, 1939. Shipments of wheel tractors were down 19 per cent, while tracklaying tractor exports increased 16 per cent over July, last year.

Harvesting machinery exports in July were valued at $1,898,435, a drop of 11 per cent from $2,135,795 exported in July, 1939. Reductions were mainly in combines and grain harvesters and binders. All other types of farm equipment exported in July totaled $454,994, a decrease of 45 per cent from $827,918, the value of such exports in July, 1939.

■ **Additional news of interest in the steel and metalworking industries will be found on pages 78, 79 and 100.**

Russia Planning Three New Steel Plants in 5-Year Program

■ ANNOUNCEMENT from Moscow, U.S.S.R., last week, of a project involving three large iron and steel plants, to be completed within five years, indicates Russia is reaching for first place in steel production in Europe and Asia. While the announcement carried little detail it stated one plant will be in the southern Ural mountains, which divide Russia in Europe from Siberia, one in Siberia, and one in northwestern Russia. All equipment is to be built in Russia.

In the first five-year plan three plants were built, with the aid of American engineers. One was at Magnitogorsk, at the foot of the Ural mountains where immense reserves of high-grade iron ore are available. A second was in Siberia, some 1400 miles east of Magnitogorsk, at Kouznetsk, where coking coal is plentiful. The plan was to carry ore to Kouznetsk and coke from there to Magnitogorsk. The third was in southern Russia near the Sea of Azov.

An indication of the size of Russian plants is found in the announcement in 1935 of a project at Bakal, in the Urals, which was to have three blast furnaces with capacity of 1100 tons per day; 20 open hearths of 100-tons capacity, five 40-ton acid open hearths, two 60-ton basic open hearths and three 30-ton electric furnaces.

Growth of Russian steel output from 1929 to 1939 is shown in the accompanying table, from annual reports in STEEL. The increase was from 4,829,000 tons in 1929 to 18,500,000 tons in 1939.

With capacity figured at 19,000,000 tons per year, Russia is in second place in Europe, exceeded only by Germany with 26,000,000 tons capacity. However, capacities of countries now under German control total about 47,700,000 tons. The following are estimates by Vincent Delport, London, STEEL's European manager:

EUROPEAN STEEL INGOT CAPACITIES
Gross Tons

Germany	26,000,000
Russia	19,000,000
Great Britain	14,700,000
France	10,000,000
Belgium	4,300,000
Luxemburg	2,800,000
Italy	2,500,000
Poland	2,100,000
Czechia	1,750,000
Sweden	1,300,000
Hungary	750,000
Spain	500,000
Rumania	250,000

RUSSIAN INGOT OUTPUT
Gross Tons

1929	4,828,000
1930	5,610,000
1931	5,333,000
1932	5,900,000
1933	6,790,000
1934	9,412,000
1935	12,320,000
1936	16,080,000
1937	17,493,000
1938	18,150,000
1939	18,500,000

Windows of WASHINGTON

By L. M. LAMM
Washington Editor, STEEL

Navy Continues Steel Purchases on Six-Months Basis.

Senate Committee Delays Labor Amendments Report.

WPA Projects Aiding National Defense To Continue.

Byrd Seeks Senate Investigation of Defense Program.

WASHINGTON

■ THAT the navy department's new policy of buying steel for delivery over a six months' period has been successful is indicated by the fact that Sept. 6 the department will open bids covering another six months.

Navy officers who have worked on this plan are enthusiastic about the results, and steel producers also are reported well pleased. The bids are for structural steel only; no armor plate.

In an effort to eliminate a long-term guarantee of prices on new ship construction, the navy department some months ago issued a steel schedule combining new construction and repair needs and asking for firm prices for a six months' period. In the past the navy has purchased steel by two methods: Bulk of steel for new ship construction was purchased on a period-of-construction contract, where the navy asked for bids on estimated quantities required and where the bidder was given a fixed price for the steel over periods ranging from two to four years.

Asked Definite Bids

In addition to this, the navy went into the market every six months for structural steel and asked for definite bids on definite sizes and quantities of steel required for general repair work at navy yards.

The experiment was tried by navy officials in an effort to cut down the period of obligation for contractors and gave definite completion date of contracts.

♦

Senator Thomas, Utah, chairman of the committee on education and labor of the upper house, which has charge of the national labor relations board amendments, stated last week he did not see how it would be possible for his committee to report the amendments at this session of congress. The house has taken favorable action.

Thomas said he told his colleagues that an early report to the senate would be possible if the committee would lay aside amendments regarding procedure and deal only with other subjects, such as reorganization of the labor board, but that they "didn't think the idea was a good one."

Thomas called attention to what he said was an "extremely harsh campaign" by the Chamber of Commerce of the United States to discharge the committee and bring the amendments before the senate.

He said the chamber had sent a letter to 12,000 members referring to "suppressive tactics being used to block a senate vote," and asking businessmen to write members of congress in an effort to have the committee discharged.

♦

Jesse H. Jones, federal loan administrator, has been offered the position of secretary of commerce but it is reported he will not accept unless he is permitted to keep his present job. This will require congressional action and the story is that his name will not be sent to the senate for confirmation until congress acts favorably. Administration officials for a long time have tried to pry Jones out of his loaning job on the basis that he is too conservative, but he will not be budged of his own will.

♦

Sidney Hillman, national defense advisory commission member in charge of the labor division, last week announced several appointments to the staff of Floyd W. Reeves, Mr. Hillman's executive assistant in charge of labor supply.

Dr. Alonzo G. Grace, Connecticut commissioner of education, was named administrative assistant for state and local co-ordination. Dr. Ralph H. Woods, Kentucky director for vocational education and immediate past president, American Vocational association, was appointed assistant in the development of the defense training program as it particularly relates to vocational schools in rural areas.

H. W. Remke, senior administrative officer, United States civil service commission, will serve as liaison assistant on requirements for labor supply in army and navy establishments. J. B. Hutson, assistant agricultural adjustment administrator has been designated deputy commissioner of the agricultural division, national defense advisory commission.

WPA HAS SPENT $455,392,000 FOR DEFENSE PURPOSES

Rapid expansion of preparedness activities in recent months has increased the five-year total of work projects administration expenditures for national defense purposes close to the half billion dollar mark, Howard O. Hunter, deputy WPA commissioner, reported last week.

WPA program in coming months, Mr. Hunter said, will emphasize im-

Whether you are producing automobiles, tanks, trucks, aircraft or any product involved in the Defense Program, you will save time and money by adopting the SPEED NUT System of Assembly wherever possible.

Now is the time to eliminate old style and costly assembly methods.

SPEED NUTS are manufactured from a high carbon spring steel and accurately heat treated. They hold assembly parts together for the life of the product with a double-locking grip that conquers vibration loosening. Over a million a day are already being used in all leading industries, improving products and lowering net assembly costs. May we ask for complete details of your assembly problems? Samples and engineering data will be forwarded immediately.

TINNERMAN PRODUCTS, INC. 2039 FULTON ROAD CLEVELAND, OHIO

MANUFACTURERS OF PATENTED SPEED NUTS

IN CANADA: Wallace Barnes Co., Ltd., Hamilton, Ontario. IN ENGLAND: Simmonds Aerocessories, Ltd., London. IN FRANCE: Aercessoires Simmonds, S. A., Paris

OVER 900 MILLION ALREADY USED—OVER 700 SHAPES AND SIZES

provement of roads of strategic military importance. This will be done largely in co-operation with and on recommendation of the public roads administration and the war and navy departments.

Included will be construction and improvement of "access" roads to military and naval reservations and airports and roads on such reservations. Another and new type of highway work will be widening of shoulders, especially on major routes, to permit parking army convoys engaged in maneuvers without obstructing usual traffic.

Projects Aid National Defense

It is also proposed WPA improve routes paralleling main highways to permit simultaneous movement of several columns of troops and supplies. Projects for widening and strengthening bridges and elimination of obstructions on roads of military importance will be stressed everywhere, Mr. Hunter said.

Recapitulating WPA and sponsors' expenditures on projects directly related to defense purposes from the beginning of the WPA program through June 30, Mr. Hunter found $421,011,000 had been spent on facilities for the army, navy and coast guard, on publicly-owned airports and on armories, rifle ranges, camps, etc. for the national guard.

In addition, the deputy commissioner said, other hundreds of millions of WPA funds have gone into projects which, while not directly related to national defense, have an important bearing on the nation's military preparedness. He cited expenditures of more than $325,000,000 for construction and improvements of primary highways, including bridges.

It was pointed out that of $421,011,000 spent on defense projects in past five years, the largest share, $181,396,000, went for airport and airway projects. While these are state and municipally owned sites, Mr. Hunter said, military officials consider all airports important to the defense program. It is estimated 85 per cent of all work on airports throughout the country since 1935 has been done by WPA, he added.

Next largest share of the funds, $144,426,000, was spent on army projects. Posts in every state and in several insular possessions benefited. In a number of instances, he said, work financed by WPA was the only important rehabilitation and remodeling available to the army over a period of years.

Facilities for national guard, principally armories, consumed $50,133,000 over the five-year period, while $43,855,000 went for projects for the navy and $1,201,000 for the coast guard. Of the total spent during the period, $343,322,000 came from WPA funds and $77,689,000 was contributed by sponsors.

With authorizations made from the beginning of the present fiscal year through Aug. 15 totaling $34,392,000, he explained further, the over-all outlay of WPA funds directly for national defense purposes now totals $455,392,000. It is anticipated, Mr. Hunter said, that additional approvals of defense projects during the next few months will place this total well above $500,000,000 before the end of the year.

Map making and establishment of geodetic controls, important to artillery and air force maneuvers, will also occupy an important part in WPA defense activities, the deputy commissioner declared. This work is carried on in co-operation with the coast and geodetic survey and the geological survey. Many vital parts of the country, he said, even along the Eastern Seaboard, have never been mapped for military purposes.

SEEKS INVESTIGATION OF DEFENSE PROGRAM

Senator Byrd, Virginia, last week introduced a resolution for a special committee to investigate the manner in which the national defense program is being executed. The committee would consist of nine senators appointed by the president of the senate and would be known as the senate committee on national defense. It would include three members of the military affairs committee and three members of the committee on navy affairs.

The committee would obtain information to enable it to make recommendations to the senate, in the form of proposed legislation or otherwise, for action designed to expedite the program.

BRITAIN RESTRICTS USE OF TIN PLATE CONTAINERS

British ministry of supply hopes to save approximately 50,000 tons of tinplate and sheet steel per annum as result of a new order regulating use of these products, according to a report from American commercial attache, London.

Order prohibits use of tin containers for an extensive list of items, including face powders, shaving sticks, cigarettes and candy, and also limits size of cans used as containers for a number of other products. In the case of certain specified items, retailers will receive supplies in large cans which will have to be returned to manufacturers after their contents have been sold in small paper containers.

Tin boxes and cans will in general be replaced by paper containers and bags. The British public is urged to return all used cans without delay to retailers or other authorized persons or agencies.

GOVERNMENT APPEALS WORLD WAR SHIPBUILDING CASE

Appealing to the Supreme Court for an authoritative determination of the status of government contractors, Francis Biddle, United States solicitor general, last week asked for a review of the justice department's World war profits case against Bethlehem Shipbuilding Corp. This charged the company with obtaining "inordinate" profits on wartime shipbuilding.

The controversy, it was stated in a petition for a writ of *certiorari*, is of "immediate national concern" because of the government's present armament program. "The government is now engaged in a program of military and naval armament comparable to or greater than that undertaken in 1917-18 . . . therefore . . . there should be an authoritative determination of the extent to which the country's need should place it at the mercy of its contractors."

"In times of national emergency," petition continued, "men charged with preparing the nation's defenses have no time for haggling with a contractor who refuses to perform his indispensable functions unless he be assured an exorbitant profit."

Contracts entered into between the government and the company during the World war were the cause of suits which the petition seeks to have reviewed. First was filed by the government in 1925 to recover allegedly excessive profits made by the company. The latter then brought suit for $7,500,000 which it claimed represented profits not yet paid it in 1926. Lower courts ultimately ruled for Bethlehem in both cases.

The government now claims its officials were forced to accept the company's terms during the war because Bethlehem's shipbuilding facilities were the largest in the world and therefore indispensable.

Contracts were on a "cost-plus" basis. Bethlehem was to be repaid the cost of constructing vessels contracted for, plus a fixed profit equal to 10 per cent of the estimated cost. In addition Bethlehem was to receive a further "bonus for savings" equal to one-half the amount by which actual cost was less than estimated cost.

According to the petition to the Supreme Court, the company submitted "inflated estimates of cost," so that it would receive more than $25,000,000 in profit for doing work which cost about $93,000,000, without running any risk of loss.

"National Defense Production Could Be Speeded by Welding"

■ NATIONAL defense production could be accelerated and the five to seven years estimated as necessary for completing the current program shortened through full utilization of welding, according to a statement by the James F. Lincoln Arc Welding Foundation, Cleveland.

Battleships, destroyers, submarines, aircraft, tanks, gun mounts, scout cars, tractors, trucks, railway artillery, as well as industrial equipment for armament production could be produced in 30 per cent less time and at approximately similar cost savings, contends the foundation. The foundation bases its estimate on its extensive files covering application of welding to many types of products and structures.

Possibilities for speeding defense production are suggested in the accompanying table prepared by the foundation. These statistics show savings in production time, cost and weight and also the claimed operating advantages made possible through greater strength and rigidity.

The foundation has underway a 2½-year program of industrial study, the object of which is to extend the application of welding. Awards totaling $200,000 and ranging from $13,700 to $100 will be made after the program closes June 1, 1942.

Participating in an earlier foundation study project were many engineers, designers and others whose plants now are engaged in armament production.

Report Tools Placed For Engine Plant

CINCINNATI, O.

■ Steel fabricators so far have not received specifications for a proposed $32,000,000 plant here for making airplane engines for national defense. Details also are lacking on the amount involved in orders for machine tools, reported placed at the Paterson, N. J., offices of the Wright Aeronautical Corp.

The tools are under order with these Cincinnati manufacturers: American Tool Works, Avey Drilling Machine Co., Carlton Machine Tool Co., Bradford Machine Tool Co., Cincinnati Bickford Tool Co., Cincinnati Gilbert Machine Tool Co., Cincinnati Milling Machine Co., Cincinnati Grinders Inc., J. A. Fay & Egan Co., Fosdick Machine Tool Co., R. K. LeBlond Machine Tool Co., Lodge & Shipley Machine Tool Co., and Schauer Machine Co.

Time, Cost and Weight Saved by Welding

Item	Production Advantages	Operating Advantages
9-foot Anti-aircraft combat car.	Elimination of extra parts and manufacturing operations.	Elimination of danger from bolts and rivets being driven into the tank; speed over 100 miles per hour; climbs grades of 50% inclination; as easy to drive as motor car.
10,000-ton cruiser.	Saving of 17% in weight, 3% in cost.	Greater maneuverability, operating speed and carrying capacity through reduced deadweight.
Two 92-foot tug boats.	20% reduction in construction time; built in only seven weeks.	Increased carrying capacity through elimination of deadweight; elimination of dangers of rivets being driven into hull by high-powered guns.
Submarine mine layer.	Construction time reduced 25%; 15% savings in weight.	Permanently leak-proof construction; elimination of rivets and their danger of being driven into the interior.
610-foot cargo vessel.	Weight reduction 16.2%; cost saving of 25.9%; 20% saving in construction time.	Greater safety at sea through increased strength; increased carrying capacity by elimination of deadweight; removal of rivet hazards.
Airplane landing gear forks.	50% saving in production time; saving of $40 per airplane.	Increase of 23.6% in structural strength, thus increasing operating safety.
Beaching gear for large aircraft.	Cost saving of 31.7%; 20% weight saving; production time saving of 20% to 25%.	Easier maneuverability through greatly reduced weight.
Field service truck body.	A saving of 25% in weight; cost saving of 32%; saving in production time 15% to 25%.	Saving in fuel cost by weight reduction; increased service life through a permanently tight construction; reduced cost of maintenance.
Trailerized tank.	Approximately 15% weight saving; 25% to 30% saving in production time.	Increase of 15% in payload capacity through reduced weight.
Locomotive frame.	Cost saving of 47.5%; weight saving 27.5%; saving in production time 30 to 35%.	Greater payload capacity; higher operating speed.
Locomotive boiler.	10% cost saving; 10% saving in weight.	Increased service life; reduced maintenance; high efficiency.
Rotary planing machine.	89% saving in production time; cost saving of approximately 70%.	Increased efficiency and service life through greater rigidity of structure

Convention Calendar

Sept. 3-6—American Society of Mechanical Engineers. Fall meeting at Hotel Davenport, Spokane, Wash. C. E. Davies, 29 West Thirty-ninth street, New York, is secretary.

Sept. 9-13—American Chemical society. 100th national meeting in Detroit. Charles L. Parsons, 728 Mills building, Washington, is secretary.

Sept. 12—Gray Iron Founders' society. Annual meeting at Hotel Cleveland, Cleveland. W. W. Rose, 1010 Public Square building, Cleveland, is executive vice president.

Sept. 16-19—American Mining congress. Seventh annual metal mining convention and exposition, Colorado Springs, Colo. Julian D. Conover, 309 Munsey building, Washington, is secretary.

Sept. 18—University of Pennsylvania. Symposium on "Development of Metal as a Structural Element in Architecture," at the university, Philadelphia.

Sept. 18-20—National Industrial Advertisers association. Eighteenth annual conference at Hotel Statler, Detroit. Mildred R. Webster, 100 East Ohio street, Chicago, is secretary.

Sept. 19-20—Concrete Reinforcing Steel Institute. Semi-annual meeting at Skytop Lodge, Skytop, Pa. H. C. Delzell, 2257 Builders building, Chicago, is executive secretary.

Sept. 20—Chicago Section, American Ceramic society, and Department of Ceramic Engineering, University of Illinois. Symposium on acid, basic and neutral refractories at auditorium, Civic Opera building, Chicago.

Sept. 23-26—American Transit association. Fifty-ninth annual meeting at Greenbrier hotel, White Sulphur Springs, W. Va. Guy C. Hecker, 292 Madison avenue, New York, is general secretary.

Sept. 24-25—Society of Automotive Engineers. National tractor meeting at Schroeder hotel, Milwaukee. John A. C. Warner, 29 West Thirty-ninth street, New York, is general manager.

Sept. 24-27—Association of Iron and Steel Engineers. Thirty-sixth convention and exposition at Stevens hotel, Chicago. Brent Wiley, 1010 Empire building, Pittsburgh, is managing director.

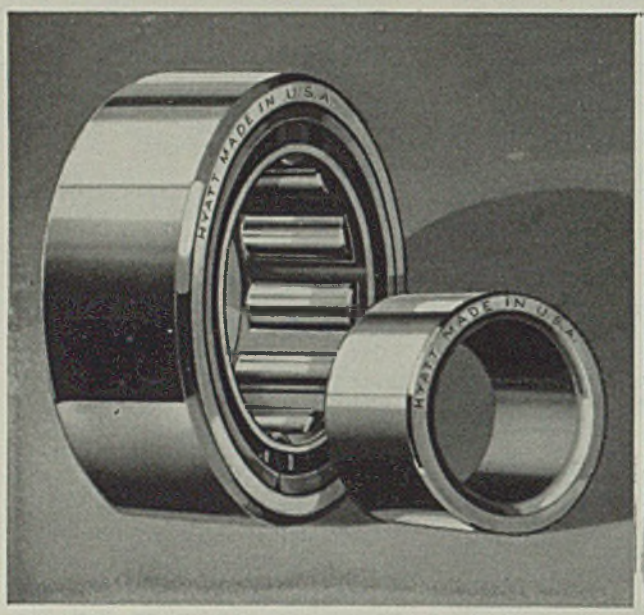
Sept. 26-29—National Association of Foremen. Seventeenth annual convention at Hotel Gibson, Cincinnati. H. G. Evans, Goodyear Tire & Rubber Co., Akron, O., is secretary.

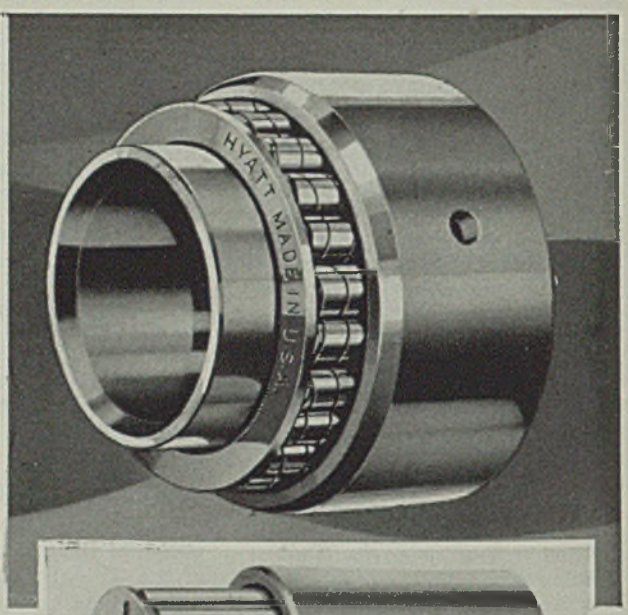
Sept. 30-Oct. 1—National Lubricating Grease Institute. Eighth annual convention at Stevens hotel, Chicago. George W. Miller, 498 Winspear avenue, Buffalo, is executive secretary.

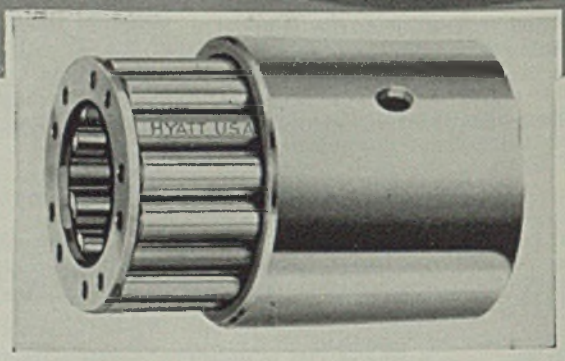
Oct. 2-5—Electrochemical Society, Inc. Seventy-eighth general convention at Chateau Laurier, Ottawa, Canada. Dr. Colin G. Fink, 3000 Broadway, New York, is secretary.

Oct. 7-11—National Safety council. Twenty-ninth national safety congress and exposition at Stevens hotel, Chicago. W. H. Cameron, 20 N. Wacker Drive, Chicago, is managing director.

LIGHTENING THE LOAD







● No matter what the application there's a size and type of Hyatt Roller Bearing for the job. Illustrated above left, Hyatt Hy-Load Solid Roller Bearing; above right, Hyatt Wound Roller Type Bearing; opposite, 90,000 Series Solid Roller Bearing.

WITH SMOOTH-ROLLING HYATTS there's no friction to rob mechanical equipment of its ability to function well. Freed from friction, Hyatt-protected machinery takes all loads with a minimum of effort . . . with less wear and attention . . . and lasts longer. Tough jobs come easy wherever Hyatt Roller Bearings are used . . . in mill and factory, on highway, farm, and railway. Let Hyatts lighten the load of all your equipment. Hyatt Bearings Division, General Motors Sales Corporation, Harrison, New Jersey; Chicago, Detroit, Pittsburgh and San Francisco.

HYATT

ROLLER BEARINGS

QUIET

Mirrors of MOTORDOM

By A. H. ALLEN
Detroit Editor, STEEL

Studebaker Grooms New Models for 150,000 Goal.

Teardrop Bodies Set Style Pace for GM.

Lincoln Zephyr Refurbishes Body Plant.

Plants for Defense Work Waiting Go Signal.

Bonanzas for Suppliers and Equipment Builders?

DETROIT

■ SEEKING to pep up sales of President and Commander models to reach an overall sales goal of 150,000 in 1941, Studebaker stylists, under direction of Raymond Loewy, have developed a new body style which has been dubbed the Land Cruiser. Reflecting the Torpedo body motif introduced by General Motors last year, it is lower, wider, roomier, with a distinctive "bustle" at the rear. Rear fender stampings have been reworked, the part just over the wheel following the contour of the wheel and the skirt or valance being stepped back an inch or so to hug the body more closely.

All Studebaker models, including the Champion, are distinguishable by the double belt molding of bright metal which extends from the center of the radiator grille in an unbroken line back to the trunk compartment. About 6 inches apart at the front, these moldings come together at the rear, providing a triangular panel on the side of the body which can be given a contrasting or harmonizing color treatment to set it off from the rest of the body.

All models are slightly longer and in general are patterned more closely along the "family" design idea. Die cast radiator grilles comprise closely spaced vertical bars which are set off from the fender surface instead of being flush. Two-tone finishes, both on exteriors and interiors, will be accentuated on the new models.

Mechanically, changes are few. Engines have slightly greater horsepower, the Champion model having 5.7 cubic inches added displacement. Aluminum alloy pistons are tin plated and equipped with a heat dam and Ferrox treated ring. Overdrives are available in all models at extra cost. Front wheel suspension has been strengthened by addition of one more spring leaf. Threaded pins are used at the outer ends of control arms for supporting steering knuckle pins. Rear spring leaves are of parabolic edge section.

Buick models for 1941 were being shown publicly last week. They embody five lines of cars, including the redesigned Special and Century series, the streamlined Limited series, as well as the Super and Roadmaster series which are substantially unchanged in appearance from 1940. Engine used in the Special and Super models is 125 horsepower, with compound carburetion, the latter being optional for $15 on the Special series and standard on all the rest.

Reduces Gear Shifting

Briefly, with compound carburetion the engine operates under all normal conditions up to 70 miles per hour on one carburetor, the second cutting in when it is needed either for fast acceleration or greater top speed. Thus, using one carburetor with smaller nozzles at driving speeds and with a second carburetor arranged to cut in automatically when called upon, a material increase in economy is effected, and gear shifting in the lower speeds becomes less frequent.

Horsepower on the new smaller engine has been increased from 115 to 125, and on the larger engine to 165.

A word should be said about the new body styles developed by Fisher for the Special and Century series. Smooth fairing of the top line eliminates the trunk compartment and places the rear window on an extremely sharp angle. Construction features are similar to those developed for the Torpedo bodies last year, except that concealed or inbuilt running boards are provided. Introduction of this new body seems to indicate that the plan now may be for Fisher Body to develop one completely new body style every year, for Buick, Olds and Pontiac, and to combine this new style with minor revisions of the preceding year's style.

An interesting feature of the new body styles is the use of courtesy lights placed close to the floor level at both front and rear doors. These lights are controlled with door jam switches identical with those used on electric refrigerators.

Other novelties include steel gravel deflectors between bumpers and body both front and rear, a perforated and chrome plated steel screen behind the radio grille on the instrument panel, direction signals now incorporated into tail lights instead of at the center of the body, integral front bumper and license plate frame, said to be the first time engineers ever have attempted to design the license plate into the lines of the car.

Expansion of the Lincoln plant here to take over manufacture of Zephyr bodies formerly produced by Briggs has been completed after a year's work and expenditure of around $1,000,000. Machine shop and two body building shops have been re-outfitted and a considerable volume of equipment installed for

welding, riveting, sanding and buffing operations.

Conveyors to move body parts along the assembly line and to move completed body skeletons include both overhead and floor carriage types. Two and one-half miles of new conveyor systems have been erected and a half of an old system relocated. The body shop has normal productive capacity of 150 bodies per 8 hours. About 25 hours are required to build each body complete. Noteworthy is the large amount of welding involved in the construction. Each body will have 4300 spot welds, 232 arc welds and 112 inches of gas welds. Equipment to handle this production includes 335 spot welding guns, 52 stationary spot welders and eight butt welders.

New seam welders are being installed in the Buick tube fabricating department which daily is turning out some 60,000 feet of various size tubing for propeller shafts, torque tubes, exhaust pipes, tail pipes, gas tank filler pipes and other parts. All this tubing is made from strip steel on machines which combine forming roll stands, circular welding electrodes and sizing rolls. Strip steel is fed into these machines from coils mounted overhead and set some distance from the machine so that about 100 feet of slack can be looped over pulleys before it enters the machine. Thus, when one coil has been used up there is sufficient slack to permit welding on a new coil, without interrupting the forming operation.

■ ACCORDING to a survey of 175 local shops supplying tools, jigs and fixtures made by the Automotive Tool and Die Manufacturers association better than one-third the capacity of these plants will be available starting this week for requirements of the national defense program. The other two-thirds still are busy on automotive work, but with the decks cleared at some shops it is expected defense work will be assigned rapidly so that workmen need not be laid off. The survey did not include die shops or tool departments of the large manufacturing corporations.

Although unconfirmed either by Packard or the federal government, it is understood in trade circles here that the contract for building 9000 Rolls-Royce aircraft engines finally has been signed by emissaries of Packard and the government. Held in abeyance for weeks, the contract has awaited clarification of financial details, but Packard has been proceeding quietly on lining up sources of materials and parts.

Now it is reported work will start shortly on a new $40,000,000 plant in which Packard will concentrate all manufacturing phases incident to this engine. Size and scope of this plant can be imagined when it is considered that the Packard Motor Car Co. itself is capitalized for only $30,000,000. Location of the new engine plant is not known definitely, but property is available adjacent to the company's present plant which might accommodate the structure.

Efforts are being made to divorce this engine project entirely from automobile manufacture, but some of the Packard engineering department personnel has been transferred to the aircraft engine division from the passenger car division. This should cause no great inconvenience, however, inasmuch as engineering departments, currently are getting a breathing spell while assembly lines start off on new models.

Vendors of equipment, supplies and other necessities involved in large new plants are licking their chops in anticipation of some juicy new business in connection with Chrysler's tank plant, to be located outside the city about three miles, and the Packard engine plant. Conveyors, trucks, machine tools, welders, punches, riveters, power and light systems, cranes and hoists are just a few of the stock items which will be required in large numbers for these vast structures.

Plans are in the formative stage for a new plant at the River Rouge works of Ford Motor Co., possibly to house manufacturing operations on the Hispano-Suiza 12-cylinder airplane engine or the 4000 Pratt & Whitney Wasps, also on the Ford agenda. Tests are being run currently on a two-cylinder section of the former engine to determine manufacturing problems and other details.

Ford is slated to make a fair-size steel purchase this week, probably for the second budget on 1941 models. Other car builders are proceeding on a normal basis as far as steel purchasing is concerned. Little credence is given the published report that Chrysler has taken over steel buying for Briggs requirements on Chrysler bodies.

Adoption of the fluid drive as optional equipment on 1941 Dodge and De Soto models has meant a number of changes in the Dodge foundry here. For cars equipped with the fluid drive a larger clutch housing and gearcase are required, so that two lines must be operated in the foundry, one for the larger castings and one for the regular size. Two cupolas in the foundry have been enlarged 12 inches in diameter in the effort to step up iron supply.

"Colossal Job To Do"

"Unless we Americans are prepared to discipline ourselves, roll up our sleeves and get down to work," James D. Mooney, GM vice president, told graduating students at General Motors institute ten days ago, "we shall not move along very rapidly in making industry fulfill her destiny. There is still a colossal job to do in America of clearing away our slums and overcoming the fear of poverty that is haunting too many millions of our people. Furthermore, we must impose this discipline on ourselves if we are to provide the airplanes, tanks, artillery and machine guns we need for national defense."

Preview of new Oldsmobile models was held last Thursday at Lansing in connection with the company's sales convention. For the first time in three years, the entire sales and service force, numbering 500, convened at Lansing for a two-day meeting to hear plans for the coming year and to meet the new general manager, S. E. Skinner. Reception for high officials of General Motors was held Wednesday, and suppliers were invited to inspect the new models on Friday.

New silent mesh transmission of the latest blocker type, with operating controls located on the side of the case to permit a more direct and simplified linkage between the transmission unit and the shift lever on the steering wheel, has been developed for 1941 Hudson models.

Unofficial but widely circulated around Detroit is the report that Cadillac will discontinue LaSalle models for 1941 and concentrate on Cadillacs.

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	362,586
July	150,450	218,494	246,171
7 mos.	1,455,951	2,274,348	2,785,611
Aug.	96,946	103,343	.....
Sept.	80,623	192,678	.....
Oct.	215,286	324,688	.....
Nov.	390,405	368,541	.....
Dec.	406,960	469,120	.....
Year	2,635,171	3,732,608	.....

Estimated by Ward's Reports

Week ended:	1940	1939†
Aug. 3	17,373	28,250
Aug. 10	11,635	26,125
Aug. 17	20,475	15,105
Aug. 24	23,732	18,365
Aug. 31	27,645	25,240

†Comparable week.

MEN of INDUSTRY

■ GEORGE W. ROONEY has been appointed comptroller, United States Steel Corp., effective Oct. 1. Mr. Rooney succeeds the late Adolph W. Vogt. He has had broad experience in accounting and has been associated with United States Steel subsidiaries since 1930.

Born in Pittsburgh, Aug. 11, 1894, Mr. Rooney was educated in the public schools there and attended the University of Pittsburgh. His first business experience was in the accounting department of H. J. Heinz Co. From 1912 to 1917 he served in a similar capacity for the board of public education, Pittsburgh. After eight years with Scott-Boschert & Co., Pittsburgh, certified public accountants, he joined Oil Well Supply Co. as auditor, and in 1938 became comptroller, National Tube Co., his present position.

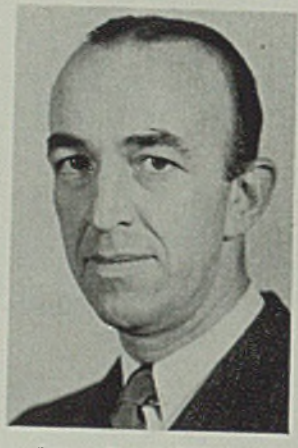
♦

James Campbell Hodge has been elected vice president and a director, Wellman Engineering Co., Cleveland. After graduation from Case School of Applied Science in 1923, he was associated with Bennett & Christensen, consulting chemists and metallurgists. He joined Babcock & Wilcox Co., Barberton, O., in 1927, as a metallurgist, where he developed and perfected the process of welding used by the company in the welding of boiler drums. In 1932 he became chief metallurgist of Babcock & Wilcox. Mr. Hodge continued his metallurgical studies at Harvard university between 1931 and 1933, and since then has been closely identified with the development of low alloy constructional steels and the various heat resistant and corrosion resistant steels, particularly with relation to their weldability. He has served on technical committees of the American Society for Testing Materials; on the boiler code committee, American Society of Mechanical Engineers; welding research committee, Engineering Foundation; American Welding society and American Petroleum institute. He was joint recipient of the J. F. Lincoln gold medal of the American Welding society in 1938.

♦

S. P. Broome has been appointed special representative of Crucible Steel Co. of America, New York, to co-operate with the national defense advisory commission. He will conduct liaison work between the company and the advisory commission. Mr. Broome was formerly eastern sales manager of the company's subsidiary, Pittsburgh Crucible Steel Co., with offices in Philadelphia.

George W. Rooney



James Campbell Hodge

S. P. Broome

♦

J. H. Morrison has been appointed general works manager, Sharon Steel Corp., Sharon, Pa. He will have charge of the Sharon and Lowellville plants. He formerly was general superintendent of the hot mills at the Monessen and Allenport, Pa., works of Pittsburgh Steel Co. In 1915 he joined Youngstown Iron & Steel Co., later absorbed by Sharon Steel Hoop Co. In 1936 he went to Monessen as superintendent of the blooming, bar and billet mills of Pittsburgh Steel, and a year later was also given supervision of the rod mill. In 1938 he became general superintendent of all the hot mills at Monessen and the tube mills at Allenport.

♦

L. H. Grutsch, formerly with International Harvester Co., Chicago, is now works manager, Cleveland Tractor Co., Cleveland.

♦

Conrad M. Wallin has been named planning director, Cleveland Pneumatic Tool Co., Cleveland. He formerly served in similar capacity with Cleveland Tractor Co.

♦

Harry F. Davis, former Detroit manufacturers' agent, has become associated with the Dycast Products division, Monarch Aluminum Mfg. Co., Cleveland, as sales manager.

♦

H. A. Myers, associated with the Long Island City, N. Y., plant of Gar Wood Industries Inc., Detroit, a number of years, has been named assistant manager there.

♦

R. K. Mitchell and Daniel Martin have been named works manager and production foreman, respectively, A. W. Hecker Co., Cleveland. They were formerly associated with Cleveland Tractor Co., Cleveland.

♦

A. Gordon King, the past 17 years service engineer, American Gas association, New York, has been elected secretary of the technical section. He succeeds the late Hugh W. Hartman.

♦

Ralph O. Wirtemburg, manager of the New York office of New Departure division of General Motors Sales Corp., has been transferred to the main office in Bristol, Conn., as eastern sales manager, a newly created post. Francis B. Wasley, in charge of the Philadelphia office, succeeds Mr. Wirtemburg in New York, and Mark Goedecke, service engineer in the Bristol office, replaces Mr. Wasley at Philadelphia.

♦

George S. Jameson, since 1918 supervisor of order and stores department, River works, General

Electric Co., Lynn, Mass., retired Sept. 1, after 52 years service. Starting as an office boy in 1888 with Thompson Houston Electric Co., he held various positions in the accounting and purchasing departments, and in 1900 was named assistant to supervisor of order and stores.

♦

H. A. Brassert & Co. announces that, following the relocation of offices in Pittsburgh and New York, personnel will be as follows: Pittsburgh, C. A. Brassert, assistant to the president; J. J. Seaver, vice president; S. P. Kinney, manager of sales; George Sanger, chief engineer. In New York are located H. A. Brassert, president; E. L. Ives, executive vice president; A. C. Barker, vice president; A. B. Markus, secretary-treasurer, and F. L. Estep, chief engineer.

♦

John H. Stapleton has been appointed assistant manager of sales in the New York district for Car-

John H. Stapleton

negie-Illinois Steel Corp. Associated with the Carnegie subsidiaries of United States Steel Corp. since 1917, Mr. Stapleton has been assistant to the vice president in charge of sales since 1938. He served the former Carnegie Steel Co. as a salesman in the Kentucky coal fields; was resident salesman at Columbus and Youngstown, O., and in 1936 became assistant to the manager of sales at Chicago.

♦

Edwin L. Brown has been appointed blooming mill superintendent, Gulfsteel division of Republic Steel Corp., Birmingham, Ala. He began his career in the steel industry with Marks Mfg. Co., Indiana Harbor, Ind., in 1919, now a Youngstown Sheet & Tube Co. plant. After serving there in the coke plant, blast furnace and rolling mill departments in various supervisory capacities, he became superintendent of rolling mills for Northwestern Steel & Wire Co., Sterling, Ill., in 1936.

William Ross Crampton has been named superintendent of transportation, Gulfsteel division. In 1918 Mr. Crampton joined Trumbull Steel Co., subsequently Republic Iron & Steel Co., and then Republic Steel Corp. W. G. Little becomes assistant to Mr. Crampton.

♦

N. C. MacDonald, formerly eastern sales manager for Barlow & Seelig Mfg. Co., Ripon, Wis., has been named eastern sales manager for Crosley Corp., Cincinnati, with headquarters in New York. B. T. Roe has been named western sales manager of Crosley, with headquarters in Chicago. Heretofore he was domestic sales manager for Universal Cooler Corp., Detroit. S. D. Camper has been appointed southern sales manager and will have headquarters in Atlanta, Ga. He formerly was manager for RCA Mfg. Co., Camden, N. J., in the Atlanta district.

♦

Frank A. Denison Jr., since 1937 associated with the Detroit office of Reliance Electric & Engineering Co., Cleveland, has been appointed manager of the newly established sales office in Houston, Tex. Tinkham Veale, in the sales service department of Reliance in Cleveland, succeeds Mr. Denison in Detroit.

♦

J. B. Morrow, since 1938 vice president in charge of operations, Pittsburgh Coal Co., Pittsburgh, has been elected president. He succeeds J. D. A. Morrow, who recently resigned to become president, Joy Mfg. Co., Franklin, Pa.

♦

Myron C. Taylor, personal envoy of President Roosevelt to the Vatican, and former chairman of the United States Steel Corp., traveling with his wife and a nurse, was reported to have sailed from Lisbon, Portugal, last week for New York.

♦

Carnegie-Illinois Steel Corp. announces the following personnel changes at its South works, Chicago:

Carl H. Youngdahl has been appointed assistant superintendent, power production division, after serving as division engineer in charge of operation, maintenance and construction since 1928 for the Illinois-Iowa Power Co.

Charles L. Clarke has been made superintendent of yards and transportation. He has been employed at South works since 1896, and prior to his present promotion was assistant superintendent of yards and transportation.

Russell W. Davy has become construction engineer, after serving in various capacities in the civil engineering department, while Howard C. Brown has become assistant superintendent of yards and transportation, succeeding Mr. Clarke. He formerly was assistant to superintendent of this department in charge of personnel.

Porcelain Enamel Finish On Turnpike Stations

■ Pennsylvania Turnpike, said to be the longest toll super-highway in the United States, will be open to traffic late this fall, according to Turnpike commission, Harrisburg, Pa. Extending from Harrisburg to Pittsburgh, the 160-mile four-lane divided highway passes through seven tunnels, with a total length of seven miles, over 139 bridges and 160 over and underpasses. A vehicle may travel the entire distance at highest speed without stopping.

The road, ordinarily a three or four-year project, was built in 20 months. Equipment valued at $25,000,000 was concentrated on the job to remove about 26,000,000 cubic yards of earth, and lay 4,300,000 square yards of concrete pavement.

Toll will be $1.50 for passenger automobiles and $3 to $10 for trucks. Partial trips will be based on 1 cent a mile for passenger cars and from 2 to 8 cents a mile for trucks and trailers. Commission engineers estimate the new turnpike will save coast-bound vehicles more than 300 miles compared with the present route through northern Ohio and New York.

Traffic will be admitted to the road at both ends and at eight intermediate stations. At each station there are lanes 1200 feet long parallel to the main pike, allowing cars to slow down on leaving and to pick up speed on entering the pike. A single ticket booth at each traffic admission point takes care of both leaving and entering traffic.

Ticket stations feature panel-type porcelain enamel exteriors with canopies 22 feet wide and from 30 to 100 feet long extending over the traffic lanes. Panels are made from 16-gage U.S.S. Vitrenamel steel sheets made by Carnegie-Illinois Steel Corp., Pittsburgh. Panels are removable for replacements. Simplicity of the structure brought the "in place" cost of the exterior down to 75 cents a square foot. Vertical surfaces are "pebble finish" light powder blue, the canopy ceiling and faces are ivory. All exterior surfaces are said to be remarkably free from glare.

■ Construction of plant additions by 40 companies, totaling more than $3,000,000, was started in the Chicago district in July, according to Chicago Association of Commerce.

EDITORIAL

War Contracts Involve Hazards

■ IF ANYBODY is puzzled over the hesitancy of manufacturers to accept government contracts until they have definite assurance as to where they stand, his confusion may be dispelled to some extent by reading United States Solicitor General Francis Biddle's appeal to the Supreme Court (p. 26) for a review of the World war profits case against Bethlehem Shipbuilding Corp.

During the World war this company received large contracts for ship construction and was highly lauded for the efficiency and despatch with which it executed them. In 1925 the government filed a suit to recover allegedly excessive profits made by the company. The latter then brought suit for $7,500,000 which it claimed as profits not yet paid. Lower courts ultimately ruled in favor of the Bethlehem company in both cases.

Manufacturers Know that Government Can Get Tough on Little Provocation

In seeking a review, the solicitor general holds that the matter is of "immediate national concern" because of the government's pressing armament program. "The government," he states, "is now engaged in a program of military and naval armament comparable to or greater than that undertaken in 1917-1918 . . . therefore . . . there should be an authoritative determination of the extent to which the country's need should place it at the mercy of its contractors."

Mr. Biddle enlarges on this theme. "In time of national emergency," he says, "men charged with preparing the nation's defenses have no time for haggling with a contractor who refuses to perform his indispensable functions unless he be assured an exorbitant profit."

The petition, of course, ignores entirely the extensive contributions which were made by all departments of the Bethlehem organization to our military objectives during the World war. It ignores entirely the agonies which the entire Bethlehem organization suffered, as a result of this whole-hearted co-operation, in subsequently readjusting itself to the conditions of peace.

Right now many patriotic manufacturers find themselves between the devil and the deep blue sea when offered government contracts. What with the profit limitations of the Vinson-Trammell act, uncertainty as to the amortization period to apply to stockholders' money invested in defense plant and equipment and lack of definite assurance as to legal status of the contracts, they just do not know where they stand.

Industry Should Explain to Public When Contracts Are Unacceptable

Many of them suffered severe headaches as a result of working for the government in the World war. They want assurances that they can proceed without danger to their future solvency. Adding to their present confusion is the action of the senate, last Wednesday, in authorizing the President to conscript manufacturing plants when their owners "balk" at accepting defense orders.

STEEL believes that the time has come when more of the publicity about industry should emanate from industry itself. It believes, particularly, that when a manufacturer finds himself embarrassed by being asked to accept an unacceptable defense contract he will act wisely if he reveals to the public his reasons for refusal. At the least he should make his position clear to his representatives in congress. That sort of publicity, of which there so far has been very little, is needed if the public is to judge industry fairly.

E C Kreutzberg

The BUSINESS TREND

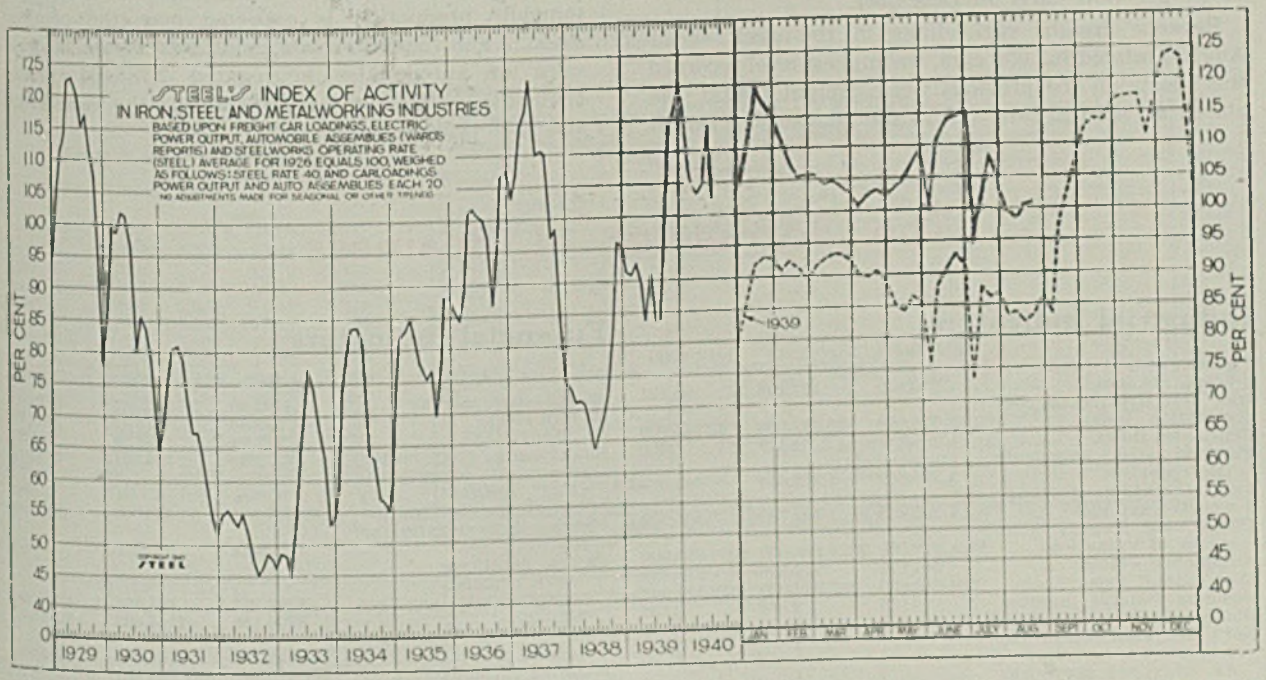
Activity Index Moves to Slightly Higher Level

AIDED measurably by expenditures connected with the domestic rearmament program and further expansion in foreign trade, industrial activity, particularly in the durable goods' industries, remains at encouraging high levels for this period of the year. Among those industries recording further gains in recent weeks are construction, steel, machine tools, aircraft and automotive. A continued high level of operations is indicated for these industries over the next few months.

Large backlog of orders in the heavy industries was also an important factor in sustaining production at the 1940 peak during the normally seasonal dull period of July and August.

Somewhat unfavorable factors at the moment include weakness of commodity prices, ample inventories, slowness of getting into actual production on defense work, uncertainty as to developments abroad and pending tax legislation.

During the week ended Aug. 24, STEEL's index of activity advanced 0.6 point to 101.4. Moderate improvement in automobile production, freight carloadings and steelmaking operations were recorded during this period. In the corresponding weeks of 1939,



STEEL'S index of activity gained 0.6 *points to* 101.4 *in the week ended Aug.* 24:

Week Ended	1940	1939
June 15	114.6	90.9
June 22	114.8	93.0
June 29	115.3	91.0
July 6	94.2	73.4
July 13	108.5	87.8
July 20	106.0	86.0
July 27	103.4	86.8
Aug. 3	99.7	83.5
Aug. 10	98.5	83.9
Aug. 17	100.8	82.2
Aug. 24	101.4	83.4

Mo. Data	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Jan.	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	34.6	69.1	87.6	104.1
Feb.	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	35.3	73.5	99.2	111.2
March	104.1	92.6	71.2	114.4	88.7	83.1	78.9	44.5	34.2	80.4	98.6	114.0
April	102.7	89.8	70.8	116.6	100.8	83.0	83.6	52.4	32.8	81.0	101.7	122.5
May	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	34.8	78.6	101.2	122.9
June	114.2	90.9	63.4	109.9	100.3	77.4	80.6	70.3	31.4	72.1	95.8	120.3
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
Aug.	.....	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4	85.4	116.9
Sept.	.....	98.0	72.3	96.8	86.7	69.7	56.9	68.0	46.5	64.3	83.7	110.8
Oct.	.....	114.0	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2	78.8	107.1
Nov.	.....	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4	71.0	92.2
Dec.	.....	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3	64.3	78.3

1938 and 1937, STEEL's index stood at 83.4, 70.3 and 108.5 respectively. Reflecting the normal seasonal upturn in automobile production, electrical power output and freight traffic, STEEL's index of activity should record further gains during the weeks immediately ahead.

Large order backlogs, encouraging volume of incoming business, and the steady improvement in export shipments are sustaining steelmaking operations at practical capacity. During the week ended Aug. 24, the national steel rate advanced one-half point to 90.5 per cent with a further slight gain indicated for the latest period. At this time a year ago the steel rate stood at 63.5 per cent, climbing steadily through the remainder of the year to reach a peak of 94 per cent early in December.

Revenue freight carloadings in the week ended Aug. 24 totaled 761,002 cars, the highest level recorded this year. In the previous week, freight traffic was placed at 743,121 cars and in the comparable period a year ago 688,591 cars. Normal seasonal improvement through the fall months should carry freight traffic to new high level for the year.

Automobile output continued to advance during the week of Aug. 24, moving up another step in the seasonal climb to 23,732 cars and trucks, compared with 20,475 in the previous week and 17,765 in the comparable 1939 week. Further improvement in automobile production is expected over the coming weeks. For the first seven months this year factory sales of automobiles aggregated 2,785,611 units, against 2,274,238 and 1,455,951 during the same 1939 and 1938 periods respectively.

Where Business Stands

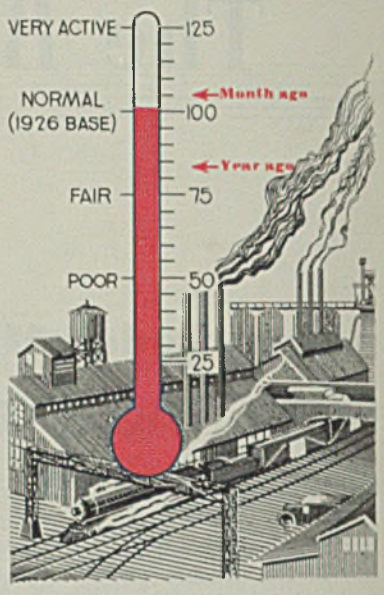
Monthly Averages, 1939 = 100

	July, 1940	June, 1940	July, 1939
Steel Ingot Output	128.8	131.2	82.0
Pig Iron Output	135.3	131.4	88.0
Freight Movement	108.2	110.5	99.7
Building Construction	134.7	109.7	101.3
Wholesale Prices	100.8	100.3	97.8
Automobile Production	79.2	116.6	70.3

Industrial Weather

TREND:

Upward



The Barometer of Business

Industrial Indicators

	July, 1940	June, 1940	July, 1939
Pig iron output (daily average, net tons)	130,919	127,103	85,121
Iron and steel scrap consumption (tons)	$3,526,000	$3,482,000	$2,247,000
Gear Sales Index	141	129	89.0
Finished steel shipments (Net tons)	1,296,887	1,209,684	745,364
Ingot output (average weekly; net tons)	1,265,853	1,289,723	806,522
Dodge bldg. awards in 37 states ($ Valuation)	$398,673,000	$324,726,000	$299,883,000
Automobile output	246,171	362,566	218,494
Coal output, tons	$36,080,000	$32,340,000	$29,391,000
Business failures; number	1175	1114	1153
Business failures; liabilities	$16,213,000	$13,734,000	$14,999,000
Nat'l Ind. Conf. board (25 industries, factory):			
Av. wkly. hrs. per worker†	38.0	37.5	37.1
Av. weekly earnings†	$28.23	$27.67	$26.67
Cement production, bbls.†	12,514,000	12,668,000	13,216,000
Cotton consumption, bales	597,850	556,529	521,353
Car loadings (weekly av.)	708,836	723,860	652,910

†June, May and June, respectively.

Foreign Trade

	June, 1940	May, 1940	June, 1939
Exports	$350,458,000	$325,306,000	$236,164,000
Imports	$211,390,000	$211,393,000	$178,866,000
Gold exports	$1,249,000	$3,563,000	$19,000
Gold imports	$1,164,224,000	$438,695,000	$240,450,000

Financial Indicators

	July, 1940	June, 1940	July, 1939
25 Industrial Stocks	$161.49	$159.61	$178.03
25 Rail stocks	$19.43	$18.72	$21.45
40 Bonds	$71.64	$69.09	$71.82
Bank clear'gs (000 omitted)	†$21,838	$24,361	$23,212
Commercial paper rate, (N. Y., per cent)	½—⅝	½—⅝	½—⅝
*Com'l. loans (000 omitted)	$8,517,000	$8,435,000	$8,166,000
Federal Reserve ratio (per cent)	89.2	88.8	86.3
Capital flotations: (000 omitted)			
New Capital	$396,071	$81,861	$317,589
Refunding	$294,138	$144,596	$272,645
Federal Gross debt (millions of dollars)	$43,771	$42,968	$40,866
Railroad earnings	†$47,419,440	$47,076,827	$39,166,788
Stock sales, New York stock exchange	7,306,720	15,573,025	18,068,610
Bond sales, par value	$98,166,050	$102,695,925	$119,475,800

†June, May and June, respectively.
*Leading member banks Federal Reserve System.

