September 23, 1940

STEEL

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PRODUCTION • PROCESSING • DISTRIBUTION • USE

ESTABLISHED 1882

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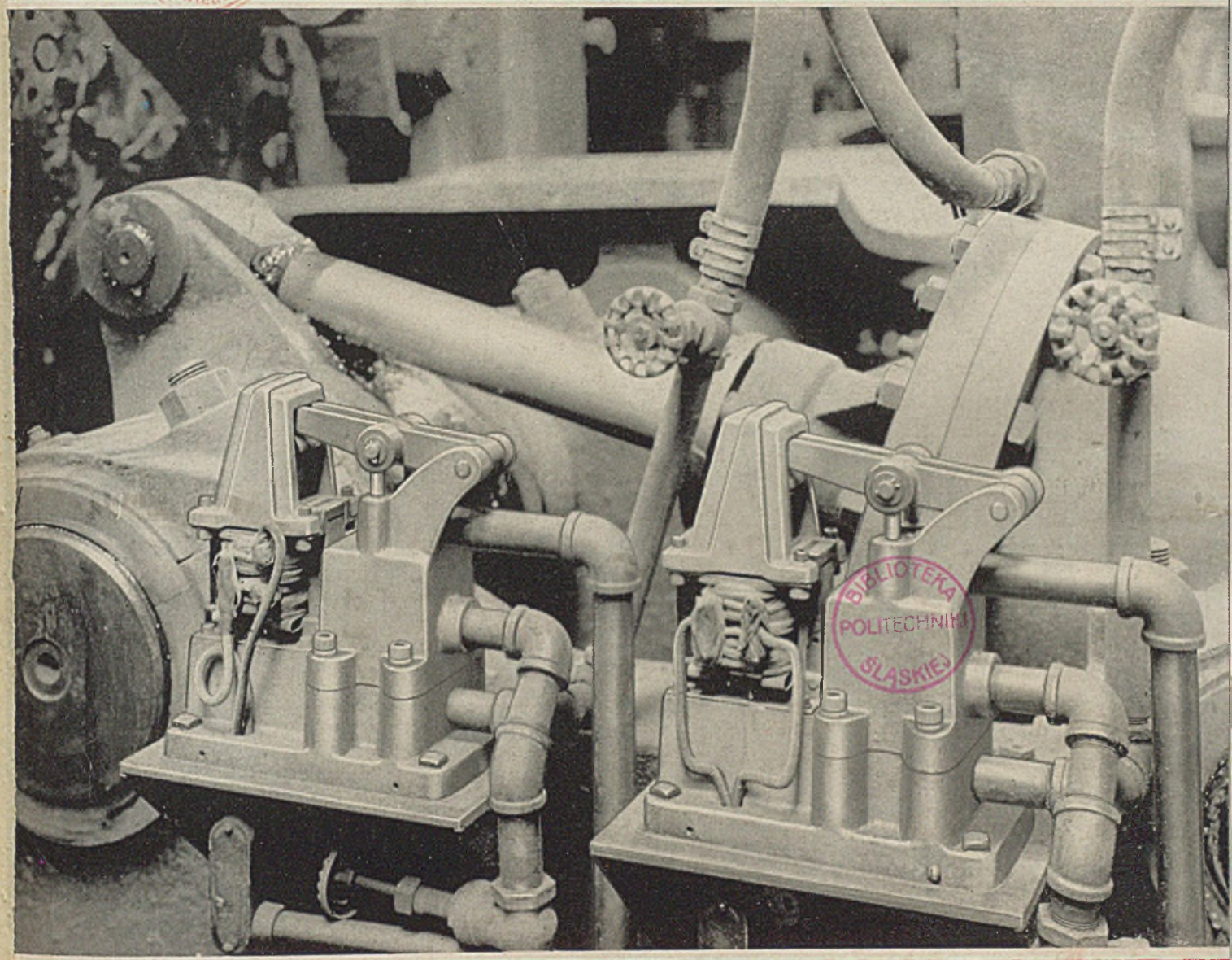

BIBLIOTEKA POLITECHNIKI ŚLĄSKIEJ

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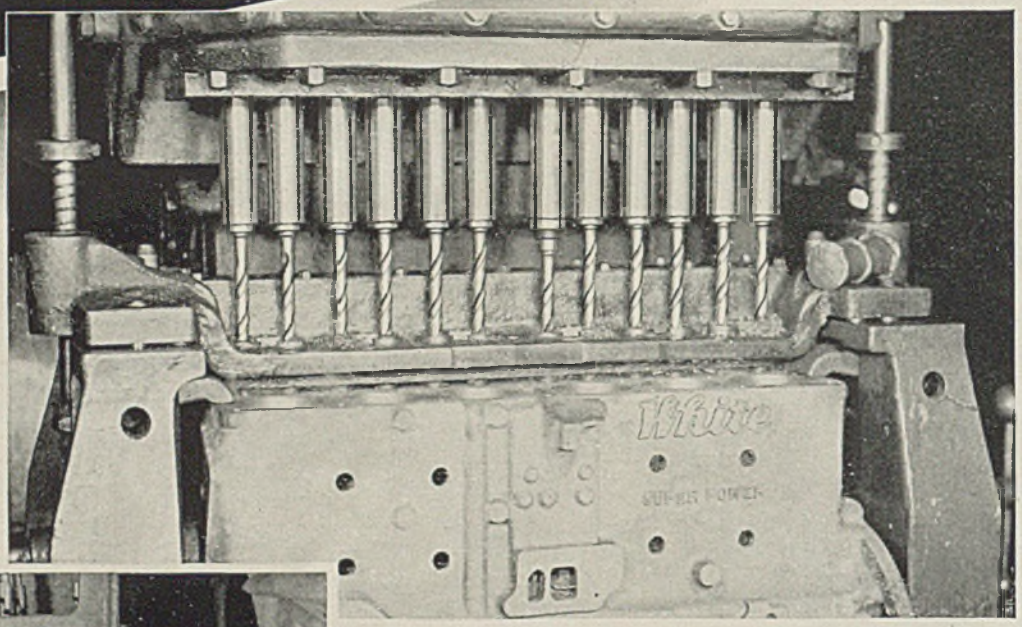
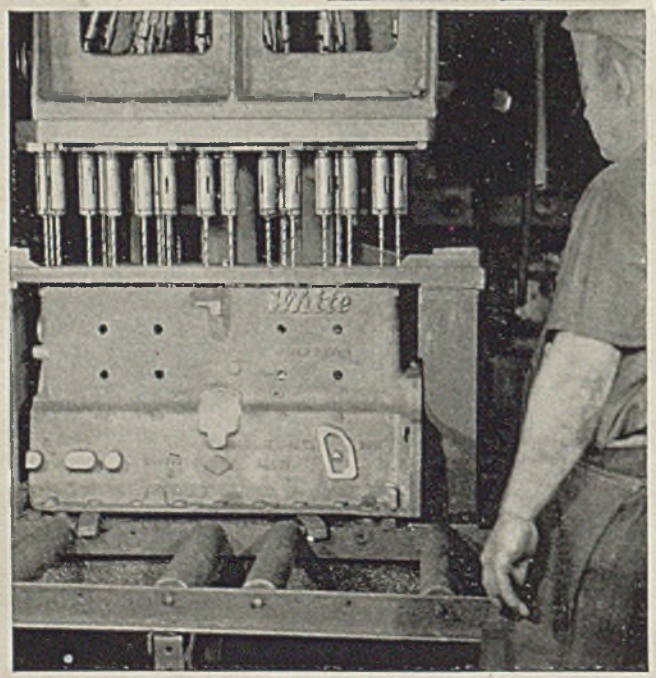
TWO SUPERB EXAMPLES OF MULTIPLE DRILLING





Here are two splendid illustrations of multiple drilling. Twelve large twist drills in one operation, and 25 other sizes in another operation.

Notice how evenly these drills are wearing down, eliminating replacements and other troubles. One of the outstanding features of "Cleveland" Twist Drills is that, in multiple drilling, they work together.

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We favor adequate Preparedness for National Defense

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STEEL

ESTABLISHED 1882

Contents

107 / 1940

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BIBLIOTEKA POLITECHNIKI ŚLĄSKIEJ

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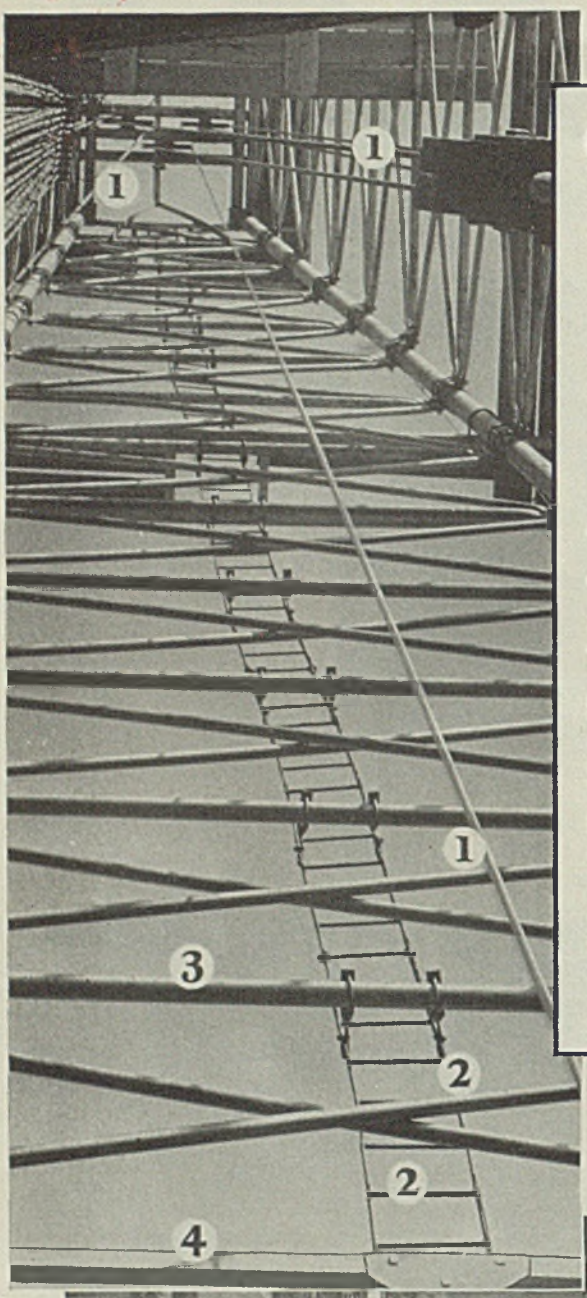

①RODS ②BARS ③SKELP ④MERCHANT SHAPES

..all present or accounted for

The Oil Derrick, for example, typifies one of the many markets for wire rods, bars, skelp and merchant shapes. These basic forms function in thousands of structures. *Their market is not confined to one or two industries!* It is broad, flexible . . . and the profits go to those mills that can deliver tonnage at low cost.

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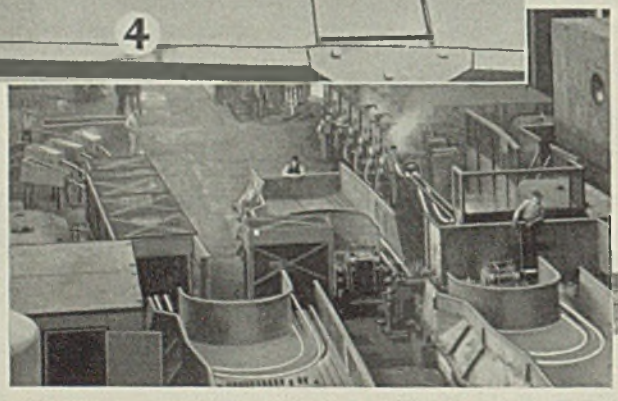
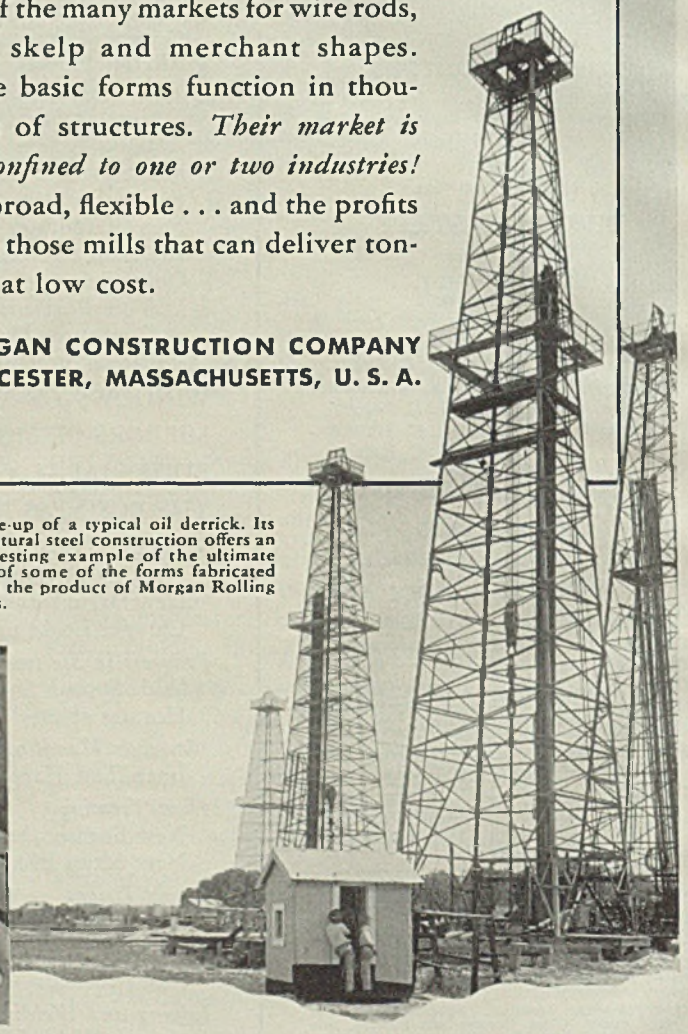
R-73



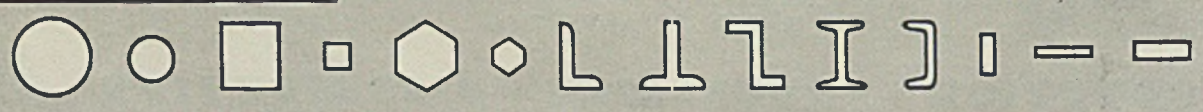


Close-up of a typical oil derrick. Its structural steel construction offers an interesting example of the ultimate use of some of the forms fabricated from the product of Morgan Rolling Mills.

MORGAN
WORCESTER
ENGINEERS AND MANUFACTURERS

CONTINUOUS ROLLING MILLS

ROD · STRIP · SKELP · MERCHANT SHAPES



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STEEL
PRODUCTION • PROCESSING • DISTRIBUTION • USE

HIGHLIGHTING THIS ISSUE

INDUSTRIAL expansion (p. 21) is at the highest level since the first World war. The new plants are aimed principally at supplementing capacity for producing aircraft and other armament, and the equipment and materials required for such production. Further stimulation in this direction is in sight. For example, the national defense commission and the war department last week (p. 23) jointly recommended establishment of a billion-dollar chain of some 30 government-owned aircraft and munitions plants. Recommended also was early placement of large government contracts to encourage development and application of mass production methods to the national defense effort.

• • •

On the business front the week's leading development was the nomination of Wendell L. Willkie as Republican candidate for President.

Confidence Increases

To business men this event is a herald that public opinion favors greater friendliness toward business on the part of government. The nomination resulted in a notable stimulation in business confidence. . . . Business volume in steel and in the metalworking industries is gaining. Steel production last week moved up another point (p. 27) to 89 per cent of ingot capacity. Mill backlogs have expanded to an extent (p. 77) that forces mills to quote deliveries on some products several weeks ahead. Many consumers anticipate shortages by enlarging their inventories.

• • •

Resuming today, after the Republican convention recess, congress (p. 31) will busy itself with further defense legislation. What action

Congress Returns

it will take with reference to the Walter-Logan bill, labor law revision and other desired legislation is not yet predictable. With the attention of congressmen focused on the Fall elections, optimistic hopes in this direction do not seem to have much justification. . . . Production on French orders for steel and armament will proceed at once; the British purchasing commission (p. 21) has taken over the French contracts. . . . Inability of scrap dealers to ship to Italy (p. 77) has caused a temporary weakening in scrap prices.

• • •

Glenn L. Martin Co. (p. 44) has a new photographic process for reproducing engineering drawings—to any desired scale—on metal and other surfaces. It sharply reduces the amount of time expended in drafting, eliminates redrafting errors, speeds production. Developed for use in expediting aircraft production, it has many other potential uses in industry. . . . H. Menck describes practical shop methods successfully employed (p. 66) in the production of welded gears which are flame-hardened after machining. . . . E. A. Gahl (p. 60) discusses the new V-belt ratings and their effect on drives. . . . C. L. Van Derau describes a unique bridge (p. 48) which solved a difficult inter-plant handling problem.

Drafting By Camera

• • •

Every steelmaker as well as consumer will be interested in Earle C. Smith's charts (p. 47) which show how unwarrantably narrow carbon and manganese spreads reduce the efficiency of the mills in meeting specifications. They prove that the consumer is wise when he authorizes reasonably wide spreads. . . . In concluding his discussion on the heating of steel, Paul J. McKimm (p. 52) tells how to prevent defective product which results from scabs that are caused by improper heating. He frowns on the theory that ingots ought to be washed free of scale. He declares that light drafts in rolling are harmful. . . . A new, widely applicable, strain-measuring method (p. 57) is available.

Wider Spreads

E C Kreutzberg

WORKING closely with each customer, Inland metallurgists thoroughly weigh all factors of use and fabrication of cold rolled sheets. Their recommendation is a "balanced" temper—one that is neither too hard nor too soft—a temper specifically selected for the job.

The Inland method for producing cold rolled sheets uses the most modern types of equipment fitted with special devices which aid in achieving exact qualities of steel with unvarying uniformity. Working side by side with skilled heaters and rollers are specially trained technicians who follow every step of the process. They check and recheck to make certain that the metallurgists' specifications for each customer are accurately followed. Thus, "balanced" temper is definitely assured in Inland's Cold Rolled Sheets. Give Inland metallurgists the opportunity to prove how "balanced" temper can help in your production—write today!

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Move To Co-Ordinate Defense Program Buying

Nelson, Procurement Chief, Appointed Co-Ordinator

Commission Recommends Billion for Munitions Plants

President Signs Special Tax Bill, Raising Debt Limit

British To Assume Liability for French War Contracts

■ WHAT, how many and when? These continue to be the questions in the minds of manufacturers ready or preparing to participate in the national defense program.

Although slightly less in the news last week—as result of competition from the Republican national convention—the defense program made definite advances on several fronts.

Donald M. Nelson, chief of the treasury's procurement division, was appointed co-ordinator of national defense purchases on the recommendation of a committee named to study government purchasing.

Army and navy buying was accelerated although present volume is inconsiderable in comparison to that anticipated for future months.

The national defense advisory commission reportedly recommended to the President the construction of a billion-dollar chain of government-owned munitions plants. The commission was augmented further by the appointment of additional industrialists to aid in formulating the defense plan.

All appropriations bills were signed by the President and various government agencies now are studying their steel and other needs for the new fiscal year.

The new defense tax bill became law. It is expected to net the government an additional billion dollars. It increases the national debt limit four billion dollars to 49 billion dollars.

Sidney Hillman, defense commissioner in charge of labor supply and labor training, announced that plans to eliminate the "human" bottleneck are going forward.

Meanwhile, industry readied itself to execute the program when formulated. Metalworking and aircraft plant expansions are coming out in large volume.

Despite the small volume of defense program orders actually awarded, industrial activity continued to edge upwards; national steelworks operations advanced 1 point to 89 per cent of capacity.

Apparently the French collapse will have little effect on exports to the Allies. Arthur B. Purvis, director-general of the British purchasing commission, announced that all existing contracts for war materials entered into by the French government with American suppliers have been assigned to the British government. Involved are several hundred thousand tons of steel both for direct shipment abroad and for processing into various types of munitions and war equipment in this country.

Committee Recommends Purchasing Policies

■ DONALD M. NELSON last Friday was appointed co-ordinator of national defense purchases by the President. Mr. Nelson, who will be associated with the national defense advisory commission, has been chief of the treasury department's procurement division and before that was a vice president of Sears, Roebuck & Co.

In his new position Mr. Nelson will determine the most economical and effective methods of purchasing repetitive items common to several agencies and will assign the purchase function to the agency best qualified to perform it. He also will collect, compile and keep current statistics on purchases made by all federal agencies and will co-ordinate research in procurement specifications and standardization now conducted by various federal agencies.

Mr. Nelson also will determine and keep current the combined immediate material requirements of all federal agencies and will estimate future requirements to facilitate purchases and to cushion the impact of such orders on the national economy. Mr. Nelson's job also will include reviewing existing

laws and recommending to the President such new legislation or simplification of existing legislation as may be necessary to make government buying more direct and more efficient.

As director of the procurement division he will have charge of coordinating foreign purchases as that work now is assigned to the treasury department.

The President made the appointment as result of a study made by a special committee which included Mr. Stettinius as chairman, Mr. Nelson, Rear Admiral Spear, and Brigadier-General C. T. Harris.

In their recommendation to the President the committee suggested the following improvements: Coordination of purchases to avoid competition between federal agencies for the same or similar materials and to avoid competition for the output of the same manufacturing facilities; compilation of combined federal material requirements both present and future; aid in the application of priorities when combined requirements exceed available resources; assignment of the purchase function to the agency best qualified to perform it economically within limits of existing laws; elimination of delays in purchasing by corrective legislation.

Aircraft Expansions at Unprecedented Rate

■ AIRCRAFT expansion programs are coming out at an unprecedented rate, with a score or more companies having announced building plans within the past several weeks. In some cases the expansions were planned when it became apparent the French and British would purchase large numbers of planes here, but were announced only after this country launched its defense program.

Curtiss Propeller division, Curtiss-Wright Corp., Clifton, N. J., will begin construction in July of a one-story plant adjoining the Caldwell-Wright airport, Caldwell, N. J., to double propeller manufacturing facilities. Plant, to be completed in September, will have 230,000 square feet of floor space and will employ 1500.

Edo Aircraft Corp., College Point, Long Island, N. Y., is planning a one and two story plant addition 103 x 200 feet costing $125,000, to double capacity. Project includes a separate boiler plant and should be completed in eight weeks.

Barkley-Grow Aircraft division of Aviation Mfg. Corp., Detroit, this month expects to expand by occupying quarters in Wayne, Mich., which were left vacant when Stinson Aircraft Corp., another subsidiary of Aviation Mfg. Corp., moved to Nashville, Tenn., early this year. New plant will employ about 500 men, incuding about 100 now employed in Detroit.

Argonaut Aircraft Corp., Los Angeles, has been organized with a capital of $1,000,000. Hillyer & Boldman, Scripps building, San Diego, Calif., represent the corporation.

Wesyn Aircraft Co., Los Angeles, has been organized with a capital of $500,000. William E. Gunason, 1010 Alvira street, Los Angeles, represents the company.

Columbia Aircraft Associates has been organized in Long Beach, Calif., with a capital of $200,000. Cobb, Campbell & Kelly, 639 South Spring street, Los Angeles, represent the company.

Manta Aircraft Corp., Los Angeles, has been organized with 100,000 shares of no par value capital stock. Haight, Trippet & Syverston, 458 South Spring street, Los Angeles, represent the company.

Lockheed Aircraft Corp., Burbank, Calif., will double existing plant capacity at a cost of $4,000,000.

Douglas Aircraft Co., Santa Monica, Calif., will add 112,000 square feet of floor space to plant at a cost of $200,000.

Vultee Aircraft Inc., Downey, Calif., is building the first unit of an expansion program which will increase floor space 142 per cent to 802,000 square feet and will cost about $2,900,000, including machinery.

Brewster Aeronautical Corp., Long Island City, N. Y., has leased the Ford Motor Co. assembly plant at Long Island City, adding 482,000 square feet of floor space to its plant.

Consolidated Aircraft Corp., San Diego, Calif., is seeking a location in the eastern states or middle west for a branch factory. San Diego plant now is undergoing $2,000,000 expansion which will increase floor space 90 per cent by Aug. 1.

Pacific Aviation Inc., Hawthorne, Calif., will erect a one and two-story plant to cost $40,000.

Los Angeles Aircraft Corp., Los Angeles, has been organized with a capital of $25,000. Directors are: F. J. Buckley, C. P. Shattuck and N. Kinney, all of Los Angeles.

Ranger Engines division of Fairchild Engine & Airplane Corp., Farmingdale, Long Island, N. Y., is expanding offices, test cells and will triple factory floor space by an addition which will be ready in two months.

Scintilla Magneto division, Bendix Aviation Corp., Sydney, N. Y., is adding 31,000 square feet of floor space to its plant and 9300 square feet to its office quarters.

Beech Aircraft Corp., Wichita, Kans., is purchasing 160 acres of land for runways and a 42,000-square foot storage hangar.

Taylorcraft Aviation Corp., Alliance, O., is proposing a refinancing plan to double plant capacity to 2000 planes a year.

Piper Aircraft Corp., Lockhaven, Pa., is building three additions to its plant.

Northrop Aircraft Inc., Hawthorne, Calif., is adding 8000 square feet of floor space to its plant and 1200 to its offices.

Metalworking Companies Increasing Capacity

■ SKF Industries Inc., Philadelphia, will increase capacity of its No. 2 plant by a one-story saw-tooth daylight type of building containing 226,000 square feet of floor space.

AC Spark Plug division, General Motors Corp., Flint, Mich., expects to complete in three weeks a new building containing 156,000 square feet of floor space. Building will house spark plug making activities.

George Gorton Machine Co., Racine, Wis., has completed a 12,000-square-foot addition expected to increase production by 25 per cent.

Carbide & Chemicals Corp., a unit of Union Carbide & Carbon Corp., Texas City, Texas, is building a major plant on a 200-acre plot to manufacture synthetic chemicals, to cost between $5,000,000 and $10,000,000. Construction is by Ford, Bacon & Davis, New York.

Worthington Pump & Machinery

Corp., Buffalo, will erect a $75,000 addition to its compressor plant.

Westinghouse Electric & Mfg. Co. will build a $40,000 plant addition at Sharon, Pa.

Antioch Foundry Co., Xenia, O., will erect a $25,000 plant in or near Yellow Springs, O., to employ 100 men.

American Stove Co., St. Louis, will erect a $300,000 addition to its stove building plant.

A site for a foundry was purchased in Tiffin, O., by Tiffin Gray Iron & Semi-Steel Co. Foundry should be completed in six weeks and employ 35 molders.

Republic Steel Co., Troy, N. Y., has leased plant of Troy Furnace Co., employing 200 men, and plans to expand it for production of armor plate.

Hobart Bros Co., Troy, O., is erecting a two-story all-welded steel building, 60 x 90 feet, for its trade school.

Philadelphia navy yard has awarded a $217,890 contract for superstructure extension of machine shop building No. 18 to Ralph Herzog, Philadelphia.

Carpenter Steel Co., Reading, Pa., will soon award contracts for another $100,000 plant unit.

Bullard Co., Bridgeport, Conn., will erect a new one-story monitor type machine shop building, 100 x 175 feet, to be completed within three months.

Farrell Cheek Foundry Co., Sandusky, O., will erect two buildings, one 70 x 100 feet for a machine shop, another 40 x 180 feet for a shower and locker room. Construction is to begin July 1.

Detroit diesel engine division of General Motors Corp. will build a 280 x 600-foot addition to its Detroit plant, plus a new two-story office building with 40,000 square feet. Manufacturing floor space will be doubled and will total 379,000 square feet.

Army, Navy Award Contracts

■ Bureau of supplies and accounts, United States navy department, has awarded the following contracts:

Schutte & Koerting Co., Philadelphia, cargo lubricating oil pumps, $14,565.18.

Gleason Works, Rochester, N. Y., gear generator, $23,686.50.

Hughes-Keenan Co., Mansfield, O., tractor cranes, $6715.

Monarch Machine Tool Co., Sidney, O., lathes, $54,681.

Brown & Sharpe Mfg. Co., Providence, R. I., machine grinder, $6632.

Westinghouse Electric & Mfg. Co., Washington, arc welding machines, $32,780.

Safe Tread Co. Inc., New York, safety treads, $15,630.

National Tube Co., Washington, steel flasks, $5769.90.

Phelps Dodge Refining Corp., New York, copper, $115,915.75.

Anaconda Sales Co., New York, copper, $35,314.

Kennecott Sales Corp., New York, copper, $141,434.75.

American Smelting & Refining Co., New York, copper, $102,710.70.

Widin Metal Goods Co., Garwood, N. J., sights, $7222.

Pennsylvania Smelting & Refining Co., Philadelphia, pig lead, $16,676.

National Lead Co., Baltimore, sheet lead, $7020.

Hoover Owens Rentschler Co., Hamilton, O., spare parts for engines, $11,621.40.

General Electric Co., Schenectady, N. Y., locomotive, $19,284.11.

Pacific Wire & Rope Co., Los Angeles, wire rope, $33,254.99.

John A. Roebling's Sons Co., Trenton, N. J., wire rope, $66,339.50.

Walter Kidde & Co. Inc., New York, fire truck, $9610.30; seamless steel cylinders, $15,051.87.

Mine Safety Appliance Co., Pittsburgh, manifolds, $45,392.90.

North American Smelting Co., Philadelphia, solder, $9316.70.

Federated Metals division, American Smelting & Refining Co., San Francisco, solder, $11,025.50; sheet and pig lead, $14,772.82.

Bethlehem Steel Co., New York, repairs to U. S. S. DENEBOLA, $124,900.

Northwest Lead Co., Seattle, sheet lead, $7566.80.

Sciaky Corp., Chicago, welding machine, $6786.

Pennsylvania Pump & Compressor Co., Easton, Pa., compressor, $8858.

Davenport Besler Corp., Davenport, Iowa, locomotive, $15,335.

Hardinge Bros. Inc., Elmira, N. Y., milling machines, $6197.

American-LaFrance-Foamite Corp., Elmira, N. Y., seamless steel cylinders, $18,097.53.

United States Motors Corp., Oshkosh, Wis., portable electric generators $5508.

Steel Products Engineering Co., Springfield, O., fluid segregators, $15,000.

Lundquist Tool & Mfg. Co., Worcester, Mass., torpedo directors, $7690.65.

Aviation Mfg. Corp., Lycoming division, Williamsport, Pa., aircraft engines, $1,541,448.80.

Continental Motors Corp., Muskegon, Mich., aircraft engines, $1,442,275.

Boeing Airplane Co., Stearman Aircraft division, Wichita, Kans., airplanes and spare parts, $3,779,628.

National Battery Co., Depew, N. Y., storage batteries, $61,160.

Thomas A. Edison Inc., West Orange, N. J., engine gage units, $58,625.

Jaeger Watch Co. Inc., New York, elapsed time clocks, $41,640.

Carborundum Co., Niagara Falls, N. Y., abrasive wheels, $17,500.

War department last week announced award of contracts totaling $41,564,986, out of 1941 appropriations. Ordnance department awards included:

White Motor Co., Cleveland, scout cars, $5,387,500.

Sperry Gyroscope Co. Inc., Brooklyn, N. Y., antiaircraft fire control instruments, $4,571,887.

Auto-Ordnance Corp., submachine guns, $877,723.

York Safe & Lock Co., York, Pa., antiaircraft gun carriages, $794,300.

Breeze Corporations Inc., Newark, N. J., antiaircraft fire control appliances, $775,991.

Keuffel & Esser Co., Hoboken, N. J., fire control instruments, $719,327.

Delco Appliance division of General Motors Sales Corp., Rochester, N. Y., antiaircraft fire control appliances, $532,500.

Midvale Co., Philadelphia, gun tubes, $428,736.

Eastman Kodak Co., Rochester, N. Y., panoramic telescopes, $242,560.

Key Co., East St. Louis, Ill., to machine one thousand 155-millimeter artillery shells.

Cleveland Steel Products Corp., Wellington, O., 125,000 drive shafts for tanks and trucks.

Commission Advises Munitions Plants

WASHINGTON

■ National defense advisory commission and the war department have recommended to the President, it was reported last week, the construction of a billion-dollar chain of government munitions plants.

Proposals made are said to include building several score plants to manufacture armor plate, aircraft, powder, shells, and other munitions. Congress already has appropriated $376,000,000 for this purpose.

Unofficial report is to the effect the advisory commission and war department officials have approved details including sites for some 30 new factories to be located in the Midwest and South.

In addition to the proposed munitions factory chain, the same government bodies are reported to have recommended to the President the placing of large orders for airplanes, weapons, warships, and other equipment on the basis that only by the letting of these large contracts can mass production be built up.

War department is said to have estimated that 139 plants for the manufacture of ordnance, airplanes, etc. are required for the defense program, while only 19 are actually in existence. War department has figured that it will cost about $527,000,000 for the suggested new ordnance plants. The plan calls for the construction of 30 additional airplane plants to cost $300,000,000 and 3 engine plants to cost $60,000,000.

Government Agencies Study Steel Needs

■ President Roosevelt last week signed all appropriation bills and the 1941 appropriations are effective July 1. Government departments know how much they may spend during the coming year and the three major purchasing offices for army, navy and procurement division of the treasury department are surveying their steel needs.

When these needs have been tabulated, they will be referred to Walter S. Tower who is handling the steel situation for the defense council advisory commission. Advisory commission officials who are familiar with the steel situation believe there

(*Please turn to Page* 75)

Designs Stainless Steel Plane To Be Built on Quantity Basis

■ WHILE no definite announcements have been made by the Stout Engineering Laboratories, Dearborn, Mich., regarding its new developments, there have been various rumors and unauthorized published material regarding some change and new activity at that plant.

This firm is now active in the purely development stages of a new airplane for the private owner, to be built with quantity production tools in 18-8 stainless steel.

For this purpose, a new company known as the Stout Skycraft Corp. has been formed and financed, to take over all airplane activities of Stout Engineering Laboratories.

This new Michigan corporation is already well into the development stage of a new version of the Stout Skycar, which William B. Stout flew so successfully a number of years ago. This plane brought back and revived interest in the three-wheeled landing gear types, which have now been adopted for practically all the new transports and bombers. It is understood the new plane carries a further development of the three-wheel type of landing gear.

The Skycar, as originally built, was a riveted duralumin structure covered with corrugated metal and was a two-seater pusher-type plane with outrigger tail, a propeller being protected between the two booms of this structure. The original plane weighed 1175 pounds and was fitted with a 90-horsepower air-cooled engine. The new plane probably will weigh under 900 pounds and will be fitted with a modern air-cooled engine of 80 to 100 horsepower. The original plane had a 42-foot wing span, whereas the new one accomplishes more with only a 35-foot span. Whereas the original wing was 14 inches thick at the root, the new wing, stronger and more efficient, will be only 9 inches thick at the root. The original Skycar had outboard struts and braces, the new design is completely clean of outside encumbrances.

New Type Tooling

The chief and most radical concept of the new design is the type of tooling with which it can be made. Plans call for assembly in spot-welding jigs of large size and completely equipped equipment, so that a wing or fuselage can be put together in a short time with little labor, thus enabling costs to be brought down in spite of the extra material cost of stainless steel.

Other planes in the past which have been designed for stainless steel have more or less copied duralumin structures and have hence run into great complication of pieces, welds, and inaccessibility. The new Stout wing design, for example, has fewer pieces than any previous unit, and is primarily a production type of wing.

There are two reasons why such a design can well come to a head at the present time. The first is the new development of welding which permits fabrication not possible in stainless steel welding a year ago, and the fact that wide sheets of 0.005-inch thickness for wing covering can now be obtained—these too not available a year ago.

Work at the Stout plant in Dearborn is at present purely in the preliminary stage and it will be six months, at least, before any new moves can be announced, according to word from Stout and his associate, Frank M. Smith.

■ William B. Stout (right) and his associate, Frank M. Smith, examine balsa wood model of pusher-type high-wing monoplane, to be built entirely of spot welded stainless steel by newly organized Stout Skycraft Corp.

Tool Engineers Charter Two Additional Chapters

■ With the recent chartering of two more chapters, at Columbus, O., and Indianapolis, American Society of Tool Engineers has increased its chapter roll to 37.

Officers of the Columbus chapter are: R. J. Freter, chief engineer, Columbus Bolt Works Co., chairman; C. E. Nelson, supervisor of tools, Jeffrey Mfg. Co., vice chairman; S. J. Matchett Jr., engineer, Ranco Inc., secretary; and H. M. Poole, instructor in industrial engineering, Ohio State university, treasurer.

Indianapolis chapter officers are: H. D. Hiatt, Allison Engineering Co., chairman; Ronald Updike, chief tool engineer, Schwitzer-Cummins Co., vice chairman; R. D. Harris, chief designer, International Harvester Co., secretary; and D. H. Chancellor, Prest-O-Lite Co. Inc., treasurer.

Declares Pilots, Not Planes, Chief Problem

■ Principal problem facing United States' aircraft expansion program lies in training a personnel sufficiently large to operate a huge air fleet, according to A. H. d'Arcambal, president, American Society of Tool Engineers and chief metallurgist, Pratt & Whitney division, Hartford, Conn. Mr. d'Arcambal declared last week America would find it easier to build 50,000 planes than to train pilots and ground crews required to man them.

United States' industry, he told the society's Dayton, O., chapter, is fully capable of meeting national needs for increased aircraft production capacity with satisfactory speed. From a manufacturing standpoint, Mr. d'Arcambal visualized the major difficulty encountered would be securing tooling and equipment needed for mass production of airplane engines.

National Defense Speed Hinges on Standards and Specifications

■ CLOSER co-operation with the government as part of the plan for industrial mobilization in the event of an emergency was stressed at the forty-third annual meeting of the American Society for Testing Materials, June 24-28, at Chalfonte-Haddon Hall, Atlantic City, N. J.

The society already has offered its standardization and other facilities to the planning division of the war department as part of the plan. In addition, the war department is represented on ten of the society's committees and additional representation is contemplated.

Discussions so far have emphasized the importance in time of emergency of having A.S.T.M. and federal specifications as closely in harmony as possible. Plans now are under development for initial application to the metals field to bring about closer working arrangements.

Effective co-operation already has resulted in the development of specifications for materials of great importance in the production of munitions, including cartridge brass, gilding metal sheet and strip, gilding metal bullet jacket cups, copper rods and bars, brass wire, brass tubing and manganese bronze castings.

Standards Boost Output

At the opening session, Lieut. Col. William C. Young, planning branch, office of the assistant secretary of war, Washington, told members of the society that the question of materials standards is a most important element in national preparedness for reducing the time factor in reaching quantity production of military equipment and supplies.

"Without these standards," he said, "there would be much delay, not only in production of semifabricated materials but also in processing them through the various stages of manufacture to the finished article."

Lieut. Col. Young pointed out that World war records showed that the supply of critical articles of equipment lagged far behind the training of manpower. Supplies of our own manufacture did not come through in quantity until the early spring of 1919, two years after the declaration of war, he said, compared with nine months' average training time for men in combat forces.

In peace procurement programs, he said, 18 to 24 months are required for delivery of many highly important items of equipment. Even with concentrated effort of industry in an emergency, military equipment and supplies needs could not be made available in less time, he added.

Delivering on Time

The speaker stressed the increasing importance of industrial mobilization since the last war. The German example offers a lesson to the United States, he indicated, where it was shown that her industrial plans were not mere paper plans but meant material delivered when needed.

A complicating factor also is the great improvement in equipment which has rendered obsolete considerable stocks of guns and equipment left on hand in 1919 as a war reserve. He pointed out the improvements in gun designs, higher speeds of transportation and the like.

In addition, thought as to the amount and kind of equipment is changing over night. "Not long ago a program of 5500 airplanes for the army was considered a reasonable measure of national defense," he said. "Today, a much greater number is being mentioned as suitable quantity to have on hand for defense purposes."

Lieut. Col. Young discussed plans for reducing the time element in producing military equipment. The best plans, he said, involve actual production orders such as in the aviation industry which is thoroughly conversant with the technique required for production on a quantity basis.

Other than aviation, considerable equipment has been placed with some 50 companies, not including subcontractors, which may run as high as 50 to 60 for each prime contract. He regarded educational orders as the next best plan and noted that 105 such orders have been placed for 58 items of a strictly noncommercial nature, and in plants not familiar with their manufacture.

The next possibility, he said is the preparation of production studies which are in reality factory production plans, but without any actual manufacture of the items. This year, a few production studies are being purchased, some of which provide for gages or jigs.

In discussing materials, the officer said that the army and navy munitions board, which is directly responsible to President Roosevelt, is studying the steel capacity of the nation with respect to war requirements. This study undertakes to discover requirements of steel for all purposes in a national emergency and to compare the steel manufacturing capacity against this requirement. The study proposes a plan for the supply of steel where needed with the least possible delay.

Simplification Is Needed

He declared that further simplification and extension of commercial standards to cover additional items whether for military or civilian use is of growing importance and noted that the director of the national bureau of standards in speaking before the thirtieth national conference on weights and measures this month called attention to the necessity of reducing the varieties of steels and their alloys in order that production may be increased for national defense purposes.

He said that organizations which devote part or all of their efforts to standardization may be called

upon to set up new standards for materials required for speeding up production and at the same time help to conserve essential raw materials.

H. H. Morgan, manager, rail and track fastenings department, Robert W. Hunt Co., Chicago, and society president for the 1939-40 term, declared in his presidential address that new specifications by individual buyers are becoming more and more numerous. Often, he said, a material conforming to a specification already written would be satisfactory for the purpose with only minor supplemental restrictions on such items as tolerance, workmanship or finish.

Mr. Morgan cited the benefits derived from using generally-recognized standards. "These specific advantages of using good specifications," he said, "may be listed as follows: (1) they enable the buyer to get what he wants; (2) the material is of uniform quality; (3) the buyer receives goods more quickly and with less trouble; (4) he has access to wider markets; (5) costs are lower; (6) a suitable acceptance basis is established; (7) material becomes standardized and (8) research is promoted."

Specifications Aid Efficiency

He declared further that the efficiency of any buying organization is improved through use of standard specifications since they assure the buyer he is receiving exactly the goods he orders. "While a large percentage of buyers cannot maintain the expert personnel or research facilities to write adequate specifications," he said, "all want to increase their efficiency."

Particularly significant of the growing concern over defense measures was the large representation of aviation industry technical men as well as many others involved in the present preparedness program. Total registrations, however, at approximately 1200, were not above the usual average for the society's annual gathering. Keen interest in the problems now facing the nation were evidenced in the attendance at the 22 general sessions and dozens of committee and subcommittee meetings.

Increased interest in the work of the society also was reflected in the large gain in number of sustaining members during the past year from only 21 to 99. Of this number, 11 signed up since June 1. Each pays annual dues of $100 per year. Included are leading companies in the iron and steel and metals fields.

Total membership on June 1 was 4314. The society also has expanded its staff and acquired more office space for its headquarters at 260 South Broad street, Philadelphia.

Seventy-seven new specifications are up for consideration, bringing the total to around 950. The committee on steel has developed a number of new specifications and revisions of existing tentative standards involving forgings, spring wire, pipe and tubing and materials for high temperature work, including pipe, castings and forgings. Four new standards for forgings alone include carbon and alloy steels for both general use and the railroad field.

At a session on methods of testing, the point was brought out that the speed of application of load to specimens probably is not so important after all, as far as

William M. Barr

New president, American Society for Testing Materials

results are concerned. The problem of speed has perplexed testing engineers for many years.

Another interesting point was revealed at a session devoted to corrosion. It was noted that nickel and copper additions to steels enhanced their resistance to marine atmospheres. Attention given to the mechanical properties of some of the newer types of high-tensile steels has somewhat overshadowed consideration of the adequacy of their corrosion resistance, it was said.

Considerable discussion developed at a meeting devoted to creep strength, including results of an investigation of 17 low alloy steels at 1000 degrees Fahr. It was noted that creep strength of carbon-molybdenum steels rises with increasing molybdenum content. Chromium tends to lower creep of carbon-molybdenum steels but stability is increased. Titanium or columbium improves creep strength of these steels but silicon and aluminum affect them adversely. In each composition, creep strength of the normalized steel was higher than that of normalized and tempered material.

More is being learned about anodic coatings on aluminum. For example, it was shown that the thickness of the coating is a characteristic which may help determine its usefulness for a number of purposes. More abrasion data also are available and are helpful in determining useful life of such coatings.

The committee on die-cast metals and alloys is raising funds for the extension of its research program covering 12 aluminum and 10 zinc-base alloys as well as 5 lead and tin-base die casting alloys, 3 zinc-base, 4 magnesium base and 3 aluminum-base alloys of varying degrees of purity.

Many other subjects of wide interest were considered during the course of the five-day program. An outstanding feature was a symposium on tools of analytical chemistry. Another covered spectrochemical analysis which tied in closely with a third on analytical chemistry. A fourth was devoted to problems in classification of natural waters intended for industrial use.

Presents Marburg Lecture

The fifteenth Marburg lecture, which perpetuates the memory of Edgar Marburg, first secretary of the society, was presented by P. H. Bates, chief, clay and silicate products division, national bureau of standards, Washington, on "Portland Cement — Theories (Proved and Otherwise) and Specifications."

The fourteenth award of the Charles B. Dudley medal was made to T. F. Willis and M. E. De Reus, research engineer, and junior engineer, respectively, bureau of materials, Missouri state highway department, Jefferson City Mo., for their paper on "Thermal Volume Change and Elasticity of Aggregates and Their Effect On Concrete," presented at the meeting last year. Mr. Dudley was first president of the society.

Two years ago, the society, formed in 1898, instituted the award of certificates commemorating 40 years of continuous membership. Eighteen awards were made in the past two years and nine more were presented this year as follows: F. H. Clark, consulting engineer, New York; Theodore L. Condron, Condron & Post, Chicago; Robert Job, Milton-Hersey Co., Montreal; David Thomas, Burnham, Pa.; Charles B. Wing, consulting engineer, Palo Alto, Calif; American Steel & Wire Co., Cleveland; Colorado Fuel & Iron Co., Denver; National Tube Co.,

(*Please turn to Page* 75)

MEETINGS

WESTERN METAL CONGRESS AND EXPOSITION NEXT MAY

■ AMERICAN Society for Metals will conduct its fourth Western Metal congress and exposition in Los Angeles, May 12-16, 1941. Of the three previous Pacific Coast events, the first was in Los Angeles in 1929, second in San Francisco in 1931, and third in Los Angeles in 1938.

A number of technical societies having representation on the West Coast will participate in the activities as they have in the past. Headquarters will be at the Biltmore hotel; the exposition in Pan Pacific auditorium.

A general convention committee appointed from the Los Angeles chapter of the society is headed by A. G. Zima, International Nickel Co. Inc., as chairman; B. H. Brown, Bethlehem Steel Co., vice chairman; and W. J. Parsons, Pacific Scientific Co., secretary. Floor plans for the show will be distributed Sept. 1.