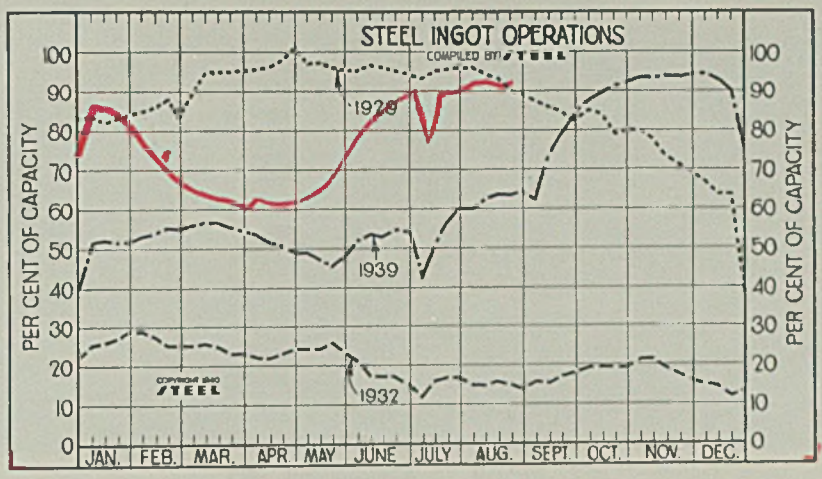
Commodity Prices

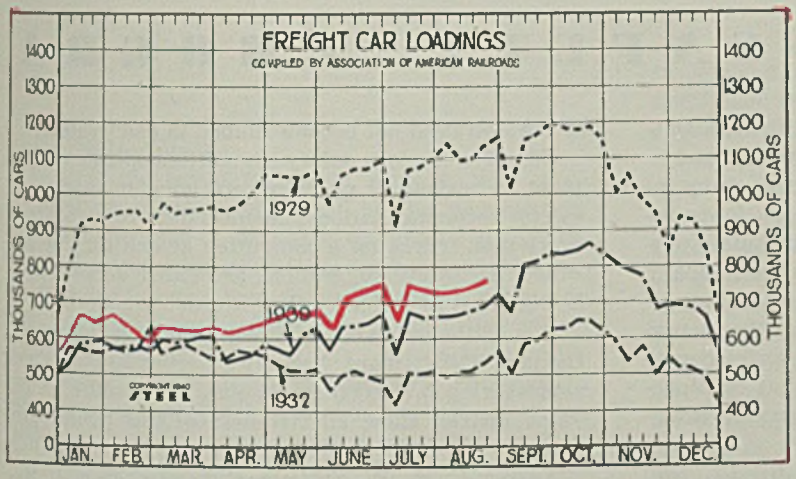
	July, 1940	June, 1940	July, 1939
STEEL's composite average of 25 iron & steel prices	$37.63	$37.69	$35.87
U. S. Bureau of Labor index	77.7	77.5	75.4
Wheat, cash (bushel)	$0.92	$0.98	$0.83
Corn, cash (bushel)	$0.79	$0.78	$0.56

Steel Ingot Operations

(Per Cent)

Week ended	1940	1939	1938	1937
May 25	75.0	48.0	28.5	75.0
June 1	78.5	52.0	25.5	75.0
June 8	81.5	53.5	25.5	74.0
June 15	86.0	52.5	27.0	75.5
June 22	88.0	54.5	28.0	74.0
June 29	89.0	54.0	28.0	77.5
July 6	75.0	42.0	24.0	74.0
July 13	88.0	50.5	32.0	82.0
July 20	88.0	56.5	36.0	81.0
July 27	89.5	60.0	37.0	84.0
Aug. 3	90.5	60.0	40.0	84.5
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





Freight Car Loadings

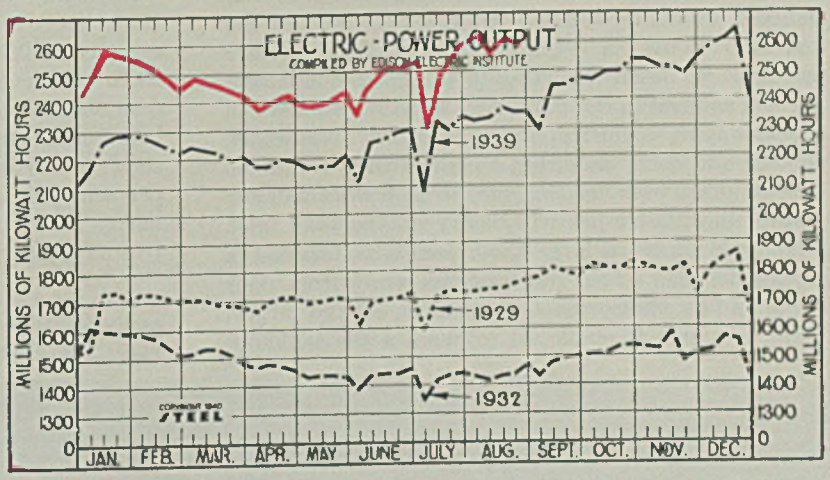
(1000 Cars)

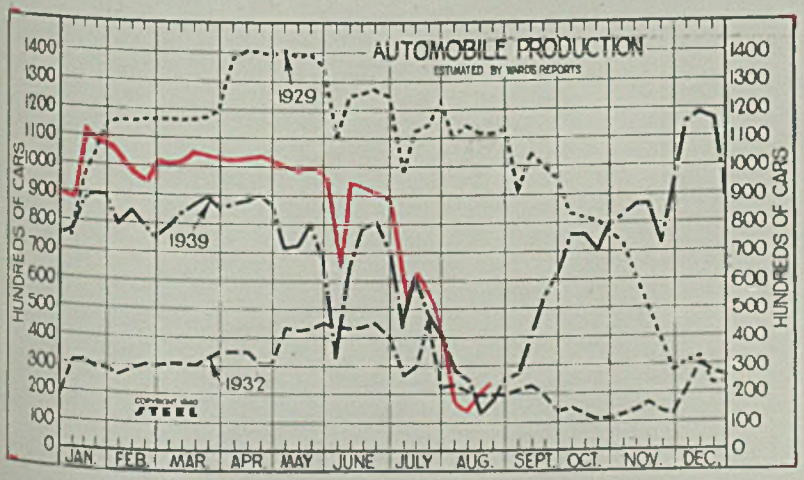
Week ended	1940	1939	1938	1937
May 25	687	628	562	795
June 1	639	568	503	692
June 8	703	635	554	754
June 15	712	638	556	756
June 22	728	643	559	774
June 29	752	666	589	806
July 6	637	559	501	682
July 13	740	674	602	770
July 20	730	656	581	771
July 27	718	660	589	783
Aug. 3	718	661	584	770
Aug. 10	727	665	590	777
Aug. 17	743	674	598	781
Aug. 24	761	688	621	787

Electric Power Output

(Million KWH)

Week ended	1940	1939	1938	1937
May 25	2,449	2,205	1,973	2,207
June 1	2,332	2,114	1,879	2,131
June 8	2,453	2,257	1,992	2,214
June 15	2,516	2,265	1,991	2,214
June 22	2,509	2,285	2,019	2,238
June 29	2,514	2,300	2,015	2,238
July 6	2,265	2,088	1,881	2,096
July 13	2,483	2,324	2,084	2,298
July 20	2,524	2,295	2,085	2,259
July 27	2,601	2,342	2,094	2,256
Aug. 3	2,605	2,325	2,116	2,262
Aug. 10	2,589	2,333	2,134	2,301
Aug. 17	2,606	2,368	2,139	2,304
Aug. 24	2,571	2,354	2,134	2,295





Auto Production

(1000 Units)

Week ended	1940	1939	1938	1937
May 25	96.8	67.7	45.1	131.4
June 1	61.3	32.4	27.0	101.7
June 8	95.6	65.3	40.2	118.8
June 15	93.6	78.3	41.8	111.6
June 22	90.1	81.1	40.9	121.0
June 29	87.6	70.7	40.9	122.9
July 6	52.0	42.8	25.4	101.0
July 13	62.2	61.6	42.0	115.4
July 20	53.0	47.4	32.1	88.1
July 27	34.8	40.6	30.4	86.4
Aug. 3	17.4	28.3	14.8	78.7
Aug. 10	12.6	24.9	13.8	103.3
Aug. 17	20.5	13.0	23.9	93.3
Aug. 24	23.7	17.5	18.7	83.3

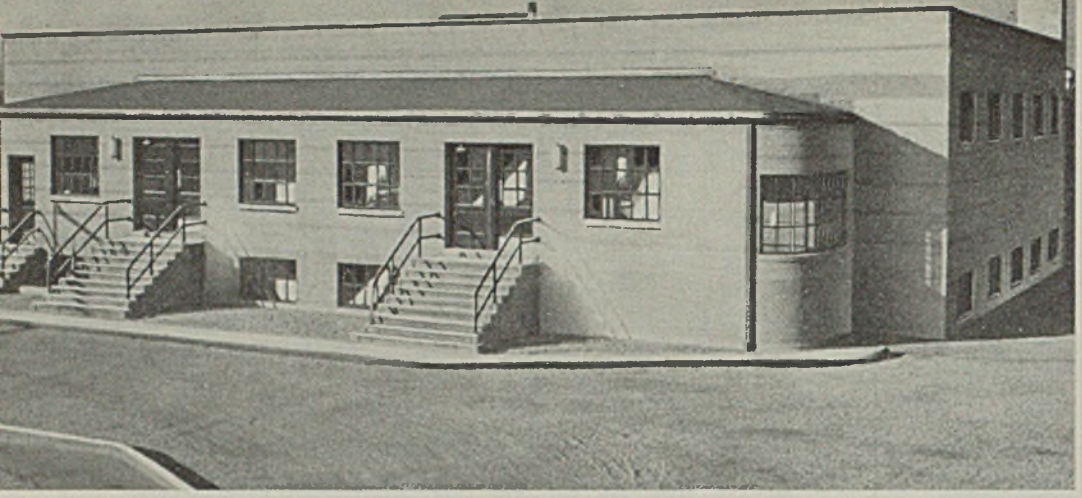


Fig. 1—Employes welfare building at Amsco's Chicago Heights plant is most recent addition of this company's personal service facilities for its workmen. It is 88 x 55 feet on two floors, has five locker rooms, 450 lockers

WELFARE-SAFETY PROGRAM

■ WHILE it is generally recognized that increased attention to the welfare of the individual worker and to a comprehensive plant safety program gives many indirect returns such as lower labor turnover, fewer rejects, less time off, etc., an effective welfare-safety program can be counted on to direct back to the company actual tangible savings in many instances equalling or exceeding its cost. Possibly typical of the actual dollars-and-cents benefits which justify an elaborate worker welfare and safety program is that of American Manganese Steel division of American Brake Shoe & Foundry Co.

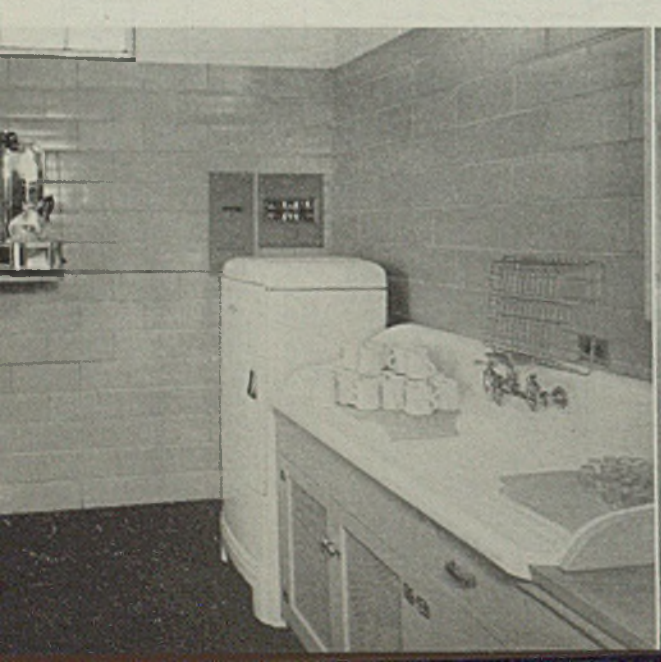
With six plants located at Chicago Heights, Ill., Oakland, Calif., Newcastle, Del., Los Angeles, Denver, and St. Louis, a common safety and welfare program is based on cleanliness, good housekeeping and interest in the individual worker. As shown in accompanying illustrations, adequate washroom, shower and toilet facilities combined with ventilated lockers afford every convenience to each workman and assure that his clothes will be dry on the next shift. In most instances, a large lunchroom is maintained to induce the men to eat their lunches away from their work and in wholesome surroundings. At the largest plant, a tunnel is employed to connect the buildings so the men need not become chilled in bad weather.

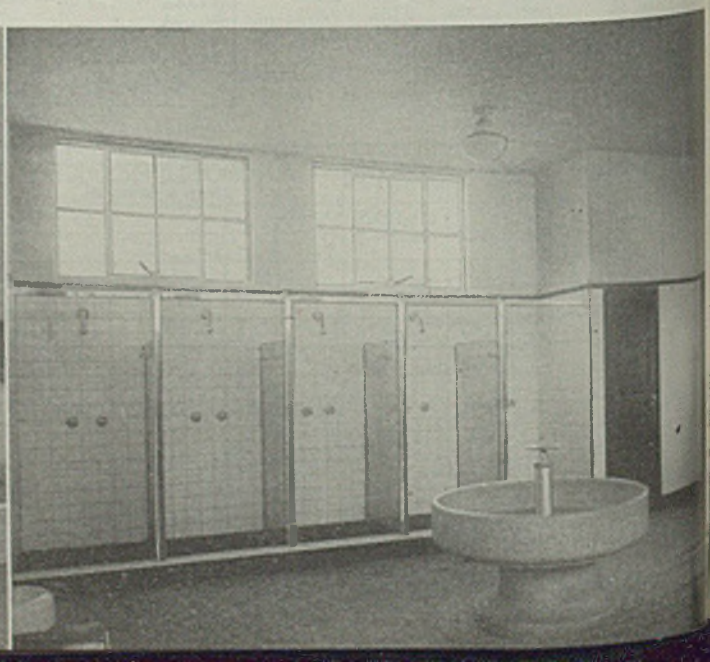
Effective employe safety committees operate in each plant to review all matters pertaining to safety and safety recommendations. Membership is rotated so every man serves on a committee at one time or another. All safety suggestions are either adopted or it is explained in full why they are not practical.

One of the outstanding safety records is that of the Oakland, Calif., plant. Reports covering 20 plants and representing 5,759,000 man-hours of exposure in the same district show effectiveness of this plant's program.

According to the National Safety council, national steel foundry accident frequency is 24.13 and severity is 0.97. This compares with a frequency of 23.10 and severity of 0.71 for the American Manganese Steel division at Oakland. A second comparison based on loss records of all steel foundries in California shows the American Manganese Steel losses are 27 per cent below the average for the steel foundry industry of that state. A record, totaling 641 consecutive days of operation, with close to one-half million

Fig. 2—Modern kitchen in welfare building at Denver plant. Fig. 3—Tiled shower in Los Angeles plant welfare building





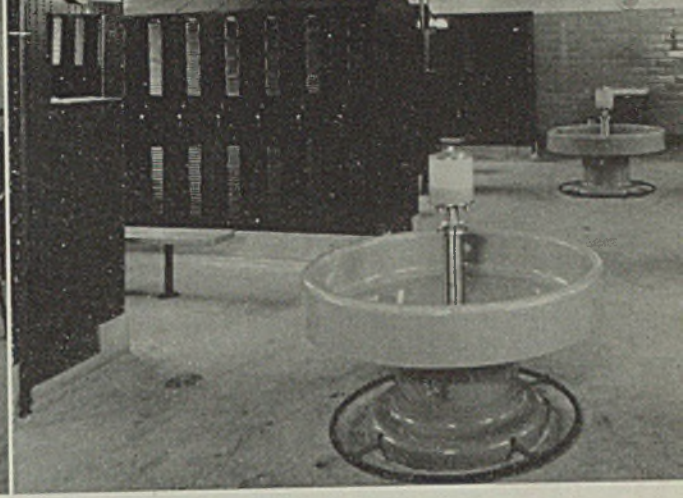


Fig. 4—Lunchroom at Denver. Fig. 5—Locker room at Denver

PAYS

man-hours of work without a lost-time injury was set in the Oakland plant.

Basis of the successful safety methods here is an enthusiastic belief on the part of the management that safe operation is vital as is wholehearted co-operation of executives in promoting safety aims. Also important are foremen who recognize that accidents do not "happen" but are caused and so can be prevented. Determination of responsibility immediately after each accident helps establish improved procedure to prevent repetition. Participation of workmen, foremen and executives in safety committee work is another essential. Development of pride in safety achievements through safety assemblies, contests, awards and recognition by company and outside agencies also is most important. Many employes are instructed as to the hazards of their occupation.

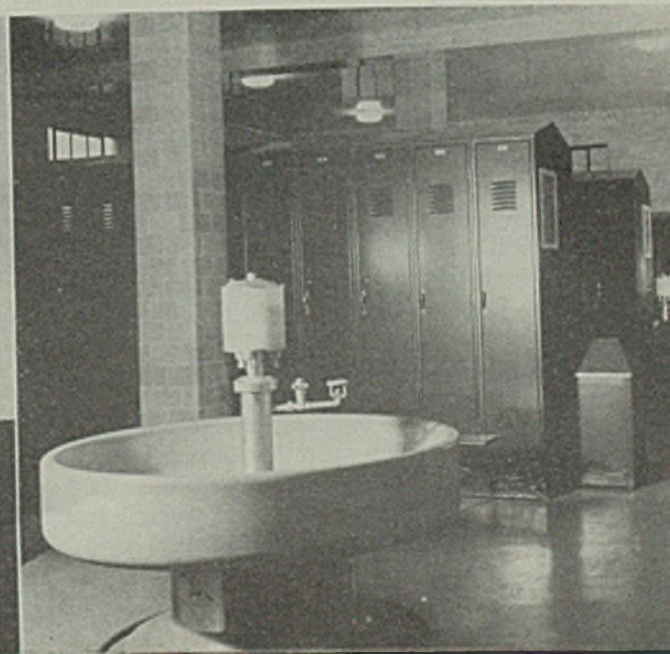
At the Chicago Heights plant, the frequency rate was reduced from 15.0 to 4.4, a substantial improvement.

Inspectors play an important part. At the Newcastle, Del. plant, the safety director is also the safety inspector and is assisted by two regular inspectors—the electrician and millwright. Doing maintenance work continually, these latter men are practically on inspection at all times.

At the St. Louis plant, 315 days of operation were recently completed without a lost-time accident. Here it has been found that the psychology of reading the employe's name and discussing his accident at the monthly meeting of safety representatives during plant hours has a big effect on reducing the number of accidents. By recording each accident in a book, the safety director can determine where the greatest number of accidents occur and concentrate efforts on that portion of the plant. Here the inspection program includes checking all chains and cables weekly and all goggles, shoes and other safety equipment monthly.

It is estimated the reduction in accident severity and frequency is saving this division of the American Brake Shoe & Foundry Co., $15,000 yearly in reduced compensation and insurance rates—more than enough to pay for actual cost of the safety program. In addition, careful consideration of workers' welfare has been found a most worthwhile investment as it helps reduce labor turnover, attracts a better class of workmen, assures complete co-operation in the company's safety and good housekeeping programs and increases employes' satisfaction.

Fig. 6—Bulletin board in vestibule of Oakland plant. Fig. 7—Ventilating system in Chicago Heights welfare building draws air through lockers to dry clothing



New Belgian Pickling Process

. . . saves acid for continual reuse, renders unnecessary any kind of waste disposal system, features increased pickling speed and notable acid economy. Quality of pickled product also improved

■ PICKLING is a most important part of producing steel sheet, strip and tube, as the final finish is largely dependent upon the cleanliness of the surface inherited from the rolling mills, while many later operations in the manufacturing sequence demand still further pickling treatment. Thus any process which offers improved pickling is of utmost value because of the expense of pickling plants, acids, and the ever-present problem of waste disposal.

A new method developed by Paul de Lattre, a Belgian, has shown such excellent results that the Belgian government has made its use compulsory in that country. There and in Germany, many steelworks have ceased to waste acid by dumping pickling liquor and washing water.

In one British steelworks, the process permits an estimated saving in acid alone of £5818 sterling minimum and £10,633 maximum (official rate of exchange July 26, 1940, pound sterling equals $4.04). Thus not only are important savings possible but other advantages include increased speed of working, improved surface quality of pickled products and improved working conditions in the shop. Of equal importance is the fact that pollution of nearby bodies of water is not produced by waste material.

The pickling of metals and their alloys is generally effected by immersing the objects in aqueous solutions of mineral acids chosen for their ability to dissolve the oxides which cover the metal surface. Normally hot 5 to 7 per cent sulfuric acid (H_2SO_4) is used. In dissolving the oxides, a corresponding amount of iron salts is formed in the solution. As soon as this salt content reaches a limit of about 30 per cent ferrous sulfate ($FeSO_4$), the efficiency of the reagent diminishes and the pickling operation becomes too slow to be practical. It is usual practice then to raise the liquid temperature with the fall of the acid strength to about 2 per cent, thus renewing the former pickling action.

Tracing this pickling action in more detail, 1 square yard of hot rolled steel coated with approximately 150 grams of iron oxide requires about 197 grams of pure 100-per-cent sulfuric acid which is converted into ferrous sulfate. This impoverishes the bath in sulfuric acid while enriching it in sulfate of iron. Reduced pickling speed results.

Most authoritative opinion is that when mild steel is hot rolled, a film having three layers with decreasing oxygen content is formed. The layer nearest the metal is ferrous oxide (FeO), the middle one is ferroso-ferric oxide (Fe_3O_4) and the top one is ferric oxide (Fe_2O_3). The two outer layers do not dissolve in the acid but are broken up and pushed off by attack of the acid on the underlying area.

To make clear normal practice for renewing bath efficiency, consider a hypothetical case. If a pickling tank of 1000 litres capacity with an acid concentration of 70 grams of sulfuric acid per litre is heated correctly, the total amount of pure acid at the start will be 70 kilograms (0.07 x 1000) of 100-per-cent sulfuric acid. If 100 square yards of steel products (slightly more than 500 pounds of 20-gage sheet) are now pickled, about 20 kilograms of pure sulfuric acid will be required. Thus 31 kilograms of ferrous sulfate will appear in the solution and only 50 kilograms of free sulfuric acid will remain.

The calculated amount of pure acid can be added to the bath to restore the initial concentration. This can be repeated after each pickling batch until the bath contains an average maximum of 300 grams per litre (300 kilograms in total) of ferrous sulfate. The acid concentration may have been kept constant by repeated additions, but the ferrous sulfate content will now be so high that the pickling speed is sufficiently retarded for the bath to be considered used up.

Just before the Nazi invasion, Alastair McLeod, editor, Sheet Metal Industries, 3, Amersham road, High Wycombe, Bucks, England, visited several Belgian steelworks and obtained details of the new de Lattre combined pickling and regenerative process. The accompanying material is abstracted from Mr. McLeod's detailed study published in the July issue of that journal. Readers of STEEL will be extremely interested in this description of how many Belgian and German steelworks have now ceased to waste acids by dumping pickle liquor and washing water

Two courses now are open. The bath can be drained and considered as waste after working down to 20 grams per litre of sulfuric acid, or the liquor can be regenerated. If regarded as waste, two commodities will be lost—the iron salts and that sulfuric acid which remains free but is ineffective.

Should the second course be adopted, the bath is regenerated by eliminating the excess ferrous sulfate merely by cooling the solution. The iron salt is separated in ferrous sulfate crystals in the form $FeSO_4$. $7H_2O$.

The contaminated pickling bath density has risen until it contains approximately 300 kilograms of ferrous sulfate and 70 kilograms of sulfuric acid. By cooling this mixture to 20 degrees Cent., 142 kilograms of ferrous sulfate in small crystals is obtained. The mother liquor will contain 158 kilograms of ferrous sulfate still in solution, and 70 kilograms of sulfuric acid.

At this point the volume has been reduced by the removal of the ferrous sulfate until only 924 litres are left. If the original 1000 litres of pickle be restored by addition of 76 litres of water, the chemical analysis would show 70 grams of 100-per-cent sulfuric acid and 158 grams of ferrous sulfate, per litre.

Now it is possible to return the regenerated liquor to the pickling bath and restore the correct working temperature. Pickling can be resumed with the recovered acid again in service instead of being discarded (assuming the liquor is discarded at normal working acid strength).

Hydrochloric Acid: Metals and their alloys are normally freed from scale and oxide by sulfuric or hydrochloric acid solution. Although more costly, hydrochloric acid solutions are preferred by some when the objects are to receive a protective metallic coating by dipping in melted tin, zinc, lead, etc. Also, these pickling baths are worked at relatively low temperatures.

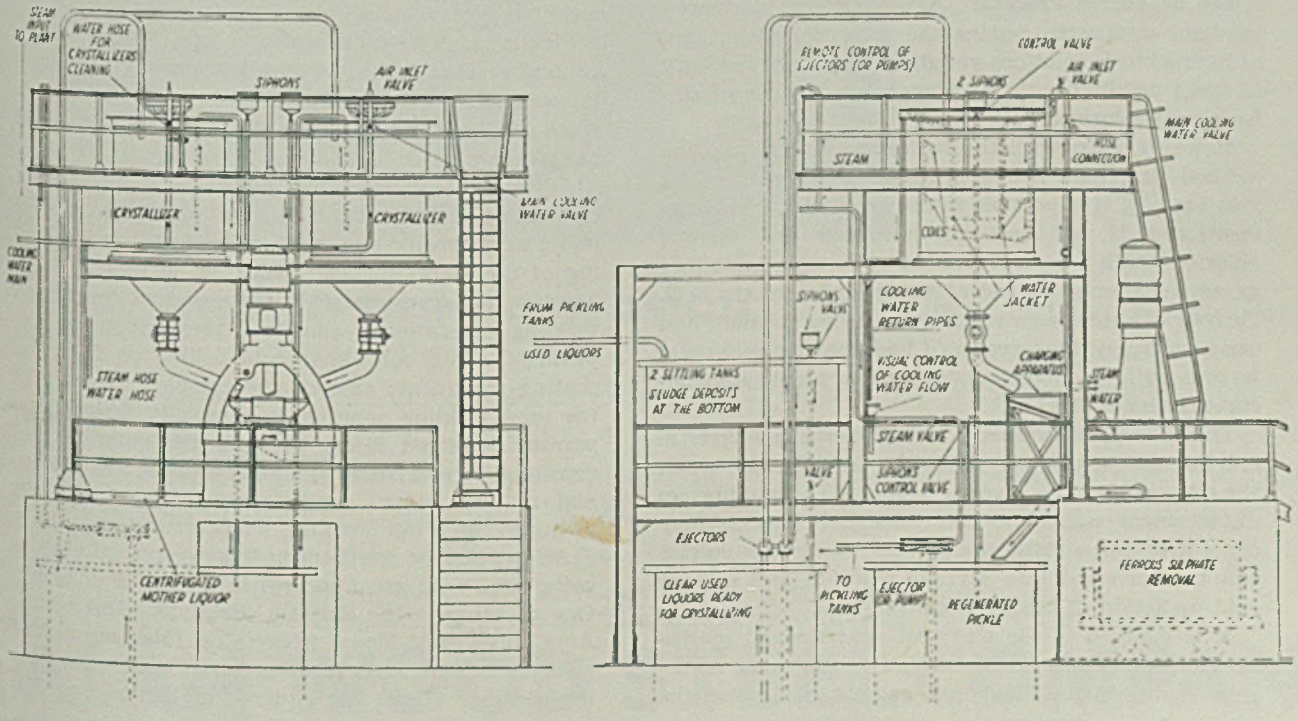
While pickling in sulfuric acid is rapid and economical and the recovery of waste solutions is easy by simple fractional crystallization of the iron salts, it is necessary to operate at high temperature in the pickling tank—70 to 90 degrees Cent. being quite common.

Also a deposit of carbon is retained on the pickled surface, hindering subsequent work. Also the corresponding increase of the iron salts content of the solution progressively reduces the rapidity and precise control of the operation. Too, a white deposit of partially dehydrated ferrous sulfate begins to appear on the work after a given efficiency limit has been reached. This salt is difficult if not impossible to remove by washing in water and may create considerable difficulty in the proper carrying out of subsequent operations.

Hydrochloric acid solutions on the contrary give clean, bright pickled surfaces and can be used a little above room temperature, say 30 to 40 degrees Cent. Price of hydrochloric acid, however, is high, particularly if one notes that the commercial product contains only one-third of its weight in HCl. A greater specific disadvantage is the possibility of hydrogen absorption in the pickled metal as soon as the acid concentration reaches the low limit of 100 grams per litre.

The most important difficulty accompanying use of hydrochloric acid, however, is how to regenerate by a practical method the used up hydrochloric solution. Various processes using a mixture of sulfuric and hy-

Two views of standard type regeneration plant similar to those inspected by Mr. McLeod at Sclessin and Flemalle, Belgium



drochloric have been evolved in an attempt to solve this problem.

Regenerating Hydrochloric Acid Solutions: Perhaps the simplest of these methods is to pickle in normal fashion in hydrochloric acid until practically no free acid exists. The temperature then is raised to about 50 degrees Cent. To the hot mixture of ferrous chloride and water is added a corresponding amount of sulfuric acid at high concentration.

A partial regeneration of the hydrochloric acid is obtained according to the reversible reaction ferrous chloride ($FeCl_2$) plus sulfuric acid (H_2SO_4) yields ferrous sulfate ($FeSO_4$) plus 2 hydrochloric acid (HCl). Thus:

$$FeCl_2 + H_2SO_4 \rightleftarrows FeSO_4 + 2HCl \quad \ldots\ldots\ldots\ldots (1)$$

Further additions of sulfuric acid increase progressively the solution's content of ferrous sulfate. This salt can be partially eliminated by cooling the mixture, as for sulfuric acid solution. It is necessary, however, to separate a fair proportion of the ferrous sulfate thus formed in the mixture, otherwise too many crystallizing operations would be necessary. Accordingly, the working temperature of the pickling bath must be raised still more, up to 55 or 60 degrees Cent., to keep the ferrous sulfate in solution.

At this point severe difficulties are encountered in practice—the absorption of hydrogen in the metal becomes quite important, affecting the mechanical properties of the pickled product.

The hot liquid gives off dense fumes of hydrogen chloride gas, and each addition of sulfuric acid is accompanied by further dangerous fumes. Also the growing amount of ferrous sulfate in the mixture progressively reduces the speed of pickling . . . It is apparent the method is unsuitable for industrial purposes.

New Process Makes Recovery Easier

The de Lattre Process: A new process developed by Paul de Lattre retains the technical advantages of hydrochloric solutions yet gives the ease of recovery of spent pickling baths accompanying the use of sulfuric acid solutions.

However, even with the hydrochloric acid pickling method described above in the reversible chemical reaction (1), it is possible to overcome the drawbacks mentioned if one uses sulfuric acid and ferrous chloride (with a correct amount of suitable inhibitor) as active agents instead of using hydrochloric acid. Ferrous chloride is an efficient cleansing medium and can be obtained by reaction of hydrochloric acid upon ferrous sulfate, thereby converting a pernicious substance into a useful one.

This new process thus is based upon the reversible reaction given above (1), but the direction in which the conversion takes place is opposite. The equilibrium displacement suffices to determine in which relative concentrations a sufficient amount of ferrous sulfate can be converted into ferrous chloride and sulfuric acid by action of the hydrochloric acid.

It is claimed in the chemical analysis and mathematical calculations of Mr. de Lattre that most favorable conditions for this result are obtained when the pickling liquor contains per litre 1 gram-molecule of ferrous sulfate, from 1 to 2 gram-molecules of hydrochloric acid and 1 gram-molecule of sulfuric acid. This solution is employed at a constant temperature of 50 to 55 degrees Cent. maintained by steam coils immersed in the pickling liquid. The proportions of sulfuric acid and hydrochloric acid are maintained at the level corresponding to the lower limit of ferrous sulfate concentration during the whole pickling operation by appropriate additions of both acid and inhibitor.

Only the sulfuric acid is consumed in pickling, the addition of hydrochloric acid being necessary only in small quantities to make up the losses due to mechanical splashes, etc. A special inhibitor consisting of gelatin, peptonised by hydrogen chloride, is used in the pickling solution.

Articles Agitated Mechanically

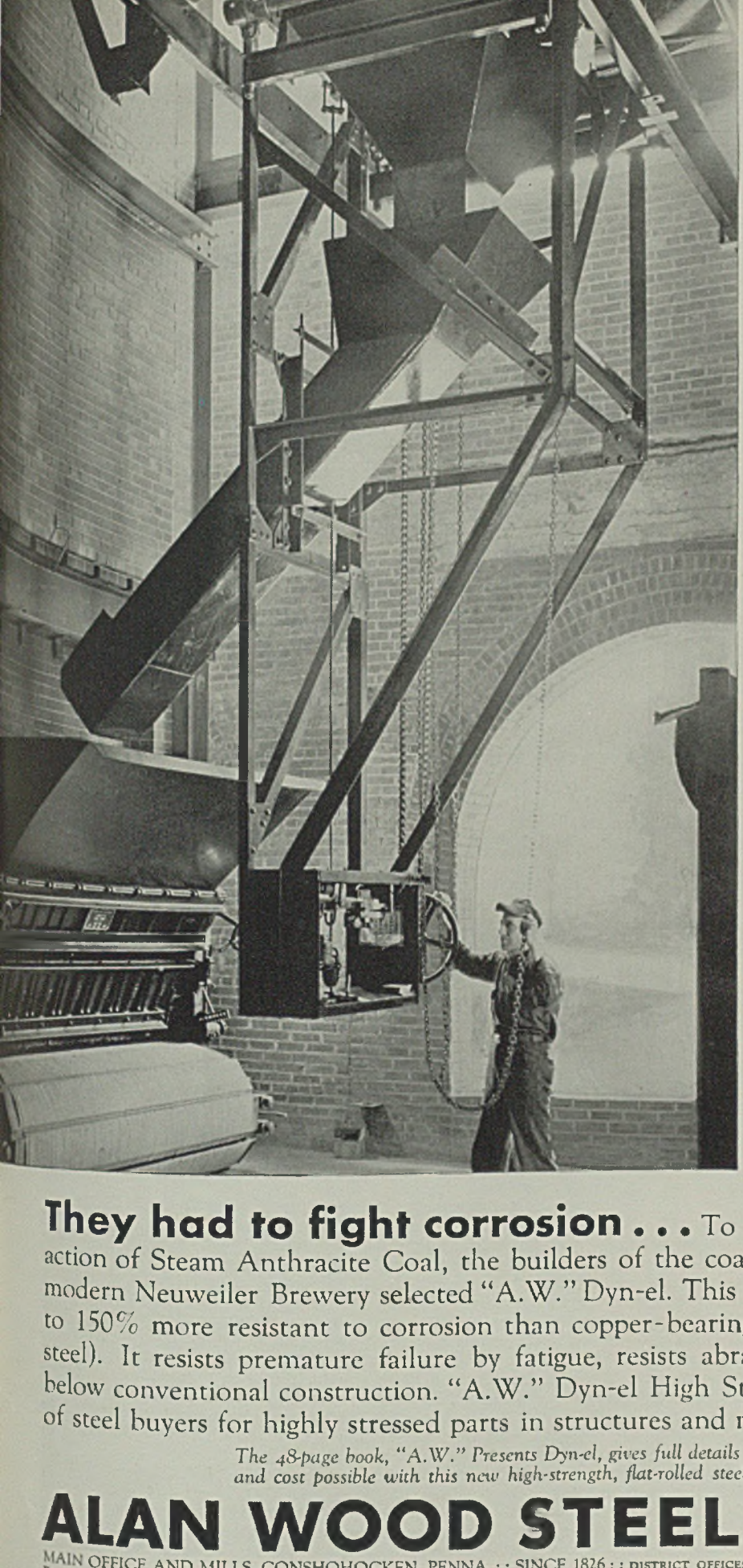
Procedure employed is simple. Articles to be pickled are dipped in the solution and rapidly agitated by mechanical means to complete the chemical effect of the acid bath with an efficient physical action. After dripping, the pickled products are washed in an adjoining tank where they are agitated. Liquor in the washing tank becomes progressively richer in acid and in iron salts with the result that it soon approaches the state of a weak pickling solution. Final traces of impurities on a metal surface thus are removed in the wash operation.

A given portion of this washing bath, say one fourth to one third, is fed to the pickling tank after regeneration of the used liquor to make good the loss in volume due to the removal of ferrous sulfate by ferrous crystallization. The correct volume of wash liquid is maintained by adding pure water. This keeps the washing tank at an acid concentration which is constant for all practical purposes as soon as the working level has been reached.

Pickling is carried on until the total ferrous sulfate content reaches from 326 to 394 grams per litre when the solution is evacuated to the recovery plant and a fresh supply drawn from the reserve tanks to continue the pickling.

Advantages afforded by this pickling method are claimed to include increased speed due to control of liquid acid density and temperature; thorough cleaning of the metal surface; reduction of hydrogen absorption and consequent brittleness due to incorrect pickling operations; complete preparation of the pickled surface for either cold rolling or for metal coating treatment; ease of the complete recovery of the used pickling solution in especially designed apparatus described later; absolute minimum of acid consumption and correspondingly reduced loss of iron; and reduced steam consumption for heating coils owing to the lower working temperatures required.

As previously mentioned, this system already is being used with great success in a number of plants. One of these is the Sclessin, Belgium, plant of Ste. Ame Tubes de la Meuse where steel tubes are pickled prior to galvanizing. Pickling tanks are successively drained every hour, the liquor being led to a prelim-



Hopper and Chute of Coal Weigh Larry
Neuweiler Brewery, Allentown, Pa. Built
"A.W." Dyn-el High Strength Steel by Beaumo
Birch Co., Philadelphia. Also included in t
company's coal conveying equipment is an
closed Bucket Elevator, with Buckets ma
of "A.W." Dyn-el High Strength Ste

▲

Typical physical properties of "A.W." Dyn
High Strength Steel: Tensile Strength—72,0
lbs. per sq. in.; Elastic Limit—58,000 lbs. per sq.

They had to fight corrosion . . . To withstand the severe corrosiv
action of Steam Anthracite Coal, the builders of the coal conveying equipment in th
modern Neuweiler Brewery selected "A.W." Dyn-el. This new high-strength steel is 60%
to 150% more resistant to corrosion than copper-bearing steel (4 to 6 times ordinar
steel). It resists premature failure by fatigue, resists abrasion and reduces weight fa
below conventional construction. "A.W." Dyn-el High Strength Steel is the first choic
of steel buyers for highly stressed parts in structures and mobile equipment of all kind

The 48-page book, "A.W." Presents Dyn-el, gives full details of savings in weight and cost possible with this new high-strength, flat-rolled steel. Write for a copy.

ALAN WOOD STEEL COMPANY

MAIN OFFICE AND MILLS, CONSHOHOCKEN, PENNA. : : SINCE 1826 : : DISTRICT OFFICES AND REPRESENTATIVES—Philadelphia, New Yo
Boston, Atlanta, Buffalo, Chicago, Cincinnati, Cleveland, Denver, Detroit, Houston, New Orleans, St. Paul, Pittsburgh, Roanoke, Sanford, N.C., St. Lou
Los Angeles, San Francisco, Seattle, Montreal—A. C. Leslie & Co. PRODUCTS INCLUDE—Steel Products in Carbon, Copper or Alloy Analyses : : Shea
Steel Plates : : Hot Rolled Sheets and Strip : : "A.W." Rolled Steel Floor Plates : : Billets, Blooms and Slabs : : "Swede" Pig Iron : : Reading Cut Na

inary settling tank which permits unwanted sludge to dissociate and gives cleaner ferrous sulfate. The evacuated solution then is syphoned into the decrystallizer proper.

The cooling system is made of lead pipes arranged in multiple coils with a central well so equipped as to allow a flow of water into its hollow sides. A propeller in the bottom of the well forces the solution to take a spiral path along the cooling surfaces so crystallization is complete in an hour. Crystals are fed by gravity into a centrifugal drier, the separated liquid returning to the reservoir tank for redistribution to the pickling shop. There are seven regenerations per 8-hour shift, giving a total volume of 8400 litres. Thus 2800 kilograms of ferrous sulfate are recovered per 8-hour shift or 8.4 tons per 24-hour day. In this installation the concentration of the pickling acid solution is kept constant at 100 grams per litre of sulfuric acid and 35 grams per litre of chlorine, 25 per cent of the chlorine existing as ferrous chloride and 75 per cent as hydrogen chloride or hydrochloric acid.

Pickling temperature is maintained at 55 degrees Cent. A suitable inhibitor is used.

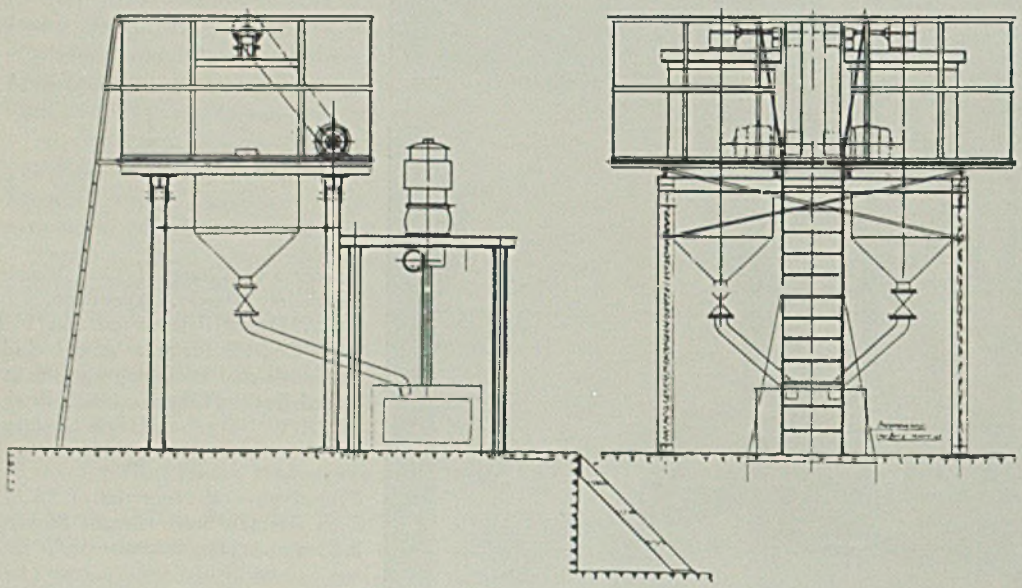
Acid consumption at this installation is reported to be 35 kilograms B. O. V. per ton against 100 kilograms B. O. V. per ton of metal pickled by the old method. Although the cooling plant here has been in use three years, incrustation on the cooling coils is negligible and there is no trace of mechanical abrasion. Precise control of the rate of convection of the solution past the coils governs also the size of crystals formed, avoiding any wear of the apparatus while giving the effect desired. One man operates the entire regenerating plant. This firm had (before the Nazi invasion) a good market for its ferrous sulfate crystals in Holland and elsewhere.

Another installation at a second works of this same company is near the German border at Flemalle, Belgium. Here cold drawn tubes with only slight oxidation were being pickled with a consumption of acid of 12 to 17 kilograms B. O. V. per ton against 28 kilograms B. O. V. per ton by the old method.

A third smaller plant provides a good example of the adaptability of the system. A parent tank has a capacity of 4000 litres, and from this batches of 200 litres of partially spent liquor are extracted and regenerated. The optimum cooling rate was approximately 20 minutes; the extraction, regeneration and return cycle is therefore accomplished three times an hour, sufficient to keep the acid at a constant iron proportion of 90 grams per litre. For simplicity and speed, no settling tank or filter was connected on this unit and the ferrous sulfate produced was not so clean as was the case with the larger installations.

The Nazi invasion which occurred while these plants were being inspected prevented a study at first hand of the cleanliness of the process as applied to sheets and tin plate, but from the data given it will be appreciated that there is a sound chemical basis for the success of the process. While hydrochloric acid is actually used for pickling, loss of acid is made good with sulfuric acid. Hydrogen embrittlement is kept down by combination of low temperature and small hydrochloric acid content. Since the pickling solution need not be reduced in acidity before draining as in ordinary practice, the average pickling time is improved while the higher sulfuric acid content reduces the ferrous sulfate solubility at room temperatures. Refrigeration, therefore, is unnecessary. Another important point is that ferrous chloride is more easily removed from finished ware than ferrous sulfate.

To obtain perfect pickling of tubes and similar hollow objects, it has been found necessary to design a special pickling machine to agitate the work. A load of tubes is lowered into the pickling solution and kept immersed long enough to permit thorough filling of every tube. The batch then is lifted out in an inclined position, kept out until thoroughly drained. Inclination of the tubes then is reversed and they are lowered into the bath the second time and are finally raised in this opposite position. This sequence is repeated automatically with parallel installations being designed for sheets and tinplate.



Layout of small high-speed crystallizer in use at the Flemalle, Belgium, works of Tubes de la Meuse

Ferrous Sulfate and Waste Disposal: The fact that ferrous sulfate can be marketed and that waste acid disposal problems are eliminated are extremely important. Belgian operators found the definite commercial value of the ferrous sulfate crystals to be a fairly important factor in the economics of the process. It is better, perhaps, to consider possible uses for this by-product rather than to guess at possible market prices. One reaction which can be applied to the treatment of some zinc ores such as zincite and zinc oxide produced in great quantities by roasting of blends is:

$$Fe_2(SO_4)_3 + 3\,ZnO + 3\,H_2O = 3ZnSO_4 + 2Fe(OH)_3$$

The iron hydroxide is separated by filtering, then is washed and dried

(*Please turn to Page 75*)

BETWEEN HEATS WITH *Shorty*

■ Say fellers:

Somethin' happened over at the blast furnaces the other day that caused a lot of 'xcitement. When the boss saw what happened, he took off his hat glistenin' with shiny flakes of graphite, scratched his head 'n sez, "Shorty, I've been furnacin' many a year and I've seen many things occur 'round the plant that ya can call a 'wow' but talk 'bout screwballs—well sir, that thing over at No. 2 is the screwiest yet."

Thought you'd like to hear 'bout it, fellers, fer maybe y' have someone at yer plant who takes things fer granted when he issues the "go-ahead" signal to his crew. Well, here it is:

Came time fer castin' ol' No. 2 stack. The troughs fer coveyin' the molten metal to the ladles were nicely clayed and grouted. The gates fer directin' the stream of metal into the ladles were set in place. Ol' Mike Stanko had his cinder trough shaped and patted down to a neat contour. The furnace keeper and his helper had a couple of bars straddlin' the main iron trough close to the splasher plate at the iron notch 'n on these they had placed a couple of corrugated steel sheets upon which to stand while they were openin' up the furnace. The compressed air drill lay nearby ready to start the bit through the clay notch whenever Dutch Gerber, the boss blower, gave the signal.

Ladles Spotted on Two Tracks

'Neath the cast-house floor in an arcade ran a railroad track long enough to spot four hot metal ladles; when the ladles were in place 'neath their respective spouts you could see 'em through grating set in the cast-house floor. There was room fer five ladles at the end of the cast-house floor out in the open on another track.

A big Russian by the name of Steve Hosak, who was "keeper" on the furnace, that is, he had charge of the castin' crew, walks over to Dutch Gerber, the boss blower, 'n sez he to Dutch, "Okay to stick the drill in 'er, Mr. Boss?"

Dutch, pullin' out his time piece 'n seein' the hands pointin' right on the dot sez, "Sure thing, Steve, give 'er the gun." 'N with that, Steve and his helper picked up the air drill, guided 'er head into the chuck 'n turned on the air. As the bit bored through the clay in the iron notch the men moved forward. Pretty soon Big Steve stopped the drill 'n stepped aside to permit one of his men to rabble out the loosened clay. 'N then the drill started to whine again, and continued its r-r-r-r-r-r until she hit the skull. Big Steve guided a steel bar into the hole, rested it in a slantin' position on a cross-bar 'n a couple of his men with sledge hammers drove 'er through the skull in the iron notch and into the hearth.

Metal Started Flowin'

A glow appeared beneath the splasher plate 'n as Steve withdrew the bar, hot metal followed. Shortly thereafter it flowed beneath the skimmer, rose to the height of the dam and started down the trough to the first gate. The metal kept coming 'n when a sufficient height was reached, it started over the spout which fed ladle No. 1 on the arcade track beneath.

'N what do y' suppose? Well, sir, there wasn't a thing beneath that spout except a pair of shiny rails. The metal started pourin' over 'n not a ladle to receive it. Fireworks started. Molten iron began spittin' in every direction. Looked like a machine gun nest had started to swing into action.

Dutch Gerber, the blower, signaled the engine room to slow down the engines 'n then took the wind off the furnace by opening the snort valve 'n allowing the cold blast to discharge into the air.

Tony, the cinder snapper, grabbed the rope on the trouble whistle 'n with continued jerkin,' sent shrill blasts into the air. Away at the other end of the plant Johnny Sullivan who was runnin' the yard crew, caught the signal 'n soon had his locomotive headin' toward ol' No. 2 with open throttle. Sensin' trouble he coupled on to a drag of hot metal ladles intended for another furnace, shifted them into No. 2 cast-house and spotted them on the outer track.

After Johnny uncoupled he signaled the engineer to back away three or four lengths and when the engine came to a stop, he jumped off the front of 'er, cocked his hat on the side of his head 'n shouted to the scared Hunkies on the cast-house floor:—"Hey, what the 'll ya tryin to do up there? Tryin' to make mud pies, huh? You're supposed to put that stuff in ladles not on the ground 'n why in 'll don't you give a guy a chance to get 'em in for y', huh?" 'N he walked toward his engine mutterin' some words that would 'ave started 'er movin' backwards if the airbrakes hadn't been set.

Well, anyway, the crew manipulated the gates in the iron trough in such a way that the metal finally was directed into ladles. 'N then they put the full blast on the furnace again and finished the cast.

Settled Down Again

Scrubbie Mills who blows No. 3 furnace came over to see what was goin' on. He took one look, shook his head from one side to another 'n sez to the water-tender, "Boy, if we'd a done that in the ol' days, we'd picked up our dinner bucket 'n headed toward the main gate, never stoppin' fer any pay comin' to us or even a coat or hat."

"Yeah, Scrubbie," sez the water tender, "but Dutch is a pretty smart dude. Y' notice he doesn't say anything, don't ya?"

"Maybe if he did say somethin' he wouldn't be so smart," Scrubbie fired back as he headed back toward his furnace.

* * *

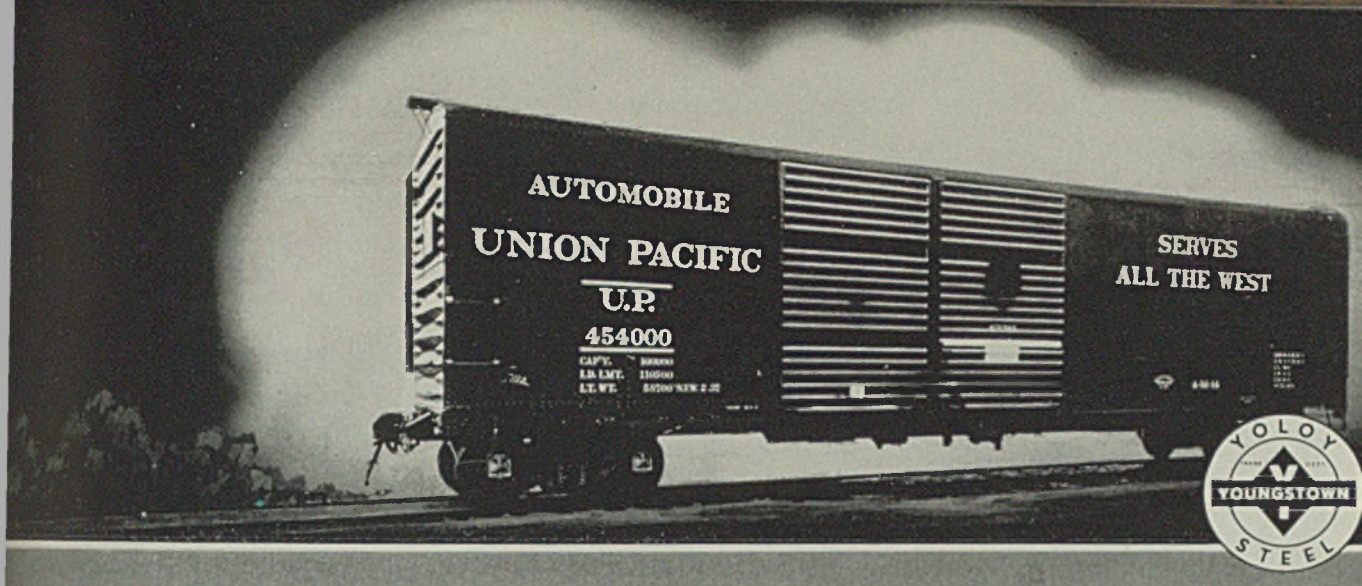
Y' want to know what happened to Dutch? Lemme ask a question—did ya ever notice the actions of a dog that had been whipped? Well then y' got an idea of how poor ol' Dutch acted fer many a day afterwards. But y' can betcher life, he never made a move from that day on unless he checked and double checked.

Sure thing, the Boss was sore at Dutch but he didn't fire him. Fact of the matter is he made him general foreman over all the furnaces 'bout two months later when the openin' came.

The boner that Dutch pulled put everyone 'round the furnace on their toes. The boys do some thinkin' now before they make any moves. So if there's ever a boner pulled at yer plant, have a heart and give the feller a break fer y' may find a prize that y' never suspected as existin' in yer organization.

Well, so long. I'll be seein' y'.

"Shorty" Long



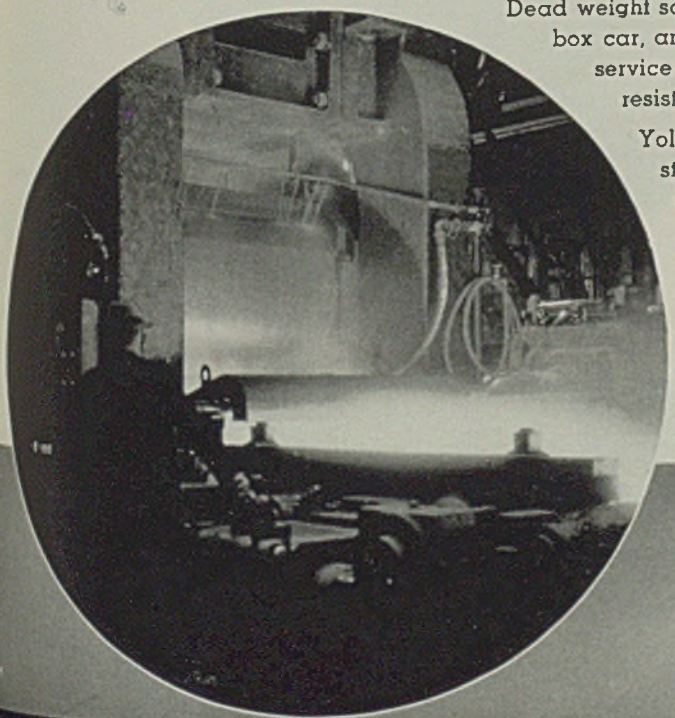
6,100 Union Pacific Box Cars

Take

YOLOY REDUCING TREATMENT

. . . Lose 6,030,800 Pounds for Life!

● Yoloy high tensile steel scores another victory over dead weight. During 1937 and 1938 the Union Pacific Railroad built 1,400 box cars, and 700 automobile cars; in 1939—1,900 box cars and 100 High Speed Merchandise Cars for Passenger Train Service, and in 1940 are building 1,500 box cars and 500 automobile cars. The sides of all of these cars, supplied by The Youngstown Steel Door Company, were made of Yoloy.



Dead weight savings total 3,015 tons or approximately 911 pounds for each box car, and 1,306 pounds for each automobile car. Normal life and service of these cars has been increased due to the high corrosion resistance of Yoloy—4 to 6 times greater than the carbon steels.

Yoloy was developed by Youngstown to provide increased strength with lighter weight. Yoloy can be welded by the arc, resistance or gas processes; has excellent corrosion fatigue properties, also greatly increased impact resistance over previously used materials.

Similar savings can be effected with all types of transportation equipment resulting in greater profits for operators.

Yoloy High Tensile Steel is available in sheets, strips, plates, bars, shapes, manufacturer's wire, welding wire, seamless pipe, and electric weld pipe.

3-9C

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon and Alloy Steels

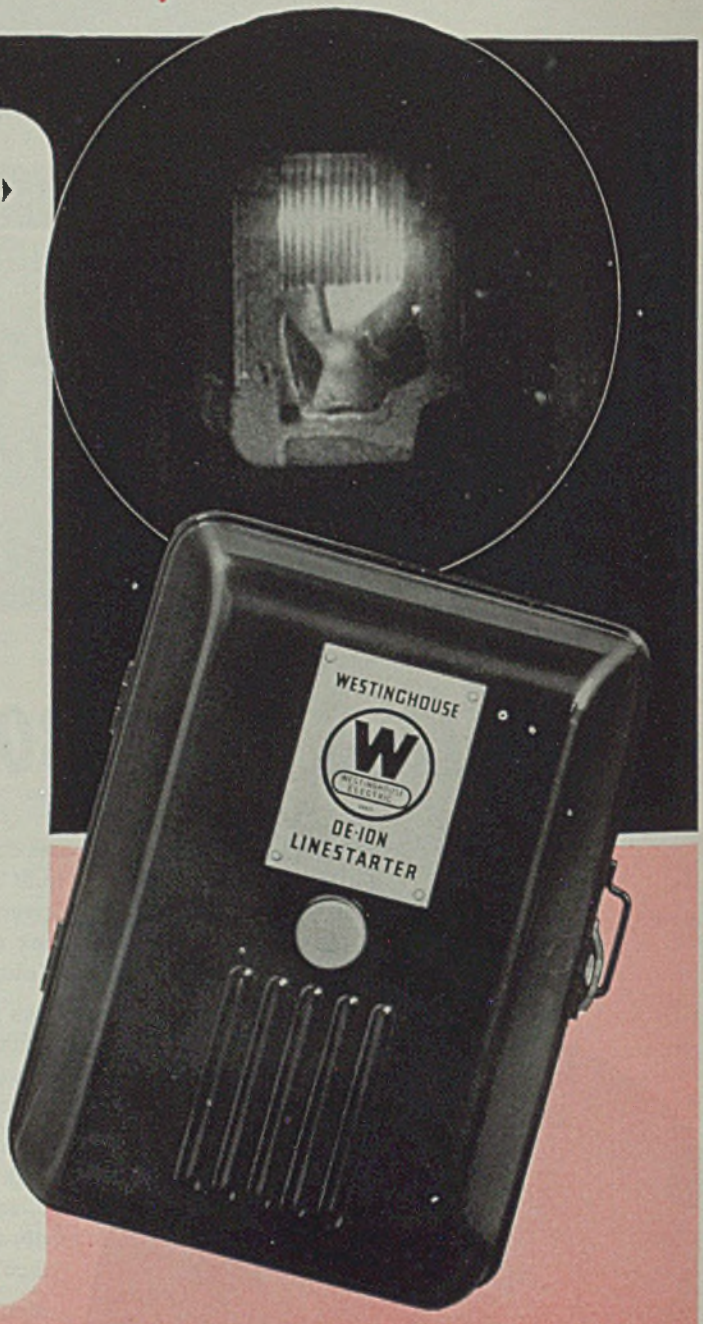
General Offices - YOUNGSTOWN, OHIO

Contacts still good after

HIGH-SPEED CAMERA SHOWS FOR FIRST TIME HOW "DE-ION" PROTECTION SAVES CONTACTS

"De-ion" Arc Quenchers snuff out arcs in half a cycle . . . so fast that only the ultra high-speed camera can catch their action.

Note how "De-ion" Arc Quenchers draw arc into grids, confining, dividing and instantly quenching it. The "De-ion" way stops flashover . . . protects contacts from burning . . . saves maintenance. You get this exclusive "De-ion" protection in Westinghouse Linestarters at no extra cost . . .



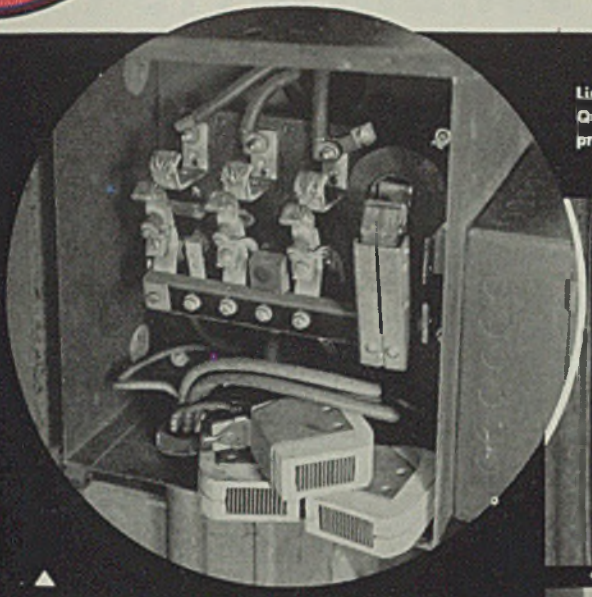
. . . AND ACCURATE BI-METAL OVERLOAD PROTECTION

Bi-Metal units in every Westinghouse Linestarter give dependable, consistent motor overload protection. Before the heat of an unsafe overload can damage motor windings, the Bi-Metal operates automatically to disconnect the motor from the line. There's nothing to renew or replace—no time lost in restoring service.

W WESTINGHOUSE ELECTRIC

Westinghouse

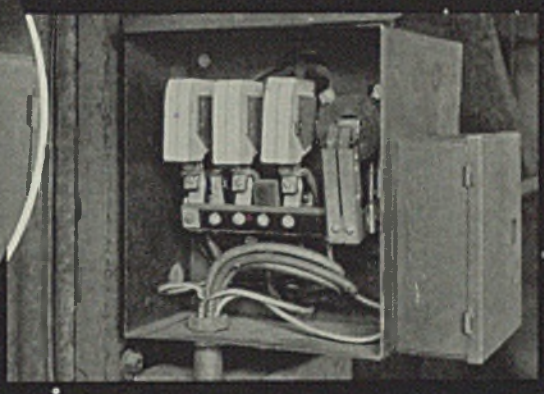
8 YEARS SERVICE

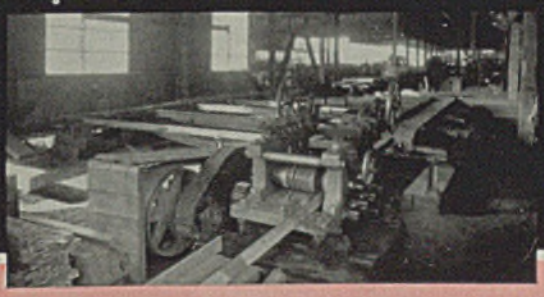


Unretouched photograph showing excellent condition of the linestarter contacts after 8 years of continuous service. Contacts have never been cleaned or dressed.