TOOL ENGINEERS TO MEET IN CINCINNATI IN OCTOBER

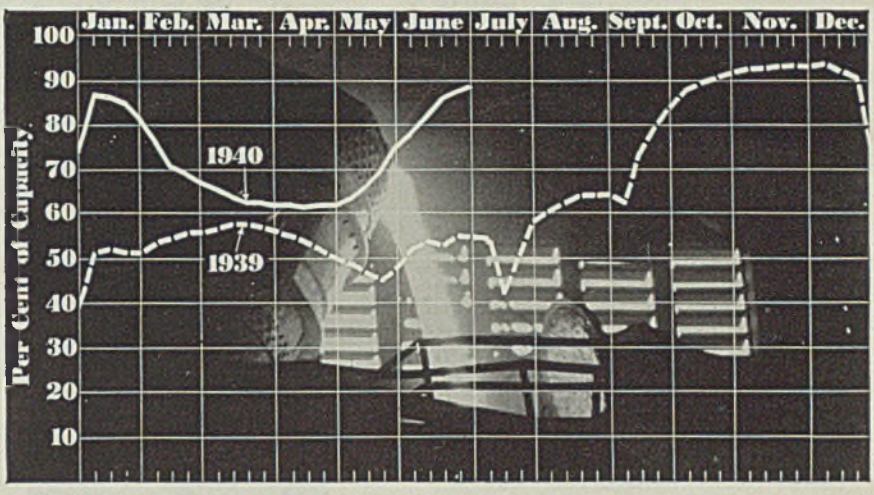
"Tooling with men and machines for national defense" will keynote the semiannual convention of the American Society of Tool Engineers in Cincinnati, Oct. 17-19. Program is to include technical sessions and inspection trips to machine tool and manufacturing plants in the Cincinnati area.

Sessions will include a symposium on "Should Industry Assume the Burden of Special Education?". This subject is of immediate vital importance because of the shortage of trained tool engineers and designers. Another session will deal with gear production methods. Aeronautical preparedness is to be the theme of the dinner meeting, Oct. 18.

NEARLY HALF OF CHICAGO CHEMICAL SHOW SPACE SOLD

Forty-three per cent of the 23,000 square feet available for the first annual National Chemical exposition in Chicago, Dec. 11-15, already is under contract. Since it appears likely that the space will be inadequate to accommodate all companies planning to exhibit, the management is considering the advisability of limiting individual allotments.

The exposition is being sponsored by the Chicago section of the American Chemical society and will be held in the Stevens hotel. Two-thirds of the space sold thus far has been taken by manufacturers of chemicals or laboratory apparatus related to chemical research, and one-third by equipment makers. M. W. Hinson, 110 North Franklin street, Chicago, is show manager.



PRODUCTION... Up

■ STEELWORKS operations last week gained 1 point to 89 per cent. Only two districts showed declines, four were unchanged and six advanced. A year ago the rate was 54 per cent; two years ago it was 28 per cent.

Chicago—Off 1 point to 92 per cent, first decline in nine weeks. Three plants are at capacity.

Birmingham, Ala.—Steady at 88 per cent for the third consecutive week, with 21 open hearths active.

Detroit—Rose 3 points to 92 per cent on minor adjustments. Furnace repairs probably will hold the rate close to this level for several weeks.

St. Louis — Advanced 2½ points to 70½ per cent as one open hearth was added. This is the best rate since January.

New England—Gained 15 points to 85 per cent, the sharpest increase in several months.

Pittsburgh—Added 1 point to 82 per cent. Due to holiday, production this week is expected to drop to 60 per cent. One plant will be down completely for the week.

Wheeling—Unchanged at 90 per cent, virtual capacity of mills now active.

Central eastern seaboard—Continued at 83 per cent, with a dip in prospect this week on account of the holiday.

Buffalo—Held at 90½ per cent, no changes being made by any producer.

Cincinnati—Down 4½ points to 81 per cent as one open hearth was taken off for repairs.

Cleveland—Added 1 point to 85½ per cent as an open hearth was put in service at midweek.

Youngstown, O.—Further advance of 2 points to 80 per cent, with three bessemers and 66 open hearths in production. This week 67 open hearths and some increase in bessemer output is planned, which would give a theoretical rate of 83 per cent. Some suspension for the holiday Thursday will reduce this.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended June 29	Change	Same week 1939	Same week 1938
Pittsburgh	82	+ 1	47	23
Chicago	92	— 1	51	27
Eastern Pa.	83	None	38	27
Youngstown	80	+ 2	51	28
Wheeling	90	None	79	38
Cleveland	85.5	+ 1	51	23
Buffalo	90.5	None	35	28
Birmingham	88	None	71	42
New England	85	+15	32	23
Cincinnati	81	— 4.5	65	28
St. Louis	70.5	+ 2.5	42	33.3
Detroit	92	+ 3	57	29
Average	89	+ 1	54	28

Origin, Distribution of Scrap Exports in 1939

■ Analysis of steel and iron scrap exports of the United States in 1939 by the metals and minerals division, department of commerce, shows total exports of 3,551,539 gross tons, compared with 2,974,375 tons in 1938 and 4,039,143 tons in 1937, which was a record year.

Atlantic coast ports handled 58 per cent of the total, the Gulf coast 21.5 per cent, the Pacific coast more than 15 per cent, the Canadian frontier nearly 5 per cent and the Mexican border, 0.2 per cent. The Far East took 58 per cent, Europe and Africa 36 per cent, Canada and Newfoundland 5 per cent and South America 1 per cent.

Japan was the largest buyer with 2,024,264 tons. United Kingdom bought 508,293 tons, Italy 425,986 tons.

MEN of INDUSTRY

■ HARRY K. CLARK has been elected vice president and general manager, and Andrew B. Holmstrom has been made vice president and works manager, Norton Co., Worcester, Mass. These appointments have been made to fill vacancies caused by two resignations. Aldus C. Higgins, president and general manager, has resigned the general managership, and George N. Jeppson, treasurer, vice president and works manager, has resigned the office of works manager.

Mr. Clark has been with the company 25 years, having held the positions of salesman; Chicago district manager; sales manager of the company's plant in Germany; sales manager abrasive division; general sales manager, a director and vice president. He is also executive officer in charge of Norton Co. of Canada Ltd.; a director, Behr-Manning Corp., Troy, N. Y., and Australian Abrasives (Pty) Ltd., Sydney, Australia. He is an active member, Grinding Wheel Manufacturers' association, and president, American Supply and Machinery Manufacturers' association.

Mr. Holmstrom, in his 20 years' association with the company, has had considerable experience as an engineer and in plant management. After five years in the Norton plants engineering department, he became superintendent of sewers, City of Worcester, when the city was installing its sewage purification plant. After its completion he returned to Norton. Mr. Holmstrom spent some time in England, first as resident engineer and later as general manager of the company's British plant. He returned to America in 1939 to become works manager, abrasive division. He is a member, American Society of Civil Engineers.

♦

A. H. Borden, identified with the grating floor industry 18 years, is now president, Borden Metal Products Co., Elizabeth, N. J., recently formed to manufacture gratings, safety steps, spiral stairs and special floors for industrial plants, refineries, subways and government work as well as punch press work. District representatives will be appointed in all principal cities.

♦

Warren W. Scherer has been appointed superintendent of maintenance, Homestead, Pa., works of Carnegie-Illinois Steel Corp., and Fred C. Frame has been named to Mr. Scherer's former position as superintendent of industrial relations at Irvin works. Mr. Scherer has been with the corporation since 1920, serving in the maintenance department at the Clairton works until 1937. He was assistant superintendent of construction at Irvin works, later becoming superintendent of maintenance, and subsequently superintendent of industrial relations.

Harry K. Clark

Andrew B. Holmstrom

A. H. Borden

Mr. Frame was plant industrial engineer at the Wood works of Carnegie-Illinois, McKeesport, Pa., from 1936 to February, 1938, and has been plant director of training at Irvin works since June 1, 1938.

♦

Clarence W. Avery, president and chairman of the board, Murray Corp. of America, Detroit, has been elected president, Detroit board of commerce.

♦

Oliver H. Smith has been placed in charge of the New York office recently opened by J. H. France Refractories Co., Snow Shoe, Pa., at 225 Broadway. He has been with the company ten years.

♦

Myron C. Taylor, personal envoy of President Roosevelt to the Vatican, and former chairman of United States Steel Corp., underwent an operation last week at the Bastianelli clinic in Rome. He is reported to have withstood the operation well.

♦

Orville R. Lyons, who has just completed a United States bureau of mines fellowship at the University of Alabama, has joined the research staff of Battelle Memorial institute, Columbus, O., and has been assigned to the ore concentration division.

♦

Melville Lowe, the past ten years metallurgist, Hevi Duty Electric Co., Milwaukee, has established his own metallurgical consultant service in connection with the Anderson laboratories at 3920 West National avenue, Milwaukee.

♦

L. G. Barnes has been named manager, Chicago district sales office of Universal Gear Corp., Indianapolis. He will be in direct supervision of all sales offices in Illinois and Iowa, with headquarters at 600 South Michigan avenue.

♦

Dr. R. W. Sorensen, professor of electrical engineering, and head of the department of electrical engineering, California Institute of Technology, Pasadena, Calif., has been elected president, American Institute of Electrical Engineers, New York, for the year beginning Aug. 1.

♦

Paul W. Allen, in charge of Inland Steel Co.'s operations at the Ravenna-Prickett open pit mine at Crystal Falls, has been transferred to the Morris mine at Ishpeming,

Mich. He will become chief engineer of all Inland's properties in Michigan.

♦

S. T. Whitbeck, auditor, air conditioning department, General Electric Co., Bloomfield, N. J., has been named auditor of receipts of the company, with headquarters in Schenectady, N. Y. He succeeds Jacob Schuler, who has retired after 43 years of service.

♦

John Shillinglaw has been appointed purchasing agent at the Watervliet, N. Y., plant of Allegheny Ludlum Steel Corp., Pittsburgh. He has been with the company about 20 years, during which time he was auditor of Ludlum Steel Co., and since the merger, has been in the accounting department of Allegheny Ludlum.

♦

Robert Urquhart, employed at the Homestead, Pa., works of Carnegie-Illinois Steel Corp., Pittsburgh,

Robert Urquhart

since 1914, has been promoted to assistant general superintendent in charge of operations there.

Other promotions in the operating department at the Homestead works include: Walter F. Nicoden as superintendent of open-hearth departments, succeeding Mr. Urquhart; Robert O. Thomas, formerly assistant to chief inspector, to chief metallurgist; A. B. Steigerwalt, to superintendent of production ships, and Myron W. Lewis to plant industrial engineer. W. C. Hogg has become assistant superintendent, open-hearth departments, and A. L. Adams, superintendent of open hearths Nos. 1 and 2 and foundry.

♦

George H. Calkins, manager of the Buffalo office of General Electric Co., Schenectady, N. Y., has retired. George Campbell, of Schenectady, succeeds Mr. Calkins. Other appointments are: Ralph M. Darrin as manager, Syracuse, N. Y., office; E. H. Aussicker as manager of Schenectady office, and E. B. Currie to succeed Mr. Aussicker at Binghamton, N. Y.

♦

Phillip W. Sloan, the past two years general manager and vice president, Linn Mfg. Co., has been appointed sales manager, truck replacement department, diesel division, General Motors Corp., Detroit. This department has been established because of the demand for diesel engines for replacement power in trucks and buses.

♦

J. L. Sturges, formerly mechanical goods salesman at Jacksonville, Fla., for Goodyear Tire & Rubber Co., Akron, O., has been appointed southern district manager of mechanical goods sales, with headquarters in Atlanta, Ga. He succeeds E. A. Filley, who has resigned to become general manager, Manufacturers Rubber Supply Co., Goodyear mechanical rubber goods distributor in the Akron area.

♦

Robert L. Clause, vice president, Pittsburgh Plate Glass Co., Pittsburgh, has been elected to the newly created post of executive vice president. John A. Wilson, general superintendent of plate glass factories, has become manager of glass manufacture; D. G. Hill, assistant to the vice president, has been made superintendent of plate glass factories; R. B. Tucker, manager of plate glass sales, has been named director of glass sales; B. J. Cassady, secretary of the commercial department, has become general manager of warehouses.

♦

William A. Hanley, in charge of engineering, Eli Lilly & Co., Indianapolis, has been nominated for president, American Society of Mechanical Engineers for 1941, to succeed Warren H. McBryde, consulting engineer of San Francisco.

Martin J. Conway

Who has been named special engineer for the petroleum industry for Lukens Steel Co., Coatesville, Pa. as noted in STEEL, June 24, p. 29

Three vice presidents were nominated as follows: Samuel B. Earle, dean, school of engineering, Clemson Agricultural college, Clemson, S. C.; Frank H. Prouty, partner, Prouty Bros. Engineering Co., Denver; and Edwin B. Ricketts, mechanical engineer, Consolidated Edison Co. of New York Inc., New York.

Nominees to serve as managers are: Huber O. Croft, professor and head of mechanical engineering department, State University of Iowa, Iowa City, Iowa; Paul B. Eaton, professor in charge of mechanical engineering department, Lafayette college, Easton, Pa.; and George E. Hulse, chief engineer, Safety Car Heating & Lighting Co., New Haven, Conn.

Selections were made by the nominating committee at a meeting in Milwaukee recently. Election will be by letter ballot closing Sept. 24, with nomination virtually assuring election.

♦

J. J. McDermott has been re-elected president and general manager, Lebanon Steel & Iron Co., Lebanon, Pa., formerly Wrought Iron Co. Other officers re-elected are: Secretary, C. A. Donley; treasurer, R. S. Imboden. The following have been elected directors: Mr. McDermott for three years, H. W. Harrison, three years; C. A. Ernst Jr., two years; C. P. Lineaweaver, two years, and Mr. Donley, one year.

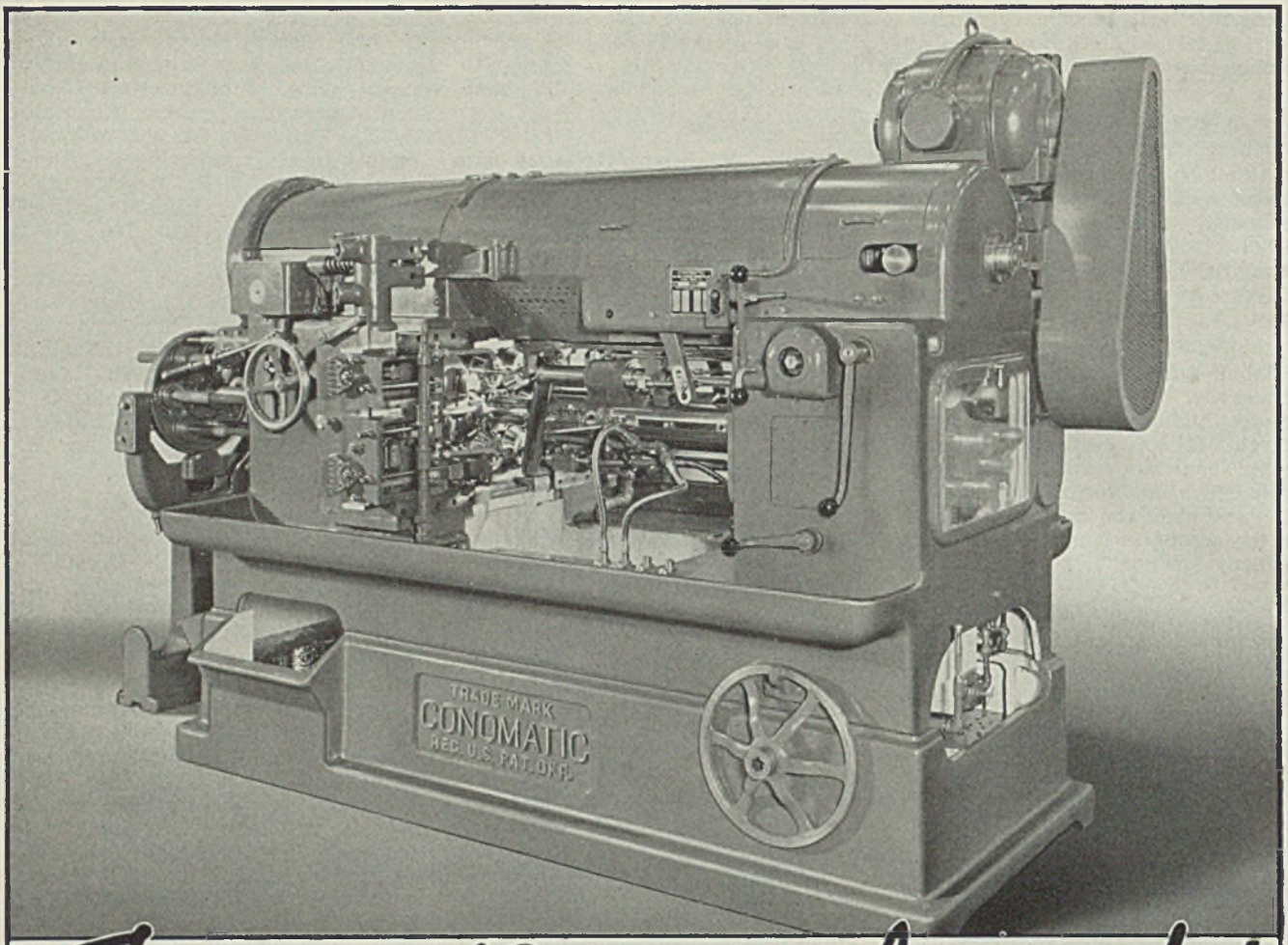
♦

Globe Steel Tubes Co., Milwaukee, has made the following appointments in its sales department: Frank T. Murphy has been made manager of sales, St. Louis district; Neal E. Boeckler, assistant manager of sales, St. Louis; Gilbert H. Krohn has been transferred from manager of sales, Wisconsin district, to sales agent at Chicago, where he will be associated with John W. Floto, vice president; Clarence A. Schroeder has been named manager of sales, Wisconsin district, with headquarters in Milwaukee.

♦

C. H. Roberts, associated with the South Chester Tube Co., Chester, Pa., 30 years advancing through various departments in plant and general office, and since 1928 serving as general sales manager, has been appointed purchasing agent. Certain responsibilities which he has also held with respect to production and control of raw materials and finished stock are now being consolidated and enlarged under his direction.

Francis H. Gibson, heretofore manager of the company's Pittsburgh district office, has been named general manager of sales. Mr. Gibson is the third generation of his family to serve this company.



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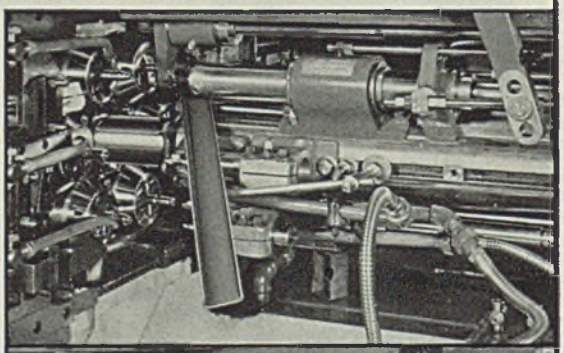
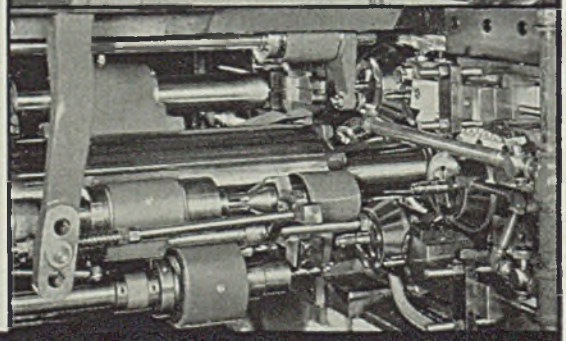




CONE AUTOMATIC MACHINE CO.
WINDSOR, VERMONT, U. S. A.

Windows of WASHINGTON

By L. M. LAMM
Washington Editor, STEEL

Congress Expected To Remain in Session All Summer

Private Lending Institutions Given First Opportunity

Unemployment Conference Advocates 16-Point Program

Consultants Appointed to National Defense Committee

Walsh-Healey Iron, Steel Purchases Total $1,369,342

WASHINGTON

■ CONGRESS, in session again after a week's recess for the Republican nominating convention, will suspend activities for another week beginning July 15 for the Democratic convention. What the situation will be after that no one knows, but there is much sentiment both in congress and apparently throughout the nation to have the legislative body remain in session. It is considered possible congress will take three-day recesses throughout the summer, and thus stay in session although little or no business will be transacted.

Before recessing June 22, congress rushed through a number of bills dealing with the present emergency. Legislative action permitting secretaries of war and navy to advance 30 per cent of contract price on warships and airplane orders, and also to award contracts without competitive bidding as well as relax government labor restrictions was finished. Profits on navy awards will be limited to 7 per cent on closed contracts and 8 per cent on those placed through competitive bidding.

Another bill receiving congressional action before latter recessed removed all restrictions from army airplane building.

So-called two-ocean navy bill passed house without a dissenting vote. Senate, however, has not yet acted upon it, must take it up for consideration. Bill, as passed by the house, is an authorization bill, not an appropriation. It would authorize a 70 per cent increase in the fleet, about 200 additional warships. This would mean an expansion of combatant and auxiliary vessels, to be built during next six years at cost approximating $4,000,000,000, totaling 1,325,000 tons.

In addition to increased ship tonnage, bill likewise proposes to increase navy's air force to 15,000 planes. It provides $25,000,000 for "mosquito" torpedo boats, and authorizes a $150,000,000 appropriation for expansion of government and private shipbuilding facilities. Further provisions include $20,000,000 expenditure for armor plate manufacture expansion and $50,000,000 for added gun construction facilities.

Grant President Emergency Fund

Admiral Stark, naval operations chief, recently stated that when the bill becomes law $175,800,000 will be asked by the administration for an immediate start on the proposed navy program.

Available information indicates the navy currently has 307 vessels in actual operation, with 160 either in process of building or definitely planned, and is reconditioning 35 destroyers and 36 submarines.

Secretary of war is authorized, by another bill recently completed, to construct manufacturing plants useful for production of critical items, and to lease them to private concerns or operate them himself. He is further authorized to negotiate contracts for supplies instead of waiting for competitive bidding. Similar powers have been granted secretary of the navy.

Shortly before recessing for the Republican convention, congress also passed bills authorizing an 11 per cent increase in navy's tonnage, and expansion of naval air strength to 10,000 planes. Other bills, still pending, materially increase these figures.

Congress likewise completed legislative action on H.R. 9850 just prior to recess, expediting strengthening of national defense. President Roosevelt was granted a $132,000,000 emergency fund, to be used at his discretion for purchase of various materials.

Smith Amendments Await Action

Section 3 of this bill empowers the President to prohibit exportation of machine tools and other national defense items whenever he sees fit. Penalty for violation includes both fine and imprisonment. This section terminates June 30, 1942, unless congress otherwise provides.

H.R. 9958 was likewise passed by both house and senate. It permits Reconstruction Finance Corp. to loan money to corporations for acquiring and carrying strategic and critical materials essential to the defense program and for construction, expansion and equipment of necessary manufacturing facilities. Further authorization is granted in its provisions for payments to be made against the purchase price in advance of the delivery of materials ordered.

Important bills still awaiting congressional action may soon be taken up for consideration, although there is little evidence to that effect. Smith amendments to the national labor relations act have already been accepted with a large majority in the house. Much pressure has

been brought to bear on senate education and labor committee to hold them up, however.

Opponents earlier were confident the amendments could be held up in committee, as adjournment by June 22 had been expected. Now that congress may stay in session indefinitely there is a strong possibility the senate will be forced to take action.

Senate also has pending on its calendar the Logan-Walter bill, which subjects rules and regulations as well as decisions of government administrative agencies to court review. This bill was overwhelmingly adopted by the house, despite strong administration opposition.

GOVERNMENT OFFERS PRIVATE CAPITAL FIRST OPPORTUNITY

President Roosevelt, Secretary Morgenthau and Jesse H. Jones, Reconstruction Finance Corp. chairman, have stated private lending institutions will have first opportunity to finance new factories for defense purposes. Formula has been worked out, Secretary Morgenthau said last week, which will be satisfactory to business for financing plant expansion for purely military purposes. If private capital proves unavailable, he said, RFC will stand ready to lend assistance.

"If the government wants a manufacturer to build a new factory to produce airplane motors," Secretary Morgenthau declared, "we will be glad to have private capital finance the construction."

"However," he continued, "since this plant will be purely for military purposes and might involve risks private capital may not be willing to undertake, it seems only common sense to us that the government ought to stand ready to put up the money if necessary."

UNEMPLOYMENT CONFERENCE PREPARES 16-POINT PROGRAM

Final report and 16-point program set up by the congressional conference on unemployment was made public last week by Representative Voorhis, permanent chairman. Signed by more than 60 representatives, report and program is result of more than four months' work.

Twenty-one Republicans joined with 38 Democrats, one Farmer-Laborite and one Progressive in endorsing the non-partisan recommendation for dealing with unemployment problem.

Report's preamble states: " . . . unemployment is the central and typical problem of the twentieth century; there is not unlimited time left in which to effect its solution; the future of individual freedom and of constitutional government depend directly upon its solution, and we should proceed at once to a consistent, determined and co-ordinated attack upon it."

Among unemployment causes listed in the report are: Nation's failure to maintain scientific balance between production increases in goods and services and expansion of the volume and velocity of its medium of exchange; idle money; technological change without compensatory price reduction; monopoly; unsound tax policies; low farm income; loss of farm ownership; exhaustion of natural resources; state trade barriers; congress' failure to develop a long-range public works program; and failure to establish a national old age pension system.

Conference's proposals include granting of such appropriations to the justice department's anti-trust division as it may be effectively able to use in breaking up monopoly controls on prices in United States. Passage of legislation to assure benefits subsequent to technological improvement be handed on either to consumers through lower prices or workers through reinvestment of savings effected was likewise recommended.

BILL PROPOSES RFC MINERAL DEPOSIT DEVELOPMENT LOANS

Senate has passed S.4008, which authorizes Reconstruction Finance Corp. to make loans for development of strategic and critical mineral deposits and also empowers corporation to make more adequate loans for mineral-development purposes. Bill has not yet passed the house.

Provision is made that not more than $20,000 shall be loaned any corporation for development purposes "except that not in excess of $40,000 in the aggregate may be loaned to any corporation, individual, or partnership for such purposes, if such corporation, individual or partnership has expended such funds previously obtained from the reconstruction finance corporation for such purposes in such manner as to justify an additional loan for such purposes; provided further, that there shall not be allocated or made available for such development loans a sum in excess of $10,000,000."

APPOINT DEFENSE ADVISORY COMMISSION ASSISTANTS

A subcommitee of two to advise the defense advisory commission on electric power problems has been appointed. They are: Gano Dunn, senior consultant to Edward R. Stettinius Jr., and Leland Olds, chairman, federal power commission, and vice-chairman, national power committee.

In addition, four consultants were named by Mr. Stettinius to aid the work of the subcommittee: Charles W. Kellogg, president, Edison Electric institute; Major Theron D. Weaver, corps of engineers, U. S. army; Commander K. B. Bragg, civil engineers' corps, U. S. navy; and John C. Parker, vice-president, Consolidated Edison Company, New York.

Announcement also has been made of the appointment to the staff of Mr. Stettinius of Robert E. Wilson, president, Pan American Petroleum and Transport Co., American Oil Co., and subsidiaries. Mr. Wilson will serve as a consultant on petroleum problems.

Dr. D. P. Morgan and E. W. Reid have been added to the staff of the chemical section under Mr. Stettinius' division. Dr. Morgan is on leave from Scudder, Stevens and Clark, investment counsellors, with whom he has besen associated as a chemical consultant. Dr. Morgan will be a consultant on economic and statistical aspects of the chemical industry. Mr. Reid, formerly associated with the Mellon institute, is a specialist in aliphatic organic chemistry. He will be a consultant on chemical production problems.

GOVERNMENT IRON, STEEL AWARDS TOTAL $1,369,342

During week ended June 15 government purchased $1,369,342.19 worth of iron and steel products under Walsh-Healey act as follows: American Bridge Co., Denver, $113,128; B. F. Goodrich Co., Akron, O., $18,090; Stanley G. Flagg & Co. Inc., Philadelphia, $40,222.43; Walworth Co., New York, $103,474.11; Wire Rope Corp. of America Inc., New Haven, Conn., $50,039.04.

Armstrong Bros. Tool Co., Chicago, $15,414.60; Mosler Safe Co., Hamilton, O., $18,887.40; Elliott Co., Jeannette, Pa., $85,146; National Tube Co., Washington, $11,931.86; Lukens Steel Co., Coatesville, Pa., $55,824; Midvale Co., Washington, $22,900; Kingston Products Corp., Kokomo, Ind., $45,062.70; Darling Valve & Mfg. Co., Williamsport, Pa., $58,902.63.

Mergenthaler Linotype Co., Brooklyn, N. Y., $128,953.29; Plomb Tool Co., Los Angeles, $62,898.19; Peter A. Petroff, Brooklyn, N. Y., $10,900; Schmitt Steel Co., Portland, Oreg., $42,984; Mattatuck Mfg. Co., Waterbury, Conn., $18,000; Chicago Screw Co., Chicago, $10,098; Standard Pressed Steel Co., Jenkintown, Pa., $304,800.

Carnegie-Illinois Steel Corp., Boston, $12,560.53; Western Pipe & Steel Co. of Calif., Los Angeles, $78,895; United States Steel Export Co., Washington, $13,267.01; Milwaukee Bridge Co., Milwaukee, $12,950; Reliance Steel Products Co., McKeesport, Pa., $16,351; Superior Sheet Steel Co., Park & Williams Inc., agents, Philadelphia, $17,662.40 (estimated).

Activities of Steel Users, Makers

■ CONTRACTS for design and construction of a $40,000 addition to the Mason-Neilan Regulator Co. plant at Dorchester, Mass., have been awarded to the Austin Co., Cleveland. The addition, scheduled for completion early in August, has been made necessary by overcrowded conditions resulting from an increase in business.

♦

Cutler-Hammer Inc., Milwaukee, has moved its Pittsburgh office to new and larger quarters in the Park building, 355 Fifth avenue. T. S. Towle is Pittsburgh district manager.

♦

Goetz-Voss Corp., Wauwatosa, Wis., has appointed United States Metallic Packing Co., Philadelphia, agent to promote sales of its new portable locomotive crank pin grinder.

♦

Joslyn Mfg. & Supply Co., Chicago, has purchased the entire stock interest of William E. Pratt Mfg. Co., Joliet, Ill., producer of malleable iron castings and roller bearings.

♦

O. Hommel Co., Pittsburgh, has purchased approximately 60 acres of ground at Pulaski, Pa., and will erect a new building for the manufacture of Frit. This completes an expansion program that included erection of a large new warehouse and an addition to the office building.

♦

Eastern Gas and Fuel Associates have awarded contract to Peabody Engineering Corp., New York, for modernization of a gas scrubber at its Everett plant. An existing tower is to be equipped with a two-plate Peabody scrubbing and drying installation, to clean blast furnace gas for use in stoves and boilers.

♦

Reading-Pratt & Cady division of American Chain & Cable Co. Inc., has moved its general sales office from Bridgeport, Conn., to the Reading, Pa. plant in order to improve its service by bringing about a closer and continuous contact between the production, engineering and sales departments. It will continue to service inquiries and orders for brass and iron valves and asbestos packed cocks from the Hartford, Conn., plant.

♦

Michigan Tool Co., Detroit, has appointed C. Howard Eden, 1031 South Broadway, Los Angeles, representative in Los Angeles area, including southern California, for its line of Michigan gear finishing, lapping and Sine-line checking equipment, and D. E. Schellenbach, 3245 Sixteenth street, San Francisco, representative in northern California and four western counties in Nevada. In addition to machinery, Mr. Schellenbach will also handle the Mitco line of cutting tools.

♦

A branch office at 443 Gazette building, Reno, Nev., for the investigation of mineral deposits in the West and the development of new mining opportunities has been established by Freeport Sulphur Co., New York. A. A. Gustafson, mining engineer, will be in charge, assisted by Ralph Taylor and David L. Evans, geologists.

♦

Atlantic Refining Co., Philadelphia, has awarded to Worthington Pump & Machinery Corp., Harrison, N. J., contract for the cargo discharge and condenser circulating pumps for a 19,405-ton all-welded tanker it is having built at the Chester, Pa., yards of Sun Shipbuilding & Dry Dock Co.

Ingersoll-Rand Co. has been awarded contracts for the condensers, condensate pumps and boiler feed pumps, and Babcock & Wilcox Co. has been awarded contract for two boilers.

♦

Dennis Steel Co. has been organized to do business in scrap steel and metals, sheets, plates and bars, by Leo H. Marks and J. Denny Marks. The company has opened an office and warehouse at 708 Fulton street, Northwest, Grand Rapids, Mich.

Died:

■ WALTER B. CHAMP, 66, president and general manager, Hamilton Bridge Co. Ltd., Hamilton, Ont., in Hamilton, June 23. He joined the old Hamilton Bridge Works Co. at the age of 17; seven years later became treasurer; in 1905 was named secretary-treasurer, and managing director and secretary in 1918. When Hamilton Bridge was formed in 1928, Mr. Champ became vice president and managing director. He had been president since 1931.

♦

Harry W. Fitts, 63, for many years New England representative, Lackawanna Steel Construction Co., June 20 in Nashua, N. H. He was vice president, New England Structural Co., and was a member, Engineers club, New England Iron league, and Master Builders association.

♦

John C. Deertz, 54, the past 15 years a cost engineer for Otis Steel Co., Cleveland, at his home in Sheffield Village, O., June 20.

♦

Edward R. Sargent, 83, retired manufacturer who for many years was associated with Sargent & Co., New Haven, Conn., June 20.

♦

John R. Boardman, 73, president and general manager, Boardman Co., sheet metal manufacturer, Oklahoma City, Okla., in that city, recently.

♦

Harold R. Mowrer, district sales manager, J. D. Adams Co., Indianapolis, maker of road construction and maintenance machinery, recently in San Francisco.

♦

Harold W. Clark, 45, general factory manager and assistant to the president, McCaskey Register Co., Alliance, O., June 21 at Madison, O.

♦

William Wallace Buffum, 51, treasurer and director, Chemical Foundation Inc., New York, at the Mountainside hospital in Montclair, N. J., June 22 after a brief illness of a heart ailment.

♦

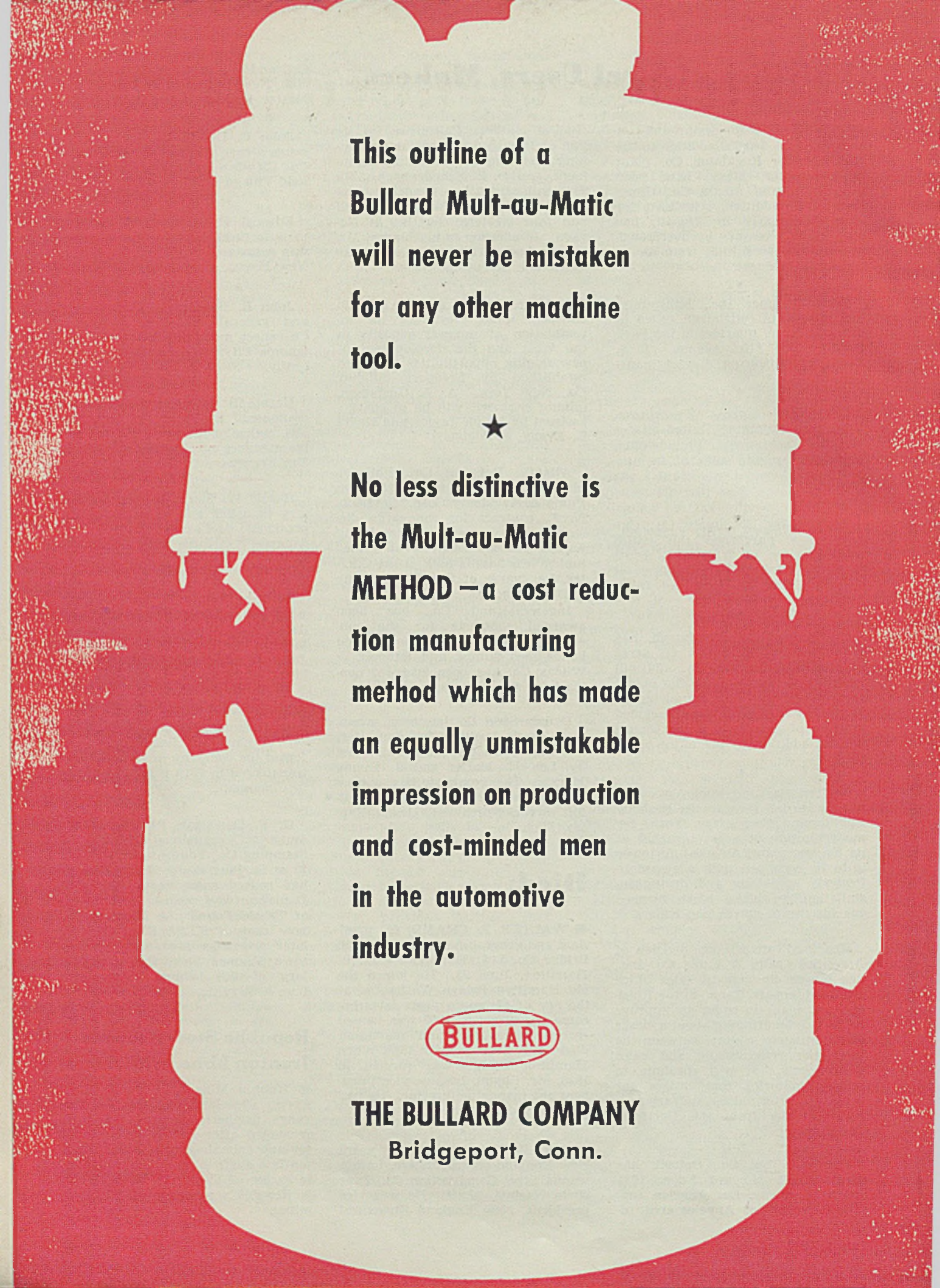
John Owen Yoder, 58, vice president, Hickman, Williams & Co., June 24. A native of Reading, Pa., he joined the company in 1913 and was transferred in 1919 from Pittsburgh to Cincinnati.

♦

G. F. Danielson, 82, one of the founders, Commercial Shearing & Stamping Co., Youngstown, O., June 25 at St. Petersburg, Fla., where he had retired some years ago. Mr. Danielson was one of the founders of Toledo Foundry & Machine Co., now part of E. W. Bliss Co. He later was associated with Youngstown Pressed Steel Co., a subsidiary of the former Youngstown Iron & Steel Co.

Republic Steel Reopens Ironton Mine in Michigan

■ Ironton Mine of Republic Steel Corp., Cleveland, in the Gogebic range, northern Michigan, has been re-opened after having been closed for approximately two years. Ironton is a shaft mine and will employ in excess of 150 men. W. M. Webb is Republic's manager of Michigan mines.



This outline of a Bullard Mult-au-Matic will never be mistaken for any other machine tool.

★

No less distinctive is the Mult-au-Matic METHOD—a cost reduction manufacturing method which has made an equally unmistakable impression on production and cost-minded men in the automotive industry.

BULLARD

THE BULLARD COMPANY
Bridgeport, Conn.

Mirrors of MOTORDOM

By A. H. ALLEN
Detroit Editor, STEEL

Motor Companies Proceed Slowly on New Model Programs

Rearmament Questions: What, How Many and When?

Ford Refuses To Build Plane Engines for Britain

New Spark Plug Reduces Short Circuiting

Hydraulic Electric Window Lifts For Taxicabs

DETROIT

■ DESPITE public statements of high automotive officials that they are hanging out the "business as usual in 1941" signs, some grounds persist for belief that the '41 programs which are closest to the starting line temporarily have been throttled down until clearer indication can be had of what the industry is going to be called upon to contribute to the national defense program. Releases for material which should normally be proceeding through the mill by this time of the year are being held in abeyance.

This applies in greater degree to the smaller manufacturers than to the larger, integrated builders, the latter feeling confident they can absorb any armament work in stride, without interrupting new models.

It has been suggested the record inventories of new cars now in dealers' hands may portend delay in introduction of models late this summer. With dealers well stocked there would be no pressure on plants to proceed with the '41 jobs, thus permitting quick absorption of a sudden torrent of defense work. When the first impact of the emergency work has been dissipated and scheduling assigned, car assemblies could go ahead on at least a near-normal basis.

In every way, the motor picture is a healthy one. Production of 1940 models has been sustained beyond expectations, the first seasonal shutdown—Nash—having come only about two weeks ago. Tool and die programs, with perhaps one important exception, are well along and in another six weeks, practically the full force of the Detroit area's 300 tool and die plants can be switched to armament and defense activity. In fact, a survey is being made just now to provide complete details of the extent of assistance possible by die shops.

Motor companies are realigning their personnel and plants so that armament programs can be handled most expeditiously. An early release of some of this work would minimize the extent of idle time for labor this summer when model changeovers are being effected. With full weeks and full pay checks in the offing, labor is disinclined to be party to any disturbances which would interfere with production.

Warns Against Hysteria

This encouraging outlook for business was echoed by K. T. Keller, president of Chrysler Corp., speaking at Salt Lake City, Utah, last week, when he advised, "Don't get down in the mouth about business in this country. There is going to be a lot of money spent here—more than any of us realize—and this money will get into circulation. What we have ahead of us is accelerated business."

Warning against hysteria, he said, "I believe our great defense program will be worked out on a basis of analysis, careful study and planning. It proceeds by practical steps. It asks for the answers to three important and essential questions: What is wanted; how many are wanted; when are they wanted?"

With these questions, Mr. Keller hit at the core of what all industrial Detroit is asking today, and the answers still are not forthcoming. Mr. Keller gave an inkling of the motor industry's productive capacity when he noted that the entire indicated forward demands of the United States army for trucks for national defense purposes could be taken care of by Chrysler alone. Thousands of trucks and reconnaissance cars already have been made by Dodge for the army, and the corporation has handled some half-million dollars' worth of educational orders for fuse bomb noses, shell forgings and cartridge cases. A special ordnance manufacturing division has been set up to handle such work.

As is probably natural in times like the present, the pall of censorship thickens over a large part of the industrial news available. One large organization, loaded with government orders and harassed in the past by frequent labor disputes, has given orders to its public relations representative that nothing whatever concerning the company's operations shall be released for publication. Another plant has stipulated that no information can be divulged on a new plant addition, since it is bound to secrecy by terms of its contract for parts to be furnished another manufacturer.

A prominent engineer here received a phone call the other day, reportedly from the intelligence department, informing him his company had just been awarded a good-size aviation contract. He is still trying to figure it all out, since of course he knew from his own force that the job had been signed.

One sad aspect of this enforced secrecy which at times is carried to ridiculous lengths is that it usually leads to a flock of wild and totally inaccurate rumors which do more harm than would a calm release of the facts.

Detroiters were pondering last

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BIBLIOTEKA POLITECHNIKI ŁÓDZKIEJ

week the statement released from Washington that the government had canceled its order for airplane engines from Ford Motor Co., ostensibly because Ford had refused to produce any of these motors for British use. Through William S. Knudsen, the national defense commission declared that "it had been hoped that production in the United States would be expedited by employing Ford facilities due to the fact that Ford interests in Great Britain have a contract with the British government for manufacture of Rolls-Royce engines."

Some interpretations of the development were that it represented nothing more than temporary pressure being put on Ford by means of publicity to the end that the original arrangements would stand. Ford reiterated his offer to build engines for the United States government only, and it seems likely the project will proceed uninterrupted at the Ford plant. In fact, a few weeks ago Ford stated that his company was going into the airplane business, government orders or no.

The engine program, according to reports, is too far along to be canceled, but of course that is the same thing that was said of the Ford 6-cylinder engine program which was canceled. Nevertheless, only last week informal inquiries were received for figures on construction of 38 engine test houses at the Ford plant, to be used in connection with the airplane engine program.

Rubber-Steel Armor Plate

Complete secrecy likewise surrounds the new rubber and steel armor plate announced recently by F. B. Davis Jr., of United States Rubber Co. here. It is known that U. S. Rubber technicians have been working for years on improving the bonding of rubber to steel for miscellaneous industrial and automotive uses, with a considerable degree of success. The new airplane armor plate apparently has been a part of this research, carried out in old steam tunnels under the 64-acre plant. The tunnels were converted into firing ranges, and the new rubber-steel armor plate is declared to have "withstood all shots from various caliber ammunition at all ranges from 200 yards to an extremely close range." Resistance of the combination plate is claimed to be equivalent to regular armor plate 20 per cent heavier.

"For obvious reasons," Mr. Davis notes, "it is not possible to detail the construction of the new armor."

■ MAJOR advance in spark plug design has been announced by Hudson where engineers have been working in co-operation with the Champion Spark Plug Co. on a new type of high-tension insulated plug, patterned after the insulators on high-tension power lines and transformers. Porcelain insulator sleeve on the new plug is fluted, or ridged, by concentric "petticoats" which are said not only to minimize accumulation of dirt and grease but also to add to the surface length of the insulator sleeve with consequent reduction in outside "flashover" or short circuiting tendencies. The ridges also serve to shed or break up the flow of moisture over the porcelain surface of the insulator sleeve.

Study of spring action and accompanying body motion of a car in movement is studied by Plymouth engineers with the aid of lights, one mounted on a rear wheel and one beside a rear window, which trace a path across a photographic plate as the car passes a camera. By laying out a deliberately rough course, it is possible to see how the rear springs iron out the waviness of the path traced by the rear wheel light.

Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

	1938	1939	1940
Jan.	226,952	356,962	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*
5 mos.	1,116,099	1,731,491	2,176,874*
June	189,402	324,253	.....
July	150,450	218,494	.....
Aug.	96,946	103,343	.....
Sept.	89,623	192,678	.....
Oct.	215,286	324,688	.....
Nov.	390,405	368,541	.....
Dec.	406,960	469,120	.....
Year	2,655,171	3,732,608	.....

*Revised.

Estimated by Ward's Reports

Week ended:	1940	1939†
June 1	61,255	32,445
June 8	95,560	65,265
June 15	93,635	78,305
June 22	90,060	81,070
June 29	87,550	70,663

†Comparable week.

■ FURTHER details on the hydraulic electric automobile window lifting mechanism, described in these pages June 17, are supplied by Detroit Harvester Co., which has developed the device in co-operation with a subsidiary, the Dura Co., Toledo, O.

Known as the Dura Hydro-Electric window regulator, the improvement is described as a remotely controlled hydraulic assembly which raises and lowers car windows. The mechanism consists of a gear pump mounted on the starting motor brush carrier plate and positively driven by the armature shaft. This pump forces fluid through metal and flexible conduits to hydraulic cylinders located in the doors. The power thus delivered is transmitted to standard glass guiding mechanisms comprising glass retainers and lifting arms.

Now being supplied for installation on a fleet of Skyview taxicabs in New York, the device will be available on at least two cars in the luxury field for 1941.

Additional load on the starter motor is not excessive, tests showing the amount of current required for 300 regulator strokes being equivalent to that expended in operating the average car radio for one hour. Use of this motor for its normal function creates no serious problem either, as a shift means has been provided which reverses the fluid flow during the cranking period and minimizes the load on the pump.

This shift means comprises a spring loaded maximum regulating valve and a solenoid operated flow control valve, the function of which is to control the flow of the liquid, as mentioned above, either forcing it into the cylinders or drawing it out and returning it to a simple non-splash vented reservoir or supply tank. Thus, suction from the pump lowers the windows; pressure raises them.

Control for Each Window

The mechanism contained in the door includes any type of conventional regulator assembly with channel, a spring which exerts downward pressure on the glass and a hydraulic cylinder. The spring pressure, coupled with the glass weight and the pull executed by the pump suction of the cylinder is strong enough to open the window against maximum resistance, plus any reasonable safety factor.

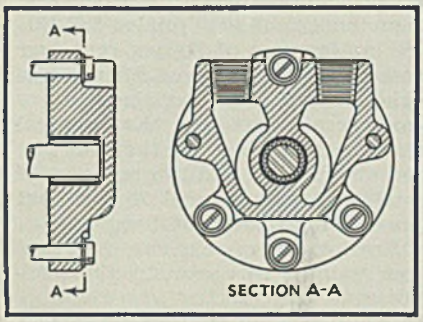
The hydraulic cylinder is connected yieldingly to the regulator mechanism so that it moves one-fourth the distance of the window range.

Control valves are operated by separate switches for each window, their location being a matter of choice, although the instrument panel appears the most logical place. These switches control the fluid flow into or out of the door cylinders through solenoid-operated rubber seated valves which may be arranged as a unit with the piston or as a separate unit located in the line at any convenient point. Flexible connections to the door cylinders are made easily through the hinge pillars with a conventional type of flexible tubing.

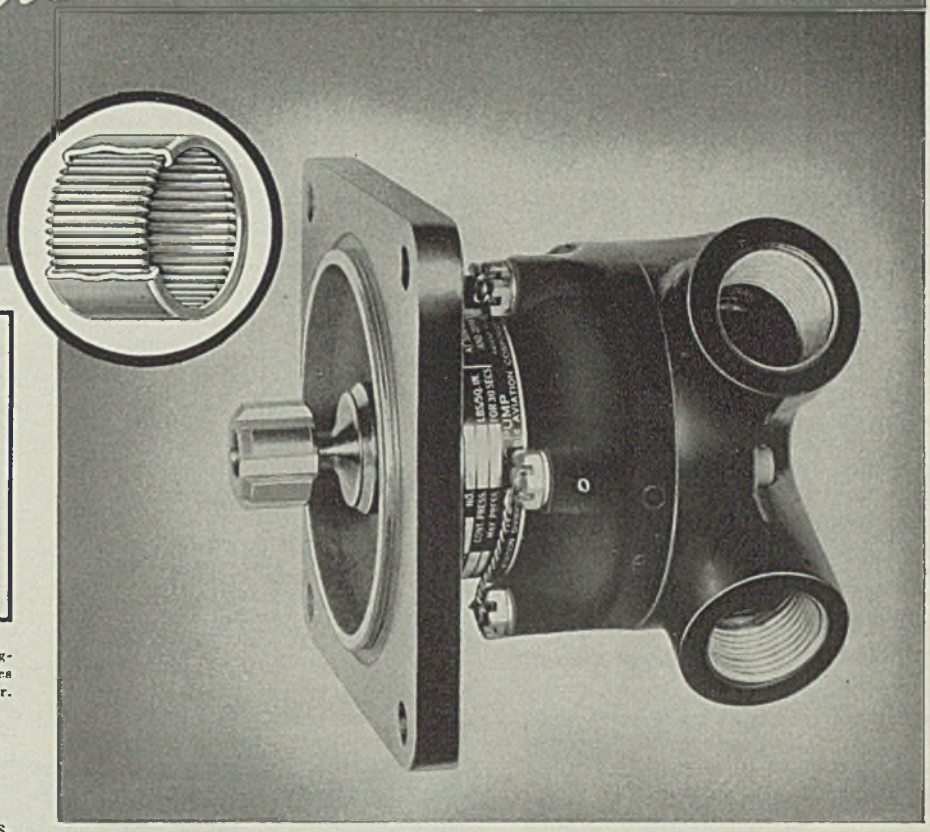
FOR ITS GEROTOR PUMP, ECLIPSE AVIATION SELECTS TORRINGTON NEEDLE BEARING

On 4 Counts

1. SMALL SIZE
2. LOW COST
3. HIGH CAPACITY
4. EASE OF LUBRICATION



(*Above*) Cross-section showing installation of Torrington Needle Bearing between the cored porting holes of the pump. Here, space limitation was a vital factor.



(*Above*) MIGHTY MIDGET: Comparatively small in size and light in weight, this Gerotor-type ECLIPSE hydraulic pump is designed for operating pressures of 500 to 1000 pounds per square inch.

ACTUATING wing flaps, wing tip floats, retractable landing gear, etc., on present-day giants of the sky is a job that requires Power—dependable, hydraulic power. That's why ECLIPSE AVIATION'S Gerotor-type Pumps are so generally specified as standard equipment in aviation circles.

Because of the weight and size limitations required for aircraft units, and as a result of service testing, design of the Eclipse Pump evolved the necessity for outboard bearing construction; i.e., straddle type bearing supports—and since the design required location of the bearing between the cored porting holes of the pump, its diameter had to be kept to a very minimum—otherwise the port end of the pump would have to be greatly enlarged, with resultant added weight.

This problem was solved by the use of the Torrington Needle Bearing, which was selected for this application because of its compactness, low cost, ease of lubrication and availability to small tolerances on both the internal and external diameters. Further, since lubrication of the Needle Bearing was no problem, no special means of lubrication had to be provided. Hence the design was simplified.

Significant is the fact, that although several hundred pumps incorporating Needle Bearings have been built by Eclipse Aviation, no reports of bearing failure have been experienced. Of particular note is the fact that an Eclipse pump on life test, equipped with Needle Bearings, has run continuously for more than 1500 hours at 1000 PSI and 3000 RPM without indication of service difficulty.

Why not let the Torrington Engineering Department show *you* how the advantages of the Needle Bearing can be incorporated in *your* product designs. For information, write for Catalog No. 10. For Needle Bearings to be used in heavier service, request Booklet 103X from our associate, Bantam Bearings Corporation, South Bend, Ind.

The Torrington Company
ESTABLISHED 1866
Torrington, Conn., U.S.A.

Makers of Needle and Ball Bearings

New York Boston Philadelphia Detroit
Cleveland Chicago London, England

TORRINGTON
NEEDLE BEARING

Defense Program Expected To Stimulate Freight Car Awards

■ ANTICIPATED emergency demands for utmost efficiency in transportation services to expedite the national defense program are expected to result in considerable freight car orders during the latter half this year. Surveys being completed in Washington will reveal, it is believed, need for much additional railroad equipment to handle the huge freight volume involved.

Pennsylvania Railroad directors last week authorized placing of orders for new equipment totaling $10,000,000. Greater part will be used for purchasing 2570 units of new steel freight equipment, according to M. W. Clement, president. This includes 2545 cars and 25 locomotive tenders.

Freight car specifications include designs for heavy jobs which the railroad is preparing to handle. Cars for shipments of unusual length and extraordinary weight, including steel and iron and various materials which go into munitions work as well as a wide variety of industrial and mill products are included.

Predict New Carloadings Record

Directors further authorized construction of two high-speed coal-burning steam passenger locomotives and eight ultra-modern passenger cars.

Norfolk & Western Railway also reported last week that it will proceed immediately with an improvement program totaling approximately $8,000,000. Program includes purchase of 25,000 tons of rails and fastenings, 1000 hopper cars and 550 box cars.

Jesse Jones, federal loan administrator, has given Illinois Central Railroad a commitment that Reconstruction Finance Corp. will loan the road $11,000,000 for rehabilitation and new equipment. Rolling stock to be purchased includes 3000 box cars, two or three diesel-electric trains and six diesel passenger locomotives.

Freight car awards last month approximated 5000, represented an appreciable upturn from the trend since last fall, when 2650 cars were placed during November and only 35 in December. Total for first five months this year was 8698. During last September and October, immediately after the war started, 42,634 cars were placed; total for 1939 was 57,775.

With less than 15,000 cars ordered so far this year, well below normal total, railroad steel sellers anticipate strongly increased buying in near future. Large volume of awards, they say, will probably be placed soon in order to interfere as little as possible with those defense program requirements which cannot be undertaken immediately.

Carloadings last fall reached 861,198, the highest weekly peak since 1930, exceeded 1937's weekly high, 847,245. Highly efficient operation enabled the railroads to handle that peak without important shortage. It is pointed out, however, that had the peak been prolonged railroads would have been hard pressed to meet requirements with equipment on hand. Usually more than two cars are required to service each carloading. Last fall 1.86 cars were used.

Proposed defense program's vast scope is expected by many to increase railroad traffic volume in coming months to or even beyond 1929's all-time weekly high, 1,203,139 cars. Class I railroads last year owned slightly more than 1,600,000 cars; private shippers, 281,000 cars. These totals compare with approximately 2,300,000 and 228,000, respectively, in 1929. Number of serviceable cars has not changed appreciably this year.

Revenue cars' average capacity has increased during the past decade, was 49.4 tons in 1938, against 46.3 tons in 1929. Total carrying capacity, however, is much smaller than in 1929. Furthermore, cars on line today are much older, on an average, than 11 years ago. This is indicated by statistics showing 965,000 cars were placed during the decade ending in 1929, compared to 290,000 in the ten-year period ended in 1939.

Heavier Rail Buying Anticipated

Increase in average age, however, is somewhat offset by longer life expectancy for cars built in recent years of stronger materials. This factor, combined with increased capacity per car, indicates purchases need not be quite as heavy as was necessary during the twenties to handle same freight volume. Nevertheless, car steel sellers are confident purchases must be substantialy enlarged to meet future emergency needs.

Equipment repairs have likewise been receiving increasing attention. Cars in bad order during May aggregated 9.9 per cent of the total, compared to 13.5 per cent in the corresponding 1939 period; average last year was 12.9 per cent, in 1938 it was 13.2 per cent. Average number of bad order cars in normal years is said to approximate 6 per cent, indicating room for further progress in this direction.

Rail buying during coming months is expected to be heavier than in late years. Chesapeake & Ohio and the Nickel Plate have ordered, recently, 46,000 tons for delivery late this year. Carnegie-Illinois Steel Corp., Chicago, received awards for 25,650 tons; Inland Steel Co., Chicago, 14,880 tons and Bethlehem Steel Co., Bethlehem, Pa., 5470 tons. Relatively little locomotive business is being actively figured, but there is said to be considerable volume in the paper stage.

Aircraft Exports Rise 215 Per Cent Above 1939

■ Aeronautical exports for first four months of 1940 totaled $88,209,488, an increase of 215 per cent over same period in 1939 and 312 per cent over same 1938 period, according to commerce department. Export total is 139 per cent greater than for last four months of 1939, 75 per cent of total 1939 exports and 29 per cent greater than total 1938 exports.

Breakdown of exports for first four months this year, by type, follows:

851 aircraft	$60,401,973
1297 engines	11,172,726
Accessories	7,721,166
Engine parts	4,022,043
Propellers, parts	3,055,458
Instruments	1,442,868
Parachutes	393,254
TOTAL	$88,209,488

Ten leading markets took 94 per cent of first four months' exports as follows:

France	$47,184,988
United Kingdom	10,517,887
Australia	8,001,153
Canada	5,129,569
Finland	3,140,597
Sweden	2,330,265
Turkey	1,831,524
China	1,683,033
Norway	1,441,771
Netherlands Indies	1,286,282
TOTAL	$82,547,069

British Foundrymen Cancel June Conference

■ Because of the war, the Institute of British Foundrymen canceled the conference which was to have been held at Cheltenham on June 7 and 8. Copies of the papers which were to have been presented are being circulated to all who had intended to participate and other members asking for them.

25 Companies Display Tools. Equipment at Cleveland Show

■ PRODUCTION executives and shopmen responsible for purchase and application of machinery, tools and other plant equipment were attracted to Cleveland in considerable numbers throughout the week of June 24 by the Production and Machine Tool Show. This exhibition, which filled the basement floor of the Public Auditorium, was sponsored by Grob Bros., Grafton, Wis., and under the management of Richard C. Bonner. About 25 companies participated as exhibitors.

Many machines were demonstrated under power and on typical production work. These included: Honing machines for precision bore finishing; continuous sawing and filing machines for tool room die shop and manufacturing operations; high speed cutoff machines of both band and circular types; attachments for performing accurate cylindrical, thread and surface grinding in standard machine tools such as lathes and planers; grinding and polishing machines of abrasive belt type, for wet and dry grinding; machines for sharpening and relieving taps; high speed punch presses, including demonstrations of pneumatic control devices; milling machines; single and multiple spindle drill presses; flexible shaft grinding and polishing units; pattern shop machinery; and high speed die grinders.

One of the largest machines in the show, and one which incidentally was exhibited on that occasion for the first time, was a percussion type press for compressing cast iron borings and chips into briquets for remelting. This automatic machine, which operates at a high rate of speed, is fed from a hopper, the chips being measured, pre-pressed and percussion briquetted in a multiple station revolving die block having an automatic ejector. The powerful percussive action of the punch which briquets the chips without use of any binder material is developed through compression of an air column.

In addition to machinery there was on display a wide variety of standard tooling equipment for use on production machine tools; quick change gear units for motorizing machine tools; precision gages; high tensile iron alloys for machinery casting; power-driven tractor and lift trucks; drafting room equipment; machine screws, etc.

A number of significant trends were emphasized by the equipment on display at this show. One was the extent to which molded plastics have now entered into the production picture. This was illustrated by the active promotion of a number of the tools on display, as of vital importance in connection with the making of plastic molding dies.

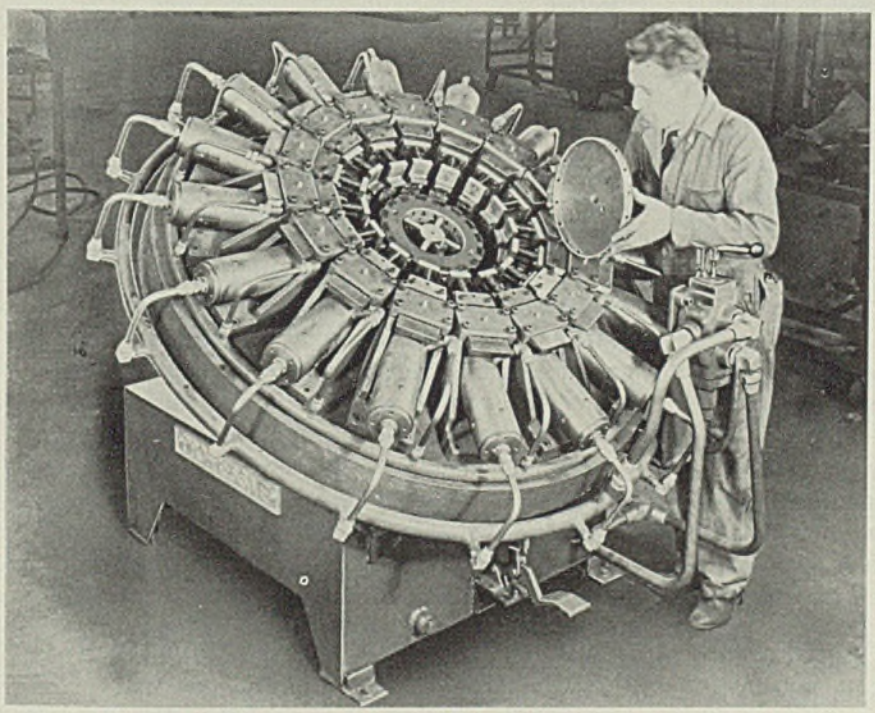
Pressed Steel in Frames

Another trend made obvious was the extent to which pressed and welded sheet steel is being used, not only for guards and covers, but also for main structural members of industrial machinery. This point was demonstrated convincingly by some of the continuous type sawing and filing machines, as well as by some of the abrasive belt grinders.

Through this method of construction, rigidity has been achieved in members formed up from sheet steel of comparatively light gage, which means of course that dead weight of the machines has been cut down considerably. These pressed and welded frames no longer have the angular qualities which some of the earlier ones had. By generously rounding the edges and corners and by co-ordinating the design of the parts with the assembly in mind, distinctly clean and pleasing lines have been attained in a thoroughly practical manner.

Still another important point which was brought out, is the improvement in efficiency of grinding wheels of small diameter by the high speeds now possible on the grinding wheel spindles of machine tool attachments and handheld tools. This has been made possible by improvements in bearings and by the development of high speed motors which operate in restricted space without undue heating. At the same time it should not be forgotten that practical use of these high speed grinding tools has been made possible by improvements in their grinding wheels. These modern abrasive wheels are remarkably free-cutting and at the same time long wearing, and they are amply strong to insure safe operation at high speed under heavy cutting pressure.

Punches 16 Holes Simultaneously in Steel Disk



■ Capable of punching 16 holes simultaneously in the rim of a 1/8-inch steel disk, this hydraulic punching machine made by Progressive Welder Co., Detroit, is representative of the high production machines in demand as the defense program gets under way. Set-up is speeded by individual punching units which can be moved easily for new positions and elimination of intermediate hand operations speeds production

■ J. D. Crawbuck & Co., Empire building, Pittsburgh, has purchased the motor equipment of the Central Tube Co. plant at Ambridge, Pa., which was recently acquired by Hetz Construction Co. from National Supply Co., which absorbed the Central Tube Co.

EDITORIAL

Let's Have Less "Fifth Column" Agitation

■ MANUFACTURERS will do well to do some serious thinking about the current "fifth-column" hysteria which, if further encouraged, is bound to bring about much friction that can only prove a deterrent to production.

For example, a newspaper in a large industrial city has been publishing the names of those who signed petitions of nomination for communistic candidates at the recent primaries. As a result one whole shift in a large industrial plant went on strike when the name of one of the workers in this shift was included. The men insisted that this man be fired—they declared they did not want to be associated with a communist. The man in question protested against this action, saying that he was a loyal American and that the petition had been misrepresented to him as one intended to help an unemployed man get a job.

In several cities during the past week the newspapers have carried short items advising readers to get in touch with the federal bureau of investigation's local headquarters whenever they obtained what they believed to be evidence of possible "fifth-column" activities among their neighbors. Fuel also has been added to the flames by proposed laws that would force aliens and foreign-born to be finger-printed.

Unjustified Suspicions Cause Discord That Needlessly Interrupts Production

All this sort of thing may seem unimportant to the "simon-pure" American—and we mean the citizen whose ancestors have been in this country at least one generation. But to the foreign-born citizen the matter is one of grave importance. These people, at this time, are sensitive on the score of their foreign birth. Their feelings clearly are understandable, particularly when it is borne in mind that having come from different countries they are therefore supposed to be affected emotionally in different ways by the developments in Europe.

The situation which has developed already is a nasty one. In many localities where citizens of foreign birth are in the majority neighbor suspects neighbor. Many families feel that they unjustifiedly are under suspicion as "fifth-columnists." Fights have broken out in various plants—seriously interfering with production.

If manufacturers are going to keep their production lines in efficient operation, they will exert all their influence against unwarranted activities of this kind. Such activities are contrary to the traditions of a free people. If encouraged and intensified, it is easy to see dangerous possibilities for internal strife. Those who, without just cause, point the finger of suspicion are as a matter of fact "fifth-columnists" themselves, in that they promote that very domestic discord which is the fifth-column objective.

Workers Should Be Protected Against Unwarranted "Fifth-Column" Suspicion

Certainly the country needs to protect itself against real "fifth-columnists." Therefore every manufacturer is justified in keeping a close watch on his organization so as to prevent or minimize the possibilities for sabotage. He should study his personnel and make it a point to know each employe. He should consult with the federal bureau of investigation when suspicious circumstances do manifest themselves. On the other hand he should discourage groundless prejudice and should exert every influence against stupid investigation methods which can have only a disrupting effect. An American does have the right to be regarded as a loyal American unless proved otherwise. Only by adhering to this fundamental tenet can we have the general cohesiveness and co-operation and true patriotism that is so essential in meeting our present national necessities.

The BUSINESS TREND

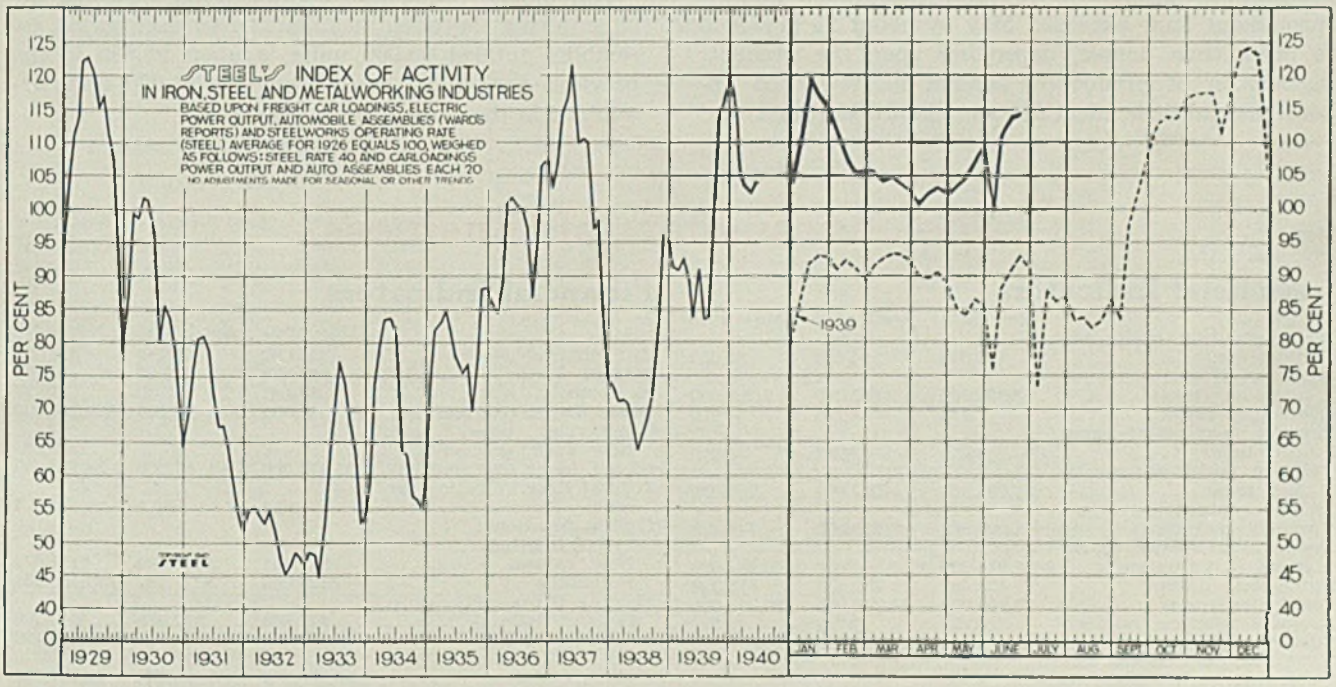
Business Upturn Gathers Increased Momentum

■ UPWARD trend in industrial output appears to be gathering increased momentum with some business indicators reaching new highs for this year.

The substantial gains in business activity since April have been dominated by the capital goods industries. This is reflected in the sharp improvement in steelmaking operations, heavy engineering construction, shipbuilding activity, expanding operations in the aircraft industry and near capacity operating schedules maintained in the production of machine tools. Consumers' goods lines have begun to offer some support to the upswing within the past week or so, reflecting steady improvement in employment.

The rearmament program now unfolding is expected to virtually guarantee a high level of activity in the heavy industries for many months. In view of this, purchasing agents continue the forward buying in machinery, steel and other lines closely connected with the program.

During the period ended June 22, STEEL's index of activity recorded the seventh consecutive weekly advance, excluding Memorial day week. Despite moderate declines in automobile production and electric power output in the latest period, the index advanced



STEEL'S index of activity advanced 0.2 *points to* 114.8 *on the week ended June* 22:

Week Ended	1940	1939
Apr. 13	102.7	89.7
Apr. 20	103.4	90.4
Apr. 27	102.8	89.2
May 4	103.3	85.1
May 11	104.8	84.2
May 18	106.8	86.6
May 25	109.1	85.4
June 1	99.2	75.9
June 8	111.9	88.2
June 15	114.6	90.9
June 22	114.8	93.0

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	54.6	69.1	87.6	104.1
Feb.	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2	111.2
March	104.1	92.6	71.2	114.4	88.7	83.1	78.9	44.5	54.2	80.4	98.6	114.0
April	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0	101.7	122.5
May	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6	101.2	122.9
June	.....	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1	95.8	120.3
July	.....	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	72.5	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

0.2 point to 114.8, the highest level since the week of Jan. 27. In the comparable period of 1939, 1938 and 1937 the index stood at 93, 66, and 112.8 respectively.

Steelmaking operations during the week of June 22 advanced to 88 per cent, the highest level this year. This represents a gain of two points over the preceding week and exceeded the previous high of 86.5 per cent recorded during the week of Jan. 6. In the comparable week last year the national steel rate stood at 54.5 per cent.

Since the latter part of April steelmaking operations have advanced 26½ points, or 43 per cent. This encouraging upturn has been accomplished without the iron and steel requirements which will eventually be needed in the armament program. Steel orders booked throughout June exceeded May by about 25 per cent to more than double, depending upon the product. Suspension of production against most French orders has had little effect on steel plant operations.

Where Business Stands

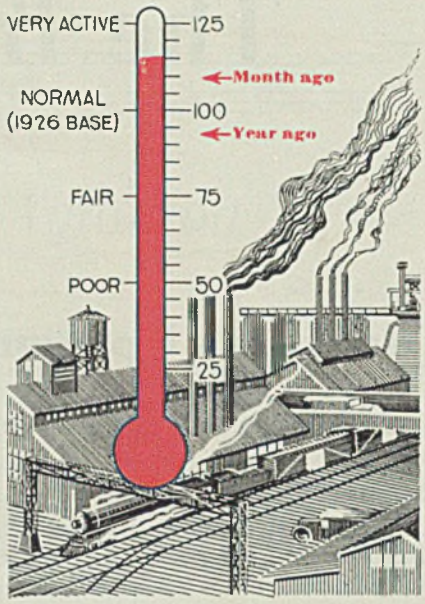
Monthly Averages 1939 = 100

	May, 1940	April, 1940	May, 1939
Steel Ingot Output	111.2	94.2	75.7
Pig Iron Output	116.4	108.2	64.1
Freight Movement	102.3	97.6	89.8
Automobile Production	133.5	145.5	100.7
Building Construction	111.2	101.6	104.3
Wholesale Prices	101.7	101.9	98.8

Industrial Weather

TREND:

Upward



Revenue freight carloadings again advanced to a new 1940 high during the week ended June 22. In that period freight traffic totaled 728,096 cars, a contraseasonal increase over the 708,000 for the previous period and remained well above the comparable 1939 week total of 642,987. Recent high level of freight traffic is reflected in the improved earnings of railroads during recent weeks.

Automobile production continued the seasonal decline during the week of June 22. In that period assemblies totaled 90,060 units, against 93,635 in the previous period, but were above the 81,070 units assembled in the same week a year ago.

The Barometer of Business

Industrial Indicators

	May, 1940	April, 1940	May, 1939
Pig iron output (daily average, tons)	112,613	104,635	62,052
Iron and steel scrap consumption (tons)	3,353,000	2,753,000	2,263,000
Gear Sales Index	133	128	93.0
Foundry equipment new order index†	192.9	243.4	146.0
Finished steel shipments (Net tons)	1,084,057	907,904	795,689
Ingot output (average weekly; net tons)	1,092,867	926,505	743,829
Dodge bldg. awards in 37 states ($ Valuation)	$328,914,000	$300,504,000	$308,487,000
Automobile output	412,492	452,433	313,248
Coal output, tons	$3,955,000	$3,746,000	$5,073,000
Business failures; number	1238	1291	1334
Business failures; liabilities	$13,068,000	$16,247,000	$15,897,000
Nat'l Ind. Conf. board (25 industries, factory):			
Av. wkly. hrs. per worker†	37.6	37.7	36.8
Av. weekly earnings†	$27.66	$26.27	$27.61
Cement production, bbls.†	10,043,000	7,917,000	9,674,000
Cotton consumption, bales	636,000	624,000	606,000
Car loadings (weekly av.)	670,351	639,296	587,935

†April, March and April, respectively.
*Preliminary.

Commodity Prices

	May, 1940	April, 1940	May, 1939
Steel's composite average of 25 iron and steel prices	$37.33	$36.69	$35.80
U. S. Bureau of Labor index	78.4	78.6	76.2
Wheat, cash (bushel)	$1.11	$1.28	$1.00
Corn, cash (bushel)	$0.80	$0.78	$0.66

Financial Indicators

	May, 1940	April, 1940	May, 1939
25 Industrial Stocks	$171.62	$195.13	$167.73
25 Rail stocks	$19.79	$23.22	$20.67
40 Bonds	$70.41	$73.60	$70.77
Bank clear'gs (000 omitted)	†$23,383,000	$23,615,000	$21,798,000
Commercial paper rate, New York, per cent)	½–⅝	½–⅝	½–⅝
*Com'l. loans (000 omitted)	$8,475,000	$8,661,000	$8,126,000
Federal Reserve ratio (per cent)	88.4	88.0	85.4
Capital flotations: (000 omitted)			
New capital	$62,111	$117,609	$116,874
Refunding	$128,068	$227,287	$1,196,131
Federal Gross debt (millions of dollars)	$42,808	$42,658	$40,286
Railroad earnings	$33,822,211	$36,734,348	$15,323,766
Stock sales, New York stock exchange	38,968,832	26,696,490	12,932,710
Bond sales, par value	$176,484,975	$165,386,700	$123,260,850

†April, March and April respectively.
*Leading member banks Federal Reserve System.

Foreign Trade

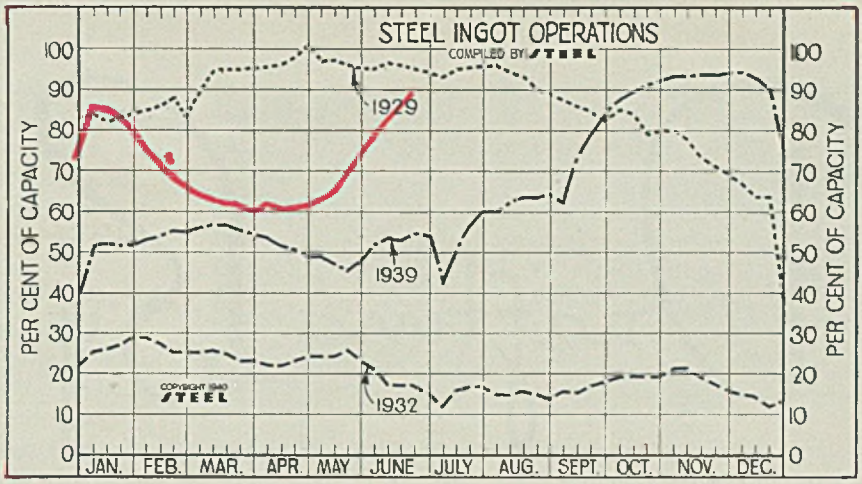
	May, 1940	April, 1940	May, 1939
Exports	*$316,874,000	$316,520,000	$246,119,000
Imports†	$212,240,000	$216,732,000	$186,296,000
Gold exports†	$33,000	$18,000	$231,000
Gold imports†	$249,885,000	$459,845,000	$606,027,000

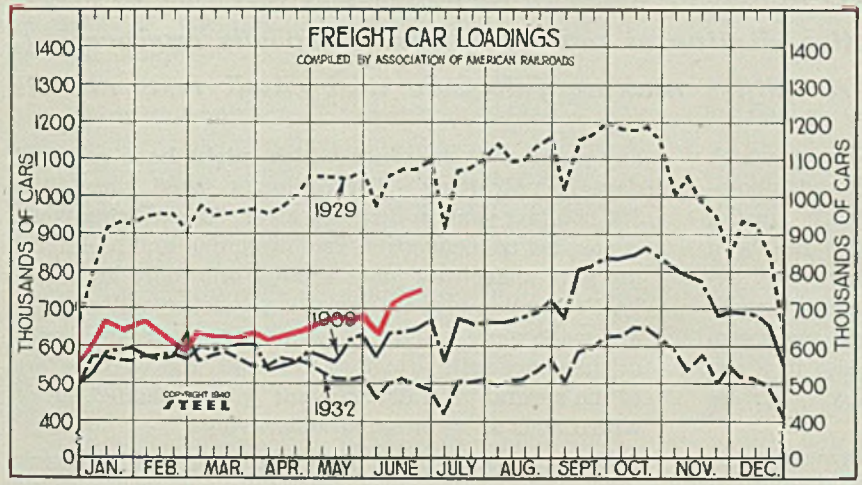
*Preliminary. †April, March and April, respectively.

Steel Ingot Operations

(Per Cent)

Week ended	1940	1939	1938	1937
Mar. 23....	62.5	55.5	35.0	90.0
Mar. 30....	61.0	54.5	36.0	91.5
Apr. 6....	61.5	53.5	32.0	91.5
Apr. 13....	61.0	51.5	32.0	91.5
Apr. 20....	61.5	50.5	32.5	91.5
Apr. 27....	61.5	49.0	32.0	91.0
May 4....	63.5	49.0	31.0	91.0
May 11....	66.5	47.0	30.0	89.0
May 18....	70.0	45.5	30.0	91.5
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





Freight Car Loadings

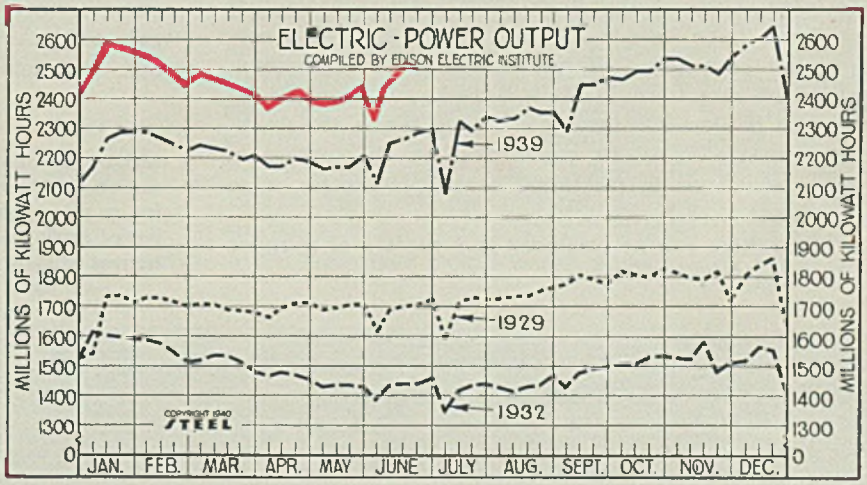
(1000 Cars)

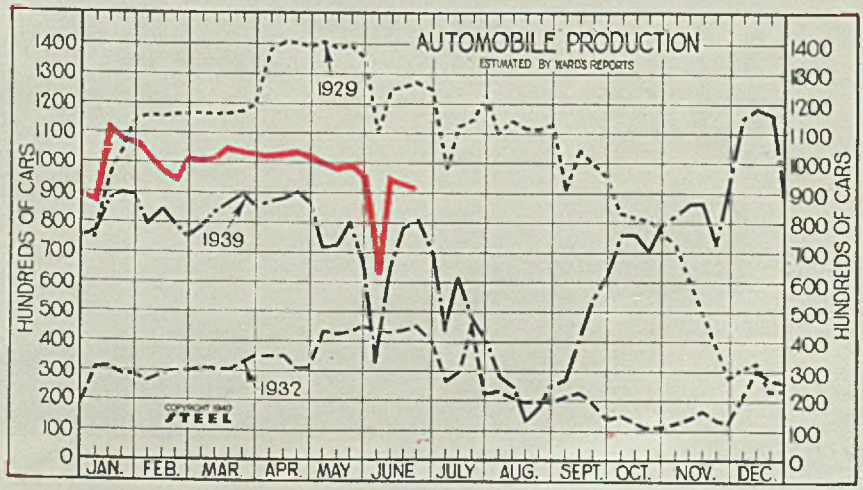
Week ended	1940	1939	1938	1937
Mar. 23.....	620	605	573	761
Mar. 30.....	628	604	523	727
Apr. 6.....	603	535	522	716
Apr. 13.....	619	548	538	751
Apr. 20.....	628	559	524	761
Apr. 27.....	645	586	543	782
May 4.....	666	573	536	767
May 11.....	681	555	542	774
May 18.....	679	616	546	779
May 25.....	687	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

Electric Power Output

(Million KWH)

Week ended	1940	1939	1938	1937
Mar. 23...	2,424	2,199	1,975	2,200
Mar. 30...	2,422	2,210	1,979	2,147
Apr. 6....	2,381	2,173	1,990	2,176
Apr. 13...	2,418	2,171	1,958	2,173
Apr. 20...	2,422	2,199	1,951	2,188
Apr. 27...	2,398	2,183	1,939	2,194
May 4....	2,386	2,164	1,939	2,176
May 11...	2,388	2,171	1,968	2,195
May 18...	2,422	2,170	1,968	2,199
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





Auto Production

(1000 Units)

Week ended	1940	1939	1938	1937
Mar. 23....	103.4	89.4	56.8	101.0
Mar. 30....	103.4	86.0	57.5	97.0
Apr. 6....	101.7	87.0	70.0	99.2
Apr. 13....	101.9	88.0	62.0	125.5
Apr. 20....	103.7	90.3	60.6	133.2
Apr. 27....	101.4	86.6	50.7	139.5
May 4....	99.3	71.4	53.4	140.2
May 11....	98.4	72.4	47.4	140.4
May 18....	99.0	80.1	46.8	131.3
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

Drafting By Camera

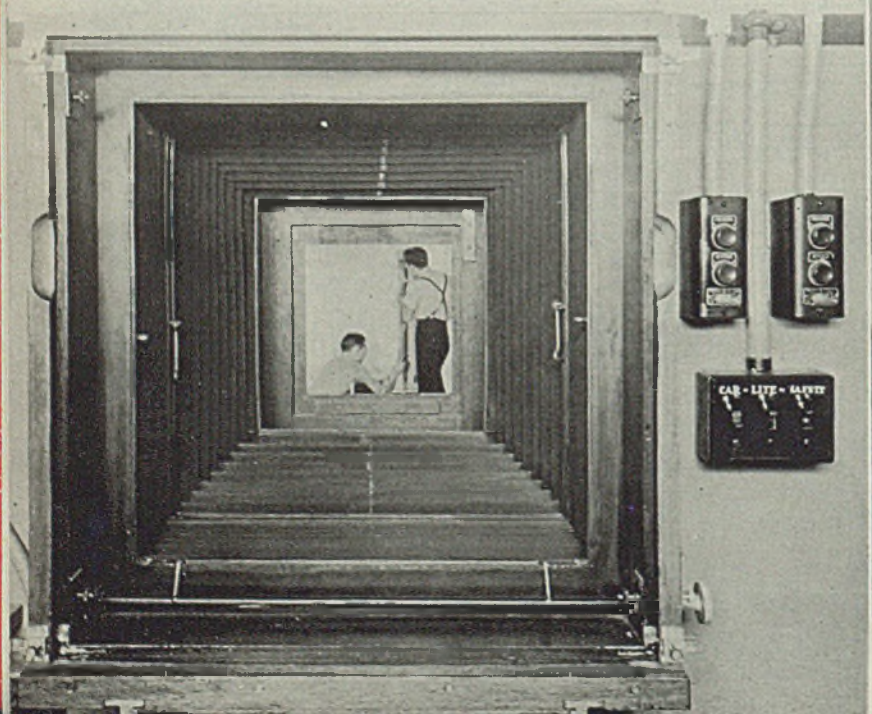
New photo technique saved one company $80,000 last year in drafting alone. Also eliminates redrafting errors; speeds engineering, production; simplifies making full-scale and small test models

■ RECENT development of a new process by which engineering drawings are directly reproduced, photographically, on nearly any kind of surface (metal, wood, cloth, and paper, to mention a few) has been announced by the Glenn L. Martin Co., Baltimore. Developed by Martin laboratories, this process is largely responsible for the factory's highly efficient mass production methods in building airplanes. Also it is expected to have wide application in many other industries.

A huge camera snaps pictures of large drawings, the negatives are developed and the images projected back to large sheets of aluminum alloy metal whose actual surfaces have been sensitized with a special photographic emulsion. When such a sheet (maximum standard size used is 10 x 5 feet, but it could be larger) is placed in large developing tanks, the drawing appears in all its preciseness on the surface in exact scale—or in fractional or multple scales, if so desired.

Thus there can be produced in a matter of minutes any number of drawings which might have required days in redrafting. The company saved more than $80,000 last year in drafting alone. Engineering work is speeded tremendously. Tool designing and tool making gets under way more rapidly and more accurately. Production preparation starts quicker and changes are made more rapidly. And because there are plenty of the exact-scale drawings available, the whole effort of the several vital departments is co-ordinated, all of which adds up to incomputable savings.

But that is not all. The versatile process has many other uses in the plant. Where an experimental airplane is to be built, the master drawings, absolutely accurate in every detail, can be photographed directly onto the metal of which the ship is to be constructed



CYCLOPS! Looking through the huge camera, one sees the original drawing mounted beyond and being checked for scale. Photographed, the negative produced is projected back in exact size to any surface desired, specially treated with a photographic emulsion. The material itself then becomes the photographic print

and the parts cut directly from the material itself. If a wind-tunnel or water basin model of a projected airplane is desired, it is only necessary to call on the camera to scale down the lines instantly from full size to an eighth or tenth or any other fraction of the full size. An easy calibration of the camera turns the trick, saving perhaps weeks of redrawing to scale.

Moreover, the huge camera is called upon for many other duties. Besides projecting drawings also onto tracing paper and vellum and wood, it photographs typewritten pages with pictures in ink, pencil or halftone photographs. Put on metal plates and specially treated, they become lithographic plates for rapid reproduction by the multilith method. It can also take ordinary photographs, "blowing them up" on paper or canvas or wood paneling to sizes as large as 10 x 5-foot photomurals.

But the greatest saving to the Glenn L. Martin Co. has been as an engineering adjunct. The Baltimore airplane factory has more than 900 engineers on its payroll of upward of 12,000 people and is searching for hundreds more, so its "mechanical draftsman" has been a godsend. Without it, drafting work would be multiplied many times.

Which brings to light the interesting "lofting" system used by this company. Borrowing this idea from the shipbuilding and automobile industries, the company has made unique application of it to airplane building.

Down in the basement of the engineering building is a long chalk-white floor, slightly raised above the building floor. Here airplanes and airplane sections are drawn out in full scale by engineers who walk and crawl over the floor on their hands and knees,—wearing flannel window-dressers' slippers over their shoes.

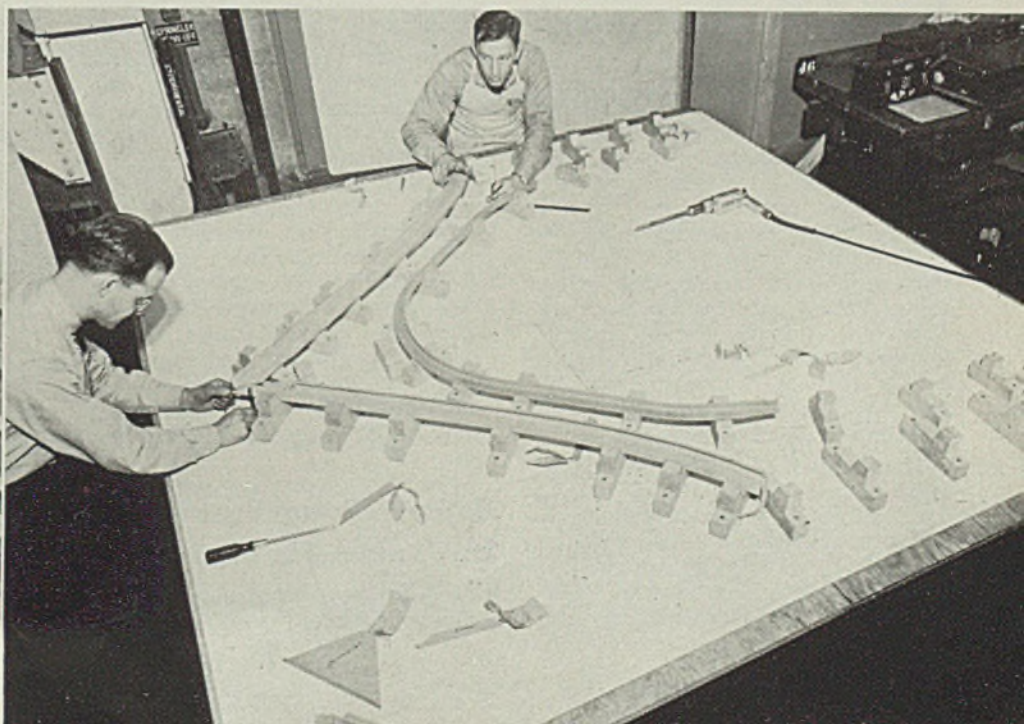
THE LOFT. Borrowed from the shipbuilding industry is this idea—a raised floor on which whole airplanes may be laid out in full size. Then come stress analyst engineers to fill in details. Drawings then are transferred to the metal sheets, production started immediately

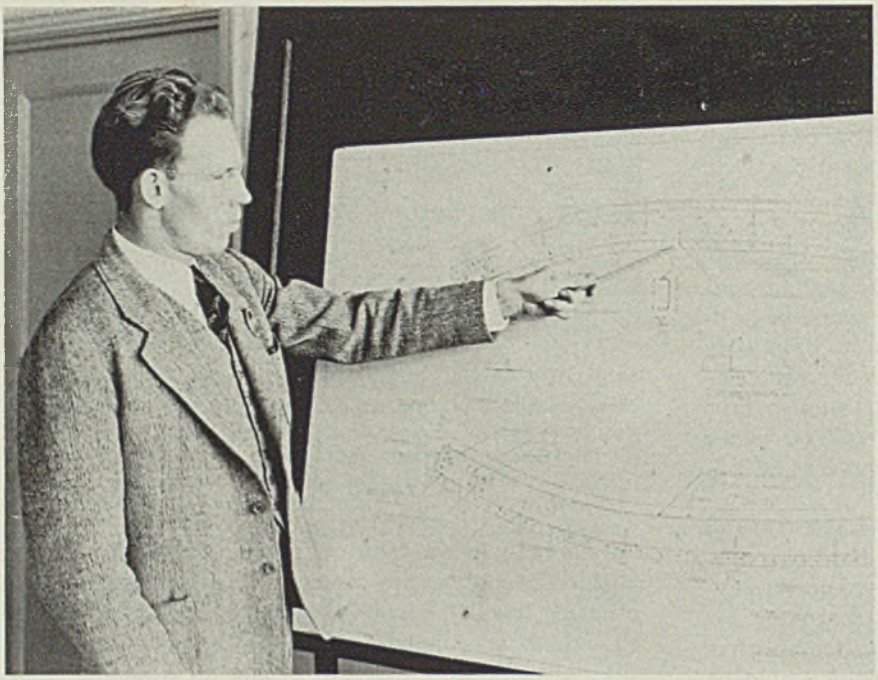
Here are born the sweeping contours and wind-cheating lines of new winged ships. To this floor, big enough to accommodate the full-size outline of even the "airplane of tomorrow," come all kinds of engineers to study the new design. Stress analysts look to each assembly to decide what trusses and stringers and braces will be necessary to carry the load. Tool designers plan out their tools and dies for each part, large or small. Production planners envision the shop and assembly line operation and how the parts may be made to flow from the machines to minor assembly departments and onto the assembly line. Details are sketched into the full-scale drawings.