Plugging the 35-hp squirrel-cage motor on this straightening roll, from full speed in one direction to full speed in the reverse . . . 200 times a day . . . has been the tough assignment handled by the linestarter.

Linestarter with cover removed, to show "De-ion" Arc Quenchers installed over contacts. This Westinghouse feature prevents contact burning, greatly prolongs the contact life.





NORTHWEST STEEL ROLLING MILLS PROVE MONEYSAVING ADVANTAGES OF "DE-ION" PROTECTION

Eight years service without maintenance is the remarkable record of this motor starter at the Northwest Steel Rolling Mills, Inc.

From the day this starter was installed in October, 1931, it has been on extremely severe plugging-reversing service . . . averaging 200 operations per day (over 200,000 total operations)... handling peak currents of 150 amperes.

Yet the original contacts are still in good operating condition . . . and they've never required any attention, not even dressing with sandpaper. They appear to be capable of many more thousands of operations.

In 8 years the cover has been off only twice . . . once for the picture above . . . once to connect a switch below the starter.

All of which goes to show the trouble-free service you can expect from any Westinghouse Linestarter . . . for every starter is equipped with "De-ion" Arc Quenchers, the exclusive feature responsible for this remarkably long contact life.

WESTINGHOUSE ELECTRIC & MANUFACTURING CO. • EAST PITTSBURGH, PA.

J-21050

Motors and Control

Automatic Preset Control

Any one of eleven sequences for heating and quenching work automatically may be chosen and preset on new control system which is part of addition to facilities of large Chicago mill

STEADILY increasing demands for heat treated alloy steels have necessitated enlarging furnace and quenching facilities at the South Works plant of Carnegie-Illinois Steel Corp., Chicago. A new electrically heated bell-type heat-treating furnace has recently been installed, together with a second quenching tank, giving three furnaces and two quenching tanks equipped to operate under fully automatic control.

This equipment permits the findings of laboratory research and data from the testing departments to be correlated with commercial practice to produce material with more uniform physical properties and microstructure.

The furnaces are designed to handle up to an 18,000-pound load, taking bars up to 10 inches in diameter and 30 feet long or plates up to 52 inches wide. The load rests on a series of heat-resisting alloy grids 21 inches above the car bottom. See accompanying illustrations. A double row of heating elements on each side wall and a triple row in the roof of each furnace provide rapid uniform heating of the load and assure heating the charge from the bottom as well as from the top.

A uniform temperature can be maintained throughout the charge, automatic controls being provided to maintain this temperature. During the cooling cycle, the controls are reset manually at prescribed intervals. Rapid controlled heating with minimum scale and decarburization is possible.

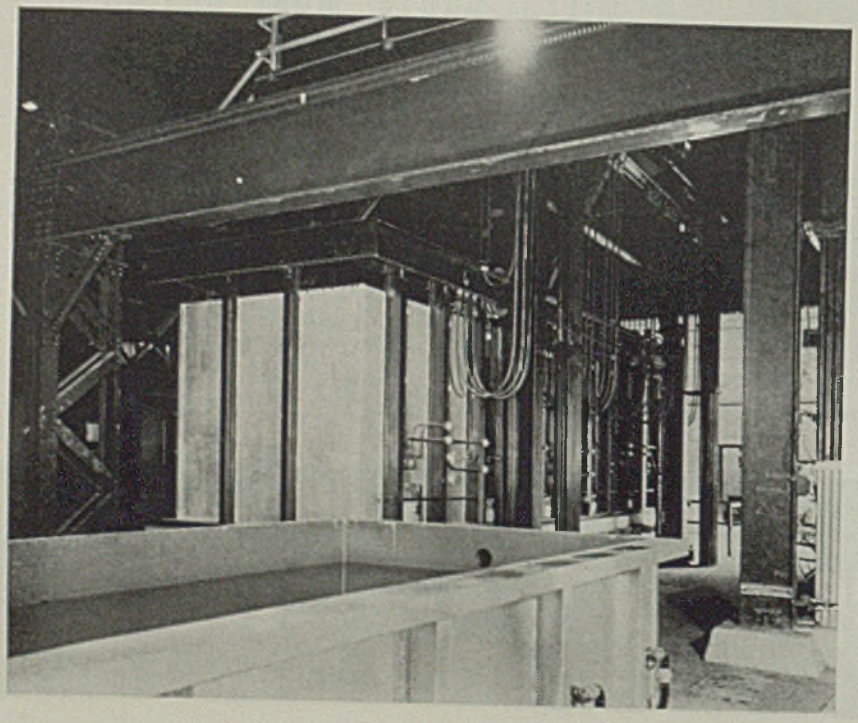
Uniform results depend upon the maintenance of uniform practices so the automatic control of furnaces and quenching tanks is important. The load for any furnace is assembled on a special charging table in a single layer in the case of heavy bars or in a double layer for lighter sections. When the charge is ready, the furnace bell is raised and the furnace car run out under a traveling crane which travels the entire length of the heat-treating building. This crane is fitted with a series of carrier arms spaced to fit between the supporting grids on the surface car, which conform to the spacing on the charging table. The load is transferred as a unit on these cars to the furnace car. This is then run back under the bell which is lowered and the heating cycle started.

Allows Much Flexibility

All operations are controlled by a single workman from the control pulpit, so located that the operator has a clear view of all manipulations. The electrical system is arranged so any operations may be controlled manually or any sequence of operations may be set to advance automatically. Eleven such sequences may be preset. The operator chooses the desired cycle by setting a selector switch on the control panel and then closes a master control switch, after which the mechanism functions automatically. This is particularly important in connection with treatment involving quenching. A typical sequence runs as follows:

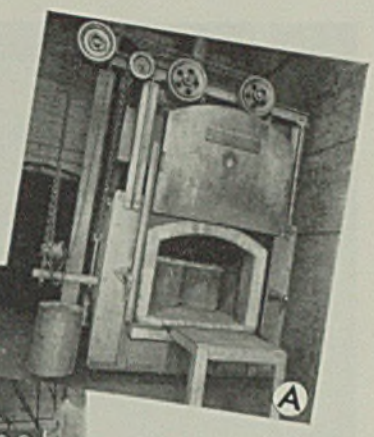
The crane is brought to its stand by position by manual control.

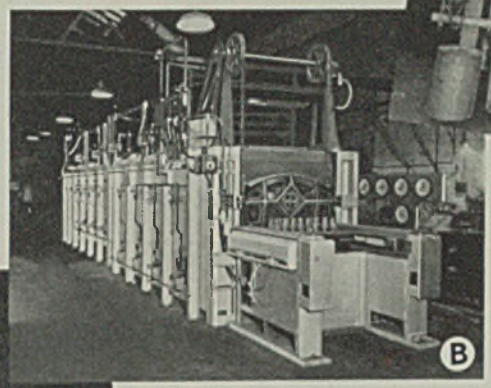
The selector switch is set for the desired cycle for quenching the load

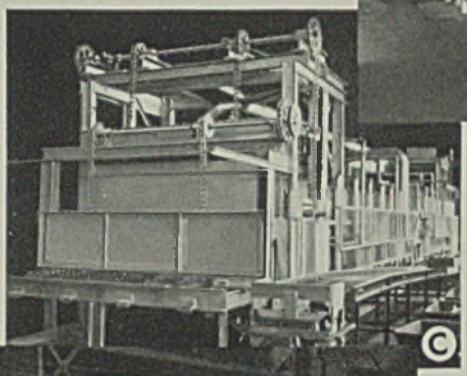


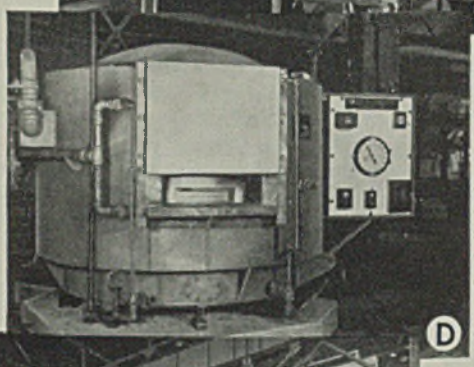
New electrically heated bell-type furnace in background handles loads up to 18,000 pounds at temperatures up to 2000 degrees Fahr. End of one of two 18,000-gallon quenching tanks is shown in foreground

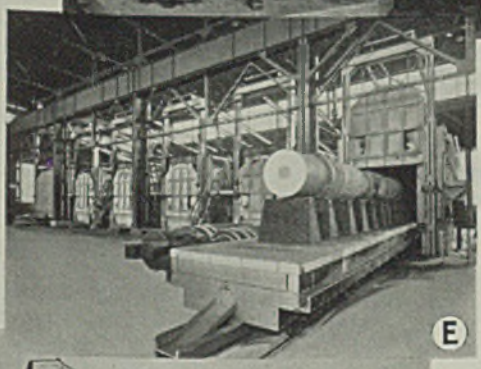
6 Manufacturers Give Performance Data on B&W INSULATING FIREBRICK

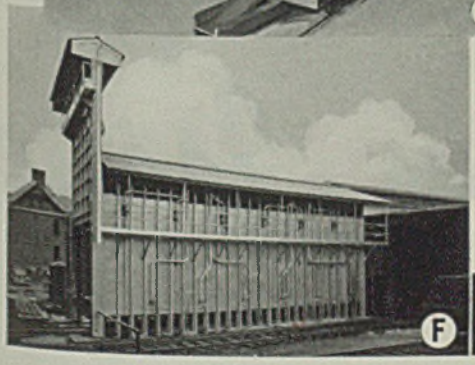












A—Builder of machines used in making paper, rubber and textiles: Saves about 40 per cent in fuel since using B&W Insulating Firebrick for walls and arch of a carburizing furnace.

B—Automobile manufacturer: Spheroidizes transmission gears in 9 hours 21 minutes in a furnace underfired with gas. Fuel consumption is only 745 Btu's per gross pound. Lining is 9 inches of B&W Insulating Firebrick.

C—Malleable castings plant: Annealing cycle is only 15 hours. Capacity, 20 tons in 24 hours. Lined and backed up with B&W Insulating Firebrick.

D—Manufacturer operating a gas-fired forging furnace: Handles varying types of stock with machine-like precision, and minimum of scale and surface decarburization. Attains 1900 F. from cold start in 20 minutes. Lined with B&W Insulating Firebrick.

E—Builder of steel mill equipment: 6 car-bottom annealing furnaces, used for rolls weighing up to 65 tons. B&W Insulating Firebrick have helped to save fuel, reduce annealing time and speed up production.

F—Railway equipment builder: Annealed a 33,000-pound chlorine tank in 7¼ hours, including heating up and cooling. Side walls, end wall, arch and door of furnace lined with B&W Insulating Firebrick; car top, B&W Insulating Concrete, covered by B&W Insulating Firebrick and paved with dense firebrick.

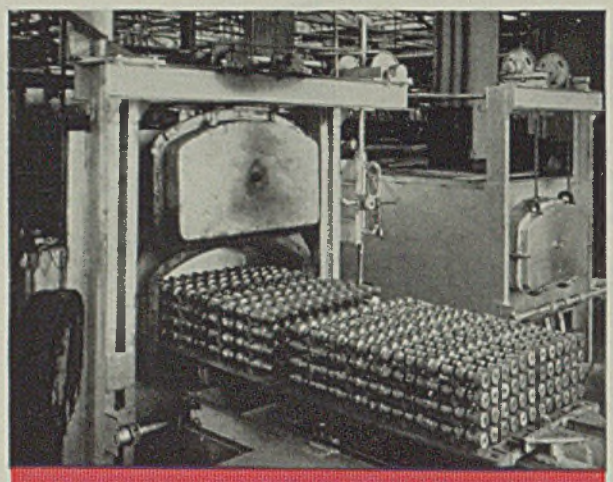
WRITE FOR BULLETIN R-2-F.

THE BABCOCK & WILCOX COMPANY

Refractories Division

85 LIBERTY STREET **NEW YORK, N. Y.**

BABCOCK & WILCOX



Carburizing camshafts in a modern automobile plant.

Fabrication by welding.

featuring

NATIONAL METAL EXPOSITION

CLEVELAND PUBLIC AUDITORIUM, OCTOBER 21-25

PARTICIPATING SOCIETIES

American Society for Metals
Wire Association
Institute of Metals Division, A.I.M.E.
Iron and Steel Division, A.I.M.E.
American Welding Society

Metal Show Issue

OCTOBER 14, 1940

Studying metal structure microscopically.

Electro-galvanizing wire at the rate of 578 miles per day.

Open-hearth pouring.

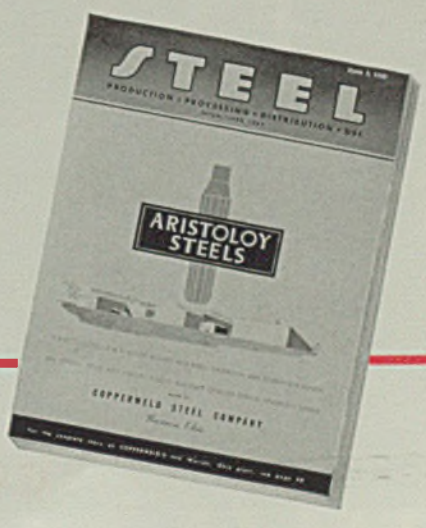
■ The latest methods, materials, equipment and metals will be on display when the twenty-second National Metal Congress and Exposition is in session at the Public Auditorium, Cleveland, Oct. 21 through 25. The papers presented at the business sessions will reflect the best thinking and most exhaustive research done over the past year. This is truly the "metal man's" greatest opportunity for an interchange of ideas and to learn of the latest developments.

Following its usual custom, STEEL will devote a large part of the October 14 issue to the same interests as the various societies participating in the National Metal Congress. This issue, dated just a week prior to the opening of the show, will carry complete advance details so that you can lay your plans as to the papers you wish to hear, the things you wish to see and the booths you would like to visit.

Our October 14 issue will contain a combined advertising and editorial insert section printed in two colors on special coated stock. This insert section will carry the complete program and list of exhibitors. In addition, it will feature pertinent comments by men known and respected throughout the industry. It will have a profusely illustrated section depicting the progress and achievements of the past year.

The advertising pages will inform you of the newest money saving equipment; of better methods; of improved materials and metals. If you attend the show, STEEL'S October 14 issue will help you to profitably plan your time. If you can't attend, this issue will bring the show to you.

Companies supplying equipment, materials, methods or metals are invited to write for information relative to advertising possibilities.



STEEL

PRODUCTION . PROCESSING . DISTRIBUTION . USE

ESTABLISHED 1882

Penton Building Cleveland, Ohio

and the master control switch closed, providing for the following automatic operations: The furnace bell rises. Furnace car is moved into position under the crane runway. Crane moves into position over the car with the carrier arms in position beneath the charge. The charge is lifted, carried to position over the quenching tank and lowered into the quenching medium. Charge is alternately raised and lowered in the quenching medium for a predetermined length of time at a rate best suited to the steel being quenched. At completion of the cycle, the crane comes to rest over the quenching tank.

The selector switch is then set for the next automatic cycle for charging the load into the tempering furnace, which has been set for the desired temperature. Then the furnace bell of the second furnace rises, the furnace car moves into position under the crane runway, the crane places the charge on the furnace car and moves back to clear the car, coming to rest in its stand-by position.

The furnace car is then moved back into position under the furnace bell which is lowered. These operations are both under manual control.

The quenching tanks, one being used for oil and the other for water, each have a capacity of 18,000 gallons and are large enough to permit the crane to submerge the full load completely. In this way each piece receives practically an individual quench, but uniformity of treatment is maintained regardless of the number of pieces in the order.

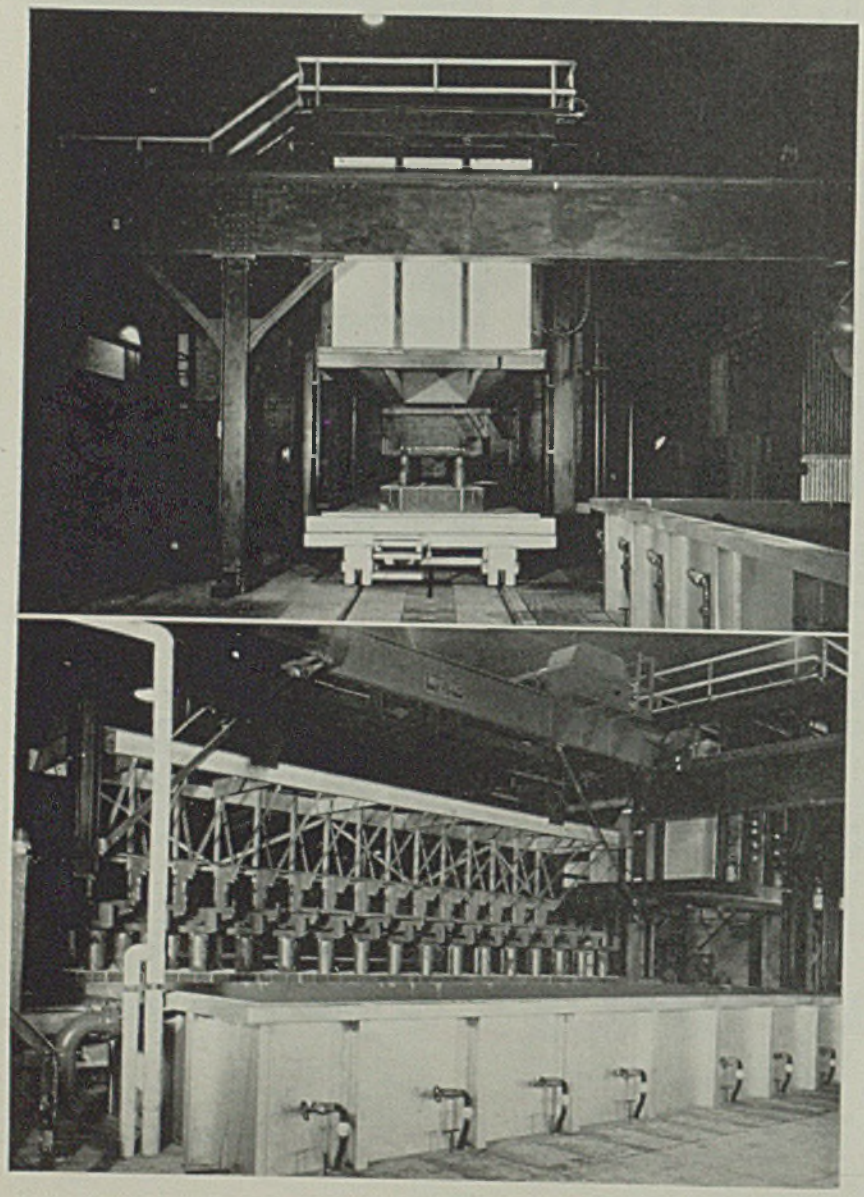
A wide variety of alloy steels are heat treated at South Works, ranging from the low alloy grades up through the austentitic stainless steels. The furnaces are designed to operate at temperatures as high as 2000 degrees Fahr. with automatic control to maintain close temperature regulation. This permits quenching from as high as 1950 degrees Fahr. as in the case of USS 18-8 stainless steel, and assures ample heating capacity when quenching from lower temperatures. The setup is such that a complete furnace load may be quenched into oil within 90 seconds, or in water within two minutes from the time a furnace bell is raised.

Quenching bath temperatures may be controlled by circulating the liquids through heat exchangers, permitting the bath to be warmed if the liquid is too cold during winter months, or cooled as may be necessary when operating on short cycles or from high temperatures.

Index System Helpful

Order requirements involving both physical properties and microstructure are frequently placed on the wide range of grades and sections handled by the heat treating department. This condition has necessitated a great deal of control and testing to assure that production meets the requirements in every respect. The results in turn have been checked by the field metallurgical engineers. From this experience the department at South Works has built up a card index system whereby it is possible to follow the steels through the various operations and trace in detail the conditions surrounding these operations. Cards list such information as the chemical analysis of the steel, its metallurgical characteristics prior to treatment, time and temperature cycles used in the heat-treating operations, and the results obtained.

To verify the uniformity of the heat-treated product, from charge to charge and from position to position within a charge, the treated product is double checked before it leaves the mill. Representative samples are taken from each lot for detailed examination by the metallurgical laboratory and each piece is given a brinell test before it leaves the heat-treating department. Two electrically driven brinell hardness-testing machines are available for the exclusive use of this department and the metallurgist in charge has trained his inspection crew to run these check



Upper, here bell of furnace is raised to permit removal of car. Complete load may be quenched in oil within 90 seconds or in water within 120 seconds after bell is raised

Lower, grapple from overhead crane removes bars from car after car and is run alongside quench tank

EFFICIENT AIRCRAFT PARTS PRODUCTION ... WITH MODERN BROWN & SHARPE MACHINES

In expanding your production, obtain equipment which will give the greatest return in productivity and accuracy. **-Specify Brown & Sharpe—**

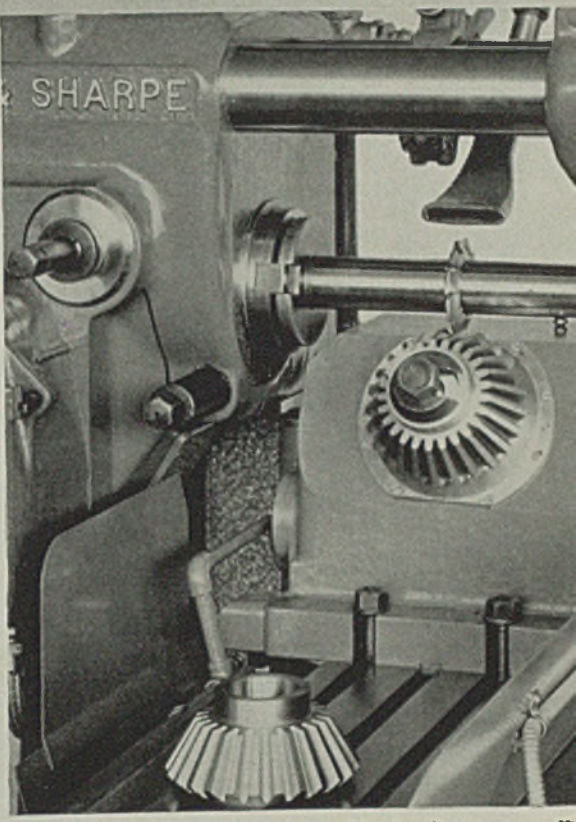
MILLING MACHINES — from the light, fast No. 000 to the powerful No. 12 — and a wide choice of toolroom as well as production equipment, including the unique Omniversal.

GRINDING MACHINES — for precision work large and small—universal, plain, surface, and tool.

SCREW MACHINES — Wire Feeds for quick set-ups — Automatics for parts in quantities.

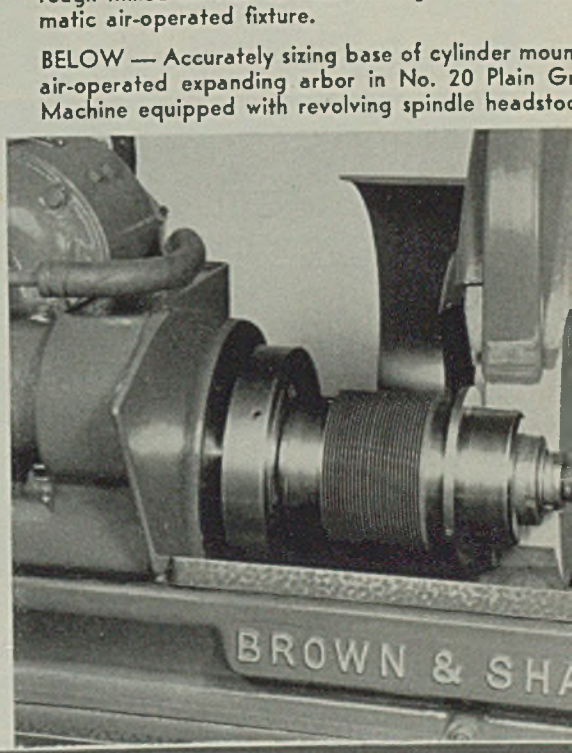
Aircraft manufacturers find the wide variety of types and sizes of these Brown & Sharpe machines give a selection of equipment for making parts at **low cost** – and to the high standards of the aircraft industry. Complete information on any machine gladly sent on request. Brown & Sharpe Mfg. Co., Providence, R. I., U. S. A.

B·S



ABOVE — Gear for retractable landing gear effi rough milled on No. 12 Plain Milling Machine with matic air-operated fixture.

BELOW — Accurately sizing base of cylinder moun air-operated expanding arbor in No. 20 Plain Gr Machine equipped with revolving spindle headstoc



BROWN & SHARPE

tests to laboratory accuracy. Impressions are measured with a brinell measuring glass and the results converted from a standard chart.

The instruments are checked twice each shift on standard test blocks and the turn foremen record these results and their random check tests on the same sheet, thus maintaining a constant check on the accuracy and uniformity of the readings at all times. The operators are carefully instructed regarding the importance of accuracy and consistency in making their tests and take pride in the part they play in maintaining the quality control established in the department. Inspection facilities are such that any piece may be checked over its entire lengh as necessary or desirable.

Although the equipment is largely used for quenched and tempered material, it is adaptable for use in annealing, normalizing, normalizing and tempering, stress relieving or spheroidizing. Quenching and drawing operations are ordinarily confined to bars.

All operations are conducted to maintain proper rates of heating and cooling. As the research and plant metallurgical departments keep the metallurgist in charge of heat treatment fully advised as to the critical cooling rates of all steels coming through his department, exceptionally favorable and uniform results are being secured.

Automatic equipment assures close control of heating time, permits more accurate control of heat loss between the time the load leaves the furnace and the moment it is first quenched, makes possible uniform quenching, and speeds up production as well as assuring uniformity at all times.

Develops New Type Wire For Making Springs

■ A new product, electromatic oil-tempered spring wire, for special mechanical springs is now being produced by an electric direct-resistance method by the Jones & Laughlin Steel Corp., Jones & Laughlin building, Pittsburgh.

In contrast to the conventional methods of heating wire to quenching temperatures, either in furnaces or by immersion in molten baths, this process consists in passing sufficient electric current through the wire to heat it to the desired temperature, much as the coils of an electric toaster are heated by their resistance to the current. The electrical resistance set up in the wire increases its temperature uniformly, and the full cross section of the wire is heated simultaneously to the desired quenching temperature.

In the process of manufacture the wire fed from reels passes first through tension rollers then through a molten electrical contact and thence through a second molten contact, completing the electric circuit through the wire. These contacts are held at a constant predetermined temperature, the second also serving as a primary quenching bath from where the wire immediately passes to an oil bath for the final quench. This double-phase quenching feature provides a gradual reduction in wire temperature, preventing the steel from being shocked by a sudden great drop in temperature. Continuing from the final quench through a molten tempering bath, the wire is reheated to give it the desired physical properties and fatigue values. It may then be passed through a light soluble oil bath prior to shipment.

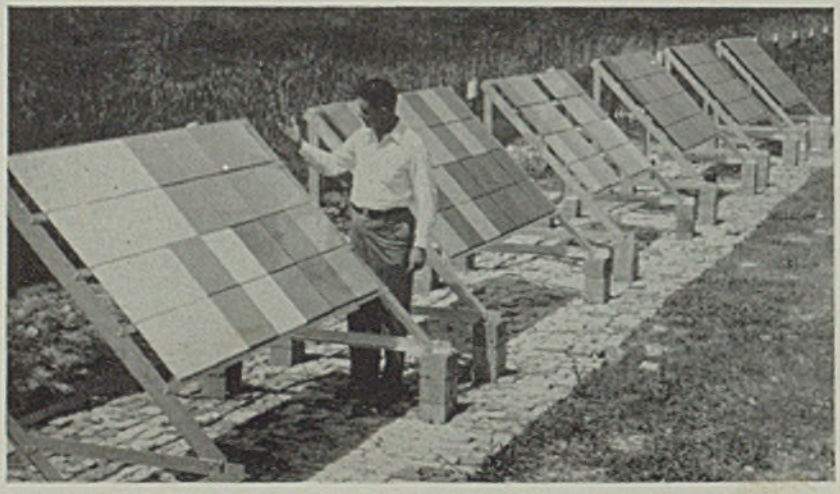
Constant flow of electric current of controlled voltage and amperage fed into the wire and the closely regulated speed of the machines governs heating the wire to within exact limits. In addition, thermocouples in all contact, quench and temper baths provide automatic temperature control over these units. The resulting combination of accurate time regulation makes possible precise control of the heating and quenching cycle.

As length of heating time and control of quenching temperatures have a direct effect on grain structure, this method makes it possible to control and reproduce desired grain sizes with the utmost accuracy.

The double-phase quenching that is provided has been found to considerably improve the physical characteristics of the wire and makes possible a close control of tensile strength, elastic limit, elongation, and Rockwell values. Also, as all the heat is within the wire itself, decarburization and scaling is controlled to narrow limits, not possible in processes using indirect heating.

Brake, clutch and grid seat springs for automobiles, various similar applications in the airplane industry, and mechanical springs for machinery are among the uses for this new type of wire.

Porcelain Enamel Faces the Elements

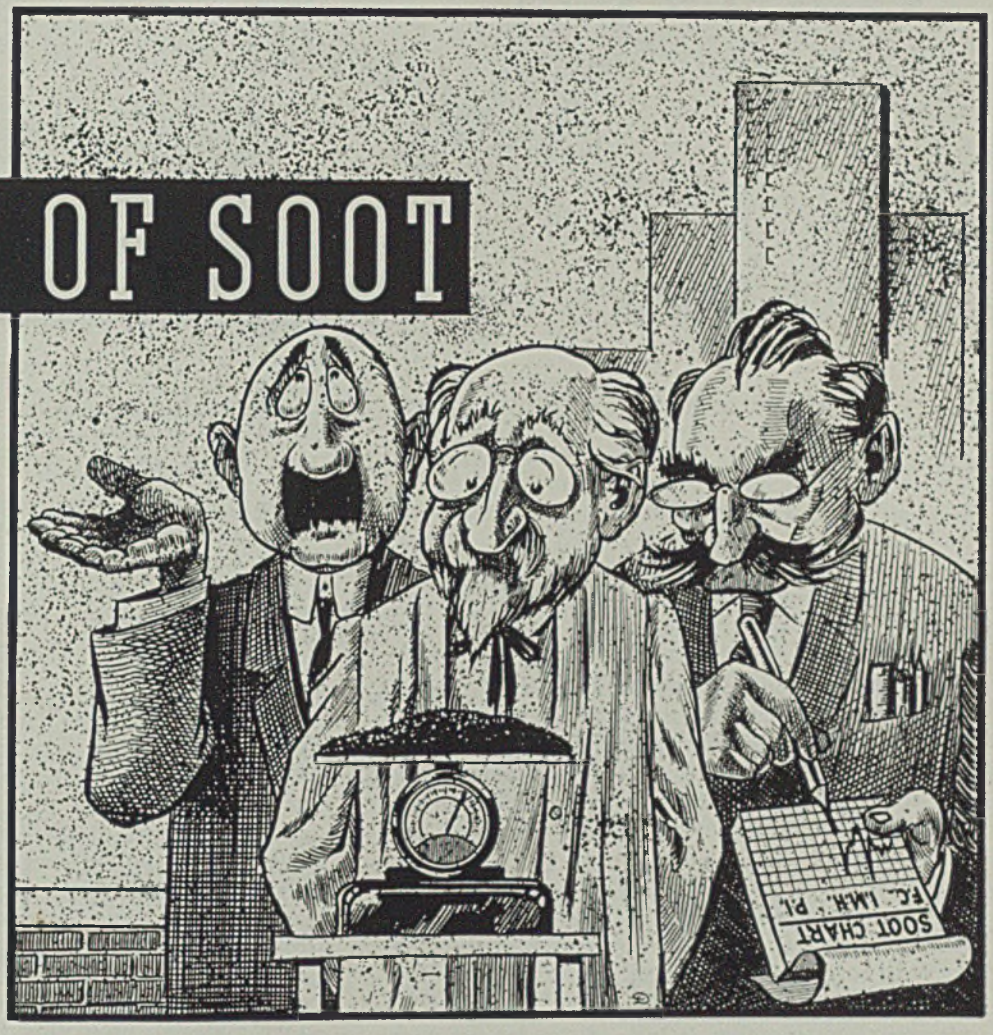


■ An extensive test of the wearing qualities of porcelain enamel exposed to the elements is now being conducted on test racks in four cities under the direction of the national bureau of standards, in co-operation with the Porcelain Enamel institute, 612 North Michigan avenue, Chicago. The racks, such as the one shown above at the municipal airport in Lakeland, Fla., contain 192 panels each 12 inches square. These will be inspected every two years. Two tidewater locations were purposely selected. Other cities in which similar racks are found are Atlantic City, N. J., St. Louis and Washington

New Leather Belting Has Greater Pull

■ E. F. Houghton & Co., Third, American and Somerset streets, Philadelphia, announces for the first time, after a year of testing, its Okay leather belting featuring a high coefficient of friction and treaded surface to reduce friction. Because of the special tannage to which this belting is subjected, it has a high tensile strength, low elongation and is very pliable. This latter feature permits its use on small pulleys with short centers. The treaded surface, besides increasing the pulling power also eliminates much windage and keeps the belt free from dust. Waterproof cement is used on laps.

COAT OF SOOT



In every large industrial city statisticians like to spring amazing facts on soot. In Chicago, Pittsburgh, Cleveland, Cincinnati, St. Louis, Buffalo, Detroit, etc., these statisticians speak about the tons of soot that fall on every square mile during the course of a year. A ton of soot must be pretty bulky; we doubt if anyone ever saw an actual ton of soot in one pile. Housewives, however, stoutly maintain that they remove tons of soot every spring from rugs, furniture, curtains, drapes, walls and ceilings. No matter how it is spread, every large city does have a coating of soot, and if the city fathers of St. Louis claim that their coating is thinner than that which mantles Pittsburgh or Cleveland, that is merely a matter of civic pride. While it may be difficult to measure the actual coating of soot that falls on a metropolis, there is no such difficulty in the matter of measuring the zinc coating on HOT DIP GALVANIZING. HANLON-GREGORY GALVANIZING CO. coats ferrous products with an adequate coating of zinc. This coating, through the HOT DIP PROCESS, becomes a part of the base metal, and the forces of rust and corrosion may attack it for years and years without effect. A coating of soot may be washed away, but ferrous products coated by HANLON-GREGORY retain their protective coats through two generations.

OFFICIAL • INSIGNIA
PROTECTED BY GENUINE HOT-DIP GALVANIZING
AMERICAN HOT DIP GALVANIZERS ASSOCIATION INC.

HANLON-GREGORY GALVANIZING CO.
PITTSBURGH PENNA.

FLAME Shaping BRASS AND ALUMINUM

Many metals or alloys with comparatively low melting points can be flame cut efficiently by use of a paste which acts as a refractory to protect metal alongside the line of the cut

By H. H. MOSS
Development Section, Engineering Department
The Linde Air Products Co.
Newark, N. J.

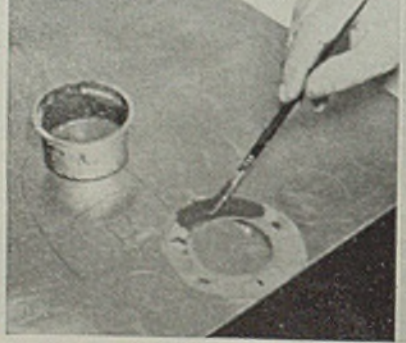
■ IN BRASS piping installations and aluminum vessels of welded construction, many openings of various size are required for branch lines, headers, manholes and connections of all sorts. Small openings are usually cut with circular saws, which is good practice where clearance permits the use of the saw.

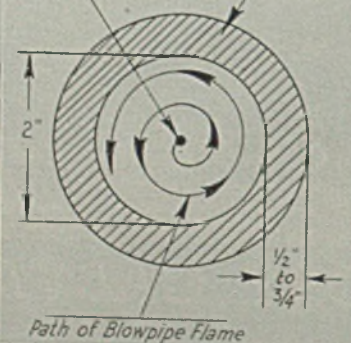
Where the openings to be cut are 2 inches or more in diameter, it often is more economical to "cut" the opening by melting it out with the oxyacetylene flame. Even the ends of brass pipe for branch connections can be shaped in this way.

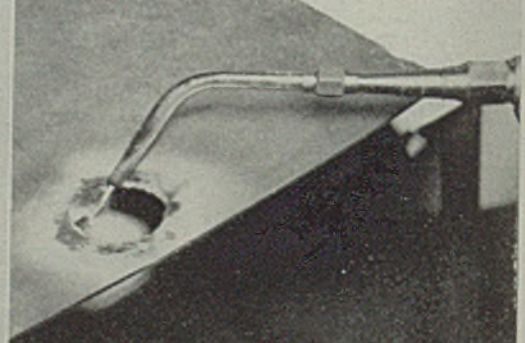
Usual practice has been to melt the opening in pipe or plate to within ¼-inch of the desired dimension and then finish by chiseling to size. However, recent developments in the melting procedure, shown in the accompanying illustrations, have made possible the speeding of this work with almost complete elimination of after-treatment.

In practice, the opening to be made is first laid out on the pipe or plate. Regardless of shape, this is accomplished with templets or by any other convenient means. A mixture of water and a quick-drying iron cement, such as is used in caulking bell-and-spigot joints, is then applied by brush around the outer limits of the scribed opening. This paste mixture is about the consistency of heavy paint, thick enough to build up on the brush considerably without dripping. One or more coats may be required to paint a band about ½ to ¾-inch wide completely around the desired opening. As the paste dries under the heat of the oxyacetylene flame it acts as a refractory material, protecting the metal which it covers, and to a certain extent prevents the melting of the metal beyond the desired limits.

Fig. 1. (Left)—The iron cement is applied by brush to a ⅛-inch yellow brass plate. Fig. 2. (Center)—After the enclosed area is preheated almost to a melting temperature, the section is melted out as shown. Fig. 3. (Right)—A No. 8 tip with oxygen pressure of 40 pounds is used







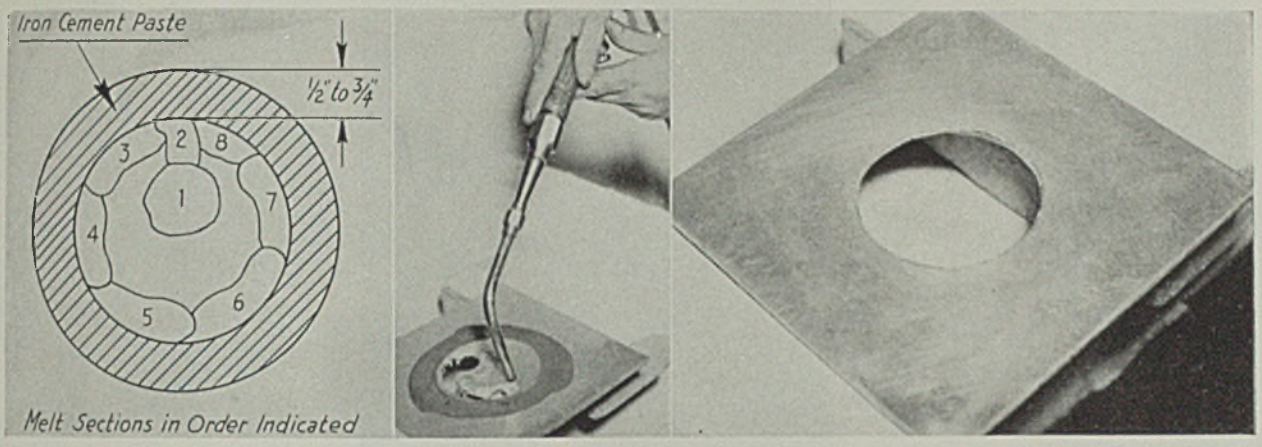


Fig. 4. (Left)—Holes 3 inches or larger in diameter are melted out in sections as shown. Fig. 5. (Center)—Torch is tipped toward the vertical to square the edge of opening. Fig. 6. (Right)—Smooth regular edges "as melted"

For brass or aluminum up to about ¼-inch thick a No. 8 welding tip is used at an oxygen pressure of 40 pounds per square inch. Tests have shown that a strongly oxidizing flame produced at this pressure will give the most uniform results. Regularity of the melted surface becomes less as the oxygen pressure is decreased.

Small holes in brass or aluminum are melted as shown in Fig. 2. The entire area enclosed by the paste is preheated almost to a melting temperature. Melting is then carried spirally from the center to the outer limits of the area.

Larger areas in both brass and aluminum are handled as shown in Fig. 4. An area about 2 inches in diameter close to the line of cut is preheated to a point just below the melting temperature. Then an area about 1 inch in diameter is melted at a point about ¾-inch from the desired line of "cut." Consecutive preheating and melting of small areas along the desired line follow in the order indicated in the sketch. These areas measure about ¾-inch wide by 1 to 1½ inches in length and are repeatedly melted out until the solid center section falls clear.

In both cases the handling of the blowpipe is identical. The blowpipe tip is tilted so that the flame points in the direction of melting at an angle of approximately 30 degrees to the surface of the metal. As the outer limits of the opening are approached, the blowpipe is gradually straightened up to the vertical position in order to square off the melted edge. "Icicles" are melted away by tipping the blowpipe to permit a slight "undercutting" along the edge.

Molten aluminum is so light that the residue may cling to the underside of the plate in such a manner as to render removal difficult with the blowpipe. In this case the "slag" is removed with a chisel and hammer. On the other hand, difficulties of this type can often be avoided by working in a vertical position.

Removal of melt residue from inside a pipe can be accomplished by blowing the solidified beads of metal to an open end, or by tipping up the length of pipe where this is possible. In most cases, however, a simple tool like the "rake" or scraper shown in Fig. 7 will be found excellent for this purpose.

The scraper consists of a sheet metal blade, sheared to shape, formed, and welded to one end of a length of steel welding rod. For convenience in handling, a wooden file handle is attached to the end of this shank. In use, the tool is simply inserted through the opening in the pipe and withdrawn, the curved

(*Please turn to Page* 76)

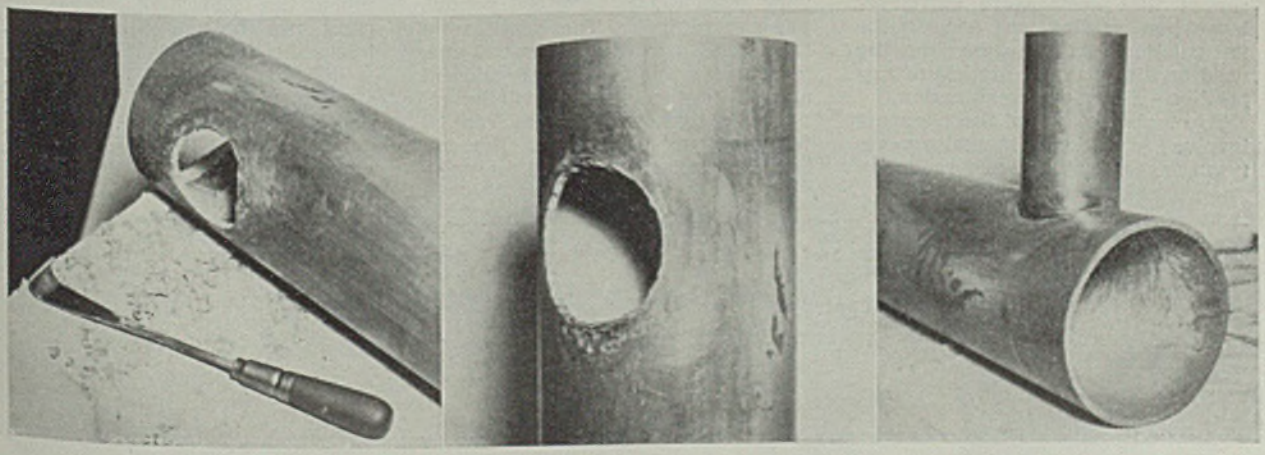


Fig. 7. (Left)—Scraper used to pull residue out through hole —a wooden file handle on a section of steel rod to which is welded a shaped sheet steel tip. Fig. 8. (Center)—Opening after paste is removed. Fig. 9. (Right)—Accurate fit is obtained

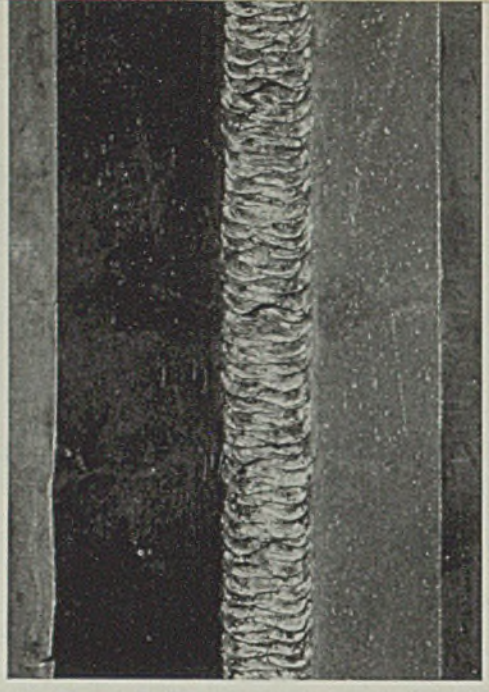


Fig. 1 — Vertical fillet weld made with an all-position electrode in 1-inch plate

By HAROLD LAWRENCE
Welding Engineer

Positioning—A Welding "Must"

Increased welding speed and improved weld quality are revealed as factors behind recent emphasis on strict positioning of all work where highest weld quality and lowest costs are essential

■ MOST efficient welding practice calls for strict positioning of all welds. Formerly the electrode manufacturer hinted that savings could be had by positioning. Later it was suggested that all welds be so arranged as to allow downhand welding. And now electrode manufacturers *insist* that all welding be done in the flat position.

What brought about such a change in attitude? Was it cost reduction? Was it an attempt to get quality? Actually the change has resulted from a broader understanding of the entire welding process. Wide awake welding engineers early observed that costs were extremely low when welding was done in the flat position. At the same time, the weld quality was the highest of any position—a perfect combination.

To emphasize all of the elements involved, consider an actual production case to see what cost reduction might be possible by positioning. To properly evaluate the welding costs, the first weld will be one in the vertical position. When a vertical fillet weld is made with the right amount of skill, it has an appearance like that in Fig. 1. This fillet weld, as are all the others, is a 1-inch fillet joining 1-inch plates.

Because this weld was made in the vertical position, a certain type of electrode was indicated. In this instance the electrode conformed to the A.W.S.—A.S.T.M. specification for iron and steel welding electrodes, Grade E-6010. The tensile strength in the stress-relieved condition will vary from 62,000 to 66,000 pounds per square inch. The ductility in the same condition (most 1-inch fillet welds would be stress-relieved and all physical values will be reported in that state) ranges from 30 to 34 per cent in 2 inches. Remember, the electrode is suited for welding in all positions—flat, vertical and overhead. This is the electrode that is becoming generally known as the all-position type.

Such an all-position electrode is a good electrode. In the hands of a skilled welder, it will produce the very finest weld metal. But it is infernally slow. The all-position electrode eats up labor at an astounding rate. That is the reason for using positioners to eliminate the necessity for the all-position weld with the slow all-position electrodes.

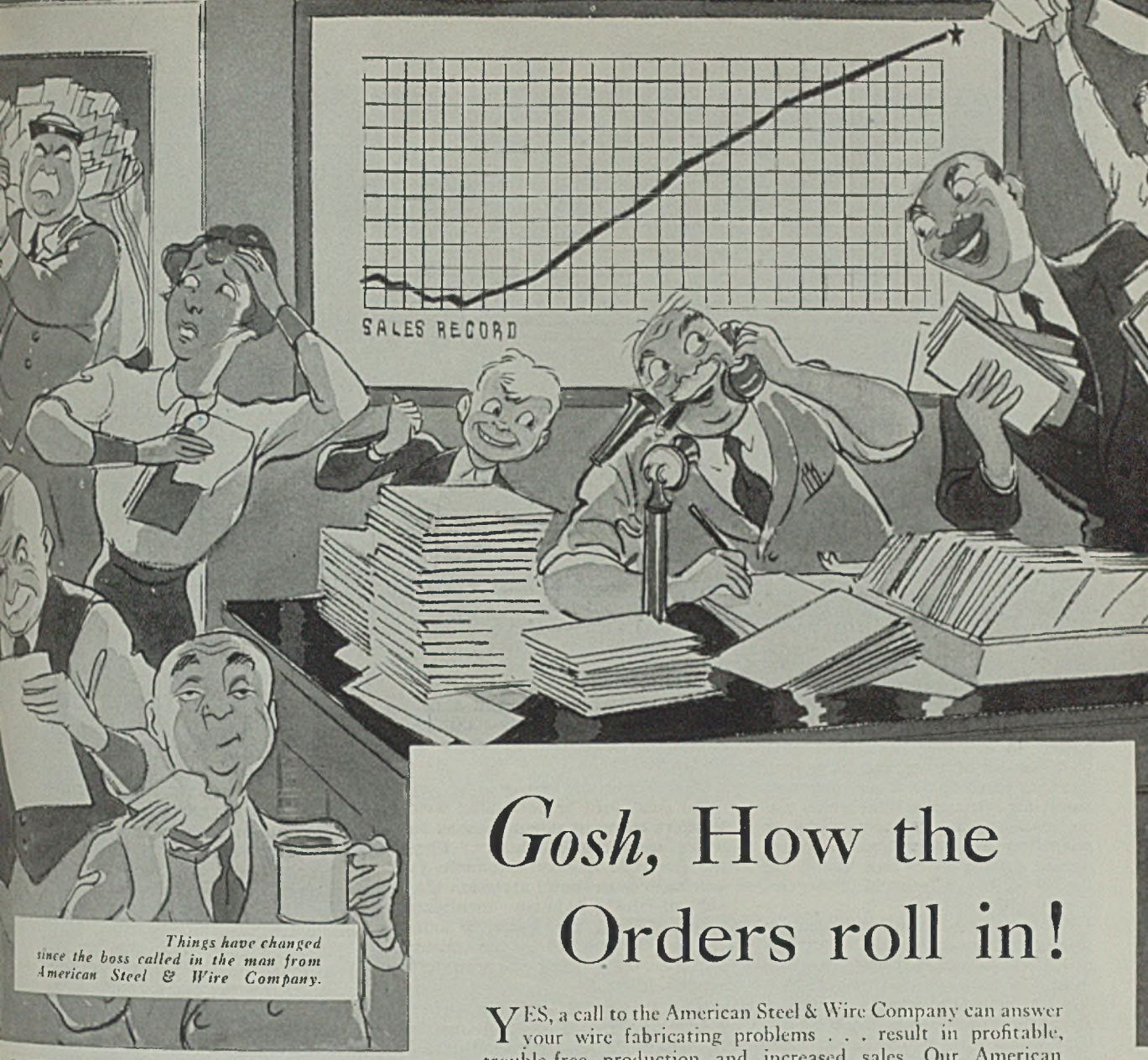
There will be times when welds cannot be positioned no matter how much the fabricator wishes. All right, use the all-position electrode, but only after the possibilities of positioning have been thoroughly studied and found impossible. An experienced welding operator will deposit metal with corrosion resistance better than that of the plate

TABLE I—Minutes Required Per Foot of Completed One-Inch Fillet Weld

Position	Arc Time	Cleaning Time	Total Time
Vertical	29	5	34
Horizontal	15	4	19
Flat	12	2	14

TABLE II—Fatigue Resistance and Impact Strength of Three Types of Electrodes for Fillet Welding

Type	Fatigue Resistance p.s.i.	Izod Impact Strength Foot-Pounds
All-Position	28,000-32,000	30-70
General Purpose	25,000-30,000	25-50
Downhand	29,000-34,000	30-60



Things have changed since the boss called in the man from American Steel & Wire Company.

Gosh, How the Orders roll in!

YES, a call to the American Steel & Wire Company can answer your wire fabricating problems . . . result in profitable, trouble-free production and increased sales. Our American Quality Wire has been meeting the needs of leading manufacturers for over a century. It can be supplied in a complete range of sizes, grades, shapes and analyses to meet the most exacting requirements. Our Sales and Techincal Departments are ready to assist you in determining the proper grade of American Quality Wire to meet your needs.

Premier Spring Wire · Weaving Wire · Pin Wire · Bolt, Rivet and Screw Wire · Broom and Brush Wire · Pinion Wire · Basic and Bessemer Screw Stock · Premier Tested Welding Wire · Flat Nut Stock · Hair Pin Wire · Mattress Wire · Music Spring Wire · Piano Wire · Amercut Cold Finished Steel Bars · Pump Rod Bars · Wool Wire · Wire Rods · Also U·S·S Stainless and Heat-Resisting Wires

AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Export Company, New York

USS

AMERICAN *Quality* WIRES
FOR MANUFACTURING PURPOSES

UNITED STATES STEEL

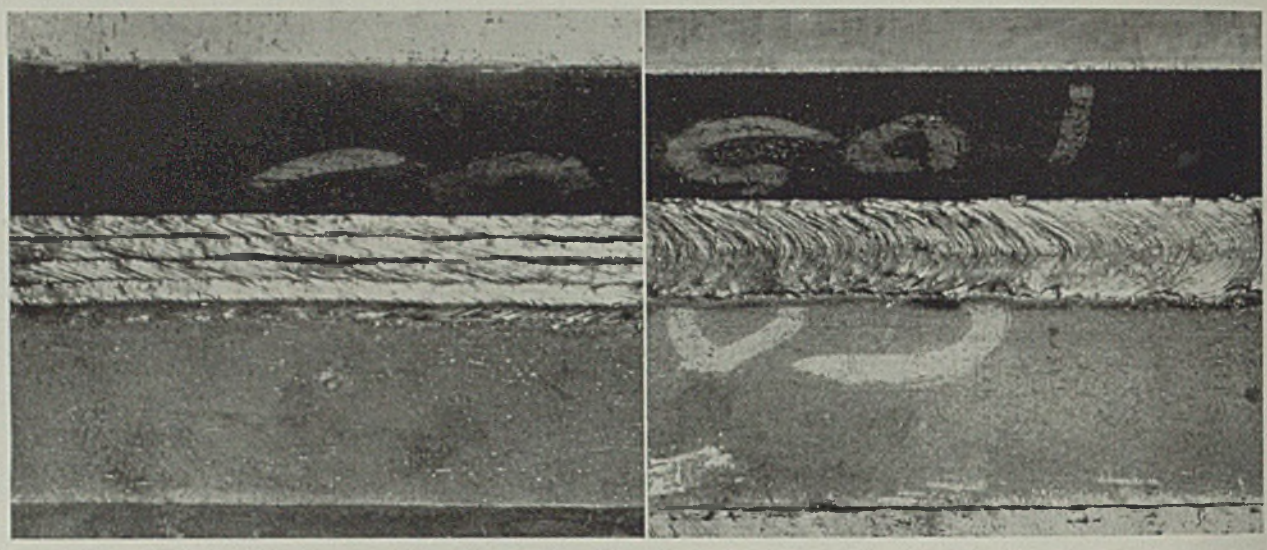


Fig. 2. (Left)—Horizontal fillet weld made with a general-purpose electrode. Fig. 3. (Right)—Flat-position fillet weld made with downhand electrode. Note all welds shown here are fillet (corner) welds in 1-inch plate

itself and with a density of 7.84 to 7.86.

Sometimes the welds may be placed to allow a horizontal fillet weld instead of a vertical fillet weld. In many cases this is a vast improvement, for horizontal fillet welds can be made with general-purpose or poor-fitup electrodes and costs are almost halved over those found for the all-position fillet weld in the vertical position.

But becoming too enthusiastic over this improvement, what about the grade and physical properties? The grade is E-6012 of the A.W.S.—A.S.T.M. specifications. Tensile strength ranges from 65,000 to 69,000 pounds per square inch. The ductility falls to 20 to 26 per cent in 2 inches. Density is lower, being between 7.80 and 7.85. Meanwhile the corrosion resistance is equal to or slightly less than that of mild steel. The reduction in the average density is brought about by the existence of porosity in the weld at times. The entire weld with the fine appearance in Fig. 2 is apt to vary in corrosion resistance due to the type of coating and deposition characteristics of the electrode, so an overall benefit results only where density and corrosion resistance are of lesser importance.

That leaves but one type of weld—the positioned or downhand weld. It offers many excellent reasons for wider use through industry. First, the electrode is easy to handle, requiring less skill and attention than any of the previously mentioned types. Second, the deposit is sound and is characterized by the concave surface that leads to properly shaped fillets.

Next the A.W.S.—A.S.T.M. Grades E-6020 and E-6030 are both met by the deposit. A tensile strength range of 61,000 to 67,000 pounds per square inch is maintained along with a ductility of 30 to 36 per cent in 2 inches. The density is the highest of the three types of electrodes, consistently attaining 7.85 or 7.86. At the same time, the corrosion resistance is greater than that of mild steel by a measurable amount.

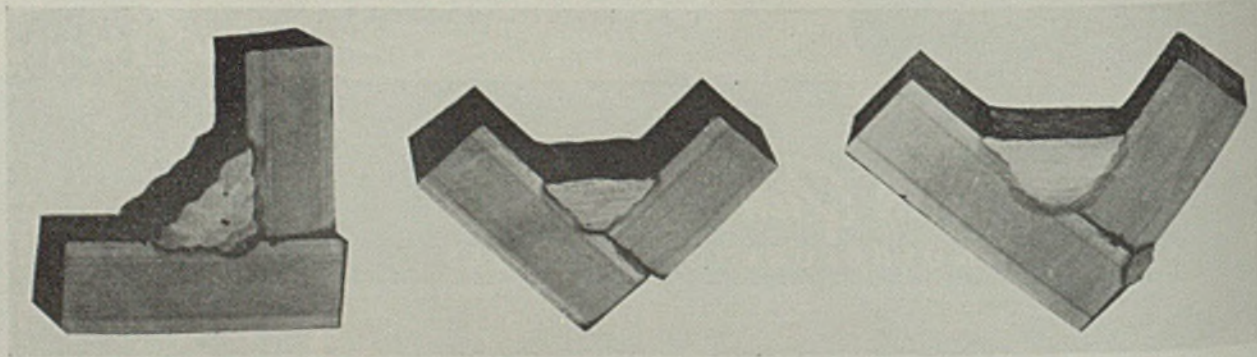
It is true that all users of welding desire the highest quality weld metal. It is equally true that the consumer wishes the lowest possible cost. Where competitive bidding is involved, and that is almost everywhere these days, the fabricator demands low-cost procedures.