Here is where the new photographic reproduction process steps into its busiest job. Between the sweeping contours drawn on the loft floor, the details of the many sections of the airplane are drawn in on the loft layouts, which are large sheets of aluminum alloy coated white on one side. No ink, only pencils, are used for this work. Few dimensional figures are necessary because the sections are in full scale. When a loft layout is finished as a drawing, it goes along a hall to

TOOL DESIGN. An immense saving in time is effected in designing tools and dies as metal templets can be made quickly, accurately and at low cost by photoprinting

SHOP. No longer do craftsmen work from scale drawings in building fixtures, jigs, etc. In many cases, these are built directly on the full-scale drawings themselves, the workmen simply following the lines of the photoprint





PRODUCTION. Reproduced drawing of an airplane section turned out in only a few minutes by the new method. Formerly this would have taken whole days and many men. Reproductions may be as large as 5 x 10 feet

the big camera and as many copies as necessary are struck on white-coated metal sheets that become duplicates while the original goes into a file for permanent record.

And where do the duplicates go? Well, tool design gets at least one; sometimes more. Little holes are drilled along each part for which a tool or die must be made. Under the layout is a piece of sheet iron and when the photodrawing is lifted, the contours are marked clearly by the drill. The part forms, or templets, then are cut out of the sheet metal and sent to the shop for manufacturing. Then the production department may get one or several of the loft layouts to keep constant check on the arrangement of fixtures and the assembly of the parts. Others may go to the different classes of engineers who must plan their work.

Errors Eliminated

The many errors of the old style of redrafting each loft layout several times is eliminated by the new process. Once an original drawing is checked carefully, no further error can be made because each reproduction is exact. But changes may be made, if needed, directly on the reproduction. This has been an important feature for no matter how careful a draftsman may be, he cannot duplicate a drawing exactly, his lines deviating in minor degrees from the original.

The system is of inestimable value also in the making of "mock-ups." Since a full-scale model of every new airplane type must be built first of wood to give engineers, tool designers and production planners their final information, the ability of the "mechanical draftsman" to photograph drawings directly onto the surface of both painted and unpainted wood saves time and effort. Skilled craftsmen in the big woodworking shop can work directly on many of the mock-up parts without constant reference to drawings.

Still another interesting function of the new process is in the making of "shrink layouts." Because zinc and other metals molded into dies shrink considerably by cooling, it has always been necessary either to make new drawings to allow for this shrinkage or to use a shrink-scale. Because the shrinkage is a known factor, however, it is easy to calibrate the camera lens to do in a moment what might consume many hours of time by older methods.

Through the big factory are distributed data books and clerical forms from the camera's lithographic plates. On the walls hang big pictures and colored canvas photographs of airplanes and views—incidental work of the process.

Martin engineers are convinced the system will have broad applications in many other industries where mass-production methods prevail.

Boilermaking Practice In Concise Handbook

■ *Handbook on Boilermaking,* by Kenneth Morrison; cloth, 106 pages, 5 x 7½ inches; published by Chemical Publishing Co. Inc., New York; supplied by STEEL, Cleveland, for $1.50.

This handbook contains a description of fundamental principles of boilermaking. Many of the formulas are original, arrived at by a study of a number of correct examples. Illustrations are many and clearly drawn. The effort has been made to have them as simple as possible, omitting all details beyond the bare outline necessary.

The facts have been put into readable form, with reasons and explanations attached.

Anneals 1500 Pounds Of Coiled Wire Hourly

■ The Ajax-Hultgren heating principle, whereby heat is generated directly in the liquid salt bath by immersed electrodes without use of heating elements is now embodied in the illustrated 150-kilowatt furnace for annealing wire in coils, according to Ajax Electric Co., Frankford avenue and Allen street, Philadelphia.

The furnace is equipped with a pot 4 feet long, 3½ feet wide and 5½ feet deep, the electrodes being arranged along the back wall of the pot. The electromotive forces created between the electrodes produce an automatic circulation of the bath. This keeps the temperature uniform throughout the contents of the pot to within 5 degrees Fahr.

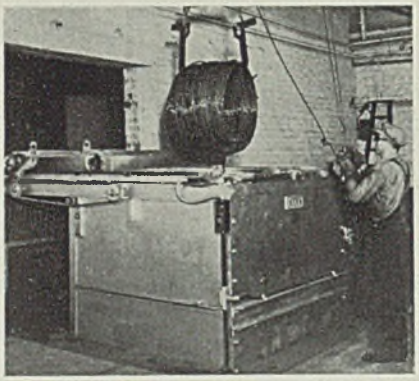
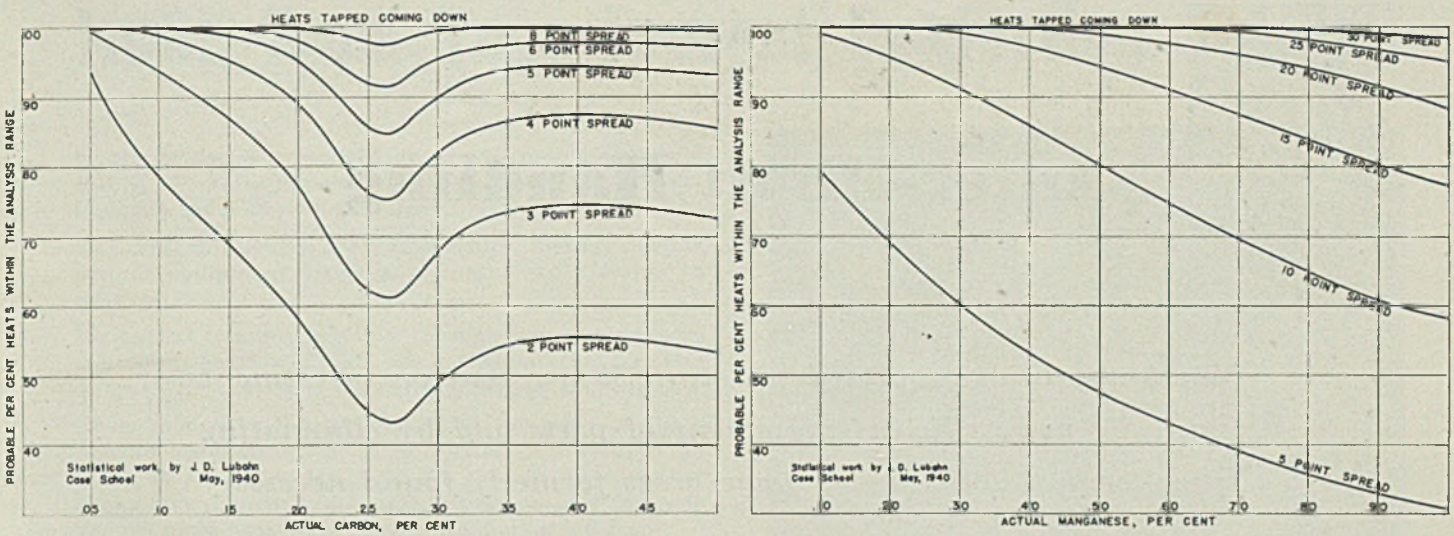


Illustration shows a charge of coiled wire being placed into an Ajax furnace for annealing

The unit is capable of annealing high carbon SAE 52100 steel wire at an hourly production of 1500 pounds. A charge of 750 pounds is placed in the bath at a temperature of 1275 degrees Fahr., and is brought to temperature within 15 minutes. It is then allowed to remain in the bath a few minutes longer and then removed. Working temperature range of the furnace is 1150 to 1500 degrees Fahr.



Left above, this shows graphically how liberal carbon spreads enable mills to produce a larger percentage of acceptable heats of open-hearth steel. Right above, liberal manganese spreads permit mills to produce a larger percentage of acceptable heats of open-hearth steel as shown here

Wide Spreads Should Be Allowed For Open-Hearth Steels

■ TO PROMOTE efficiency in the production of steel to meet consumer requirements, the producer must have the widest possible latitude under the specifications. The probable percentage of the number of heats that will be acceptable varies directly with the width of the permissible analysis ranges of key elements.

The accompanying charts—set up from experience—show the percentage of acceptable heats of open-hearth steel that can be expected under certain carbon and manganese spreads. These curves are to appear in an appendix to the paper on "Control of Steel Composition and the Problem It Presents," delivered by Earle C. Smith before the recent meeting of the American Iron and Steel institute and published in STEEL of June 3, p. 44.

When 0.20 carbon steel is specified—the carbon chart shows—nearly 100 per cent of the heats will prove acceptable provided a spread of 8 points is allowed. On the other hand, only about 60 out of every 100 heats can be expected to prove acceptable if the spread is restricted to 2 points. In the case of 0.40 carbon steel about 55 per cent of the heats will be satisfactory if a 2-point spread is allowed whereas more than 90 per cent of the heats will be right if the allowable spread is 8 points.

The manganese chart shows that the highest per cent of satisfactory heats is obtained when the allowable manganese spread is 20 points or more. When 0.50 manganese is specified, for example, less than 50 per cent of the heats can be expected to meet requirements in the case of a spread of 5 points, whereas if a 20-point spread is allowed more than 90 per cent of the heats can be expected to fall within the permissible range.

The charts tell at a glance the carbon and manganese ranges that permit the mills to execute orders with the utmost efficiency and despatch.

♦

A.S.T.E. Now Member of Standards Association

■ American Society of Tool Engineers has assumed membership in the American Standards association and has appointed E. W. Ernest, chairman of its national standards committee, as its representative on the A.S.A council. Mr. Ernest is superintendent, section "A", General Electric Co., Schenectady, N. Y. Though official connection with the A.S.A. has just been effected, the Tool Engineers' society has had members serving on various committees.

For some years, the A.S.T.E. has issued its membership standards sheets covering various forms of tools and equipment, but in the future it is planned to correlate these with other types of standards through co-operation with the A.S.A.

Announces New Steel Mirror for Washrooms

■ A new bright steel sheet mirror, called Kromirror, suitable for industrial washrooms is announced by Sheet Metal Specialty Co., subsidiary of Follansbee Steel Corp., Third and Liberty avenues, Pittsburgh. Its nickel-chromium surface provides good reflection and is not impaired by severe or unusual atmospheric conditions.

The reflecting sheet is backed up by another steel sheet for extra support.

The mirrors are available in standard sizes of 14 x 18, 18 x 48 and 17 x 54½ inches along with necessary equipment for locking them securely to the wall.

Inter-Plant Handling

New 5-way bridge expected to return 33 per cent on investment yearly by more efficient movement of parts and by eliminating truck-loading docks and storage areas formerly found necessary

By C. L. VAN DERAU
Works Manager
Westinghouse Electric & Mfg. Co.
Mansfield, O.

■ RECENT completion of the new 1000-foot industrial bridge at the Mansfield, Ohio, plant of Westinghouse Electric & Mfg. Co. makes possible a smooth and easily handled flow of materials back and forth between the assembly plant and the vitreous enamel plant more than two blocks away. Because of savings in factory costs, the new bridge will return the investment within three years.

In the past, a fleet of trucks and trailers was maintained on a 24-hour-a-day basis to haul range and refrigerator bodies and parts and other appliances between the buildings. Because the trucks had to travel a rough street and cross railroad tracks, it was necessary to place all ware in cartons to avoid chipping of enamel or other damage.

The bridge thus saves a great deal of expensive handling. It is a simple operation now to load range bodies or other metal stampings onto one of the three conveyors in the bridge, send them over to the vitreous plant and bring them back the same way.

With the bridge, the ware returning from the enameling plant feeds directly into the starting point of the range assembly line. Thus, there is a continuous flow from the enameling ovens to the assembly line, to the crating section and thence to the warehouse. This facilitates the entire set of manufacturing operations, makes parts available as wanted, avoids storage to feed assembly lines.

One material saving accomplished by the bridge, in addition to the new ease of handling, is that the truck and trailer fleet is no longer necessary. This fleet made a continuous cycle back and forth between the buildings, averaging three loads per hour, utilizing considerable manpower and requiring loading docks at both ends.

At the assembly building alone, unloading space available for outside trucks and trailers has been increased by 25 per cent because the dock space no longer is needed for the interplant trucks.

Another material saving accomplished by the bridge is in storage space. The three long conveyor lines operate, in effect, as an actual storehouse. In the past, considerable space was devoted to storage of range bodies and other parts after the stamping operation, preparatory to being taken to the enameling plant, and another large space was needed for storage of the enameled

Fig. 1—Recently completed 1000-foot overhead bridge extends over more than two city blocks, crosses streets and railroad tracks to connect main assembly plant to vitreous enameling plant

MORE From Your Present Production Set-Up!

It *can* be done—*is* being done in well over a thousand plants. Men are discovering this new way to get *more* from present production set-ups.

By simply checking on tool performance, they are making present equipment yield *extra* output—at a saving in unit costs.

Hours that formerly were lost through frequent machine shutdowns because of tools, are now accounting for extra output with the aid of Carpenter Matched Tool Steels.

These modern tool steels reduce the number of times machines and presses must be shut down to redress, re-grind, or replace tools. Send for the new booklet that shows how improved tool and die performance can help you get *more* from your present production set-up.

THE CARPENTER STEEL CO.
Reading, Pa.

RESULTS WITH MATCHED TOOL STEELS

PLANT A—
14.5 more productive hours per press per month on finish drawing 18-8 Stainless Steel watch cases.

PLANT B—
42 more productive hours per month per press on drawing a bearing retainer.

PLANT C—
53.6 more productive hours per month on punching and coining job.

(For details—
send for booklet)

Carpenter MATCHED TOOL STEELS

FREE—TO HELP YOU GET IMPROVED TOOL PERFORMANCE

THE CARPENTER STEEL COMPANY
139 W. Bern St., Reading, Pa.

Without obligation, send me your new illustrated booklet that shows how to increase output per machine and reduce unit costs.

Name_____ Title_____
Firm_____
(Firm name must be given)
Address_____
City_____ State_____

Fig. 2—Interior view showing reversible belt conveyor line at left, 6-foot aisle for trucks and continuous 2-way overhead chain conveyors at right

parts after they were returned from the vitreous furnaces.

This double storage operation no longer is necessary, because a steady flow of bodies and parts from the metal stamping department to the enameling plant can be maintained *via* the bridge. In the same way, the enameled parts can be carried back by conveyor in the amount needed to supply the assembly line.

One principal reason why this is possible is that one of the three conveyors, a 4-foot roller type with a live roller turn, is reversible in direction, while the two overhead conveyors which form an endless chain on caterpillar drive, are variable in speed from zero to 30 feet a minute. The chain conveyors have suspended carrying baskets at 6-foot intervals.

Space for Power Trucks

Roller conveyor is along one side of bridge, the two overhead conveyors along the other side with ample space in center for power trucks to pass—making available a total of five paths for flow of material across the bridge. See Fig. 2.

This flexibility of conveyor operations means that the flow of materials can be keyed perfectly with the needs of the enameling plant and the requirements of the production line.

The bridge, completed recently after five months work at a cost of approximately $150,000 is believed to be the largest of its type in use. In one point it is 30 feet above the ground and at another 22½. Twenty feet wide and 13 feet high, it is completely enclosed and protected from the weather. Approximately 376 tons of steel were used in the construction, and the bridge flooring is made up of 16,500 square feet of steel decking. There are 2330 feet of belting and the roller conveyor and the continuous windows on both sides of the bridge have more than 3000 individual panes.

Value of the bridge, already dem-

(*Please turn to Page* 76)

Brookings Issues Study Of Capital Problems

■ *Capital Expansion, Employment and Economic Stability*, cloth, 413 pages, 6 x 9 inches; published by the Brookings Institution, Washington; supplied by STEEL, Cleveland, for $3.50.

An analysis of the causes of the great depression of the past ten years, this volume represents an effort to reach the true reason for the belated recovery from the depths of business recession.

It is divided into two main sections, investment trends and capital requirements, and government policies and private capital expansion. The study is of limited objective in that it does not undertake to analyze all the varied factors, private as well as public, which affect the economic situation. It is concentrated on the factors which directly affect the flow of funds into investment enterprise. It does not cover agriculture or labor problems or price and wage policies in relation to economic progress.

An attempt is made to give answer to various vital current questions, such as: Are there significant needs and opportunities for further private capital expansion in the United States and, if so, in what type of economic enterprise; are American corporations now in a position to finance the great bulk of potential capital requirements from internal sources without resort to the investment market; what are the possibilities for future employment in connection with the expansion of capital enterprise and the raising of standards of living?

Offers Resurfacer in Improved Form

■ An improved and stronger Ruggedwear floor resurfacer is now being offered by Flexrock Co., Twenty-third and Manning streets, Philadelphia. It has been strengthened by the addition of Chrysotile, a fibrous rock wherein the fibers are resistant to all ordinary acids, are twice the strength of regular fibers and are waterproof. This improvement in the product not only provides a tougher floor, but also makes much stronger feather-edges in patching service.

Training Suggestions Outlined in Bulletin

■ In view of the present governmental emergency program and the urgent need for skilled machinists, South Bend Lathe Works, South Bend, Ind., recently issued a bulletin entitled "Planning the Industrial Apprentice Training Shop." The publication contains a number of practical shop layouts planned for efficient vocational training.

Methods of organizing shop work, suggestions for selection of equipment and lists of tools and accessories for various sizes of industrial apprentice machine shops are included. In addition to this material, the South Bend Lathe Works is offering the services of its engineering department, without obligation, to anyone interested in working out a shop floor plan.

New Electroplated Finish Plates Rapidly

■ A new black, electroplated finish called Moly-Black is announced by Electroplating division, E. I. du Pont de Nemours & Co., Wilmington, Del. It is used for finishing automotive and building hardware, art objects, electrical accessories and fixtures, tools and other objects. The finish is resistant to atmospheric corrosion and holds its color both indoors and outdoors.

The plating process gives deposits of 0.001-inch in 10 minutes, and operates in the usual nickel-plating equipment. The plating solution is readily made up and maintained from prepared salts. It is not sensitive to slight changes in operating conditions.

THOUGHTS ON POPULAR COATS NO. 2 *By Hanlon-Gregory Galvanizing Co.*

While Nature has gone to the bother of giving each of us a body, practically hairless and very tender, we have been obliged to protect it ourselves. Whimsical anatomists have said that, whereas the skeleton prevents us from falling in on ourselves, our coating of skin prevents us from falling out. This skin coating is very remarkable in that it builds up its own protection against the sun. To us ordinary, everyday people the scientific explanation of actinic rays, pigmentation and absorption is just a lot of impressive talk; we prefer to say that a coat of tan prevents sunburn, and let it go at that. Some persons tan right away; others acquire a coat after frequent exposure; some folks don't tan at all. All we know is this: if you're going to run around unclothed in the sun, you have to get a coat of tan or get burned. Ferrous metals, for all their durability, have sensitive skins, too. To endure, they must be coated, and of all protective coating, none equals a galvanized coat. HANLON - GREGORY GALVANIZING CO., by HOT-DIPPED PROCESS sets aside the forces of corrosion and rust. HOT-DIPPED galvanized products take a longer lease on life. We'd be happy to show you how you can extend this lease on YOUR products.

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PROTECTED BY GENUINE HOT-DIP GALVANIZING
AMERICAN HOT DIP GALVANIZERS ASSOCIATION, INC.

HANLON-GREGORY GALVANIZING CO.

PITTSBURGH, PENNA.

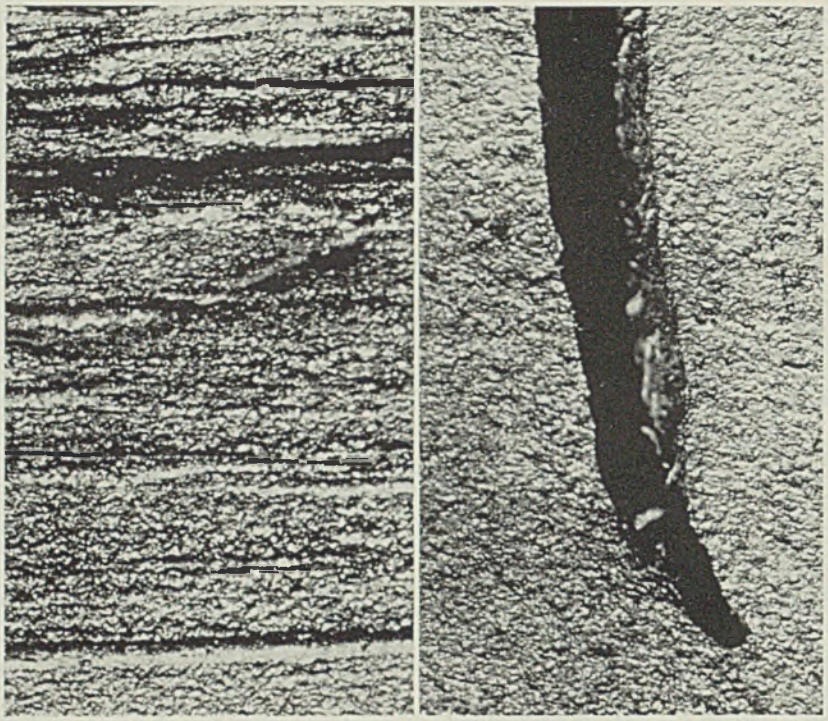

Fig. 32. (Left)—Hot band rolled from steel that had been subjected to too oxidizing atmosphere. X15. Fig. 33 (Right)—Broken edge traceable to mechanical causes. X15

Heating of Steel

Scale on surface of ingot should be light to facilitate removal in early roll passes. Physical and micro-characteristics of hot-rolled strip steel are controlled by the finishing temperature

PART III

By PAUL J. McKIMM
Cleveland

■ SCABS are caused by improper heating. It is not meant to lessen the responsibility of the open-hearth operators in this respect because all scabs found in inspection of final product are attributed to open-hearth causes. Nevertheless it is true that scabs can be the product of heating causes. Every steel man is familiar with the general appearance of slabs or bloom sections resulting from "burned' ingots. Usually and generally they are crumbled especially in the corner areas and if the condition is severe, part or all of the surface areas are affected and many types of defects will result which are easily identified. In some cases, however, the crumbled areas take sort of a circular or elliptical form and having depth and being rolled into the body of the metal and often having an oxide layer they will appear as scabs in the finished material. The most fruitful source of this scab-forming condition is steel that is overheated to a lesser degree, perhaps not visibly evident in the slab except where overfilling of the edging pass existed. In this event the excess metal forming the extruded area will crumble and roll-in and will be at a varying distance in from the corner depending on the method of breaking down. This will result in the formation of a crumbled metal band, and ultimately in scabs in final product. Most certainly the usual cause of scabs are due to open-hearth practice such as bad pour, heats having ladle skulls, splash, poured off center hitting one mold wall, or heats having heavy bottom erosion during refining, etc.

Another cause of defectiveness is that of melting the top of the ingot so that molten metal flows down the sides of the ingot over a previously scaled surface. This refers to melted metal and not oxygenized. This is graphically shown in Fig. 35, where areas "A" represent the molten metal flow over the scaled ingot surface. Fig. 36 suggests the appearance of this condition in the slab which naturally may be of varying formation from a few streaks to that covering a considerable area of its face. This excess metal rolled into the slab will always have a lighter sort of a silvery colored scale and on the face will be similar to a seam, as indicated by "A". Beneath this metal exists a film of scale, hence no bond with the body of the slab. This must be eliminated or the product will be rejected in the finish. Often this metal breaks loose at the shear edge and curls up.

Scale

As there exists considerable data on scale in literature[7], no further technical information will be offered. It is imperative, however, that steel be heated so that it is covered with a layer of scale and that is easily eliminated in the first several passes. This is accomplished by having the

[7] "The Relationship Between the Microstructure and the Adherence of Scale Deposit," R. Griffiths, page 165, Carnegie Scholarship Memoirs, British Iron and Steel Institute, Vol. 26, 1937.

heating atmosphere sufficiently oxidizing toward the end of the heating cycle. Secondary scaling is to a great extent dependent on the furnace atmosphere because if oxygenization has taken place it will affect secondary scale formation during all further hot working.

Some steelmakers believe that ingots ought to be washed free of scale. This practice is not recommended. The ingots generally are washed by excess air and at rolling temperatures the steel is readily cut or burned. If an ingot is partially washed (not cut), the washed area will develop an air scale that will clean readily as will that portion properly scaled, but an intermediate area between the two will not clean. If the scale is not free cleaning it will roll-in the metal and if not eliminated by the necessary medium whether pickling, blasting, chipping or other means of conditioning, it will carry through and result in rejection of the finished product. The medium necessary for cleaning rolled-in scale depends on its chemical and physical composition which varies widely. Some operators maintain that any rolled-in scale on material subjected to reheating will be eliminated by the following scale formation but this is not always the case.

On the other hand the formation of too heavy scale does not benefit the quality of the steel but results in an excessive loss of metal through oxidation.

Heavy Drafts Preferable

Some producers assume that light drafts in rolling are preferable but in reality such are harmful. If an ingot is suitably heated the heavier drafts are preferable in which event there will be practically no drop in temperature for about 80 per cent of the reduction varies with the type and speed of processing. In rolling slabs on the standard type of blooming mill it is practical to maintain a temperature at the shears or entering reheating furnace of 1900 degrees Fahr., starting with a soaked ingot at temperatures of 2200 to 2250 degrees Fahr. If drafts are too light the surfaces chill off due to increase in the rolling time, greater exposure to roll cooling water and longer contact with the cool roll surface. This creates a hard shell which will not elongate with the mass section when stressed and results in defective surfaces. An experience of this type was witnessed in rolling a number of ingots with drafts of 1, 1½, 2, 2½ and 3 inches, respectively, where the greatest reduction yielded far superior results than that having the 1-inch reduction.

In order to avoid complexity the discussion has been confined to carbon steels of the lower carbon order, that is, below the forging grades but nevertheless the fundamentals hold true for heating all grades of steel. With the steels classified in the more special groups greater care is essential and it is usually found that such procedure is followed and naturally better results are attained. Some of these grades require a slight shading of the pit temperature before charging, though this is often carried farther than necessary. Increased heating cycle is required. With stainless the pits usually are cooled down and heating progressed slowly until a deep cherry red is reached; then it can be heated normally. The easiest steels to heat are the low-alloy high-tensile steels, the high silicon steels over 0.20 per cent, or the 0.03 to 0.10 per cent silicon steels where deoxidation is completed with aluminum.

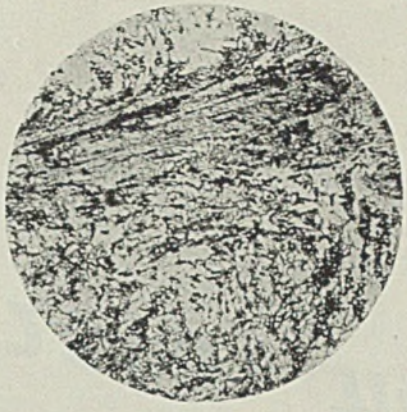

Fig. 34—Microstructure found in edge of hot band of Fig. 32. X100

Suitable ingots must be supplied by the open-hearth department if properly heated steel is to be expected. If a good ingot exists at the start and is properly heated it can stand a great deal of punishment before the quality of resultant product is impaired.

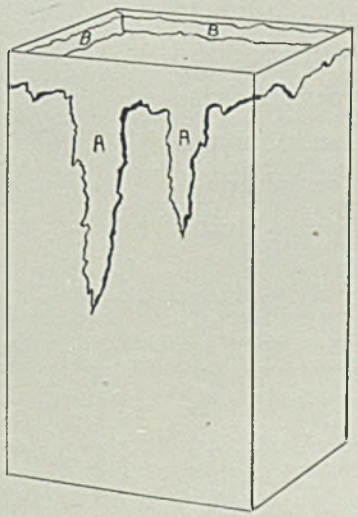

Fig. 35—Sketch representing molten metal flow over scaled ingot surface

The grain structure of the slab or bloom is not always of much importance because this is mostly influenced by mode of cooling from above the critical point where no load or stress is applied below this range. Reheating is always far above the critical range and with the succeeding mechanical working, the structure is developed based on the principles of grain-control.

Reheating

In this phase of steel processing the fundamental factors already stated hold true only to a far greater degree. The slab or bloom must be thoroughly soaked to a good rolling temperature and have a scale that is easily freed at the first or scale breaking pass. The heating must be governed to yield a predetermined finishing temperature. Slabs must be heated thoroughly to a good rolling temperature, preferably 2250 degrees Fahr., and must be uniform throughout the section. If the reheating furnace is of the single zone firing type a sufficient amount of oxygen must be present to give a scale that is free cleaning; if the furnace is of the 3-zone type the heating should be accomplished under slightly reducing atmospheres; the zone firing the soaking hearth should be slightly oxidizing to yield suitable scaling characteristics. If there is excess scaling a considerable loss of material follows. If the atmosphere is so excessively oxidizing that oxygenization takes place a quality product cannot be obtained. The defects commonly encountered are burned edges, which cause defective surface; checking, which will result in open surfaces and a slivered condition.

Fig. 37 is a deep etched sample of an edge of a slab. Fig. 32 represents a hot band rolled from steel that had been subjected to furnace atmospheres that were too oxidizing for normal time cycles. The bad edges as well as hair-line seams existing to a considerable distance into the strip surfaces are evident. Fig. 34 is a photomicrograph representative of the microstructure found in the edges of Fig. 32. Fig. 33 shows a broken edge traceable to mechanical causes. This is included here to show the difference of the two types of bad edges; those of a mechanical nature and those commonly known as "burned." Fig. 38 is another example of cold strip where all visible ragged edges were slit out of the hot band before cold rolling. At X35 magnification and slightly etched the hair-line seams are evident and the product had to be rejected after complete processing. Fig. 40 is a galvanized cold band which had its edges slit before cold rolling. This indi-

Have you reserved your

Increased operations in the steel industry necessitated by normal rise in business conditions and the national emergency will mean additional orders for the steel mill equipment manufacturers. Already over $150,000,000 has been allocated for new equipment with many more millions to be spent for modernizing the obsolescent equipment in the industry in order to sustain steel production at a maximum. The engineering and operating personnel of the steel industry, whose function will be to design, specify, operate and maintain this equipment, will be in attendance at the Iron and Steel Exposition in order to study and see the latest equipment. Make sure that these men are acquainted with what you have to offer by exhibiting at this show. Plenty of good space is still available and we would advise an immediate reservation in order to insure your participation. Write, wire or phone—Iron and Steel Exposition, 1010 Empire Building, Pittsburgh, Pennsylvania.

Partial List of *Exhibitors*

Alliance Machine Company
Allis-Chalmers Manufacturing Company
Aluminum Company of America
American Car and Foundry Company
Amsler-Morton Company
Askania Regulator Company
Automatic Transportation Company
Baker-Raulang Company
Bantam Bearings Corporation
Benjamin Electric Company
Blaw-Knox Company
Bristol Company
Charles Bruning Company
Bussmann Manufacturing Company
A. W. Cadman Company
Clark Controller Company
Cleveland Crane and Engineering Company
Cleveland Worm and Gear Company
Colt's Patent Fire Arms Manufacturing Company
Crouse-Hinds Company
Cuno Engineering Corporation
Cutler-Hammer, Inc.
Delta-Star Electric Company
Joseph Dixon Crucible Company
Edison Storage Battery Division of Thomas A. Edison, Inc
Electrical Engineers Equipment Company
Electric Controller and Manufacturing Company
Electric Service Supplies Company
Electric Storage Battery Company
Elwell-Parker Electric Company
Farrel-Birmingham Company, Inc.
Farval Corporation
Garlock Packing Company
General Electric Company
Gould Storage Battery Corporation
Graybar Electric Company Inc.
Heppenstall Company
Holophane Company, Inc.
Homestead Valve Manufacturing Company, Inc.
Hyatt Bearings Division, General Motors Sales Corporation
I-T-E Circuit Breaker Company
Jefferson Electric Company
Johns-Manville
Keystone Lubricating Company
LeCarbone Company
Link Belt Company
Mercury Manufacturing Company
Mesta Machine Company
Miller Company, Ivanhoe Division
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Morgan Construction Company
Morgan Engineering Company
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National Carbon Company, Inc.
National Electric Coil Company
Norma-Hoffmann Bearings Corporation
Owens-Corning Fiberglas Corporation
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Post-Glover Electric Company
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Rockbestos Products Corporation
Rollway Bearing Company, Inc.
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Joseph T. Ryerson and Sons, Inc.
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SPACE *in the* IRON *and* STEEL EXPOSITION?

HOTEL STEVENS CHICAGO - ILLINOIS

SEPTEMBER 24 - 25 - 26 - 27, 1940

Under one roof will be housed all the activities of the Convention and Exposition, thus affording ample opportunity for all to participate fully in all functions.

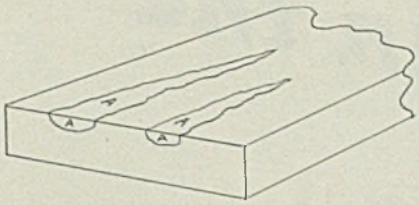


Fig. 36—Sketch representing molten metal flow over scaled slab surface

cates to what extent defectiveness existed in the galvanized sheet.

Thus, it is evident to what extent extremely oxidizing furnace atmospheres can play in damaging steel that otherwise has normal characteristics. No mention is made here of cracked edges found in ingot iron when rolled or stressed in its critical range because such is well understood.

If furnace atmospheres are too reducing so that scale cannot be cleaned at the scale breaker or early passes it will be rolled-in, the various formations resulting in loss of material. Fig. 39 represents a common type of rolled-in scale, which carried through to cold reduced strip. This, of course, is large but if scale is existent to a much lesser degree commercial cold strip cannot be attained consistently.

Other bad scale conditions are those encountered in rolling squares, rounds and hexagons from badly scaled billets or blooms especially those heated in continuous reheating furnaces where suitable scale characteristics were attained on the top surface due to proper atmospheric conditions. Because there is a lack of circulation between the sides butting each other and of radiation from one to the other, a light scale streak develops just below the line of tight contact. Often this streak rolls in forming a black line on the surface of steel rounds or on one face of hexagons and is detrimental because it carries through, even in cold drawn material. This is especially true with nickel steels.

The importance of good heating on hot strip practice is paramount because slabs must be uniformly from slab to slab so that uniform characteristics such as gage, shape, surface physical properties and microstructure, etc., can be attained.

The finishing temperature of hot strip is the most fundamental function of the process because it controls physical and micro characteristics. Strip mills formerly heat treated hot strip for drawing specifications by normalizing and or box annealing. At this time it was demonstrated that by suitable finishing temperatures no load or strain

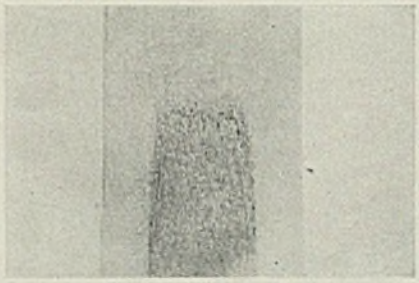


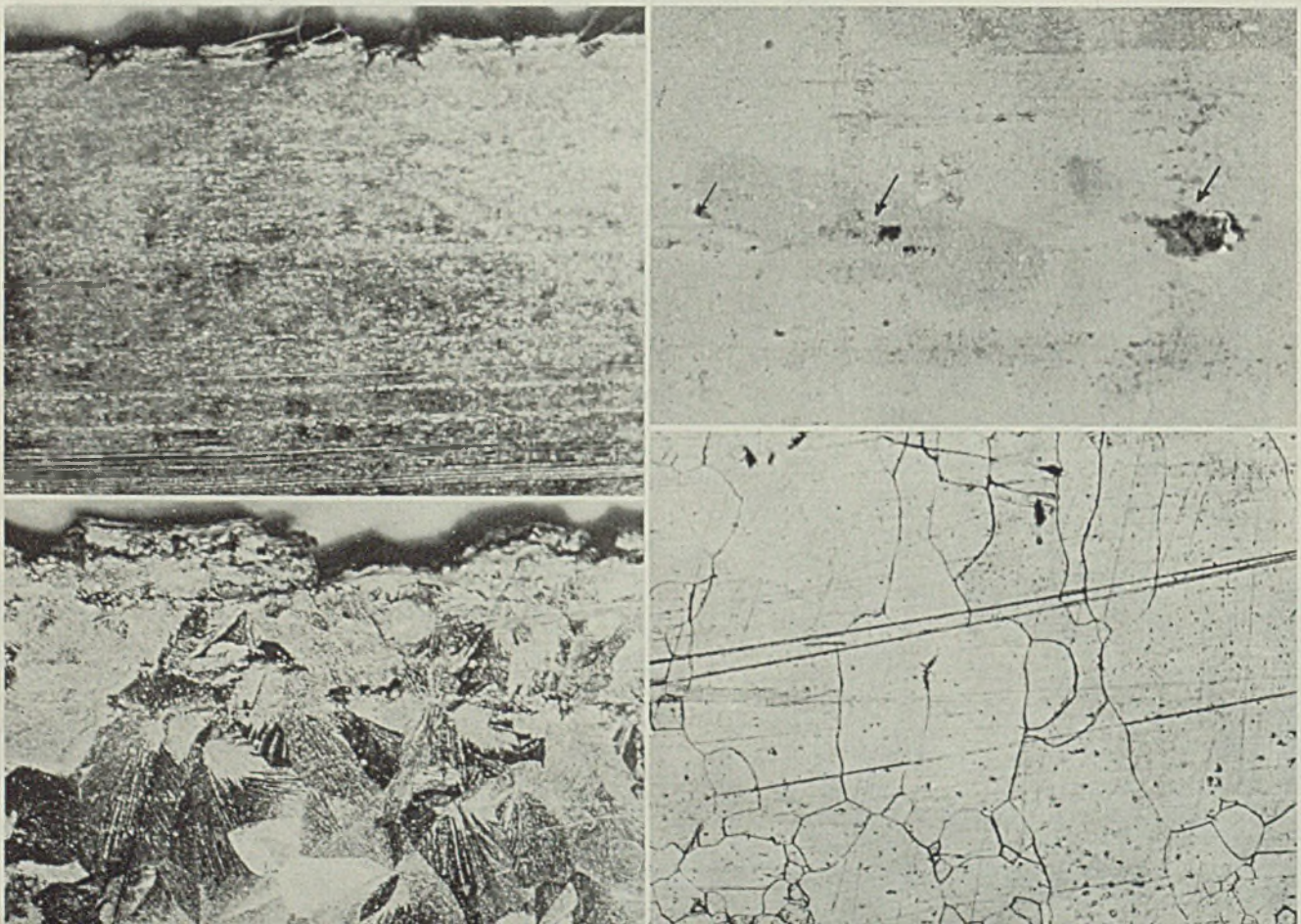
Fig. 37—Deep etched cross section of edge of slab

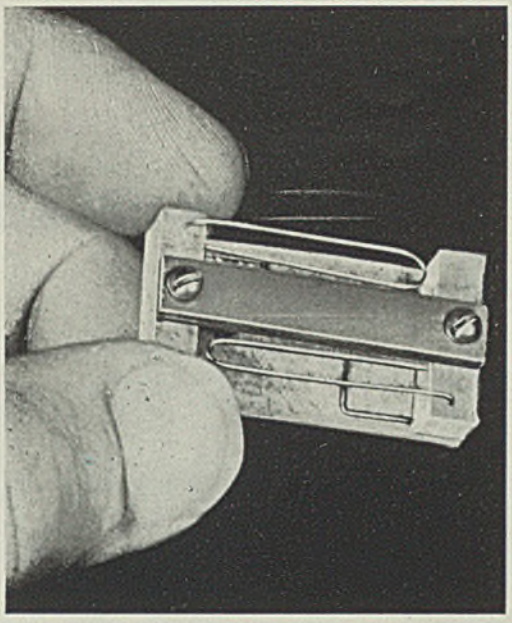
was applied below the upper critical range. That is, if a temperature somewhat above the upper critical was maintained and the product cooled on the hot bed a microstructure identical to that of normalized stock would result. It developed, however, that existing mills speeded up their equipment and the designers incorporated such in new installations. One example is offered to show that any load irrespective of how light it is applied at certain critical temperatures will ruin the microstructure of hot strip and exert an influence on its physical properties.

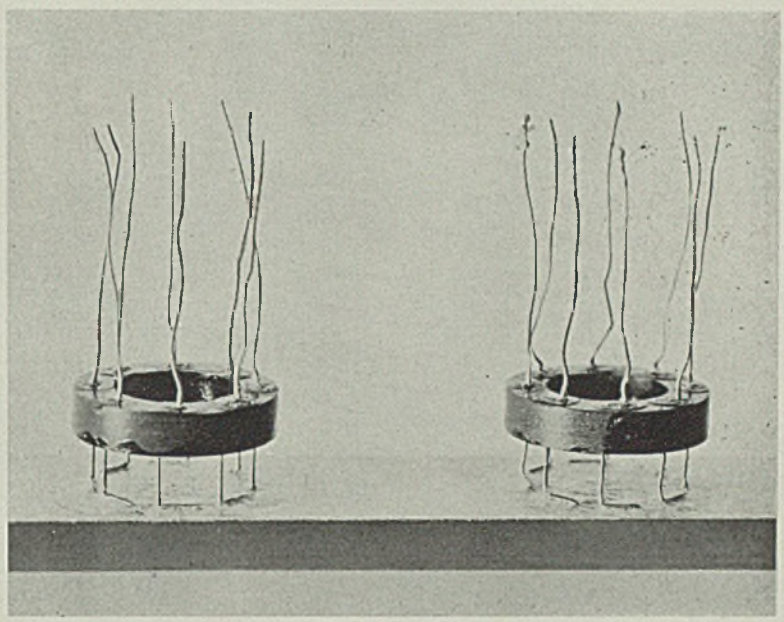
Fig. 41 is a photomicrograph of a hot band finished at the desired temperature. The material cooled on a hot bed possessed normal structure but this sample was processed by passing the length of the hot bed, thence through pinch rolls and

(*Please turn to Page* 68)

Fig. 38. (Top left)—Cold strip after slitting ragged edge that was visible. X35. Fig. 39. (Top right)—Rolled-in scale on surface of cold-rolled strip. Fig. 40. (Bottom left)—Galvanized cold band which had its edges slit before coating. X35. Fig. 41. (Bottom right)—Photomicrograph of hot band finished at the desired temperature







New Strain Measurement Method Offers Unusual Possibilities

■ AS A result of work done at California Institute of Technology, Pasadena, Calif., and Massachusetts Institute of Technology, Cambridge, Mass., a new method of strain determination has been developed and has been found suitable for application to static and dynamic stresses in tension, compression or torsion as well as high-speed impact tests for determining stresses in gun barrels upon firing a shell and amount of high-impact forces produced by projectile striking an object. The development also has applications in connection with measuring fluid pressure changes and can be used in power meters and variable-resistance rheostats without sliding contacts.

The development centers around a new type of strain gage which employs a metallic wire filament as the strained element. Patent applications cover the method and devices used. Baldwin Southwark division, The Baldwin Locomotive Works, Philadelphia, is exclusive licensee. With the new method it has been found possible to reduce the effects of both temperature and hysteresis so strain can be measured dependably to better than one millionth of an inch in a 1-inch gage length, 20 pounds per square inch in steel, for example. The bond of the strained filament has been developed to a point where it is sufficently free from creep so measurements can be made over a period of months. These features are combined in a simple foolproof unit that can be used in the field as well as in the laboratory. Remote reading is another important feature.

The principle employed utilizes the novel effect of strain in changing the electric resistance of a metallic conductor. The filament changes resistance as rapidly as change of strain can occur in the metal to which the filament is bonded, even at extremely high frequencies. Dynamic tests have already been made at frequencies of over 30,000 cycles per second without distortion and with no upper frequency limit being apparent.

To measure strain with this new method, the gage is applied to the metal by cementing against a metal surface, using a standard household cement. With cement applied to undersurface of the gage, it is held gently against the surface by the brass bar until the excess cement is squeezed out.

After the cement has dried thoroughly, about 2½ to 3 hours, the brass bar is removed and the gage is ready to operate. Electric connections to the gage terminals are soldered. Where gages are exposed to damp atmospheres, a thin coating of paraffin, vaseline or wax is applied.

As seen from the accompanying illustrations, the gages are extremely small in size, effective gage length being 1 inch with overall dimensions approximately ¾ x 1⅜ x 1¼ inches. The gage can be installed wherever it is possible to reach to cement it in place. This permits making accurate strain measurements for the first time in otherwise totally inaccessible places.

To cover various fields of application, three basic designs of the new gage are available with a unique Wheatstone bridge assembly specially built for use with these units for static strain measurements. For dynamic and semi-dynamic work, it is necessary to use a conventional high-fidelity vacuum tube amplifier and output meter, oscillograph, or pen and ink recorder. For high-speed impact work, a special single sweep oscillograph is used.

To measure bending in a member by this new method, two gages are placed equidistant from the neutral axis and connected into legs of the Wheatstone bridge, using only three leads as one is common to the two gages. This arrangement gives bending independent of any uniform stress that may be present. In addition, automatic temperature compensation results so accurate measurements can be made over wide temperature range with full precision.

To measure direct stress in a member in which bending is present, two gages are placed equidistant from the neutral axis and connected in series, the combination being inserted into an arm of the Wheatstone bridge. This arrangement has the important advantage of avoiding the necessity of averaging individual readings of two strain gages to eliminate bending as is ordinarily done.

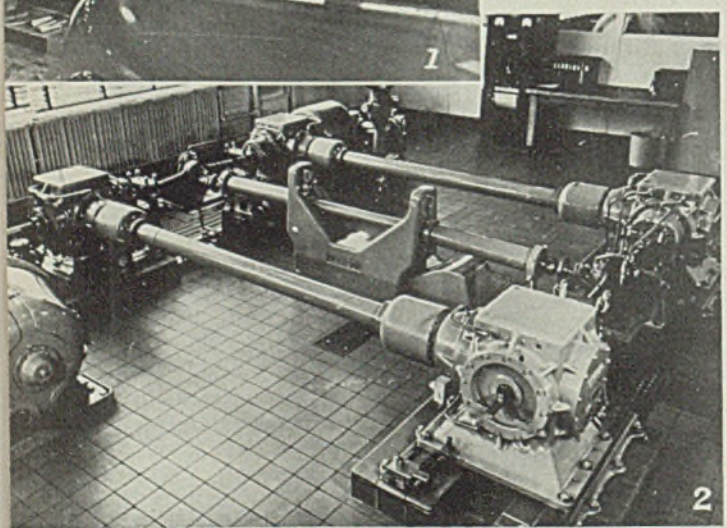
To measure the difference in

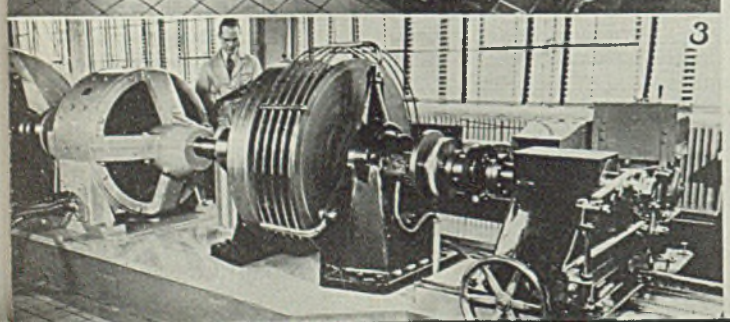
(*Please turn to Page* 68)

Chrysler

Looks to

■ FORMAL opening of new engineering and research laboratories by Chrysler Corp., Detroit, June 6 and 7, was signalized by K. T. Keller, president, as allowing "free rein to the creative imagination of Chrysler engineers to give them the best possible facilities to look ahead 5, 10, 15 years and develop fundamental automobile improvements." Chrysler's engineering triumvirate, Fred M. Zeder, O. R. Skelton and Carl Breer, figured prominently in the christening of 162,000 square feet of additional floor space which doubles previous engineering equipment. Nearly every phase of testing and research in chemical, metallurgical, electrical, physical and mechanical sciences is available in the 94 laboratories, offices and test rooms, a few of which are shown in these pages.





1—"Mockups", full-size clay models scaled from full-size drawings on blackboards, are an important step in creation of new car models. Note shrouds on some of the models to shield details from the inquisitive eye of the camera

2—Rear-axle dynamometer room with two rear-end assemblies mounted at either end to strain one against the other for long periods of time, giving accurate information on temperatures, stresses and power flow

3—Measurement of brake efficiencies is obtained in this brake dynamometer room, the motor driving the massive flywheel (behind guard) which is in turn connected to the brake drum and shoe assembly

4—Vibrate, pound, twist and bend is the order of the day in this special mechanical testing laboratory. In foreground is machine for determining soundness of connections on brake hoses by rapid rotation of a set of four hoses against a solid backing plate

5—Dynamic balancing of crankshaft and fluid drive assembly is a common procedure used on nearly all rotating parts in today's automobiles. It is stated the machine shown can detect and locate unbalance caused by so small an object as a fly stuck to some portion of the rotating mass

6—A 4-place X-ray diffraction camera for study of atomic structures of metals in various conditions of heat treatment

7—Study of stresses in metal parts is facilitated by this camera using polarized light and transparent plastic models of parts under scrutiny

8—Photographic study of carburizing-gas analysis equipment in the chemical laboratory

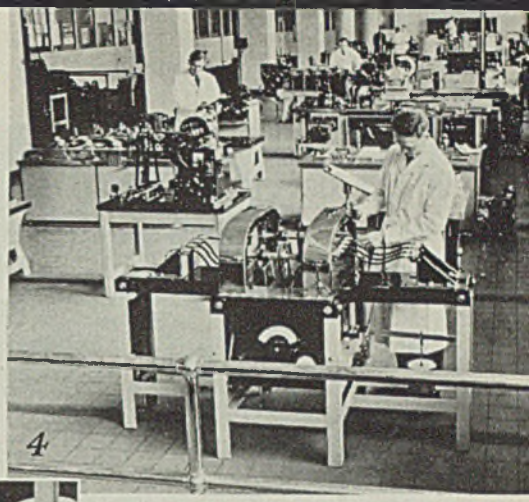
9—Qualitative determination of alloying elements in metals, even in minute amounts, is accomplished in the spectrographic laboratory, staffed by the usual woman operator

10—In the aerodynamics laboratory, a wind tunnel provides air pressures on one-tenth scale models up to 90 miles an hour. Pressure measurements are made in all directions

11—Ample space and light, functionally designed benches with toe space at their bases and the newest types of chemical and metallurgical equipment make working a pleasure in this routine ferrous laboratory. Each bench is devoted to a separate element

12—Completely dehumidified room can be brought down to 45 degrees Fahr. below zero or heated above human tolerance to reproduce extreme conditions under which cars can be studied for operating characteristics in the dynamometer building

the Future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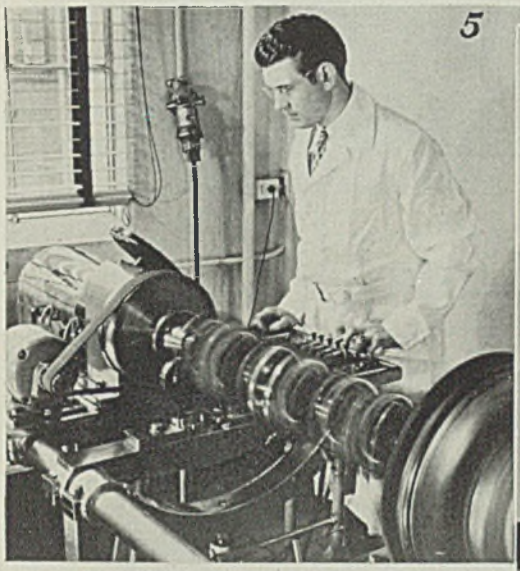
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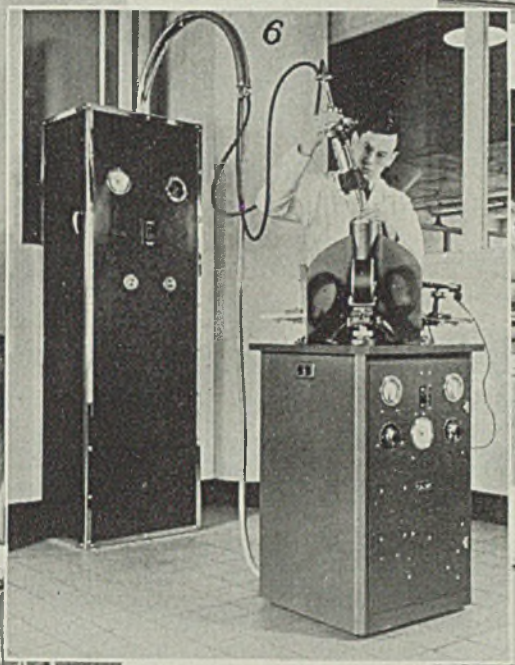
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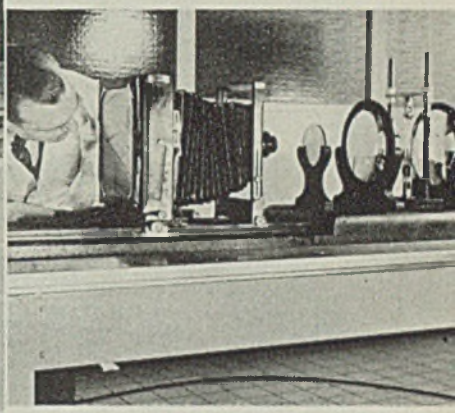

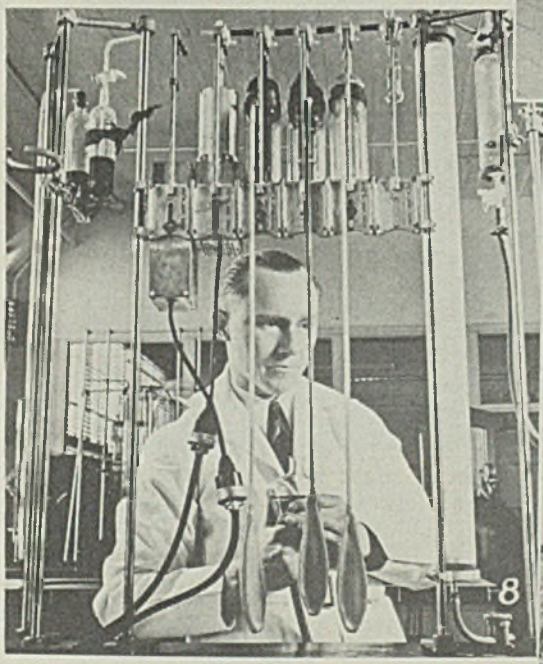
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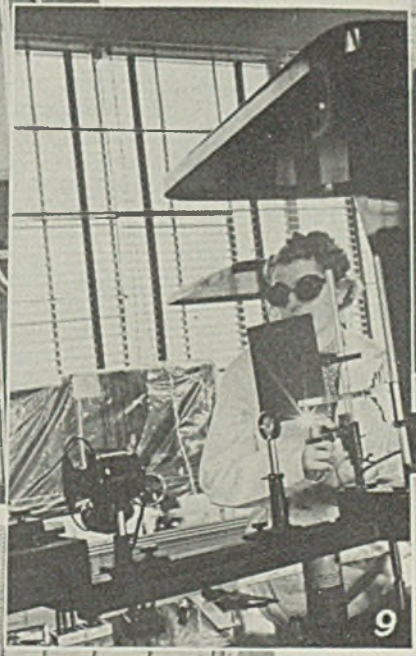
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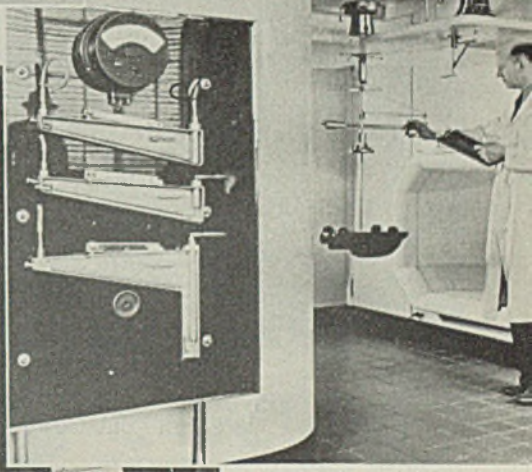

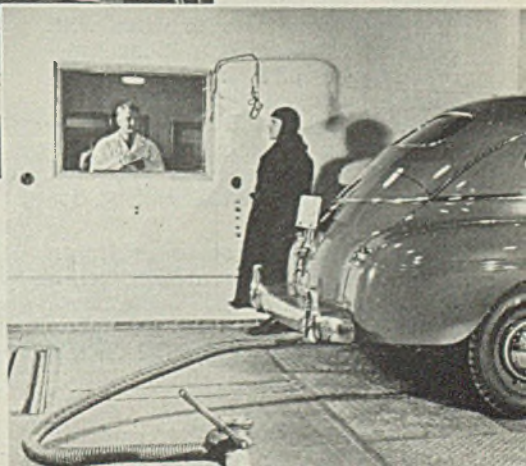

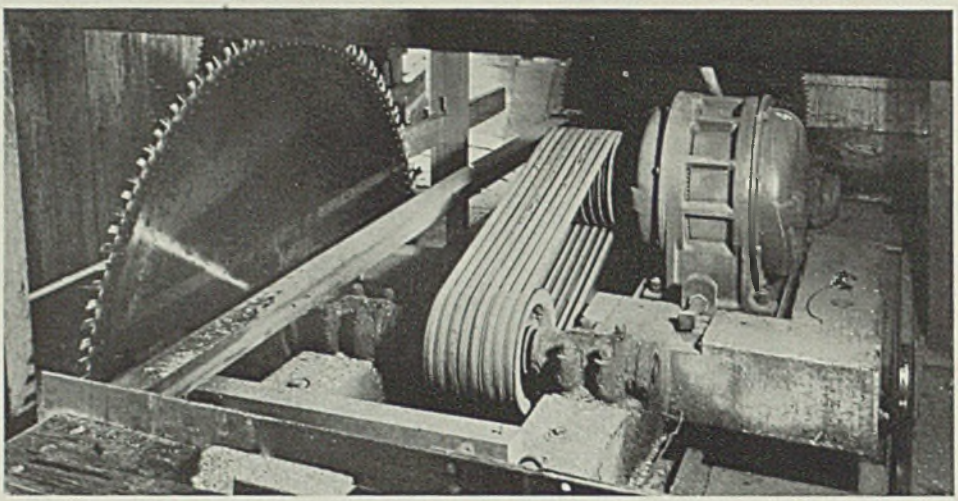

Texrope drive on a cut-off saw

New V-Belt Ratings Make Better Drives Possible

By E. A. GAHL
Allis-Chalmers Mfg. Co.
Milwaukee

■ THE NEW V-belt ratings mean more to the operator when proper conditions are considered. Large diameter sheaves have always been looked upon as more expensive. However, they are not necessarily so. Today the trend is toward larger diameter sheaves and fewer belts on the drive. This combination is always less costly than the older method of using small sheaves and more belts and in addition actually gives considerably longer belt life.

A recent case illustrates this clearly. A 200-horsepower drive, a hot saw in a steel mill, was changed over to V-belt drive. It was an application similar to that shown above but of course larger and heavier. The motor, at 560 revolutions per minute, was used to drive the saw at 1420 revolutions per minute. Because of the saw frame arrangement, the space for the saw arbor sheave was limited to 26½-inch face and 13½-inch outside diameter.

Under ordinary circumstances, a "D" section V-belt would be the proper recommendation and the first suggestion was to drive with eighteen D480 belts, a 32-inch motor sheave and 12.6-inch driven sheave having a face width of 26 inches. This drive with a belt speed of 4700 feet per minute and a rating of 12.9-horsepower per belt made the drive actually good for 232 horsepower.

Considering the severe service on a hot saw used for cutting steel, a 15 per cent load factor is far from adequate for this drive. The V-belt catalog lists a 60 per cent load factor for such service. Although 18 "D" belts were all that could be accommodated in the 26-inch limited face of sheave, the drive requires still more belts to handle the service, so it would be necessary to use 25 "D" belts instead of 18. This is out of the question because of the space limitation, so the logical procedure is to use "C" belts instead.

Using the same combination of sheaves, 32.0 and 12.6-inch, the belt speed is 4700 feet per minute and each "C" belt has a rating of 13 horsepower. This high rating for the "C" belt is due to the fact that it operates over a 12.6-inch pitch diameter sheave, large enough to give the maximum rating possible.

Of course, 25 "C" belts actually give 325 horsepower, which is sufficient for a 200-horsepower drive including a 60 per cent load factor. The width of a 25-groove "C" sheave is 25⅜-inches, which easily meets the limited space of 26 inches available.

Before outlining the advantages of this drive, consider prices:

25—D480-320-126**	$1369.55
18—D480-320-126	993.95*
25—C480-320-126	853.75

*Inadequate as it includes no load factor.

**The expression 25—D480-320-126 has a definite meaning. The first and second items indicate the quantity and serial number of the V-belts. The third and fourth items indicate the pitch diameter of the driver and driven sheaves respectively in tenths of an inch.

Thus, we find that a 25 "C" belt drive has a price advantage of more than 37 per cent over the proper "D" section drive. However, the greatest advantage is not the price at all. Adaptability is the important factor in this case; then also there is the matter of low maintenance and longer belt life.

Low maintenance means less care and expense. Only an occasional check-up is required to maintain proper tension. While on this subject, remember that belt ratings are based on a definite tension for each size belt and if that tension is not maintained, then the belt rating is reduced. The proper tension on any drive will be when there is just a slight stretch in the belts. Some operators can determine this by sight, others by feel. However, it is not difficult to learn either method.

Consider maintenance expense of these drives. At sometime in the future it may become necessary to replace the belts. The cost of twenty-five C480 belts is $480, while the twenty-five D480 belts will cost $891.48. So replacement expense is also in favor of the "C" belt drive by about 46 per cent.

Now analyze the matter of longer belt life. It is definitely an advantage to use the "C" belt on the 12.6-inch pitch diameter sheave instead of using a "D" belt on the same diameter sheave. The action of the

(*Please turn to Page 76*)

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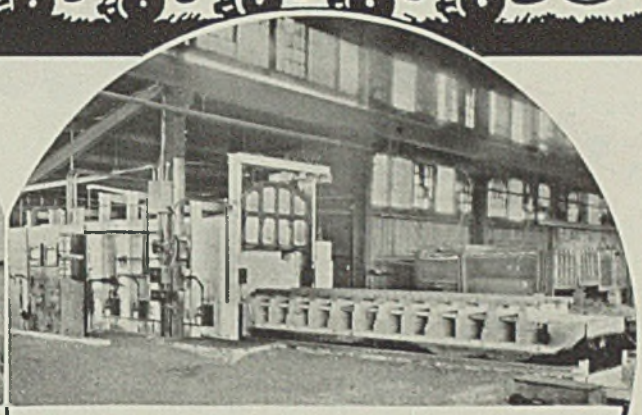

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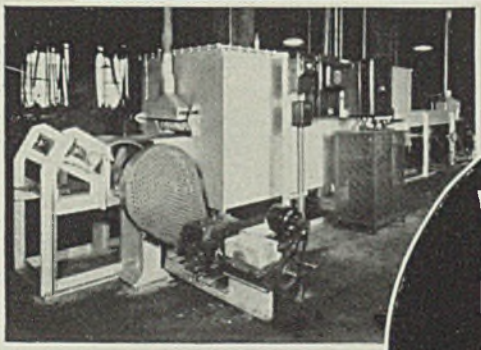

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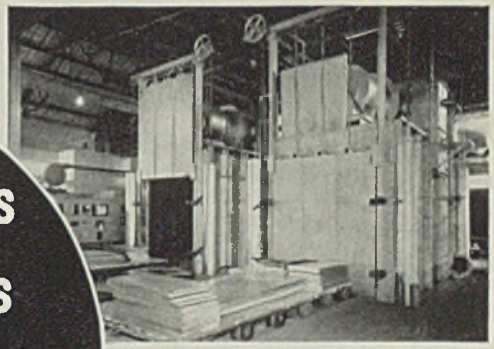

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RUST PROBLEMS

Alloyed surfaces, cladding, metallic and metal-salt coatings, chemical and mechanical treatments, organic finishes avoid rust. Where already rusted, a new development prevents further rusting and establishes a firm paint base

By RALPH W. BAKER*
The Flood Co.
Cleveland

■ WHILE it is possible to prevent or limit formation of rust on steel in the mill and fabricating plant, it is almost impossible to separate rust from steel in field work and in maintenance operations. We must, therefore, learn to "get along with" rust in many cases. However, there are many ways of controlling or stopping rust.

The rust problem really is in two phases: How to make steel initially immune to or at least effectively resistant to rusting in production and fabrication . . . How to stop further rust action after rusting has started.

Corrosion engineers today accept the electrochemical theory of rust action—not the bacterial, not the carbon dioxide, not the free energy theory. And far from being a mere theory, the electrochemical explanation is backed up by facts which seem orderly and beyond challenge. . . .

Rust is largely ferric oxide or iron oxide, the most stable compound of iron. Iron oxide is the ultimate product of corrosion of iron and steel. So both the opening and closing chapters in the life of unprotected iron and steel products is iron oxide.

Both moisture and air are required before the rusting of steel proceeds very far. Every material including iron, zinc, copper will dissolve a certain amount in water. When iron is exposed to moisture, a certain portion dissolves or goes into solution at any positive or anodic area, displacing its equivalent of hydrogen at the negative or cathode areas. And the rusting action continues until the electromotive force set up by the hydrogen equally opposes the tendency of iron to continue to go into solution. Then oxygen from the air combines with and removes the polarizing hydrogen and the cycle starts all over again until oxygen ultimately precipitates the iron out of solution in the familiar form of iron oxide or rust.

Since a metal dissolves—goes into solution—at an anode and displaces hydrogen at the cathode, it follows that one part of the metal must be an anode and another part a cathode at any given time. . . . Factors which contribute to this electrolytic action include differences in composition of the metal, differences in physical or surface condition of the metal and differences in the chemical or physical state of the surrounding water or corrosive medium.

While the theory of rusting thus is comparatively simple, its interpretation—why did the steel rust or not rust—is much more complicated. Even though many things enter into the problem, there are a few fundamentals which will answer the bulk of the questions.

Whatever the analysis, shape or form of the steel involved, both producer and fabricator are recognizing and educating the consumer in those fundamentals which the consumer can control but over which the producer and fabricator have no control. For instance, both the rate and distribution of rusting are a function of the pH, oxygen content, temperature and pressure of the water contacting the steel surface. Thus control of these factors can effectively reduce the corrosion rate.

Certain nobler metals accelerate the corrosion electrochemically because they provide more cathodic area for deposition of hydrogen ions. Thus such things as mill scales, brass fittings and so on are to be avoided wherever practical.

Similarly, stray currents received by or induced in the steel may accelerate the corrosion electrolytically and so must be avoided or insulated.

The problem of how to prevent rust at the production end has largely been solved. The producer and fabricator have recognized, studied and solved for the time being the factors to be controlled. With rather remarkable speed, a number of methods have been

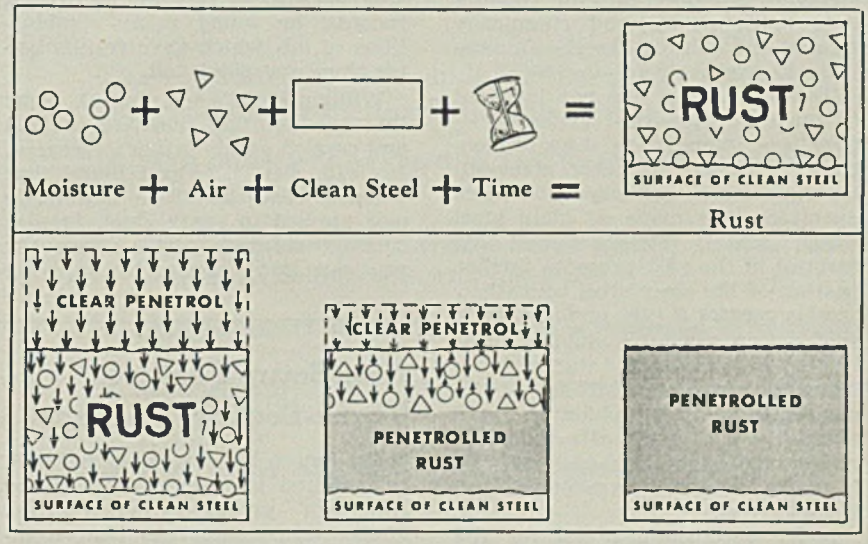
*The author was formerly in the steel industry for 12 years as a metallurgical and corrosion engineer.

developed which effectively prevent or counteract rust in production.

Low Alloyed Steels: Use of alloyed irons and steels inherently resistant to rust action is one answer. However, the controlled chemical and physical uniformity of the surface and cross section often is of equal importance. In the beginning the plain open-hearth steels were followed by development of pure open-hearth irons in a worthy attempt to satisfy the demands for uniformity. The siliceous surface film of genuine slag-bearing wrought iron appears to retard rusting effectively. Low-alloyed iron and steels of bessemer types but chiefly of open-hearth production incorporate 2 per cent or less of such elements as copper, nickel, molybdenum, phosphorus, chromium, etc., to make a corrosion resistant metal. Use of this large group of alloy steels for rust resistant applications is growing rapidly largely because of higher resistance to initial electrochemical solution and because of the formation of protective oxide films.

High-Alloyed Steels: Another group of alloys popularly known as the stainless and heat resistant alloys provides yet another answer. One steel producer lists 50 separate stainless alloy chemistries, any one of which does a given duty better than the remaining 49, yet all of which are generally characterized as immune or completely resistant to rusting. These steels depend partially upon nobility but chiefly upon formation of protective films for their resistance to rusting. Such films are essentially chromium oxide in basis. They are protective and self healing under most conditions.

Surface Methods: Various methods of protecting against rust by application or development of special protective surfaces include cladding, metallic coating, metal-salt coating, chemical treatment, mechanical treatment, organic finishes. As noted below, many offer excellent protection.



Upper illustration graphically portrays the elements entering into rust formation according to the electrochemical theory. Below is shown how Penetrol surrounds and locks rust particles together, providing an insulating foundation for exposure coats. The material penetrates to the clean metal and then hardens from the bottom up

Cladding: Clad metals often are very effective. Today a number of processes have been developed for bonding various thicknesses of another metal or alloy inherently corrosion resistant on one or both sides of the base metal. These include cast, wrought or furnace welded processes. In addition to metallic cladding, this classification might also include glass linings, porcelain enameling, rubber lining, plastic compositing, cement and asbestos-cement lining.

Metallic Coatings: Many improvements have been made in improving rust resistance of surfaces by application of coatings of zinc, tin, lead, cadmium, nickel, chromium, copper, brass and aluminum as well as others. Application methods include use of the metal-spray gun and electroplating. Many improvements have been made in electroplating to increase uniformity of throwing power, brightness and grain control—all helpful in building up rust resistance. One new method involves a preliminary electrodeposition of nickel and then of zinc, followed by heat treatment to produce alloy layers of extremely high protective value. In addition, the zinc plugs the porosity of the nickel, thereby giving electrochemical protection to the bared steel areas.

Powder metallurgy, commercially in its infancy, will make its impression in this group, too. Metal spraying and selective crystallization processes are here and growing fast.

Metal-Salt Coating: Production methods effectively deposit iron and zinc phosphate on black and galvanized steel respectively; chromium-iron phosphate; iron chromates; and other corrosion inhibiting films that are effective to a degree when deposited on clean steel which is subsequently painted. The idea is to make the steel surface more chemically uniform and thus more free from corrosion in accordance with the electrochemical theory.

Chemical Treatment: Any of the treatment referred to above under metal-salt coating or in this paragraph might logically be combined under the same heading. However, these treatments include chemical and electrochemical pickling, iron oxide films built in situ, chemical and electrochemical degreasing, sodium silicate films, etc.

Mechanical Treatment: Use of sand, grit, steam, air and other blasts as well as hand and power wire brushes affords means of removing rust films, water scale, mill scale, etc. for the subsequent application of a metallic coating, metal-salt coating or organic finish. While necessary and effective in production, *these methods are useless or ineffective or too expensive in maintenance and field operations.*

Applied Organic Finishes: Clean steel surfaces when primed and painted by either still or continuous

air or bake drying effectively guard against rust. However, *clean surfaces are known practically only in production work.*

With but few exceptions, it thus is seen that the consumer can purchase from the producer a solution to any specific rust problem. These answers to the corrosion problem are bought daily. Included are stainless steel cooking utensils, nickel-clad hot water storage tanks, porcelain-enameled stoves, tinned cans of food, bright electrogalvanized bolts and nuts, various machines and vehicles. The body of your automobile, for instance, was mechanically cleaned, phosphate treated and given a baked-on coating of enamel.

Maintenance is different: Oh, if only these cheap and effective production control methods were available to rehabilitation and maintenance work! Wouldn't it be nice to think of a hot-dipped galvanized lake freighter, a porcelain-enameled steel-mill building, an oil refinery unit mechanically and chemically treated and painted like the automobiles it feeds, etc.?

These fantasies are not intended to burlesque practical endeavor — they are intended to draw a contrast. The lake freighter, steel-mill building and oil refinery—just three examples—are made of plain steel which rusts. Moisture and air trapped in the rust promote further rusting of the clean steel beneath.

This creates a rust problem. Here rust action must be stopped after rusting has already started. To "give it a coat of paint" is not the answer to the rust problem in maintenance work. Lack of a thorough understanding of this fact perhaps is the reason much present practice is ineffective.

Many specifications call for the removal of all rust before painting because most people fear rust. Too often they have seen a good, otherwise useful, paint film fail because of the rust action beneath. Ordinary paint applied directly to rusty steel has not stopped further rust action.

The rust problem is the impossibility of completely removing rust in the field.

The practical answer for effective and orderly practice is to utilize the rust mechanically as a protective pigment by applying a clear primer —a certain heat-treated blend of natural oils—which stops further rusting. This is followed by applying that exposure paint coat most suitable to the environment. A primer or contact coat is one thing; an exposure paint coat is quite another. Neither can be substituted for the other, yet both are essential for effective functioning of the other.

About 1875, William Flood, a Cleveland painting contractor, reasoned that the oil content of paint is its most necessary part. To him, pigments in paint were necessary, but the best of them, dry, would contribute nothing toward protection. From conscientiously observing the results of this work over a long period and fortified by careful records, he found many combinations of oils which gave results better than any single oil.

William Flood's son, Earl D., came into the painting business in 1911 and carried on his father's research. In 1913, Earl D. Flood found that when a clear blend he had made was applied to rusty steel, further rusting stopped. This discovery was put into practice by applying the clear oil to the rusty surface as a primer coat and, when containing pigment, as an exposure coat.

The primer, Penetrol, does not contain fish oils and volatiles, like naphtha and turpentine. As its name conveys and as a mechanical function of its low surface tension, it penetrates through and under the rust to the bottom of the pits of the steel and to the spaces between the steel and the rust particles—thus surrounding and locking the rust into a firm foundation for exposure coats. It has another mechanical function of hardening into an elastic film from the bottom up without depending upon driers. Moisture and air are squeezed out and displaced when this primer hardens from the bottom. An adequate tack or tooth insures adherence of the exposure coats, allowing them to live out their normal useful life.

After all of the necessary mechanical requirements are accomplished, the dried film, of high dielectric strength, insulates the clean steel underneath the rust from electrochemical action. It thus protects both the steel and the paint.

In just this way nearly all the large Great Lakes vessel companies, many steel companies, steel fabricators and others now "get along with" rust. It appears to solve effectively the rust problem in maintenance, in field work and where parts are exposed outdoors.

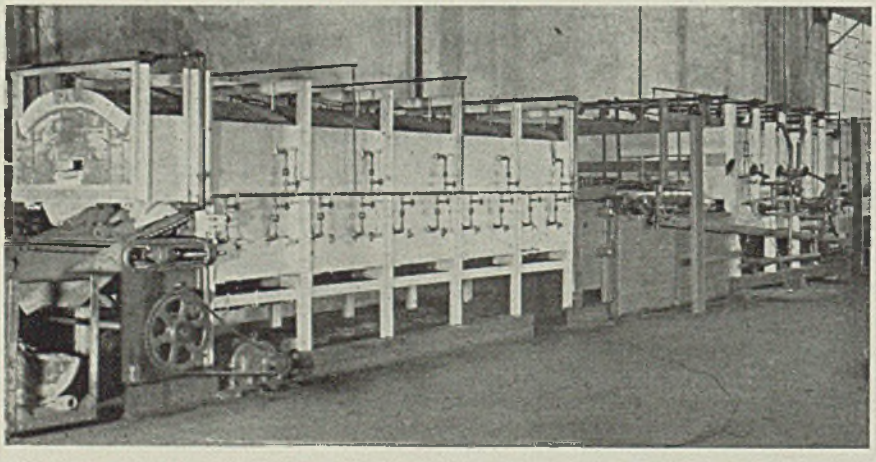
New Setup Features Three-Section Furnace

■ To better handle work that will be required in connection with the American preparedness program, Metlab Co., commercial heat treaters, 1000 East Mermaid lane, Philadelphia, recently completed installation of an unusual fully mechanized three-section furnace for mass heat treatment of forgings, castings or rough machine parts of uniform size and under closely controlled temperature and time conditions.

With a capacity exceeding 12 tons per day on 24-hour basis, the furnace accommodates parts of a size up to about 5 inches in diameter, 24 inches long. The three-section gas-fired unit operates at temperatures up to 1600 degrees Fahr. First section preheats and saturates the work. Second section is a quenching tank, and third section is a tempering unit. In the first section are two zones, each under separate automatic temperature control. Parts are moved mechanically through this section and are dropped into the quench tank without losing temperature. Parts are kept separated in the bath of quenching oil or water which is strongly circulated to insure uniformity.

Raised from the quench bath on a mechanical conveyor, they are al-

(*Please turn to Page* 76)



New automatic heat-treating setup employs 2-zone preheating and soaking unit, automatically discharging into quench. Conveyor then carries work from quench, through tempering section. Handles more than 12 tons daily

QUIZ NUMBER 1

DO YOU . . . KNOW THE ANSWERS?

AS an additional service to all regular subscribers, Penton's Almanac, 1940-1941, is now on the desks of executives, production men, purchasing and sales officials. STEEL's editors have compiled into 148 pages all of the important facts and figures on the metalproducing and metalworking industries. Penton's Almanac has already established itself as a much-needed and valuable addition to STEEL's regular weekly service.

ENTHUSIASTIC READERS *say:*

. . . "You have done a wonderful job with Penton's Almanac. It is full of valuable information which cannot be found in any other single publication".

Harry M. Begg, P. A.
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. . . "One of the most useful and valuable compilations of statistics that has come to our attention in a long time. Greatly appreciated".

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. . . "We wish to compliment you upon the manner in which the data are presented and the wealth of information assembled by your staff."

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F. H. Fechtig, Purchasing Agent
Atlantic Coast Line Railroad Co.

These and literally thousands of other pertinent questions are answered in Penton's Almanac, 1940-1941.

1. **How much will be spent in 1940 by the steel industry for new equipment?** (see p. 120)
2. **What has been the wartime trade by the United States with both belligerents and neutrals?** (see p. 78)
3. **What country leads the world in aluminum production?** (see p. 85)
4. **How does the Walsh-Healey Act define the iron and steel industry?** (see p. 34)
5. **How many passenger cars are registered in the United States?** (see p. 42)
6. **What recent amendments were made to the United States Patent Laws?** (see p. 22)
7. **How much lubricating oil and grease did the railroads buy in 1939?** (see p. 48)
8. **What are the proved oil reserves in the United States?** (see p. 60)
9. **What metals are used in a typical 4-engined airplane?** (see p. 63)
10. **What was the price of cold rolled strip, Pittsburgh, in February, 1931?** (see p. 95)

Penton's Almanac

1940-1941

AN ADDITIONAL SERVICE TO REGULAR SUBSCRIBERS TO STEEL

Making Welded Gears

Highly developed procedure produces heavy-duty gears in an extremely wide range of sizes. All are flame hardened after machining. No finish grinding required as no distortion occurs

By H. MENCK
Works Manager
Harnischfeger Corp.
Milwaukee

■ WHILE advantages of welded gear construction, such as flexibility of design and ease of production control, are quite well known, experience at Harnischfeger in manufacturing more than 800 welded gears a month for the past five years has produced a number of developments in production methods which may be of interest.

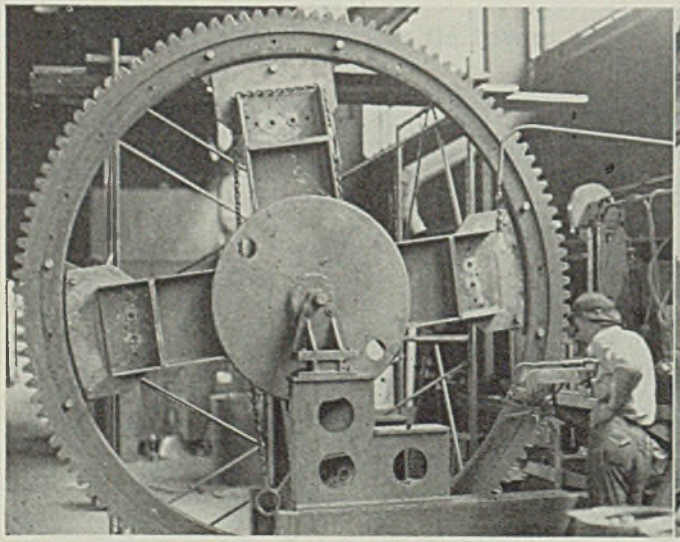
In the first welded gears, it was general practice to roll up the rim and close the seam of the rim from the inside. Then hobbing was started at a point where most of the welded material would be cut away in forming a tooth. All teeth, when finally machined out, then consisted of parent material.

From the production angle, there are many undesirable features in this procedure. The need for extensive welding on the rim tends to make the rim oblong in shape after welding is completed, which then necessitates taking a machine cut on the inside of the rim to permit a fairly close fit between web and rim. This requires extra handling of the material for machining, which in turn results in delays due to scheduling additional operations that add nothing to the quality of the product when finally completed. Cost is increased, also.

To eliminate this difficulty, a method has been developed whereby the gear is tack welded completely so no machining operations need be performed on rim before teeth are cut. Thus gear is in same stage of manufacture as a forged or cast gear would be when delivered to the machine shop.

Equipment required for this work is simple and is not expensive. The only investment required is for a bending roll that will handle stock of the size required for the gear rim and a setup table of rough character with a number of holes drilled into it to receive pegs.

First step in making a welded gear by this method is to cut off and drill the hub, burn out the web to shape from a plate and tack weld these two items together. The rough web then is placed on the surface plate which is near the forming roll. Immediately after the rim has been rolled to shape and while it is still hot, it is thrown around the web as it lies on the surface plate. Any irregularities that the rolling operation may leave on the rim are eliminated by driving wedges between the rim and pegs set in the floor plate at various spots around the rim. These



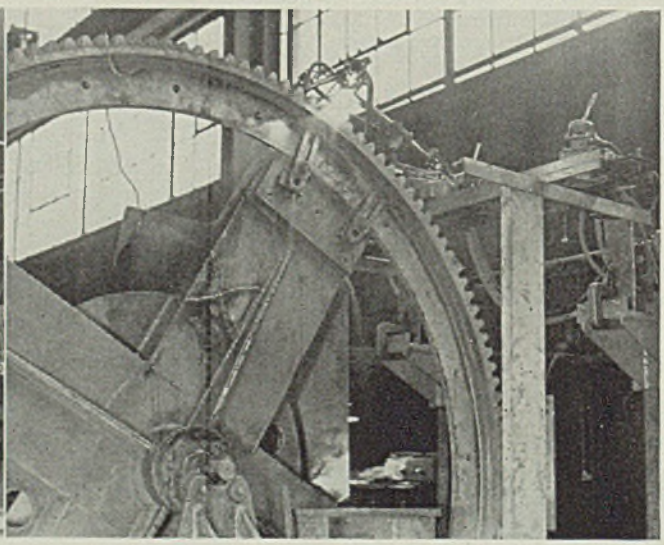


Fig. 1. (Left)—Flame-hardening machine about to harden teeth on a large gear ring. (Fig. 2. (Right)—Closeup of same machine. Note builtup support for traveling torch head

tighten the rim to the hub effectively while it is hot. It then cools to retain the shape desired.

At this point, rim is tack welded to web so the two pieces can be handled together without any difficulty during succeeding operations. Where the two ends of the rim come together, a ¼-inch opening is left on the side nearest to the web. From this point, the opening assumes about a 30-degree taper, opening outward from the web. Size and taper of opening may vary slightly in actual practice, but no particular difficulty will be experienced if these dimensions are not maintained exactly.

To back up the rim weld, part of the web is cut away with an oxyacetylene torch and a ¾-inch plate tack welded underneath the gap in the rim. Then all other parts of the gear, such as spokes and reinforcements, are tack welded into place. All welds subsequently are completed except for the seam on the rim.

Welds Involve Two Passes

Most finish welding is done on a positioning machine so welds can be made downhand. A good many of these welds involve use of ¼-inch rod and two passes, depending on size of the gear. For a comparatively small gear, two passes may be made on one side and one pass on the opposite side. On larger gears it may be necessary to take two passes on each side. Leaving the gap of the rim open during welding of web to rim permits the rim to expand and contract as the stresses may pull it during welding. This materially reduces cracking of the welds.

With all other welding completed, the rim seam is welded using a special rod (P & H Smootharc 4620) which will develop the same characteristics under heat treatment as the rim itself. Also it responds to flame hardening in the same manner as the parent metal in the rim. As most rim material is SAE 1040 steel, a rod of approximately the same analysis is essential. The weld is built up from the ¼-inch plate backing previously mentioned which is tacked lengthwise the seam just underneath the rim.

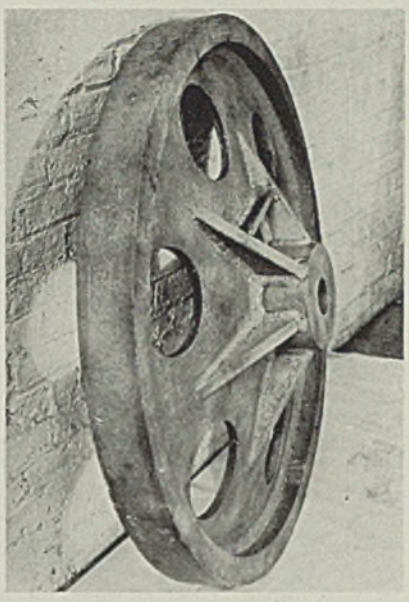


Fig. 3—Typical design of welded gear with rolled rim, strengthening ribs, heavy hub

When depositing weld metal in this rim seam, it has been found advantageous not to weave layer after layer across the entire gap of the seam but rather to build up the seam by concentrating the weld into the corner left by the preceding beads, going from side to side of the opening. Beads thus are deposited lengthwise rather than across the seam. The beginning of a crack develops most easily where the welding metal joins the parent material. The above procedure has been found valuable in preventing cracking at this critical rim joint.

Also extreme caution should be exercised to remove all slag between passes as any inclusions or incompletely welded material naturally will show up when the gear is machined.

In most instances, the entire gear is normalized. Then teeth are cut and the gear finish machined completely.

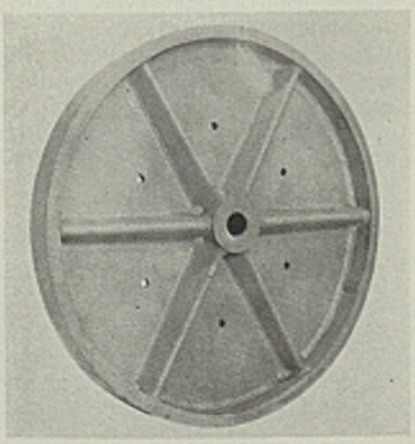
Properly heat treating areas of gear teeth subject to wear is of utmost importance. For the last three years, most gears in this plant have been flame hardened. A hardness between 50 and 55 Rockwell on the pitch line of the tooth is being obtained consistently. It is possible to raise this hardness by changing the material in the rim where greater hardness is required. Also the flame hardening is done in such a manner as to prevent distortion. Thus no finish grinding is involved.

Flame Hardening Simple

Flame-hardening equipment is extremely simple as can be seen from Fig. 1. Note how supporting blocks of various sizes are assembled to handle even the largest size gears. The flame-hardening machine itself is extremely flexible, easily accommodating gears of practically any diameter tooth size and pitch. Fig. 2 is a closeup of the machine in operation. Various structural members are assembled with clamps to form a support for the traveling torch head wherever desired. Common practice is to harden entire surface of one tooth in a single pass of the torch. Of course a motor-driven torch carriage is utilized to assure uniform, accurately controlled rate of movement of torch.

Fig. 5 shows etched teeth, illustrating their hardened areas and approximate depth of the hardened section.

It will be noted the metal is hardened deepest on the pitch line, thinning out toward tip and root. This assures maximum amount of unaffected material near root to serve as tough, strong support for



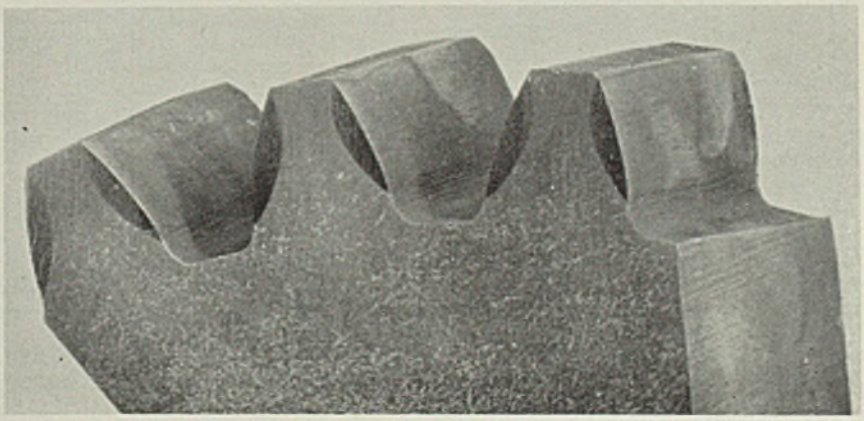


Fig. 4. (Left)—This large welded gear has spokes of heavy formed plate which produce a triangular cross section when welded to web. Fig. 5. (Right) Cut and etched section through flame-hardened gear showing hardened areas of teeth

tooth, an essential requirement of heavy-duty gears.

In developing flame-hardening procedure, adequate testing equipment is important to check hardness produced, uniformity of the flame-hardening operation and area and depth of flame-hardened portion. There being no suitable Rockwell testing equipment available to test on the pitch line of a tooth, the following method was developed. Enough material for a single tooth is cut off from the end of the same bar from which the gear rim is taken. This test piece is machined and tack welded in line with one of the teeth and is flame hardened at the same time as the gear. Subsequently this piece is removed and tested for hardness to provide a check on torch settings and machine speed used in flame hardening.

Advantages of this method of gear construction are that the gear teeth can be machined in a condition as soft as possible. This permits fast speeds and feeds as well as giving longer cutter life. In addition the flame-hardened tooth usually develops a higher surface hardness than is possible with conventional methods of heat treating without distortion. Also flame hardening can be done with so little distortion that finish grinding the teeth as a final operation is entirely unnecessary. On large gears, this may be an expensive operation so its elimination affords an important economy.

Gears Can Be Made Stronger

Flame-hardened gears are superior to ordinary gears made from tool steel because it is possible to use high-strength alloy steels such as SAE 1040, 4340 and 4135 instead of the ordinary SAE 1020.

Another important feature of making welded gears in your own shop is commonly overlooked. If overhead is charged by allowing a certain percentage for every productive man-hour of work done in the shop, doing the welding and flame-hardening operations in your own plant absorbs overhead.

Also there is a considerable saving, commonly amounting to about 10 per cent, due to the complete absence of scrap in the final machine operation as no welded steel gears need ever be scrapped.

Indirect advantages include such well-known features as quicker production which enables a plant to meet last-minute changes or rush deliveries. For instance, a 62-tooth gear weighing 98 pounds can be produced from raw material to finished flame-hardened gear in 21 hours, figuring continuous operation. This can be done at a cost 15 per cent less than by other methods including $4.15 more overhead being absorbed than if the gear were purchased.

Another indirect advantage is the possibility of leaving the hub of the gear much softer and without the presence of hard spots. In modern design of multiple spline construction, this feature may aid considerably in producing a good spline without damaging costly broaches.