Since all of these conditions are best met by positioning, there should be no argument. . . . Yet the rapid expansion of welding has only served to obscure some of these simple truths.

First, consider the question of cost, letting quality ride for the moment. An actual labor analysis of 1-inch fillets in 1-inch plate gave the figures in minutes per foot of completed weld shown in Table I. When you consider that most welding operations show an arc time that is but one-third the total welding time, it is seen that the figures presented

(*Please turn to Page* 70)

Fig. 4. (Left)—Porosity in horizontal fillet weld as revealed here is objectionable. Fig. 5. (Center)—A sound weld made with an all-position electrode. Fig. 6. (Right)—Perfect welds such as this are routine and easily obtained with downhand electrode



Electric Control Improves Mixer Valve Operation

Variations in hot blast temperature are minimized by new device which proportions the flow of air, assures responsive control action and corrects any deviation from the desired control point

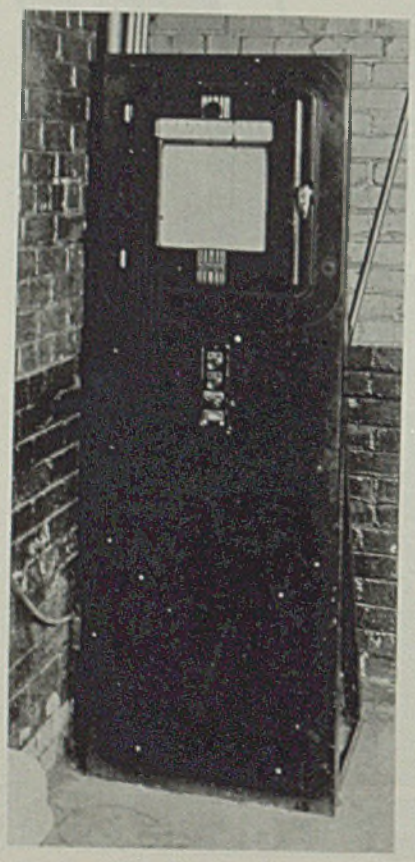
■ HOT BLAST temperatures under electric control at two plants in the Pittsburgh district seldom deviate from that desired by the furnace foreman. The new system of hot blast regulation carries the micro-responsive action of the recorder-controller directly through to the mixer valve's drive unit.

The equipment consists of a thermocouple, a recorder-controller, a relay-detector, a motor-operated valve drive unit, a remote control station and a control panel, made by Leeds & Northrup Co., 4908 Stenton avenue, Philadelphia. The panel when shipped has the controller and relay-detector mounted in place and fully wired. When it is installed in the instrument building or other station convenient for the operators, when the thermocouple is inserted in the hot blast main in front of the bustle pipe and the drive-unit mounted at the mixer valve and connected with suitable linkage, and connection made with the power supply, the equipment is ready for operation.

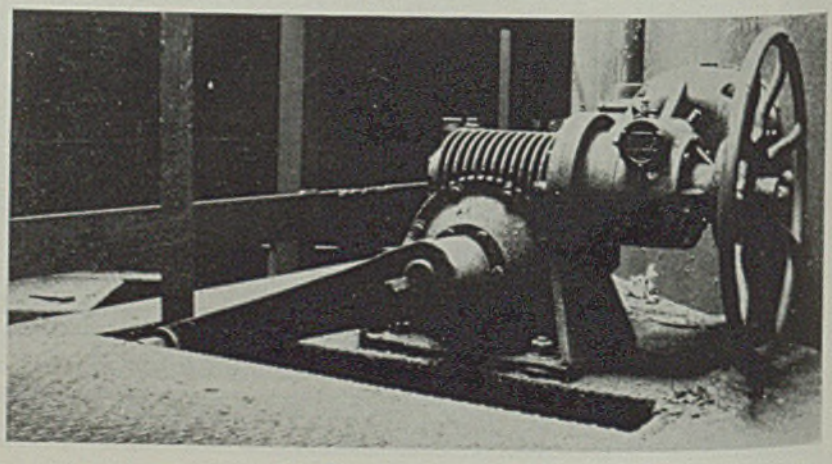
Device has floating or proportional control; it handles temperature just as a good second helper would if he had nothing else to do. It keeps the mixer valve in almost invisible, continual motion as a hot blast stove is cooling down. When a hot stove is put on the furnace the controller first spins the cold-blast mixer valve wide open in order to hold the temperature down, then spins it the opposite way to prevent undershooting, and in a minute or two has the blast back at the desired temperature and the valve gently and progressively closing as the stove temperature recedes.

To detect the temperature of the blast, the thermocouple projects into the hot blast main, usually through a small hole in the top. Leadwired to the couple, yet located at any desired distance from it, is the recorder-controller. In its potentiometer circuit, the electromotive force from the couple is balanced automatically against an adjustable standard electromotive force, and the resulting temperature value continuously indicated and recorded.

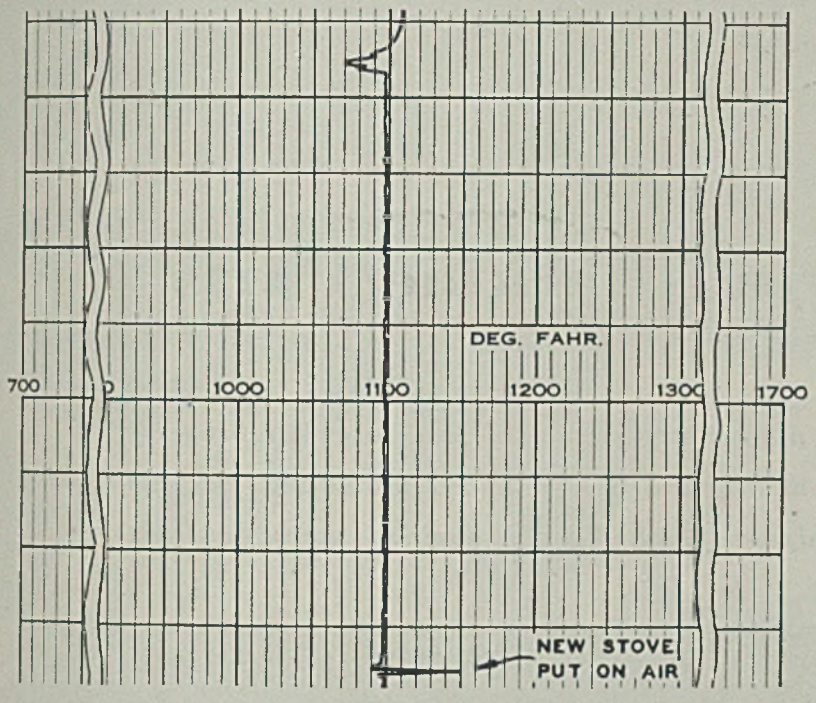
If the hot blast temperature starts to deviate from the control value, the potentiometer circuit unbalances. Immediately the controller, through



Electric control panel, left, showing the recording controller and push-button station. Control unit is mounted at rear



Husky drive unit, below, moves the mixer valve in response to any need for readjustment



Section of strip-chart showing temperature record from one stove change to another

its relay, actuates the motor-driven unit to increase or decrease the flow of air. The extent of this increase or decrease is determined by the extent of the temperature departure. This proportioning action assures smooth, responsive control action and corrects for any deviation in the shortest possible time.

Temperature departures so minute that they cannot be detected are headed off before they reach a wide variation. When a fresh stove is put on the furnace the temperature is felt by the device which then opens wide the mixer valve. As the temperature moves back toward that desired for efficient smelting, the controller closes the mixer valve gradually, so that the temperature and valve come to a halt smoothly at the point of balance.

Part of the control circuit is mounted directly on the shaft of the drive unit; another part of the circuit is on the shaft of the instrument's balancing slidewire. A relay especially designed to match the sensitivity of the pyrometer mechanism also is provided. Thus when the pyrometer catches even a minute temperature change, the valve-drive receives a slight but firm nudge, and it must move until its position matches that of the pyrometer.

In addition to its main job of controlling, the instrument moves a black pointer laterally across a clear-calibrated scale to indicate temperature continuously. At the same time, a recording pen, mounted just beneath the pointer, draws a detailed red-ink temperature record on a wide strip-chart. The instrument also can be equipped to operate signal lights or alarms to warn of any unusual temperature condition.

♦

Finishes Steel Castings By Electrolytic Process

■ Lustracast, for finishing alloy steel castings is announced by Cooper Alloy Foundry Co., Elizabeth, N. J. Although not a surface coating, it not only cleans and brightens plain or ornate surfaces, but provides smoother surfaces.

The process also improves machinability owing to a more uniform removal of scale and is successfully used in cleaning odd-size, odd-shape castings which formerly were considered impractical or impossible to polish. The process at present, is being applied to all of this company's stainless steel pipe fittings and valves.

New Booklet Urges Power Plants to Prepare

■ Hagan Corp., Bowman building, Pittsburgh, and Hall Laboratories Inc., Pittsburgh, have collaborated in the publication of a timely booklet, "Put Your Power Plant on a Preparedness Basis."

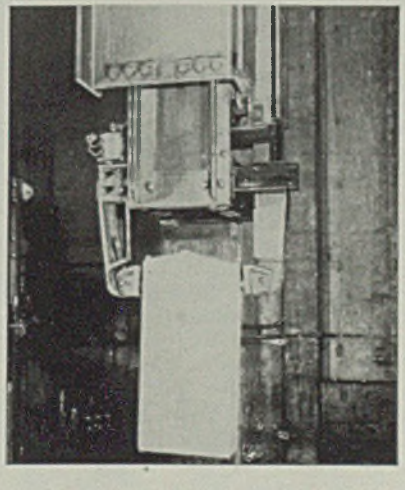
By means of actual plant experiences, the booklet portrays many of the agonizing conditions prevailing in various industries during World War I, giving many reasons and emphasizing the need for industry to look to its power plants *now* while there is still time.

In conjunction with this booklet, a supplementary pamphlet, "Seventeen Case Histories from the Files of Hall Laboratories," is being issued by Hall Laboratories. This material provides a clear insight into various water problems existing in representative plants throughout the country and relates how these problems were solved. Copies of both publications are available on request.

Motor-Driven Grapple

■ The motor actuated Mansaver grab (illustrated) is employed with a stiff-legged crane in handling hot ingots varying in width from 12 to 42 inches. Here, the stiff leg hangs from an electrical Northern Engineering crane. The grab is supported by a carriage which rides up and down in the stiff leg, the latter being quite long in order that grapple may be lowered to the proper point, and still be under the control of the stiff leg. For clearance purposes, the traveling holder for the grapple is telescoped in the stiff leg.

The motor is used only for adjusting the position of the gripping leg to the size of the ingot. At the end of the gripping leg are pointed jaws. These points are pushed into the ingot by the force of the motor. The actual gripping, however, is done with the aid of a slideable leg which is kept up by springs. As the grab rises, the weight of the ingot causes the jaws to slide up an inclined plane on the holding leg thus putting the necessary pressure on the ingot to keep it from slipping. Photo courtesy J-B Engineering Sales Co., New Haven, Conn.



Sewing Machine Parts

Special trucks and moveable floor racks facilitate handling of large sections. Smaller hand racks have individual pockets to protect small highly finished parts during manufacturing

Fig. 1. (Left)—Arms and bed plates are transported to the machine shop in wood box trucks. Fig. 2. (Right)—After the bed plates and arms are assembled as one unit they are sent to the enameling department in 3-deck wood trucks

■ IT IS, of course, essential that the materials-handling system in any manufacturing plant be especially suited to the plant or building layout, number and type of parts to be handled, processing operations involved and similar factors. Thus at the works of the White Sewing Machine Co., Main and Elm streets, Cleveland, materials handling methods have been developed which help this plant, comprising some five acres of floor space in two 6-story buildings, to maintain an output of about 700 machines a day. This is just double the original production of 350 machines a day and improved materials-handling operations have much to do in simplifying and expediting the flow of work here.

Materials entering into the construction of sewing machines are gray iron castings for the beds and arms, flat and round bar stock, drop forgings and sheet steel. All these are received on the ground floor where they are stored to be taken out as production necessitates. Bar stock and flat stock present no unusual storage or transportation difficulties. They are loaded on shop trucks and taken to the machine shop or the press department. Trucks are conveyed from floor to floor by large elevators which serve all floors.

Handling of castings and semi-finished machines is greatly facilitated by using special trucks. After castings for arms and bed plates are received, they are rough polished and then stacked in orderly piles. Interlocking projecting arms in hollow portions of adjacent pieces makes a complete arrangement that saves floor space.

In production, parts must flow through the shop in a steady stream so work in process does not take up excessive floor space. This means castings are taken out of stock and conveyed to the machine shop only as needed, using a wood caster-truck shown in Fig. 1. Aside from their use in transporting castings from the ground floor to the machine shop on the fifth floor, these trucks are employed to transfer semifinished units from one machining operation to another.

With machining on beds and arms completed, these two units are permanently fastened together with screws and dowels to form one unit. After the two sections are assembled, they are transported to the enameling department on special wood trucks, one of which is shown in Fig. 2. These are 3-deck trucks, each with a capacity of 36 machines.

With beds and arms assembled, the castings are conveyed to the enameling department on same type of truck shown in Fig. 2. Here the first step is to burn off all oil because enamel will not adhere to an oily surface. This degreasing operation is accomplished by heating

They didn't think we could make a tube *Like This!*

Outside Diameter	1.120″
Inside Diameter	.9995″ to 1.0005″
Wall Thickness	.059″ to .060″
Length	91/4″ (+1/32″−.00″)

This specification presented a tough problem — a problem our prospective customer didn't think we could lick — a total inside tolerance of one-thousandth of an inch and a mirror-like inside finish.

Frankly, we didn't know whether we could produce it — because we never had tried. But we did lick it — to the satisfaction of one of the most exacting manufacturers in the nation, who to date has ordered and used thousands of these tubes.

Do you have a tubing problem? Do you have an idea that you could save money or improve your product through the use of tubing, but you're not quite certain about it? In either case, why not tell Steel and Tubes engineers about it? They have produced and have assisted in the application of more than a billion feet of tubing. They have been confronted with and have licked countless tubing problems — and have helped many manufacturers achieve the very objectives which may be yours.

Tell us what you make or what you want in tubing. Our engineers will tell you promptly and intelligently what Republic ELECTRUNITE Tubing can do for you. Steel and Tubes Division, Republic Steel Corporation, Cleveland, Ohio — *world's largest manufacturer of steel and ferrous alloy electric resistance welded tubing.*

REPUBLIC

ELECTRUNITE

REG. U.S. PAT. OFF.

ELECTRIC RESISTANCE WELDED TUBING

and Heat Exchanger Tubes

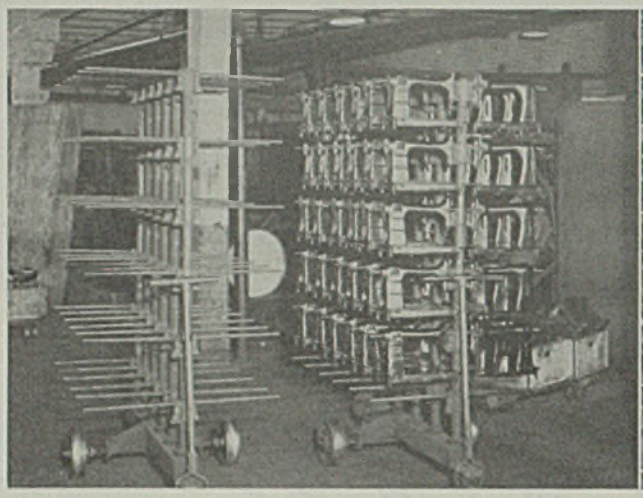


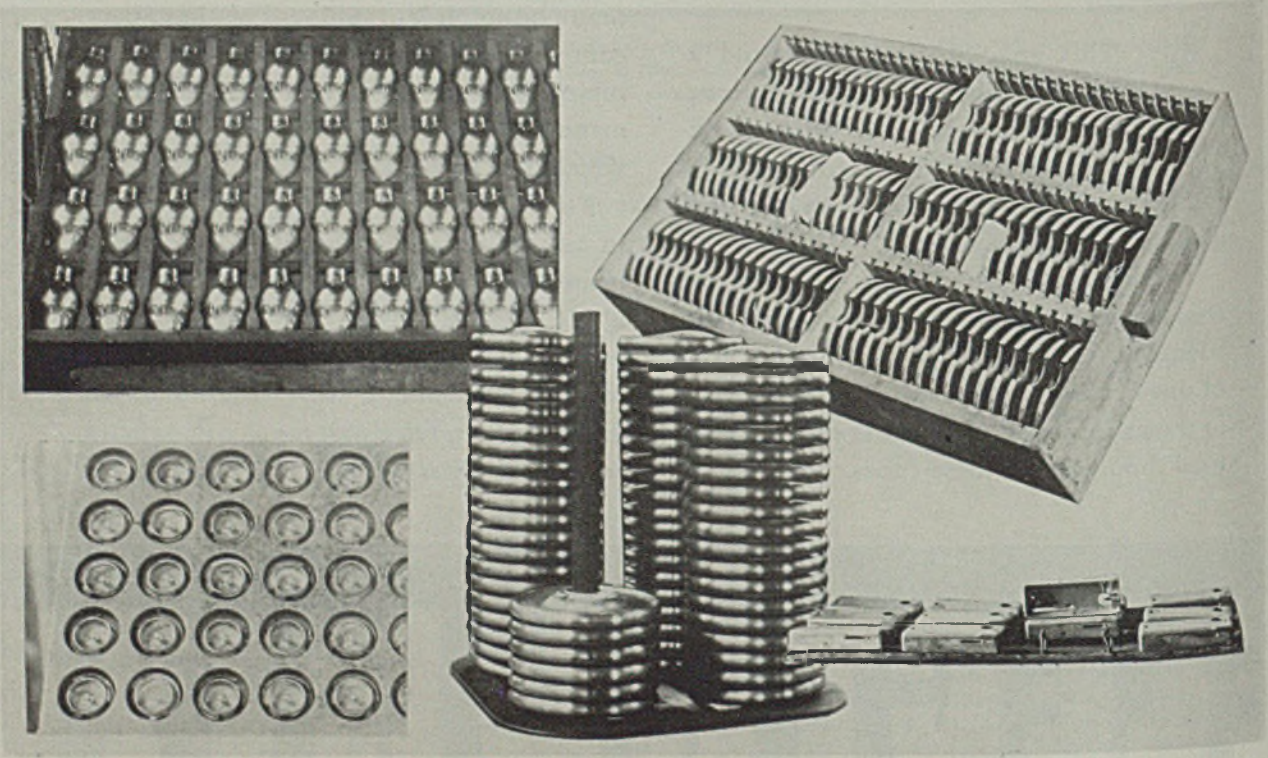
Fig. 3. (Left))—Type of 3-wheel all-metal truck used for holding arm and bed plate assemblies during degreasing and enamel baking. Fig. 4. (Right)—Storage racks for assembled machines and the type of truck used to convey the machines from the assembly to the storage department

the parts in gas-fired ovens to a temperature of 400 degrees Fahr. Since it is not practical to subject a wood truck to this heat, the parts are transferred to special all-metal trucks, Fig. 3, which holds 72 units each, slipped over rods as shown. Fig. 3 also shows an empty at left as well as the loaded truck at right. After the parts are degreased, they are spray enameled and baked again using the type of truck in Fig. 3 with 72 units per load.

In enameling operations, care must be taken to make sure that finished surfaces are not marred before the enamel is baked. For instance, parts called faces hold the front end mechanism, the needle bar and pressure foot bar. In finishing these, a special rack is used to support 12 of these parts. See Fig. 5. Each part rests on two supports bent up from the rack as shown. Thus all enameled surfaces including the back of the face are adequately protected against marring.

After the arm and bedplate assemblies are enameled and baked, they go to the assembly department. Operations in this department are well organized. Each workman attends to special assembly operations. When done, he passes the partial assembly to another man who completes certain operations and so on until the machine is fully assembled. Under ordinary conditions, this procedure would entail a considerable amount

Fig. 5—Special metal racks are used for holding enameled front ends so that none of the finished surfaces will be marred. Fig. 6—Electric lamp reflectors are stored in special racks to protect the highly finished chromium plated surfaces. Fig. 7—Finished sewing machine shuttles are packed in special rack boards to protect the high finish. Fig. 8—Hand wheels are racked in piles to prevent marring highly polished rims. Fig. 9—Special box rack for hand plates



of trucking. However, this is eliminated by using permanent racks between each work station. After one assembler has completed his part of the work he places it on the rack nearby and also within easy reach of the next assembler who then takes the machines from this rack and completes his share of the assembly. A number of these racks with assemblers working between them eliminate trucking.

When completely assembled, the machines are carefully run in. This is followed by testing, after which they are taken to the store room on the ground floor in special type rack trucks and placed in racks as shown in Fig. 4.

From the store room, completed sewing machine heads are boxed and shipped as units to various distributors who assemble them in the cabinets. Heads are never shipped installed in cabinets because of high breakage of cabinets that would result with this added weight suspended in the cabinet.

If all the materials handling problems in a sewing machine manufacuring plant consisted of conveying parts on special trucks, the procedure would be comparatively simple. However, there are tens of thousands of small parts which are carefully surface finished and which require special means to preserve this surface. An excellent example is the handling of sewing machine shuttles. These units are highly finished by polishing. To protect these surfaces after the parts are polished, they are stored in special rack boards, Fig. 7, which accommodate 50 shuttles each, placed in individual holes. These openings are sufficiently deep so the racks can be stacked one over another without danger of marring the finished surfaces. After the shuttles receive their final polish, they go to the stock room and are stored in these racks which then are used to convey them to the assembly line when wanted.

Fig. 9 shows a special box rack which provides for storing 50 hand plates. These box racks are stacked one over another without danger of marring the polished surfaces. Fig. 6 shows a special rack for holding electric lamp reflectors of chrome plated brass. Fig. 8 illustrates a special rack to hold die-cast hand wheels having highly polished and chrome plated rims.

A stock room on the ground floor provides facilities for storing parts in steel tote boxes in steel racks. When there is no danger of marring highly finished surfaces, the parts are stored in bulk. Somewhat bulky parts are placed in wood boxes but are stored in steel racks.

Special trucks and parts racks similar to those described often may prove valuable in simplifying handling where thousands of small parts are involved.

♦

Scale Preventative for Water Stills Announced

■ K.A.T., a material that can be used in preventing the formation of scale in distilled water stills and evaporators, is announced by American K.A.T. Corp., 122 East Forty-second street, New York. It consists of an emulsion of organic materials utilizing colloidal principles—adsorption, absorption and electrophysical polarization.

Containing no synthetic chemicals or oils, its action is physical; scale-forming impurities are coated and precipitated as sludge. It works with all waters and requires no chemical water analyses except to determine hardness. The material is said to reduce draining and flushing outages and maintenance expense.

A Welding "Must"

(*Concluded from Page* 62)

in Table I are conservative. Although an operating factor of 33 1/3 per cent appears to be dangerously low, ratios of arc times to total welding times average surprisingly near that figure. Thus the figures appear to show a decided trend in favor of the fillet weld illustrated in Fig. 3.

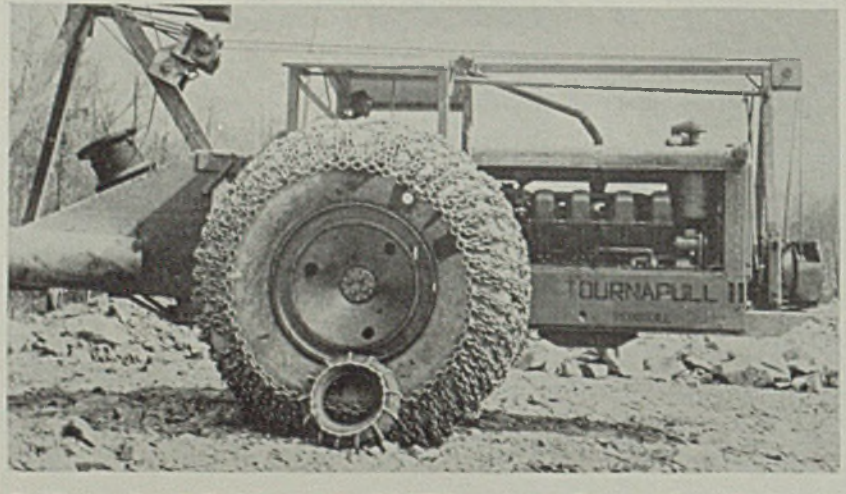
From the standpoint of cost, there can be no question about the relative merits of the three welding positions described, nor is there much choice when the question of quality is considered. Under the ASME code for unfired pressure vessels, there are three classes of work ranging from the highest quality, U68, through the next highest class, U69, down to the lowest class, U70. Both the all-position electrodes and the flat position electrodes may be used for all three classes, but the general-purpose electrode is restricted to the U70, or lowest class. This is an argument frequently used against the general-purpose electrode. The two spots of porosity in Fig. 4 would tend to substantiate this argument.

Further differences in the three classes of electrodes may be seen from the figures presented in Table II as abstracted from the fifth edition of the procedure handbook of "Arc Welding Design and Practice." Here the relative merits of the three types of electrodes are investigated with respect to fatigue resistance and impact strength. Once more the superiority of the downhand and all-position electrodes is demonstrated.

Figs. 5 and 6 point out the contour of the beads deposited in vertical and downhand fillets respectively. Note the vertical fillet is almost flat across the face whereas the flat-position fillet weld gives a hint of being concave. The degree of concavity is a function of the amount of heat or amperage carried while welding. The more heat, the more concave the weld.

Throughout this discussion, attention has been paid to both cost and quality values. Never, in welding, may quality be sacrificed to cost.

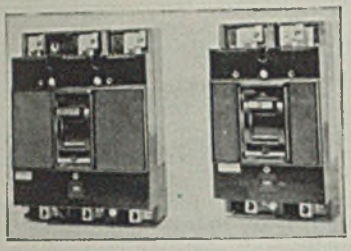
"Chain Armor" for Pulling Huge Loads



■ When orders called for a powerful 160-horsepower Tournapull to shoulder its share of 30-yard loads on rocky surfaces near Johnston, Pa., the tremendous load and power combined called for chains. Chains of a size previously unheard of until American Chain & Cable Co., Bridgeport, Conn., built the illustrated "chain link armor." These are of welded construction and the arrangement of cross and side links are of unusual design. They not only provide traction, but also form a protective web covering most of the tread surface of the tires

Circuit Breakers

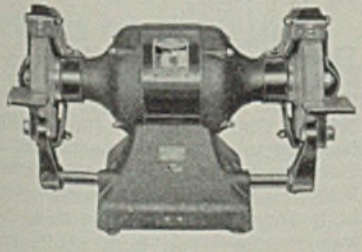
■ Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., announces a new line of type AB general utility circuit breakers for enclosure, panelboard or switchboard mount-



ing. These, rated 50, 70, 90 and 100 amperes at 250 and 600 volts alternating current 2 and 3 pole, and 125, 250 volts direct current, are adaptable to lighting and feeder circuits and motor branch circuit protection. Breakers use the 100-ampere frame, permitting interchangeability. Chief feature is the adjustable magnetic trip which permits close setting of the breaker for any tripping current from 3½ to 11 times the breaker's normal rated current, and enables the trip to be set in the field under actual service conditions to give maximum protection. An inverse time thermal trip of bi-metallic type provides adequate protection for light overloads. Other improvements include use of a hot molded base and cover, replaceable molded operating handle, and an external trip-rating marker located on the front of the breaker cover. Contact arm has been redesigned to require minimum flexing of the shunt.

Bench Grinder

■ Independent Pneumatic Tool Co., 600 West Jackson boulevard, Chicago, announces three new electric bench grinders for all around service in grinding, buffing and wire wheel work. The three sizes, 6-inch light duty (B-66), 6-inch heavy duty (B-6) and 7-inch heavy duty (B-70), have motors completely enclosed. All sizes are provided with adjusta-



ble tool rests and arranged so that safety glass eye shields can be attached. The wheel guards are extra heavy and on sizes B-6 and B-7 are of the enclosed type with chutes. The size B-66 and the B-6 are of the split-phase start, induction-run type and the B-7 is of the capacitor-start, capacitor-run type, with oil-filled condenser in base. The latter, having no centrifugal starting switch, commutator or brushes, will withstand adverse conditions without burning out.

Sweat Bands

■ Jackson Electrode Holder Co., 15122 Mack avenue, Detroit, has placed on the market two new sweat bands made of fine pore, cellulose sponge stitched securely to a fabricoid band with an inner lining of cork. The No. 15, shown in position, is a general purpose band for eliminating perspiration running

into the eyes. It is adjusted easily to the head with a longlasting ½-inch wide elastic band. No. 5, illustrated, is for use with all eyeshields

except types D, D-6 and No. 25. It is snapped inside the bands. Both bands are light, cool and comfortable and easily absorb more than fifteen times their weight in moisture. Both are cleaned quickly by letting water or any safe antiseptic solution run through the sponge cellulose.

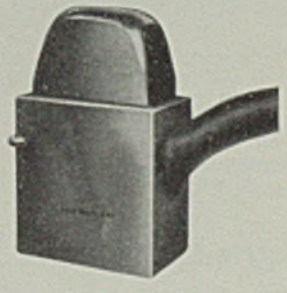
Hoist Brakes

■ Electric Controller & Mfg. Co., 2700 East Seventy-ninth street, Cleveland, announces a type WB brake for cranes, hoists and mill machinery. It features a heavy stationary magnet and self-aligning shoes. Its only moving member is the light armature. The brake is equipped with a large, molded brake block which permits ⅛-inch wear on the smallest size to 7/16-inch wear on the largest. Because of the properties incorporated in the block, it has frictional qualities which permit complete wear down to the rivet heads.

Another feature of this brake is it permits quick armature replacement without disturbing the original adjustments. The design of the brake allows a liberal clearance between the shoes and wheel with the brake released. Other advantages include low contact pressure per square inch and equalized impact when brake operates.

Type Holder

■ M. E. Cunningham Co., 115 East Carson street, Pittsburgh, has introduced a double-floating box-type safety holder for marking on hot, cold, flat, round or angular surfaces. It works equally well whether the surface to be marked is rough sheared, sawed or ground. The holder includes a sleeve which levels or holds the floating holder at right angles on the surface to be marked. The steel type also "floats" within the type holder. Because both holder and type are held loosely in place,

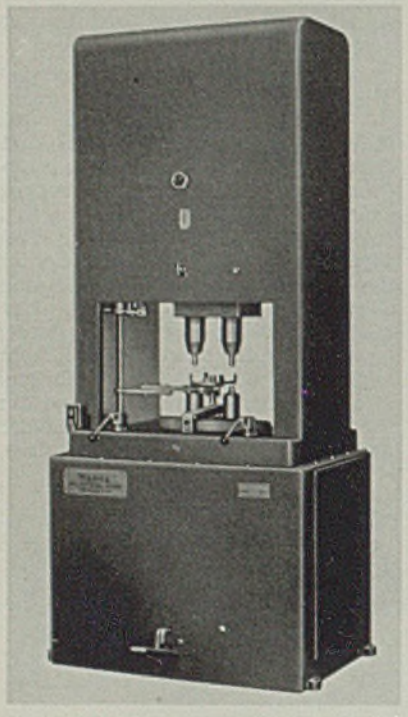


a double leveling action takes place when the holder is struck with a hammer. The leveling sleeve prevents the holder from tipping over when in use, and, at the same time,

prevents the pieces from flying out of the holder in case one of the stamps should break or chip off from misuse.

Riveting Presses

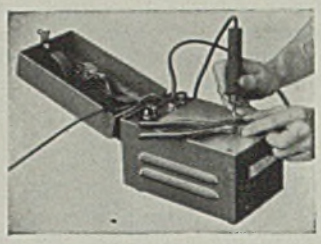
■ Hanna Engineering Works, 1765 Elston avenue, Chicago, has augmented its line of electric-hydraulic riveting presses by the type illustrated. It is capable of driving from one to six rivets simultaneously, with equal pressure exerted on each rivet regardless of variation in length or hardness of rivet. The machine's required floor space has been held to the minimum and motor, pump, controls, piping, cylinder, and reservoir are all totally enclosed. Front and rear panels may be removed to make motor, pump, and reservoir accessible. A side panel affords access to the controls. The entire machine can be lifted out of its base without disturbing a hydraulic, electrical or mechanical



element. The work is illuminated by built-in lamps. Tonnage adjustment and gage are located directly before the operator's eyes as is also the oil level sight glass. This unit is available in capacities from 10 to 100 tons.

Electric Etcher

■ Ideal Commutator Dresser Co., Sycamore, Ill., announces a new portable No. 13 universal electric etcher. It consists of the etcher tool, cords, switch and indicator lamp, these being all under cover. Small objects are etched on the work plate which makes up part of the case while a ground clamp is furnished for larger objects. Etching heats of 120, 240, 420 and 700 watts are available. The standard unit is



for 110-volt, 60-cycle alternating current. Overall size of the etcher is only 7¼ x 5⅛ x 8½ inches, and it weighs 16 pounds.

Gasoline Engine Starting Diesel Welder

■ Lincoln Electric Co., 12818 Coit road, Cleveland, announces the incorporation of gasoline engine starting on its 400-ampere diesel arc welder, facilitating starting in any weather. The gasoline starting engine is a small auxiliary mounted above the diesel. It is started by means of a hand crank. A belt drive, engaged by a clutch, connects the starting engine to the diesel. The cooling system of the small starting engine is connected into the cooling system of the diesel. This permits warming up the diesel readily.

Of 400-ampere capacity, the Shield Arc SAE arc welding generator used on the new diesel welder is equipped with dual continuous control. This provides a welding arc of the correct type and intensity for all applications of welding.

Welding Gloves

■ American Optical Co., Southbridge, Mass., announces two welding gloves, TX100 and 3015. The former is made from a chrome tan horsehide and from a "gun-cut" pattern, with no seams exposed. The seams are at the back of the fingers, except at the base of the second and third fingers, these being welt reinforced.

Both the thumb and index finger also are reinforced. This reinforcement is continuous from the tip of the index finger to the tip of the thumb. The back of the glove also is onepiece, while the inside is insulated with wool. Glove is made in a regular size that measures 14 inches overall, 5 inches across the palm with a 6-inch gauntlet.

The other glove, of slightly different design, also is made on the "gun-cut" pattern from chrome tanned horsehide, with a seamless palm. Only differences from the No. TX100 glove are that the thumb and index fingers are reinforced and the back of the glove is reinforced with an outside patch.

Hydraulic Devices

■ Blackhawk Mfg. Co., 5325 West Rogers street, Milwaukee, announces a number of new Porto-Power hydraulic devices for pushing, pulling, clamping, pressing, bending and spreading operations. One device, a Spee-D-Coupler, makes it possible to connect the same pump and hose to any one of the Porto-Power rams, in 4, 7, 10, 20 or 50-ton capacity. In addition, it seals an oil channel that transmits 10,000 pounds per square inch oil pressure. Another develop-

ment is a thimble-size 4-ton ram. It measures 1⅝ inches high and exerts pressure in remote assemblies where large-size tools or hands could not be inserted. It can be fed into small openings or channels as it is operated remotely on the end of an 8-foot hose. Among the attachments in the line is a Duck-Bill spreader which adapts the plunger action of the 10-ton ram to spreading sheet metal and other assemblies. The jaws spread from 1½ to 6 inches.

Disconnect Switch

■ Pringle Electrical Mfg. Co., 1906 North Sixth street, Philadelphia, has developed a new 3-pole outdoor disconnect switch for a 4000-ampere load at 23,000 volts. Because of the high amperage, Gibsiloy Grade A-8 was employed on both blades and jaw contacts. Other outstanding properties of the contacts include higher resistance to wear and galling, greater strength, and less tendency to stick or weld.

Advertisement

SEPTEMBER, 1940

COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by the Bridgeport Brass Co. "Bridgeport" *Headquarters for BRASS, BRONZE and COPPER*

Duronze Sucker Rods Offer New Proof of Alloy's Durability

The extraordinary corrosion resistance of Duronze® has received fresh proof in the oil fields, where sucker rods made from this high-strength silicon bronze, developed by Bridgeport, have been in service in one of the most corrosive wells in West Texas. The sour crudes found in this oil field produce exceptionally severe corrosive attack, and ordinary steel rods lasted only about 30 days. The first Duronze sucker rods used in the same well remained in service for a year and eight months, and a second string has now been in service for more than a year without a case of failure.

This high corrosion resistance of Duronze, combined with its exceptional tensile strength, offers opportunities for the fabrication of many types of parts exposed to severe corrosive attack. Write Bridgeport for literature on the properties and applications of the Duronze alloys.

Duronze sucker rods before and after 18½ months' service in an extremely corrosive well.

Memos on Brass—No. 13

Brass is readily welded by the oxy-acetylene process. Large brass pipes, for example, used in plumbing, heating, and general industrial applications, are frequently joined by bronze welding.

Reports on Unifying Sheet and Wire Gages

Progress toward unification of the many existing systems of gages for measuring thickness of sheet and diameter of wire is indicated by the announcement that a tentative report on the subject has been completed. The report, which should be of broad interest to the metal-working industries, is now being widely distributed for criticism and comment.

Bridgeport will gladly refer readers to a source of further information on the proposed gage unification.

Ductility an Outstanding Factor In Industrial Utility of Brass

Copper Alloys are Readily Adapted to Production of Intricate Shapes by Cold Working Operations

The extraordinarily high ductility of many of the copper alloys is one of the leading factors in broadening their range of engineering utility. From the standpoint of the fabricator, one of the most valuable properties of these alloys is the readiness with which they can be subjected to severe cold working and forming operations.

An understanding of the mechanics underlying the phenomenon of ductility is of considerable assistance to the fabricator in planning his choice of materials and equipment for most economical production.

Structure of Brass

Metals are ductile or not depending upon the type of crystalline structure which they possess. The brasses containing more than about 63% copper have a crystal structure which is exceptionally conducive to ductility. These so-called alpha brasses owe their ductility to the ability of the crystals to flow or stretch under load to a remarkable degree. This is due to the slip which takes place along the crystallographic planes within the crystals. The exact manner in which slip takes place within the individual crystals of a piece of brass is very complicated, but experience has proven that coarse grain permits greater amounts of slip or deformation than fine grain. Brass is therefore ductile because it has a crystal structure having great capacity for slip, and in any particular alpha brass alloy the ductility is controlled by the size of the individual crystals.

When brass is cold worked, slip occurs and as it progresses there is developed an increased resistance to further slip. This results in hardening and strengthening of the brass and also in loss of ductility. In order to restore ductility the brass must be annealed. The temperature of annealing controls the grain growth and size of grain in the recrystallized structure. If, therefore, brass is desired for cold working by forming, drawing, or spinning operations, it is necessary to anneal at a temperature which will produce a large grain size if the maximum amount of cold working is to be done.

Effect on Finishing Operations

In many cases brass sheet, for instance, is cold worked by cupping or forming into an article which must then be polished. Polishing involves the removal by abrasives of surface irregularities that may have developed during the cold working operations.

(Continued on following page, column 2)

Figure 1. COARSE GRAIN. Longitudinal edge section of brass sheet after etching and then stretching. Mag. 15X.

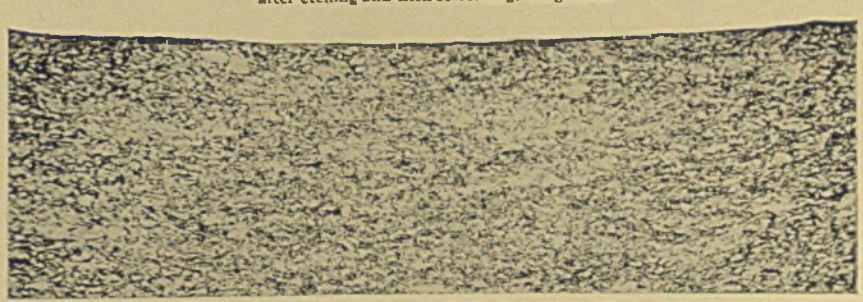


Figure 2. FINE GRAIN. Longitudinal edge section of brass sheet after etching and then stretching. Mag. 50X.

COPPER ALLOY BULLETIN

ALLOYS OF COPPER

This is the fifteenth of a series of articles on the properties and applications of the copper alloys, and concludes the subject of Muntz Metal.

MUNTZ METAL

The resistance of Muntz Metal to failure by season cracking or stress corrosion cracking is about equal to that of regular high brass. The alloy is subject to failure by dezincification, although it is less likely to fail by the plug type than are the straight alpha high brasses. It has fairly good resistance to attack by sulphur compounds, and in this respect is definitely superior to the higher copper alloys.

Modifications of Alloy

As pointed out last month, most of the applications of Muntz Metal are the result of its ease of hot working. Perhaps the most interesting feature of the alloy is the fact that it is the basis for a large number of alloys formed by adding small quantities of other elements for specific purposes, while retaining the desirable hot working characteristics of Muntz Metal. Actually, much larger quantities of these modified alloys are used than of the basic Muntz Metal.

Physical Properties

The properties of Muntz Metal are more vitally affected by small changes in copper content than are the properties of the alpha copper-zinc alloys. This is due to the appreciable change in relative quantities of alpha and beta, depending in part on the annealing temperatures and rate of cooling, but more particularly on the copper content.

The following table lists the more important physical properties of Muntz Metal:

Specific Gravity	8.40
Density, lbs. /cu. in.	.303
Electrical Resistance, ohms /cir. mil ft. at 20° C.	36.49
Electrical Conductivity, I. A. C. S.	28.4
Thermal Conductivity, cal. /sq. cm. /cm. /sec. /° C. at 20° C.	.303
Thermal Conductivity % copper	32.2
Tensile Strength, lbs. /sq. in.	
.050" Annealed Sheet	48,000-58,000
.050" Hard Sheet	75,000-85,000
Elongation, % in 2 in.	
.050" Annealed Sheet	38-50
.050" Hard Sheet	2-7

Importance of Ductility in Utility of Brass

(*Continued from preceding page, column 3*)

The amount of polishing depends to a large extent on the grain size of the annealed brass from which the finished article was produced. This relationship between grain size and the amount of roughening can be seen from photomicrographs on preceding page. Figures 1 and 2 show longitudinal edge sections of sheet brass having coarse and fine grain structures. The surface roughening of the coarse grain sheet is very obvious. Much greater amounts of polishing will be required to produce a smooth surface on the coarse grained sheet than on the fine grained sheet.

It is obvious, therefore, that the grain size best suited for ease of forming in severe cold working operations is not at all the best surface from the standpoint of finishing requirements.

In many applications it is necessary to effect a compromise between the requirements of ease of forming (high ductility and large crystals) and ease of polishing (smooth surface and small crystals). Such a compromise, for maximum economy, calls for very careful processing of the metal at the brass mill.

Selection of Alloy

A second factor that affects the ductility of brass is the copper content. The yellow brasses, which are extensively used for cold forming, are all very ductile for copper contents down to about 63%. The brasses in this range all contain only the alpha solid solution, which is ductile at room temperatures. Below 63% copper, brass may contain the beta phase also, which is less ductile than the alpha phase at room temperatures. The alloys containing less than 63% copper are therefore not as suitable for cold working.

Among the alpha brasses, the choice of a specific alloy often depends on a compromise between ductility and cost. The brasses containing 72-75% copper, for example, are more ductile than any of the other alpha brasses. They are little used, however, because their greater ductility, compared to 70-30 or 66-34 brass, is seldom sufficient to justify their higher cost.

In selecting an alloy of the proper composition and crystal structure to give greatest over-all efficiency in specific forming jobs, the fabricator can profit by availing himself of the expert metallurgical assistance offered by Bridgeport.

Did you get your copy of the Bridgeport Rod-O-Graph Chart for estimating costs of rod for screw machine parts? If not write for free copy.

NEW DEVELOPMENTS

Wing nuts made from sheet brass are said to be free from burrs or sharp edges. They are reported to be available both in plain bright finish and plated to meet specific requirements. (No. 80)

A soldering tool is heated by an enclosed carbon arc, according to the manufacturer. Operation is controlled by a thumb button on the handle, and heat is shut off when button is released. Unit is designed for light intermittent duty. (No. 81)

Lock screws for metal-to-metal fastening are said to embody all the advantages of separate lock washers and screw assemblies. It is reported that design of washer teeth, material, and temper can be varied for specific requirements. (No. 82)

Skin protection for workers using cooling lubricants and cutting compounds is said to be provided by a cream recently placed on the market. An ointment made by the same company protects against acids, it is claimed. (No. 83)

New connectors may be used either as solderless connectors or as solder lugs, it is said. Each connector has a cast lug and a special set-screw. They are made in several sizes for a range of wire diameters. (No. 84)

Fine wire brushes said to be suitable for working on brass and for buffing and finishing are available in 1-, 2-, and 3-section types, and in sizes from 4 to 12 inches in diameter. (No. 85)

A wire stripper is operated by foot pedal, is said to strip with a straight-way pull that leaves the wire straight and free from nicks or scratches. It is said to be adaptable to practically all types of wire, and to strip as fast as the operator can feed. (No. 86)

A clear finish is reported to be suitable for beautifying and protecting metal surfaces, including plated finishes. It is said to approximate distilled water in color, to require no thinning, and to resist sulphur dioxide, sunlight, moisture, oil, grease, and gasoline. (No. 87)

A core oil made from soy beans is reported to work freely in foundry core boxes without sticking. Maker says that it will stand considerable over-baking, and that it will not cause the sand to deteriorate. (No. 88)

Tooth design on new metal-cutting saws produces a curled chip, it is claimed. According to the manufacturer, this design results in a self-cleaning action and allows heavier feeds and faster cutting speeds. (No. 89)

A profiling machine is said to be adapted to milling internal or external, flat or under-cut profiles on parts having contour pattern up to 6 by 8 by 2 inches, where cut is up to $\frac{1}{8}$ inch deep on face $\frac{3}{4}$ inch wide or less. Operation, it is reported, is entirely automatic, and finished work can be held to a tolerance of 0.002 inch. (No. 90)

Lay-out dope for tools and dies is said to dry quickly. It is reported that it will not rub off, and that a scribe or lay-out tool shows a clear, distinct line without chipping or scraping. (No. 91)

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.

Pickling Process

(*Continued from Page 44*)

to give a high quality pigment. The zinc sulfate can be converted into pure metallic zinc by electrolysis or be crystallized and sold as zinc sulfate crystals.

Again, direct decomposition of ferrous sulfate by heat gives ferric oxide (Fe_2O_3) and sulfur trioxide (SO_3) which dissociates further into SO_2 plus oxygen, according to pressure and temperature. The reaction thus produces raw materials for the manufacture of sulfuric acid. It will be seen that such transformation from ferrous sulfate to sulfuric acid completes the cycle which started by using sulfuric acid for the pickling operation. The consumed acid is reclaimed except for the inevitable losses which are relatively small.

One of the practical processes for decomposition of ferrous sulfate by heat is to mix the hydrated ferrous sulfate with 20 to 30 per cent of its weight of ferric oxide. An addition of 1 per cent of sodium carbonate is sometimes made to neutralize entirely the free acid contained in the iron salts. This mixture is dried in a rotary oven in an oxidizing atmosphere at temperature of 300 to 400 degrees Cent. After drying, the mixture is sintered at 750 to 850 degrees Cent. to produce ferric oxide and certain gases consisting mainly of sulfur trioxide, owing to the presence of the ferric oxide which acts as a catalyser.

Salt Sticks to Oven's Walls

One plant has an average capacity of 70 tons of ferrous sulfate per day. It is impractical to do the dehydration and decomposition of ferrous sulfate in a single operation. The salt melts in its own water of crystallization and sticks to the oven's walls. Thus it first is necessary to dehydrate the ferrous sulfate and then to begin the sintering itself. The best degree of dehydration corresponds to the form $FeSO_4 \cdot 3H_2O$, which salt may either be made directly or more easily obtained by correct mixture of dehydrated ferrous sulfate with $FeSO_4 \cdot 7H_2O$.

Fuel consumption is 8.5 tons of lignite dust per 100 tons of hydrated ferrous sulfate treated. The salt containing three molecules of water of crystallization is mixed with 4.5 per cent of close-burning coal and heated in a rotary furnace. Treatment is 2 hours. Temperature is 300 degrees Cent. at entrance of furnace and 1250 to 1300 degrees Cent. at exit. Ferrous sulfate is completely decomposed and ferric oxide is agglomerated in the hot part of the furnace near the outlet. It can be used directly in blast furnaces. The gases contain about 5.5 per cent sulfur dioxide, 6.9 per cent oxygen. The whole process is quite economical.

This furnace handling 100 tons of ferrous sulfate or 61 tons of monohydrated salt daily has an overall length of 65 feet with a diameter of 8½ feet. Output is 28 tons of sulfuric anhydride and 28 tons of ferric oxide daily. Conversion of the anhydride into sulfuric acid can be done by the catalytic process.

Key to the successful operation of the process, as mentioned previously lies in dehydrating and melting the aggregation in two separate heat treatments, the last being accompanied by an oxidation which transforms the salt into ferric sulfate which by decomposition gives a pure ferric oxide and a mixture of SO_2 and SO_3.

Choice of the heat treatment is determined by the critical dehydration temperatures of the crystallized ferrous sulfate. The elimination of water molecules is made in three steps:

At 21 degrees Cent., the $FeSO_4 \cdot 7H_2O$ loses three molecules of water.

Above 80 degrees Cent., the $FeSO_4 \cdot 4H_2O$ is converted into monohydrated salt, $FeSO_4 \cdot H_2O$, which re-

mains stable up to 166 degrees Cent.

Over 167 degrees Cent. the monohydrated salt begins its conversion into basic ferric sulfate, which transformation is very active at 480 degrees Cent.

The basic sulfate starts its decomposition into Fe_2O_3 and SO_3 above 492 degrees Cent., the reaction being fast at 560 degrees Cent.

Practically, the heating of ferrous sulfate at 150 degrees Cent. gives monohydrated salt; this heating takes place in the presence of air and is accompanied by oxidation which transforms about 20 per cent of the total iron into ferric iron after an hour or so. When this mixture is heated up to 475 degrees Cent., a total conversion into anhydrous basic ferric sulfate takes place.

The de Lattre process should resolve the various technical problems of the transformation of ferric sulfate into sulfuric acid, and the equipment should not be unduly expensive.

Waste Acid Disposal: Probably the most startling feature of the de Lattre method of regeneration is that all the elaborate disposal systems now in use for spent pickling liquors are rendered unnecessary. The economic and other advantages of this fact are apparent. Not only is first cost of disposal systems expensive but maintenance costs are also heavy.

The pollution of streams and rivers with spent pickling liquor is a serious menace to animal and fish life, and even to human inhabitants in the vicinity of such waters. Conscientious works managements have experienced increasing difficulty in the finding of suitable and safe points at which their waste acids may be dumped. Even disused mine shafts are not completely satisfactory.

The difficulties attendant upon waste pickling liquor disposal are not confined to the contents of the pickling bath proper. All washing or neutralizing operations subsequent to the main process help accumulate solutions which with repeated use become equal to weak pickling solutions.

Safe disposal of washing waters, etc., therefore requires as much care as acids. Dumping of either may be regarded as wasteful.

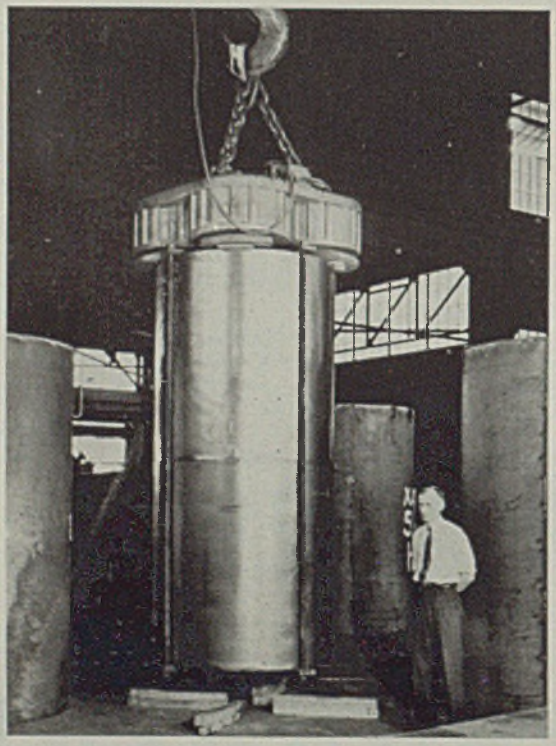
An example quoted by the Belgians was of a steelworks which had no regenerative process installed, and which used an amount of washing water equal to 230 cubic meters per hour. This water was pumped from a lake and dumped in a stream after use. Soon after starting up this particular works, it was discovered that no more fish were to be found in this stream; even cattle had to be kept from drinking the river water to avoid trouble.

The de Lattre process outlined above saves the acid for continual reuse, and renders unnecessary any kind of waste disposal system. *Many works executives will probably conclude that this fact alone would justify investigation of the whole matter*, and this opinion would be strongly reinforced by consideration of the other factors which have been discussed, notably acid economy and improved quality of the pickled product.

Estimated figures of acid and other savings given by the inventors of the process, while admittedly calculated, indicate the somewhat astonishing results to be expected from an efficient regeneration system.

One cold-strip rolling mill in England reports an annual consumption of acid equal to 280 tons, or 45 pounds per ton of pickled strip. It was estimated that the total acid consumption for this plant, if the de Lattre process were adopted, would fall to 196 tons and the regeneration system would then provide a recovered ferrous sulfate output of 350 tons per year on the reduced figure given. In this instance it was proposed to retain the pickling tanks which were in use and to add two small high-speed crystallizers of 400-litre capacity each. A 650-millimeter drier would also be required, and the redesigned plant would be capable of regenerating all the pickling liquor in about 7 hours.

Magnet Handles Large Coils of Strip



■ **Coil-handling magnet built by Electric Controller & Mfg. Co., Cleveland, with a normal rating to lift a finished coil weighing 40,000 pounds. The accompanying illustration shows the magnet lifting a total load of 56,600 pounds through two wooden spacers of 7/16-inch total. The coils of strip are 55½ inches outside diameter and 61 inches high. The test was made at the plant of American Rolling Mill Co., Middletown, O., at 80 per cent current with magnet hot. To meet the trend toward bigger and heavier coils of strip Electric Controller & Mfg. Co. is now building five larger magnets of similar design for handling 60,000-pound coils with a 50 per cent safety factor**

Flame Shaping

(*Concluded from Page* 59)

blade carrying the melt residue from the inside surface of the pipe.

In making branch connections, the end of the brass pipe is first marked off with a templet. After the paste mixture is applied as a protective guide, the pipe is positioned horizontally and melting is started at the highest point. For maximum accuracy, the operator works in sections. After completing quadrants 1 and 2, the pipe is turned over and quadrants 3 and 4 are melted to shape. Thus the operator works continuously in the 9 to 12 o'clock and 12 to 3 o'clock positions.

Time required for each of the jobs illustrated was remarkably short. Melting of the 2-inch-diameter hole in ⅛-inch yellow brass plate required only about 1½ minutes while the 3-inch hole in ¼-inch aluminum plate required about 2 minutes. Shaping the end of the 3-inch 90-degree branch took approximately 3 minutes, and the opening to accommodate this connection in a section of 6-inch yellow brass pipe with ¼-inch wall was completed in about 7 minutes.

Died:

■ M. McW. CADMAN, 64, director of raw materials, Carnegie-Illinois Steel Corp., Pittsburgh, Aug. 25, in that city. Mr. Cadman had been associated with Carnegie-Illinois 47 years. He also was a director, A. W. Cadman Mfg. Co., Pittsburgh.

♦

George C. Newell, 59, associated with Brown & Sharpe Mfg. Co., Providence, R. I., 35 years, Aug. 25, in that city. He was first employed in the screw machine manufacturing department, after which he became assistant foreman and foreman of lathes. He was made assistant to works superintendent in 1917, and 12 years later was placed in charge of the Cincinnati office. He returned to the sales department at Providence a few years later, and in 1939 assumed the duties of supervising purchasing of plant equipment.

♦

William Silcock, 53, works engineer, Nash Motors Co., Kenosha, Wis., from 1918 to 1927, when he retired, Aug. 5, at his home in Lake Geneva, Wis.

♦

William L. Fewsmith, 61, manager of publicity and advertising, Robins Conveying Belt Co., Passaic, N. J., at Port Carling, Ont., Aug. 15. He had been associated with the Robins company since 1913.

♦

Irving C. Hicks, 69, former mechanical superintendent, Atchison, Topeka & Santa Fe railroad, Topeka, Kans., at his home in Chicago, Aug. 26.

♦

Louis A. Ferguson, 73, retired vice president in charge of engineering and construction, Commonwealth Edison Co., Chicago, in Rhinelander, Wis., Aug. 25. He was a past president, American Institute of Electrical Engineers.

♦

Andrew R. Dole, 82, founder, Dole Valve Co., Chicago, at his home in Oak Park, Ill., Aug. 20. A native of Maine, Mr. Dole went to Chicago 60 years ago. He was also chairman, Hooker Glass & Paint Mfg. Co., Chicago.

♦

Harry R. Woodrow, 53, vice president in charge of design, planning, and inventory, Consolidated Edison Co. of New York Inc., and at one time general engineer of Westinghouse Electric & Mfg. Co., Aug. 12, at his home in Bronxville, N. Y. Mr. Woodrow held several patents on electrical devices and equipment, and was active in engineering organizations.

♦

Jess Parker, 46, sales engineer for International Conveyor & Washer Corp., Detroit, in that city, Aug. 23. Associated with International four years, his previous connections included Hudson Motor Car Co., Jordan Motor Co., Dietrich division of Murray Corp. of America, and Oaks Production Co., Chicago.

♦

George Taylor Bishop, 75, retired Cleveland financier, Aug. 24 in Chicago. Mr. Bishop was associated with many industrial companies, and had been a director of Youngstown Sheet & Tube Co., Youngstown, O.

♦

Harry L. Hudson, 73, president and founder, H. L. Hudson Co., Brooklyn, N. Y., manufacturer of metal boxes, at his home in Hempstead, recently.

♦

Walter C. Marmon, 68, member of the pioneer automobile manufacturing family, Aug. 29. He was chairman of the board of directors, Marmon-Herrington Co. Inc., Indianapolis.

First-Half Pig Iron Output Up 49 Per Cent

■ PIG IRON production in the first half of 1940 was 49 per cent larger than in the corresponding period of 1939, totaling 20,556,849 net tons, compared with 13,790,970, according to the American Iron and Steel institute. Output of ferroalloys increased 77 per cent, from 384,805 tons to 681,525 tons.

Pennsylvania led pig iron production in the first six months this year, with 6,448,392 tons; Ohio was second with 4,269,739 tons; Illinois third, 1,687,167 tons; Alabama fourth, 1,584,935 tons.

Pig iron made for producers' use increased 49.9 per cent, from 12,118,420 tons to 18,172,468 tons, and tonnage made for sale rose 42.5 per cent, from 1,672,550 tons to 2,384,381 tons.

Ferroalloys produced in electric furnaces amounted to 186,958 tons, representing 27.43 per cent of the total, compared with 34.5 per cent in first half, 1939. Blast furnace ferroalloy production was 494,567 tons in first half this year, 72.5 per cent of the total, compared with 65.5 per cent in first half last year.

HALF-YEARLY PRODUCTION OF PIG IRON AND FERRO-ALLOYS BY STATES

States	Blast furnaces (a)				Production		
	In blast Dec. 31, 1939	June 30, 1940 In	Out	Total	First 6 months 1939	Second 6 months 1939	First 6 months 1940
PIG IRON:							
Mass.	1	0	1	1	917,610	1,505,234	1,293,618
New York	11	11	4	15			
Penna.	57	55	15	70	3,613,891	6,195,596	6,448,392
Maryland	6	6	0	6	1,286,795	1,829,949	1,743,147
West Va.	3	3	0	3			
Kentucky	2	2	0	2			
Tennessee	1	1	0	1			
Alabama	16	15	2	17	1,378,236	1,557,449	1,584,935
Ohio	41	37	8	45	3,145,641	4,887,770	4,269,739
Illinois	14	11	12	23	1,206,350	1,762,256	1,687,167
Indiana	17	16	3	19	1,918,019	2,868,784	3,062,445
Michigan	7	8	0	8			
Minnesota	2	2	0	2			
Iowa	0	0	0	0	324,428	410,674	467,406
Colorado	3	2	0	2			
Utah	1	1	0	1			
Total	182	170	45	215	13,790,970	21,017,712	20,556,849
FERRO-ALLOYS:							
New York	0	0	0	0	141,401	203,487	312,863
Penna.	8	6	1	7			
Virginia	1	1	0	1			
Tennessee	0	1	1	2			
Alabama	2	2	0	2	110,793	132,115	181,704
Ohio	2	3	0	3			
Colorado	0	1	0	1			
Blast furnaces	13	14	2	16	252,194	335,602	494,567
Electric furnaces	—	—	—	—	132,611	148,008	186,958
Total	13	14	2	16	384,805	483,610	681,525
Grand total	195	184	47	231	14,175,775	21,501,322	21,238,374

(a) Completed and rebuilding pig iron furnaces.

HALF-YEARLY PRODUCTION OF PIG IRON BY GRADES AND FERRO-ALLOYS BY KINDS

BASIC PIG IRON

States	First 6 months 1939	Second 6 months 1939	First 6 months 1940
Massachusetts, New York	599,846	962,742	834,839
Pennsylvania	2,695,560	4,372,743	4,538,815
Maryland, West Virginia, Ky., Ala.	2,021,997	2,522,008	2,570,411
Ohio	2,070,156	3,166,749	3,018,345
Indiana, Illinois	2,122,259	3,232,257	3,432,332
Michigan, Minnesota, Colorado, Utah	764,454	907,097	1,033,890
Total	10,274,272	15,163,596	15,428,632

BESSEMER AND LOW-PHOSPHORUS PIG IRON

Pennsylvania	840,523	1,698,480	1,644,628
New York, Md., West Va., Ala.	239,189	381,842	325,763
Ohio	801,932	1,370,819	961,735
Indiana, Illinois	249,799	388,050	263,427
Total	2,131,443	3,839,191	3,195,553

FOUNDRY PIG IRON

Massachusetts, New York, Penna.	217,293	228,963	254,117
Maryland, Ky., Tenn., Ala.	459,210	576,433	557,043
Ohio	78,744	91,282	80,380
Indiana, Ill., Mich., Minn., Col., Utah	88,863	170,080	156,210
Total	844,110	1,066,758	1,047,750

MALLEABLE PIG IRON

Massachusetts, New York, Penna.	100,442	295,489	264,806
Ohio	187,901	243,895	204,657
Indiana, Illinois, Michigan, Minnesota	220,169	338,441	327,181
Total	508,512	877,825	796,646

FERRO-ALLOYS BY KINDS

Ferro-manganese and spiegeleisen	164,777	288,797	410,150
Ferro-silicon	195,528	166,830	236,146
Other ferro-alloys	24,500	27,983	35,229
Total	384,805	483,610	681,525

PRODUCTION OF PIG IRON AND FERRO-ALLOYS IN THE FIRST 6 MONTHS OF 1940

(For Sale and for Maker's Use)

	For sale	For maker's use	Total
PIG IRON:			
Basic	499,400	14,929,232	15,428,632
Bessemer and low-phosphorus	184,699	3,010,856	3,195,555
Foundry	936,430	111,320	1,047,750
Malleable	702,505	94,141	796,646
Forge or mill	3,590	—	3,590
White and mottled, direct castings, etc.	57,757	26,919	84,676
Total	2,384,381	18,172,468	20,556,849
FERRO-ALLOYS:			
Ferro-manganese and spiegeleisen	193,626	216,524	410,150
Ferro-silicon	235,745	401	236,146
Other ferro-alloys	35,229	—	35,229
Total	464,600	216,925	681,525
Grand total	2,848,981	18,389,393	21,238,374

Steel Output Reaches Year's Highest Point

Many mills exceed rated capacity. Backlogs hold and deliveries lag. Much tonnage for early closing. Scrap makes further gain

MARKET IN TABLOID ★

Demand
Continues heavy, with much pending.

Prices
Unchanged for fourth quarter; scrap higher.

Production
Up 1 point to 91½ per cent.

■ GRADUAL upward movement of steel production continues under pressure of enlarged specifications and delivery requests. In a number of instances mills are operating well above 100 per cent of rated capacity, some having been as high as 109 per cent during August.

In spite of this rate of output backlogs continue to grow and delivery delays continue, in some cases being increased. No serious inconvenience appears to have resulted and suppliers are making every effort to meet consumer needs. Greatest delay is in plates, structurals and special analysis steels, for which demand probably will continue to expand. Sheets and strip are available in little more than normal processing time, partly due to heavy deliveries on the low-priced tonnage placed several months ago.

Some increase in inventory is evident but probably not out of line with current consumption and possibility of further delivery delay. In a considerable area a canvass indicates 75 to 90 days' supply of steel and 60 days' requirements in pig iron. Foundries are increasing production and pig iron and coke shipments are heavier.

Fourth quarter steel prices, as had been expected, have been announced unchanged from current levels. Carnegie-Illinois Steel Corp. made announcement Aug. 27, followed by other producers. Prices apply to shipments to and including Dec. 31, shipments after that date taking prices then in effect. A base price was named on hot-rolled alloy plates, an item not previously quoted, sales having been on the basis of negotiation. While there had been little doubt of prices continuing at the current level the formal statement clears any doubts and adds stability to the situation.

Led by an increase of 3½ points at Pittsburgh the national production rate last week advanced 1 point to 91½ per cent, the highest this year. Pittsburgh's rate moved up to 86½ per cent. Detroit rose 1 point to 93 per cent, St. Louis 2½ to 80, Chicago 1 point to 99, Cleveland 3½ to 90 and Youngstown 1 point to 84 per cent. Cincinnati lost 1 point to 77, Wheeling 1 point to 98 and New England 5 points to 80. Rates were unchanged at Birmingham, 88 per cent; Eastern Pennsylvania 89; Buffalo 90½.

Scrap presents an interesting situation, supply being light and melters holding back but prices rising gradually in absence of demand. With steelmaking at practically capacity rate a larger proportion of scrap is likely to be used in open hearths, stimulating demand. Last week prices advanced at Chicago and in eastern Pennsylvania, carrying the composite price to $19.16, a rise of 29 cents, the highest since late June. The iron and steel composite was increased 4 cents to $37.78 because of scrap rises.

Steel products imported in July totaled 3390 tons of materials other than scrap and 152 tons of scrap. This is a sharp decline from 5505 tons imported in June and only a fraction of the 27,516 tons entering in July, 1939. In seven months this year iron and steel imports were only 22 per cent of entries in the corresponding period last year. Exports of iron and steel products increased in July for the third consecutive month, setting a new high record at 707,809 gross tons, exclusive of scrap. June total on the same basis was 607,678 tons. In July, 1939, the total was only 25 per cent as large. July scrap exports were 327,129 tons.

Steady increase in automotive production continues, last week bringing 27,645 units off the assembly lines, compared with 23,732 the preceding week. In the comparable week in 1939 production was 25,240.

Railroad buying is irregular, though heavy rail tonnages are expected to come out soon. The Illinois Central is negotiating for 26,400 tons, which will be allocated within the next week. The Wabash has closed its inquiry for 5000 tons. Elgin, Joliet & Eastern, serving Chicago as an outer belt line, has placed 15 diesel-electric switchers with several builders. Pittsburgh & Lake Erie is in the market for 1000 high-side gondolas. Other inquiry and buying is for small lots.

Requirements for structural shapes and reinforcing bars continue high, with most large awards last week for public work. Cherokee dam, for the TVA, took 2660 tons of shapes; southeast airport, Mobile, Ala., 1675 tons; flood control at Hartford, Conn., 3000 tons; a power plant extension at Penns Grove, N. J., 1000 tons and four landplane hangars at Quonset Point, R. I., 3000 tons. Pending business in both shapes and reinforcing bars is heavy, promising continued large awards.

COMPOSITE MARKET AVERAGES

	Aug. 31	Aug. 24	Aug. 17	One Month Ago July, 1940	Three Months Ago May, 1940	One Year Ago Aug., 1939	Five Years Ago Aug., 1935
Iron and Steel	$37.78	$37.74	37.73	$37.63	$37.33	$35.95	$32.68
Finished Steel	56.60	56.60	56.60	56.60	56.60	55.60	54.02
Steelworks Scrap..	19.16	18.87	18.83	18.56	17.18	15.30	12.05

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

	Aug. 31, 1940	July 1940	May 1940	Aug. 1939
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.47
Iron bars, Chicago	2.25	2.25	2.25	2.05
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.00
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.00
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.60
Tin plate, per base box, Pitts.	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.40

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to ⅜-inch, Pitts.	2.00	2.00	2.00	1.92

Pig Iron

	Aug. 31, 1940	July 1940	May 1940	Aug. 1939
Bessemer, del. Pittsburgh	$24.34	$24.34	$24.34	$22.34
Basic, Valley	22.50	22.50	22.50	20.50
Basic, eastern, del. Philadelphia	24.34	24.34	24.34	22.34
No. 2 foundry, Pittsburgh	24.21	24.21	24.21	22.21
No. 2 foundry, Chicago	23.00	23.00	23.00	21.00
Southern No. 2, Birmingham	19.38	19.38	19.38	17.38
Southern No. 2, del. Cincinnati	22.89	22.89	22.89	20.89
No. 2X, del. Phila. (differ av.)	25.215	25.215	25.215	23.215
Malleable, Valley	23.00	23.00	23.00	21.00
Malleable, Chicago	23.00	23.00	23.00	21.00
Lake Sup., charcoal, del. Chicago	30.34	30.34	30.34	28.34
Gray forge, del. Pittsburgh	23.17	23.17	23.17	21.17
Ferromanganese, del. Pittsburgh	125.33	125.33	105.33	85.33

Scrap

Heavy melt. steel, Pitts.	$18.75	$19.55	$18.00	$16.15
Heavy melt. steel, No. 2, E. Pa.	19.50	17.50	16.00	14.40
Heavy melting steel, Chicago	18.50	17.45	16.65	13.75
Rails for rolling, Chicago	22.25	21.65	20.45	17.75
Railroad steel specialties, Chicago	21.50	21.00	19.75	15.50

Coke

Connellsville, furnace, ovens	$4.75	$4.75	$4.75	$3.75
Connellsville, foundry, ovens	5.75	5.75	5.75	5.00
Chicago, by-product fdry., del.	11.25	11.25	11.25	10.50

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Except when otherwise designated, prices are base, f.o.b. cars.

Sheet Steel

Hot Rolled

Pittsburgh	2.10c
Chicago, Gary	2.10c
Cleveland	2.10c
Detroit, del.	2.20c
Buffalo	2.10c
Sparrows Point, Md.	2.10c
New York, del.	2.34c
Philadelphia, del.	2.27c
Granite City, Ill.	2.20c
Middletown, O.	2.10c
Youngstown, O.	2.10c
Birmingham	2.10c
Pacific Coast ports	2.65c

Cold Rolled

Pittsburgh	3.05c
Chicago, Gary	3.05c
Buffalo	3.05c
Cleveland	3.05c
Detroit, delivered	3.15c
Philadelphia, del.	3.37c
New York, del.	3.39c
Granite City, Ill.	3.15c
Middletown, O.	3.05c
Youngstown, O.	3.05c
Pacific Coast ports	3.70c

Galvanized No. 24

Pittsburgh	3.50c
Chicago, Gary	3.50c
Buffalo	3.50c
Sparrows Point, Md.	3.50c
Philadelphia, del.	3.67c
New York, delivered	3.74c
Birmingham	3.50c
Granite City, Ill.	3.60c
Middletown, O.	3.50c
Youngstown, O.	3.50c
Pacific Coast ports	4.05c

Black Plate, No. 29 and Lighter

Pittsburgh	3.05c
Chicago, Gary	3.05c
Granite City, Ill.	3.15c

Long Ternes No. 24 Unassorted

Pittsburgh, Gary	3.80c
Pacific Coast	4.55c

Enameling Sheets

	No. 10	No. 20
Pittsburgh	2.75c	3.35c
Chicago, Gary	2.75c	3.35c
Granite City, Ill.	2.85c	3.45c
Youngstown, O.	2.75c	3.35c
Cleveland	2.75c	3.35c
Middletown, O.	2.75c	3.35c
Pacific Coast	3.40c	4.00c

Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.

Chrome-Nickel

	No. 302	No. 304
Bars	24.00	25.00
Plates	27.00	29.00
Sheets	34.00	36.00
Hot strip	21.50	23.50
Cold strip	28.00	30.00

Straight Chromes

	No. 410	No. 430	No. 442	No. 446
Bars	18.50	19.00	22.50	27.50
Plates	21.50	22.00	25.50	30.50
Sheets	26.50	29.00	32.50	36.50
Hot strip	17.00	17.50	24.00	35.00
Cold strip	22.00	22.50	32.00	52.00

Steel Plate

Pittsburgh	2.10c
New York, del.	2.29c
Philadelphia, del.	2.15c
Boston, delivered	2.46c
Buffalo, delivered	2.33c
Chicago or Gary	2.10c
Cleveland	2.10c
Birmingham	2.10c
Coatesville, Pa.	2.10c
Sparrows Point, Md.	2.10c
Claymont, Del.	2.10c
Youngstown	2.10c
Gulf ports	2.45c
Pacific Coast ports	2.65c

Steel Floor Plates

Pittsburgh	3.35c
Chicago	3.35c
Gulf ports	3.70c
Pacific Coast ports	4.00c

Structural Shapes

Pittsburgh	2.10c
Philadelphia, del.	2.21½c
New York, del.	2.27c
Boston, delivered	2.41c
Bethlehem	2.10c
Chicago	2.10c
Cleveland, del.	2.30c
Buffalo	2.10c
Gulf ports	2.45c
Birmingham	2.10c
St. Louis, del.	2.34c
Pacific Coast ports	2.70c

Tin and Terne Plate

Tin Plate, Coke (base box)

Pittsburgh, Gary, Chicago	$5.00
Granite City, Ill.	5.10

Mfg. Terne Plate (base box)

Pittsburgh, Gary, Chicago	$4.30
Granite City, Ill.	4.40

Bars

Soft Steel

(Base, 20 tons or over)

Pittsburgh	2.15c
Chicago or Gary	2.15c
Duluth	2.25c
Birmingham	2.15c
Cleveland	2.15c
Buffalo	2.15c
Detroit, delivered	2.25c
Philadelphia, del.	2.47c
Boston, delivered	2.52c
New York, del.	2.49c
Gulf ports	2.50c
Pacific Coast ports	2.80c

Rail Steel

(Base, 5 tons or over)

Pittsburgh	2.05c
Chicago or Gary	2.05c
Detroit, delivered	2.15c
Cleveland	2.05c

Buffalo	2.05c
Birmingham	2.05c
Gulf ports	2.40c
Pacific Coast ports	2.70c

Iron

Chicago	2.25c
Philadelphia, del.	2.37c
Pittsburgh, refined	3.50-8.00c
Terre Haute, Ind.	2.15c

Reinforcing

New Billet Bars, Base

Chicago, Gary, Buffalo, Cleve., Birm., Young., Sparrows Pt., Pitts.	2.15c
Gulf ports	2.50c
Pacific Coast ports	2.60c

Rail Steel Bars, Base

Pittsburgh, Gary, Chicago, Buffalo, Cleveland, Birm.	2.05c
Gulf ports	2.40c
Pacific Coast ports	2.50c

Wire Products

Pitts.-Cleve.-Chicago-Birm. base per 100 lb. keg in carloads

Standard and cement coated wire nails	$2.55
(Per Pound)	
Polished fence staples	2.55c
Annealed fence wire	3.05c
Galv. fence wire	3.40c
Woven wire fencing (base C. L. column)	67
Single loop bale ties, (base C.L. column)	56
Galv. barbed wire, 80-rod spools, base column	70
Twisted barbless wire, column	70

To Manufacturing Trade

Base, Pitts. - Cleve. - Chicago Birmingham (except spring wire)	
Bright bess., basic wire	2.60c
Galvanized wire	2.60c
Spring wire	3.20c

Worcester, Mass., $2 higher on bright basic and spring wire.

Cut Nails

Carload, Pittsburgh, keg $3.85

Cold-Finished Bars

	Carbon	Alloy
Pittsburgh	2.65c	3.35c
Chicago	2.65c	3.35c
Gary, Ind.	2.65c	3.35c
Detroit	2.70c	*3.45c
Cleveland	2.65c	3.35c
Buffalo	2.65c	3.35c

*Delivered.

Alloy Bars (Hot)

(Base, 20 tons or over)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem 2.70c

Detroit, delivered 2.80c

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.35	3100	0.70
2100	0.75	3200	1.35
2300	1.55	3300	3.80
2500	2.25	3400	3.20

4100 0.15 to 0.25 Mo. 0.55

4600 0.20 to 0.30 Mo. 1.50-2.00 Ni. 1.10

5100 0.80-1.10 Cr. 0.45

5100 Cr. spring flats 0.15

6100 bars 1.20

6100 spring flats 0.85

Cr. N., Van. 1.50

Carbon Van. 0.85

9200 spring flats 0.15

9200 spring rounds, squares 0.40

Electric furnace up 50 cents.

Alloy Plates (Hot)

Pittsburgh, del. 3.275c

Chicago, del. 3.28c

Strip and Hoops

(Base, hot strip, 1 ton or over; cold, 3 tons or over)

Hot Strip, 12-inch and less

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, Birmingham	2.10c
Detroit, del.	2.20c
Philadelphia, del.	2.42c
New York, del.	2.46c
Pacific Coast ports	2.75c
Cooperage hoop, Young., Pitts.; Chicago, Birm.	2.20c
Cold strip, 0.25 carbon and under, Pittsburgh, Cleveland, Youngstown	2.80c
Chicago	2.90c
Detroit, del.	2.90c
Worcester, Mass.	3.00c

Carbon	Cleve., Pitts.
0.26—0.50	2.80c
0.51—0.75	4.30c
0.76—1.00	6.15c
Over 1.00	8.35c

Worcester, Mass. $4 higher.

Commodity Cold-Rolled Strip

Pitts.-Cleve.-Youngstown	2.95c
Chicago	3.05c
Detroit, del.	3.05c
Worcester, Mass.	3.35c

Lamp stock up 10 cents.

Rails, Fastenings

(Gross Tons)

Standard rails, mill	$40.00
Relay rails, Pittsburgh 20—100 lbs.	32.50-35.50
Light rails, billet qual., Pitts., Chicago, B'ham.	$40.00
Do., rerolling quality	39.00
Cents per pound	
Angle bars, billet, mills.	2.70c
Do., axle steel	2.35c
Spikes, R. R. base	3.00c
Track bolts, base	4.15c
Car axles forged, Pitts., Chicago, Birmingham.	3.15c
Tie plates, base	2.15c

Base, light rails 25 to 60 lbs., 20 lbs. up $2; 16 lbs. up $4; 12 lbs. up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base plates 20 tons.

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller	68.5 off
Do. larger, to 1-in.	66 off
Do. 1⅛ and larger	64 off
Tire bolts	52.5 off

Stove Bolts

In packages with nuts separate 72.5 off; with nuts attached add 15%; bulk 83.5 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts	60 off
Plow bolts	68.5 off

Nuts

Semifinished hex.	U.S.S.	S.A.E.
⅛-inch and less.	67	70
⅛-1-inch	64	65
1⅛-1½-inch	62	62
1⅝ and larger	60	..

Hexagon Cap Screws

Upset 1-in., smaller	70.0 off

Square Head Set Screws

Upset, 1-in., smaller	75.0 off
Headless set screws	64.0 off

Piling

Pitts., Chgo., Buffalo	2.40c
Gulf ports	2.85c
Pacific Coast ports	2.95c

Rivets, Washers

F.o.b. Pitts., Cleve., Chgo., Bham.

Structural	3.40c
⅞-inch and under	65-10 off

Wrought washers, Pitts., Chi., Phila., to jobbers and large nut, bolt mfrs. l.c.l. $5.40; c.l. $5.75 off

Welded Iron, Steel Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads, Gary, Ind., 2 points less on lap weld, 1 point less on butt weld, Chicago delivery 2½ and 1½ less, respectively. Wrought pipe, Pittsburgh base.

Butt Weld

Steel

In.	Blk.	Galv.
⅛	63½	54
¼	66½	58
1—3	68½	60½

Iron

¼	30	13
1—1¼	34	19
1½	38	21½
2	37½	21

Lap Weld

Steel

2	61	52½
2½—3	64	55½
3½—6	66	57½
7 and 8	65	55½
9 and 10	64½	55
11 and 12	63½	54

Iron

2	30½	15
2½—3½	31½	17½
4	33½	21
4½—8	32½	20
9—12	28½	15

Line Pipe

Steel

1 to 3, butt weld	67½
2, lap weld	60
2½ to 3, lap weld	63
3½ to 6, lap weld	65
7 and 8, lap weld	64
10-inch lap weld	63½
12-inch, lap weld	62½

Iron

	Blk.	Galv.
¾ butt weld	25	7
1 and 1¼ butt weld	29	13
1½ butt weld	33	15½
2 butt weld	32½	15
1½ lap weld	23½	7
2 lap weld	25½	9
2½ to 3½ lap weld	26½	11½
4 lap weld	28½	15
4½ to 8 lap weld	27½	14
9 to 12 lap weld	23½	9

Boiler Tubes

Carloads minimum wall seamless steel boiler tubes, cut-lengths 4 to 24 feet; f.o.b. Pittsburgh, base price per 100 feet subject to usual extras.

Lap Welded

Sizes	Gage	Steel	Charcoal Iron
1½" O.D.	13	$ 9.72	$23.71
1¾" O.D.	13	11.06	22.93
2" O.D.	13	12.38	19.35
2¼" O.D.	13	13.79	21.68
2¼" O.D.	12	15.16	.....
2½" O.D.	12	16.58	26.57
2¾" O.D.	12	17.54	29.00
3" O.D.	12	18.35	31.36
3½" O.D.	11	23.15	39.81
4" O.D.	10	28.66	49.90
5" O.D.	9	44.25	73.93
6" O.D.	7	68.14	.....

Seamless

Sizes	Gage	Hot Rolled	Cold Drawn
1" O.D.	13	$ 7.82	$ 9.01
1¼" O.D.	13	9.26	10.67
1½" O.D.	13	10.23	11.79
1¾" O.D.	13	11.64	13.42
2" O.D.	13	13.04	15.03
2¼" O.D.	13	14.54	16.76
2¼" O.D.	12	16.01	18.45
2½" O.D.	12	17.54	20.21
2¾" O.D.	12	18.59	21.42
3" O.D.	12	19.50	22.48
3½" O.D.	11	24.62	28.37
4" O.D.	10	30.54	35.20
4½" O.D.	10	37.35	43.04
5" O.D.	9	46.87	54.01
6" O.D.	7	71.96	82.93

Cast Iron Pipe

Class B Pipe—Pet Net Ton

6-in., & over, Birm.	$45.00-46.00
4-in., Birmingham	48.00-49.00
4-in., Chicago	56.80-57.80
6-in. & over, Chicago	53.80-54.80
6-in. & over, east fdy.	49.00
Do., 4-in.	52.00

Class A Pipe $3 over Class B

Stnd. fitgs., Birm., base $100.00.

Semifinished Steel

Rerolling Billets, Slabs

(Gross Tons)

Pittsburgh, Chicago, Gary, Cleve., Buffalo, Youngs., Birm., Sparrows Point	$34.00
Duluth (billets)	36.00
Detroit, delivered	36.00

Forging Quality Billets

Pitts., Chi., Gary, Cleve., Young, Buffalo, Birm.	40.00
Duluth	42.00

Sheet Bars

Pitts., Cleveland, Young., Sparrows Point, Buffalo, Canton, Chicago	34.00
Detroit, delivered	36.00

Wire Rods

Pitts., Cleveland, Chicago, Birmingham No. 5 to ⅜-inch incl. (per 100 lbs.)	$2.00
Do., over ⅜ to ⅝-in. incl.	2.15

Worcester up $0.10; Galveston up $0.25; Pacific Coast up $0.50.

Skelp

Pitts., Chi., Youngstown, Coatesville, Sparrows Pt.	1.90c

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur.	$4.35- 4.60
Connellsville, fdry.	5.25- 5.50
Connell, prem. fdry.	5.75- 6.25
New River fdry.	6.25- 6.50
Wise county fdry	5.50- 6.50
Wise county fur.	5.00- 5.25

By-Product Foundry

Newark, N. J., del.	11.38-11.85
Chicago, outside del.	10.50
Chicago, delivered	11.25
Terre Haute, del.	10.75
Milwaukee, ovens	11.25
New England, del.	12.50
St. Louis, del.	11.75
Birmingham, ovens	7.50
Indianapolis, del.	10.75
Cincinnati, del.	10.50
Cleveland, del.	11.05
Buffalo, del.	11.25
Detroit, del.	11.00
Philadelphia, del.	11.15

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
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.)	14.75c
Do. (1000 lbs. or over)	13.75c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers	7.00c

Per ton, bulk, f.o.b. port

Sulphate of ammonia	$28.00

Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25 sil.; 50c diff. below 1.75 sil. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$24.00	$24.50	$23.50	$25.00
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	.....	.....	...
Sharpsville, Pa.	23.00	23.00	22.50	23.50
Sparrow's Point, Md.	24.00	.....	23.50	.....
Swedeland, Pa.	24.00	24.50	23.50	25.00
Toledo, O.	23.00	23.00	22.50	23.50
Youngstown, O.	23.00	23.00	22.50	23.50

‡Subject to 38 cents deduction for 0.70 per cent phosphorus or higher.

Delivered from Basing Points:				
Akron, O., from Cleveland	24.39	24.39	23.89	24.89
Baltimore from Birmingham	24.78	.....	23.66	.....
Boston from Birmingham	24.12	.....	.....	.....
Boston from Everett, Mass.	24.50	25.00	24.00	25.50
Boston from Buffalo	24.50	25.00	24.00	25.50
Brooklyn, N. Y., from Bethlehem	26.50	27.00	.....	.....
Canton, O., from Cleveland	24.39	24.39	23.89	24.89
Chicago from Birmingham	†23.22	.....	.....	.....
Cincinnati from Hamilton, O.	23.24	24.11	23.61	.....
Cincinnati from Birmingham	23.06	.....	22.06	.....
Cleveland from Birmingham	23.32	.....	22.82	.....
Mansfield, O., from Toledo, O.	24.94	24.94	24.44	24.44
Milwaukee from Chicago	24.10	24.10	23.60	24.60
Muskegon, Mich., from Chicago, Toledo or Detroit	26.19	26.19	25.69	26.69
Newark, N. J., from Birmingham	25.15	.....	.....	.....
Newark, N. J., from Bethlehem	25.53	26.03	.....	.....
Philadelphia from Birmingham	24.46	.....	23.96	.....
Philadelphia from Swedeland, Pa.	24.84	25.34	24.34	.....
Pittsburgh district from Neville Island	Neville base, plus 69c, 84c, and $1.24 freight.			
Saginaw, Mich., from Detroit	25.31	25.31	24.81	25.81
St. Louis, northern	23.50	23.50	23.00	.....
St. Louis from Birmingham	†23.12	.....	22.62	.....
St. Paul from Duluth	25.63	25.63	.....	26.13

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $28.50, base; $29.74 delivered Philadelphia.

Gray Forge		Charcoal	
Valley furnace	$22.50	Lake Superior fur.	$27.00
Pitts. dist. fur.	22.50	do., del. Chicago	30.34
		Lyles, Tenn.	26.50

†Silvery

Jackson county, O., base: 6-6.50 per cent $28.50; 6.51-7—$29.00; 7-7.50—$29.50; 7.51-8—$30.00; 8-8.50—$30.50; 8.51-9—$31.00; 9-9.50—$31.50; Buffalo, $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base; Prices are the same as for silveries, plus $1 a ton.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Manganese differentials in silvery iron and ferrosilicon, 2 to 3%, $1 per ton add. Each unit over 3%, add $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$60.80

First Quality

Pa., Ill., Md., Mo., Ky.	47.50
Alabama, Georgia	47.50
New Jersey	52.50

Second Quality

Pa., Ill., Ky., Md., Mo.	42.75
Georgia, Alabama	34.20
New Jersey	49.00

Ohio

First quality	39.90
Intermediate	36.10
Second quality	31.35

Malleable Bung Brick

All bases	$56.05

Silica Brick

Pennsylvania	$47.50
Joliet, E. Chicago	55.10
Birmingham, Ala.	47.50

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$28.00
Wire cut	26.00

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$50.00
Chem. bonded chrome	50.00
Magnesite brick	72.00
Chem. bonded magnesite	61.00

Fluorspar

Washed gravel, duty pd., tide, net ton	$25.00-$26.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	21.00
Do. barge	21.00
No. 2 lump	22.00

Ferroalloy Prices

Ferromanganese, 78-82%,
carlots, duty pd. $120.00
Ton lots 130.00
Less ton lots 133.50
Less 200 lb. lots 138.00
Do., carlots del. Pitts. 125.33

Spiegeleisen, 19-21% dom.
Palmerton, Pa., spot 36.00
Do., 26-28% 49.50

Ferrosilicon, 50% freight allowed, c.l. 74.50
Do., ton lot 87.00
Do., 75 per cent 135.00
Do., ton lots 151.00
Spot, $5 a ton higher.

Silicomanganese, c.l., 2½ per cent carbon 118.00
2% carbon, 108.00; 1%, 133.00
Contract ton price $12.50 higher; spot $5 over contract.

Ferrotungsten, stand., lb. con. del. cars 1.90-2.00

Ferrovanadium, 35 to 40%, lb., cont. 2.70-2.80-2.90

Ferrophosphorus, gr. ton, c.l., 17-18% Rockdale, Tenn., basis, 18%, $3 unitage, 58.50; electric furn., per ton, c. l., 23-26% f.o.b. Mt. Pleasant, Tenn., 24% $3 unitage 75.00

Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb., contained cr., del. carlots 11.00c
Do., ton lots 11.75c
Do., less-ton lots 12.00c

67-72% low carbon:

	Carloads	Ton lots	Less ton
2% carb.	17.50c	18.25c	18.75c
1% carb.	18.50c	19.25c	19.75c
0.10% carb.	20.50c	21.25c	21.75c
0.20% carb.	19.50c	20.25c	20.75c

Spot ¼c higher

Ferromolybdenum, 55-65% molyb. cont., f.o.b. mill, lb. 0.95

Calcium molybdate, lb. molyb. cont., f.o.b. mill 0.80

Ferrotitanium, 40-45%, lb., con. ti., f.o.b. Niagara Falls, ton lots $1.23
Do., less-ton lots 1.25
20-25% carbon, 0.10 max., ton lots, lb. 1.35
Do., less-ton lots 1.40
Spot 5c higher

Ferrocolumbium, 50-60%, contract, lb. con. col., f.o.b. Niagara Falls $2.25
Do., less-ton lots 2.30
Spot is 10c higher

Technical molybdenum trioxide, 53 to 60% molybdenum, lb. molyb. cont., f.o.b. mill 0.80

Ferro-carbon-titanium, 15-18%, ti., 6-8% carb., carlots, contr., net ton $142.50
Do., spot 145.00
Do., contract, ton lots 145.00
Do., spot, ton lots 150.00
15-18% ti., 3-5% carbon, carlots, contr., net ton 157.50
Do., spot 160.00
Do., contract, ton lots. 160.00
Do., spot, ton lots 165.00

Alsifer, contract carlots, f.o.b. Niagara Falls, lb. 7.50c
Do., ton lots 8.00c
Do., less-ton lots 8.50c
Spot ½c lb. higher

Chromium Briquets, contract, freight allowed, lb. spot carlots, bulk 7.00c
Do., ton lots 7.50c
Do., less-ton lots 7.75c
Do., less 200 lbs. 8.00c
Spot, ¼c higher.

Tungsten Metal Powder, according to grade, spot shipment, 200-lb. drum lots, lb. $2.50
Do., smaller lots 2.60

Vanadium Pentoxide, contract, lb. contained $1.10
Do., spot 1.15

Chromium Metal, 98% cr., 0.50 carbon max., contract, lb. con. chrome 84.00c
Do., spot 89.00c
88% chrome, contract 83.00c
Do., spot 88.00c

Silicon Metal, 1% iron, contract, carlots, 2 x ⅛-in., lb. 14.00c
Do., 2% 12.50c
Spot ¼c higher

Silicon Briquets, contract carloads, bulk, freight allowed, ton $69.50
Ton lots 79.50
Less-ton lots, lb. 3.75c
Less 200 lb. lots, lb. 4.00c
Spot ¼-cent higher.

Manganese Briquets, contract carloads, bulk freight allowed, lb. 5.00c
Ton lots 5.50c
Less-ton lots 5.75c
Spot ¼c higher

Zirconium Alloy, 12-15%, contract, carloads, bulk, gross ton 102.50
Do., spot 107.50
34-40%, contract, carloads, lb., alloy 14.00c
Do., ton lots 15.00c
Do., less-ton lots 16.00c
Spot ¼c higher

Molybdenum Powder, 99%, f.o.b. York, Pa. 200-lb. kegs, lb. $2.60
Do., 100-200 lb. lots 2.75
Do., under 100-lb. lots 3.00

Molybdenum Oxide Briquets, 48-52% molybdenum, per pound contained, f.o.b. producers' plant 80.00c

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials

	Soft Bars	Bands	Hoops	Plates ¼-in. & Over	Structural Shapes	Floor Plates	Sheets: Hot Rolled	Sheets: Cold Rolled	Sheets: Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars: Carbon	Cold Drawn Bars: S.A.E. 2300	Cold Drawn Bars: S.A.E. 3100
Boston	3.98	3.86	4.86	3.85	3.85	5.66	3.51	4.48	4.66	3.46	4.13	8.63	7.23
New York (Met.)	3.84	3.76	3.76	3.76	3.75	5.56	3.38	4.40	4.05	3.31	4.09	8.59	7.19
Philadelphia	3.83	3.75	4.25	3.55	3.55	5.25	3.35	4.05	4.00	3.31	4.06	8.56	7.16
Baltimore	3.85	4.00	4.35	3.70	3.70	5.25	3.50	....	5.05	....	4.05	....	....
Norfolk, Va.	4.00	4.10	....	4.05	4.05	5.45	3.85	....	5.40	....	4.15	....	....
Buffalo	3.35	3.62	3.62	3.62	3.40	5.25	3.05	4.30	4.00	3.22	3.75	8.15	6.75
Pittsburgh	3.35	3.40	3.40	3.40	3.40	5.00	3.15	....	4.45	....	3.65	8.15	6.75
Cleveland	3.25	3.30	3.30	3.40	3.58	5.18	3.15	4.05	4.42	3.20	3.75	8.15	6.75
Detroit	3.43	3.23	3.48	3.60	3.65	5.27	3.25	4.30	4.64	3.20	3.80	8.45	7.05
Omaha	3.90	3.80	3.80	3.95	3.95	5.55	3.45	...	5.00	....	4.42	....	....
Cincinnati	3.60	3.47	3.47	3.65	3.68	5.28	3.22	4.00	4.67	3.47	4.00	8.50	7.10
Chicago	3.50	3.40	3.40	3.55	3.55	5.15	3.05	4.10	4.60	3.30	3.75	8.15	6.75
Twin Cities	3.75	3.65	3.65	3.80	3.80	5.40	3.30	4.35	4.75	3.83	4.34	8.84	7.44
Milwaukee	3.63	3.53	3.53	3.68	3.68	5.28	3.18	4.23	4.73	3.54	3.88	8.38	6.98
St. Louis	3.62	3.52	3.52	3.47	3.47	5.07	3.18	4.12	4.87	3.41	4.02	8.52	7.12
Kansas City	4.05	4.15	4.15	4.00	4.00	5.60	3.90	....	5.00	....	4.30	....	....
Indianapolis	3.60	3.55	3.55	3.70	3.70	5.30	3.25	....	4.76	....	3.97	....	....
Memphis	3.90	4.10	4.10	3.95	3.95	5.71	3.85	....	5.25	....	4.31	....	....
Chattanooga	3.80	4.00	4.00	3.85	3.85	5.68	3.70	....	4.40	....	4.39	....	....
Tulsa, Okla.	4.44	4.34	4.34	4.33	4.33	5.93	3.99	....	5.71	....	4.69	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.88	3.45	....	4.75	....	4.43	....	....
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	4.80	5.00	4.60	....	....
Houston, Tex.	4.05	6.20	6.20	4.05	4.05	5.75	4.20	....	5.25	....	....	....	....
Seattle	4.00	3.85	5.20	3.65	3.75	5.75	3.70	6.50	5.00	....	5.75	....	....
Portland, Oreg.	4.25	4.50	6.10	4.00	4.00	5.75	3.95	6.50	4.75	....	5.75	....	....
Los Angeles	4.15	4.60	4.45	4.00	4.00	6.40	4.30	6.50	5.25	....	6.60	10.65	9.80
San Francisco	3.50	4.00	6.00	3.35	3.35	5.60	3.40	6.40	5.15	....	6.80	10.65	9.80

	S.A.E. Hot-rolled Bars (Unannealed): 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.18	7.50	6.05	5.80	7.90
New York (Met.)	4.04	7.35	5.90	5.65	....
Philadelphia	4.10	7.31	5.86	5.61	8.56
Baltimore	4.45	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.10	5.65	5.40	7.50
Pittsburgh	3.40	7.20	5.75	5.50	7.60
Cleveland	3.30	7.30	5.85	5.85	7.70
Detroit	3.48	7.42	5.97	5.72	7.19
Cincinnati	3.65	7.44	5.99	5.74	7.84
Chicago	3.70	7.10	5.65	5.40	7.50
Twin Cities	3.95	7.45	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.82	7.47	6.02	5.77	7.87
Seattle	5.85	....	8.00	7.85	8.65
Portland, Oreg.	5.70	8.85	8.00	7.85	8.65
Los Angeles	4.80	9.40	8.55	8.40	9.05
San Francisco	5.00	9.65	8.80	8.65	9.30

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300-4999 pounds in Portland, Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in Birmingham.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Kansas City and St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 300-4999 in San Francisco, Portland; any quantity in Twin Cities; 300-1999 in Los Angeles.

Galvanized Sheets: Base, 1500-3499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 150-1049 in Los Angeles; 300-4999 in Portland, Seattle, San Francisco; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis, Tulsa; 1500 and over in Chattanooga: any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; 25 to 49 bundles in Philadelphia.

Cold Rolled Strip: No base quantity; extras apply on lots of all size

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco, 1000 and over in Portland, Seattle; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

CURRENT IRON AND STEEL PRICES OF EUROPE

Dollars at Official Rates of Exchange

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	British gross tons U. K. ports: £ s d	Quoted in dollars at current value	Continental North Channel or Sea ports, gross tons‡‡: **Quoted in gold pounds sterling: £ s d
Foundry, 2.50-3.00 Si.	.....	$33.23	3 18 0
Basic bessemer	.....	.....	.....
Hematite, Phos. .03-.05	.....	.....	.....
Billets	.....	$31.95	3 15 0
Wire rods, No. 5 gage	.....	60.71	7 2 6
Standard rails	.....	$48.99	5 15 0
Merchant bars	2.66c 14 15 0	2.77c	7 6 0
Structural shapes	2.48c 13 15 0	2.83c	7 9 0
Plates, 1¼ in. or 5 mm.	2.68c 14 17 6	3.53c	9 6 0
Sheets, black, 24 gage or 0.5 mm.	3.40c 18 17 6	2.98c	7 17 0°
Sheets, gal., 24 ga., corr.	3.98c 22 2 6	3.94c	10 7 6
Bands and strips	.....	2.76c	7 5 0
Plain wire, base	.....	3.15c	8 6 3
Galvanized wire, base	.....	3.75c	9 17 6
Wire nails, base	.....	3.56c	9 7 6
Tin plate, box 108 lbs.	$ 5.61 1 7 9	....	.....

British ferromanganese $120.00 delivered Atlantic seaboard duty-paid.

Domestic Prices at Works or Furnace—

Last Reported

	£ s d		French ‡‡Francs		Belgian ‡‡Francs		Reich ‡‡Mar
Fdy. pig iron, Si. 2.5	$24.24	6 0 0(a)	$17.18	788	$31.44	950	$25.33	63
Basic bess. pig iron	22.83	5 13 0(a)	.....	...	29.79	900	27.94	(b) 69.50
Furnace coke	6.77	1 13 5	4.91	225	10.92	320	7.64	19
Billets	42.42	10 10 0	26.62	1,221	42.20	1,275	38.79	96
Standard rails	2.30c	12 15 6	1.69c	1,692	2.06c	1,375	2.38c	132
Merchant bars	2.78c	15 8 0††	1.53c	1,530	2.06c	1,375	1.98c	110
Structural shapes	2.46c	13 13 0††	1.49c	1,487	2.06c	1,375	1.93c	107
Plates, †¼-in. or 5 mm.	2.53c	14 3 0†;	1.95c	1,951	2.42c	1,610	2.29c	127
Sheets, black	3.49c	19 17 6§	2.30c	2,295‡	2.85c	1,900‡	2.59c	144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.	4.07c	22 12 6	3.59c	3,589	4.80c	3,200	6.66c	370
Plain wire	3.83c	21 5 0	2.34c	2,340	3.00c	2,000	3.11c	173
Bands and strips	2.91c	16 3 6††	1.71c	1,713	2.45c	1,650	2.29c	127

†British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continent usually for basic-bessemer steel. (a) del. Middlesbrough. 5s rebate to approved customers. (b) hematite. °Close annealed. ††Rebate of 15s on certain conditions. **Gold pound sterling not quoted. ‡‡No quotations.

IRON AND STEEL SCRAP PRICES

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated; †indicates brokers prices

HEAVY MELTING STEEL

Birmingham, No. 1	15.00
Bos. dock No. 1 exp.	16.25-16.50
New Eng. del. No. 1	15.50-16.00
Buffalo, No. 1	18.00-18.50
Buffalo, No. 2	16.00-16.50
Chicago, No. 1	18.25-18.75
Chicago, auto, no alloy	17.25-17.75
Cincinnati, dealers	15.25-15.75
Cleveland, No. 1	18.50-19.00
Cleveland, No. 2	17.50-18.00
Detroit, No. 1	†15.50-16.00
Detroit, No. 2	†14.50-15.00
Eastern Pa., No. 1	20.50
Eastern Pa., No. 2	19.50
Federal, Ill., No. 2	14.75-15.25
Granite City, R. R. No. 1	15.75-16.25
Granite City No. 2	14.50-15.00
Los Ang., No. 1, net	13.00-13.50
Los Ang., No. 2, net	12.00-12.50
N.Y. dock No. 1 exp.	†15.50-16.00
Pitts., No. 1 (R.R.)	20.50-21.00
Pittsburgh, No. 1	18.50-19.00
Pittsburgh, No. 2	17.00-17.50
St. Louis, No. 1	16.00-16.50
St. Louis, No. 2	14.75-15.25
San Fran., No. 1, net	13.00-13.50
San Fran., No. 2, net	12.00-12.50
Seattle, No. 1	15.00
Toronto, dlrs., No. 1	11.00
Valleys, No. 1	18.50-19.00

COMPRESSED SHEETS

Buffalo, new	17.00-17.50
Chicago, factory	17.75-18.25
Chicago, dealers	16.00-16.50
Cincinnati, dealers	14.25-14.75
Cleveland	18.00-18.50
Detroit	†17.00-17.50
E. Pa., new mat.	20.50
E. Pa., old mat.	17.50-18.00
Los Angeles, net	10.00-10.50
Pittsburgh	18.50-19.00
St. Louis	12.50-13.00
San Francisco, net	10.00-10.50
Valleys	18.00-18.50

BUNDLED SHEETS

Buffalo, No. 1	16.00-16.50
Buffalo, No. 2	14.50-15.00
Cleveland	14.00-14.50
Pittsburgh	17.50-18.00
St. Louis	11.50-12.00
Toronto, dealers	9.75

SHEET CLIPPINGS, LOOSE

Chicago	13.00-13.50
Cincinnati, dealers	9.75-10.25
Detroit	†13.50-14.00
St. Louis	10.50-11.00
Toronto, dealers	9.00

BUSHELING

Birmingham, No. 1	13.00
Buffalo, No. 1	16.00-16.50
Chicago, No. 1	17.25-17.75
Cincin., No. 1 deal.	11.00-11.50
Cincin., No. 2 deal.	6.25- 6.75
Cleveland, No. 2	12.50-13.00
Detroit, No. 1 new	†16.00-16.50
Valleys, new, No. 1	17.50-18.00
Toronto, dealers	5.50- 6.00

MACHINE TURNINGS (Long)

Birmingham	5.00
Buffalo	12.00-12.50
Chicago	12.50-13.00
Cincinnati, dealers	7.75- 8.25
Cleveland, no alloy	12.00-12.50
Detroit	†9.75-10.25
Eastern Pa.	14.50
Los Angeles	4.00- 5.00
New York	†9.00- 9.50
Pittsburgh	14.50-15.00
St. Louis	9.00- 9.50
San Francisco	5.00
Toronto, dealers	7.00- 7.25
Valleys	12.00-12.50

SHOVELING TURNINGS

Buffalo	13.00-13.50
Cleveland	12.50-13.00
Chicago	12.50-13.00
Chicago, spel, anal.	14.50-15.00
Detroit	†10.75-11.25
Pitts., alloy-free	15.50-16.00

BORINGS AND TURNINGS
For Blast Furnace Use

Boston district	†6.75- 7.00
Buffalo	12.00-12.50
Cincinnati, dealers	6.25- 6.75
Cleveland	12.50-13.00
Eastern Pa.	13.00
Detroit	†11.00-11.50
New York	†8.75- 9.00
Pittsburgh	12.50-13.00
Toronto, dealers	6.75

AXLE TURNINGS

Buffalo	16.00-16.50
Boston district	†10.50-11.00
Chicago, elec. fur.	18.00-18.50
East. Pa. elec. fur.	17.50-18.00
St. Louis	13.00-13.50
Toronto	6.00- 6.50

CAST IRON BORINGS

Birmingham	8.00
Boston dist. chem.	†8.50- 8.75
Buffalo	12.00-12.50
Chicago	12.00-12.50
Cincinnati, dealers	6.25- 6.75
Cleveland	12.50-13.00
Detroit	†11.00-11.50
E. Pa., chemical	14.50-15.00
New York	†8.75- 9.00
St. Louis	9.00- 9.50
Toronto, dealers	6.75

RAILROAD SPECIALTIES

Chicago	21.25-21.75

ANGLE BARS—STEEL

Chicago	21.50-22.00
St. Louis	18.00-18.50

SPRINGS

Buffalo	22.00-22.50
Chicago, coil	22.50-23.00
Chicago, leaf	21.00-21.50
Eastern Pa.	24.50-25.00
Pittsburgh	25.50-26.00
St. Louis	20.00-20.50

STEEL RAILS, SHORT

Birmingham	17.00
Buffalo	22.50-23.00
Chicago (3 ft)	21.50-22.00
Chicago (2 ft)	22.50-23.00
Cincinnati, dealers	21.50-22.00
Detroit	†21.50-22.00
Pitts., 3 ft. and less	25.00-25.50
St. L. 2 ft. & less	20.50-21.00

STEEL RAILS, SCRAP

Birmingham	15.00
Boston district	†14.50-15.00
Buffalo	21.00-21.50
Chicago	18.25-18.75
Cleveland	23.00-23.50
Pittsburgh	23.00-23.50
St. Louis	18.00-18.50
Seattle	18.00-18.50

PIPE AND FLUES

Chicago, net	12.50-13.00
Cincinnati, dealers	11.75-12.25

RAILROAD GRATE BARS

Buffalo	13.00-13.50
Chicago, net	13.50-14.00
Cincinnati, dealers	10.75-11.25
Eastern Pa.	17.50
New York	†12.00-12.50
St. Louis	13.00-13.50

RAILROAD WROUGHT

Birmingham	14.00
Boston district	†9.50-10.00
Eastern Pa., No. 1	20.00-20.50
St. Louis, No. 1	12.00-12.50
St. Louis, No. 2	15.00-15.50

FORGE FLASHINGS

Boston district	†11.50-12.00
Buffalo	16.00-16.50
Cleveland	16.50-17.00
Detroit	†15.50-16.00
Pittsburgh	16.50-17.00

FORGE SCRAP

Boston district	†7.00
Chicago, heavy	22.50-23.00

LOW PHOSPHORUS

Cleveland, crops	23.00-23.50
Eastern Pa., crops	25.00-25.50
Pitts., billet, bloom, slab crops	25.00-25.50

LOW PHOS. PUNCHINGS

Buffalo	21.00-21.50
Chicago	21.75-22.25
Cleveland	20.00-20.50
Eastern Pa.	25.00-25.50
Pittsburgh	24.50-25.00
Seattle	15.00
Detroit	†17.50-18.00

RAILS FOR ROLLING
5 feet and over

Birmingham	16.50
Boston	†15.75-16.00
Chicago	22.00-22.50
New York	†17.50-18.00
Eastern Pa.	23.00-23.50
St. Louis	20.00-20.50

STEEL CAR AXLES

Birmingham	18.00
Boston district	†18.50-19.00
Chicago, net	22.50-23.00
Eastern Pa.	24.50
St. Louis	21.00-21.50

LOCOMOTIVE TIRES

Chicago (cut)	22.00-22.50
St. Louis, No. 1	17.00-17.50

SHAFTING

Boston district	†19.00-19.25
New York	†19.00-19.50
Eastern Pa.	25.00-25.50
St. Louis, 1¼-3¾"	18.00-18.50

CAR WHEELS

Birmingham, iron	13.00
Boston dist., iron	†14.75-15.00
Buffalo, steel	22.00-22.50
Chicago, iron	19.00-19.50
Chicago, rolled steel	21.50-22.00
Cincin., iron, deal.	18.50-19.00
Eastern Pa., iron	21.50-22.00
Eastern Pa., steel	24.50-25.00
Pittsburgh, iron	21.00-21.50
Pittsburgh, steel	25.50-26.00
St. Louis, iron	18.25-18.75
St. Louis, steel	19.50-20.00

NO. 1 CAST SCRAP

Birmingham	15.50
Boston, No. 1 mach.	†15.75-16.25
N. Eng. del. No. 2	15.25-15.75
N. Eng. del. textile	18.75-20.00
Buffalo, cupola	17.50-18.00
Buffalo, mach.	19.00-19.50
Chicago, agri. net	15.00-15.50
Chicago, auto net	17.25-17.75
Chicago, railroad net	16.00-16.50
Chicago, mach. net	16.50-17.00
Cincin., mach. deal.	19.00-19.50
Cleveland, mach.	21.25-21.75
Detroit, cupola, net	†17.00-17.50
Eastern Pa., cupola	21.50-22.00
E. Pa., No. 2 yard	18.50-19.00
E. Pa., yard fdry.	19.00
Los Angeles	16.50-17.00
Pittsburgh, cupola	19.00-19.50
San Francisco	14.50-15.00
Seattle	14.50-16.00
St. L., agri. mach.	18.00-18.50
St. L., No. 1 mach.	18.75-19.25
Toronto, No. 1 mach., net dealers	18.00-18.50

HEAVY CAST

Boston dist. break	†14.75-15.00
New England, del.	15.50-16.00
Buffalo, break	16.50-17.00
Cleveland, break, net	16.50-17.00
Detroit, auto net	†17.25-17.75
Detroit, break.	†15.00-15.50
Eastern Pa.	20.50
Los Ang., auto, net	13.00-14.00
New York break	†16.00-16.50
Pittsburgh, break	16.00-16.50

STOVE PLATE

Birmingham	10.00-11.00
Boston district	†11.50-11.75
Buffalo	15.00-15.50
Chicago, net	12.00-12.50
Cincinnati, dealers	11.25-11.75
Detroit, net	†11.00-11.50
Eastern Pa.	17.50
New York fdry	†13.00
St. Louis	†12.00-12.50
Toronto dealers, net	12.00

MALLEABLE

New England, del.	21.50-22.00
Buffalo	21.50-22.00
Chicago, R. R.	22.00-22.50
Cincin. agri., deal.	16.25-16.75
Cleveland, rail	21.50-22.00
Eastern Pa., R. R.	22.50-23.00
Los Angeles	12.50
Pittsburgh, rail	23.50-24.00
St. Louis, R. R.	19.00-19.50

Ores

Lake Superior Iron Ore

Gross ton, 51½ %

Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	10.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-35% Fe, 6-10% Mang.	Nom.
N. African low phos	nom.
Spanish, No. African basic, 50 to 60%	nom.
Chinese wolframite, net ton, duty pd.	$23.50-24.00
Brazil iron ore, 68-69%, ord.	7.50c
Low phos. (.02 max.)	8.00c

F.O.B. Rio Janeiro.

Scheelite, imp.	$25.00
Chrome ore, Indian, 48% gross ton, c.i.f.	$28.00-30.00

Manganese Ore

Including war risk but not duty, cents per unit cargo lots

Caucasian, 50-52%	60.00
So. African, 50-52%	55.00-59.00
Indian, 49-50%	56.00
Brazilian, 46%	50.00-53.00
Cuban, 50-51%, duty free	71.00-73.00

Molybdenum

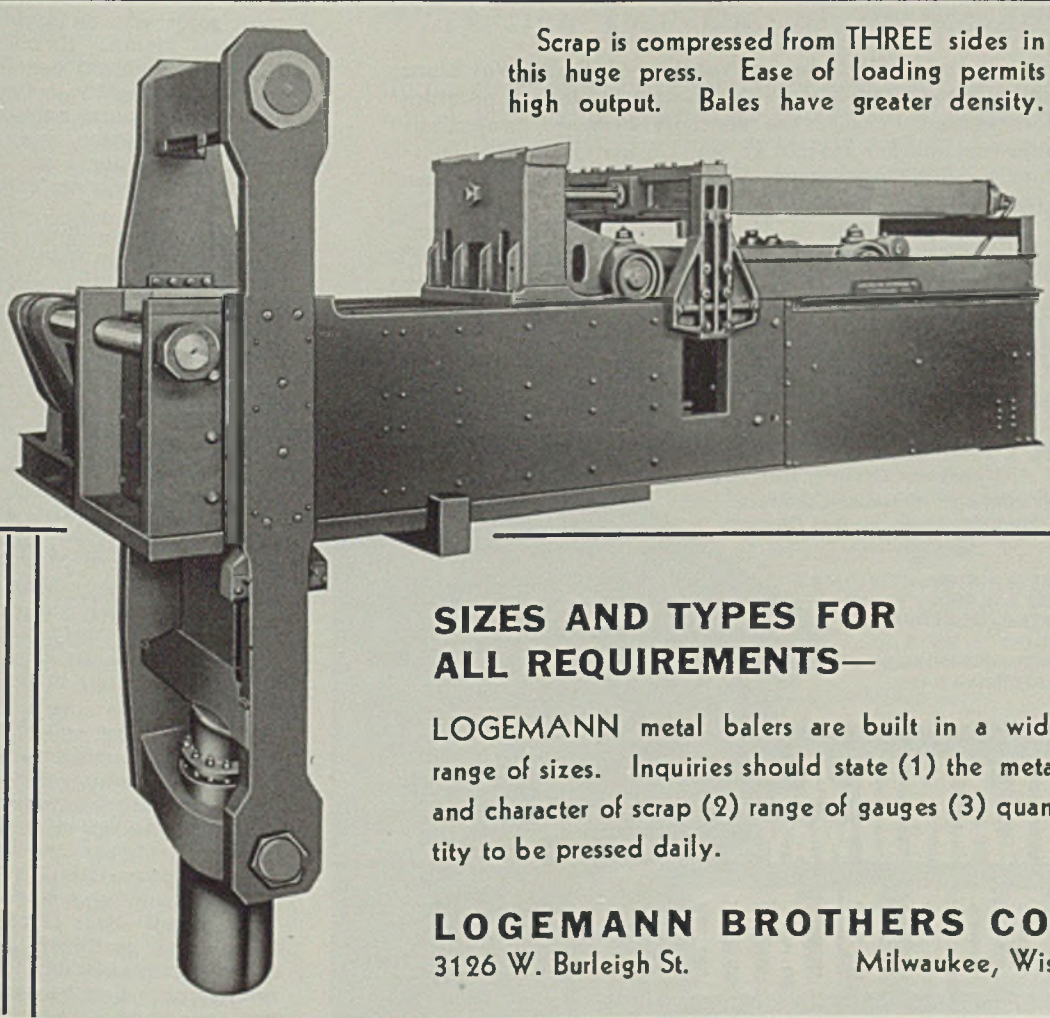
Sulphide conc., lb. Mo. cont., mines	$0.75

SHEET SCRAP?

Bale it in a LOGEMANN SCRAP PRESS

"Hydraulic-compressed" scrap pressed in LOGEMANN metal balers, commands the best price at all times. It can be more conveniently stored and more economically handled.

It can be readily held for favorable markets. It practically eliminates corrosion, saves much heat in remelting. It easily loads cars to capacity.



Scrap is compressed from THREE sides in this huge press. Ease of loading permits high output. Bales have greater density.

SIZES AND TYPES FOR ALL REQUIREMENTS—

LOGEMANN metal balers are built in a wide range of sizes. Inquiries should state (1) the metal and character of scrap (2) range of gauges (3) quantity to be pressed daily.