♦

Strain Measurement

(*Concluded from Page* 57)

strain between any two points, the problem is essentially the same as in measuring bending. Two gages are placed at the points in question and inserted in two arms of a bridge.

The sum of strains at any two points is found in a manner that resembles measuring direct stress in a member in which bending is present.

To measure accurately slowly varying strains, it is advantageous to use a bridge with a suitable amplifier substituted for the galvanometer. If an extremely wide range of frequency is to be handled, a direct-current amplifier should be used. In such an instance, the frequency range is limited only by the zero drift and frequency discrimination of the amplifier employed.

Over a moderate range of frequencies, it is convenient to operate the bridge on alternating current, using any good alternating-current amplifier. In this manner, a modulated alternating-current signal is obtained, making it possible to do precise work with economical outlay for equipment. Good quality public address or similar vacuum tube amplifiers are quite satisfactory for most work.

For high-gain work, it is valuable to balance the bridge for phase as well as direct-current resistance. This usually is done by shunting one arm of the bridge with a small paper condenser in series with a megohm resistor. For frequencies from zero to 8 or 10 cycles per second, bridge can be operated from a 60-cycle source with good results. Use of a balanced bridge also enables operator to extend his frequency range down to zero or static strain. Also a balanced bridge enables the operator to eliminate surges in plugging in the amplifier and switching from bridge to bridge and from gage to gage.

Tests made by cementing a number of units on the same bar of steel and subjecting the bar to bending stresses show that strain tests made by this method have an overall accuracy of 1 per cent. This high accuracy is readily obtainable in normal use and includes the calibration of the Wheatstone bridge control box. Errors introduced by temperature changes are well within the limits of possible accuracy.

An indication of the wide range of application possible with this method of strain measurement is in its application to the 2-dimensional strain rosette problem where a highly simplified instrument with multiple elements is used. The rosette is cemented as a unit to the surface under investigation and contains four gage lines at 45-degree angles to each other, each 3/4-inch in length. By connecting in turn the leads from the rosette to the control box, the amounts and directions of the principal stresses of any surface can be determined accurately and rapidly. The unit is especially useful for all thin-walled structures. A particularly valuable application appears to be on stressed skin structures in aircraft.

Heating of Steel

(*Concluded from Page* 56)

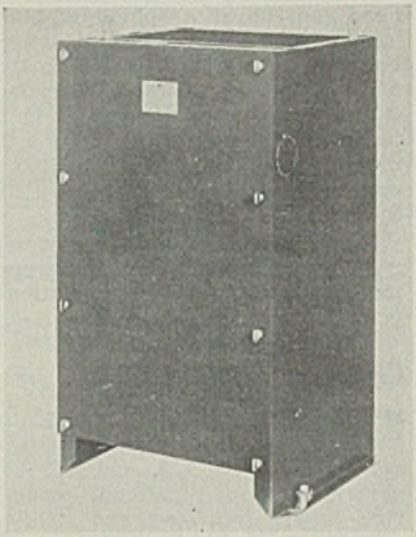
hot piled. While pinch rolls had considerable tension on the screws it was not sufficient to cause any reduction, but the material had cooled down much below its critical and just this small amount of stress caused critical strain so that grain germination existed at lower temperatures. The critical strain was such that excessive grain growth occurred in the affected area at temperatures present in the hot piling. This condition was eliminated by relieving the tension on the pinch roll screws, the temperature of finishing and piling being the same. This large grain surface shown in Fig. 41 is not due to decarburized surface in heating.

These data may be somewhat crudely formulated necessitated by the fact that all technical and scientific explanations were avoided and further by the extent of variable factors envolved in the process such as variations present in the ingots of each different grade of steel. Furthermore it is offered to show actual conditions as they exist so that the men in the plant can readily comprehend the importance of heating as it affects quality.

In conclusion good ingots are essential and can be produced easily and consistently by normal practical practice at the open hearth. They can be heated and soaked to good rolling conditions. Slightly inferior ingot structures, such as thin walls or tender ingots often can be saved by a little extra caution. Normal heating can be maintained by commonsense methods. As quality requirements become more and more exacting the greater will be the trend toward more scientific heating. At present this feature of steelmaking remains an art.

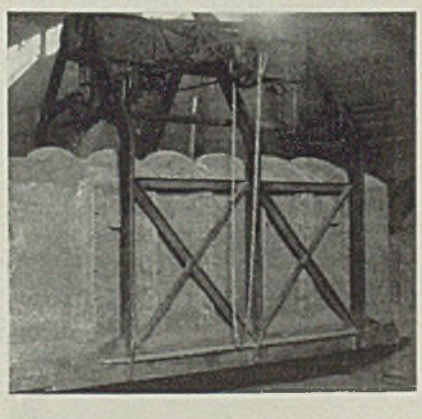
Capacitor System

■ General Electric Co., Schenectady, N. Y., has developed a new series-capacitor system, consisting of a capacitor connected in series with the transformer primary of the resistance welding machine, and of the proper rating to improve the power-factor of the welding circuit. This can be applied to spot, projection, seam and butt resistance welding, and is used with both synchronous and nonsynchronous control. The series-capacitor is made up of individual Pyranol capacitor units mounted in a suitable supporting rack. Racks are available for floor, wall or ceiling mounting.



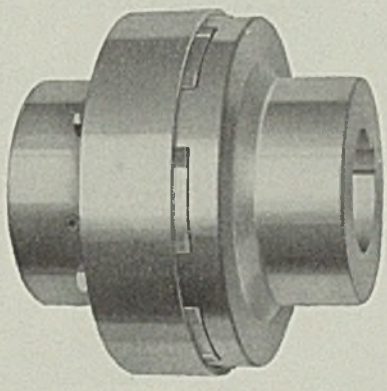
Lifter for Handling Annealing Boxes

■ Cullen-Friestedt Co., 1300 South Kilbourn avenue, Chicago, has placed on the market a new lifter for handling annealing boxes. It is designed to eliminate warping of annealing bottoms when being handled hot. This is accomplished by the use of a continuous angle which engages the bottom in place of the previously used prong. The lifter can be operated by one man and its overall height is held to a minimum, allowing it to pass over other boxes on the floor. The lifter illustrated is of 30-ton capacity and is operated by hand, however, it may be power driven if desired.



Flexible Coupling

◘ Lovejoy Flexible Coupling Co., 4973 West Lake street, Chicago, has introduced a new L-R type H nonlubricated heavy duty flexible coupling, which has 80 per cent greater load carrying capacity. The individual load cushions are free floating between the metal jaws and rest upon the central hub, being secured in place by an endless steel floating cushion retainer. Cushions are free to move and adjust themselves to any momentary position of the jaws. In operation, one half of the cushions are idlers, except on reversing loads. Couplings are available with either of three types of resilient cushioning materials—metalflex, leather load cushions, or multiflex cushions. This particular coupling is made in standard sizes with bores from 1½ to 14 inches (5 to 3000 horsepower at 100 revolutions per minute).

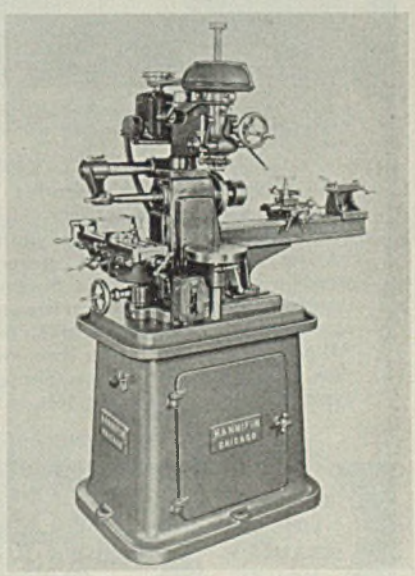


Airless Blast Cleaning Equipment

■ W. W. Sly Mfg. Co., 4700 Train avenue, Cleveland, has introduced two new pieces of equipment, the Centri-Blast rotary mill and Centri-Blast rotary table, for airless blast cleaning. The former is for cleaning rugged castings and the latter is for the more delicate, flat and intricate castings. Abrasive is fed to the wheel in a simple manner, with an initial velocity produced by a small blower. This distributes it uniformly over the blades of the blast wheel. This, plus the centrifugal velocity created by the wheel, results in a more powerful blast. The blast, by being concentrated and directionally controlled, accumulates added force. Machines feature special alloy wear plates on the rotor. Blades are designed and fastened in the wheel so they can be readily changed.

Tool Room Machine

■ Hannifin Mfg. Co., 621 South Kolmar avenue, Chicago, announces a No. 10 tool room machine which combines a lathe, drill press, horizontal milling machine and vertical milling machine in one unit. It may be used for production of many kinds of parts manufactured in small quantities. The lathe bed is mounted on a heavy base and the tail stock has ground gibs on all bearing surfaces for take-up in any direction. Spindle is ball bearing mounted, and is formed to take adapters having B & S No. 10 tapered shank. The compound slide has rapid adjustment features and extra strong tool slide. A 4-inch, 3-jaw universal chuck is furnished together with a 3-jaw No. 6-A Jacobs chuck for the tail stock. The drill press unit has easily acces-



sible controls. Its 9-inch adjustable table is rigidly mounted on the main machine column. Both rapid hand feed and worm drive feed are provided.

The horizontal milling machine has a table which is rigidly fitted to the long bearing with an adjustable gib in the saddle. A large hand wheel with micrometer scale gives rapid vertical feed. The vertical milling machine is adapted to convenient, accurate handling of a complete range of work. Its spindle is chrome nickel steel and is mounted in large ball bearings. Horizontal, vertical and cross feeds have hand wheels fitted with micrometer scales.

Swing Frame Grinding And Polishing Machine

■ Jefferson Machine Tool Co., Fourth, Cutter and Sweeney streets, Cincinnati, has introduced a No. 101 swing frame grinding and polishing machine. It is also utilized (with the usual standard type of buffing wheels) for grinding or polishing sheets, tubing, bars and shapes too large for the usual standard floor lathes.

It can be swung forward and backwards, up and down, rig left, and at any degree of a twist at the spindle head. Tw tion joint can be set at any or locked in any position perm ly.

It will take up to 14 x 2 grinding wheels or 14 x 3-inc fing and polishing wheels. Po head consists of a spindle o carbon steel 1—7/16-inch dia between bearings, 1¼-inch dia at bearings and runs at 2100 r tions per minute. The pulle inches in diameter and carrie inch belt. Belt stretch can be up readily on the sliding ba the motor.

Unit is powered by a 3-hors er fully enclosed alternating-cu motor running at 1750 revol per minute.

Grinding Wheels

■ Atlantic Abrasive Corp., Braintree, Mass., has introduce new type wheels, L.A. and S. general use on aluminum, c zinc, brass, iron, steel and st and for fast, clean grinding loy metals, respectively. wheels are made with a new thetic bond that keeps them under extremely tough grindin ditions.

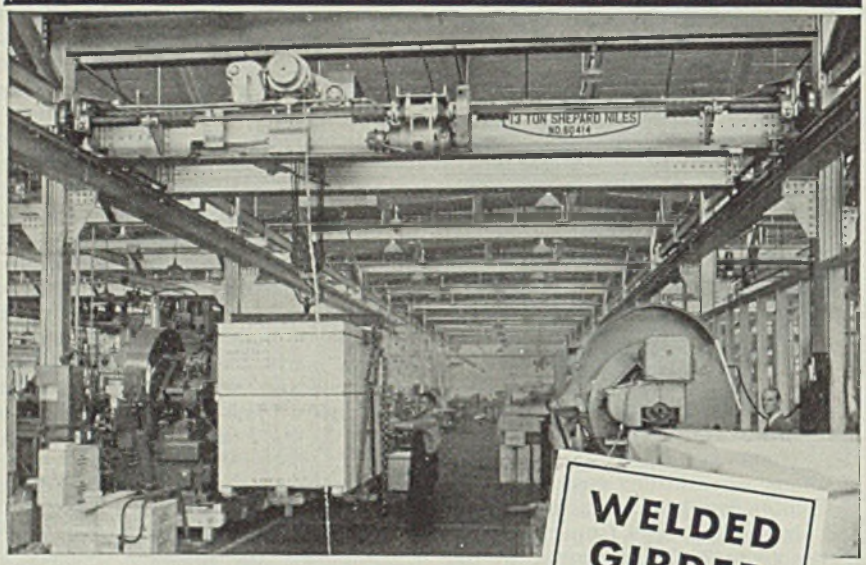
Rotary Print Dryer

■ Warren Electric Appliance Warren, Pa., has developed a r print dryer for drying photo and photographic prints, blue and other wet developed pri has a chromium plated drum will take prints up to 24 x 28 i Prints are placed on the electr heated drum and drum rev This pulls a canvas belt ove prints so that they dry flat and ly in 4 to 8 minutes. The S Commercial model uses 230 alternating or direct current list price is $19.95. A smaller lists at $9.95.

Sensitive Relay

■ Struthers Dunn Inc., 1315 C street, Philadelphia, announces S sensitive relays for exacting cations where a high degree o sitivity must be coupled with speed, low-power operation. operate on only 0.008 watts, current, or 0.10 volt-amperes cycles alternating current. R will operate on as low as one-f of rated power where reduced tact pressure is permissible. crometer adjustment and bal construction of all parts assu pendability, even where vibrati encountered. An antifreeze pi vents sticking of contacts, and

OVERHEAD
Electric Traveling Cranes
CAPACITIES 1 TO 450 TONS



• *Welded Box Girder Crane equipped with Shepard Niles 5-Speed Push Button Control for hoist, trolley and bridge motors.*

WELDED GIRDER TYPE
• CAPACITIES 1 TO 15 TONS
RIVETED BOX GIRDER TYPE
1 TO 450 TONS

● 33 Shepards speed assembly for this machine tool manufacturer. Here again Shepard Niles planned load-handling is paying dividends. Every process that needs a lift is served by a Shepard Niles crane or hoist—production moves swiftly and surely, with never a hitch or a halt. All along the production line—wherever you need a lift—there's a Shepard Niles crane or hoist of the exact type and capacity for the job.

A COMPLETE LINE OF CRANES & HOISTS

SHEPARD NILES CRANE & HOIST CORP.

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

ing friction is minimized by pin bearing and balanced armature. Relays are available in two types, one having contacts separate from coil circuit for general applications and the other with contacts interconnected with the coil circuit for use with contact-equipped galvanometers or sensitive mercurial thermostats.

Wire Wheel Brushes

■ Van Dorn Electric Tools, Towson, Md., announces new whirlwind wire wheel brushes for cleaning castings, removing scale, paint and rust, etc. Brushes are available with wire suitable for coarse or fine work and in a variety of wheel sizes to suit requirements.

Fluorescent Unit

■ Hygrade Sylvania Corp., Salem, Mass., announces the Miralume C-101 fluorescent lighting unit. The lamps and chassis in this unit are housed in a sand-blasted, glass-paneled shade, triangular in cross-sectional shape. Units are available for operation on either 110-125 volts or 220-250 volts, 60 cycle alternating current.

It is available completely assembled and wired, ready to install.

Flange Head Oil Immersion Heater

■ Westinghouse Electric & Mfg. Co., Mansfield, O., has developed a special flange head oil immersion heater for use in high pressure systems.

All of the heater tubes are steel, silver soldered into a cast iron head. Heaters are for both circulating and noncirculating systems. Noncirculating heaters have a rating of 1 to 3 kilowatts for 115 or 230 volts with two heater tubes ranging in length from 14⅞ to 37⅞ inches. Circulating heaters have either two or four heater tubes 33⅜ to 37⅞ inches long with a rating of 5 to 8 kilowatts for 230 volts.

Fire Extinguisher Wall Bracket

■ Pyrene Mfg. Co. Newark N. J., announces a new fire extinguisher wall bracket for keeping extinguisher from swinging or scratching walls and from being knocked down.

It is equipped with a long steel band at the back extending the length of the extinguisher and provides 2-point suspension. The top of the bracket slides into the standard supporting loop on the extinguisher. A semicircular holder fits into and around the apron of the extinguisher at the bottom to prevent sidesway. The extinguisher is held in a firm position but may be removed easily and quickly in emergencies.

Combustion Furnace

■ Harry W. Dietert Co., 9330 Roselawn avenue, Detroit, announces a varitemp combustion furnace for carbon and sulphur determinations of all metals. Having a temperature range up to 2750 degrees Fahr., it also is adaptable for combustion of coal, coke and oils for determination of sulphur with a Leco sulphur determinator.

The furnace uses three Blobar heating elements which are placed equidistant around the outside of the combustion tube. This imparts uniform and efficient heating. A high temperature zone of 6 inches in length is obtained in the tube. The combustion tube is held securely on each end by a clamp faced with an asbestos gland. Electrical wiring, switches and transformer are enclosed and ventilated. Two rotary switches on the front of the furnace select the proper voltage.

The temperature is indicated by

Production Costs Go Down

When you stop the waste of dripping, leaking oil. Because oil always escapes from bearings frequent re-application is necessary. Even so, bearings run dry, get hot and waste power. Breakdowns from worn parts are all too frequent.

Such losses are stopped by NON-FLUID OIL. Drip-less and waste-less, NON-FLUID OIL stays in bearings and lubricates until entirely consumed. It lasts longer and needs less frequent application.

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

NEW YORK & NEW JERSEY LUBRICANT CO.

Main Office: 292 MADISON AVENUE, NEW YORK

WAREHOUSES:

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TRADE MARK REGISTERED IN U.S. PAT. OFFICE & FOREIGN COUNTRIES

NON-FLUID OIL

MODERN STEEL MILL LUBRICANT

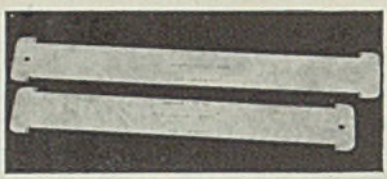
Better Lubrication at Less Cost per Month

a fan-shaped compensated pyrometer meter on the front of the furnace.

As the furnace measures 16 inches in diameter, it allows a heavy wall of insulating brick and Suprex insulation to be used to conserve electrical power.

Go and No-Go Gages

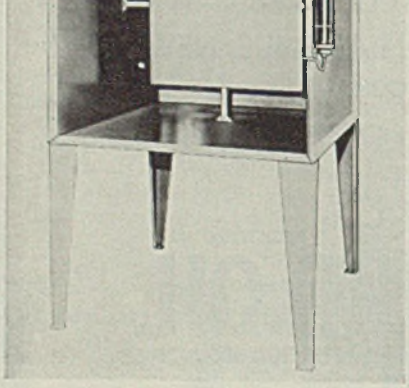
■ McKenna Metals Co., Latrobe, Pa., announces go and no-go gages tipped with Kennametal for gaging of cylinders, tubing and other parts



where dimensions must be held to a close tolerance. They consist of notched steel blanks with small pieces of Kennametal brazed at both ends where the work is measured. Difference in width between the go end and the no-go end on the gages illustrated is 0.002-inch. However, gages can be made to measure any practical tolerance in almost any diameter.

Spray Booth

■ Binks Mfg. Co., 3114 Carroll avenue, Chicago, has announced two low priced, paint spray booths to their Roche low-cost line. Booths are of 22-gage sheet metal compan-



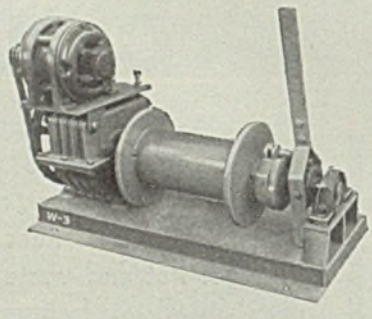
ion flange construction. They are available in one standard size only, width, height and depth being 3 feet 6 inches each. All panels are interchangeable, so exhaust fan can be run out of top, side or back. Price of booth without legs is $27, or $37 complete with 31-inch legs.

Portable Lamp

■ U-C Lite Mfg. Co., 500 North Dearborn street, Chicago, announces a No. 700 big beam portable lamp which projects a ray over 2000 feet. It is constructed with a 6-inch parabolic silvered reflector, prefocused bulb and simple head focus without adjustments of any kind. It operates on four No. 6 dry cells at maximum efficiency on any all night jobs.

Speed Reducer Winch

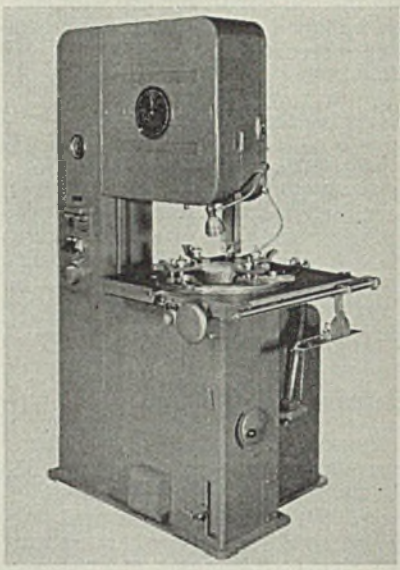
■ Stephens-Adamson Mfg. Co., Aurora, Ill., has added to its line of hand and motor winches a new Saco speed reducer winch for han-



dling very small or large capacities. Its feature is a jaw clutch which releases the pulling rope when disengaged. The speed reducer incorporated enables the speed of the drum to be determined by placing the proper size sheave on the motor drive shaft of the reducer, since first reduction of the unit takes place through adjustable V-belts. Second reduction is through cut steel helical gears inside the cast iron housing.

Sawing Machine

■ Continental Machines Inc., 1301 Washington avenue, Minneapolis, has placed on the market a new Super Doall sawing machine which not only draws the work into the saw but controls the curvature of the cut mechanically with a hand wheel. It accommodates saws 1-inch wide as well as the usual range of narrow saws used in contour sawing. Saw guides hold any thickness of band that is used on the machine. The Machine is furnished with three widths of file bands and three abrasive polishing bands. Saws and files and polishing bands are all guarded to the point of work. A 1½-horsepower motor is incorporated in the base of the cabinet. A ¼-horsepower motor in the column operates the grinder for the automatic bu welder. Other features include i luminated magnifying attachmer and remote control push butto



starting switch. This model is fu nished complete with cut-off an mitering attachment, automatic dis cutting attachment, rip fence, ele tric etching pencil, table tilt con pensator and a heavy work slide.

Water Valves

■ Albright Equipment Co., 9 Crafts building, Pittsburgh, a nounces a series of Hydra valv for use in hydraulic presses and m chinery. They may be used on w ter, steam and oil lines, havi pressures up to 4000 pounds p square inch. Internal parts are

stainless steel construction an electric solenoids with push butto control. Valves are made in thr body types, brass, bronze, and stee standard sizes include ½, ¾, 1, 1 1¼ and 2-inch diameters. Larg sizes are available.

Advertisement

JULY, 1940

COPPER ALLOY BULLETIN

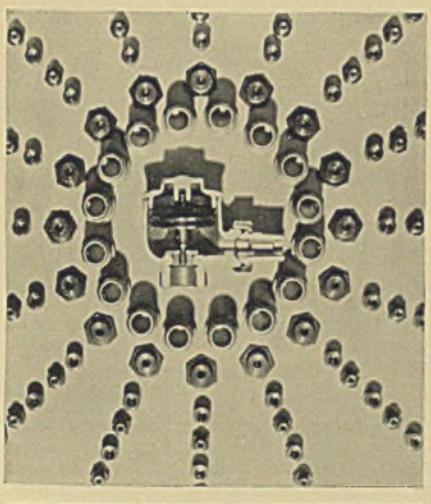
REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by the Bridgeport Brass Co. "Bridgeport" *Headquarters for BRASS, BRONZE and COPPER*

Ledrite Rod Speeds Production of Traps

Ledrite* (free-cutting brass rod) meets all production and design requirements in many parts of the 7M Thermostatic Traps made by Warren Webster & Company. These unusual traps, used for process steam applications and on the radiators of Webster Steam Heating Systems, are fully compensated for pressure, and operate efficiently at any point over their entire pressure range.

Parts made from Ledrite include upper and lower thermostat hubs, union nipple, and seat casing. Ledrite, developed by Bridgeport especially for automatic screw machine work, offers exceptional opportunities for high-speed production.



Memos on Brass—No. 11

Brass often proves to be more economical than other materials that are lower in initial cost. In many applications the ease and speed with which brass can be fabricated more than offset a differential in first cost.

Fine Bronze Screens Shut Out Sun's Heat

New screens that are said to exclude the heat of the sun without shutting off light, view, or breeze promise a new measure of relief on sweltering summer days. The screens, says the maker, are like Venetian blinds—but with the slats the width of a pencil lead, and the thickness of a sheet of paper. Vertical wires hold the flat horizontals at a fixed angle that lets in the light, keeps out direct radiation. The screens are made from bronze to assure long life when exposed to weather conditions.

Copper and Its Alloys Are Easily Colored by Chemical Treatments

Attractive Tones Range Through Browns to Black; Reds, Blues, and Antique Finishes Can Be Obtained

While the natural colors of brass and copper are an important factor in their popularity, there are many cases in which the fabricator desires to color these metals artificially. This is a relatively simple process, for the copper alloys readily lend themselves to a variety of chemical treatments that produce attractive colors.

Factors Affecting Color

A few preliminary cautions should be noted. In general, copper and high copper alloys are more readily colored than the low copper alloys, and the color obtained is affected by the copper content. Immersion time and temperature also affect the color, and it is usually desirable to arrive at the proper conditions through experiment. The work must always be absolutely clean to obtain satisfactory results.

Brown and Black Colors

A versatile solution applicable to copper and to alloys containing at least 85% copper has the following proportions:

Hot water	1 gal.
Potassium sulfuret	2 oz.
Caustic soda	3 oz.

Use solution hot at 160° to 180° F. Tones develop in this order: brownish, reddish bronze, bluish black, and black. The work is removed when the desired tone is reached, and then washed thoroughly. Scouring with pumice and water or oil or scratch brushing develops additional tones and finishes.

A solution that will produce a black color on brass containing less than 85% copper (including leaded brass) is prepared as follows: Dissolve 8 ounces of copper carbonate in 1 pint of 26° Baumé ammonia water. Add to 1 gallon of water heated to 150° F. Then add 4 ounces of crystal sal soda. Use at 150° F.

Red Tones

The striking color known as "Royal Red" can be produced on copper by heat treatment after lead plating, but for production work it is more practicable to immerse the work in molten sodium nitrate. The work is then dipped in paraffin oil, dried in sawdust, and buffed on a soft wheel with rouge.

Brass can be given a red color with the following solution:

Iron nitrate	6 oz.
Sodium hyposulphite	6 oz.
Water	1 gal.

Reaction is accelerated by heating solution to 170° F. Changing the proportions to 2 ounces of iron nitrate and 8 ounces of sodium hyposulphite produces a green color.

Artificially Produced Patina

The extremely attractive patina developed on copper after exposure to the weather has been the subject of considerable study, and many attempts have been made to produce the patina artificially.

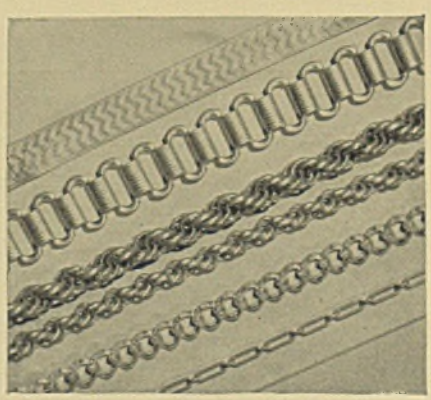
One method which is reported to give highly satisfactory results was developed after several years of research work. Space does not permit a full description of the process, but Bridgeport will gladly refer readers to a source from which complete details can be obtained.

The formulas given in this article represent only a small percentage of the solutions that have given satisfactory results. A radically different method of metal coloring is the relatively new patented process in which, using a single solution with the aid of current, an extraordinary variety of colors can be produced.

Brass a Favorite in Jewelry Manufacture

The attractive color of brass and the ease with which it can be fabricated, polished, or plated make it a leading choice in the manufacture of jewelry. An outstanding advantage of brass is the fact that its color can be varied over a wide range by careful control of its composition. If desired, the color of gold can be closely simulated.

Typical of the attractive jewelry that can be made from brass are the chains illustrated, manufactured by Universal Chain Co., Inc



ALLOYS OF COPPER

This is the thirteenth of a series of articles on the properties and applications of the copper alloys, and continues the subject of Common High Brass.

COMMON HIGH BRASS

As pointed out in last month's article, Common High Brass is the most widely used alloy of copper and zinc for fabricating purposes, because it is the most economical alloy suitable for severe cold working.

The reasons for the wide use of Common High Brass can be clearly seen by reference to the accompanying curves. It will be noted that the properties which can be obtained cover a wide range. Typical applications of Common High Brass include electrical fittings, flashlight parts, and automobile hardware. Large quantities of Common High Brass are employed for the manufacture of screws, rivets, and similar products by the cold heading process.

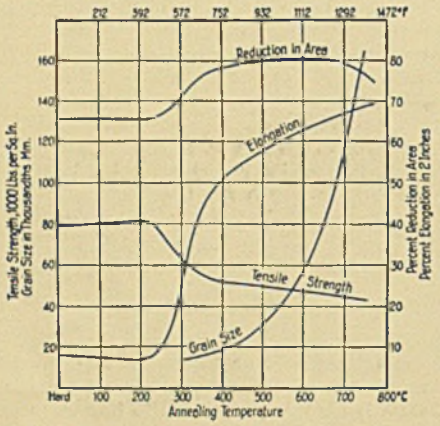


Fig. 1—Effect of Annealing Temperatures on Properties of Common High Brass.

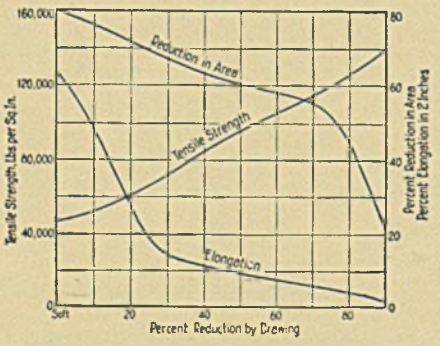


Fig. 2—Effect of Cold Drawing on the Properties of Common High Brass.

Copper, Bronze Extend Life of Relief Valves

Bronze for the valve body and copper for the diaphragm give the best service and longest life in diaphragm relief valves, in the opinion of J. E. Lonergan Co., manufacturer of the popular DRV Model.

Designed primarily to meet the requirements of the A. S. M. E. Code for Unfired Pressure Vessels, the valve is used solely for water relief purposes, and a high degree of resistance to corrosion is extremely important. By using copper and bronze, Lonergan produces a valve that is superior in service life to similar valves employing materials more likely to deteriorate.

Brass Finds Wide Use In Wheatstone Bridges

Brass is practically the only metal to be found in the precision Anthony-Pattern Wheatstone Bridge manufactured by Leeds & Northrup Company. Said to be the most accurate general-purpose bridge manufactured in this country, it is extensively used by research and testing laboratories to check and maintain resistance standards.

Brass parts in the Anthony-Pattern Bridge include bindingposts,plugblocks, bars, plugs, screws, and even the forms on which the resistor coils are wound.

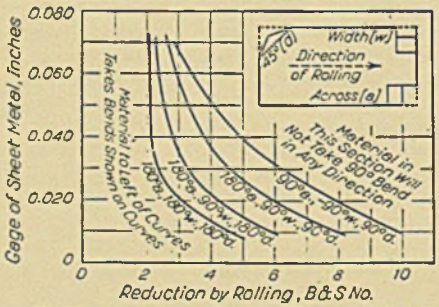


Fig. 3—Approximate Bending Characteristics of Common High Brass Sheet.

NEW DEVELOPMENTS

Plating power is said to be available from a new light-weight unit especially suitable for small plants, experimental work, or small jobs in large plants. Unit delivers 4 amperes at 7½ volts on continuous load; operates on alternating current only. **(No. 60)**

New lock-nuts are designed for insertion in sheet metal to increase the thread area. They are said to permit the use of lighter gage metals and to simplify assembly. It is said that they can be clinched to the metal by a swaging tool. **(No. 61)**

A liquid filter for plating solution is mounted, together with pump and motor, on a caster-equipped truck to form a complete portable unit. Capacities are said to range from 5 to 30 gpm. **(No. 62)**

Numbering plates for gates, plant equipment, etc., are cast in one piece from acid-resisting bronze. Maker says they can be supplied in sizes up to 3x2 feet in any style or combination of letters and figures. Letters and figures are raised for high visibility. **(No. 63)**

Immersion heaters are said to be especially designed for heating alkaline plating solutions. They are made in circulating and non-circulating types. Capacities range from 1 to 3 kw for non-circulating type; from 5 to 8 kw for circulating. **(No. 64)**

New goggles are said to be designed particularly for gas welders who must wear vision-correcting glasses. Goggles fit snugly over any type of glasses, it is claimed, and protect the eyes against sparks and glare. **(No. 65)**

A polishing machine has a jointed radial arm that extends horizontally from wall mounting plate, and mounts a vertical shaft at its outer end. Arm assembly is said to provide sufficient movement to enable operator to cover area 4 feet square. **(No. 66)**

Smooth cores for casting non-ferrous metals can be made by treating the cores with a new wetting agent, it is claimed. The wetting agent is used in a solution that also includes molasses, graphite, and water. **(No. 67)**

Three-ply rubber lining is said to be suitable for lining bright nickel plating tanks. Lining is reported to consist of a layer of hard rubber cushioned between two layers of soft rubber, the three being vulcanized to form an integral unit. Installation is made by the manufacturer's technicians. **(No. 68)**

This column lists items manufactured or developed by many different sources. Further information on any of them may be obtained by writing Bridgeport Brass Company, which will gladly refer readers to the manufacturer or other source.

PRODUCTS OF THE BRIDGEPORT BRASS COMPANY

Executive Offices: BRIDGEPORT, CONN.—Branch Offices and Warehouses in Principal Cities

SHEETS, ROLLS, STRIPS—*Brass, bronze, copper, Duronze,** for stamping, deep drawing, forming and spinning.

CONDENSER, HEAT EXCHANGER, SUGAR TUBES—For steam surface condensers, heat exchangers, oil refineries, and process industries.

PHONO-ELECTRIC* ALLOYS—High-strength bronze trolley, messenger wire and cable.

WELDING ROD—For repairing cast iron and steel, fabricating silicon bronze tanks.

LEDRITE* ROD—For making automatic screw machine products.

"Bridgeport" BRASS CO. *Established 1865*

COPPER WATER TUBE AND FITTINGS—For plumbing, heating, underground piping.

DURONZE ALLOYS—High-strength silicon bronzes for corrosion-resistant connectors, marine hardware; *hot rolled sheets* for tanks, boilers, heaters, flues, ducts, flashings.

BRASS, BRONZE, DURONZE WIRE—For cap and machine screws, wood screws, rivets, bolts, nuts.

FABRICATING SERVICE DEPT.—Engineering staff, special equipment for making parts or complete items.

BRASS AND COPPER PIPE—"Plumrite"* for plumbing, underground and industrial services.

*Trade-name.

BRIDGEPORT BRASS

Canadian Steel Production at All-Time Peak: Capacity Expanded

■ CANADA'S production of steel ingots and castings during May totaled 174,417 gross tons, an all-time monthly high, with Dominion plants operating at virtual capacity. Demands made upon steel producers are still increasing as Canada's war program gathers further momentum.

Plant expansions and enlargements, undertaken to increase steel production for war needs, will have increased the country's steelmaking capacity more than 30 per cent by the end of this year. Nearly all mills have either already completed or are engaged in construction and expansion programs.

Steel production during first five months this year totaled 792,033 tons, also an all-time record, compared to 472,239 tons in corresponding 1939 period. April output was 153,451 tons; in May, 1939, 121,033 tons.

May pig iron production totaled 93,254 gross tons, compared with 84,210 in previous month and 57,746 tons in May, 1939. Output included basic iron, 78,553 gross tons; malleable, 6787, and foundry, 7914 tons. Cumulative production for five months including May was 460,971 tons, compared to 243,716 in same period last year.

Ferroalloy output in May declined 28 per cent to 10,272 tons from April's total, 13,989 tons. Production in May, 1939, was 4925 tons.

Seven blast furnaces were active May 31, with one out for relining, compared to eight in blast April 30. Last week three stacks were down.

Steel interests declare sales are holding at a high rate, with demand widely diversified. Sharp increases in requirements for war purposes have more than offset any tendency towards decline in demands for domestic consumption. Mills continue to push forward delivery dates on sheets, plates and merchant bars, with heavy booking on these materials reported into third quarter. New booking continues at a rapid pace. Dominion government is likewise spending large sums on tools, plants and equipment to facilitate production of war *materiel*.

C. D. Howe, munitions and supply minister, Ottawa, reports negotiations for purchase of airplane engines totaling $8,000,000 from United States have been completed. Engines will be for installation in Canadian-built Fleet and Anson trainers, are expected to expedite British Commonwealth air training program. Delivery is to start immediately, with all engines available within ten months.

Munitions and supply department, Ottawa, last week reported placing 849 new contracts; total value was $9,482,494.

Government Agencies Study Steel Needs

(*Concluded from Page* 23)

is plenty of steel capacity to take care of government steel needs, in addition to regular business. There are certain exceptions to this, notably armor plate.

Mr. Stettinius has stated that a "quick" survey will be made of all industries dealing with the present emergency following which it is probable that he will call some of the industries into conference. The steel industry, of course, is included.

Main objective of the iron and steel division of the advisory commission at this particular time at least is to act as a liaison between the steel industry and the advisory commission of the defense council. In other words, if Mr. Stettinius and his organization desire any information on the steel industry, he will apply to Mr. Tower and if members of the industry on the other hand want information from the commission, they will contact Mr. Tower. At the moment the steel division consists only of Mr. Tower as chief and W. A. Hauck. This organization will be increased as the demands upon it increase. Mr. Tower now spends several days a week in Washington. Mr. Hauck spends all of his time in Washington.

National Defense Speed Hinges on Standards

(*Concluded from Page* 26)

Pittsburgh; and John A. Roeblings' Sons Co., Trenton, N. J.

Honorary memberships were awarded to Cloyd M. Chapman, consulting engineer, New York; H. E. Smith, materials engineer, White Plains, N. Y.; and Thomas R. Lawson, head, department of civil engineering, Rensselaer Polytechnic Institute, Troy, N. Y.

William M. Barr, chief chemical and metallurgical engineer, Union Pacific railroad, Omaha, Nebr., was elected president for the 1940-41 term. Herbert J. Ball, professor of textile engineering, Lowell Textile Institute, Lowell, Mass., was named vice president for two years. G. E. F. Lundell, chief, chemistry division, national bureau of standards, Washington, elected a vice president in 1939, continues in that post for another year.

Five new members of the executive committee were named as follows: C. H. Fellows, head, chemical division, research department, Detroit Edison Co., Detroit; Jerome Strauss, vice president, Vanadium Corp. of America, New York; Paul D. Merica, vice president and director, International Nickel Co. Inc., New York; Stanton Walker, director, engineering and research division, National Sand and Gravel association, Washington; and Roger C. Griffin, treasurer, Arthur D. Little Inc., Cambridge, Mass.

Continuing on the committee are: J. J. Allen, chief chemist, Fall River plant, Firestone Tire & Rubber Co., Fall River, Mass; T. S. Fuller, engineer of materials, works laboratory, General Electric Co., Schenectady, N. Y.; M. A. Swayze, director of research, Lone Star Cement Corp., Hudson, N. Y.; J. L. McCloud, metallurgical chemist, Ford Motor Co., Dearborn, Mich.; and R. D. Bonney, assistant manager of manufacturing, Congoleum-Nairn Inc., Kearny, N. J.

The next spring meeting and group committee meetings will be held in Washington, March 3-7, 1941. Next annual meeting is scheduled for Chicago, June 23-27, 1941.

Philadelphia Steel Club Holds Annual Outing

■ Steel Club of Philadelphia held its annual outing June 21, at Aronimink club, Philadelphia. Several hundred representatives of leading steel producing and consuming companies joined in an afternoon of golf and a dinner in the evening.

Registration committee included: S. H. Baker, Sharon Steel Corp., chairman; R. H. McCracken, Central Iron & Steel Co.; Paul King, Worth Steel Co., and Gerald Boyd, Youngstown Sheet & Tube Co.

Starting committee was composed of: Roger Clapp, John A. Roebling's Sons Co., chairman; William Steytler, Jones & Laughlin Steel Corp.; Frank Shants, Lukens Steel Co.; L. L. Anderson, American Steel & Wire Co.; A. MacLean Jr., Rustless Iron & Steel Corp., and P. B. Burtis, Bethlehem Steel Co.

Robert Saunders, Weirton Steel Co., W. O. Lange, Phoenix Iron Co., and A. M. Wortley, American Rolling Mill Co., formed the stunt committee. H. W. Merriman, Alan Wood Steel Co. and C. H. Stoeckle, Crucible Steel Co., were the prize committee.

Inter-Plant Handling

(*Concluded from Page* 50)

onstrated in a short period of operation, will be increased materially upon completion of an expansion program costing in excess of $500,000, recently planned for the Mansfield plant.

A major item in the building program will be construction of a new metal stamping building adjacent to the vitreous plant. The benefit of this in simplification of manufacturing operations is obvious, since it will remove the need for double handling.

Steel and other materials will be unloaded from freight cars directly into the new building. Range bodies and parts, refrigerator cabinets, and other ware will be stamped out there and enameled in the adjacent vitreous plant. After enameling, they will be carried as needed by the conveyors on the new bridge to the assembly lines in the main plant.

♦

Ryerson Now Handling New Steel Alloy

■ SAE 4815, a new carburizing nickel-molybdenum steel, which recently has come into prominence for heavy duty gear and shafting applications, is now being carried in stock by Joseph T. Ryerson & Son Inc., Sixteenth and Rockwell streets, Chicago.

In the normalized condition, the steel's machining properties compare with SAE 4615 and 2315 in respect to cutting speeds and finish. Carburizing practice is much the same as for SAE 2315. Although some shops are quenching direct, the single quench from above the core critical after slow cooling from the carburize temperature is preferred. Its distortion compares with SAE 2315 or 4615.

Outstanding advantage of this new alloy is the high core strength which may be developed by the single quench treatment. In sections up to 1-inch tensile values up to 200,000 pounds per square inch and yield strengths in the neighborhood of 165,000 pounds per square inch may be developed in the core together with a hardness up to 415 brinell, providing excellent backing for the case under crushing loads. The case provides good resistance to wear, spalling and pitting fatigue.

Besides heavy duty parts, this steel is recommended for miscellaneous stressed parts of trucks, airplane motors, tractors, pneumatic and machine tools and similar applications. It is available from Ryerson in hot rolled rounds (not annealed) in diameters ranging from ½ to 6 inches inclusive.

Milk Cooler Features Stainless Construction

■ A large capacity milk cooler recently announced by York Ice Machinery Corp., York, Pa., features nearly 100 per cent stainless steel construction, both inside and out. Ammonia headers, cabinet bottom support and gravity-feed system are the only parts of the cooler that are not of stainless. The milk cooling sections are die-stampings, welded and polished. Besides being attractive and compact, the cooler can be cleaned quickly and easily.

♦

New V-Belt Ratings

(*Concluded from Page* 60)

"D" belt operating on a 12.6-inch pitch diameter sheave is much like bending a wire back and forth between your fingers. The friction from flexing causes heat to be generated inside the belt. As a result, the belt disintegrates rapidly to a point where it finally breaks. Running the belt on a comparatively small sheave causes excessive friction on the pitch line, and disintegration there may ruin the belt long before it has had a chance to give satisfactory service.

But by using proportionately larger diameter sheaves such as a "C" belt on a 12.6-inch pitch diameter sheave, the friction and heat are almost entirely eliminated and what heat is developed is easily dissipated, thus causing no damage. This results in longer belt life. At the same time, each belt has a chance to give its whole strength to pulling the load instead of sharing its pull with heat and friction.

It becomes evident that large diameter sheaves for V-belt drives are the best to use from every angle, whether it is original cost, maintenance or long life. The new belt ratings with larger sheave diameters thus are a help in obtaining the most satisfactory V-belt drive.

Three-Section Furnace

(*Concluded from Page* 64)

lowed to drain and are fed directly onto the chain belt conveyor of the tempering section where they are brought up to desired temperature and held for a soaking period, after which they pass into hoppers where they cool slowly or where they may be quenched again if required. Tempering section also is under automatic control with a maximum range of 1300 degrees Fahr. Four pyrometers and 16 thermocouples serve to regulate and record the heat-treating temperatures.

While bright heat treatment has not been attempted, good regulation of furnace atmosphere is obtained. Both high temperature section and the tempering unit are heated under as well as over the hearth to insure maximum uniformity. The furnace was designed by Horace C. Knerr, president, and built by the company.

"HERCULES" RED-STRAND WIRE ROPE
REG. U.S. PAT. OFF.

You Can Depend On "Hercules" (Red Strand) Wire Rope

Highlights of Quality
1. Acid Open-Hearth Steel Wire
2. Rigid Tests and Inspections
3. Correct Manufacturing Methods
4. Furnished in both the Round and Flattened Strand constructions, in either Standard or Preformed Type.

• • *Results are what count, and the performance record of this wire rope continues to make and hold friends.*

MADE ONLY BY
A. LESCHEN & SONS ROPE CO.
WIRE ROPE MAKERS — ESTABLISHED 1857
5909 KENNERLY AVENUE — ST. LOUIS, MISSOURI, U. S. A.

NEW YORK 90 West Street
CHICAGO 810 W. Washington Blvd.
DENVER 1554 Wazee Street
SAN FRANCISCO 520 Fourth Street
PORTLAND 914 N. W. 14th Avenue
SEATTLE 3410 First Avenue South

Steel Deliveries Are Being Extended

Consumers increase inventory to protect against shortage. Defense needs not yet defined. Railroads continue heavy buying

MARKET IN TABLOID ★

Demand
Strong; deliveries delayed in some products.

Prices
Generally firm; scrap shows weakness.

Production
Up 1 point to 89 per cent.

■ ALTHOUGH practically none of the expected heavy steel requirements for national defense has reached steel mills production continues at a rate within reaching distance of practical capacity.

Announcement by the British buying commission that Great Britain will assume all the French contracts for war materials, with small changes in specifications, has reassured steelmakers on that score and production will proceed at once. Other export tonnage is appearing in the American market following drying up of usual European sources of supply.

In addition to airplanes and munitions the defense program will bring out heavy requirements for industrial expansion and shipbuilding, plans for the latter involving an unprecedented number of ships for which steel tonnage will be immense, though required over a long period.

Accumulation of mill backlogs under present active buying is indicated by steady advancement of delivery dates, now several weeks in the future on some products. In general buyers are adding to inventory as a safeguard against expected curtailment of supplies as defense measures bring tonnage to mills, with perhaps priority provisions. Warehouses are also adding to stocks for the same reason.