LOGEMANN BROTHERS CO.
3126 W. Burleigh St. Milwaukee, Wis.

Sheets, Strip

Sheet & Strip Prices, Pages 80, 81

Pittsburgh—Bookings last week were the heaviest in several months, principally as a result of automobile programs. Heavy automotive buying is augmented by miscellaneous domestic placements and a sprinkling of export orders. Mill operations are steady at around 75 per cent of capacity.

Chicago—Heavier demand for flat-rolled products results principally from the upturn in automotive operations. Household equipment manufacturers continue fairly busy. Buying still is retarded somewhat by consumers' inventory additions in recent weeks. The department of agriculture has taken bids on additional bins for the storage of corn. If purchased in the maximum number indicated these bins will require more than 30,000 tons of sheets and other steel products.

Boston—Most strip buying is by fabricators of standard products requiring specialties, who fear a possible shortage later. Buying slackened the last three days previous to the holiday and incoming volume in August about equaled the previous month, with shipments and operations close to 90 per cent of capacity. Sheet buying is sluggish with mill consumers and secondary distributors working off stocks taken in at lower prices.

New York—On the meager tonnage of hot-rolled sheets being bought, 2.10c base, appears to be holding despite reports of concessions for tonnage in some areas. The same applies to galvanized at 3.50c base, but orders for both are admittedly limited. Buying is mostly confined to special finishes not involved in price weakness of recent months or for needs developing from newly placed defense orders, which are being booked in increasing number. These frequently require specifications on which consumers are not covered. Stainless material is moving well and deliveries are becoming more extended.

While there was a temporary lull in cold strip buying just previous to the holiday, decline in new orders was slight and August volume with most mills was on a par with the previous month. Re-rolling operations are high, 90 per cent of capacity or slightly better. More specifications are appearing from automotive buyers, including part-makers, who for some time have placed most tonnage for that industry.

Philadelphia—Sheet prices currently are being scrutinized closely but it appears that 2.10c on hot rolled applies generally on the small volume of business now being placed. It is understood that substantial additional protection has been extended on the basis of 1.90c to firms with large automotive contracts but this is not regarded as out of line, inasmuch as tentative arrangements had been concluded a number of weeks ago. Deliveries still are being made against low-priced contracts at mill convenience. According to some estimates, 80 per cent or more of consumer requirements for the balance of the year will be met from steel bought on these contracts.

Buffalo—Mills have increased production of sheet and strip steel to capacity on a six-day week basis from the normal five-day week. Brisk operations, however, are making little impression on substantial backlogs. Active buying for defense purposes is augmented by an increased flow of motor business.

Cincinnati—Base prices on sheets have been reaffirmed for fourth quarter. Considerable tonnage was quickly placed on books. The market generally appears stronger,

partly from expanding releases for automotive needs. Books of mills fail to reflect direct national defense requirements.

St. Louis—Specifications on steel sheets and strip have increased further, users being disposed to build up reserves. Container and steel furniture manufacturers are ordering freely. Automotive releases of strip are larger.

Birmingham, Ala. — Sheet production, while still active, has given way in some measure to increased output of heavy items. Demand is fairly even between manufacturers' and roofing sheets, and output is at 80 per cent or slightly better. Strip production is reasonably good, mainly cotton ties.

Toronto, Ont.—Sheet and strip orders are heavy and Canadian mills now report contracts running to the end of the year and orders now being closed are for delivery early in 1941. The automotive industry has bought heavily recently and other consumers outside war contractors, also have placed substantial tonnages.

Tin Plate

Tin Plate Prices, Page 80

Pittsburgh—Tin mill operations were off another 5 points last week to 57 per cent of capacity. New business is not developing as rapidly as had been expected and in all probability there will be little increase in production over the balance of the year. Stocks remain fairly heavy, with domestic and export shipments good.

New York—Buying and specifications lag, due to stock accumulation by mills and consumers. Curtailment of exports is also a factor, usual commercial channels abroad not taking usual volume.

Fourth Quarter Steel Prices Are Unchanged

Prices on steel products have been reaffirmed for fourth quarter, as had been generally expected in the trade. Carnegie-Illinois Steel Corp. Aug. 27 issued the following announcement:

"Carnegie-Illinois Steel Corp. announced today reaffirmation of its present base prices on hot-rolled carbon steel semifinished material, bars, structural shapes, plates, steel sheet piling, hot and cold-rolled sheets, hot-rolled strip and standard rails, as well as all hot-rolled alloy steel items, excepting alloy plates, on which it has announced base prices of $3.275 per 100 pounds, delivered Pittsburgh, and $3.28 per 100 pounds, delivered Chicago, all for shipment

to and including Dec. 31, 1940, for delivery and consumption in the United States.

"The prices will apply only on such shipments as are made up to and including Dec. 31, 1940, and any shipments after that will be billed at the prices then in effect."

Alloy plates, on which a price was announced, have not been quoted previously, the price having been furnished on application.

Other steelmakers followed with similar announcements during the week, establishing the market for the remainder of the year.

Plates

Plate Prices, Page 80

Pittsburgh — Shipments during August were equal to those of July. Wide plate deliveries are considerably delayed, but narrow widths can be had on relatively short notice. Base price has been announced on alloy plates and extra books were issued late last week on this item.

Chicago—Demand from railroads is increasing as a result of better activity at repair shops and heavier orders recently for new freight cars. Tank fabricators are fairly busy, with builders of machinery and heavy industrial equipment good outlets for plates. Mills have sizable backlogs, although early delivery is available on lighter gages. Shipments are deferred five to six weeks on heavier sections.

Boston—Plate demand tapered toward the close of August. Shipments are well maintained, however, with deliveries in wider sizes and alloys slightly more extended. The same is true of large-diameter heads. Shipyard specifications and navy tonnage being bid for delivery to New England yards lead activity. The lag smaller yards have experienced is expected to be taken up shortly by contracts for small, speedy naval craft. While miscellaneous industrial needs tend upward, specified work is light. Construction requirements are gaining, although individual tonnages involved are not large. Heavy machinery and equipment demand is improving.

New York — Plate shipments are active and specifications, despite a mild lull in buying, maintain high rolling schedules, with deliveries six to eight weeks on wider widths; smaller sizes three to four. Railroads are buying sparingly for maintenance needs, but car-building shops are generally covered against current requirements.

Philadelphia — It is understood that the Navy department will issue revised inquiries for more than 100,000 tons bars, plates and shapes, Sept. 6. Under the revised plan, requirements will be broken down into smaller units so that more companies may bid on them. Also it is understood bids may be entered for requirements for one or more yards. Also as part of the plan black and galvanized items will be separated. Platemakers are reported considering establishment of a new card providing increased extras for quality, quantities and size, with an extra for silicon or aluminum killed steel. Some companies already are charging an extra of $5 per ton for killed steel. There has been some talk among independents relative to the possible re-establishment of a higher base price on plates, such as was the case a number of months ago. At that time, several interests quoted 2.35c. base, or $5 a ton above the figure named by larger interests.

Birmingham, Ala. — Plates continue probably the most active steel product as demand is unabated from such major users as shipbuilders, manufacturers of tanks and car builders. Deliveries are considerably delayed and bookings continue

heavy. Cutput is at virtual capacity.

Seattle — Ship repair and ship construction jobs have increased demand for plates, some fabricators complaining of slow deliveries. United States engineer, Portland, has received bids for an unstated tonnage, Lukens Steel Co., low on one schedule at $5113, Columbia Steel Co. low on another at $5979.

San Francisco—Awards have so far been made by the navy department, for from 4 to 20 lighters under schedule 2575, involving approximately 100 tons each as follows; Basalt Rock Co., Napa, Calif., secured 800 tons for eight and Puget Sound Bridge & Dredging Co., Seattle, booked one at 100 tons. Awards totaled 2263 tons, bringing the year's aggregate to 57,170 tons, compared with 35,314 tons for the same period a year ago.

Toronto, Ont.—Plate demand is larger as a result of additional contracts just placed and in prospect for ship construction and for building of war tanks. Canadian plate production has been absorbed to the end of the year and new demand is going chiefly to the United States.

Plate Contracts Placed

15,000 tons, fabricated steel plates, steel bolts and miscellaneous parts, additional locks, Panama Canal, schedule 4171; bids Aug. 6, Washington.

800 tons, eight lighters, navy department, schedule 2575, to Basalt Rock Co., Napa, Calif.

700 tons, standby plant for gas department, Long Beach, Calif., to Southwestern Engineering Co., Los Angeles.

500 tons, wind tunnel, Moffett Field, Calif., to Moore Drydock Co., Oakland, Calif.

100 tons, one lighter, navy department, schedule 2575, to Puget Sound Bridge & Dredging Co., Seattle, Wash.

Unstated tonnage, 150,000-gallon elevated tank, spec. 1005, Norfolk navy yard, Portsmouth, Va., to Chicago Bridge & Iron Co., Chicago.

Plate Contracts Pending

7000 tons, 40 lighters, navy department, schedule 2764; bids Sept. 6.

1725 tons, fabricated high-strength low-alloy steel plates for gate decks and 592 tons low alloy steel deck supports schedule 4274, Panama, bids Sept. 9; also 31 tons, bolts, screws, eyebolts and seal bars.

1280 tons, fabricated high-strength low-alloy plates, and bolts, schedule 4303 Panama; bids Sept. 12, Washington.

220 tons, eight mine sweepers of 600 tons standard displacement each, in lots of two, three or four; bids Sept. 18, navy department.

145 tons, 300,000-gallon elevated steel tank, southeastern airport, Mobile, Ala., Taylor Iron Works, Macon, Ga., low.

Unstated, 300,000-gallon elevated water tank, Chanute field, Rantoul, Ill.; bids Sept. 3.

Unstated tonnage, one 550-ton steel cargo barge for army transport service, Honolulu, T. H.; bids in the Holabird quartermaster depot, Baltimore.

Unstated tonnage, two 250,000-gallon elevated steel water tanks, Camp Custer, Mich.; bids in to constructing quartermaster, that station.

Unstated, Columbia river drainage projects, Lukens Steel Co. and Columbia Steel Co., low to United States engineer, Portland, Oreg.

Unstated, 39,460 feet of 4 to 20-inch welded steel pipe and fittings; bids to Denver, Sept. 11; Spec. 1420-D.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 81

New York—Improved demand for larger bolts and nuts reflects more pier, dry dock, shipyard and heavy construction work. Operations are 55-60 per cent of capacity with producers of heavier goods while those engaged on lighter products are more active with automotive and airplane requirements supplying most new business. Eliot & Wadsworth, Providence, R. I., has the contract for a pier, Electric Boat Co., Groton, Conn., and McLane Construction Co., Baltimore, for a dry dock, Newport News Shipbuilding & Dry Dock Co., Newport, Va., both taking fair tonnages of bolts and nuts.

Bars

Bar Prices, Page 80

Pittsburgh—Bar bookings are active. Automotive releases are heavy and miscellaneous buying has appeared, although there is as yet no sign of a jam in this district. Export demand is fairly good. Demand for cold-finished materials is heavy, with shipments running normal.

Chicago—Bar sales continue active from a diversified list of consumers and despite heavy shipments, backlogs are sustained. With expanding automotive operations, sustained or heavier needs of farm equipment builders and growing demands for the defense program, bar mills are faced with brisk schedules for an extended period.

Boston — While numerous consumers of carbon steel and alloy bars, notably government shops, are covered well ahead, broadening consumption as orders for defense products appear, tends to maintain active demand. This is especially true of alloys, deliveries on some sizes and finishes of which are slipping slightly. Secondary distributors of bars are moving good volume, small orders being frequent and well diversified. On some finishes, government shops have or are seeking to cover beyond fourth quarter, although reaffirmed prices apply only to shipments up to Dec. 31.

New York—Alloy steel bar buying is relatively more active than carbon bar demand, the latter being affected by heavy specifications for semifinished in larger sizes. Orders for alloys are broadening with deliveries falling further behind, notably aircraft electric furnace material which with other heat-treated stock ranges up to 12 weeks. Orders for defense products are increasingly stimulating bar demand, larger diameters for forgings especially.

Philadelphia — Further pressure for bars is developing as the result of national defense program. It is estimated that fully 75 per cent of forging capacity, estimated at 120,000 tons annually, will be engaged within the next year or so. Large orders for forgings have been placed and others are in the making, pending inquiries including 50,000 37-millimeter cannon for aircraft. Machine tool builders continue busy and are purchasing material well ahead. As an example, one interest has just placed about 200 tons of an item which is expected to cover requirements 12 to 18 months ahead. Makers of screw machine products also are busy.

Buffalo—With consumers pressing for delivery mills have extended bar mill rolling schedules to six days a week at capacity. One mill shut down only for a single eight-hour shift on Sunday. Deliveries continue to lag.

Toronto, Ont.—Merchant bar sales show steady improvement, with large demand reported from the automotive industry, toolmakers and other consumers. Demand for the mining industry gave a sharp spurt to forward delivery bookings during the past week or ten days. Canadian mills are booked into November on bars, but no special difficulty is reported in meeting domestic demands.

Ferroalloys

Ferroalloy Prices, Page 82

New York—Fourth quarter prices on ferroalloys are expected around Sept. 10-15. Meanwhile shipments of ferro manganese and other products are slack with consumers drawing substantially against supplies taken in before the last increases. High rate of steel operations, however,

has steadily lowered inventories and regardless of price developments later this month, more consumers are expected to replenish stocks early in September.

Pipe

Pipe Prices, Page 81

Pittsburgh—Oil country goods and pressure tubing were off slightly last week, but there has been a slight increase in standard pipe. Prices are firmer on carload lots, although the secondary market remains spotty. Mechanical tubing orders are somewhat better, reflecting increased automotive demand. Line pipe is down considerably, the decline being enough to drop August pipe bookings below the July level.

Boston — Merchant steel pipe demand gradually improves, but most such tonnage is yet to come out, notably for multiple housing. Resale prices continue mixed. Cast pipe buying is limited to scattered lots with few involving more than 100 tons. Demand for mechanical and seamless tubing is well maintained, aircraft taking alloys in good volume while the Springfield, Mass., armory closed on 110,000 feet of seamless.

New York—Merchant steel pipe prices are unchanged and mills are holding firmer but resale quotations continue mixed and easy. Demand and prospective volume are slightly heavier. Cast pipe buying for domestic needs is in small scattered lots but export demand is good.

Seattle — No large projects are up for figures but demand for small tonnages is active and prospects improved. H. G. Purcell, Seattle, has been awarded 134 tons of 4 to 10-inch cast iron pipe for the Fort Lewis, Wash., army post. Estacada, Oreg., has decided to purchase steel pipe and has awarded 44,000 feet to Consolidated Supply Co., Portland.

San Francisco—Only one cast iron pipe letting of size was reported placed. United States Pipe & Foundry Co. took 163 tons of 10 and 16-inch pipe for east bay municipal utility district, Oakland, Calif.

Cast Pipe Placed

200 tons, 6-inch, Brockton, Mass., to Warren Pipe Co., Everett, Mass.

200 tons, Shelbourne, Vt., to Warren Pipe Co., Everett, Mass.

180 tons, Holton, Me., to United States Pipe & Foundry Co., Burlington, N. J.

168 tons, 10 and 16-inch, Class 150, east bay municipal utility district, Oakland, Calif., to United States Pipe & Foundry Co., Burlington, N. J.

134 tons, 4 to 10-inch, for Fort Lewis, Wash., to H. G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.

100 tons, Lynn, Mass., to Warren Pipe Co., Everett, Mass.

Cast Pipe Pending

810 tons, 8 to 14-inch, cast iron, asbestos, steel or concrete pipe, Bishop, Calif.; bids opened.

287 tons, 8-inch, San Francisco; bids Sept. 6.

200 tons, 6 to 20-inch, for Spokane, Wash.; bids in.

190 tons, 8-inch, San Francisco; Central Foundry Co., low.

Steel Pipe Placed

Unstated, 44,000 feet, for Estacada, Oreg., to Consolidated Supply Co., Portland, Oreg.

Steel Pipe Pending

Unstated tonnage, 30,000 feet, 2-inch standard pipe, 7-foot lengths, department of streets and electricity, Chicago; bids Sept. 4.

Wire

Wire Prices, Page 81

Pittsburgh—Manufacturers' items are moving fairly well. Considerable new domestic buying has ap-

peared and numerous export orders involving fair tonnage are pending. In the merchant market some interest is being shown in export wire items, particularly barbed wire, nails and fencing. On the domestic scene, jobbers are stocked fairly well and buying is relatively light, considering the season. However, agricultural demand is increasing and it is expected to reach fair levels during September.

Boston—With releases to the automotive industry improving, incoming wire volume is widely diversified and sustained. Orders, notably for some specialties, are ahead of shipments, which are heavy, with finishing departments in numerous instances close to 95 per cent or practically at capacity. Prompt delivery is stressed by many of these buyers. This is especially true of business traceable to government defense orders, which are being taken in New England in increasing number.

New York—Wire buying continues brisk and well spread. Automotive purchases are expanding and incoming orders to mills reflect heavier defense contracts involving wire. Prompt delivery is asked on numerous specialties, buying of which continues active. Large government orders for rope, cable and electrical materials have been placed with inquiry still heavy. While operations in some finishing departments are close to capacity and shipments in line, incoming tonnage is such as to maintain backlogs on many products. Spring wire continues on the pickup.

Birmingham, Ala. — Output of wire products has slackened somewhat although the aggregate output is satisfactory. Cotton picking season, just now setting in, is believed to figure substantially in the let-down. Production is around 80 per cent.

Rails, Cars

Track Material Prices, Page 81

Railroad buying is light, most important tonnage being 26,400 tons of rails for the Illinois Central, which is expected to be placed this week. The Wabash has distributed 5000 tons of rails.

Elgin, Joliet & Eastern has placed 15 diesel-electric switchers and Chicago, St. Paul, Minneapolis & Omaha three. Car buying has been in small lots.

Locomotives Placed

Chicago, St. Paul, Minneapolis & Omaha, three diesel switch engines; one 600-horsepower and one 1000-horsepower to Electro-Motive Corp., La Grange, Ill.; one 1000-horsepower to American Locomotive Co., New York.

Elgin, Joliet & Eastern, 15 diesel electric switch engines; two 1000-horsepower and six 600-horsepower to Electro-Motive Corp., LaGrange, Ill.; two 1000-horsepower and two 660-horsepower, to American Locomotive Co., New York, and three 660-horsepower to Baldwin Locomotive Works, Philadelphia.

Car Orders Placed

Atlantic Coast Line, 125 flat cars, to Greenville Car Co., Greenville, Pa.

Charleston & Western Carolina, 35 hoppers, 50-ton capacity, to Pullman-Standard Car Mfg. Co., Chicago.

Chicago, Indianapolis & Louisville, 100 hoppers, 50-ton capacity, to Pullman-Standard Car Mfg. Co., Chicago.

Chicago & Northwestern, reconditioning of 500 forty-eight foot drop end gondolas and 500 forty-foot drop bottom gondolas, to own shops.

Monon, 100 hopper-bottom coal cars to Pullman-Standard Car Mfg. Co., Chicago.

National Council of Railways of Colombia, 22 diesel-powered rail-motor coaches and 13 trailer coaches to American Car & Foundry Co., New York.

Car Orders Pending

Chicago, Rock Island & Pacific, to rebuild 300 flat cars and remodel 100 coal

cars in own shops.

Duluth, Missabe & Iron Range, thirty 50-ton ballast and ten 70-ton hoppers.

Louisiana & Arkansas, 50 to 100 hoppers, 70 tons capacity each.

Pittsburgh & Lake Erie, 1000 high-side gondolas.

United States engineer, Washington, three 50-ton flat cars and three 50-ton gondolas for Rock Island arsenal; bids Sept. 5.

Rail Orders Placed

Wabash, 5000 tons; 2750 tons to Carnegie-Illinois Steel Corp., Chicago; 1125 tons each to Inland Steel Co., Chicago, and Bethlehem Steel Co., Bethlehem, Pa.

Rail Orders Pending

26,400 tons, Illinois Central; contracts expected to be placed this week.

Shapes

Structural Shape Prices, Page 80

Pittsburgh — Construction inquiries were slightly lighter last week and awards also were slightly off. However, heavy unplaced tonnage remains in the market and mill backlogs show no signs of moving downward. Heavy sections, in particular, cannot be delivered less than 60 days. Public works and private industrial expansion projects are both active.

Chicago — Structural orders and prospective business continue to expand. Mills are unable to work off backlogs, with four to five weeks required for delivery of standard shapes. Demand other than for building construction remains active. Work in sight for coming weeks points to no easing in the delivery situation before end of the year.

Boston — Heavier structural tonnage going to fabricating shops includes 3000 tons for additional hangars, Quonset Point, R. I., but current contracts are overshadowed by prospective new work and pending tonnage, led by a 11,500-ton bridge, Hartford, Conn., bids Sept. 17. This will be followed by a large structure over the Thames, New London, Conn., and probably later by another at South Portland, Me. Meanwhile a large volume of heavy steel is required for cost-plus-fee contracts at shipyards, naval bases and other government stations. Considerable of this has reached the active stage for steel bidding.

New York — Tentative contract for the first subway section placed in months, 14,000 tons of structural steel, was awarded to American Bridge Co., Pittsburgh. Aggregate volume going to fabricating shops is heavier. Plain shape deliveries range from six to eight weeks, depending on size. Tonnage of structural steel required for defense program construction and yet to be estimated or bought strongly indicates total bookings for the fabricating industry this year will surpass that of 1939.

Structural steel contracts closed in July totaled 184,499 tons, compared with 109,744 tons in June and 114,056 tons in July, 1939, according to the American Institute of Steel Construction. Shipments in July were 117,438 tons, compared with 119,087 in June and 110,473 in July last year. Total orders for seven months were

Shape Awards Compared

	Tons
Week ended Aug. 31	29,909
Week ended Aug. 24	23,819
Week ended Aug. 17	19,467
This week, 1939	23,897
Weekly average, year, 1940	21,285
Weekly average, 1939	22,411
Weekly average, July	33,958
Total to date, 1939	776,945
Total to date, 1940	754,990

Includes awards of 100 tons or more.

Behind the Scenes with STEEL

On vacation—see you next week.

SHRDLU

803,730 tons, compared with 780,303 in the same period last year; shipments were 772,450 tons compared with 781,300 tons.

Philadelphia — Approximately 14,000 tons of heavy H-piling for two navy yard drydocks has been tentatively placed with two steel companies. Before these jobs are completed, it is estimated that close to 25,000 tons will be required. Considerable other work also is pending, including public work and plant extensions.

San Francisco—While structural awards were by no means heavy, aggregating 1040 tons, pending business exceeds 24,500 tons. Milwaukee Bridge Co. booked 335 tons for barracks, hospital and post exchange for the Alaska air base at Fairbanks. Columbia Steel Co. took 334 tons of sheet piling for the United States engineer office, Portland, Oreg.

Birmingham, Ala. — Shape output has shown substantial improvement and tonnage is large. Bridge and highway work and private construction account for most bookings.

Shape Contracts Placed

3000 tons, steel sheet piling, concrete flood walls, earth dikes and appurtenant works, Connecticut river below highway bridge, Hartford, Conn., to Weirton Steel Co., Weirton, W. Va.; A. I. Savin Construction Co., East Hartford, Conn., contractor, $1,618,467, United States engineer project, Providence district.

3000 tons, four land plane hangars, air station, Quonset Point, R. I., to Phoenix Bridge Co., Phoenixville, Pa.; Merritt-Chapman & Scott Corp. and George A. Fuller Co., New York, joint contractors.

3000 tons, shop buildings, navy yard, Brooklyn, to American Bridge Co., Pittsburgh; Walter Kidde Constructors, Inc., New York, contractor.

2660 tons, trestle, Cherokee dam, Holston river, Tennessee, TVA req. 214544, to Mt. Vernon Bridge Co., Mt. Vernon, O.

1675 tons, depot supply building, Southeast airport, Mobile, Ala., to Virginia Bridge Co., Roanoke, Va.; Foster & Creighton, Nashville, Tenn., contractors.

1525 tons, additional buildings, Willowbrook state school and hospital, Staten Island, N. Y., to Belmont Iron Works, Philadelphia, through Weinstein & Rubin, New York.

1510 tons, power house addition, Northern States Power Co., St. Paul, Minn., to St. Paul Foundry Co., St. Paul.

1500 tons, bridge, Belt parkway, Brooklyn, to American Bridge Co., Pittsburgh, Triborough bridge authority project; Mill Basin Asphalt Co., New York, contractor.

1200 tons, plant addition, Libbey-Owens-Ford Glass Co., Toledo, O., to Mississippi Valley Structural Steel Co., Decatur, Ill.

1000 tons, extension to power plant, Deepwater Operating Co., Penns Grove, N. J., to Fort Pitt Bridge Works, Pittsburgh.

730 tons, additions to erecting and testing buildings, Electro-Motive Corp., McCook, Ill., to Joseph T. Ryerson & Son Inc., Chicago.

655 tons, bridge FAP-314, Bowie and Cass counties, Texas, to Mosher Steel Co., Dallas, Tex.

540 tons, repair shop, southeast airport, Mobile, Ala., to Nashville Bridge Co., Nashville, Tenn.; Foster & Creighton, Nashville, contractor.

510 tons, office building, United Carbon Co., Charleston, W. Va., to Pittsburgh Bridge & Iron Co., Pittsburgh.

500 tons, piling, Fort Supply dam, Supply, Okla., for United States engineer, Tulsa, Okla., to unstated interest; Leo C. Sanders, contractor.

390 tons, transmission towers, Dallas Power & Light Co., Dallas, Tex., to Emsco Derrick & Equipment Co., Los Angeles.

350 tons, four buildings, air station, Quonset Point, R. I., to Ingalls Iron Works, Birmingham, Merritt-Chapman & Scott Corp. and George A. Fuller Co., New York, joint contractors.

340 tons, cleaning house, Pittsburgh Steel Co., Monessen, Pa., to Pittsburgh Bridge & Iron Co., Pittsburgh.

335 tons, barracks, hospital and post exchange, invitation 6808-41-110, Alaskan air base, Fairbanks, Alaska, to Milwaukee Bridge Co., Milwaukee.

334 tons, sheet piling, United States engineer office, Portland, Oreg., to Columbia Steel Co., San Francisco.

330 tons, plant building, Chicago, Wilmington & Franklin Coal Co., Frankfort, Ill., to Vincennes Steel Corp., Vincennes, Ind.

325 tons, piling, bridge, Missouri state highway commission, St. Louis, to Inland Steel Co., Chicago; bids June 7, G. L. Tarlton, contractor.

300 tons, mill buildings, Republic Steel Corp., Gary, Ind., to Truscon Steel Co., Youngstown, O.

300 tons, power house substructure, Fort Peck dam, Mont., to Des Moines Steel Co., Des Moines, Ia.; Wood Bros. Construction Co., Lincoln, Nebr., contractor.

270 tons, bridge R-336, section 6, Northumberland county, Pennsylvania, to Fort Pitt Bridge Works, Pittsburgh.

260 tons, power house, Utility Management Corp., St. Petersburg, Fla., to Belmont Iron Works, Eddystone, Pa.

240 tons, state bridge 1, Walkill, N. Y., to American Bridge Co., Pittsburgh.

225 tons, beams and fabricated shapes, state procurement office, Nashville, for Rives, Tenn., to Nashville Bridge Co., Nashville.

220 tons, forge shop, Budd Wheel Co., Detroit, to R. C. Mahon Co., Detroit.

200 tons, grade separation bridge, Cleveland, for state of Ohio, to Fort Pitt Bridge Works, Pittsburgh.

200 tons, housing project, New Britain, Conn., to National Steel Products Co., Hartford, Conn., through Southern New England Contracting Co.

185 tons, building, Chemical National Bank, New York, to Harris Structural Steel Co., New York, through James Stewart & Co., New York.

175 tons, overpass, Dennisville, N. J., for state, to American Bridge Co., Pittsburgh.

175 tons, alterations to bleach room, Penobscot Chemical Fibre Co., Great Works, Me., to Bethlehem Fabricators Inc., Bethlehem, Pa.

170 tons, piling, bridge, Texas state highway department, to Bethlehem Steel Co., Bethlehem, Pa.; bids July 23.

145 tons, central heating plant, Chicopee Falls, Mass., for army, to Haarmann Steel Co., Holyoke, Mass.

140 tons, addition, steel storage building No. 187, navy yard, Boston, to Phoenix Bridge Co., Phoenixville, Pa.

135 tons, state bridge 755, Viroqua, Wis., to unstated supplier.

130 tons, state highway bridge, Livingston county, New York, to Bethlehem Steel Co., Buffalo.

125 tons, bridge, Lafayette county, Mississippi, to Virginia Bridge Co., Roanoke, Va.

125 tons, building, for P. J. Schweitzer Inc., Elizabeth, N. J., to Oltmer Iron Works, Jersey City, N. J.

125 tons, vertical lift trucking bridge, Chicago, for Chicago, Milwaukee, St. Paul & Pacific railroad, to Wisconsin Bridge & Iron Co., Milwaukee.

120 tons, turbogenerator foundations, for Pennsylvania Electric Co., Seward, Pa., to Lehigh Structural Steel Co., Allentown, Pa.

110 tons bridge, B1 of 36-6-1, Tyron, Iron county, Mich., to Worden Allen Co., Milwaukee.

110 tons, FAP-300, Shelby county, Tennessee to Pidgeon-Thomas Iron Co. Inc., Memphis.

110 tons, building Borden Co., 125th street, New York, to Bethlehem Steel Co., Bethlehem, Pa.

105 tons, state highway bridge, Stager, Mich., to Worden-Allen Co., Milwaukee.

100 tons, beam bridges, Essex-Hinesburg-Huntington, Vt., to Bermont Structural Steel Co., Burlington, Vt., through Warnard Constructions Inc., Boston.

Shape Contracts Pending

14,000 tons, subway route 110, section 10, Brooklyn; George H. Flinn Corp., New York, low.

2800 tons, trusses, Portsmouth, Va., for navy department.

2700 tons, Benjamin Franklin high school, New York; Psaty & Fuhrman Inc., New York, low.

1800 tons, Woodrow Wilson high school, New York; Psaty & Fuhrman Inc., New York, low.

1200 tons, apartment, Sixty-first street and Park avenue, New York.

1000 tons, factory building, Springfield armory, Springfield, Mass., for government.

1000 tons, three bridges, relocation Great Northern railway, Columbia basin project, Kettle Falls, Wash.; Norris Bros., Burlington, Wash., low on general contract.

900 tons, bridge, Boston road, New York, for city.

850 tons, building extensions, Bethlehem Steel Co., Staten Island, New York.

800 tons, including other items, Bonneville, Wash., power house; bids opened by United States engineer, Aug. 30.

600 tons, New York Central railroad

bridge, Cowden, Ill.

565 tons, extension to power plant, for Toledo Edison Co., Toledo, O.

500 tons, addition, crane runways and buildings, navy yard, Philadelphia, Hughes-Foulkrod Co., Philadelphia, general contractor.

490 tons, hospital building, St. Vincent's hospital, New York.

385 tons, paint and oil storehouse, Quonset Point, R. I., for navy.

350 tons, overhead crossing FAGH-286-A, Wyndmere, N. Dak., for state.

350 tons, hangar building, Denver, for city and county of Denver.

350 tons, addition, federal reserve bank of Philadelphia, Philadelphia, bids Aug. 29.

333 tons, steel sheet piling Columbia river drainage projects; Inland Steel Co., Chicago, and Columbia Steel Co., low to United States engineer.

325 tons, bridge, Fayette county, Pa., Midwest Construction Co., Chicago, low.

325 tons, state highway bridge, Westfield, N. Y.; bids Sept. 4.

320 tons, medical school, Carlisle, Pa., H. A. Williams, Allentown, Pa., low general contract.

275 tons, shipping and storage building, for Warren Telechron Co., Ashland, Mass.

260 tons, bridges, Wilkinsburg and Churchill boroughs, Allegheny county, Pennsylvania; bids to state highway department, Harrisburg, Pa., Sept. 6.

250 tons, addition, public school 29, Staten Island, N. Y.; Jonwall Construction Co., New York, low.

240 tons, supports, Duchesne tunnel, Provo river project, Utah; Utah Construction Co., box 187, Ogden, Utah, low at $727,578.

200 tons, trusses for building, for unstated owner, Chicago.

200 tons, state highway bridge, Dunkirk, N. Y.; Bero Engineering & Construction Co., Tonawanda, N. Y., low on general contract.

197 tons, addition to Electrical Engineering building, Purdue university, Lafayette, Ind.

175 tons, state bridge 2014, Franklin, Ind.

175 tons, factory building, Eaton Mfg. Co., Cleveland.

150 tons, state bridge 2011, Mechanicsburg, Ind.

150 tons, two state highway bridges, Allegany county, New York, Steinbiser Co., Belfast, N. Y., low on general contract.

140 tons, state highway bridge, Hamburg, N. Y.; bids Sept. 4.

135 tons, jail building, Chemung county, New York.

135 tons, sheet piling, United States Indian irrigation service, Parker, Ariz.; bids opened.

135 tons, steel piles, flood wall and dike, Hartford, Conn.; B. Perini & Sons, Inc., Framingham, Mass., contractor, $2,877,784, bids Aug. 23, U. S. engineer, Providence, R. I.

115 tons, state highway bridge, Kemmerer, Wyo.

115 tons, viaduct, Crookston, Nebr., for state.

115 tons, coaling station, Faribault, Minn., for Chicago, Milwaukee, St. Paul & Pacific railroad.

110 tons, building, for Howard Sober, Lansing, Mich.

110 tons, addition to Letsche school, Pittsburgh.

110 tons, building, Colonial theater, Elmira, N. Y.

100 tons, coaling station, Chicago, Milwaukee, St. Paul & Pacific railroad, Faribault, Minn.

100 tons, airport, Stockton, Calif.; bids Sept. 4.

100 tons, state highway bridge, Ontario county, New York; bids Sept. 4.

Reinforcing

Reinforcing Bar Prices, Page 81

Pittsburgh—Jobber prices along the eastern seaboard have strengthened, although mill prices were somewhat weaker last week. In the Midwest levels are firm, and over the country as a whole, shading is somewhat less frequent. Buying is active, with a fair number of new jobs appearing last week and considerable unplaced tonnage remaining in the market. Export demand is heavy, although placements are lighter.

Chicago—Concrete bar orders are sustained, and the amount of building and engineering construction for which plans now are being prepared points to continued good demand. It is difficult to estimate the proportion of current work which

is related to defense measures, but considerable building activity is for ordinary industrial requirements.

Boston — Reinforcing steel buying is heavier, but is not keeping pace with the volume of new work pending or being estimated. B. Perini & Sons Inc., Framingham, Mass., booked the largest active project in the East, pressure conduit, Park river, Hartford, Conn., 8600 tons. Housing requirements, which are mounting, are further stimulated by several such projects for defense employes, two being approved for Portsmouth, N. H., and Newport, R. I.

New York—One of the few weak spots in the steel price structure is on highway mesh, with concrete bars firmer than usual, although shading on the latter has not entirely disappeared. Demand for mesh is fairly active, but keen competition continues to bring about soft quotations. Bar buying is heavier in the East, notably in Connecticut.

Seattle — Bids are in to United States engineer, Bonneville, Wash., for units 7 to 10 of Bonneville power house substructure, involving 7000 tons, one of the largest reinforcing jobs of the year. Other large contracts are soon to develop. Meanwhile there is an increase in small lots of less than 50 tons each. Rolling mills have fair backlogs. Merchant bars continue to move freely. Prices are firm.

Reinforcing Steel Awards

8600 tons, pressure conduit and appurtenant structures, Park river, Connecticut tributary, Hartford, Conn., to Bethlehem, Pa.; B. Perini & Sons Inc., Framingham, Mass., contractors, bid Aug. 23 to U. S. engineer, Providence, R. I.

3000 tons, navy yard warehouse and office building, Brooklyn, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.; Turner Construction Co., New York, contractor.

2350 tons, Kingsboro housing project, Brooklyn, to Seaboard Steel Products Corp., New York; Cauldwell-Wingate Co., New York, contractor.

1500 tons, bars and sheet piling, East river drive, Thirtieth to Thirty-sixth street, New York, to Bethlehem Steel Co., Bethlehem, Pa., through Allen N. Spooner & Son Inc., New York.

1000 tons, South End housing project, Bridgeport, Conn., to Truscon Steel Co., Youngstown, O.; E. & F. Construction Co., Bridgeport, Conn.

750 tons, bars and shapes, housing units, Ga. 6-5, Pt. 2, Atlanta, Ga., to Truscon Steel Co., Youngstown, O.; Beers Construction Co., Atlanta, contractor.

700 tons, grain elevator, East St. Louis, Ill., to Laclede Steel Co., St. Louis.

700 tons, Libbey-Owens-Ford Glass Co. warehouse and factory, Rossford, O., to Pollak Steel Co.; A. Bentley & Co., contractor.

700 tons, runway and apron paving and drainage, MacDill field, Tampa, Fla., to Florida Steel Products, Inc., Tampa; Ebersbach Construction Co., Tampa, contractor.

600 tons, Newport News Shipbuilding & Drydock Co., pier, Newport News, Va., to Bethlehem Steel Co., Bethlehem, Pa.; McLean Construction Co., contractor.

500 tons, naval academy buildings, Annapolis, Md., to Bethlehem Steel Co., Bethlehem, Pa.; McCloskey & Co., contractor.

500 tons, ten storage warehouses for United States government, Jeffersonville, Ind., to American Builders Inc., Louisville, Ky., through F. W. Owens Co., general contractor, Louisville; 1600 tons of shapes not yet placed.

350 tons, shop buildings, navy yard, Brooklyn, to Ceco Steel Products Co., New York; Walter Kidde Constructors Inc., New York, contractor.

325 tons, mesh, highway project RC-40-57, Orange county, New York, to Pittsburgh Steel Co., Pittsburgh; Frank Stento & Son, Binghamton, N. Y., contractors, $432,551.70.

300 tons, navy yard sub assembly shop, Brooklyn, N. Y., to Republic Steel Corp., Cleveland, through Ceco Steel Products; Walter Kidde Inc., contractor.

300 tons, mesh, state highway project, Herkimer county, New York, to Wickwire-Spencer Steel Co., Buffalo; Dale Engineering Co., Utica, N. Y., contractor, bids Aug. 21, Albany.

256 tons, invitation 8608-40-227, air base, Alaska, to Bethlehem Steel Co., Seattle, Wash.

250 tons, state highway project, Leg. R-14, Bradford, Pa., to Bethlehem Steel Co., Bethlehem, Pa.; H. R. Dickens, contractor.

218 tons, postoffice, Fairmont, W. Va., to West Virginia Rail Co., Huntington, W. Va., through Ross Engineering Co., Washington.

200 tons, warehouse, Dixie-Vortex Co., Chicago, to Joseph T. Ryerson & Son Inc., Chicago.

200 tons, highway section, belt parkway, Brooklyn, N. Y., to Igoe Bros., Newark, N. J., through Turecamo Contracting Co., New York.

170 tons, court house, Marinette, Wis., to Bethlehem Steel Co., Bethlehem, Pa.

124 tons, engine test building and spray pool, Duncan Field, Texas, to Brandt Iron Works, San Antonio, Tex.; Ed W. Oeffinger, San Antonio, contractor.

120 tons, bureau of reclamation, Mills, Wyo., to Pacific Coast Steel Co., San Francisco.

104 tons, bridge, St. Clair county, Ill., to Calumet Steel Co., Chicago.

Concrete Bars Compared

	Tons
Week ended Aug. 31	**23,817**
Week ended Aug. 24	**8,509**
Week ended Aug. 17	**9,147**
This week, 1939	**13,046**
Weekly average, year, 1940	**9,515**
Weekly average, 1939	**9,197**
Weekly average, July	**8,543**
Total to date, 1939	**349,223**
Total to date, 1940	**323,498**

Includes awards of 100 tons or more

Reinforcing Steel Pending

7000 tons, foundations for Bonneville power house; bids to United States engineer, Portland, Oreg., Aug. 30.

1000 tons, bridge, Hartford, Conn.; bids Sept. 17; project also takes 2000 tons steel sheet piling.

900 tons, Outhwaite homes housing, Cleveland; bids Sept. 16.

700 tons, three bridges, Riverton, Va.; bids Sept. 5.

700 tons, Felix field housing, Newark, N. J.

495 tons, typical melt loading line, group 1, government ordnance depot, Savanna, Ill.; Hagstrom Construction Co., Minneapolis, low for general contract.

400 tons, East river drive, contract 34, New York; bids Sept. 4.

400 tons, marginal street improvement, East 41st to East 49th streets, New York; bids Sept. 4.

300 tons, elevator, Hutchinson, Kans.

275 tons, subway station, sec. D-2-C, Chicago; bids Sept. 12.

251 tons, (including miscellaneous) Winthrop, Wash., fish control project; David A. Richardson Co., Leavenworth, Wash., low to reclamation bureau, which will supply materials.

240 tons, navy yard miscellaneous buildings, Philadelphia; Hughes-Foulkrod Co., contractor.

200 tons, Kurth Malting Co., Milwaukee.

200 tons, Albertus Brown homes housing, Toledo, O.; Weinstein Construction Co., low.

180 tons, Allegheny county, Pennsylvania, highway R-187-R-395; bids Sept. 6.

150 tons, highway project, route 44, section 10, Nortonsville, Gloucester county, New Jersey; bids Sept. 13, E. Donald Sterner, state highway commissioner, Trenton, N. J.

137 tons, (including 59 tons shapes) state crossing, Kettle Falls, Wash.; J. A. Terteling & Sons, Boise, Idaho, general contractor.

123 tons, Washington state highway spans and bridge piers, Spokane river; Angeles Gravel & Supply Co., Port Angeles, Wash., general contractor.

115 tons, highway project, state, Pittsford, N. Y.

Pig Iron

Pig Iron Prices, Page 82

Pittsburgh—Production is being maintained at a high level, with demand good. Foundry buying has increased slightly, and some stocking is noticeable. Tonnage produced by integrated mills is at practical peak. Export demand is good.

Chicago—Buyers show little interest in additional forward purchasing, and sellers are not being pressed to make a formal price announcement for next quarter. Meanwhile the market is continued at $23, furnace, for No. 2 foundry and malleable. While orders have been slightly heavier recently, demand consists largely of releases against previous commitments.

Boston—Pig iron shipments are steady and fairly heavy, August deliveries being ahead of July. While buying is slow, more spot orders have been placed than appears on the surface, mostly from foundries booking casting orders in connection with defense contracts.

New York—Formal announcement of pig iron prices for fourth quarter by most blast furnaces is considered unlikely in some quarters with current quotations unchanged unless unforeseen developments materialize. Shipments are maintained and August deliveries were well ahead of those in July. In view of heavier releases buying on the whole is quiet, but here and there where foundries have booked unexpected orders for castings some further purchases are being made. This is the case in armament business. Foundry melt tends upward, and, despite recent substantial shipments consumer inventories have not been mounting materially.

Philadelphia—Considerable uncertainty exists over pig iron prices for fourth quarter despite the fact that some new business has been done within the past few days for that delivery. At the moment, it is believed that prices will be extended on the basis of $24, base, for No. 2 foundry, $24.50 for malleable and $23.50 for basic. This would be in line with the extensions of st prices. A decidedly important f tor which may have a bearing on t price for next quarter is the extrer ly strong market for coke. As indication of the tightness of t situation, it is reported that t British have been unable to obt quantities of iron required and several instances hurry calls ha been set out for substitute carg of scrap.

Buffalo—Third quarter bookin by leading foundries are shrinki as producers report ample dema to absorb entire output at the 92 p cent production rate. Foundri working on aircraft castings a melting at capacity.

Cincinnati—Shipments of pig ir during the latter part of August panded slightly. Demand for ca ings from machine tool manuf turers remains steady, reflecting pacity operations. Pig iron nee are covered by contracts, and bu ing is virtually absent.

St. Louis—Demand for pig ir continues active. While more terest is being taken in fourth qu ter supplies, nothing has been tually booked thus far. Further pansion in the general melt is not with the present rate approximat

0 per cent higher than a month go. This pace is expected to bet- er seasonally during the early all. While deliveries of southern ron are still prompt, sellers re- uest customers to anticipate re- uirements by ten days to two eeks.

Toronto, Ont.—Merchant pig iron ales are at a high level and pro- uction has been increased to take are of requirements by mills and econdary plants. Spot sales are n good volume and melters enter he market at frequent intervals for ots up to 300 tons. Current pro- uction is 93 per cent of Canada's otal with nine out of 10 furnaces n blast.

Scrap

Scrap Prices, Page 81

Pittsburgh—Market is dull on pen-hearth grades, with sales be- g made at the quoted range. elatively heavy buying of No. 2 eel appeared late last week at 17.50 per ton, with the result that rade is off 50 cents. Demand is eavy for railroad specialties, rails and electric furnace material. Prices on these items are strong and moving upward. For the most part dealer markets are strong and No. 1 steel is being shipped from this district into the Youngstown area to apply on orders there.

Cleveland—Steel and iron scrap is strong and supplies are light, even railroad lists carrying smaller tonnages of steelmaking grades than usual. Prices are nominally unchanged but renewed buying is expected to bring a rise.

Chicago—Prices continue supported by heavy requirements of steelworks, and quotations on a number of grades have been raised 25 to 50 cents. No. 1 heavy melting steel now is $18.25 to $18.75 on the basis of mill buying and broker-dealer trading, although some brokers reportedly are offering no more than $18.50 This also represents the minimum at which this grade can be picked up. Scrap needs of foundries are heavy, with some increases shown recently in operations of gray iron melters.

Boston — Iron and steel scrap prices are stronger with buying more active, advances of 50 cents a ton being made on several grades. Demand for No. 2 heavy melting steel for both dock delivery and domestic shipment has improved; also stove plate and most cast grades. Two steel works in the district are showing more interest in scrap and one has bought a moderate tonnage at better than $16 delivered. Export prices for dock delivery are stronger, brokers paying slightly more for heavy melting steel with boat loadings for England maintained while a cargo, mostly No. 2 steel scrap, is being loaded at Providence, R. I. Melt by district foundries tends upward.

New York—Scrap shipments to steelworks and foundries are heavier against orders placed recently and prices are firmer, several grades advancing 50 cents per ton on recent purchases. For both export and domestic shipment buying of No. 2 steel exceeds that of No. 1 two to one. Movement by canal barge to the Buffalo district is considerable but most is being delivered between New York and point of destination. Some of this tonnage goes beyond Buffalo to lake ports and Canada. Buying against export orders is steady, with two boats loading for England.

Philadelphia—Iron and steel scrap has developed a decidedly stronger tone, especially in steelmaking grades, which are quoted 50 cents to $1 a ton higher. No. 2 heavy melting steel now is quoted only $1 a ton under No. 1 at $19.50, due to heavy pressure. Brokers have paid more than $19 for No. 2 steel against contracts booked only a few days ago at that figure. Specialties are unchanged at the moment but are expected to participate in the stronger market shortly.

Buffalo — Despite a continued stalemate, buoyancy among dealers is becoming more widespread. Consumers are bidding within the prevailing range of $18 to $18.50 a ton for No. 1 steel but no stock is available. Chief supporting factor is the high ingot production rate.

Detroit—Bullishness of scrap dealers in the past few weeks has failed to meet response from mills and the market definitely has settled back a notch. Borings and turnings, sheet bundles and loose clippings are weaker by 25 to 50 cents per ton. Ford continues to buy some scrap but as the 1941 model manufacturing program gets under way these should be concluded. Despite capacity operations, steel mills appear well supplied.

Cincinnati—Iron and steel scrap is stronger, but without much increase in activity. Dealers are confident that continued high steelmaking operations will result in heavier consumer demand, and are holding accumulations. Recent increases were based largely on dealer trading, bet-

ter bids on railroad lists, and reaction to stronger neighboring markets.

St. Louis—Iron and steel scrap continues strong, with mills and foundries evincing more interest. Trading is light, mainly because of scant supply. During the past several days several transactions in No. 2 heavy melting steel were reported on a basis of $15 per ton, up 50 cents from the last previous sales.

Birmingham, Ala. — Slight easing is still noted in the scrap market. Prices are unchanged with heavy melting at $15, delivered.

Seattle—While the market is not active, export sales continue steady in small lots. Rolling mills are buying limited tonnages. Prices are reasonably firm and steady. Export volume has not been seriously affected by embargo regulations and licenses for shipment of No. 1 scrap are being issued.

Toronto, Ont.—Brisk activity continues in scrap, with consumers and dealers tapping every available source for supplies. Mills are taking all offerings for spot and future delivery and it is reported in some quarters that Canadian supplies may be exhausted soon if consumption continues at the present high rate.

San Francisco—Scrap prices continue firm and there is little likelihood of recession during the next month or two. Exporters are busy supplying material for Japan and considerable so-called relaying rails in uncut lengths are being shipped, despite the fact that this material when cut, is classified as No. 1 heavy melting steel.

Warehouse

Warehouse Prices, Page 83

Chicago—Business still is moderately below the first quarter peak but the trend is upward and further gains are indicated for September and October. Practically all products are moving well.

New York—Buying from warehouse is active and widely diversified, August being the best month of the year with some suppliers. Alloys are moving in heavy volume, including tubing for aircraft needs. Prices are firm except in hot-rolled and galvanized sheets which are being shaded by some weaker secondary sellers with large stocks.

Philadelphia — Warehouses are booking a large number of orders but tonnage still has not come up to the volume of a year ago. Leading interests here look for a decided increase as mill deliveries grow more extended and are preparing for it by building up inventories above average levels.

Buffalo—With improved demand noted in heavier lines warehouse trade is sustained at good levels. Buying for national defense purposes is reported. Prices are steady.

Detroit — Warehouse sales are steady despite gradual conclusion of tool and die programs. Survey of 175 tool, jig and fixture shops in this district shows one-third ready to take on defense program work.

Cincinnati—Warehouse sales were heavier in the latter part of August and total tonnage was better than in July. Reaffirming of mill prices left the jobbers' schedule firm and unchanged.

St. Louis—Preliminary reports indicate that August warehouse volume will be largest for any month this year. Most items participate in current demand, reflecting a broad diversity of requirements. Merchant bars and tool steel are outstanding.

Firth-Sterling Holds High-Speed Steel Price

Continuing its policy of stabilized prices, Firth-Sterling Steel Co., McKeesport, Pa., Aug. 30 reaffirmed current prices for fourth quarter on all of its grades. This policy led to pegging of the price of 18 per cent tungsten high-speed steel during the period of brisk buyin last year. The company believe that its action at that time intro duced a period of stable buying and that assurance of price stabi ity now will minimize speculativ purchases, which were a factor i quadrupling high speed steel price during the previous World war.

Steel in Europe

Foreign Steel Prices, Page 83

London—(*By Cable*)—Iron an steel furnaces and works in Grea Britain continued full productior with no holiday interruption. Th situation has improved further i regard to ore, coke, scrap and sem finished steel and only hematite pi iron is still tight. Government cor tract deliveries have been shortenec Some sheet tonnage is available fo export. Trade in tin plate is fairl good.

A $100,000 contract has beer awarded to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., t light the Washington, D. C., nationa airport. Contract is reported to pro vide for the largest amount of light ing equipment ever to be installe in an airport.

Canadian Contracts for Week Total $10,957,688

(*Concluded from Page* 17)

during the past month to a total of 17,000, according to C. D. Howe, minister of munitions and supply.

Contract for six large rescue boats, costing $600,000, has been awarded to Aero-Marine Crafts Ltd., Toronto. Boats will be 60 to 70 feet long, will have three engines and a speed of 35 knots. They will be used by the Royal air force in rescue work off English coasts.

Thomas Arnold, chairman, Manitoba Steel Foundries Ltd., Winnipeg, has been appointed machine tool controller for Canadian industry. He will control production and purchase of tools, issuing of export or import licenses. He also is president of Citadel Merchandising Co. Ltd., a government-owned corporation for procuring machine tools.

Department of munitions and supply, Ottawa, announced last week 1525 contracts were placed totaling $10,957,688. Awards for the week include:

Munitions: Remington Arms Co. Inc., Bridgeport, Conn., U.S.A., $74,268; British admiralty, England, $3,784,055; Defense Industries Ltd., Montreal, $5400; Anaconda American Brass Ltd., New Toronto, Ont., $74,268.

Ordnance: Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., $257,663; War office, England, $9000; Montreal Suspender & Umbrellas Ltd., Montreal, $5880; Beatty Bros. Ltd., Fergus, Ont., $8720.

Shipbuilding: Canadian Vickers Ltd., Montreal, $21,500; Dominion Foundries & Steel Ltd., Hamilton, Ont., $9330; John Patterson, Brampton, Ont., $8500.

Barrack Stores: Canadian Locomotive Co. Ltd., Kingston, Ont., $57,744; Horton Steel Works Ltd., Toronto, $38,546; Herbert Morris, Train & Hoist Co. Ltd., Niagara Falls, Ont., $18,350; General Supply Co. of Canada Ltd., Ottawa, $18,404; Ontario Hughes Owens Co. Ltd., Ottawa, $8321; Renfrew Electric & Refrigerator Co. Ltd., Renfrew, Ont., $9855; McGlashan, Clarke Co. Ltd., Niagara Falls, $14,962; International Silver Co. of Canada Ltd., Hamilton, $16,025; Canadian Wm. A. Rogers Ltd., Toronto, $14,737; Woods Mfg. Co. Ltd., Ottawa, $16,500; Simmons Ltd., Montreal, $11,000; Wrights' Canadian Ropes Ltd., Vancouver, B. C., $17,038; F. Jeuny & Bros. Ltd., Victoria, B. C., $17,295.

Mechanical Transport: Chrysler Corp. of Canada Ltd., Windsor, Ont., $71,208; Pyrene Mfg. Co. of Canada Ltd., Toronto, $8244; Canadian Fire Hose Co. Ltd., Montreal, $36,000.

Aircraft Supplies: Fleet Aircraft Ltd., Fort Erie, Ont., $265,484; DeHavilland Aircraft of Canada Ltd., Toronto, $46,440; MacDonald Bros. Aircraft Ltd., Winnipeg, Man., $13,000; Aviation Electric Ltd., Montreal, $6890.

Machinery & Tools: Harrington & Richardson, Worcester, Mass., U.S.A., $13,188; Canada Machinery Corp. Ltd., Galt, Ont., $5829; Harrison Co., Montreal, $32,122.

Electrical Equipment: Canada Wire & Cable Co. Ltd., Montreal, $24,211; Canadian General Electric Co. Ltd., Ottawa, $14,760; Northern Electric Co. Ltd., Ottawa, $17,840; Crouse-Hinds Co. of Canada Ltd., Toronto, $50,544; Boston Insulated Wire & Cable Co. Ltd., Hamilton, $5642.

Construction Projects: James W. Ross, Montreal, $198,246; W. D. Edge Ltd., Ottawa, $80,800; E. A. Jones Ltd., Leaside, Ont., $31,704; Canadian Comstock Co. Ltd., Toronto, $28,795; General Engineering Co. of Canada Ltd., Toronto, $332,910; Russell Construction Co. Ltd., Toronto, $419,949; Storms Contracting Co. Ltd., Toronto, $868,000; Pigott Construction Co. Ltd., Hamilton, $390,600; Bird Construction Co. Ltd., Winnipeg, $430,255; H. G. MacDonald & Co., Edmonton, Alta., $819,732; West Coast Salvage & Contracting Co. Ltd., Vancouver, $71,000.

GE, Carboloy Named In Antitrust Action

■ A special federal grand jury in New York inquiring into national defense "bottlenecks" last week returned an indictment charging General Electric Co., Schenectady, N. Y., Carboloy Co. Inc., Detroit, a subsidiary, and the Krupp Works, Essen, Germany, with raising the price of tungsten carbide alloys.

Through the activities of the companies named, a government spokesman charged, the government has had to pay three and four times what it should for the alloys needed for military work.

The indictment specifically alleges violation of the Sherman antitrust act and the Wilson tariff act. It also charges the Krupp works holds the power of veto over the issuance of patent licenses to American manufacturers in the making of such metal compositions for cutting tools.

General Electric is alleged to have bought the American patent rights from Krupp in 1928. The indictment charges secret covenants were entered into whereby Krupp would not ship tungsten carbide to this country and there would be no export from this to other countries. The agreements resulted, the indictment said, in a jump in the price of the alloy from $48 to $435 a pound. Present price is around $205.

W. G. Robbins, president of the Carboloy company, issued the following statement:

"We have just been advised by the press of the action of the federal grand jury, but have not as yet received notification or a copy of the action. Commercial agreements originally made and under which we have been operating during the past ten or more years have been, and still are, considered entirely legal by us.

"The agreement is simply the relationship of manufacturer and inventor and does not exercise any control over manufacture, distribution or prices.

"Our company has not knowingly violated either the letter or the spirit of the law in any respect. We await the results of the court action with complete confidence."

Nonferrous Metals

New York—An unusual degree of steadiness prevailed in major nonferrous metal market last week. Even Straits spot and ninety-nine per cent tin prices held unchanged at 50.62½c until Friday when the former eased ⅛-cent. Actual consumption maintained a high level although demand was moderate.

Copper—Sales for the week exceeded 12,000 tons, not including additional month-end bookings. All leading first-hand sellers as well as resellers maintained prices on a firm 11-cent level, while export copper held at 9.90c, f.a.s. New York.

Lead—Following two weeks of excellent business, sales declined last week to a level lower than production and considerably less than shipments. Prices held steady on the basis of 4.75c, East St. Louis.

Zinc—Many sellers were reluctant to book additional business due to their well sold positions. Despite tightness of the market, a fair volume of business probably was done at the firm 6.50-cent price level.

Tin—Straits spot closed at 50.50c, compared with the previous week's close of 50.55c. Stocks held by private consumers and by the government apparently are rising with August imports estimated in excess of consumption by 5000 tons.

Equipment

New York—Flood of orders and inquiry for machine tools from aircraft builders, shipbuilding shops, industrial plants with defense program contracts and government departments continues. The navy alone now has several hundred tools, large and small, bid or up for bids, including 58 sensitive drills and 61 bench grinders. Placing of contracts is being expedited, outstanding being 26 engine lathes for Boston to Reed-Prentice Corp., Worcester, Mass., $111,670; Brown & Sharpe, Providence, R. I., milling machines, $134,220, and Cincinnati Milling Machine & Cincinnati Grinders, Inc., milling machines, $148,890.

Chicago—Business is well sustained, showing little change since a month ago. Buying is light in some directions—particularly among the railroads—but this is offset by steady call from a variety of other industries. Relatively few orders are directly traceable to armament production, although this demand is expected to grow as the defense program progresses. Machine tool orders from railroad shops usually are confined to one or two items at a time, and only small lots are pending.

Seattle — Demand for machinery

Nonferrous Metal Prices

Aug.	Copper: Electro, del. Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin, New York: Spot	Straits Tin, New York: Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
24	11.00	11.00	10.62½	50.55	50.05	4.90	4.75	6.50	18.00	14.00	35.00
26	11.00	11.00	10.62½	50.62½	50.20	4.90	4.75	6.50	18.00	14.00	35.00
27	11.00	11.00	10.62½	50.62½	50.20	4.90	4.75	6.50	18.00	14.00	35.00
28	11.00	11.00	10.62½	50.62½	50.12½	4.90	4.75	6.50	18.00	14.00	35.00
29	11.00	11.00	10.62½	50.62½	50.12½	4.90	4.75	6.50	18.00	14.00	35.00
30	11.00	11.00	10.62½	50.50	50.12½	4.90	4.75	6.50	18.00	14.00	35.00

MILL PRODUCTS

F.o.b. mill base, cents per lb., except as specified. Copper brass products based on 11.00c Conn. copper

Sheets

Yellow brass (high) 18.23
Copper, hot rolled 19.62
Lead, cut to jobbers 7.15
Zinc, 100 lb. base 11.50

Tubes

High yellow brass 20.98
Seamless copper 20.12

Rods

High yellow brass 13.26
Copper, hot rolled 17.12

Anodes

Copper, untrimmed 16.87

Wire

Yellow brass (high) 18.48

OLD METALS

Nom. Dealers' Buying Prices

No. 1 Composition Red Brass

New York 6.87½-7.12½
Cleveland 7.25-7.50
Chicago 7.25-7.50
St. Louis 7.75

Heavy Copper and Wire

New York, No. 1 ..... 8.50-8.75
Cleveland, No. 1 ..... 8.25-8.50
Chicago, No. 1 ..... 8.50-8.75
St. Louis 8.75

Composition Brass Turnings

New York 6.50-6.75

Light Copper

New York 6.50-6.75
Cleveland 6.25-6.50
Chicago 6.50-6.75
St. Louis 6.75

Light Brass

Cleveland 3.50-3.75
Chicago 4.25-4.37½
St. Louis 4.25

Lead

New York 4.25-4.35
Cleveland 3.60-3.75
Chicago 3.75-4.00
St. Louis 3.50-3.75

Zinc

New York 3.75-4.00
Cleveland 3.25-3.50
St. Louis 3.50-3.75

Aluminum

Misc., cast, Cleveland 8.50
Borings, Cleveland 6.50
Clips, soft, Cleveland 14.00
Misc. cast, St. Louis 7.75-8.00

SECONDARY METALS

Brass ingot, 85-5-5-5, less carloads 11.75
Standard No. 12 aluminum 14.00-14.25

and equipment is brisk and dealers anticipate a heavy turnover during the remainder of the year. General Electric has the award at $70,159 to furnish six transformers for the Coulee power house. American Transformer Co., Newark, N. J., has an award at $50,692 for furnishing induction heating transformers. Bonneville project, Portland, has called bids as follows: Sept. 6, conductor and accessories; Sept. 9, oil purifying equipment; Sept. 9, three potential transformers; Sept. 10, conductor hardware; Sept. 13, compressor. Denver opened bids Aug. 26 for central control equipment, drum gate spillway, and other equipment for Coulee dam, Aug. 30 for ten gate closures and Sept. 5 for pipe, fittings, valves, etc. Bids are called at Denver Sept. 5 for two pumping units, Spec. 1417-D, for Buffalo Rapids project, Montana.

Construction and Enterprise

Ohio

ASHTABULA, O.—East Ohio Gas Co., East Ohio building, Cleveland, is developing natural gas area in Ashtabula county, including wells, pipe lines, pumping stations and booster units, at cost of $25,000.

BARBERTON, O.—City, William Jamieson, service director, will take bids Sept. 3 for a 13,000,000 gallon centrifugal pump, electric motor and base.

CLEVELAND — Austin Co., 16112 Euclid avenue, has been given contract for design and construction of $185,000 expansion of General Motors Corp. diesel engine division at Cleveland.

CLEVELAND—Vichek Tool Co., Frank J. Vichek, president, 3001 East Eighty-seventh street, will build a branch plant at Middlefield, O., 45 x 120 feet, to house plastics department.

CLEVELAND—Buckeye Forging Co., 10003 Harvard avenue, plans enlargement of its forging shop. Plans by Christian, Schwartzenburg & Gaede, 1836 Euclid avenue, call for one-story structure 36 x 50 feet. Equipment is to be purchased. James W. Baxter is president.

CLEVELAND—North American Mfg. Co., 2910 East Seventy-fifth street, will double floor space by an addition containing 14,000 square feet, for use as shipping and storage rooms, allowing rearrangement and enlargement of manufacturing space. George R. Brown is president.

DAYTON, O.—Aeroproducts division, General Motors Corp., 288 East First street, has given general contract to F. A. Messer & Son Inc., 2515 Burnet street, Cincinnati, for a one-story propeller test laboratory to cost about $65,000. (Noted June 17.)

KENT, O.—Bendix Westinghouse Automotive Air Brake Co., 5001 Centre avenue, Pittsburgh, is considering establishing plant here in idle plant of Mason Tire & Rubber Co.

PLYMOUTH, O.—Village, J. H. Rhine, clerk, is having plans drawn by Boyd Wierman, 1090 Park avenue, Mansfield, O., for a municipal power plant to cost about $90,000. Bids will be advertised about Sept. 10.

RIPLEY, O.—City, A. Hicks Jr. mayor, plans waterworks plant, including water softener, pumping station, etc., to cost about $75,000.

SANDUSKY, O.—Sandusky Foundry & Machine Co., 615 West Market street, is hurrying plant addition to speed production on naval order and will probably build another addition to increase output.

TOLEDO, O.—City Auto Stamping Co., A. Lint, president, will build a one-story die plant costing about $500,000. General contract let to H. J. Spicker Co., 1418 Elm street, Toledo. (Noted May 27.)

WADSWORTH, O.—Russell and Donovan Close, Akron, O., and Wayland Close, Boyer street, Wadsworth, are building a refrigerated locker storage plant

■ Additional Construction and Enterprise leads may be found in the list of Shapes Pending on page 94 and Reinforcing Bars Pending on page 97 of this issue.

on Watrusa avenue. Refrigeration equipment is to be bought.

Connecticut

BRIDGEPORT, CONN.—Moore Special Tool Co. is building a two-story steel and concrete tool manufacturing plant.

ELMWOOD, CONN. — Holo-Chrome Screw Corp. is building a one-story addition 100 x 200 feet, estimated to cost $120,000.

NORWALK, CONN.—Erickson Screw & Machine Products Co., 25 LaFayette street, Brooklyn, N. Y., will take bids in September on one-story steel and concrete factory building 102 x 160 feet at Post road and Richards avenue, costing about $70,000. Fletcher-Thompson Inc., 1336 Fairfield avenue, Bridgeport, Conn., is consulting engineer. (Noted July 29.)

STRATFORD, CONN.—Vought-Sikorsky division United Aircraft Corp., 400 Main street, East Hartford, Conn., will build a warehouse 120 x 120 feet and wind tunnel 40 x 60 feet. General contract to Edwin Moss & Son, 555 Grant street, Bridgeport, Conn. Cost about $45,000.

WATERBURY, CONN. — American Brass Co. is building two one-story additions, 80 x 200 feet and 62 x 82 feet.

Massachusetts

DORCHESTER, MASS. — Mason-Nielan Regulator Co. is building a one-story addition to cost $50,000 with equipment.

GARDNER, MASS.—Florence Stove Co. is building a one-story laboratory unit 70 x 80 feet, estimated to cost $40,000.

QUINCY, MASS.—Bethlehem Steel Co. is building a one-story steel and concrete boiler plant 145 x 165 feet.

Vermont

SPRINGFIELD, VT.—Bryant Chucking Grinder Co. is building three additional bays and a crane runway, at cost of about $40,000.

New York

ENDICOTT, N. Y.—International Business Machines Corp., Thomas J. Watson, president, has let contracts for a plant addition, of steel and glass, with four acres floor space.

GENEVA, N. Y.—Geneva Forge Inc. will build plant additions 180 x 402 and 50 x 160 feet, costing about $100,000. A. S. Alschuler Inc., 28 East Jackson boulevard, Chicago, is architect.

New Jersey

CAMDEN, N. J.—New York Shipbuilding Corp., Broadway and Fairview street, Camden, has given general contract to Leonard Shaffer, 1310 Spruce street, Philadelphia, for two-story addition costing about $40,000.

Virginia

RADFORD, VA.—Hercules Powder Co., 900 Market street, Wilmington, Del., will erect powder plant on 2500-acre site, with capacity for production of 200,000 pounds of smokeless powder daily. Plant to cost about $25,000,000.

West Virginia

CHARLESTON, W. VA. — United Carbon Co., Union Trust building, will let contract soon for a 12-story plant 45 x 105 feet, to cost about $250,000.

Pennsylvania

CHESTER, PA.—Philadelphia Electric Co., 1000 Chestnut street, Philadelphia, will build 50 x 80 x 150-foot generating plant addition with 80,000 kilowatt capacity. General contract to Westinghouse Electric & Mfg. Co., 300 Walnut street, Philadelphia. Cost estimated at 1,600,000.

ERIE, PA.—General Electric Co., H. L. R. Emmet, works manager, Lake road, will build a one-story warehouse 316 x 400 feet, costing about $400,000. General contract has been given Sessinghaus & Ostergaard Inc., 1115 Peach street.

PHILADELPHIA—Pennsylvania Range Boiler Co., Twenty-fourth street and Washington avenue, has given general contract to Steele, Pownall & Gibhardt, 316 Arch street, for a one-story plant addition 70 x 205 feet, costing about 340,000.

PITTSBURGH—O. Hommel Co., 211 Fourth avenue, has bought 50 acres on Shenango river near Pulaski, Pa., will build plant for manufacture of oxides, chemicals and frit. H. R. Urbach is secretary-treasurer.

Michigan

MONROE, MICH.—Monroe Steel Castings Co., Carl Clark, president, plans immediate construction of a factory addition.

SAGINAW, MICH.—Saginaw Stamping & Tool Co., 68 Williams avenue, manufacturer of casters, bearings, trolleys and trucks, has started construction of an addition 100 x 140 feet.

Illinois

CHICAGO—Chicago Flexible Shaft Co., 5600 Roosevelt road, has given general contract to C. E. Erickson Co., 2847 North Clark street, for a two-story factory addition 75 x 90 feet, costing about $50,000. Olsen & Urbin, 228 North LaSalle street, are architects.

CHICAGO—Sprague, Warner & Co., 600 West Erie street, will let contract soon for a one and two-story grocery warehouse at Franklin boulevard and Sacramento boulevard, costing $2,000,000. A. Epstein, 2001 West Pershing road, is engineer.

CHICAGO—Bartlett Trailer Corp., 3830 South Michigan avenue, has plans for a plant containing 30,000 square feet floor space, costing $35,000, at Ashland and Archer avenues. Production and working force will be doubled. P. H. Bartlett is president.

CHICAGO—Commonwealth Edison Co., Harold Plumley, purchasing agent, 72 West Adams street, will build a machine shop addition costing $70,000 at California avenue and Roscoe street. Holabird & Root, 333 North Michigan avenue, are architects.

Maryland

BALTIMORE—Locke Insulator Co., 2501 South Charles street, will build plant addition 86 x 100 feet, to cost about $17,000, bids Sept. 6. H. J. Dudley, 102 West Chase street, in charge.

District of Columbia

WASHINGTON—Bureau of supplies and accounts, navy department, will take bids as follows: Sept. 6, schedule 2820, two motor-driven heavy duty lathes for South Boston, Mass.; schedule 2895, motor-driven milling machine for Norfolk, Va.; schedule 2899, motor-driven double-housing planer for Brooklyn, N. Y.; schedule 2855, two motor-driven precision toolmakers' lathes for Philadelphia; Sept. 13, schedule 2889, twelve motor-driven light type universal milling machines for naval torpedo station, Keyport, Wash.; schedule 2890, eight motor-driven precision lathes for Keyport, Wash.; schedule 2892, motor-driven heavy duty hydraulic surface grinder for Keyport, Wash.; schedule 2893, motor-driven universal duplex milling machine for Keyport, Wash.; schedule 2894, two motor-driven automatic type plain milling machines for Keyport, Wash.; schedule 2847, eight motor-driven heavy duty engine lathes for various yards; schedule 2865, motor-driven light type universal milling machine for Puget Sound, Wash.; schedule 2870, four motor-driven heavy duty universal and vertical milling machines for Puget Sound, Wash.; schedule 2882, three motor-driven plain milling machines for Puget Sound, Wash.; schedule 2891, motor-driven gear hobbing machine for Keyport, Wash.; Sept. 17, schedule 2908, four welding sets and panels for ship delivery; Sept. 10, schedule 2818, arc welding sets for vessel delivery; schedule 2843, 14 motor-driven electric grinders for various yards; Sept. 3, schedule 2845, motor-driven heavy duty engine lathe for South Boston, Mass.

Florida

ST. PETERSBURG, FLA. — Florida Power & Light Corp., Milwaukee, Fla., plans $3,000,000 expansion program. First unit, $1,000,000, includes addition to power house with two boilers and equipment to treble present kilowatt capacity. Interconnections with other power systems is included.

North Carolina

CHARLOTTE, N. C.—New York Transport Co., H. D. Horton, vice president, is considering plans for terminal for trucking merger of 50 companies at cost of $2,000,000. Proposed company to operate 8000 trucks, capital $30,000,000.

Missouri

CHILLICOTHE, MO.—REA has allotted $65,000 to Farmers Electric co-operative, Ernest Wood, superintendent, for 102 miles rural electric lines to serve 453 customers. Frank Horton, Lamar, Mo., is engineer.

KANSAS CITY, MO.—City, R. McKinley, city engineer, plans a water softening plant costing about $650,000.

ST. LOUIS—Marlo Coil Co., 6136 Manchester avenue, has bought site adjoining its plant and will build an addition to increase manufacturing capacity. New equipment will be installed.

ST. LOUIS—Missouri Bridge & Iron Co., Fullerton building, has bought 15 acres on La Porte highway at Houston, Tex., for erection of a steel fabricating plant.

Wisconsin

BELOIT, WIS. — Fairbanks, Morse & Co., manufacturer of diesel engines, power pumps, electric motors, etc., will take bids soon for a foundry building 80 x 220 feet. O. D. Conover, Cleveland, is architect.

CORNELL, WIS.—Chippewa valley electric co-operative, Raymond L. Cleaves, superintendent, has received REA allottment of $103,000 for 126 miles rural lines to serve 381 customers.

RACINE, WIS.—Modine Mfg. Co., manufacturer of auto radiators and air conditioning equipment, plans immediate construction of a one-story plant addition.

WISCONSIN RAPIDS, WIS.—City council, Nels Justeson, clerk, has approved construction of one-story brick electric substation with switchgear equipment and three 100-foot steel towers, costing about $60,000. Donn Hougen, Wisconsin Rapids, is architect.

Minnesota

ALEXANDRIA, MINN.—Douglas county light co-operative, Clifford R. Hove, superintendent, will take bids to Sept. 9 on 420 miles rural electric lines. General Engineering Corp., 2944 Cedar avenue, Minneapolis, is engineer.

BENSON, MINN.—Stevens-Big Stone power co-operative, Victor Hanson, superintendent, will take bids to Sept. 9 on 219 miles rural power lines to serve 465 customers. General Engineering Corp., 2944 Cedar avenue, Minneapolis, is engineer.

HOPKINS, MINN.—Minneapolis-Moline Power Implement Co., manufacturer of farm and industrial tractors, will award contract soon for new plant here replacing one recently burned. Cost estimated at $250,000. (Noted May 13.)

KETTLE RIVER, MINN.—Carlton county power co-operative, Matt O. Wilson, superintendent, has given contract to Zontelli Bros., Ironton, Minn., at $99,464 for 146 miles rural lines to serve 407 customers. United Engineering Service, 1406 West Lake street, Minneapolis, is consulting engineer.

ROCHESTER, MINN.—Peoples co-operative power association, Jay Carroll, secretary, is taking bids to Sept. 3 on 235 miles rural lines. Ellerbe & Co., E-1021 First National Bank building, St. Paul, are engineers.

Texas

PORT ARTHUR, TEX.—Bayonne Steel Barrel Co. has started work on one-story plant on Taylors bayou turning basin, 63 x 270 feet, costing $50,000. Thomas Bates & Sons, 420 Walker street, Houston, Tex., general contractor. (Noted July 1.)

Kansas

BURLINGTON, KANS.—Burlington rural electric co-operative will take bids early in September for 140 miles of transmission lines to serve 372 customers, at cost of about $140,000. Paulette & Wilson, 1006 Kansas avenue, Topeka, Kans., are engineers.

Iowa

ALGONA, IOWA—City, L. Misbach, mayor, is completing plans for a power plant building costing $100,000. Burns & McDonnell Engineering Co., 107 West Linwood boulevard, Kansas City, Mo., is engineer.

AUDUBON, IOWA—City will hold bond issue election soon to provide funds for municipal electric plant. Buell & Winter, Sioux City, Iowa, are engineers.

MARSHALLTOWN, IOWA—Marshall county rural electric co-operative, Harry H. Frey, superintendent, has received REA allottment of $193,000 for 215 miles rural lines to serve 525 customers in five counties.

OTTUMWA, IOWA—John Morrell Co., meat packer, will build power plant addition costing $40,000, exclusive of equipment. Helmick, Edeskuty & Lutz, Essex building, Minneapolis, are engineers.

SUMNER, IOWA—City, H. W. Bathke, clerk, plans sewage disposal plant addition costing about $30,000, bids to be asked early in 1941. E. E. Schank, 214 Waterloo building, Waterloo, Iowa, is engineer.

Colorado

DENVER—Board of water commissioners, George F. Hughes, secretary, will take bids soon for installation of 48-inch steel or 46-inch concrete conduit at cost of about $184,000.

DENVER—Bureau of reclamation, Denver, is taking bids to Sept. 6 on two 250-ton double trolley motor-operated cranes for Shasta power plant, Central valley project, California. Installation will be by government.

Pacific Coast

LOS ANGELES—California Tool & Production Co., 1806 East Fifty-fifth street, has been formed by Benjamin J. Kovack and E. L. Ruth.

LOS ANGELES—Rohr Aircraft Corp. has been incorporated with $500,000 capital by Fred H. Rohr, 3603 Amaryliss drive, San Diego, Calif., and associates.

LOS ANGELES—Aircraft Instrument Co. has been incorporated with $250,000 capital by Frank E. Benedict and Clarence Cronkite, Los Angeles. F. W. Bahl, 639 South Spring street, Los Angeles is representative.

LOS ANGELES—Dow Chemical Co., Midland, Mich., manufacturer of magnesium alloys, will build a plant at Seal Beach, Calif., including manufacturing building 100 x 110 feet, shop building 60 x 60 feet and warehouse 60 x 60 feet.

SALEM, OREG.—City is considering construction of sewage treatment plant and extension of sewer system at estimated cost of $384,000. John W. Cunningham, Portland, Oreg., is engineer.

SPOKANE, WASH.—City plans construction of warehouse building for water department, including traveling crane and rail trackage.

WAITSBURG, WASH. — Waitsburg Welding Works has been advanced $18,000 by RFC, enabling it to end receivership and continue business.

Canada

COLLINGWOOD, ONT.—Hydro electric power commission of Ontario, Dr. Thomas H. Hogg, chief engineer, 620 University avenue, Toronto, Ont., has plans for power development on Musquash river to develop 10,000 to 12,000 horsepower at cost of $1,000,000. Equipment will represent large part of cost.

OSHAWA, ONT.—General Motors Co. of Canada Ltd., William street East, H. J. Carmichael, vice president and general manager, has let general contract to Smith Bros. Construction Co. Ltd., 1740 Ellen avenue, Niagara Falls, Ont., for an addition to building No. 65.

LONGUE POINTE, QUE. — Canadian Car & Foundry Co. Ltd., 621 Craig street West, Montreal, has given Foundation Co. of Canada Ltd., 1538 Sherbrooke street West, general contract for plant addition here to cost about $50,000.

MONTREAL, QUE.—Canadian National Railways, 360 McGill street, W. U. Appleton, general manager, has given general contract for $300,000 terminal and locomotive erecting shops at Fairview, N. S., to Fundy Construction Co., Isleville and Russell streets, Halifax, N. S. Also general contract to L. G. Ogilvie & Co. Ltd., 1440 St. Catharine street, West Montreal, for locomotive erecting shop at Moncton, N. B.

THREE RIVERS, QUE.—Electric Steels Ltd., 507 Place D'Armes, Montreal, E. H. Gurney, president, has given general contract to Anglin Norcross Corp. Ltd., 892 Sherbrooke street West, Montreal, for construction of steel plant here.

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., 61st St. and A. V. R. R., Pittsburgh, Pa.

ABRASIVE CLOTH
Abrasive Products Co., 511 Pearl St., So. Braintree, Mass.

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., 243 N. Morgan St., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

ACETYLENE
Air Reduction Sales Co., 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.
Cellcote 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.
Amco Metal, Inc., Dept. S-812, 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
Lintern Corp., The, 7980 Lorain Ave., Cleveland, O.
Peabody Engineering Corp., 580 Fifth Ave., New York City.
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
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

ALLOYS—See FERROALLOYS

ANGLES, CHANNELS—See BEAMS, CHANNELS, ANGLES

ANGLE IRON BENDERS
Excelsior 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., 28th and Smallman Sts., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

BAGS (Cotton)
Ames Bag Machine Co., 1991 E. 66th St., Cleveland, O.

BALING PRESSES
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

BALL TRANSFERS
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

BALLS (Brass or Bronze)
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Strom Steel Ball Co., 1850 So. 54th Ave., Cicero, Ill.

BALLS (Special Alloy Metals)
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

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

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'r'g Works Div.), Neville Island, Pittsburgh, Pa.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Maryland Dry Dock Co., Baltimore, Md.

BARRELS (Steel)
Petroleum Iron Works Co., Sharon, Pa.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

BARS (Alloy)
Amco Metal, Inc., Dept. S-812, 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. S-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 Co. Inc., 230 Park Ave., New York City.

BARS (Concrete Reinforcing)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., 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.

BATHS (Heat Treating—High Speed)
Holden, A. F., Co., 200 Winchester Ave., New Haven, Conn.

BATTERIES (Storage)
Electric Storage Battery Co., The, 19th St. and Allegheny Ave., Philadelphia, Pa.
Graybar Electric Co., 420 Lexington Ave., New York City.

BATTERY CHARGING APPARATUS
Cutler-Hammer, Inc., [illegible] 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.

WHERE-TO-BUY

BEARINGS (Brass, Bronze)
Ampco Metal, Inc., Dept. S-812, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 28th and Smallman Sts., Pittsburgh, Pa.
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
Lawrence Copper & Bronze, Bessemer Bldg., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.
Shoop Bronze Co., The, 344-60 W. 6th Ave., Tarentum, Pa.

BEARINGS (Journal)
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Division, General Motors Sales Corp., Harrison, N. J.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Needle)
Torrington Co., The, Torrington, Conn.

BEARINGS (Non-Metallic)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.

BEARINGS (Oilless)
Rhoades, R. W., Metaline Co., 50 Third St., Long Island City, N. Y.

BEARINGS (Quill)
Bantam Bearings Corp., South Bend, Ind.

BEARINGS (Radial)
American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa.
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.
Link-Belt Co., 519 No. Holmes Ave., Indianapolis, Ind.
New Departure Div., General Motors Corp., Bristol, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St., and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The Canton, O.

BEARINGS (Roll Neck)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.
Morgan Construction Co., Worcester, Mass.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Shoop Bronze Co., The, 344-60 W. 6th Ave., Tarentum, Pa.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roller)
American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa.
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Rolling Mill)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa.
Bantam Bearings Corp., South Bend, Ind.
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.
Morgan Construction Co., Worcester, Mass.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Thrust)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Link-Belt Co., 519 No. Holmes Ave., Indianapolis, Ind.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BELTING (Chain and Link)
Baldwin-Duckworth Div. 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.
United States Rubber Co., 1230 Sixth Ave., New York City.

BENDING AND STRAIGHTENING MACHINES
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
Alliance Machine Co., The, Alliance, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Kardong Bros., Inc., 346 Buchanan St., Minneapolis, Minn.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.

BENZOL AND TOLUOL RECOVERY PLANTS
Koppers Co., Engineering and Construction Div., 300 Koppers Bldg., Pittsburgh, Pa.
Koppers Co., Tar & Chemical Div., 901 Koppers Bldg., Pittsburgh, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
Youngstown Sheet & Tube Co., 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.
Firth-Sterling Steel Co., McKeesport, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

BILLETS (Forging)
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
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.

» » » WHERE-TO-BUY « « «

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.
*Firth-Sterling Steel Co.,
McKeesport, Pa.
Inland Steel Co.,
38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg.,
St. Louis, Mo.
Pittsburgh Steel Co.,
1653 Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp.,
Dept. ST, Cleveland, O.
Standard Steel Works
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.
Peabody Engineering Corp.,
580 Fifth Ave., New York City.

BLAST FURNACE HOT BLAST STOVES
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.
Brosius, 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 HOUSES
McKee, Arthur G., & Co.,
2422 Euclid Ave., Cleveland, O.

BLAST FURNACES—See FURNACES (Blast)

BLOCKS (Chain)
Yale & Towne Mfg. Co.,
4532 Tacony St., Philadelphia, Pa.

BLOWERS
General Electric Co.,
Schenectady, N. Y.
Ingersoll-Rand Co.,
11 Broadway, New York City.
Sawyer Electrical Mfg. Co.,
5715 Leneve St., Los Angeles, Cal.
Stewart Furnace Div., Chicago Flexible Shaft Co., 1106 So. Central Ave., Chicago, Ill.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Truflo 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,
Refractories Div., 85 Liberty St.,
New York City.
Oil Well Supply Co., Dallas, Texas.

BOLT AND NUT MACHINERY
Acme Machinery Div., Hill Acme Co., 4535 St. Clair Ave.,
Cleveland, O.
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., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
*Ryerson, Jos. T., & Son, Inc.,
16th and Rockwell Sts.,
Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg.,
Birmingham, Ala.

BOLTS (Carriage and Machine)
Bethlehem Steel Co.,
Bethlehem, Pa.
Cleveland Cap Screw Co.,
2934 E. 79th St., Cleveland, O.
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., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc.,
16th & Rockwell Sts.,
Chicago, Ill.

BOLTS (Special)
Bethlehem Steel Co.,
Bethlehem, Pa.
Cleveland Cap Screw Co.,
2934 E. 79th St., Cleveland, O.
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., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS (Stove)
Central Screw Company,
3517 Shields Ave., Chicago, Ill.
Cleveland Cap Screw Co.,
2934 E. 79th St., Cleveland, O.
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., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc.
16th and Rockwell Sts.,
Chicago, Ill.
Townsend Co., New Brighton, Pa

BOLTS (Stove, Recessed Head)
American Screw Co.,
Providence, R. I.
Chandler Products Co., Euclid, O.
Continental Screw Co.,
New Bedford, Mass.
Corbin Screw Corp.,
New Britain, Conn.
Lamson & Sessions Co., The,
1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co.,
2440 E. 75th St., Cleveland, O.
Pheoli Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., Waterbury, Conn.

BOLTS (Track)—See TRACK BOLTS

BOOKS
International Correspondence Schools, Box 9377, Scranton, Pa.

BORING MACHINES (Precision)
Barnes, W. F. & John, Co.,
201 S. Water St., Rockford, Ill.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Heald Machine Co.,
Worcester, Mass.
Sellers, Wm., & Co., Inc.,
1622 Hamilton St.,
Philadelphia, Pa.

BOXES (Annealing)
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co.,
E. Chicago, Ind.
National-Erie Corp., Erie, Pa.
Petroleum Iron Works Co.,
Sharon, Pa.
Union Steel Casting Co., 62nd & Butler Sts., Pittsburgh, Pa.
United Engineering & Foundry Co.,
First National Bank Bldg.,
Pittsburgh, Pa.
Wilson, Lee, Engineering Co.,
1370 Blount St., Cleveland, O.

BOXES, (Open Hearth Charging)
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co.,
E. Chicago, Ind.
Morgan Engineering Co., The,
Alliance, O.
Petroleum Iron Works Co.,
Sharon, Pa.

BRAKE SHOES
American Brake Shoe & Fdry. Co.,
The, 230 Park Ave.,
New York City.

BRAKE LININGS
Garlock Packing Co., The,
S 3-40, Palmyra, N. Y.
Johns-Manville Corp., 22 E. 40th St.,
New York City.

BRAKES (Electric)
Clark Controller Co., The,
1146 E. 152nd St., Cleveland, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co.,
2698 E. 79th St., Cleveland, O.

BRAKES (Press)
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Crane & Engineering Co., The, Steelweld Machinery Div.,
Wickliffe, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St.,
Chicago, Ill.

BRICK—(Insulating)—See INSULATING BRICK

BRICK (Refractory)—See REFRACTORIES, CEMENT, ETC.

BRICK (Acid Resisting)
Keagler Brick Co., 1443 W. Market St., Steubenville, O.

BRICK (Ladle)
Globe Brick Co., The,
East Liverpool, O.

BRICK (Silicon Carbide)
Carborundum Co., The,
Perth Amboy, N. J.
Norton Co., Worcester, Mass.

BRIDGE CRANES (Ore and Coal Handling)—See CRANES (Bridge)

BRIDGES, BUILDINGS, VIADUCTS, STACKS, ETC.
American Bridge Co.,
Frick Bldg., Pittsburgh, Pa.
Babcock & Wilcox Co., The,
Refractories Div., 85 Liberty St.,
New York City.
Belmont Iron Works,
22nd St., and Washington Ave.,
Philadelphia, Pa.
Bethlehem Steel Co.,
Bethlehem, Pa.
Blaw-Knox Co., Blawnox, Pa.
Columbia Steel Co.,
San Francisco, Calif.
Petroleum Iron Works Co.,
Sharon, Pa.

BROACHING CUTTERS
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

BROACHING MACHINES
Bullard Co., The, Bridgeport, Conn.
Cincinnati Milling Machine & Cincinnati Grinders, Inc.,
Oakley Sta., Cincinnati, O.
Colonial Broach Co.,
147 Jos. Campau, Detroit, Mich.

BRUSHES
Fuller Brush Co., The, Steelgript Div., Dept. SC, 3582 Main St.,
Hartford, Conn.

BUCKETS (Clam Shell, Dragline Grab, Single Line)
Atlas Car & Mfg. Co., The,
1140 Ivanhoe Rd., Cleveland, O.
Blaw-Knox Co., Blawnox, Pa.
Cullen-Friestedt Co., 1308 So. Kilbourn St., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp.,
Bay City, Mich.

BUCKETS (Single Hook, Automatic Dump, Automatic Single Line)
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

BUILDINGS (Steel)—See BRIDGES, BUILDINGS, ETC.

BULLDOZERS
Ajax Manufacturing Co.,
1441 Chardon Rd., Cleveland, O.
Beatty Machine & Mfg. Co.,
944 150th St., Hammond, Ind.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Logemann Brothers Co.,
3126 Burleigh St., Milwaukee, Wis.

BURNERS (Acetylene)—See TORCHES AND BURNERS

BURNERS (Automatic)
Kemp, C. M., Mfg. Co.,
405 E. Oliver St., Baltimore, Md.
Peabody Engineering Corp.,
580 Fifth Ave., New York City.
Pennsylvania Industrial Engineers,
2413 W. Magnolia St.,
Pittsburgh, Pa.
Surface Combustion Corp.,
2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co.,
1370 Blount St., Cleveland, O.

BURNERS (Fuel, Oil, Gas, Combination)
Babcock & Wilcox Co., The,
Refractories Div., 85 Liberty St.,
New York City.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Peabody Engineering Corp.,
580 Fifth Ave., New York City.
Pennsylvania Industrial Engineers,
2413 W. Magnolia St.,
Pittsburgh, Pa.
Stewart Furnace Div., Chicago Flexible Shaft Co., 1106 So. Central Ave., Chicago, Ill.
Surface Combustion Corp.,
2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co.,
1370 Blount St., Cleveland, O.

BUSHINGS (Bronze)
Ampco Metal, Inc., Dept. S-812,
3830 W. Burnham St.,
Milwaukee, Wis.
Cadman, A. W., Mfg. Co.,
28th and Smallman Sts.,
Pittsburgh, Pa.
Johnson Bronze Co.,
550 So. Mill St., New Castle, Pa.
Lawrence Copper & Bronze,
Bessemer Bldg., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.
Shoop Bronze Co., The,
344-60 W. 6th Ave.,
Tarentum, Pa.

BUSHINGS (Jig)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

BUSHINGS (Oilless)
Rhoades, R. W., Metaline Co.,
50 Third St., Long Island City,
N. Y.

BY-PRODUCT PLANTS
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

CAISSONS (Pneumatic)
Dravo Corp., (Contracting Div.),
Neville Island, Pittsburgh, Pa.

CALCIUM METAL AND ALLOYS
Electro Metallurgical Sales Corp.,
30 E. 42nd St., New York City.

CAP SCREWS—See SCREWS (Cap, Set, Safety-Set)

CAR DUMPERS
Alliance Machine Co., The,
Alliance, O.
Industrial Brownhoist Corp.,
Bay City, Mich.

CAR PULLERS and SPOTTERS
American Engineering Co.,
2484 Aramingo Ave.,
Philadelphia, Pa.

» » » WHERE-TO-BUY « « «

Cullen-Friestedt Co., 1308 So. Kilbourn St., Chicago, Ill.
Link-Belt Co., 2410 W. 18th St., Chicago, Ill.

CARBIDE
Linde Air Products Co., The, 30 E. 42nd St., New York City.
National Carbide Corp., 60 E. 42nd St., New York City.

CARS (Charging)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.

CARS (Under Pot)
Pressed Steel Car Co.,* (Koppel Div.) Koppers Bldg., Pittsburgh, Pa.

CARS (Dump)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.
Pressed Steel Car Co., (Koppel Div.) Koppers Bldg., Pittsburgh, Pa.

CARS (Industrial and Mining)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Differential Steel Car Co., Findlay, O.
Petroleum Iron Works Co., Sharon, Pa.
Pressed Steel Car Co., (Koppel Div.) Koppers Bldg., Pittsburgh, Pa.

CARS (Scale)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

CASTING WASHER EQUIPMENT
Pangborn Corp., Hagerstown, Md.

CASTINGS (Acid Resisting)
American Brake Shoe & Fdry Co., The, 230 Park Ave.,
Ampco Metal, Inc., Dept. S-812, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 28th and Smallman Sts., Pittsburgh, Pa.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
International Nickel Co., Inc., The, 67 Wall St., New York City.
Meehanite Metal Corp., 311 Ross St., Pittsburgh, Pa.
National Alloy Steel Co., Blawnox, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.

CASTINGS (Alloy Steel)
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Damascus Steel Casting Co., New Brighton, Pa.
Electro-Alloys Co., The, Elyria, O.
National-Erie Corp., Erie, Pa.
Ohio Steel Foundry Co., Lima, O., Springfield, O.
Pittsburgh Rolls, Div. of Blaw-Knox Co., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Union Steel Casting Co., 62nd and Butler Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Brass, Bronze, Copper, Aluminum)
Ampco Metal, Inc., Dept. S-812, 3830 W. Burnham St., Milwaukee, Wis.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Cadman, A. W., Mfg. Co., 28th and Smallman Sts., Pittsburgh, Pa.
Lawrence Copper & Bronze, Bessemer Bldg., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.
Shoop Bronze Co., The, 344-60 W. 6th Ave. Tarentum, Pa.
Titan Metal Mfg. Co., Bellefonte, Pa.

CASTINGS (Brass, Pressure)
Titan Metal Mfg. Co., Bellefonte, Pa.

CASTINGS (Die)—See DIE CASTINGS

CASTINGS (Electric Steel)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Damascus Steel Casting Co., New Brighton, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
National-Erie Corp., Erie, Pa.
Reading Steel Casting Div. of American Chain & Cable Co. Inc., Reading, Pa.
West Steel Casting Co., 805 E. 70th St., Cleveland, O.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Gray Iron, Alloy, or Semi-Steel)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Canton Pattern & Mfg. Co., The, Andrews Pl. S.W., Canton, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Columbia Steel Co., San Francisco, Calif.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Oil Well Supply Co., Dallas, Texas.
Shenango Penn Mold Co., Dover, O.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

CASTINGS (Heat Resisting)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
Electro-Alloys Co., The, Elyria, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
National Alloy Steel Co., Blawnox, Pa.
Shenango Penn Mold Co., Dover, O.

CASTINGS (Malleable)
American Chain & Cable Co. Inc., Bridgeport, Conn.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Lake City Malleable Co., 5026 Lakeside Ave., Cleveland, O.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CASTINGS (Manganese Steel)
Damascus Steel Casting Co., New Brighton, Pa.

CASTINGS (Steel)
(*Also Stainless)
*Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Damascus Steel Casting Co., New Brighton, Pa.

CASTINGS (Steel)—Con.
(*Also Stainless)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
National-Erie Corp., Erie, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O., Springfield, O.
Oil Well Supply Co., Dallas, Texas.
Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh, Pa.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.
Steel Founders' Society of America, 920 Midland Bldg., Cleveland, O.
Strong Steel Fdry. Co., Hertel & Norris Ave., Buffalo, N. Y.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Union Steel Casting Co., 62nd and Butler Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
West Steel Casting Co., 805 E. 70th St., Cleveland, O.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Wear Resisting)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
Meehanite Metal Corp., 311 Ross St., Pittsburgh, Pa.
Shenango Penn Mold Co., Dover, O

CASTINGS (Worm and Gear Bronze)
Ampco Metal, Inc., Dept. S-812, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 28th and Smallman Sts., Pittsburgh, Pa.

CEMENT (Acid Proof)
Atlas Mineral Products Co. of Pa., Mertztown, Pa.
Pennsylvania Salt Mfg. Co., Dept. E., Pennsalt Cleaner Div., Philadelphia, Pa.

CEMENT (High Temperature)
Carborundum Co., The, Perth Amboy, N. J.
Johns-Manville Corp., 22 E. 40th St., New York City.
Norton Company, Worcester, Mass.

CEMENT (High Temperature Hydraulic)
Atlas Lumnite Cement Co., Dept. S-5, 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.

CHAIRS (Steel)
Harter Corp., The, Sturgis, Mich.

CHARGING MACHINES (Cupola)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.

CHARGING MACHINES (Open Hearth)
Morgan Engineering Co., The, Alliance, O.

CHARGING MACHINES AND MANIPULATORS (Autofloor Type)
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

CHECKER BRICK
Loftus Engineering Corp., 509 Oliver Bldg., Pittsburgh, Pa.

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
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 SPECIALTIES
American Chemical Paint Co., Dept. 310, Ambler, Pa.
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 W. Roosevelt Rd., Chicago, Ill.
Twin Disc Clutch Co., 1379 Racine Ave., Racine, Wis.

CLUTCHES (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

COAL OR COKE
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.

COAL OR COKE—Con.

Columbia Steel Co., San Francisco, Calif.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Koppers Co., Gas & Coke Div., 300 Koppers Bldg., Pittsburgh, Pa.
Koppers Coal Co., 300 Koppers Bldg., Pittsburgh, Pa.
New England Coal & Coke Co., Boston, Mass.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
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 Brownhoist Corp., Bay City, Mich.
Koppers Co., Engineering & Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Koppers-Rheolaveur Co., 300 Koppers Bldg., Pittsburgh, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

COKE—See COAL OR COKE

COKE OVEN MACHINERY

Alliance Machine Co., The, Alliance, O.
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.

COKE OVENS (By-Product)

Koppers Co., Engineering and Construction Div., 100 Koppers Bldg., Pittsburgh, Pa.

COLUMBIUM

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

COMBUSTION BULBS

Norton Company, Worcester, Mass.

COMBUSTION CONTROLS

Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.
Morgan Construction Co., Worcester, Mass.
Norton Company, Worcester, Mass.

COMPARATORS (Optical)

Jones & Lamson Machine Co., Springfield, Vt.

COMPENSATORS (Automatic)

Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.

COMPRESSORS (Air)

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
General Electric Co., Schenectady, N. Y.
Ingersoll-Rand Co., 11 Broadway, New York City.
Worthington Pump & Machinery Corp., Harrison, N. J.

CONCRETE (Heat Resistant)

Atlas Lumnite Cement Co., Dept. S-5, Chrysler Bldg., New York City.

CONCRETE REINFORCING BARS —See BARS (Concrete Reinforcing)

CONDENSERS (Surface, Barometric, Multi-Jet)

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Ingersoll-Rand Co., 11 Broadway, New York City.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
Worthington Pump & Machinery Corp., Harrison, N. J.

CONDUITS (Electric)

Youngstown Sheet & Tube Co., The, Youngstown, O.

CONDUITS (Pressure-Treated Wood)

Wood Preserving Corp., The, 300 Koppers Bldg., Pittsburgh, Pa.

CONNECTING RODS

Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

CONTRACTORS—See ENGINEERS AND CONTRACTORS

CONTROL SYSTEMS (Automatic)

Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

CONTROLLERS (Electric)

Allen-Bradley Co., 1320 So. Second St., Milwaukee, Wis.
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.

CONTROLS (Combustion)—See COMBUSTION CONTROLS

CONTROLS (Hydraulic)

Hydro-Power Systems, Inc., 604 Grant Bldg., Pittsburgh, Pa.

CONTROLS (Temperature)

Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

CONVEYOR BELTS (High and Low Temperature)

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

CONVEYOR BELTS (Wire)

Cyclone Fence Co., Waukegan, Ill.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

CONVEYORS (Apron)

Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Chain)

Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Elevating)

Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Overhead Trolley)

American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.

CONVEYORS (Roller—Power and Gravity)

Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Vibratory)

Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

COPPER (Phosphorized)

National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Revere Copper & Brass Co., Inc., 230 Park Ave., New York City.

COPPERING COMPOUND

American Chemical Paint Co., Dept. 310, Ambler, Pa.

CORRESPONDENCE COURSES

International Correspondence Schools, Box 9377, Scranton, Pa.

COTTER PINS

Hindley Mfg. Co., Valley Falls, R. I.
Hubbard, M. D., Spring Co., 414 Central Ave., Pontiac, Mich.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.

COUNTERBORES

Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

COUPLERS

Hunt, C. B., & Son, Salem, O.

COUPLINGS (Flexible)

Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
American Flexible Coupling Co., 18th & Pittsburgh Aves., Erie, Pa.
Baldwin-Duckworth Div. of Chain Belt Co., 326 Plainfield St., Springfield, Mass.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
General Electric Co., Schenectady, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.
Lovejoy Flexible Coupling Co., 4973 W. Lake St., Chicago, Ill.
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.
Poole Fdy. & Mach. Co., Woodberry St., Baltimore, Md.
Waldron, John, Corp., New Brunswick, N. J.

COUPLINGS (Pipe)

Bethlehem Steel Co., Bethlehem, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Oil Well Supply Co., Dallas, Texas.
Republic Steel Corp., Dept. ST, Cleveland, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

CRANES, BRIDGE (Ore and Coal Handling)

Alliance Machine Co., The, Alliance, O.
Dravo Corp. (Engin'r'g Works Div.), Neville Island, Pittsburgh, Pa.
Industrial Brownhoist Corp., Bay City, Mich.

CRANES (Charging)

Alliance Machine Co., The, Alliance, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Crawler, Erection)

Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.

CRANES (Electric)

Alliance Machine Co., The, Alliance, O.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

CRANES (Gantry)

Alliance Machine Co., The, Alliance, O.
Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Gasoline and Diesel)

Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.

CRANES (Hand)

American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
Industrial Brownhoist Corp., Bay City, Mich.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

CRANES (Jib)

Alliance Machine Co., The, Alliance, O.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

CRANES (Locomotive)

Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.

CRANES (Monorail)

American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Traveling)

Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.

CRANK SHAFTS

Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.

CRUSHERS

American Pulverizer Co., 1539 Macklind Ave., St. Louis, Mo.

WHERE-TO-BUY

CUSHIONS (Pneumatic)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

CUTTERS (Die Sinking & End Milling)
Brown & Sharpe Mfg. Co., Providence, R. I.
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.

CUTTERS (Gang Slitter)
Cowles Tool Co., 2086 W. 110th St., Cleveland, O

CUTTING AND WELDING—See WELDING

CUTTING OILS—See OILS (Cutting)

CYLINDERS (Air or Hydraulic)
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hydro-Power Systems, Inc., 604 Grant Bldg., Pittsburgh, Pa.
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.

CYLINDERS (Pressure)
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

DEGREASERS
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

DEOXIDIZERS
Vanadium Corp. of America, 420 Lexington Ave., New York City

DIE BLOCKS
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.
Ampco Metal, Inc., Dept. S-812, 3830 W. Burnham St., Milwaukee, Wis.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Heppenstall Co., 47th and Hatfield Sts., Pittsburgh, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

DIE CASTINGS
Titan Metal Mfg. Co., Bellefonte, Pa.

DIE HEADS
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Inc., Waynesboro, Pa.
National Acme Co., The, 170 E. 131st St., Cleveland, O.

DIE-SINKING MACHINES
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, O.

DIES (Cast)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.

DIES (Punching, Stamping, Blanking)
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

DOLOMITE—FLUX AND REFRACTORIES
Basic Dolomite, Inc., Hanna Bldg., Cleveland, O.

DOORS & SHUTTERS (Steel, Fire, and Rolling)
Kinnear Mfg. Co., 1780-1800 Fields Ave., Columbus, O.

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)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

DRILL RODS—See RODS (Drill)

DRILLING MACHINES (Radial)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

DRILLS (Portable—Pneumatic)
Ingersoll-Rand Co., 11 Broadway, New York City.

DRILLS (Twist)—See TWIST DRILLS

DRIVES (Chain)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

DRIVES (Cut Herringbone Gear)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
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 (Hydraulic)
Hydro-Power Systems, Inc., 604 Grant Bldg., Pittsburgh, Pa.

DRIVES (Multi-V-Belt)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

DRIVES (Reciprocating)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

DRUMS (Steel)
Petroleum Iron Works Co., Sharon, Pa.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

DRYERS (Compressed Air)
Ruemelin Mfg. Co., 3882 N. Palmer St., Milwaukee, Wis.

DRYERS (Rotary)
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

DUST ARRESTING EQUIPMENT
Pangborn Corp., Hagerstown, Md.
Peabody Engineering Corp., 580 Fifth Ave., New York City.
Ruemelin Mfg. Co., 3882 N. Palmer St., Milwaukee, Wis.

ECONOMIC SERVICE
Brookmire Corp., 551 Fifth Ave., New York City.

ECONOMIZERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

ELECTRIC WELDING—See WELDING

ELECTRIC WIRING—See WIRE AND CABLE

ELECTRICAL EQUIPMENT
Allen-Bradley Co., 1320 So. Second St., Milwaukee, Wis.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City.

ELECTRODES (Carbon and Graphite)
National Carbon Co., W. 117th St. at Madison Ave., Cleveland, O.

ELEVATING AND CONVEYING MACHINERY—See CONVEYORS

ENGINEERS AND CONTRACTORS
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Brassert, H. A., & Co., 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.
Uhl Construction Co., 6001 Butler St., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

ENGINEERS (Consulting)
Brassert, H. A., & Co., 1st National Bank Bldg., Pittsburgh, Pa.
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

ENGINEERS (Consulting)—Con.
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.
Ingersoll-Rand Co., 11 Broadway, New York City.
Worthington Pump & Machinery Corp., Harrison, N. J.

ENGINES (Steam)
Oil Well Supply Co., Dallas, Texas.

FANS (Crane Cab)
Graybar Electric Co., 420 Lexington Ave., New York City.
Trufio Fan Co., 600 Mercer St., Harmony, Pa.

EXCAVATORS
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

FANS (Exhaust Ventilating)
Graybar Electric Co., 420 Lexington Ave., New York City.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Trufio Fan Co., 600 Mercer St., Harmony, Pa.

FANS (High Temperature)
Garden City Fan Co., 332 S. Michigan Ave., Chicago, Ill.

FANS (Portable)
Graybar Electric Co., 420 Lexington Ave., New York City.
Perkins, B. F., & Son, Inc., Holyoke, Mass.
Trufio Fan Co., 600 Mercer St., Harmony, Pa.

FANS (Wall)
Graybar Electric Co., 420 Lexington Ave., New York City.
Trufio Fan Co., 600 Mercer St., Harmony, Pa.

FENCE (Chain Link)
Cyclone Fence Co., Waukegan, Ill.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.

FENCING (Wire)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

FERROALLOY (Briquets)
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

FERROALLOYS
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
International Nickel Co., Inc., The, 67 Wall St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROCHROME
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROMANGANESE
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FERROPHOSPHORUS
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FERROSILICON
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank, & Co., Inc., Harrison, Bldg., Philadelphia, Pa.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROSILICON (Aluminum)
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROTITANIUM
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROVANADIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FILES AND RASPS
Simonds Saw & Steel Co., Fitchburg, Mass.

FILING CABINETS (Blueprint, Drawing and Tracing)
Pease, C. F., 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 Sales Co., 60 E. 42nd St., New York City.
Linde Air Products Co., 30 E. 42nd St., New York City.
National-Erie Corp., Erie, Pa.

FLANGES (Welded Steel)
King Fifth Wheel Co., 5027 Beaumont Ave., Philadelphia, Pa.

FLOORING (Monolithic)
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.
Johns-Manville Corp., 22 E. 40th St., New York City.

FLOORING (Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Blaw-Knox Co., Blawnox, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

FLUE DUST CONDITIONERS
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

FLUE GAS ANALYZERS
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

FLUORSPAR
Hillside Fluor Spar Mines, 38 S. Dearborn St., Chicago, Ill.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FLUXES (Soldering, Welding & Tinning)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Kester Solder Co., 4222 Wrightwood Ave., Chicago, Ill.

FORGING BILLETS—See BILLETS

FORGING MACHINERY
Acme Machinery Div., Hill Acme Co., 4535 St. Clair Ave., Cleveland, O.
Alliance Machine Co., The, Alliance, O.
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
Erie Foundry Co., Erie, Pa.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
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-812, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.
Titan Metal Mfg. Co., Bellefonte, Pa.

FORGINGS (Drop) (*Also Stainless)
American Forge Div. of The American Brake Shoe & Fdry Co., 2621 So. Hoyne Ave., Chicago, Ill.
*Atlas Drop Forge Co., Lansing, Mich.
*Bethlehem Steel Co., Bethlehem, Pa.
Oil Well Supply Co., Dallas, Texas.
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

FORGINGS (Hollow Bored)
Atlas Drop Forge Co., Lansing, Mich.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.

FORGINGS (Iron and Steel) (*Also Stainless)
American Forge Div. of American Brake Shoe & Fdry. Co., The, 2621 S. Hoyne Ave., Chicago, Ill.
*Atlas Drop Forge Co., Lansing, Mich.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Oil Well Supply Co., Dallas, Texas.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

FORGINGS (Upset)
American Forge Div. of The American Brake Shoe & Fdry Co., 2621 So. Hoyne Ave., Chicago, Ill.
Atlas Drop Forge Co., Lansing, Mich.
Bethlehem Steel Co., Bethlehem, Pa.

FROGS AND SWITCHES
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.

FURNACE INSULATION—See INSULATION

FURNACES (Blast)
Brassert, H. A., & Co., 1st National Bank Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2422 Euclid Ave., Cleveland, O.

FURNACES (Brazing)
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.

FURNACES (Electric Heating)
Ajax Electrothermic Corp., Ajax Park Trenton, N. J.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1257, Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Westinghouse Electric & Mfg. Co., 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. Carson St., Pittsburgh, Pa.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., 1106 So. Central Ave., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

FURNACES (Heat Treating, Annealing, Carburizing, Hardening, Tempering)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
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. Carson St., Pittsburgh, Pa.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.
Holden, A. F., Co., 200 Winchester Ave., New Haven, Conn.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
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.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.

FURNACES (Non-Ferrous Melting)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.

FURNACES (Open Hearth)
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.

» » » WHERE-TO-BUY « « «

FURNACES (Recuperative)
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J. Co., 2400 E. Carson St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

FURNACES (Rivet Heating)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

FURNACES (Sheet and Tin Mill)
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

FURNACES (Steel Mill)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Criswell, James, Co., Keenan Bldg., Pittsburgh, Pa.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1885, Pittsburgh, Pa.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

FURNITURE (Tubular Steel)
Harter Corp., The, Sturgis, Mich.

GAGE BLOCKS
Dearborn Gage Co., 23036 Beech St., Dearborn, Mich.

GAGES
Brown & Sharpe Mfg. Co., Providence, R. I.
Greenfield Tap & Die Corp., Greenfield, Mass.

GAGES (Draft)
Peabody Engineering Corp., 580 Fifth Ave., New York City.

GALVANIZING (Hot Dip)
Acme Galvanizing, Inc., Milwaukee, Wis.
Acme Steel & Malleable Iron Works, Buffalo, N. Y.
American Hot Dip Galvanizers Assoc., Inc., 903 American Bank Bldg., Pittsburgh, Pa.
American Tinning & Galvanizing Co., Erie, Pa.
Atlantic Steel Co., Atlanta, Ga.
Buffalo Galvanizing & Tinning Works, Inc., Buffalo, N. Y.
Cattie, Jos. P., & Bros., Gaul and Liberty Sts., Philadelphia, Pa.
Commercial Metals Treating, Inc., Toledo, O.
Diamond Expansion Bolt Co., Inc., Garwood, N. J.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Farner Mfg. Co., The, Cleveland, O.
John Finn Metal Works, San Francisco, Calif.
Gregory, Thomas, Galvanizing Works, Maspeth, N. Y.
Hanlon-Gregory Galvanizing Co., 5815 Butler St., Pittsburgh, Pa.
Hubbard & Co., Oakland, Calif.
Independent Galvanizing Co., Newark, N. J.
International Derrick & Equipment Co., Columbus, O.
Joslyn Co. of California, Los Angeles, Calif.
Joslyn Mfg. & Supply Co., Chicago, Ill.
Koven, L. O., & Bro., Inc., Jersey City, N. J.
Lehigh Structural Steel Co., Allentown, Pa.
Lewis Bolt & Nut Co., Minneapolis, Minn.
Missouri Rolling Mill Corp., St. Louis, Mo.
National Telephone Supply Co., The, Cleveland, O.
Riverside Foundry & Galvanizing Co., Kalamazoo, Mich.
San Francisco Galvanizing Works, San Francisco, Calif.
Sanitary Tinning Co., The, Cleveland, O.
Standard Galvanizing Co., Chicago, Ill.
Wilcox, Crittenden & Co., Inc., Middletown, Conn.
Witt Cornice Co., The, Cincinnati, O.

GALVANIZING PLANTS FOR SHEETS
Erie Foundry Co., Erie, Pa.
Wean Engineering Co., Warren, O.

GAS HOLDERS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Petroleum Iron Works Co., Sharon, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

GAS PRODUCER PLANTS
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

GAS RECOVERY COKE OVEN AND GAS PLANTS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

GAS SCRUBBERS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Brassert, H. A., & Co., 1st National Bank Bldg., Pittsburgh, Pa.
Peabody Engineering Corp., 580 Fifth Ave., New York City.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

GASKETS (Asbestos, Metal or Rubber)
Garlock Packing Co., The, S 3-40, Palmyra, N. Y.
Johns-Manville Corp., 22 E. 40th St., New York City.

GAUGES (Indicating and Recording)
General Electric Co., Schenectady, N. Y.

GEAR BLANKS
Ampco Metal, Inc., Dept. S-812, 3830 W. Burnham St., Milwaukee, Wis.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
King Fifth Wheel Co., 5027 Beaumont Ave., Philadelphia, Pa.
National-Erie Corp., Erie, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Waldron, John, Corp., New Brunswick, N. J.

GEAR MACHINERY (Generating)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.

GEARS (Non-Metallic)
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.
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.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
General Electric Co., Schenectady, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.

GEARS AND GEAR CUTTING—Con.
Jones, W. A., Fdry. & Mach. Co., 4437 W. Roosevelt Rd., Chicago, Ill.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
National-Erie Corp., Erie, Pa.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., 25th St., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

GENERATING SETS
Electric Generator & Motor Co., 4519 Hamilton Ave., Cleveland, O.
Fairbanks, Morse & Co., Dept. 96, 600 So. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Reliance Electric & Eng. Co., 1081 Ivanhoe Rd., Cleveland, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

GENERATORS (Acetylene—Portable and Stationary)
Linde Air Products Co., The, 30 E. 42nd St., New York City.

GENERATORS (Electric)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-25.
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.

GREASE (Lubricating)—See LUBRICANTS (Industrial)

GREASE RETAINERS AND SEALS
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.

GRINDERS (Pedestal, High Speed)
Sawyer Electrical Mfg. Co., 5715 Leneve St., Los Angeles, Cal.

GRINDERS (Portable—Pneumatic)
Ingersoll-Rand Co., 11 Broadway, New York City.

GRINDERS (Precision Thread)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Jones & Lamson Machine Co., Springfield, Vt.

GRINDERS (Single Slide Internal)
Bryant Chucking Grinder Co., Springfield, Vt.

GRINDERS (Surface)
Brown & Sharpe Mfg. Co., Providence, R. I.
Heald Machine Co., Worcester, Mass.
Norton Company, Worcester, Mass.

GRINDERS (Swing Frame)
Fox Grinders, Inc., Oliver Bldg., Pittsburgh, Pa.

GRINDING COMPOUNDS
Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.

GRINDING DISCS
Abrasive Products Co., 511 Pearl St., So. Braintree, Mass.

GRINDING MACHINES (Automotive Reconditioning)
Heald Machine Co., Worcester, Mass.
Landis Tool Company, Waynesboro, Pa.

GRINDING MACHINES (Centerless, Internal and External)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES (Chucking)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Heald Machine Co., Worcester, Mass.
Landis Tool Company, Waynesboro, Pa.

GRINDING MACHINES (Crank Pin, Cam, Piston & Valve Face)
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., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Landis Tool Co., Waynesboro, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Norton Co., Worcester, Mass.

GRINDING MACHINES (Rotary Surface)
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES (Tool and Cutter)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Kearney & Trecker Corp., 5926 National Ave., Milwaukee, Wis.
Landis Tool Co., Waynesboro, Pa.
Norton Co., Worcester, Mass.
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)
Ampco Metal, Inc., Dept. S-812, 3830 W. Burnham St., Milwaukee, Wis.
National-Erie Corp., Erie, Pa.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

» » » WHERE-TO-BUY « « «

GUNS (Blast Furnace Mud)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

GUNS (Steam, Hydraulic, Electric)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

HAMMER BUSHINGS
Steel Conversion & Supply Co., P. O. Box 537 (Castle Shannon), Pittsburgh, Pa.

HAMMERS (Chipping, Riveting, Calking)
Ingersoll-Rand Co., 11 Broadway, New York City.