Railroad buying has become an important factor, with cars, locomotives and rails being booked in unusual volume for this season. While car purchases last week were not equal to those of the two preceding weeks important inquiries have come out for early closing, including 3000 cars for the Illinois Central, 2275 for the Southern Pacific, 1550 for Norfolk & Western and 2345 freight and eight passenger cars for the Pennsylvania. Placing of 46,000 tons of rails by the Chesapeake & Ohio and Nickel Plate is the first large purchase of the present movement. Norfolk & Western plans to buy 25,000 tons and a Brazilian railway has placed 22,500 tons with Inland Steel Co., pending completion of credit arrangements, an Inland vice president having gone to Rio Janeiro to close the deal. The Santa Fe has placed two 54,000-horsepower locomotives for road freight service and the Pennsylvania plans to buy two steam locomotives.

Structural and concrete reinforcing steel inquiries and bookings bear striking evidence of growing industrial preparations for defense measures by private enterprise and government agencies. While no unusually large single tonnages have been closed the number of plant additions and army and navy structures is of moment. Some fabricators have been booking tonnage to the point they are well filled and competition, especially in reinforcing bars, is much less, giving more stability to prices.

Automobile production continues to give way slowly to the seasonal recession, 87,550 units being made last week, compared with 90,060 the preceding week. In the corresponding week last year output was 70,663 cars.

Scrap prices have weakened under pressure of heavy supplies and return of some tonnage bought for export and now diverted to domestic channels since shipment is interfered with. In face of continued high steel production many observers regard this as a correction and believe it will be only temporary. The composite price of steelmaking grades dropped 71 cents last week, to $19.04, the first decline since the second week in April. The finished steel composite is unchanged at $56.60 but the iron and steel composite fell four cents, to $37.76, because of lower scrap prices.

Advance of $1 per ton in pig iron price by the Utah furnace has not been reflected in the eastern market and no indication has been given as to future prices. Most melters are covered for third quarter and buying is light but shipments are increasing steadily. Foundries in some cases are adding to stocks as protection against possible future shortage.

Steelworks operations last week advanced 1 point to 89 per cent of capacity as all districts but two held or improved their rate. Chicago dropped 1 point to 92 per cent and Cincinnati 4½ points to 81 per cent. Unchanged rates held at Birmingham, 88; Wheeling, 90; Buffalo, 90½; Eastern Pennsylvania, 83. Detroit gained 3 points to 92 per cent, St. Louis 2½ points to 70½, Cleveland 1 point to 85½, Pittsburgh 1 point to 82, New England 15 points to 85 and Youngstown 2 to 80 per cent.

COMPOSITE MARKET AVERAGES

	June 29	June 22	June 15	One Month Ago May, 1940	Three Months Ago March, 1940	One Year Ago June, 1939	Five Years Ago June, 1935
Iron and Steel	$37.76	$37.80	$37.76	$37.33	$37.07	$35.69	$32.42
Finished Steel	56.60	56.60	56.60	56.60	56.50	55.70	54.00
Steelworks Scrap..	19.04	19.75	19.33	17.18	16.47	14.49	10.45

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

	June 29, 1940	May 1940	Mar. 1940	June 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	2.45

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

	June 29, 1940	May 1940	Mar. 1940	June 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	105.33	105.33	85.33

Scrap

Heavy melt. steel, Pitts.	$20.25	$18.00	$17.05	$15.00
Heavy melt. steel No. 2, E. Pa.	18.00	16.00	15.90	13.10
Heavy melting steel, Chicago	17.75	16.65	15.50	13.40
Rails for rolling, Chicago	22.25	20.45	18.25	17.65
Railroad steel specialties, Chicago	21.75	19.75	18.40	15.30

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 stp.	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.	1.90c
Gulf ports	2.25c
Pacific Coast ports	2.30c

Rail Steel Bars, Base

Pittsburgh, Gary Chicago, Buffalo, Cleveland, Birm.	1.80c
Gulf ports	2.15c
Pacific Coast ports	2.20c

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 tie, (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

Alloy S.A.E.	Diff.	Alloy S.A.E.	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 30 cents.

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.
½-inch and less.	67	70
⅝-1-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
⅜-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
2½" O.D.	12	16.01	18.45
2½" O.D.	12	17.54	20.21
2¾" O.D.	12	18.59	21.42
3" O.D.	12	19.50	22.48
3½" O.D.	11	24.62	28.37
4" O.D.	10	30.54	35.20
4½" O.D.	10	37.35	43.04
5" O.D.	9	46.87	54.01
6" O.D.	7	71.96	82.93

Cast Iron Pipe

Class B Pipe—Per Net Ton

6-in., & over, Birm.	$45.00-46.00
4-in., Birmingham	48.00-49.00
4-in., Chicago	56.80-57.80
6-in. & over, Chicago	53.80-54.80
6-in. & over, east fdy.	49.00
Do., 4-in.	52.00

Class A Pipe $3 over Class B
Stnd. fittgs., Birm., base $100.00

Semifinished Steel

Rerolling Billets, Slabs

(Gross Tons)

Pittsburgh, Chicago, Gary, Cleve., Buffalo, Young., 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 41/64-in. incl.	2.15

Worcester up $0.10; Galveston up $0.25; Pacific Coast up $0.50.

Skelp

Pitts., Chi., Youngstown, Coatesville, Sparrows Pt.	1.90c

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur.	$4.35- 4.60
Connellsville, fdry.	5.00- 5.75
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
Birdsboro, Pa.	24.00	24.50	23.50	25.00
Birmingham, Ala.§	19.38	.....	18.38	24.00
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	21.00	.....	.....	.....
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
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

‡Subject to 38 cents deduction for 0.70 per cent phosphorus or higher.

	No. 2 Fdry.	Malleable	Basic	Bessemer
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	20.00
Do. barge	20.00
No. 2 lump	21.00

Ferroalloy Prices

Ferromanganese, 78-82%, carlots, duty pd. $120.00
Ton lots 130.00
Less ton lots 133.50
Less 200 lb. lots 138.00
Do., carlots del. Pitts. 125.33

Spiegeleisen, 19-21% dom.
Palmerton, Pa., spot 36.00
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. tl., 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%, tl., 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% tl., 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: SAE 2300	Cold Drawn Bars: SAE 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	3.85	3.75	4.25	3.55	3.55	5.25	3.35	4.05	4.25	3.31	4.06	8.56	7.16
Baltimore	3.95	4.05	4.45	3.70	3.70	5.25	3.55	....	5.05	....	4.05	....	....
Norfolk, Va.	4.15	4.25	....	3.90	3.90	5.45	3.75	....	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	3.23	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	3.62	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	5.83	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

	SAE 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	4.10	....	....	....	....
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	3.85	....	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; 10 to 24 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 Rates of Exchange, June 27

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 Channel or North Sea ports, gross tons‡‡ **Quoted in gold pounds sterling	£ s d
Foundry, 2.50-3.00 Si.	$23.52	6 0 0	$33.23		3 18 0
Basic bessemer	.....	.....	.....		.....
Hematite, Phos. .03-.05	24.50	6 5 0	.....		.....
Billets	.....	.....	$31.95		3 15 0
Wire rods, No. 5 gage	.....	.....	60.71		7 2 6
Standard rails	$41.16	10 10 0	$48.99		5 15 0
Merchant bars	2.43c	13 10 0	2.77c		7 6 0
Structural shapes	2.25c	12 10 0	2.83c		7 9 0
Plates, †¼ in. or 5 mm.	2.39c	13 5 0	3.53c		9 6 0
Sheets, black, 24 gage or 0.5 mm	3.66c	17 0 0	2.98c		7 17 0°
Sheets, gal., 24 ga., corr.	3.66c	20 6 3	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.	$ 5.97	1 10 6	.....		.....

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.	$21.76	5 11 0(a)	$17.18	788	$31.44	950	$25.33	63
Basic bess. pig iron	20.48	5 4 6(a)	.....	.....	29.79	900	27.94	(b) 69.50
Furnace coke	6.20	1 11 8	4.91	225	10.92	320	7.64	19
Billets	36.75	9 7 6	26.62	1,221	42.20	1,275	38.79	96
Standard rails	2.01c	11 3 0	1.69c	1,692	2.06c	1,375	2.38c	132
Merchant bars	2.52c	14 0 0††	1.53c	1,530	2.06c	1,375	1.98c	110
Structural shapes	2.23c	12 8 0††	1.49c	1,487	2.06c	1,375	1.93c	107
Plates, †¼-in. or 5 mm.	2.25c	12 10 0††	1.95c	1,951	2.42c	1,610	2.29c	127
Sheets, black	3.15c	17 10 0§	2.30c	2,295‡	2.85c	1,900‡	2.59c	144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.	3.75c	20 16 3	3.59c	3,589	4.80c	3,200	6.66c	370
Plain wire	3.51c	19 10 0	2.34c	2,340	3.00c	2,000	3.11c	173
Bands and strips	2.66c	14 15 0††	1.71c	1,713	2.48c	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.	16.00
Bos. dock No. 1 exp.	16.25-16.75
New Eng. del. No. 1	16.00-16.25
Buffalo, No. 1	19.00-19.50
Buffalo, No. 2	17.50-18.00
Chicago, No. 1	17.50-18.00
Chicago, auto. no alloy	16.50-17.00
Cincinnati, dealers.	15.50-16.00
Cleveland, No. 1	19.00-19.50
Cleveland, No. 2	18.00-18.50
Detroit No. 1	†16.00-16.50
Detroit No. 2	†15.00-15.50
Eastern Pa., No. 1.	19.00-20.00
Eastern Pa., No. 2.	18.00
Federal, Ill., No. 2	15.00-15.50
Granite City, R. R. No. 1	16.00-16.50
Granite City, No. 2.	15.00-15.50
Los Ang., No. 1, net	13.00-13.50
Los Ang., No. 2, net	12.00-12.50
N. Y. dock No. 1 exp.	16.00
Pitts., No. 1 (R. R.)	21.50-22.00
Pittsburgh, No. 1	20.00-20.50
Pittsburgh, No. 2	19.00-19.50
St. Louis, No. 1	16.00-16.50
St. Louis, No. 2	15.00-15.50
San Fran., No. 2 net	13.00-13.50
San Fran., No. 2 net	12.00-12.50
Seattle, No. 1	16.00
Toronto, dirs., No. 1	11.00
Valleys, No. 1	20.00-20.50

COMPRESSED SHEETS

Buffalo, new	18.00-18.50
Chicago, factory	17.00-17.50
Chicago, dealers	15.50-16.00
Cincinnati, dealers.	14.75-15.25
Cleveland	18.50-19.00
Detroit	†17.50-18.00
E. Pa., new mat.	19.00-19.50
E. Pa., old mat.	15.50-16.00
Los Angeles, net	10.00-10.50
Pittsburgh	20.00-20.50
St. Louis	13.00-13.50
San Francisco, net	10.00-10.50
Valleys	19.25-19.75

BUNDLED SHEETS

Buffalo, No. 1	17.00-17.50
Buffalo, No. 2	15.50-16.00
Cleveland	15.50-16.00
Pittsburgh	19.00-19.50
St. Louis	11.00-11.50
Toronto, dealers	9.75

SHEET CLIPPINGS, LOOSE

Chicago	12.50-13.00
Cincinnati, dealers.	10.50-11.00
Detroit	†14.00-14.50
St. Louis	10.00-11.00
Toronto, dealers	9.00

BUSHELING

Birmingham, No. 1.	15.00
Buffalo, No. 1	17.00-17.50
Chicago, No. 1	16.50-17.00
Cincin., No. 1 deal.	12.00-12.50
Cincin., No. 2 deal.	6.50- 7.00
Cleveland, No. 2	12.00-12.50
Detroit No. 1 new	†16.00-16.50
Valleys, new, No. 1	19.25-19.75
Toronto, dealers	5.50- 6.00

MACHINE TURNINGS (Long)

Birmingham	5.00
Buffalo	12.00-12.50
Chicago	12.00-12.50
Cincinnati, dealers.	7.50- 8.00
Cleveland, no alloy.	12.50-13.00
Detroit	†10.00-10.50
Eastern Pa.	13.00-13.50
Los Angeles	4.00- 5.00
New York	†8.50
Pittsburgh	14.50-15.00
St. Louis	8.75- 9.25
San Francisco	5.00
Toronto, dealers	7.00- 7.25
Valleys	11.50-12.00

SHOVELING TURNINGS

Buffalo	13.00-13.50
Cleveland	12.00-12.50
Chicago	12.50-13.00
Chicago, spcl, anal.	15.50-16.00
Detroit	†11.50-12.00
Pitts., alloy-free	16.50-17.00

BORINGS AND TURNINGS

For Blast Furnace Use

Boston district	†5.75- 6.25
Buffalo	11.50-12.00
Cincinnati, dealers.	6.50- 7.00
Cleveland	12.50-13.00
Eastern Pa.	11.50-12.00
Detroit	†10.50-11.00
New York	†7.00
Pittsburgh	11.50-12.00
Toronto, dealers	6.75

AXLE TURNINGS

Buffalo	16.00-16.50
Boston district	†9.00- 9.50
Chicago, elec. fur.	17.50-18.00
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	11.50-12.00
Chicago	10.75-11.25
Cincinnati, dealers.	6.50- 7.00
Cleveland	12.50-13.00
Detroit	†11.00-11.50
E. Pa., chemical	14.50-15.00
New York	†7.50- 8.00
St. Louis	8.25- 8.75
Toronto, dealers	6.75

RAILROAD SPECIALTIES

Chicago	21.50-22.00

ANGLE BARS—STEEL

Chicago	21.00-21.50
St. Louis	18.50-19.00

SPRINGS

Buffalo	23.00-24.00
Chicago, coil	22.50-23.00
Chicago, leaf	22.00-22.50
Eastern Pa. crops.	24.00-25.00
Pittsburgh	25.50-26.00
St. Louis	20.00-20.50

STEEL RAILS, SHORT

Birmingham	17.00
Buffalo	24.00-25.00
Chicago (3 ft.)	21.50-22.00
Chicago (2 ft.)	22.00-22.50
Cincinnati, dealers.	23.00-23.50
Detroit	†22.50-23.00
Pitts., 3 ft. and less	25.50-26.00
St. L., 2 ft. & Less.	20.50-21.00

STEEL RAILS, SCRAP

Birmingham	15.50
Boston district	†14.50-15.00
Buffalo	22.00-22.50
Chicago	18.50-19.00
Cleveland	22.00-23.00
Pittsburgh	22.00-22.50
St. Louis	†18.75-19.25
Seattle	18.00-18.50

PIPE AND FLUES

Chicago, net	12.50-13.00
Cincinnati, dealers.	12.00-12.50

RAILROAD GRATE BARS

Buffalo	13.50-14.00
Chicago, net	13.50-14.00
Cincinnati, dealers.	11.00-11.50
Eastern Pa.	16.50-17.00
New York	†11.50-12.00
St. Louis	14.50-15.00

RAILROAD WROUGHT

Birmingham	14.00
Boston district	†9.50-10.00
Eastern Pa., No. 1.	20.00-20.50
St. Louis, No. 1	†13.50-14.00
St. Louis, No. 2.	15.00-16.00

FORGE FLASHINGS

Boston district	†11.00-11.50
Buffalo	17.00-17.50
Cleveland	17.50-18.00
Detroit	†15.50-16.00
Pittsburgh	17.50-18.00

FORGE SCRAP

Boston district	†7.00
Chicago, heavy	22.00-22.50

LOW PHOSPHORUS

Cleveland, crops	24.50-25.00
Eastern Pa., crops	26.00-26.50
Pitts., billet, bloom, slab crops	25.50-26.00

LOW PHOS. PUNCHINGS

Buffalo	21.50-22.00
Chicago	20.50-21.00
Cleveland	20.00-20.50
Eastern Pa.	25.00-25.50
Pittsburgh	24.50-25.00
Seattle	15.00
Detroit	†18.00-18.50

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	†18.00-18.50
Chicago, net	22.50-23.00
Eastern Pa.	25.00-25.50
St. Louis	†21.00-21.50

LOCOMOTIVE TIRES

Chicago (cut)	22.00-22.50
St. Louis, No. 1	†17.50-18.00

SHAFTING

Boston district	†18.50-19.00
New York	†19.00-19.50
Eastern Pa.	24.50-25.00
St. Louis, 1¼-3¾"	18.25-18.75

CAR WHEELS

Birmingham, iron	13.00
Boston dist., iron	†14.75-15.00
Buffalo, steel	23.00-23.50
Chicago, iron	18.50-19.00
Chicago, rolled steel	21.00-21.50
Cincin., iron, deal.	18.00-18.50
Eastern Pa., iron	21.50-22.00
Eastern Pa., steel	24.00-25.00
Pittsburgh, iron	20.50-21.00
Pittsburgh, steel	25.50-26.00
St. Louis, iron	17.25-17.75
St. Louis, steel	19.50-20.00

NO. 1 CAST SCRAP

Birmingham	15.50
Boston, No. 1 mach.	†16.50-17.00
N. Eng. del. No. 2.	14.50-14.75
N. Eng. del. textile	18.75-20.00
Buffalo, cupola	18.50-19.00
Buffalo, mach.	20.00-20.50
Chicago, agri. net.	15.00-15.50
Chicago, auto net.	17.50-18.00
Chicago, railroad net	16.00-16.50
Chicago, mach. net.	17.00-17.50
Cincin., mach. deal.	20.00-20.50
Cleveland, mach.	22.50-23.00
Detroit, cupola, net.	†17.00-17.50
Eastern Pa., cupola.	22.00-22.50
E. Pa., No. 2 yard	18.50-19.00
E. Pa., yard fdry.	18.50-19.00
Los Angeles	16.50-17.00
Pittsburgh, cupola.	20.50-21.00
San Francisco	14.50-15.00
Seattle	14.50-16.00
St. L., agri. mach.	17.50-18.00
St. L., No. 1 mach.	18.50-19.00
Toronto, No. 1 mach., net dealers	18.00-18.50

HEAVY CAST

Boston dist. break.	†14.50-14.75
New England, del.	15.50-16.00
Buffalo, break	16.50-17.00
Cleveland, break, net	15.50-16.00
Detroit auto net.	†17.50-18.00
Detroit break	†16.00-16.50
Eastern Pa.	20.00-20.50
Los Ang., auto, net.	13.00-14.00
New York break	†15.50
Pittsburgh, break.	17.50-18.00

STOVE PLATE

Birmingham	10.00-11.00
Boston district	†11.00-11.50
Buffalo	16.00-16.50
Chicago, net	12.00-12.50
Cincinnati, dealers.	11.50-12.00
Detroit, net	†11.00-11.50
Eastern Pa.	16.50-17.00
New York fdry	†12.25
St. Louis	†12.00-12.50
Toronto dealers, net	12.00

MALLEABLE

New England, del.	21.50-22.00
Buffalo	23.00-23.50
Chicago, R. R.	21.50-22.00
Cincin. agri., deal.	16.00-16.50
Cleveland, rail	22.50-23.00
Eastern Pa., R. R.	22.00-22.50
Los Angeles	12.50
Pittsburgh, rail	24.00-24.50
St. Louis, R. R.	18.50-19.00

Ores

Lake Superior Iron Ore

Gross ton, 51½ %

Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer.	4.60

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	10.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mn.	nom.
North African low phos.	nom.
Spanish, No. African basic, 50 to 60%	nom.
Chinese wolframite, short ton unit, duty paid	$23.50-24.00
Scheelite, imp.	$25.00
Chrome ore, Indian, 48% gross ton, cif.	$28.00-30.00

Manganese Ore

Including war risk but not duty, cents per unit cargo lots.

Caucasian, 50-52%	55.00
So. African, 50-52%	57.00
Indian, 49-50%	55.00
Brazilian, 46%	50.00-53.00
Cuban, 50-51%, duty free	71.00-73.00

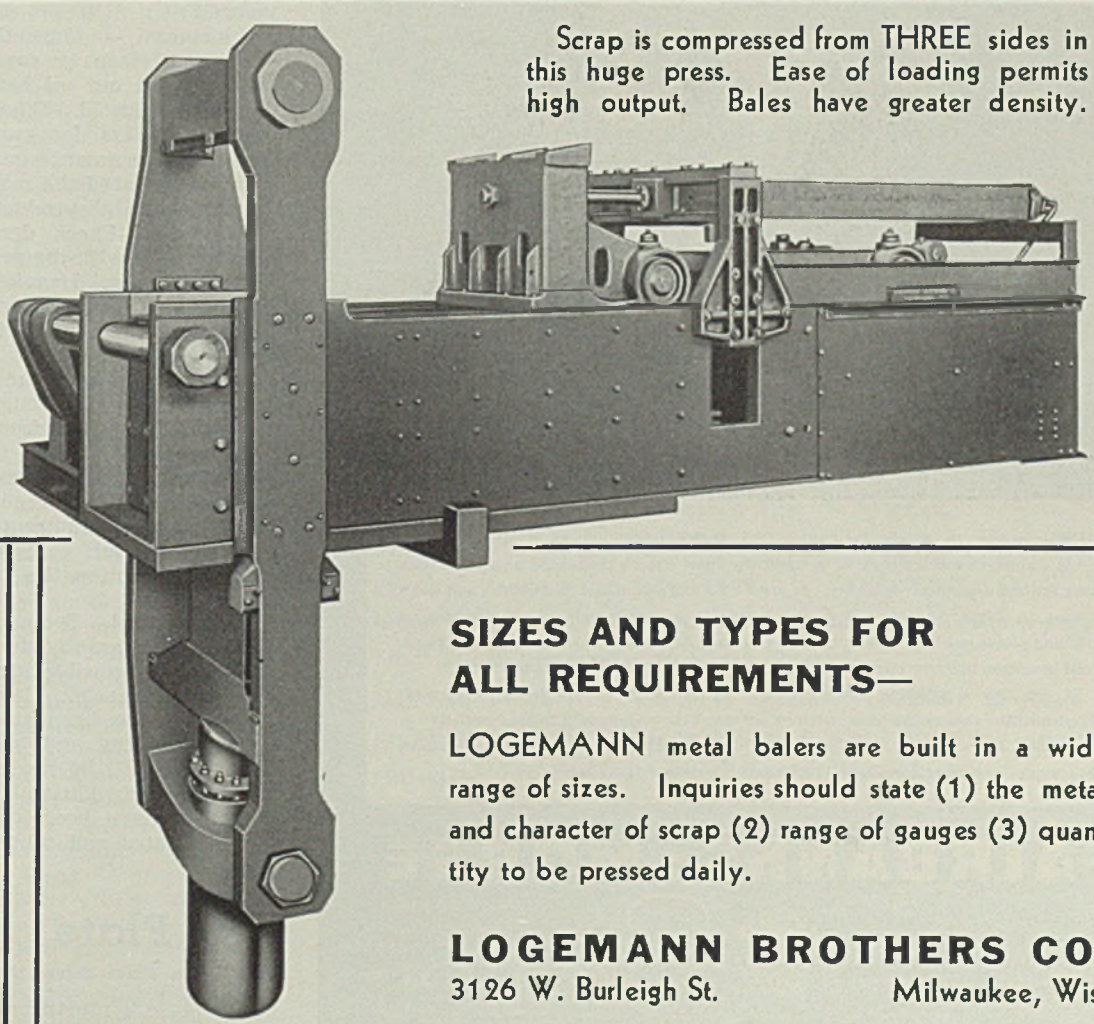
Molybdenum

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.

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3126 W. Burleigh St. Milwaukee, Wis.

Sheets, Strip

Sheet & Strip Prices, Pages 78, 79

Pittsburgh—Sheet mill operations continue to rise, with output now nearly 75 per cent of capacity. Galvanized sheet production last week continued its contraseasonal upward movement to 63 per cent, a three-point gain. No specifications have been received on 1941 model steel, although some sellers expect this shortly. Operations on narrow strip mills approximate 55 per cent of capacity and are moving up steadily. Demand is fairly steady.

Chicago—Buying volume is not large, due to previous coverages of most consumers. Warehouses indicate improvement in orders for all finishes of sheets, while demand for narrow strip is particularly prominent.

New York—Sheet specifications this month have about held even with those in May, according to leading sellers. Meanwhile, deliveries are being extended. Hot sheets are now available in four to five weeks, on an average, and cold sheets close to five weeks. While consumption of sheets for household appliances has tapered seasonally, releases are holding up particularly well in some lines, due apparently to manufacturers' efforts to build up stocks in expectations of munition contracts later.

Cold strip mills are operating at a high rate, but due to late releases considerable low-priced tonnage booked under blanket contracts early this quarter will not be shipped for another week or 10 days. Meanwhile buying is expanding with consumers covering more in advance, or through third quarter, although much volume is wanted for prompt delivery.

Philadelphia—Sheet specifications are fairly well maintained, with deliveries on hot-rolled ranging from four to five weeks for lighter gages, three weeks being possible on heavier gages.

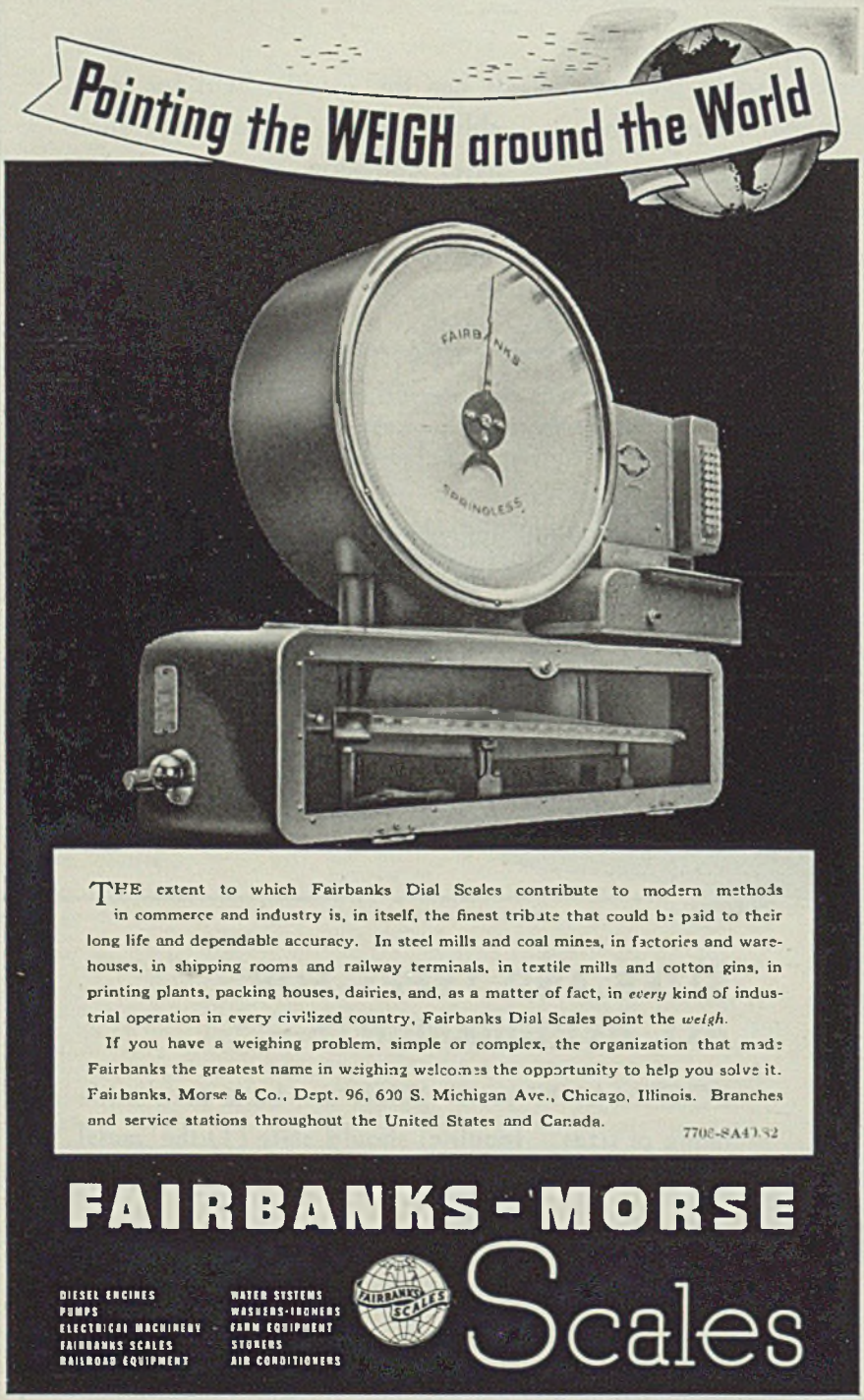
Buffalo—Mills report releases and new business in sheet and strip in ample volume. While there are some indications that consumers are building up inventories for national defense purposes no disturbing or unbalanced supply situation has developed.

Cincinnati — Schedules of sheet mills are close to capacity in efforts to get out all low-priced tonnage by June 30. Buying by automobile makers for early delivery, and by government agencies of galvanized featured the market. Backlogs assure high production in July.

St. Louis—Sheet demand holds about steady with the preceding two or three weeks. Heaviest buying is by interests participating in armament orders, either direct or indirect. Takings by implement and tractor manufacturers continue on a large scale, and outlet through container makers is also broad.

Birmingham, Ala. — Considerable more activity is reported in sheet mills, especially as regards roofing, with bookings running abreast of current output. A considerable tonnage of cotton ties also is being produced.

Toronto, Ont.—Speeding up of war contracts, especially for motor vehicles, is responsible for substantial orders for sheets. Canadian sheet production has been at capacity for several months and backlogs indicate there will be no let-up in this high rate. In addition large tonnage contracts have been placed in the United States and others are pending.



Tin Plate

Tin Plate Prices, Page 78

Tin plate is moving more actively than at any time this year, with the

summer canning season well under way. There is also an improvement in specifications from manufacturers of general line cans, although releases still reflect the heavy stocks that were ordered last year. Production last week was estimated at 78 per cent.

Plates

Plate Prices, Page 78

Pittsburgh—Plate backlogs continue to increase, resulting from increased construction, naval program and industrial expansion. Local plate buyers report some difficulties in deliveries. Some buyers are undoubtedly building up stocks, although it is probable most current demand comes from actual consumption needs.

Chicago — Plate orders are improved in volume, due to increased private and public construction and also to a reported increase in stocking of material by fabricators and warehouses. Situation is encouraging, due to prospects for continued good demand and firm maintenance of prices. Additional railroad requirements are noted and tank, machinery, bridge, petroleum, and government needs continue heavy.

Boston — Shipbuilding requirements continue to lead plate demand with recent mild improvement held in miscellaneous demand. Buying is mainly in small lots with prompt shipment asked, although deliveries on some sizes and widths are slightly more extended. Edward M. Matz, Inc., Jamaica Plain district, Boston, is low on 1625 feet of 48-inch steel water pipe for the metropolitan district commission, Boston, taking close to 1000 tons of plates.

New York — Plate business this month will show a noticeable improvement over May; nevertheless, buying in this district has not been heavy and the noticeable increase at this time does not mean so much when it is considered that last month was dull, apart from ship specifications which have gone principally to mills with shipyard affiliates. Specifications from tank and boiler shops are heavier as a result of more business from oil companies and public utilities. Recently most eastern sellers could make shipment within a week but some are now unable to do much better than two weeks.

Philadelphia—Plate mills are operating at a high rate, some at virtual capacity and with backlogs that promise sustained operations through third quarter. Deliveries, while being extended, average not

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INSULATED GRINDING DISCS

Special aluminum oxide grit – capable of 25% more work. Exclusive bond that won't soften under high heat. Toughest backing you ever saw. That's the new Silver Streak Insulated Grinding Disc – and we're so sure it will boost your finishing time and cut your finishing costs that we're prepared to back our claims – with this generous Free Trial offer.

You know what happens when friction-generated heat rockets grinding temperature up – 1500° . . . 1600° . . . 1700°. You know the glue softens, melts – the grit literally "lies down on the job." It can't happen with Silver Streak!

Make us prove it! You have absolutely nothing to lose – and probably a lot to gain as grinding speed steps up – finishing costs and disc costs go down. In one test, this new disc completed 72 units of work on which an ordinary disc was "all through" at 17 units! Write for the Free Trial today telling the size and grit you want! Abrasive Products, Inc., 511 Pearl Street, South Braintree, Massachusetts.

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more than two weeks, with some producers able to do better. Ship work lags, with tank and boiler work improving. Repair program by the Pennsylvania railroad will result in early plate requisitions. About 450 tons of plates will be required for four harbor tugs for the navy, to be built by Morris Heights Shipbuilding Co., Morris Heights, N. Y.

Birmingham, Ala. — Plate mill backlogs are well maintained, largely because of continued demand from producers of tanks, shipbuilders and for miscellaneous construction. Recently booked orders for cars at the Pullman Bessemer, Ala., plant also will add to current bookings.

San Francisco—No plate awards of size were noted but bids have been opened on from 3100 to 6300 tons for a welded steel, precast reinforced concrete or cast iron pipe line for the metropolitan water district, Los Angeles, between Burbank and Santa Monica, Calif. The same district will take bids July 7 for 27.7 miles of 36 to 42-inch precast reinforced concrete or welded steel pipe for the Orange county feeder line of which at least 3100 tons will be welded steel pipe.

Toronto, Ont.—Canada's entry into production of tanks for war purposes has given another uplift to plate demand and inquiries have increased. While steel for the heavy 40-ton tanks is not now available in Canada, it is reported that Canadian mills are providing some of the plate for light tanks. Boiler and tank builders also are taking good deliveries and placing future delivery contracts.

Plate Contracts Pending

5000 tons, 48-inch water line, Hartford, Conn.; low bid under section C (reinforced concrete) by Lock Joint Pipe Co., Ampere, N. J., $939,305.50; bids June 24, Hartford.

3100 to 10,800 tons, Orange county feeder line for metropolitan water district, Los Angeles, specification 335; bids July 10; alternate bids on precast reinforced concrete and welded steel pipe, 36 to 42-inch.

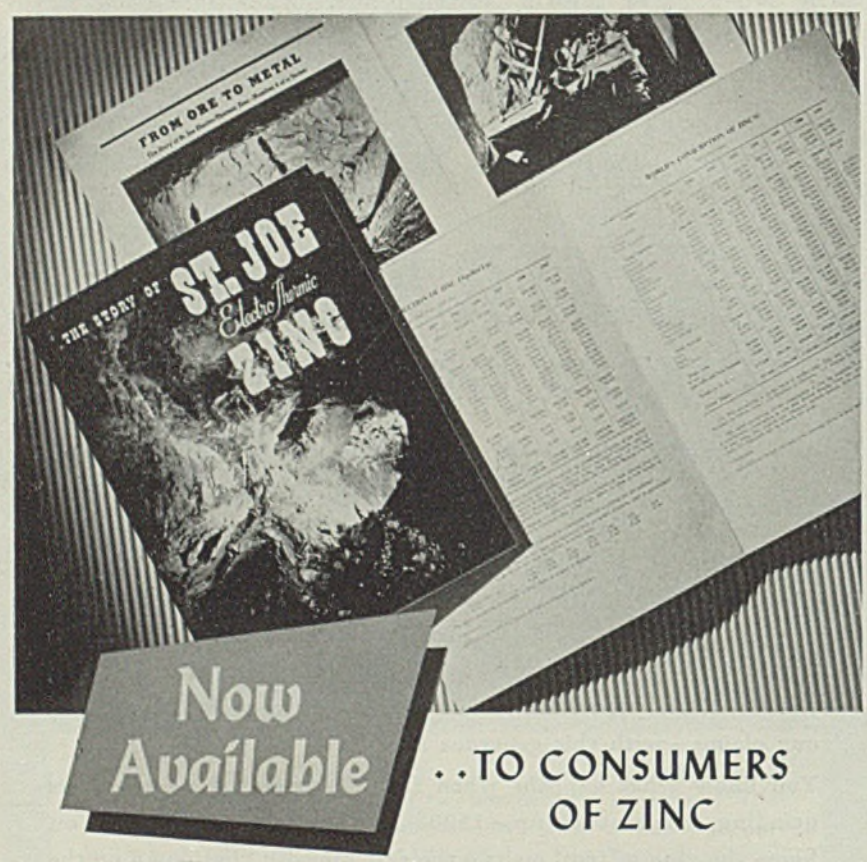
2900 tons, 214, 50,000-gallon tanks, navy department, Washington; Invitation 950-40-349 for delivery at Panama Canal, Hawaii and Alaska; bids opened.

804 tons, low alloy steel plates, bolts and accessories, Panama, schedule 4105; United States Steel Export Co., New York, low at $86,064.57.

100 tons or more, diesel oil storage tanks, naval submarine base, St. Thomas, Virgin Islands; bids of June 12 rejected.

Unstated, 134 horizontal steel gasoline storage tanks, 50,000-gallon capacity; bids July 1, quartermaster, war department, Washington.

Unstated, 500,000-gallon elevated steel tank, MacDill Field, Tampa, Fla.; bids July 19, to construction quartermaster, Washington.



Our new booklet, "The Story of St. Joe Electric-Thermic Zinc", is now off the press; it contains data and statistics of value to consumers of zinc and zinc oxide. It may not be generally known that the ore from which St. Joe Zinc and St. Joe Zinc Oxide is produced originates in the Company's own mines at Edwards and Balmat, St. Lawrence County, New York. Hence, reprints of twelve advertisements which tell in detail how St. Joe Electric-Thermic Zinc is produced—from Ore to Metal—have also been included in the booklet.

Copies will be mailed on request.

ST. JOSEPH LEAD COMPANY

250 PARK AVENUE NEW YORK, N. Y.

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PLANT AND LABORATORY: JOSEPHTOWN, BEAVER COUNTY, PENNSYLVANIA

Bars

Bar Prices, Page 78

Pittsburgh — Substantial backlogs are being built up. Currently deliveries are running fairly close to specified dates on all but a few items, but mills anticipate more trouble as time goes on, particularly after the needs of the national defense program begin to appear.

Chicago—Demand continues to increase, supported by farm equipment makers, machinery and equipment interests. Increase of inventories also is reported partly responsible for heavier tonnages being ordered.

Boston — Consumption of alloy steel bars is mounting, with deliveries somewhat further extended, notably for special finished stock. Machine tool builders, government shops and the aircraft industry are leading consumers and where possible production schedules involving the use of bar stock are being increased. Shipyard and chainmaking specifications are also maintained, and secondary distributors,

while generally covered well in advance, are rounding out inventories of both alloy and carbon steel bars.

New York — Bar delivery schedules are expanding. Hot carbon bar shipments now average around four weeks, but leading sellers here claim that deliveries will soon be extended to six weeks. Hot alloy bar shipments range six to eight weeks and cold alloy shipments around seven to nine weeks in some cases, although at the moment somewhat better than this can be done. Where bars are subject to special heat treatment, deliveries run 15 weeks and beyond in some cases. Cold drawn carbon bar deliveries range around four weeks.

Philadelphia—Backlogs are accumulating on books of barmakers, as evidenced by further extended deliveries, some sellers requiring six weeks on carbon bars, although four to five weeks still can be done. Alloy bars range from seven to nine weeks.

Birmingham, Ala. — Bar buying has increased with indication by manufacturers of increasing stocks. Output of bars is better than 85 per cent, with a large part of the tonnage going into agricultural implements.

Buffalo — Although backlogs are not expanding as rapidly as two weeks ago, bar mill rolling schedules are practically at a capacity. Buying is miscellaneous as diversified industrial plants build up inventories to guard against delay from war and armament demands. Aircraft, machinery, tool and motor makers are among the leading consumers.

Toronto, Ont.—Increased pressure on industrial plants and tool makers, as well as the mining industry, to provide war needs, has had a stimulating effect on merchant bars and local steel interests state that sales are running well above the average. Producers report substantial booking into third quarter, but see no difficulty in taking care of the expanded demand.

Pipe

Pipe Prices, Page 79

Pittsburgh—Incoming orders for oil country goods are steady, although standard pipe demand is increasing and orders for June are expected to run 20 to 30 per cent better than in May. Specifications on mechanical tubing needs have been fairly good and demand for pressure tubing is rising. Prices are firm.

Boston—Expanding building construction is reflected in slight im-

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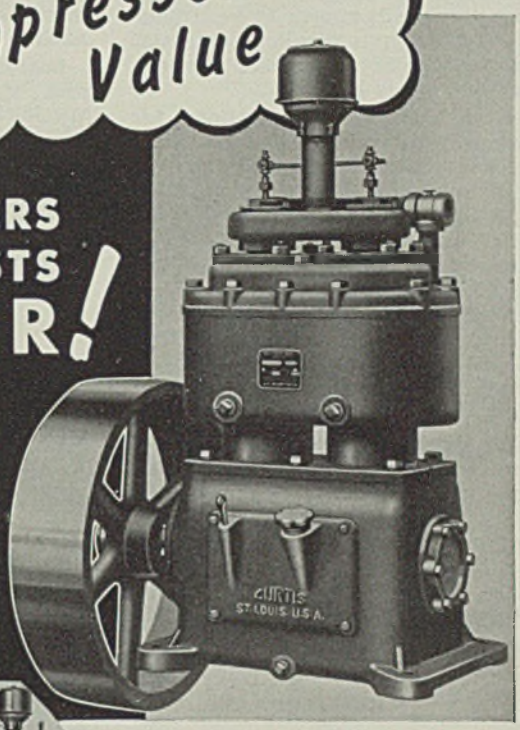

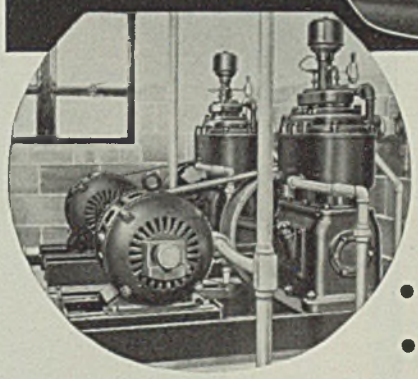

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- *Maximum capacity per dollar of first cost*
- *Highest volumetric and mechanical efficiency*
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- *Lowest maintenance expense and oil consumption*

And actual operating records prove the fact that Curtis Compressors deliver dependable air service at minimum cost. With Curtis Compressors you can benefit in two ways—by replacing your present overloaded outworn and inefficient equipment and by extending the use of air operated equipment in your plant. More and more, air power is being used to operate modern equipment.

Curtis economy is the result of such design features as Timken Roller Bearings, Carbon-free Disc Valves, Centro-Ring Oiling, Automatic Pressure Unloader, and Precision Workmanship throughout, with all parts readily accessible; furnished in capacities up to 360 cfm.

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Division of Curtis Manufacturing Co.
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ST. LOUIS NEW YORK CHICAGO
SAN FRANCISCO PORTLAND

provement in merchant steel pipe buying, although volume handled by secondary sellers is not heavy. Cast pipe needs appear to be largely covered through blanket contracts, releases against which are lagging. New buying is light.

New York — Specifications for pipe and tubular goods, particularly mechanical tubing, are reported brisk by some leading sellers. Line pipe tonnage is lagging, but most other lines are moving well, stimulated by action of jobbers in building up inventories in expectation of extended mill deliveries. Decline in apartment house building requirements is being offset by greater needs for miscellaneous industrial work.

Birmingham, Ala.—Pipe production is comparatively good with some gain from municipal and utility sources. Individually large orders are lacking, but the aggregate is satisfactory.

San Francisco — Cast iron pipe lettings were confined to lots of less than 100 tons, although pending business exceeds 4000 tons. So far this year 15,292 tons have been placed as compared with 16,757 tons for the corresponding period in 1939. Bids have just been opened on 2900 tons of 6 to 12-in. pipe for Los Angeles and on 600 tons of 6 to 12-in. pipe for Long Beach, Calif.

Cast Pipe Placed

600 tons, small diameters, U.S. property disbursing office, Pennsylvania national guard, Harrisburg, to Florence Pipe Foundry & Machine Co., Philadelphia; bends, tees, plugs and reducers, Donald H. Walter Co., New York; Crane Co., Philadelphia and Raub Supply Co., Lancaster, Pa.; valves, Noland Co., Inc., Washington, D. C.

115 tons, 8-inch, Lunenburg, Mass., to United States Pipe & Foundry Co., Burlington, N. J.

100 tons, 6-inch for Yakima, Wash., to Pacific States C. I. Pipe Co., Provo, Utah.

Cast Pipe Pending

2900 tons, 6 to 12-inch, Los Angeles, bids opened.

600 tons, 6 to 12-inch, Long Beach, Calif; bids opened.

300 tons, 8 to 20-inch, Rahway, N. J.; bids July 8.

275 tons, 12-inch, Spring Lake, N. J.; bids July 8.

149 to 174 tons, 14-inch, Sumner, Wash; bids opened.

Wire

Wire Prices, Page 70

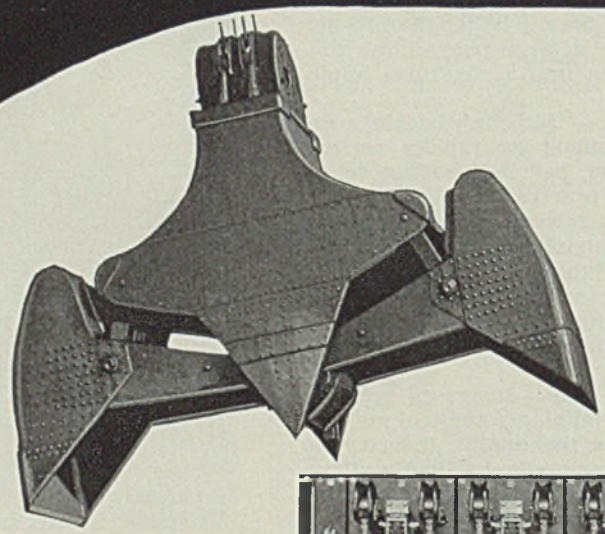
Chicago—June tonnage compared favorably with that of May. Some interests reported a slight but not significant gain. Roadbuilding mesh requirements and rural needs are prominent, in addition to general manufacturing. Farm equipment makers continue heavy takers.

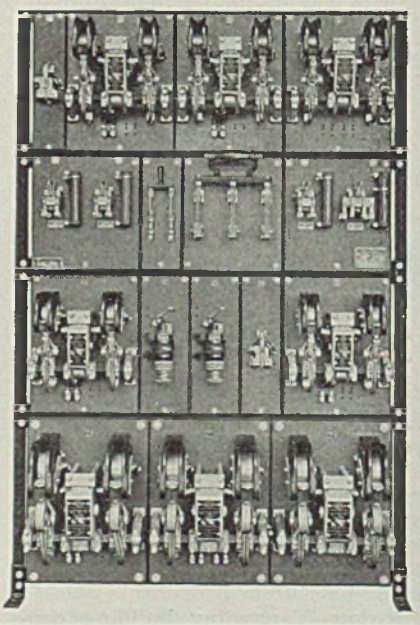
Boston—Incoming wire orders surpass shipments and backlogs in specialties, manufacturers' wire and other products are accumulating. June volume topped that of May by at least 20 per cent. Shipments in some lines are further extended although finishing operations in some eastern plants approach 90 per cent.

New York—Wire tonnage booked in June was fully 25 per cent above that of May and incoming volume is still steadily increasing. Consumers are seeking to cover through the remainder of the year and even beyond in some instances, but mills are reluctant to go beyond the third quarter.