HAMMERS (Drop)
Alliance Machine Co., The, Alliance, O.
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St. Buffalo, N. Y.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.

HAMMERS (Steam)
Alliance Machine Co., The, Alliance, O.
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.

HANGERS
Grinnell Co., Inc., Providence, R. I.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

HANGERS (Shaft)
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Division, General Motors Sales Corp., Harrison, N. J.
New Departure Div., General Motors Corp., Bristol, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

HEADING MACHINERY
Ajax Mfg. Co., 1441 Chardon Rd., Cleveland, O.
National Machinery Co., Tiffin, O.

HEATERS (Air)
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

HEATERS (Electric Space)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

HEATERS (Unit)
Drave 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.

HOISTS (Chain)
Ford Chain Block Div. of American Chain & Cable Co., Inc., 2nd & Diamond Sts., Philadelphia, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

HOISTS (Electric)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Wright Mfg. Div. of American Chain & Cable Co. Inc., York, Pa.
Yale & Towne Mfg. Co. 4532 Tacony St., Philadelphia, Pa.

HOISTS (Monorail)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard-Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

HOISTS (Pneumatic)
Curtis Pneumatic Machinery Co., 1906 Kienlen Ave., St. Louis, Mo.
Ingersoll-Rand Co., 11 Broadway, New York City.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.

HOOKS (Chain)
American Chain & Cable Co., Inc., Bridgeport, Conn.

HOOPS AND BANDS
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn.
Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

HOSE (Flexible Metal)
American Metal Hose Branch of American Brass Co., The, Waterbury, Conn.

HOSE (Rubber)
Lowman-Shields Rubber Co., 209 First Ave., Pittsburgh, Pa.
United States Rubber Co., 1230 Sixth Ave., New York City.

HUMIDIFIERS (Industrial)
Grinnell Co., Inc., Providence, R. I.

HYDRAULIC MACHINERY
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Alliance Machine Co., The, Alliance, O.
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Morgan Engineering Co., The, Alliance, O.
National-Erie Corp., Erie, Pa.
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.
Hydro-Power Systems, Inc., 604 Grant Bldg., Pittsburgh, Pa

INDICATORS (Temperature)
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

INDICATORS (Blast Furnace Stock Line)
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

INGOT MOLDS
Bethlehem Steel Co., Bethlehem, Pa.
Shenango-Penn Mold Co., Oliver Bldg., Pittsburgh, Pa.
Valley Mould & Iron Corp., Hubbard, O.

INHIBITORS
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Parkin, Wm. M., Co., The, 1005 Highland Bldg., Pittsburgh, Pa.

INJECTORS (Lead)
Dietzel Lead Burning Co., Coraopolis, Pa.

INSTRUMENTS (Electric Indicating and Recording)
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Westinghouse Electric & Mfg. Co., 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 Lumnite Cement Co., Dept. S-5, 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.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATION (Building)
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATION (Furnace, Boiler Settings, Ovens, Steam Pipe, Etc.)
Armstrong Cork Co., 985 Concord St., Lancaster, Pa.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.

IRON (Bar)
Ryerson, Jos. T., & Son Co., 16th & Rockwell Sts., Chicago, Ill.

IRON ORE
Alan Wood Steel Co., Conshohocken, Pa.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The, Youngstown, O.

JIGS AND FIXTURES
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.

KETTLES (Galvanizing)
Petroleum Iron Works Co., Sharon, Pa.

KEYS (Machine or Woodruff)
Moltrup Steel Products Co., Beaver Falls, Pa.

KNIVES
American Shear Knife Co., 3rd and Ann Sts., Homestead, Pa.
Cowles Tool Co., 2086 W. 110th St., Cleveland, O.

LABORATORY WARE
Norton Company, Worcester, Mass.

LADLES
Hollands Mfg. Co., 342-352 E. 18th St., Erie, Pa.
Petroleum Iron Works Co., Sharon, Pa.

LAMPS (Industrial)
General Electric Co., Dept. 8-E, 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.
Norton Company, Worcester, Mass.

LARRIES (Coal)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.

LATHE DOGS (Drop Forged)
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

LATHES
Jones & Lamson Machine Co., Springfield, Vt.
LeBlond, R. K., Machine Tool Co., Dept. J-11, 2694 Madison Rd., Cincinnati, O.
Monarch Machine Tool Co., Sidney, O.
South Bend Lathe Works, 862 E. Madison St., South Bend, Ind.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LATHES (Automatic)
Brown & Sharpe Mfg. Co., Providence, R. I.
Jones & Lamson Machine Co., Springfield, Vt.
Monarch Machine Tool Co., Sidney, O.

LATHES (Engine)
Monarch Machine Tool Co., Sidney, O.
South Bend Lathe Works, 862 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 Fdry. & Mach. Co. P. O. Box 1586, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LATHES (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.

LEAD (Chemical, Corroding, Desilvered)
St. Joseph Lead Co., 250 Park Ave., New York City.

LEAD (Tellurium)
National Lead Co. 111 Broadway, New York City.

LEAD WORK
Dietzel Lead Burning Co., Coraopolis, Pa.

LEVELING MACHINES
Erie Foundry Co., Erie, Pa.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
McKay Machine Co., Youngstown, O.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

LIFT TRUCKS—See TRUCKS (Lift)

LIFTERS (Rubber Vacuum)
Lowman-Shields Rubber Co., 209 First Ave., Pittsburgh, Pa.

LIFTING MAGNETS—See MAGNETS (Lifting)

WHERE-TO-BUY

LIGHTING (Industrial)
General Electric Co., Dept. S-F, Nela Park, Cleveland, O.
Graybar Electric Co., 420 Lexington Ave., New York City.

LINERS (Pump and Cylinder)
Shenango-Penn Mold Co., Dover, O.

LOCOMOTIVE CRANES—See CRANES (Locomotive)

LOCOMOTIVES (Diesel-Electric)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.
Plymouth Locomotive Works, Div. Fate-Root-Heath Co., Plymouth, O.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Diesel Mechanical)
Plymouth Locomotive Works, Div. Fate-Root-Heath Co., Plymouth, O.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Electric Trolley)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
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 Mechanical)
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.
Ingersoll-Rand Co., 11 Broadway, New York City.

LOCOMOTIVES (Storage Battery)
Atlas Car & Mfg Co., The, 1140 Ivanhoe Rd., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

LUBRICANTS (Industrial)
American Lanolin Corp., Railroad St., Lawrence, Mass.
Gulf Oil Corp. of Penna., Gulf Refining Co., 3813 Gulf Bldg., Pittsburgh, Pa.
New York & New Jersey Lubricant Co., 292 Madison Ave., New York City.
Pensla, 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., 3608 Walnut St., Philadelphia, Pa.
Tide Water Associated Oil Co., 17 Battery Place, New York City.

LUBRICATING SYSTEMS
Farval Corp., The, 3270 E. 80th St., Cleveland, O.

MACHINE WORK
Continental Roll & Steel Fdry Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.

MACHINERY (Second Hand)
Emerman, Louis E., & Co., 1760 Elston Ave., Chicago, Ill.
Marr-Galbreath Machinery Co., 53 Water St., Pittsburgh, Pa.
West Penn Machinery Co., 1208 House Bldg., Pittsburgh, Pa.

MACHINERY (Special)
Alliance Machine Co., The, Alliance, O.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Barnes, W. F. & John, Co., 201 So. Water St., Rockford, Ill.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
Broslus, Edgar E., Inc., Sharpsburgh Branch, Pittsburgh, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National-Erie Corp., Erie, Pa.
National Roll & Fdry. Co., The, Avonmore, Pa.
Niagara Machine & Tool Works, 637 Northland Ave., Buffalo, N. Y.
Oil Well Supply Co., Dallas, Texas.
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.

MAGNESIA (Electrically Fused)
Norton Co., Worcester, Mass.

MAGNETIC SEPARATORS—See SEPARATORS (Magnetic)

MAGNETS (Lifting)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

MAGNETS (Separating)
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

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
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.

MANIPULATORS (Forging)
Alliance Machine Co., The, Alliance, O.

MARKING DEVICES
Helmer-Staley, Inc., 321 W. Huron St., Chicago, Ill.

METAL (Perforated)—See PERFORATED METAL

METAL BLAST ABRASIVES (Shot and Grit)
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., 61st St. and A. V. R. R., Pittsburgh, Pa.

METAL CLEANERS
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Pennsylvania Salt Mfg. Co., Dept. E. Pennsalt Cleaner Div., Philadelphia, Pa.

METAL FINISHES
American Nickeloid Co., 1310 Second St., Peru, Ill.

METAL SPECIALTIES AND PARTS—See STAMPINGS

METAL STAMPINGS—See STAMPINGS

METALS (Nonferrous)
American Brass Co., The, Waterbury, Conn.
International Nickel Co., Inc., The, 67 Wall St., New York City.

» » » WHERE-TO-BUY « « «

MICROMETERS
Brown & Sharpe Mfg. Co., Providence, R. I.

MILLING CUTTERS
Brown & Sharpe Mfg. Co., Providence, R. I.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

MILLING MACHINES
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders Inc., Oakley Sta., Cincinnati, O.
Kearney & Trecker Corp., 5926 National Ave., Milwaukee, Wis.
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

MOLDS (Ingot)—See INGOT MOLDS

MOLYBDENUM
Climax Molybdenum Co., 500 Fifth Ave., New York City.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

MONEL METAL (All Commercial Forms)
International Nickel Co., Inc., The, 67 Wall St., New York City.

MONORAIL SYSTEMS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

MOTORS (Electric)
Allis-Chalmers Mfg. Co. Milwaukee, Wis.
Fairbanks, Morse & Co., Dept. 96, 600 So. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-25.
Reliance Electric & Eng. Co., 1081 Ivanhoe Rd., Cleveland, O.
Sawyer Electrical Mfg. Co., 5715 Leneve St., Los Angeles, Cal.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

MUCK BAR
Samuel, Frank, & Co., Inc., The, Harrison Bldg., Philadelphia, Pa.

NAILS
(*Also Stainless)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
*Pittsburgh Steel Co., 1653 Grant Bldg, Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

NAILS (Coated and Galvanized)
Wickwire Brothers, 189 Main St., Cortland, N. Y.

NAILS (Special Only—All Metals)
Townsend Co., New Brighton, Pa.

NICKEL (All Commercial Forms)
International Nickel Co., Inc., The, 67 Wall St., New York City.

NICKEL (Shot)
International Nickel Co., Inc., The, 67 Wall St., New York City.

NICKEL STEEL (Cold Drawn)
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Republic Steel Co., Dept. ST, Cleveland, O.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.

NOZZLES (Blasting)
Pangborn Corporation, Hagerstown, Md.

NOZZLES (Descaling)
Aldrich Pump Co., The, Allentown, Pa.

NUTS
(*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Elastic Stop Nut Corp., 2340 A Vauxhall Rd., Union, N. J.
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., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Tinnerman Products, Inc., 2039 Fulton Rd., Cleveland, O.

NUTS (Castellated)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS (Machine Screw)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.

NUTS (Self Locking)
Elastic Stop Nut Corp., 2340 A Vauxhall Rd., Union, N. J.

NUTS (Semi-Finished)
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., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS (Wing)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Parker-Kalon Corp., 194-200 Varick St., New York City.

OIL RETAINERS AND SEALS
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.
Garlock Packing Co., The, S 3-40, Palmyra, N. Y.

OILS (Cutting)
Gulf Oil Corp. of Penna., Gulf Refining Co., 3813 Gulf Bldg., Pittsburgh, Pa.
Penola, Inc., 34th & Smallman Sts., Pittsburgh, Pa.
Pure Oil Co., The, 35 E. Wacker Dr., Chicago, Ill.
Shell Oil Co., Inc., 50 W. 50th St., New York City.
Socony-Vacuum Oil Co., Inc., 26 Broadway, New York City.
Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.
Tide Water Associated Oil Co., 17 Battery Place, New York City.

OILS (Lubricating)—See LUBRICANTS (Industrial)

OILS (Rust Preventive)
American Chemical Paint Co., Dept. 310, Ambler, Pa.

OPEN-HEARTH FURNACES—See FURNACES (Open-Hearth)

OVENS (Annealing, Japanning, Tempering)
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Stewart Furnace Div., Chicago Flexible Shaft Co., 1106 So. Central Ave., Chicago, Ill.

OVENS (Coke, By-Product Recovery)
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

OVENS (Core and Mold)
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.

OXY-ACETYLENE WELDING AND CUTTING—See WELDING

OXYGEN IN CYLINDERS
Air Reduction Sales Co., 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.

PACKING (Asbestos or Rubber)
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.
Garlock Packing Co., The, S 3-40, Palmyra, N. Y.
Johns-Manville Corp., 22 E. 40th St., New York City.
United States Rubber Co., 1230 Sixth Ave., New York City.

PACKINGS—MECHANICAL LEATHER (Cup, U-Cup, Flange and Vees)
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.
Garlock Packing Co., The, S 3-40, Palmyra, N. Y.

PAINT (Alkali Resisting)
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

PAINT (Aluminum)
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

PAINT (Heat Resisting)
American Chemical Paint Co., Dept. 310, Ambler, Pa.

PAINT (Industrial)
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.

PAINT (Marking)
Helmer-Staley, Inc., 321 W. Huron St., Chicago, Ill.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

PAINT (Rust Preventive)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

PAINT (Stick Form)
Helmer-Staley, Inc., 321 W. Huron St., Chicago, Ill.

PARTS (Precision)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

PERFORATED METAL
Chicago Perforating Co., 2443 W. 24th Pl., Chicago, Ill.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

PHENOL RECOVERY PLANTS
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

PICKLING COMPOUND
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

PICKLING CRATES
Youngstown Welding & Engineering Co., The, Youngstown, O.

PICKLING EQUIPMENT
International Nickel Co., The, 67 Wall St., New York City.
Youngstown Welding & Engineering Co., The, Youngstown, O.

PICKLING MACHINERY
Erie Foundry Co., Erie, Pa.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

PICKLING TANK LININGS
Atlas Mineral Products Co., of Pa., Mertztown, Pa.
Cellcote Co., 750 Rockefeller Bldg., Cleveland, O.
Keagler Brick Co., 1443 W. Market St., Steubenville, O.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

PICKLING TANKS—See TANKS (Pickling)

PIERCER POINTS
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

PIG IRON
Alan Wood Steel Co., Conshohocken, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Brooke, E. & G., Iron Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Jackson Iron & Steel Co., Jackson, O.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Samuel, Frank & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

PILING (Iron and Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 28 South Dearborn St., Chicago, Ill.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Co., Dept. ST, Cleveland, O.

PILING (Pressure-Treated Wood)
Wood Preserving Corp., The, 300 Koppers Bldg., Pittsburgh, Pa.

PILLOW BLOCKS (Roller Bearing)
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.

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

PINIONS (Mill)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
National-Erie Corp., Erie, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.
United Engineering & Foundry Co., First National Bank Bldg., Pittsburgh, Pa.

PINS (Case Hardened or Heat Treated)
Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.

PINS (Clevis)
Townsend Co., New Brighton, Pa.

PINS (Taper)
Moltrup Steel Products Co., Beaver Falls, Pa.

PIPE (Brass, Bronze, Copper)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Shenango-Penn Mold Co., Dover, O.

PIPE (Square and Rectangular)
Youngstown Sheet & Tube Co., The, Youngstown, O.

PIPE (Steel)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 540 Curtis St., Middletown, O.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PIPE BALLS
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

PIPE BENDING
Crane Co., 836 So. Michigan Ave., Chicago, Ill.

PIPE CUTTING AND THREADING MACHINERY
Landis Machine Co., Inc., Waynesboro, Pa.

PIPE FITTINGS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Grinnell Co., Inc., Providence, R. I.
Hydro-Power Systems, Inc., 604 Grant Bldg., Pittsburgh, Pa.
Oil Well Supply Co., Dallas, Texas.
Worthington Pump & Machy. Corp., Harrison, N. J.

PIPE LINES (Riveted and Welded)
Bethlehem Steel Co., Bethlehem, Pa.
Petroleum Iron Works Co., Sharon, Pa.

PIPE MILL MACHINERY
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PIPE STRAIGHTENING MACHINERY
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PIPE TOOLS
Greenfield Tap & Die Corp., Greenfield, Mass.

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 & 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, 540 Curtis St., Middletown, O.
*Bethlehem Steel Co., Bethlehem, Pa.
*Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Worth Steel Co., Claymont, Del.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PLATES (Stainless Clad)
Granite City Steel Co., Granite City, Ill.

PLATES (Steel—Floor)—See FLOORING (Steel)

PLATES (Terne and Tin)—See TIN PLATE

PLUGS (Expansion)
Hubbard, M. D., Spring Co., 414 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.

POWER UNITS (Gasoline, Electric for Industrial Trucks)
Ready-Power Co., The, 3826 Grand River Ave., Detroit, Mich.

POWER UNITS (Hydraulic)
Hydro-Power Systems, Inc., 604 Grant Bldg., Pittsburgh, Pa.

PREHEATERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

PRESSED METAL PARTS
American Forge Div. of American Brake Shoe & Fdry. Co., The, 2621 S. Hoyne Ave., Chicago, Ill.
Stanley Works, The, Pressed Metal Div., New Britain, Conn.

PRESSES
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Streine Tool & Mfg. Co., New Bremen, O.
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.

PRESSES (Bending)
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Extrusion)
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
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.
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
Chambersburg Engineering Co., Chambersburg, Pa.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National-Erie Corp., Erie, Pa.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

PRESSES (Pneumatic)
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

PRESSES (Punching, Drawing, Coining, Blanking, etc.)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Riveting)
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

PRESSES (Scrap Bundling and Baling)
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

PRESSES (Stamping)
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Welding)—See WELDERS

PRESSURE VESSELS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

PRODUCER GAS SYSTEMS—See GAS PRODUCER PLANTS

PUG MILLS (For Blast Furnaces and Sintering Plants)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.

PULLEYS (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

PULVERIZERS
American Pulverizer Co., 1539 Macklind Ave., St. Louis, Mo.

PUMP HOUSES
Dravo Corp. (Contracting Div.), Neville Island, Pittsburgh, Pa.

PUMPS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Oil Well Supply Co., Dallas, Texas.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Boiler Feed)
Aldrich Pump Co., The, Allentown, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Centrifugal)
Aldrich Pump Co., The, Allentown, Pa.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Brown & Sharpe Mfg. Co., Providence, R. I.
Fairbanks, Morse & Co., Dept. 96, 600 So. Michigan Ave., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York City.
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Fuel Injection)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

PUMPS (Hydraulic)
Aldrich Pump Co., The, Allentown, Pa.
Brown & Sharpe Mfg. Co., Providence, R. I.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Hydro-Power Systems, Inc., 604 Grant Bldg., Pittsburgh, Pa.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

PUMPS (Reciprocating)
Aldrich Pump Co., The, Allentown, Pa.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Rotary)
Brown & Sharpe Mfg. Co., Providence, R. I.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Vacuum)
Ingersoll-Rand Co., 11 Broadway, New York City.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUNCHES (Multiple)
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
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 Co., P. O. Box 1586, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PYROMETER TUBES
Norton Company, Worcester, Mass.

PYROMETERS
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

RAIL BREAKERS
National Roll & Foundry Co., The, Avonmore, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

RAILS (New and Relaying)
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.

RAILS (Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

REAMERS
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.

» » » WHERE-TO-BUY « « «

REAMERS (Pneumatic)
Ingersoll-Rand Co.,
11 Broadway, New York City.

REAMERS (Sand, Ingot Mold—Pneumatic)
Ingersoll-Rand Co.,
11 Broadway, New York City.

REBUILT EQUIPMENT
Emerson, Louis E., & Co.,
1760 Elston Ave., Chicago, Ill.
Marr-Galbreath Machinery Co.,
53 Water St., Pittsburgh, Pa.
West Penn Machinery Co.,
1208 House Bldg., Pittsburgh, Pa.

RECEIVERS
Petroleum Iron Works Co.,
Sharon, Pa.
Pressed Steel Tank Co., 1461 So.
66th St., Milwaukee, Wis.

RECORDERS (Combustion)
Hays Corp., The, 960 Eighth Ave.,
Michigan City, Ind.

RECORDERS (Pressure, Speed, Temperature, Time)
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave.,
Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

REDUCERS (Speed)—See SPEED REDUCERS

REDUCTION GEARS
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.
Keagler Brick Co., 1443 W. Market St., Steubenville, O.

REFRACTORIES (For High Frequency Furnaces)
Ajax Electrothermic Corp.,
Ajax Park, Trenton, N. J.
Carborundum Co., The,
Perth Amboy, N. J.
Norton Company, Worcester, Mass.

REFRACTORIES (Silicon Carbide)
Carborundum Co., The,
Perth Amboy, N. J.
Norton Co., Worcester, Mass.

REFRACTORY CONCRETE
Atlas Lumnite Cement Co., Dept. S-5, 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 (Jam, Pedestal, Staybolt, Squeeze, Stationary, Yoke—Pneumatic)
Ingersoll-Rand Co.,
11 Broadway, New York City.

RIVETERS (Pneumatic)
Hannifin Mfg. Co., 621-631 So.
Kolmar Ave., Chicago, Ill.

RIVETING MACHINERY
Acme Machinery Div., Hill Acme Co., 4535 St. Clair Ave.,
Cleveland, O.
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 Scranton Rd., Cleveland, O.
*Russell, Burdsall & 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.
Titan Metal Mfg. Co.,
Bellefonte, Pa.

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.
*Copperweld Steel Co., Warren, O.
*Firth-Sterling Steel Co.,
McKeesport, Pa.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg.,
St. Louis, Mo.
*Republic Steel Corp.,
Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co.,
Brown-Marx Bldg.,
Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Washburn Wire Co.,
Phillipsdale, R. I.
Youngstown Sheet & Tube Co., The,
Youngstown, O.

RODS (Steel and Iron)
Firth-Sterling Steel Co.,
McKeesport, Pa.
National Forge & Ordnance Co.,
Irvine, Warren Co., Pa.

RODS (Welding)—See WELDING RODS

RODS (Wire)—See WIRE PRODUCTS

ROLL COOLERS (Internal, Water)
Hunt, C. B., & Son, Salem, O.

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 Fdry. & Mach. Co.,
P. O. Box 1586, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co.,
P. O. Box 1466, Pittsburgh, Pa.
Morgan Construction Co.,
Worcester, Mass.
Morgan Engineering Co., The,
Alliance, O.
National Roll & Foundry Co., The,
Avonmore, Pa.
Streine Tool & Mfg. Co.,
New Bremen, O.
United Engineering & Fdry. Co.,
First National Bank Bldg.,
Pittsburgh, Pa.
Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

ROLLS (Bending and Straightening)
Baldwin Southwark Div., Baldwin Locomotive Works,
Philadelphia, Pa.
Hannifin Mfg. Co., 621-631 So.
Kolmar Ave., Chicago, Ill.

ROLLS (Rubber Covered)
Lowman-Shields Rubber Co.,
209 First Ave., Pittsburgh, Pa.

ROLLS (Sand and Chilled)
Birdsboro Steel Fdry. & Mach. Co.,
Birdsboro, Pa.
Continental Roll & Steel Fdry. Co.,
E. Chicago, Ind.
Hyde Park Fdry. & Mach. Co.,
Hyde Park, Pa.
Lewis Foundry & Machine Co.,
P. O. Box 1586, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co.,
P. O. Box 1466, Pittsburgh, Pa.
National Roll & Foundry Co., The,
Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O.
Springfield, O.
Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh, Pa.
United Engineering & Fdry. Co.,
First National Bank Bldg.,
Pittsburgh, Pa.

ROLLS (Steel and Iron)
Bethlehem Steel Co.,
Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co.,
Birdsboro, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co.,
E. Chicago, Ind.
Farrel-Birmingham Co., Inc.,
110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Hyde Park Fdry. and Machine Co.,
Hyde Park, Pa.
Lewis Foundry & Machine Co.,
P. O. Box 1586, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co.,
P. O. Box 1466, Pittsburgh, Pa.
Midvale Co., The, Nicetown,
Philadelphia, Pa.
National Roll & Fdry Co., The,
Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O.
Springfield, O.
Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh, Pa.
United Engineering & Fdry Co.,
First National Bank Bldg.,
Pittsburgh, Pa.

ROLLS (Tinning Machine)
American Shear Knife Co.,
3rd & Ann Sts., Homestead, Pa.

ROOFING AND SIDING (Corrugated and Plain)
American Rolling Mill Co., The,
540 Curtis St., Middletown, O.
Andrews Steel Co., The,
Newport, Ky.
Bethlehem Steel Co.,
Bethlehem, Pa.
Carey, Philip, Co., The, Dept. 71,
Lockland, Cincinnati, O.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Columbia Steel Co.,
San Francisco, Calif.
Granite City Steel Co.,
Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
New Jersey Zinc Co.,
160 Front St., New York City.
Republic Steel Corp.,
Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Sons, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg.,
Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The,
Youngstown, O.

ROOFING (Plastic and Liquid)
Carey, Philip, Co., The, Dept. 71,
Lockland, Cincinnati, O.
Koppers Co., Tar & Chemical Div.,
300 Koppers Bldg.,
Pittsburgh, Pa.

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.
Lowman-Shields Rubber Co.,
209 First Ave., Pittsburgh, Pa.
United States Rubber Co.,
1230 Sixth Ave., New York City.

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.
Lintern Corp., The,
7960 Lorain Ave., Cleveland, O.

SALT TABLETS
Morton Salt Co., 310 So. Michigan Ave., Chicago, Ill.

SAND CONDITIONING AND PREPARING MACHINERY
Link-Belt Co.,
300 W. Pershing Rd., Chicago, Ill.

SAWING MACHINES (Hot and Cold)
Ajax Manufacturing Co.,
1441 Chardon Rd., Cleveland, O
Armstrong-Blum Mfg. Co.,
5737 Bloomingdale Ave.,
Chicago, Ill.
Morgan Engineering Co., The,
Alliance, O.
Motch & Merryweather Machy. Co.,
Penton Bldg., Cleveland, 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.,
5737 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.

WHERE-TO-BUY

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.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Toledo Scale Co., 3216 Monroe St., Toledo, O.

SCALING TOOLS (Pneumatic)
Ingersoll-Rand Co., 11 Broadway, New York City.

SCHOOLS
International Correspondence Schools, Box 9477, 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.
Titan Metal Mfg. Co., Bellefonte, Pa.

SCREW MACHINES (Automatic, Single and Multiple Spindle)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cone Automatic Machine Co., Windsor, Vt.
National Acme Co., The, 170 E. 131st St., Cleveland, O.

SCREW PLATES
Greenfield Tap & Die Corp., Greenfield, Mass.

SCREW STOCK—See STEEL (Screw Stock)

SCREWS
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.
Townsend Co., New Brighton, Pa.

SCREWS (Cap, Set, Safety-Set)
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Acme Co., The, 170 E. 131st St., Cleveland, O.

SCREWS (Cold Headed)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Townsend Co., New Brighton, Pa.

SCREWS (Conveyor)
Lee Spring Co. Inc., 30 Main St., Brooklyn, N. Y.

SCREWS (Drive)
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.
Townsend Co., New Brighton, Pa.

SCREWS (Hardened Self-Tapping)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Machine)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.

SCREWS (Machine, Recessed Head)
American Screw Co., Providence, R. I.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., Waterbury, Conn.

SCREWS (Self Locking)
Shakeproof Lock Washer Co., 2525 N. 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 Varick St., New York City.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

SCREWS (Socket, Cold Forged)
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Thread-Cutting)
Shakeproof Lock Washer Co., 2525 N. Keeler Ave., Chicago, Ill.

SCREWS (Thumb)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Wood, Recessed Head)
American Screw Co., Providence, R. I.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.

SEAMLESS STEEL TUBING—See TUBES

SEPARATORS (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland, O.
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

SHAFT HANGERS—See HANGERS (Shaft)

SHAFTING
Bliss & Laughlin, Inc., Harvey, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
LaSalle Steel Co., Dept. SA, P. O. Box 6800-A, Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.

SHAFTING—Con.
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., 180 No. Michigan Ave., Chicago, Ill.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

SHAKERS
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

SHAPERS
Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.

SHAPES (Steel)—See STEEL (Structural)

SHAPES (Brass, Bronze, Nickel Silver)
Titan Metal Mfg. Co., Bellefonte, Pa.

SHAPES, SPECIAL (Steel)
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Fort Pitt Spring Co., P. O. Box 1377, Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
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.
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
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.
Hallden Machine Co., The, Thomaston, Conn.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Fdry. & Mach. Co., P. O. Box 1586, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Streine Tool & Mfg. Co., New Bremen, O.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

SHEET BARS
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEET LIFTERS AND CARRIERS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago, Ill.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
J-B Engineering Sales Co., 1743 Orange St., New Haven, Conn.

SHEET METAL PRODUCTS—See STAMPINGS

SHEET METAL WORKERS MACHINES
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Excelsior Tool & Machine Co., Ridge & Jefferson Aves., E. St. Louis, Ill.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Streine Tool & Mfg. Co., New Bremen, O.

SHEET STEEL PILING (New and Used)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.

SHEETS (Acid Resisting)
International Nickel Co., Inc., The, 67 Wall St., New York City.

SHEETS (Black)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Andrews Steel Co., The, Newport, Ky.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.

SHEETS (Brass, Bronze, Copper, Nickel Silver, Silicon-Bronze)
American Brass Co., The, Waterbury, Conn.
Ampco Metal, Inc., Dept. S-812, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.

SHEETS (Corrugated)
American Rolling Mill Co., The, 540 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Deep Drawing and Stamping)
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., The, 540 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.

SHEETS (Deep Drawing and Stamping)—Con.
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.
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 (Electrical)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 540 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, 540 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
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, 540 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Long Terne)
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Perforated)
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.

SHEETS (Reinforced)
Erdle Perforating Co., 171 York St., Rochester, N. Y.
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, 540 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, 540 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
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, 540 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHOVELS (Power)
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

SIEVES—See SCREENS AND SIEVES

SIGNALING & INTER-COMMUNICATION EQUIPMENT
Graybar Electric Co., 420 Lexington Ave., New York City.

SILICO-MANGANESE
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

SILICON METAL AND ALLOYS
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Revere Copper & Brass Co., Inc., 230 Park Ave., New York City.

SKELP (Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

SLAG GRANULATING MACHINES (Blast Furnace and Open Hearth)
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

SMALL TOOLS
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.

SOAKING PITS
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., 1211 St. Paul Ave., Milwaukee, Wis.

SOLVENT (Degreasing)
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

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.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Jones, W. A., Fdry. & Mach. Co., 4437 W. Roosevelt Rd., Chicago, Ill.
Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.
New Departure Div., General Motors Corp., Bristol, Conn.

SPELTER (Zinc)
St. Joseph Lead Co., 250 Park Ave., New York City.

SPIEGELEISEN
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
New Jersey Zinc Co., 160 Front St., New York City.
Samuel, Frank, & Co., Inc., The, Harrison Bldg., Philadelphia, Pa.

SPIKES (Screw)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SPINDLES (Grinding)
Bryant Chucking Grinder Co., Springfield, Vt.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Heald Machine Co., Worcester, Mass.

SPLICE BARS (Rail)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

SPRINGS (*Also Stainless)
Accurate Spring Mfg. Co., 3823 W. Lake St., Chicago, Ill.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Durex Spring & Mfg. Co., Pittsburgh, Pa.
Fort Pitt Spring Co., P. O. Box 1377, Pittsburgh, Pa.
Hubbard, M. D., Spring Co., 414 Central Ave., Pontiac, Mich.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
Raymond Mfg. Co., Div. Associated Spring Corp., Corry, Pa.
Standard Steel Works 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 (Alloy)
Fort Pitt Spring Co., P. O. Box 1377, Pittsburgh, Pa.

SPRINGS (Coil and Elliptic)
Fort Pitt Spring Co., P. O. Box 1377, Pittsburgh, Pa.

SPRINGS (Oil Tempered—Flat)
Davis Brake Beam Co., Laurel Ave., & P. R. R., Johnstown, Pa.

SPRINKLERS (Automatic)
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., 414 Central Ave., Pontiac, Mich.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Raymond Mfg. Co., Div. Associated Spring Corp., Corry, Pa.
Shakeproof Lock Washer Co., 2525 N. 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, 180 Main St., Cortland, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STARTERS (Electric Motor)
Electric Controller & Mfg. Co., 2699 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.
Henpenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Jessop Steel Co., 584 Green St., Washington, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Simonds Saw & Steel Co., Fitchburg, Mass.
Stanley Works, The, New Britain, Conn.
Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Washburn Wire Co., Phillipsdale, R. I.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

STEEL (Alloy, Cold Finished)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co., McKeesport, Pa.
LaSalle Steel Co., Dept. 8A, 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.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

STEEL (Clad—Corrosion Resisting) (*Also Stainless)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
*Copperweld Steel Co., Warren, O.
*Granite City Steel Co., Granite City, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.
Superior Steel Corp., Carnegie, Pa.

STEEL (Cold Drawn)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
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. Michigan Ave., Chicago, Ill.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Cold Finished)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
LaSalle Steel Co., Dept. 8A, 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. Michigan Ave., Chicago, Ill.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Corrosion Resisting)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 540 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Crucible Steel Company of America, 405 Lexington Ave., New York City.
Firth-Sterling Steel Co., McKeesport, Pa.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn.
Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

STEEL (Die)
Crucible Steel Company of America, 405 Lexington Ave., New York City.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL (Drill)
Crucible Steel Company of America, 405 Lexington Ave., New York City.

STEEL (Electric)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Crucible Steel Company of America, 405 Lexington Ave., New York City.
Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

STEEL (High Speed)
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.
Jessop Steel Co., 584 Green St., Washington, Pa.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL (High Tensile, Low Alloy)
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Nitriding)
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. 8A, 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 So., 180 No. Michigan Ave., Chicago, Ill.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Spring)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Fort Pitt Spring Co., P. O. Box 1377, Pittsburgh, Pa.
Washburn Wire Co., 118th St. & Harlem River, New York City. Phillipsdale, R. I.

STEEL (Stainless)—See STEEL (Corrosion Resisting)

STEEL (Strip, Copper Coated)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Thomas Steel Co., The, Warren, O

STEEL (Strip, Hot and Cold Rolled) (*Also Stainless)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
*American Rolling Mill Co., The, 540 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
American Tube & Stamping Plant, (Stanley Wks.), Bridgeport, Conn.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
*Firth-Sterling Steel Co., McKeesport, Pa.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
*Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Seneca Wire & Mfg. Co., Fostoria, O.
*Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Thomas Steel Co., 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. Michigan Ave., Chicago, Ill.

STEEL (Strip, Tin Coated)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City.

STEEL (Strip, Zinc Coated)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Thomas Steel Co., 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. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Tool)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Copperweld Steel Co., Warren, O.
Crucible Steel Company of America, 405 Lexington Ave., New York City.
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Jessop, Wm., & Sons Co., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Vanadium Alloys Steel Co., Latrobe, Pa.

STEEL BUILDINGS—See BRIDGES, BUILDINGS, ETC.

STEEL DOORS & SHUTTERS—See DOORS & SHUTTERS

STEEL FABRICATORS—See BRIDGES, BUILDINGS, ETC.

STEEL FLOATING AND TERMINAL EQUIPMENT
Dravo Corp. (Engin'r'g Works Div.), Neville Island, Pittsburgh, Pa.

STEEL PLATE CONSTRUCTION
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Belmont Iron Works, 22nd St., and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Petroleum Iron Works Co., Sharon, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

STELLITE
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.

STOKERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Canton Pattern & Mfg. Co., The, Andrews Pl. S. W., Canton, O.

STOPPERS (Cinder Notch)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

STOPPERS (Rubber)
Rhoades, R. W., Metaline Co., 50 Third St., Long Island City, N. Y.

STORAGE BATTERIES—See BATTERIES (Storage)

STRAIGHTENING MACHINERY
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Lewis Machine Co., 3450 E. 76th St., Cleveland, O.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Medart Co., The, 3520 de Kalb St., St. Louis, Mo.
Shuster, F. B., Co., The, New Haven, Conn.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.

SULPHURIC ACID
Cleveland-Cliffs Iron Co., The, Union Commerce Bldg., Cleveland, O.
New Jersey Zinc Co., 160 Front St., New York City.
Pennsylvania Salt Mfg. Co., Dept. E. Pennsalt Cleaner Div., Philadelphia, Pa.

SWITCHES (Electric)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.
General Electric Co., Dept. S-E, Nela Park, Cleveland, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

TACHOMETERS
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.

TANK LININGS
Ceilcote Co., 750 Rockefeller Bldg., Cleveland, O.
National Carbon Co., W. 117th St. and Madison Ave., Cleveland, O.

TANKS (Pickling)
Atlas Mineral Products Co. of Pa., Mertztown, Pa.
National Carbon Co., W. 117th St. and Madison Ave., Cleveland, O.
United States Rubber Co., 1230 Sixth Ave., New York City.

TANKS (Storage, Pressure, Riveted, Welded)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Petroleum Iron Works Co., Sharon, Pa.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

TANKS—WOOD OR STEEL (Rubber or Lead Lined)
Dietzel Lead Burning Co., Coraopolis, Pa.
United States Rubber Co., 1230 Sixth Ave., New York City.

TANTALUM CARBIDE
Carboloy Co., Inc., The, 11141 E. 8 Mile Rd., Detroit, Mich.

TAPS AND DIES
Greenfield Tap & Die Corp., Greenfield, Mass.
Landis Machine Co., Inc., Waynesboro, Pa.
National Acme Co., The, 170 E. 131st St., Cleveland, O.

TESTING MACHINERY (Materials)
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Hydro-Power Systems, Inc., 604 Grant Bldg., Pittsburgh, Pa.

TERMINALS (Locking)
Shakeproof Lock Washer Co., 2525 N. Keelor Ave., Chicago, Ill.
Thompson-Bremer & Co., 1610 W. Hubbard St., Chicago, Ill.

TERNE PLATE—See TIN PLATE

THERMOMETERS
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

THREAD CUTTING TOOLS
Landis Machine Co., Inc., Waynesboro, Pa.

TIE PLATES
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

TIN PLATE
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TIN PLATE MACHINERY
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Wean Engineering Co., Warren, O.

TITANIUM
Vanadium Corp. of America, 420 Lexington Ave., New York City.

TONGS (Chain Pipe)
Williams, J. H., & Co., 400 Vulcan 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.

TOOL HOLDERS
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

TOOLS (Pneumatic)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Ingersoll-Rand Co., 11 Broadway, New York City.

TOOLS (Precision, Lathe, Metal Cutting, etc.)
Brown & Sharpe Mfg. Co., Providence, R. I.
Carboloy Co., Inc., The, 11141 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, 11141 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.

WHERE-TO-BUY

TORCHES AND BURNERS (Acetylene, Blow, Oxy-Acetylene)
Air Reduction Sales Co., 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.

TOWBOATS
Dravo Corp. (Engin'r'g Works Div.), Neville Island, Pittsburgh, Pa.

TOWERS (Transmission)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.

TOWERS (Tubular Hoisting)
Dravo Corp., (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.

TOY PARTS
Townsend Co., New Brighton, Pa.

TRACK ACCESSORIES
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

TRACK BOLTS
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TRAILERS (Arch-Girder)
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

TRAMRAILS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

TRANSMISSIONS—VARIABLE SPEED
Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.

TRAPS (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, 2699 Atwater St., Detroit, Mich.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

TRUCKS AND TRACTORS (Electric Industrial)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Towmotor, Inc. 1247 E. 152nd St., Cleveland, O.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

TRUCKS AND TRACTORS (Gasoline Industrial)
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Towmotor, Inc., 1247 E. 152nd St., Cleveland, O.

TRUCKS (Dump-Industrial)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Towmotor, Inc. 1247 E. 152nd St., Cleveland, O.

TRUCKS (Hydraulic Lift)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Towmotor, Inc. 1247 E. 152nd St., Cleveland, O.

TRUCKS (Lift)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Towmotor, Inc., 1247 E. 152nd St., Cleveland, O.
Yale & Towne Mfg. Co., 4532 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.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
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., 1653 Grant Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Steel & Tubes Division, Republic Steel Corp., Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBES (Brass, Bronze, Copper, Nickel Silver)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Revere Copper & Brass Co. 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.
Bissett 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., 1653 Grant Bldg., Pittsburgh, Pa.
Steel & Tubes Division, Republic Steel Corp., Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

TUBING (Copper, Brass, Aluminum)
American Brass Co., The, Waterbury, Conn.
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.
Revere Copper & Brass Co. Inc., 230 Park Ave., New York City.
Shenango-Penn Mold Co., Dover, O.

» » » WHERE-TO-BUY « « «

TUBING (Seamless Flexible Metal)
American Metal Hose Branch of American Brass Co., The, 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., 1653 Grant Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Steel & Tubes Division, Republic Steel Corp., Cleveland, O.
Standard Tube Co., The, 14600 Woodward Ave., Detroit, Mich.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBING (Square, Rectangular)
Ohio Seamless Tube Co., Shelby, O.
Steel & Tubes Division, Republic Steel Corp., Cleveland, O.

TUBING (Welded Steel)
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
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 Co., Inc., 230 Park Ave., New York City.
Steel & Tubes Division, Republic Steel Corp., Cleveland, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBULAR PRODUCTS
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)
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

TUNGSTEN CARBIDE
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.

TUNGSTEN CARBIDE (Tools and Dies)
Carboloy Co. Inc., The 11141 E. 8 Mile Rd., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.

TUNGSTEN METAL AND ALLOYS
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

TURBINES (Steam)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., 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., 1211 St. Paul Ave., Milwaukee, Wis.

VALVES (Blast Furnace)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

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

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

VALVES (Control—Air and Hydraulic)
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hunt, C. B., & Son, Salem, O.
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.
Ross Operating Valve Co., 6474 Epworth Blvd., Detroit, Mich.

VALVES (Electrically Operated)
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Hunt, C. B., & Son, Salem, O.
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Marre, Pa.
Ross Operating Valve Co., 6474 Epworth Blvd., Detroit, Mich.

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

VALVES (Gate)
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Crane Co., The, 836 So. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co. Inc., Bridgeport, Conn.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

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

VALVES (Hydraulic)
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Hunt, C. B., & Son, Salem, O.
Hydro-Power Systems, Inc., 604 Grant Bldg., Pittsburgh, Pa.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

VALVES (Hydraulic De-Scaling)
Hunt, C. B., & Son, Salem, O.

VALVES (Lead)
Dietzel Lead Burning Co., Coraopolis, Pa.

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

VALVES (Open Hearth Control—Oil, Tar, Steam & Air)
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

VALVES (Steam and Water)
Reading-Pratt & Cady Div. of American Chain & Cable Co. Inc., Bridgeport, Conn.

VALVES AND FITTINGS—See PIPE FITTINGS

VANADIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

VIADUCTS (Steel)—See BRIDGES, ETC.

WALKWAYS—See FLOORING—STEEL

WASHERS (Iron and Steel)
Hubbard, M. D., Spring Co., 414 Central Ave., Pontiac, Mich.
Thompson-Bremer & Co., 1640 W. Hubbard St., Chicago, Ill.

WASHERS (Lock)
American Nut & Bolt Fastener Co., Pittsburgh, Pa.
Beall Tool Co., East Alton, Ill.
Butcher & Hart Mfg. Co., Toledo, O.
Eaton Mfg. Co., Massillon, O.
National Lock Washer Co., The, Newark, N. J. and Milwaukee, Wis.
Philadelphia Steel & Wire Corp., Germantown, Philadelphia, Pa.
Positive Lock Washer Co., Newark, N. J.
Shakeproof Lock Washer Co., 2525 N. 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, Spot, Seam, Flash, Butt, Automatic Projection, Hydromatic, Etc.)
Federal Machine & Welder Co., Dana St., Warren, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Hobart Bros., Dept. ST-940, Troy, O.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-25.
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., Dept. Y-25.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

WELDING AND CUTTING APPARATUS AND SUPPLIES (Electric)
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Hobart Bros., Dept. ST-940, Troy, O.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-25.
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 Sales Co., 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. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-25.
Maurath, Inc., 7311 Union Ave., Cleveland, O.
Metal & Thermit Corp., 120 Broadway, New York City.
Page Steel & Wire Div. of American Chain & Cable Co. Inc., Monessen, Pa.

WELDING RODS (Bronze)
American Brass Co., The, Waterbury, Conn.
Revere Copper & Brass Co. Inc., 230 Park Ave., New York City.
Titan Metal Mfg. Co., Bellefonte, Pa.

WELDING RODS OR WIRE
Air Reduction Sales Co., 60 East 42nd St., New York City.
American Agile Corp., 5806 Hough Ave., Cleveland, O.
American Brass Co., The, Waterbury, Conn.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bridgeport Brass Co., Bridgeport, Conn.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Hobart Bros., Dept. ST-940, Troy, O.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-25.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
Maurath, Inc., 7311 Union Ave., Cleveland, O.
Metal & Thermit Corp., 120 Broadway New York City.
Page Steel & Wire Div. of American Chain & Cable Co. Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Revere Copper & Brass Co. Inc., 230 Park Ave., New York City.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Seneca Wire & Mfg. Co., Fostoria, O.
Washburn Wire Co., Phillipsdale, R. I.
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 American Chain & Cable Co. Inc., Monessen, Pa.
*Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Seneca Wire & Mfg. Co., Fostoria, O.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City

WIRE (Annealed, Bright, Galvanized)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co. Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Seneca Wire & Mfg. Co., Fostoria, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
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., 1653 Grant Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE (Brass)
Titan Metal Mfg. Co., Bellefonte, Pa.

WIRE (Cold Drawn)
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 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.

WHERE-TO-BUY

WIRE (High Carbon)—Con.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co. Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Seneca Wire & Mfg. Co., Fostoria, O.
Washburn Wire Co., 118th St. and Harlem River, New York City.

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., 1653 Grant Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Washburn Wire Co., 118th St. & Harlem River, New York City.

WIRE (Stainless)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Page Steel & Wire Div. of American Chain & Cable Co. Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
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., 420 Lexington Ave., 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 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., 414 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., Bridgeport, Conn.

WIRE MILL EQUIPMENT
Lewis Foundry & Machine Co., P. O. Box 1586, 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., 414 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., 1653 Grant Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Seneca Wire & Mfg. Co., Fostoria, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Townsend Co., New Brighton, Pa.
Washburn Wire Co., 118th St. and Harlem River, New York City.
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 Co., P. O. Box 1586, 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.

CLASSIFIED

Distributors Wanted

MANUFACTURER'S AGENTS—MANUFACturer of Foundry Supplies and Equipment desires to negotiate with salesmen, with established contacts, in Indianapolis, Cincinnati, Cleveland and Milwaukee, for additional representation. Address Box 297, STEEL, Penton Bldg., Cleveland.

Bids Wanted

Federal Works Agency, Public Buildings Administration, Washington, D. C., Aug. 14, 1940.—Sealed proposals in duplicate will be publicly opened in this office at 1 P. M., Standard Time, Sept. 17, 1940, for construction of the U. S. P. O. at Roaring Spring, Pa. 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

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.

Bids Wanted

Federal Works Agency, Public Buildings Administration, Washington, D. C., Aug 16, 1940.—Sealed proposals in duplicate will be publicly opened in this office at 1 P. M., Standard Time, Sept. 19, 1940, for construction of the U. S. P. O. at Carlisle, Ky. 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 1½ ton Elec. Furnaces. Makers of high grade light steel castings, also alloy castings subject to wear or high heat.

Bids Wanted

Federal Works Agency, Public Buildings Administration, Washington, D. C., Aug. 24, 1940.—Sealed proposals in duplicate will be publicly opened in this office at 1 P.M., Standard Time, Sept. 24, 1940, for the construction of the U.S.P.O. at Cadiz, Ky. 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.

Classified

HELP WANTED
Single Insertion—50c per line
Three to Six Insertions—48c per line
Six or more Insertions—45c per line

Seven words of ordinary length make a line.
FIRST LINE IN BOLD FACE TYPE
A box number address counts as one line.

POSITIONS WANTED
Single Insertion—25c per line
Three to Six Insertions—24c per line
Six or more Insertions—23c per line

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.

Accounts Wanted

SALES EXECUTIVE WITH ELEVEN years experience in automotive field with such concerns as Thompson Products, Inc., Timken-Detroit Axle Co., General Motors Corp., desires to act as manufacturer's representative in Detroit Area. An energetic worker, age 34, with wide acquaintance in the Detroit district. Well qualified to sell established products. Address Box 282, STEEL, Penton Bldg., Cleveland.

MANUFACTURERS AGENT 15 YEARS EXperience in Detroit territory, desires one or two accounts, on productive material, or factory equipment. Address Box 300, STEEL, Penton Bldg., Cleveland.

Opportunities

SOUTH AMERICAN STEEL & METAL BUSINESS

Managing Director of Argentine and Uruguay Firm of Steel and Metal Importers and Representatives having large established connections shortly arriving in the U.S.A. Would like to hear from important manufacturers interested in extending their export to these markets. Please write reference "Steelexport" Box 299, Steel, Penton Bldg., Cleveland.

Help Wanted

AN OLD, WELL-ESTABLISHED AND progressive manufacturer offers to a man, that can fit their job, an opportunity with a good future. Guaranteed Salary and Expenses to start with an additional Working Arrangement after ability has been proven. The man desired is one experienced with machinery and equipment used by basic metal manufacturers where his sales have originated with the Executive Departments and this carried through to completion with the Engineering and Manufacturing personnel. In applying, state age, sales experience in detail, amount of technical training or practical experience, etc. Applications received will be held in strict confidence until after personal interviews but those who do not give full and complete particulars will receive no consideration. Address Box 296, STEEL, Penton Bldg., Cleveland.

SHOP SUPT. FOR PLANT PRODUCING heavy work and to have general supervision over following departments. Steel Fabricating Shop—Machine Shop—Fitting Up Assembly and Testing Shop. Give complete details in first letter as to Age—Education — Experience — Nationality — Family — Size — Weight — Positions held in last 10 years — Salary Expected — and References. Good position open to a man who can produce good work at reasonable costs. Address Box 264, STEEL, Penton Bldg., Cleveland.

WANTED — GENERAL FOREMAN WITH executive ability, experienced in steel plate products manufacturing and close tolerance structural work. Must be familiar with all phases of shop work and have thorough knowledge of equipment. Permanent position in large Great Lakes city. Address Box 298, STEEL, Penton Bldg., Cleveland.

SALESMEN AND ENGINEERS are readers of this page—if you need a good man quickly, use the Help Wanted column of next week's issue. A four line ad will cost only $2.00.

Equipment For Sale

—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.
484 North Peoria St. Chicago, Ill.

Rails—"1 Ton or 1000"

NEW RAILS—5000 tons—All Sections—All Sizes.
RELAYING RAILS—25,000 tons—All Sections—All Sizes, practically as good as New.
ACCESSORIES—Every Track Accessory carried in stock—Angle and Splice Bars, Bolts, Nuts, Frogs, Switches, Tie Plates.
Buy from One Source—Save Time and Money
'Phone, Write, or Wire

L. B. FOSTER COMPANY, Inc.
PITTSBURGH NEW YORK CHICAGO

42" and 62" Vertical Boring Mills.
48" x 30' New Haven Lathe, 22' cc. B.D.
30" x 76" Farrel Roll Grinder, M.D.
10' Bridgeport Knife Grinder, M.D.
150 ton United St.-Hyd. Forging Press.
2"-4"-6"-8"-12" Wm. Pipe Mach., M.D.
No. 5 H&J Guill Shear 4-1/2" rd., M.D.
10'x1/4" Bliss Sq. Shear 18" gap.
18" W-F & 36" Yoder Gang Slitters, M.D.
48" Aetna-Std. Straightener 17-3 3/4" M.D.

WEST PENN MACHINERY CO.
1208 House Bldg. Pittsburgh, Pa.

LOCOMOTIVES FOR SALE

One Standard gauge 2-6-0 Type locomotive, maximum tractive power 23,800 lbs., soft coal burning boiler, tested 180 lbs. pressure. One Standard gauge 0-6-0 Type switching engine, tractive power 28,700 lbs., soft coal burning boiler, tested 180 lbs. pressure. Both excellent condition. If interested, please write for specifications and price. Address Box 295, STEEL, Penton Bldg., Cleveland.

For Sale

FOR SALE: ERIE CITY NO. 527 HEATing boiler with ½-ton hopper National stoker and Nash circulating pump. Used only short time. Address Box 285, STEEL, Penton Bldg., Cleveland.

CONTRACT WORK

Are You Alive?

Do the executives in the metal-working industries—the ones who have business to place under contract—know that you are alive? Thousands of them read these pages every week. Let them know your facilities, that you are ready and capable. You can do it regularly and economically through these columns. Write for details.

KIRK & BLUM
SHEET METAL CRAFTSMANSHIP
Complete Fabricated Steel Service from Design to Assembled Units
• • •
Sheet Steel and Plate Work
• • •
THE KIRK & BLUM MFG. CO.
2822 Spring Grove Ave., Cincinnati, Ohio

GRAY IRON CASTINGS

Maximum Weight—25,000 lbs.
MACHINE TOOL—BODY DIE
ALLOYS
HIGH TEST IRONS

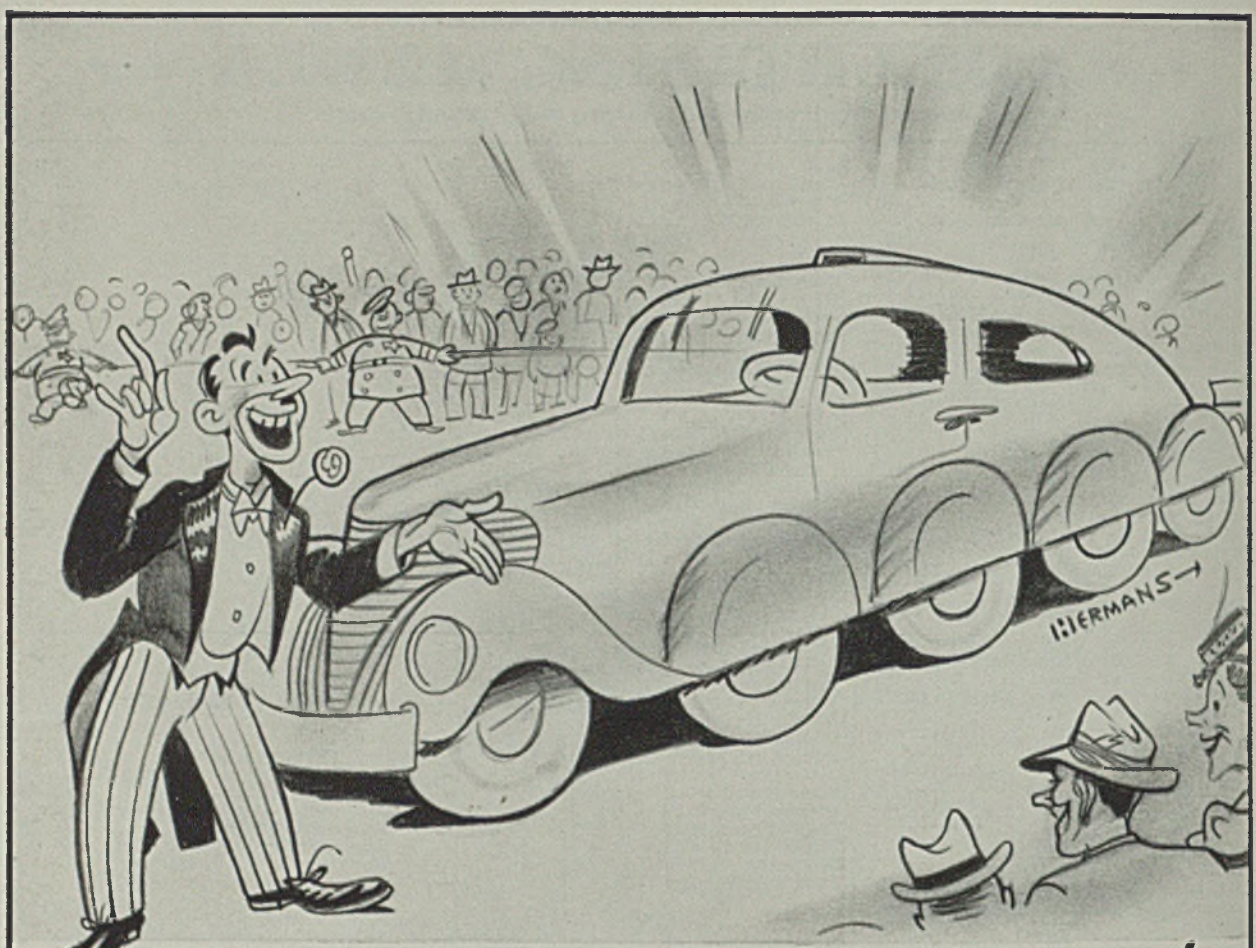
THE ETNA MACHINE CO.
3400 Maplewood Ave.
TOLEDO, OHIO

ADVERTISING INDEX

Where-to-Buy Products Index carried in first issue of month.

◆ ◆ ADVERTISING INDEX ◆ ◆

Where-to-Buy Products Index carried in first issue of month.



"and our new model is a TEN-WHEELER!"

Hurry! *Hurry!* HURRY! Step up and be amazed! See what *this* new model has to offer. She's a TEN-WHEELER—no less! Each clinic a wheel, and each wheel a whizzer! Ten—count 'em—*ten.*

There she stands . . . the new *Clinic Special* . . . custom built by N. I. A. A. . . . tuned for a record run. If you would keep up with the pace of today, and lead the field of tomorrow, try this streamlined special!

The time: September 18, 19, 20 . . . The place: Hotel Statler, Detroit . . . The ten clinics: (1) Coordination of Advertising with Selling; How to Win Active Cooperation from Salesmen (2) Measuring Advertising Results (3) Prepare and Present an Advertising Program that Management Will Approve (4) How Can the Advertising Department Contribute to the Solution of General Company Problems (5) How to Increase Direct Mail Effectiveness (6) Get Out into the Field (7) Allocation of Budgets; How to Organize Your Work (8) Measuring the Readership of Business Papers (9) Creation of Effective Copy. Layout and Illustration; How to Test the Relative Effectiveness of Your Work (10) Market Information; How to Get it and Use it. Other features: General Management and Marketing Sessions, display of 1940 advertising campaigns, free program for wives. Open to: all industrial advertising and sales executives. For program and advance registration, write to: Mr. Henry G. Doering, Registration Chairman, Truscon Laboratories, Inc.; Box 69, Milwaukee Junction P. O.; Detroit, Mich. (Advance registration saves you time and trouble—send no money.)

Hurry! *Hurry!* HURRY! It's yours . . . the TEN-WHEELER Clinic Special . . . for the small sum of ten bucks, only a buck a wheel!

18th Annual **CONFERENCE** *and Exposition*
National **INDUSTRIAL ADVERTISERS** *Association*
SEPT. 18, 19, 20 . . . DETROIT . . . HOTEL STATLER