Birmingham, Ala.—All specifications in wire are moving briskly. Fencing and nails, particularly, are in good demand and backlogs are being maintained. Production is near capacity and bookings are steady.

FAST OPERATION of 2-Motor Bucket-- hoists





EC&M 75 HP 220 Volt Frequency Relay Magnetic Controller for closing Line Motor on recent bucket crane. Duplicate controller is used for Holding Line Motor. Controllers are equipped with LINE-ARC Contactors and each is operated by an EC&M Type NT Master Switch as shown on opposite page.

THE ELECTRIC CONTROLLER & MFG. CO. E&M CLEVELAND, OHIO

HEAVY DUTY MOTOR CONTROL FOR CRANES, MILL DRIVES AND MACHINERY • BRAKES • LIMIT STOPS • LIFTING MAGNETS AND AUTOMATIC WELD TIMERS.

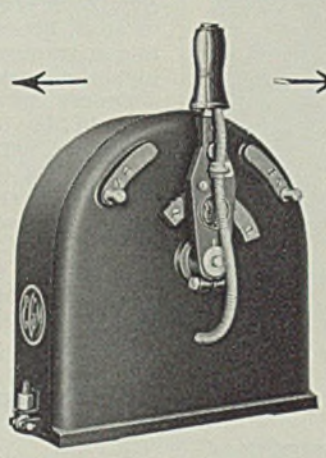
Rails, Cars

Track Material Prices, Page 79

Railroads continue to enter the market for rolling stock and rails, current new inquiry included 2155 freight and 120 passenger cars and 25 locomotives for the Southern Pacific, 3000 box cars for the Illinois Central, Norfolk & Western 1550 freight cars and the Pennsylvania 2345 freight and eight passenger cars, requiring about 34,000 tons of steel.

Chesapeake & Ohio and Nickel Plate have distributed 46,000 tons of rails and a Brazilian railroad has placed 22,500 tons of rails and fastenings with Inland Steel Co., pending final approval of terms, a vice president of Inland having gone to Rio Janeiro to close the deal. The Santa Fe has placed two 54,000 horsepower diesel-electric locomotives with Electro-Motive Corp. for freight road service. The Pennsylvania is planning purchase of two steam locomotives. Norfolk & Western has scheduled 25,000 tons of 131-pound rails for early purchase.

with EC&M FREQUENCY RELAY MAGNETIC CONTROL



COUNTER-TORQUE permits Fast Bucket Opening

On bucket cranes operated by A.C. wound-rotor motors, the counter-torque method of control with EC&M Frequency Relays has important advantages. These are:—the ability to land the empty bucket carefully—to empty the bucket quickly—and to stop the motors without imposing severe duty on the holding brakes.

EC&M Frequency Relay Magnetic Control permits the use of weak values of counter-torque resulting in very accurate, slow control of the bucket for clean-up operations, when entering hatchways and similar restricted openings. There is no tendency for the bucket to overshoot or land hard, because the operator has graduated and refined control by means of the new EC&M Frequency Relay Equipment.

Under this system of operation, fast bucket opening can be secured and the brakes are relieved of the duty of stopping a descending load; they only hold the load after the bucket is at standstill. Ask for complete details.

Car Orders Placed

Detroit, Toledo & Ironton, fifty 70-ton covered hopper cars, to Greenville Steel Car Co., Greenville, Pa.

Interstate commerce commission has authorized Union Tank Car Co. to build 100 experimental fusion-welded tank cars for experimental service.

Interstate commerce commission has authorized construction of one car with riveted aluminum alloy tank for experimental service in transportation of 95 per cent nitric acid, by the Monsanto Chemical Co., St. Louis, and American Car & Foundry Co., New York.

Philadelphia Suburban Transportation Co., Upper Darby, Pa., eight 59-passenger electric motor cars, to J. G. Brill Co., Philadelphia.

Car Orders Pending

Illinois Central, 3000 box cars; bids July 3.

Norfolk & Western, 1000 fifty-five-ton hoppers, 500 forty-foot box cars, 50 fifty-foot box cars.

Pennsylvania, 1900 gondolas, 225 covered hoppers, 20 heavy-duty flat cars, 200 all-steel cabooses, eight de luxe passenger cars.

Southern Pacific, 1500 automobile cars, 500 box cars, 125 flat cars, 30 cabooses, 120 passenger cars; bids July 15.

Locomotives Placed

Atchison, Topeka & Santa Fe, two 5400 horsepower diesel-electric freight locomotives, to Electro-Motive Corp., La Grange, Ill.

Mitsui & Co., six 2-8-2 ton locomotives, to American Locomotive Co., New York, for service in Korea.

Locomotives Pending

Pennsylvania, two steam locomotives.

Southern Pacific, 25 locomotives; bids asked.

Rail Orders Placed

Chesapeake & Ohio, 35,000 tons, Nickel Plate, 11,000 tons, including 3600 tons placed previous week; combined order allocated as follows: Carnegie-Illinois Steel Corp., Gary mill, 25,650 tons; Inland Steel Co., Indiana Harbor mill, 14,880 tons; Bethlehem Steel Co., Lackawanna mill, 5470 tons.

Rio Grande do Sul Railway, Brazil, 22,500 tons rails and fastenings; to Inland Steel Co., Chicago, pending settlement of detailed conditions; understood financing partly by United States Export-Import Bank.

Rail Orders Pending

Norfolk & Western, 25,000 tons, 131-pound rails and fastenings.

Buses Booked

The a.c.f. Motors Co., New York: Nine 36-passenger for San Diego Electric Railway Co., San Diego, Calif.; six 36-passenger for Springfield Street Railway Co., Springfield, Mass.; five 36-passenger for Boston Elevated Railway Co., Boston; four 34-passenger for Williamsport Transportation Co., Williamsport, Pa.; two 39-passenger for Quaker City Bus Co., Camden, N. J.; two 37-passenger for Eastern Massachusetts Street Railway Co., Boston; two 37-passenger for Southeastern Greyhound Lines, Lexington, Ky.

Twin Coach Co., Kent, O.: Twenty-one

41-passenger for Pacific Electric Railway Co., Los Angeles; seventeen 41-passenger for Seattle Transit System, Seattle; eight 25-passenger for Northern Indiana Transit Co., South Bend, Ind.; seven 31-passenger for British Columbia Electric Railway Co., Vancouver, B. C.; five 41-passenger for Boston Elevated Railway Co., Boston; two 37-passenger for Union Pacific Stages, Omaha, Nebr.

Semifinished Steel

Semifinished Prices, Page 79

Pittsburgh—Semifinished mills are operating close to capacity, with chief demand for wire rods, tube rounds, and in some cases, billets, although the pressure has been alleviated considerably by cancellation of French orders. In some cases the French orders have been taken over by the British commission, but some has been suspended indefinitely.

Shapes

Structural Shape Prices, Page 78

Pittsburgh—Construction projects continue to come out in volume, both from public works and from private industry. Effects of the national defense program are obvious with extension of industrial plants, construction of new aircraft units and flying fields.

Chicago — Orders have shown material improvement in volume. Structural material now ranks as one of the most active steel products. Improvement is general in both public and private construction. Fabricators note maintenance of volume on small-lot inquiries.

Boston — Current gains in industrial plant expansions will be accompanied shortly by sharp increase in structural requirements for government shops at navy yards, air stations and army posts. For hangars especially, a substantial tonnage will be required, 5000 tons for five at Chicopee, Mass., to be followed by several thousand tons for the Quonset Point, R. I., naval air station, plans for which are being expedited.

New York—Contractors have refused to bid on Woodrow Wilson and Benjamin Franklin high schools, New York, requiring about 5000 tons of steel, because of inability to obtain guarantees of protection against higher material and labor costs.

Orders for fabricated structural steel in May totaled 117,789 net tons, compared with 67,104 tons in April and 156,848 tons in May, 1939, according to the American Institute of Steel Construction. Shipments in May were 109,191 tons, compared with 115,869 tons in April and 125,818 tons in May, 1939. Total orders for five months this year were 493,785 tons, compared with 554,653 tons in the same period of 1939. Five months' shipments this year were 529,051 tons; in 1939 they were 540,713 tons.

Philadelphia—Structural business is moderately active with competition keen among fabricators. Shape deliveries range around two weeks.

San Francisco — Fabricators are encouraged over the fact that more than 26,000 tons of structural material are up for figures and a huge

Shape Awards Compared

	Tons
Week ended June 29	19,837
Week ended June 22	13,835
Week ended June 15	22,430
This week, 1939	14,850
Weekly average, year, 1940	18,159
Weekly average, 1939	22,411
Weekly average, May	22,717
Total to date, 1939	582,579
Total to date, 1940	472,142

Includes awards of 100 tons or more.

LEADING enamelers quickly recognize the outstanding superiorities of GOHI Enameling Iron and the many production advantages made possible through its use, with the result that this fine metal is accorded top rating by those who demand the utmost in performance, whose manufacturing facilities are geared up to highest operating efficiency.

GOHI Enameling Iron is metallurgically pure, free from grease and pickle marks. The smooth, satiny surface holds the enamel tightly — many common enameling troubles are eliminated, and the appearance and longevity of the finished product are immeasurably improved.

NEWPORT PRODUCTS

Hot Rolled Sheets • Newport Electrical Sheets • GOHI Pure Iron-Copper Alloy Sheets • Globe Brand Galvanized Steel Sheets, Roofing and Siding • GOHI Enameling Iron Sheets • KCB Copper Steel Sheets • Newport Long Terne Sheets • Newport Galvannealed and DeLuxe Metal Sheets.

THE NEWPORT ROLLING MILL CO.
NEWPORT KENTUCKY
DIVISION OF THE ANDREWS STEEL CO.

ANDREWS PRODUCTS IN CARBON AND ALLOY STEEL: Bars • Plates • Universal Mill Plates • Sheet Bars • Billets • Blooms • Slabs

tonnage is expected to come into the market for national defense work. Awards aggregated 3262 tons, bringing the year's total to 102,090 tons, compared with 67,804 tons for the corresponding period in 1939.

Seattle—The market is active. No outstanding projects are up for figures but there is an improvement in smaller jobs.

Toronto, Ont.—Governmental construction projects and extensive plant enlargements as well as continued work on private undertaking is responsible for big movement of structural steel. Fabricators report steady flow of new orders with backlogs at the highest peak in years.

Shape Contracts Placed

1825 tons, four naval store houses, Oakland, Calif., to Duffin Iron Co., Chicago.

1800 tons, state bridge, Kettle Falls, Wash., to Pacific Car & Foundry Co., Seattle.

1600 tons, college and boys' high school, for Archdiocese of New York, New York, to American Bridge Co., Pittsburgh.

1250 tons, state bridge over Hoosic river, North Adams, Mass., to American Bridge Co., Pittsburgh.

1050 tons, extension machine shop building No. 18, navy yard, Philadelphia, to Lehigh Structural Steel Co., Allentown, Pa.

1000 tons, building, Lebanon hospital, Bronx, New York, to Bethlehem Fabricators Inc., through J. H. Taylor Co., New York, contractor.

800 tons, warehouse, American Stores Warehouse Co., Kearny, N. J., to American Bridge Co., Pittsburgh, through Turner Construction Co., New York.

627 tons, including 362 tons bearing piles and 165 tons sheet piling, Brea dam, Orange county, California, to Bethlehem Steel Co.

600 tons, bridge, Hutchinson river parkway, New York, for Triboro Bridge authority, to American Bridge Co., Pittsburgh.

575 tons, addition to warehouse and passageway building, for Ohio Rubber Co., Willoughby, O., to Bethlehem Steel Co., Bethlehem, Pa.

550 tons, factory building, Soss Mfg. Co., Detroit, to Whitehead & Kales, Detroit.

400 tons, addition to plant, for Vultee Aircraft Co., Los Angeles, to Consolidated Steel Corp., Los Angeles.

400 tons, warehouse, Sears, Roebuck & Co., Chicago, to Joseph T. Ryerson & Son Inc., Chicago.

375 tons, Winton Terrace housing project, Cincinnati, for Cincinnati metropolitan housing authority, to Bethlehem Steel Co., Bethlehem, Pa.

370 tons, state bridge FAS-12-A, Safford, Ariz., to Bethlehem Steel Co., Bethlehem, Pa.

365 tons, four state highway bridges, route 29, Newark, N. J., to Bethlehem Steel Co., Bethlehem, Pa.

350 tons, bridge, FAP-284-C, Cotton county, Oklahoma, to Paterson Steel Co., Tulsa, Okla.

350 tons, buildings, for Blanton Co., St. Louis, to Mississippi Valley Structural Steel Co., Decatur, Ill.

300 tons, auxiliary lock walls, Mississippi river, to Mississippi Valley Structural Steel Co., Decatur, Ill.

285 tons, building, Grayclan Co., Elizabeth, N. J., to Oltmer Iron Works, Jersey City, N. J.

290 tons, press building, for Argonaut Realty Division and Oldsmobile division of the General Motors Corp., Lansing, Mich., to Whitehead & Kales, Detroit.

265 tons, state bridge, Mannington, W. Va., to Riverside Steel Co., Wheeling, W. Va.

260 tons, bridge, SP-8574, Rusk county, Wisconsin, to American Bridge Co., Pittsburgh.

230 tons, national guard hangar, Baltimore, for state, to Bethlehem Steel Co., Bethlehem, Pa.

230 tons, boiler supports, Combustion Engineering Co., Harrisburg, Pa., to Bethlehem Contracting Co., Bethlehem, Pa.

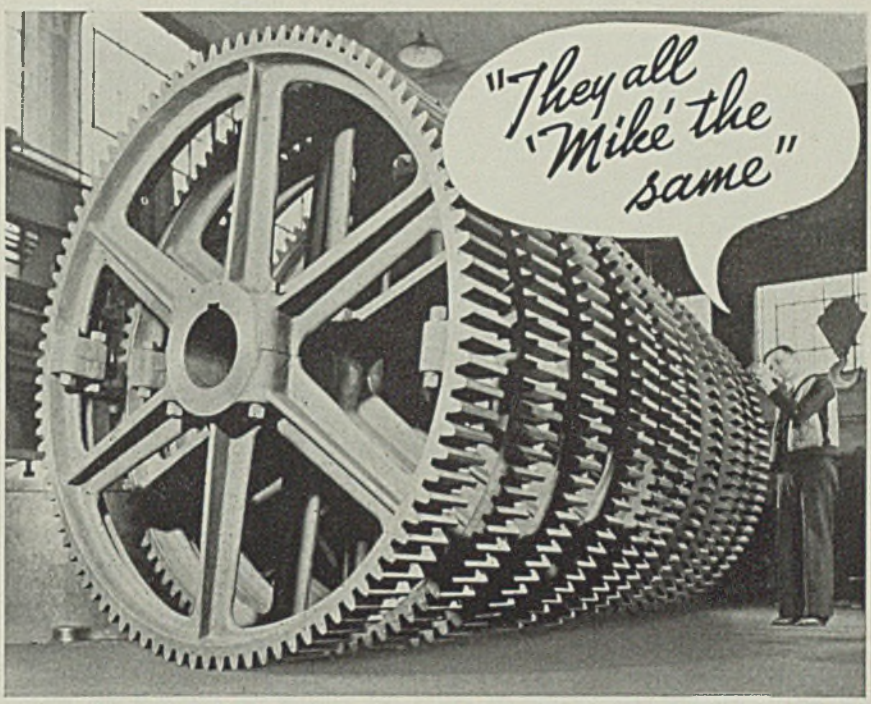
225 tons, building Air Associates Inc., Bendix, N. J., to American Bridge Co., Pittsburgh; Austin Co., Cleveland, contractor.

215 tons, state highway bridge, Tamaqua, Pa., to Bethlehem Steel Co., Bethlehem Pa.

200 tons, Jacobs Aircraft Engine Co., Pottstown, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

200 tons, building 101, for Worthington Pump & Machinery Co., Buffalo, to R. S. McMannus Steel Construction Co. Inc., Buffalo.

195 tons, Sears, Roebuck & Co. store,



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Wheeling, W. Va., to Riverside Steel Co., Wheeling.

185 tons, state bridge, Conneaut, O., to Fort Pitt Bridge Works, Pittsburgh.

160 tons, bridge contract 1979, Crawfordsville, Ind., to Central States Bridge & Structural Co., Indianapolis, Ind.

150 tons, highway bridge, FAGM-515, Gate City, Va., to Virginia Bridge Co., Roanoke, Va.

150 tons, roof for court buildings 42 and 43, for General Electric Co., Pittsfield, Mass., to Bethlehem Steel Co., Bethlehem, Pa.

150 tons building for Fanny Farmer Candy Shops, Detroit to Whitehead & Kales Co., Detroit.

150 tons, alterations, high school, New Brunswick, N. J., to Bethlehem Steel Co., Bethlehem, Pa.

150 tons, air station building, Baltimore, for city, to Dietrich Bros. Inc., Baltimore.

145 tons, service building, for Caterpillar Tractor Co., Peoria, Ill., to Joseph T. Ryerson & Son Inc., Chicago.

140 tons, extension to warehouse, for Isabella Sugar Co., Mt. Pleasant, Mich., to International Steel Co., Evansville, Ind.

135 tons, bridge project 5341, between Clay and St. Johns counties, Florida, to Nashville Bridge Co., Nashville Tenn.

125 tons, bridge 373, Rawson, Wis., for Chicago & North Western railway, to Worden-Allen Co., Milwaukee.

125 tons, buildings, Puget Sound navy yard, to Isaacson Iron Works, Seattle; A. F. Mowat, Seattle, general contractor.

125 tons, State highway bridge, Ladysmith, Wis., to American Bridge Co., Chicago.

120 tons, factory addition, Chester, W. Va., to Keystone Engineering Co., Pittsburgh.

115 tons, arts and science building, Hackettstown, N. J., to H. R. Goeller, Inc., Hillside, N. J.

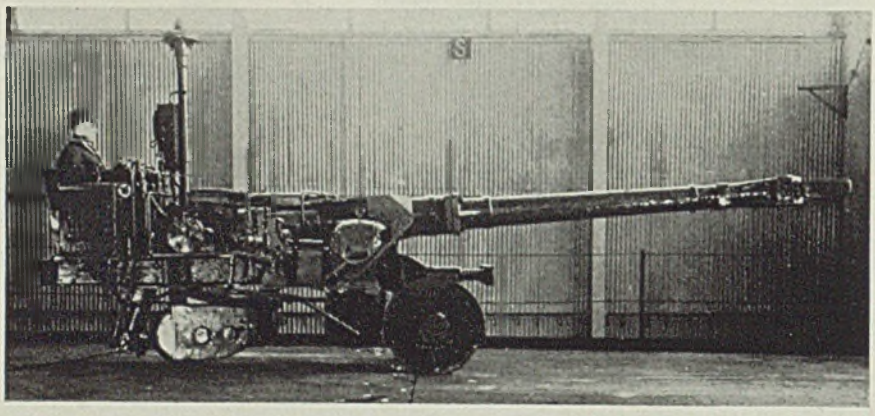
110 tons, warehouse, for Drackett Co., Reading, O., to Bethlehem Steel Co., Bethlehem, Pa.

110 tons, highway bridge FA-631, Rockbridge county, Virginia, to Virginia Bridge Co., Roanoke, Va.

110 tons, gate tracks, specification 1351-D, bureau of reclamation, Odair, Wash., to Koppers Co., Pittsburgh.

100 tons, plant extension Soundview Pulp Co., Everett, Wash., to Isaacson Iron Works, Seattle.

100 tons, shapes and bars, addition, annealing department, Saginaw Malleable Iron division, General Motors Corp., Saginaw, Mich., to Koehler Bros., Saginaw; Spence Bros., Saginaw, general contractors.



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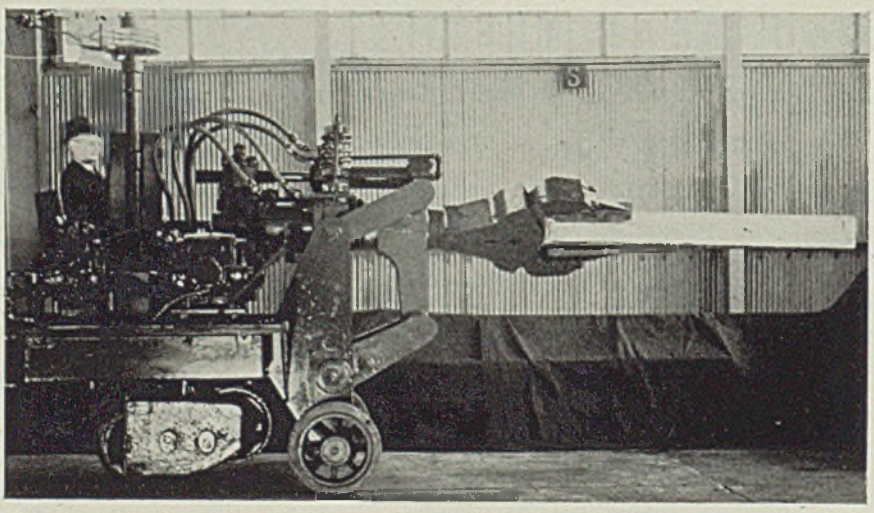
Above—A standard 4000 lb. Auto Floor Charging Machine handling billets between reheating furnace and steam hammer. Below—A 2000 lb. Auto Floor Manipulator which manipulates under steam hammer or press. They are rugged, fast and mobile. We design and build to suit the particular job.



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

PITTSBURGH SHARPSBURG BRANCH PA.

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

Shape Contracts Pending

3500 tons, war department, 44 additional ammunition magazines, Proving Ground, Ill., bids July 10.

3000 tons, four landplane hangars, specification 9185, naval air base, Alameda, Calif.; general contract to Robt. E. McKee, 4700 San Fernando Road, Los Angeles, at $1,149,000.

1900 tons, airplane repair dock, Patterson field, Dayton, O., for United States government.

1500 tons, additional story on wings of navy and munitions building, Washington; bids July 2.

1500 tons, steel sheet pile bulkhead, naval air station, Pensacola, Fla.; Kansas City Bridge Co., Kansas City, Mo., low $163,266.

1400 tons, war department, hangar and annex, Hill Field, Ogden, Utah, bids July 9.

1200 tons, 16 tainter gates, etc., Caddoa, Colo., for army engineers.

1200 tons, 20 radial spillway gates, Watts Bar dam, Tennessee, for Tennessee valley authority.

1100 tons, extension to power plant, for Deepwater Operating Co., Penns Grove, N. J.

1000 tons, Waterman Memorial building, for University of Vermont, Burlington, Vt.

850 tons, engineering shop expansion, Patterson field, Dayton, O., for United States government.

850 tons, extension to power house, for Ohio Power Co., Philo, O.

700 tons, extension to power house, for Duquesne Light Co., Pittsburgh.

660 tons, power station No. 9, unit 4, for Public Service Co. of Northern Illinois, Joliet, Ill.

640 tons, new administration building, University of California, Berkeley, Calif.; K. E. Parker, 135 South Park street, San Francisco, low on general contract at $657,450.

600 tons, bridge, Pelham parkway, Bronx, New York, for Triboro Bridge authority.

600 tons, sheet piling, flood protection project, section 1, Cohocton and Chemung rivers, Riverside, Painted Post

Sussex, New Jersey, to Igoe Bros. Inc., New York, low.

570 tons, boiler supports and addition to boiler house, for West Virginia Pulp & Paper Co., Mechanicville, N. Y.

550 tons, extension to building 242, for Aluminum Co. of America, Arnold, Pa.

500 tons, superstructure of bridge over navigation lock, Kentucky dam; bids July 16 to Tennessee valley authority, Knoxville, Tenn.

450 tons, bridges, Fullerton parkway, Chicago, for Chicago Park district.

450 tons, state bridge, Skinker road, St. Louis.

450 tons, including 270 tons sheet piling, bridge at Sepulveda dam, Los Angeles; general contract to Lovrick & Konjevod, 2835 Newell street, Los Angeles, at $149,395.

440 tons, bridges, California and Oklahoma, for Atchison, Topeka & Santa Fe railway.

425 tons, intake gate rail support towers, Kentucky dam project; bids July 15 to Tennessee valley authority, Knoxville, Tenn.

405 tons, transmission line Chehalis to Covington, Wash.; bids to Bonneville project, Portland, June 29.

375 tons, building, for E. R. Squibb & Sons, Brooklyn, N. Y.

375 tons, tunnel supports, Continental Divide tunnel near Gran Lake, Colo.; Pratt Rogers, Pueblo, Colo., low on general contract at $389,370.

325 tons, building, Monsanto Chemical Co., Springfield, Mass.

300 tons, state bridge RC-40-45-46, Worcester, N. Y.

300 tons, shops and parking deck building, for Marshall Field estate, Chicago.

284 tons, two state bridges in Clallam county, Wash.; Maeri & Coluccio, Seattle, low.

250 tons, equipment repair building, Patterson field, Dayton, O., for United States government.

250 tons, bridge, Philadelphia, for city.

250 tons, state bridge over Tonoloway creek, Hancock, Md.

250 tons, sheet steel piling flood control project, Coeur d'Alene, Idaho; Sather & Son, Seattle, low.

250 tons, office building for Rohn & Haas Co., Philadelphia; bids July 2.

250 tons, sheet piling, flood protection project, section 2, Binghamton, Conklin and Port Dickinson, N. Y.; Tuckahoe Construction Co., Tuckahoe, N. Y., low.

240 tons, state bridges, Minturn, Colo.

235 tons, grade crossing elimination, state project, Dover Plains, N. Y.

220 tons, dumping board, contract 9-C, New York, for state.

220 tons, reconstruction bridge, East 204th street, New York, for state.

220 tons, addition to public school 29, Richmond, Staten Island, N. Y., for state.

200 tons, office building, for Arthur G. McKee & Co., Cleveland.

200 tons, boiler house, for Henry Disstons & Sons, Philadelphia.

200 tons, reconstruction nine bridges, Kingston, N. Y., for New York Central railroad.

200 tons, Binghamton state hospital power plant, Binghamton, N. Y., L. B. Strandberg & Co., Chicago; low.

180 tons, state bridge RC-40-51, Addison, N. Y.

180 tons, bridge, Margaretta and Lefever streets, Frankfort, Philadelphia; bids July 3.

175 tons, stadium, Worcester, Mass.

175 tons, overpass, South Dennis, N. J.; also 90 tons bars.

175 tons, bridge repairs, Thirty-fourth street, Philadelphia; Belmont Iron Works, Eddystone, Pa., low.

175 tons, relocation, including overpass and approaches, route 49, section 16, Pennsylvania-Reading Seashore lines, South Dennis, N. J.; bids July 12, state highway commissioner, E. Donald Sterner, Trenton, N. J.

170 tons, factory building, for York Safe & Lock Co., York, Pa.

160 tons, bridge, Binghamton, N. Y., Tuckahoe Construction Co., Tuckahoe, N. Y., low.

160 tons, Fender ferry bridge across Pit river, Shasta national forest, California; bids July 9, San Francisco.

160 tons, grade crossing elimination, state project RC-40-53, Erie county, New York.

150 tons, state bridge, Colorado Springs, Colo.

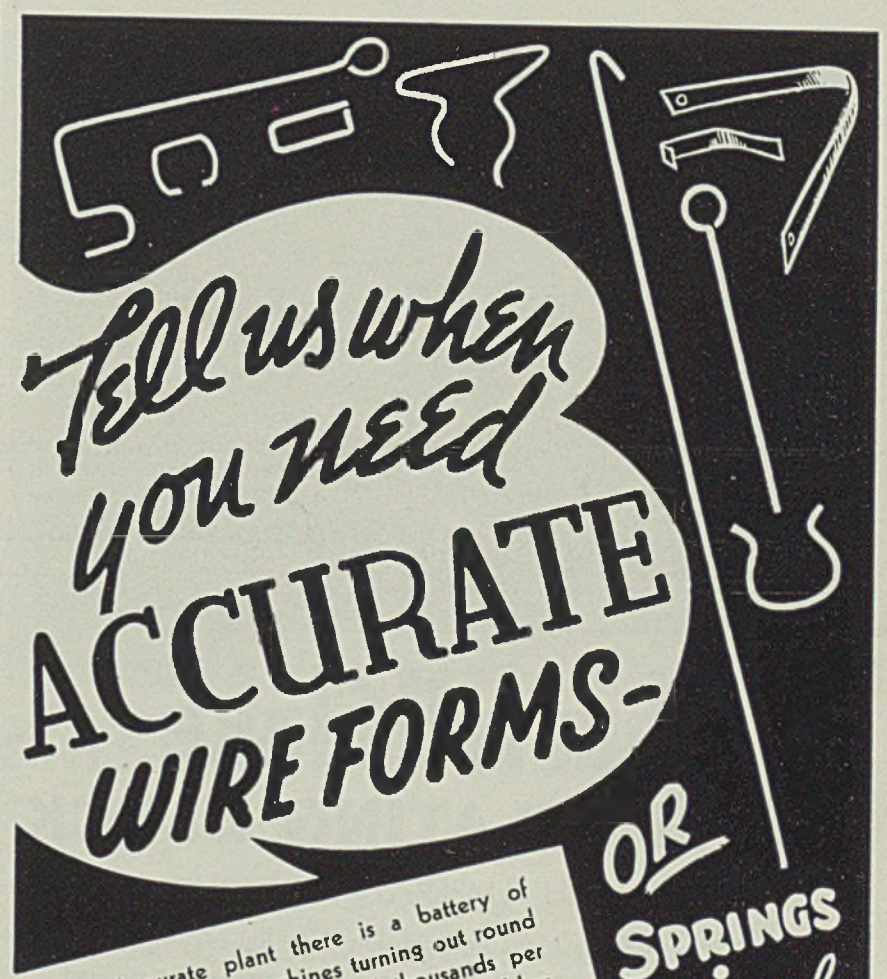
150 tons, bridge between buildings, General Motors Corp., Fisher Body division, St. Louis.

150 tons, bridge, Forty-ninth street and Kingsessing avenue, Philadelphia; bids July 3.

150 tons, bridge, Erie railroad, Belwood Park, N. J.

144 tons, H columns, San Joaquin river bridge, Fresno and Madera counties, California, for state; bids opened.

140 tons, state bridge, Idledale, Colo.



IN the Accurate plant there is a battery of modern Four Slide machines turning out round & flat wire forms at the rate of thousands per hour. Some of these wire shapes are odd—some are extremely simple—but most all of them have important jobs to do. That's why they must be carefully designed—accurately made—and also economically produced. They are at Accurate!

We invite you to TELL US when you need wire forms, springs, or small stampings. Ask for quotations or to see an Accurate engineer.

ACCURATE SPRING MFG. CO.
3823 W. Lake Street, Chicago, Ill.

Accurate Springs

140 tons, reconstruction state highway bridge, Tunkhannock Pa.

140 tons, Jacobs drawbridge No. 1 near Stockton, Calif., for state; bids opened.

130 tons, state bridge, East Windsor, Conn.

130 tons, state bridge, Willimantic, Conn.

125 tons, highway bridge, state project RC-40-58, Seeley Creek, New York.

120 tons, bridges, Iowa and Minnesota, for Chicago, Milwaukee, St. Paul & Pacific railroad.

120 tons, addition to warehouse, for West Virginia Liquor control commission, Charleston, W. Va.

120 tons, state highway bridge, Chester Hill, Pa.

120 tons, bridge, Millington, Tenn., for Illinois Central railroad.

120 tons, buildings 76, 77, 78 and 79, for Mathieson Alkali Works, Niagara Falls, N. Y.

120 tons, state bridge RC-40-50, Candor, N. Y.

Reinforcing

Reinforcing Bar Prices, Page 79

Chicago — Uptrend in volume of inquiries and pending tonnage is noted, with new private projects prominent. Numerous small tonnage inquiries are augmented by more substantial inquiries involving new private construction in Chicago. War department ammunition magazine construction, Proving Ground, Ill., is expected to run close to 1000 tons in reinforcing requirements.

Boston—Inquiry for reinforcing steel is featured by additional flood control work along the Connecticut river, pumping stations and dikes, which will be bid to the United States engineer, Providence, R. I. Highway and bridge requirements are for small tonnages, although the number of such contracts is increasing.

New York—While shading of 50 cents a ton under the 1.90c base price was brought out in bids to a general contractor involving a 1350-ton project, prices are generally steadier at the new level, with purchases mostly in small lots. Pending volume is heavier, notably for bridges and highways and additional tonnage is also appearing for building construction, mostly industrial expansions.

Seattle—Small tonnages feature the market, the aggregate providing a fair volume of turnover. Prospects are improved. Bids are in at Denver for several sizable lots, and at Olympia for 120 tons involved in state bridges in Clallam county, Washington.

San Francisco — Reinforcing bar lettings totaled 4226 tons last week. This brought the aggregate to date to 78,636 tons, compared with 85,737 tons for the same period last year. Soule Steel Co. booked 2129 tons for a marginal wharf in Oakland, Calif., for the naval supply depot. Truscon Steel Co. booked 1368 tons for a viaduct at San Rafael, Calif.

Toronto, Ont. — Demand for reinforcing steel is holding well with upwards of 5000 tons pending for early closing, in lots ranging from 50 to 1000 tons.

Therm-O-flake

B B INSULATING BLOCK

SUPERIOR HIGH TEMPERATURE INSULATION

Has smooth, perfectly plane surfaces that make tight-fitting joints.

Provides extra efficient insulation over a wide temperature range.

Widely used in steel plated furnace walls and is quite water resistant.

Extra strong, sharp edges and corners insures minimum loss thru breakage.

Supplied in all standard block sizes and lagging, also in a wide variety of tailor made special shapes.

Write for Information and Prices

Other **Therm-O-flake** Products

Made from Exfoliated Vermiculite

Granules - Brick - Block - Concrete

Illinois Clay Products Company

JOLIET, ILL.

Reinforcing Steel Awards

2129 tons, marginal wharf, specification 9587, naval supply depot, Oakland, Calif., to Soule Steel Co., San Francisco.

1400 tons, grade crossing, sections 3 and

Concrete Bars Compared

	Tons
Week ended June 29	10,500
Week ended June 22	12,073
Week ended June 15	4,014
This week, 1939	10,819
Weekly average, year, 1940	8,399
Weekly average, 1939	9,197
Weekly average, May	7,058
Total to date, 1939	272,297
Total to date, 1940	218,397

Includes awards of 100 tons or more.

4, Long Island railroad, Atlantic avenue, Brooklyn, to Igoe Bros., Newark, N. J., through Tomasetti Contracting Co., New York.

1368 tons, viaduct at San Rafael, Marin county, Calif., for state, to Truscon Steel Co., San Francisco.

700 tons, factory, E. R. Squibb Co., Brooklyn, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.; Turner Construction Co., contractor.

650 tons, Charles street housing, Detroit, to Great Lakes Steel Corp., Detroit, through Ceco Steel Products Corp.; Consolidated Construction Co., contractor.

500 tons, United States treasury, procurement division, inv. 10299, Albia, Iowa, to Truscon Steel Co., Youngstown, O.

500 tons, flood control project, unit 4, Johnstown, Pa., to Bethlehem Steel Co., Bethlehem, Pa.; Leo Butler & Son, contractor.

480 tons, including 300 tons reinforcing trusses, Passaic river bridge, route 25, section 30C, New Jersey, to Jones & Laughlin Steel Corp., Pittsburgh, through Lafera-Greeco Contracting Co., Newark, N. J.

370 tons, state highway project RD-40-37, Dutchess county, New York, to Wickwire Spencer Steel Co., through John Arborio Inc., Poughkeepsie, N. Y.

270 tons, state highway project RC-40-39, St. Lawrence county, New York, to American Steel & Wire Co., Pittsburgh, through Law Bros. Contracting Co., Herkimer, N. Y.

250 tons, state highway project RC-40-18 East Pembroke - Batavia, Genessee county, N. Y., to Wickwire Spencer Steel Co., Buffalo, through Bero Engineering & Construction Corp., North Tonawanda, N. Y.

250 tons, plant, Indiana Water Co., Indianapolis, to Jos. T. Ryerson & Son Inc., Chicago; Service Construction Co., contractor.

215 tons, grade crossing, Siegfried, Del., to Taylor-Davis Co., Philadelphia.

200 tons, culvert, Kingston, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

200 tons, elevator, Albert Schwill Co., Chicago, to Truscon Steel Co., Youngstown, O.; James Stewart Co., contractor.

175 tons, bars and mesh, grade crossing elimination, route 23, section 8B, near and Corning, N. Y.; Cleverock Inc., Newark, N. J., through Jannarone Contracting Co., Belleville, N. J.

157 tons, Holy Name parochial school, San Francisco, to Ceco Steel Products Corp., San Francisco.

157 tons, three bridges, Yolo and Butte counties, California, for state, to Kyle & Co., Fresno, Calif.

140 tons, flood control, Mound City, Ill., for United States engineer, Louisville, Ky., to Bethlehem Steel Co., Bethlehem, Pa.; Regenhart & Southern, contractors.

109 tons, school, Piedmont, Calif., to Herrick Iron Works, Oakland, Calif.

100 tons, state highway project RC-40-35, Madison county, New York, to American Steel & Wire Co., Pittsburgh, through Davis G. Stearns Inc., Whitesboro, N. Y.

100 tons, museum and library, Bloomfield Hills, Mich., to Great Lakes Steel Corp., Detroit, through McRae Steel Co., Detroit.

100 tons, comfort station improvements, Grand and Montague streets, New York, to Carroll & McCready Co. Inc., Brooklyn, N. Y., through J. L. Rice Co., New York.

Reinforcing Steel Pending

2245 tons precast reinforced concrete pipe, Orange county feeder line, metropolitan water district, Los Angeles, specification 335, alternate bids on welded steel pipe; bids July 10.

1350 tons, grade crossing elimination, Long Island railroad, Rockaway, N. Y.; Charles F. Vachris Co., New York, low.

600 tons, flood control project, Corning, N. Y.; Clevorock Inc., New York, low.

600 tons, Frankfort Distillery Co., warehouse, Dundalk, Md.; bids July 3.

500 tons, apartment building, coco solo, Canal Zone; McCarthy Construction Co., contractor.

400 tons, plant addition, Campbell Soup Co., Chicago; bids in.

400 tons, new administration building, University of California, Berkeley, Calif.; K. E. Parker, 135 South Park street, San Francisco, low on general contract at $657,540.

392 tons, bridge, Franklin Park, Ill.; Thomas McQueen Co., Chicago, low.

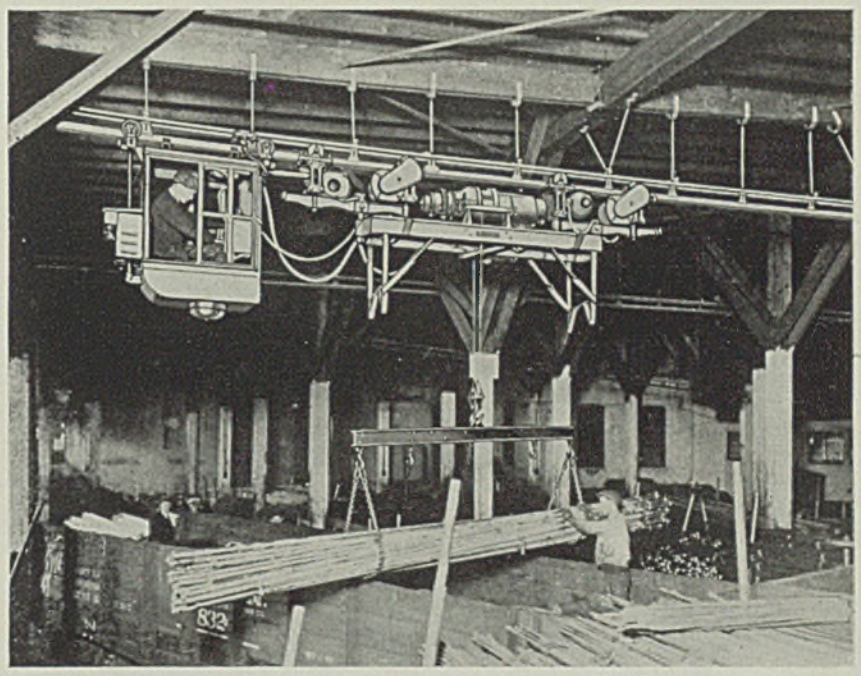
385 tons, bridge over San Joaquin River, Fresno and Madera counties, California, for state; bids opened.

380 tons, Mannheim road bridge over Milwaukee railroad tracks, Chicago; bids July 25.

326 tons, flood wall, Kansas City, Kans.; bids June 26.

325 tons, housing project, Fall River, Mass.; M. Spinelli & Sons Co. Inc., Boston, recommended for contract on base bid of $731,500.

320 tons, state highway project RC-40-57,



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OVERHEAD MATERIALS HANDLING EQUIPMENT
Other products: CLEVELAND CRANES and STEELWELD MACHINERY

Behind the Scenes with STEEL

Thoughts on Reading

■ K. B. Elliott, v. p., Studebaker Corp., gave a talk the other day in Indianapolis emphasizing this interesting point on business reading: *Too many men are trying camel-like, to live off their hump—the hump of their accumulated knowledge and experience up to the point at which they cease to continue their inquiring study in the field in which they work.*

Mrs. Shipton's Prophecy

■ Talking with Bill Stout in his engineering laboratories the other day at Dearborn, Mich., Detroit editor, A. H. Allen kept admiring the model of Stout's proposed stainless steel skycar which hangs over his desk. The newspaper man — artist — engineer, who many claim is miles ahead of the aviation parade, handed him the following, from Mother Shipton's Prophecy, written back around the fourteenth century:

When pictures look alive with actions free
And ships like fishes swim beneath the sea;
When men, acquiring wings which scan the sky,
Then half the world, deep drenched in blood, shall die.

Mamma Shipton certainly had a canny foresight, or else the rum in those days did peculiar things to you. It is too bad she can't be operating today when she could really clean up with some sort of service like Lady Shipton's Confidential Stuff on Events to Come. She could make a barrel of cabbage giving out the winners at Aqueduct every day just to the boys who hang around our bookie-barber shop up the street.

Without Fail

■ Speaking of Allen and his Mirrors of Motordom, we would all be completely whipped here if a week ever passed by without at least one orchid tossed his way by an ardent reader. The choice this week is from Detroit itself: *I want to express my appreciation for the authentic, up-to-date information which is featured in Mirrors of Motordom. To me it is the highspot of* STEEL.

Philadelphia Madhouse

■ And speaking of highspots, we got a big kick out of that South Dakota Republican delegate with the Weber and Fields accent, who, try as hard as he might, could only say it one way: *Von for Veelkee!*

Willkie's Double

■ And now that Veelkee has von, he's going to be pretty well occupied and as rumor has it such busy men often need a double. If so, STEEL's Eastern Manager, Emil Kreutzberg will surely be drafted. He looks more like Veelkee than Willkie does.

Murder Mystery

■ Try a hand at this one, if you haven't already seen it in the June *United Effort*: Four men, whom we shall call Robert, Ronald, Ralph and Rudolph, were playing cards one evening. As a result of a quarrel during the game, one of these men shot and killed another. From the following facts, name the victim and his murderer.

Robert will not expose his brother's guilt.

Rudolph had been released from jail on the day of the murder, after having served a three-day sentence.

Robert had wheeled Ralph, a cripple, to the card game at Ronald's house.

Rudolph had known Ronald for only five days before the murder.

Ralph had met Robert's father only once.

The host is about to give evidence against the murderer, whom he dislikes.

The murdered man had eaten dinner on the previous night with one of the men who did not bowl with Ronald customarily.

SHRDLU

Orange county, New York.

286 tons, extension shipway No. 3, Philadelphia navy yard; Duffy Construction Co., New York, contractor.

282 tons, depot and supply building, Hill Field, Ogden, Utah; bids opened.

250 tons, Fullerton avenue bridge, Chicago; bids July 2.

250 tons, garage, Randolph and Wabash, Chicago; bids in.

230 tons, United States treasury, procurement division, inv. 5780, Topeka, Kans.

210 tons, housing project, Stamford, Conn.

180 tons, plant for Swift & Co., Seattle, Wash.; general contract to Howard S. Wright, 407 Yale avenue N., Seattle.

163 tons, warehouse, Sears, Roebuck & Co., Chicago; bids in.

140 tons, building, Standard Grocery Co., Minneapolis.

140 tons, sporting goods building, 7 North Wabash avenue, Chicago; bids in.

180 tons, highway project, including overpass and approaches, route 49, section 16, Pennsylvania-Reading Seashore Lines, South Dennis, N. J.; bids July 12, E. Donald Sterner, state highway commissioner, Trenton.

126 tons, storm drain, water and power department, Los Angeles; bids July 3.

125 tons, state highway project, Waterloo, N. Y.

125 tons, United States engineer, Chicago, guide walls, Marseilles, Ill.; bids July 1.

122 tons, flood control project, Coeur d' Alene, Idaho; Sather & Son, Seattle, low.

120 tons, two state bridges, Clallam county, Wash.; Macri & Colucelo, Seattle, low.

119 tons, underpass, Palo Alto, Calif., for state; bids July 10.

102 tons, highway project FAS-292-C, Carter county, Kentucky; bids July 12.

100 tons, state highway project Fort Ann, N. Y.

100 tons, state highway project, Auburn, N. Y.

100 tons, state highway projects, Dover Plains, N. Y.

100 tons, Coca Cola building, Ft. Wayne, Ind.

100 tons, sewage treatment plant, Riverside, Calif.; bids opened.

100 tons, bars, piling and miscellaneous steel, Paderewski pumping station, Connecticut river, Chicopee, Mass.; Intercounty Construction Corp., Rye, N. Y., low.

Unstated tonnage, 44 standard type, 63 to 87 igloo type ammunition magazines, Proving Ground, Ill.; war department.

Unstated, malt storage elevator for Great Western Malting Co., Vancouver, Wash.; George H. Buckler Co., Portland, Oreg., low.

Unstated, control house and untanking tower for Bonneville project, Chehalis, Wash.; O. R. Wyman, Portland, Oreg., low.

Unstated, addition to hospital, Fort Lewis, Wash.; MacDonald Building Co., Tacoma, Wash., low.

Unstated, city water reservoir, Salem, Oreg.; Viesko & Hannaman, Salem, low.

Metallurgical Coke

Coke Prices, Page 79

Pittsburgh—Activity in beehive sections of Western Pennsylvania has been increasing and many ovens have been lighted over the past week. Coke sellers report some

buyers are attempting to build up stocks in anticipation of heavier needs, although to all appearances the supply is sufficient and will probably remain so. Prices are steady and tend to be strong at present level of demand.

Seattle—Prices are unchanged at $21.10, delivered here by rail, as all water imports have been cut off by war conditions which have forced local consumers to turn from British coke to domestic, now coming by rail. Sales are slow and show no increase, although prompt delivery is difficult in the face of conditions.

Pig Iron

Pig Iron Prices, Page 80

Pittsburgh—Production is being pushed, although no new furnaces have been blown in during the past week, 39 of 50 stacks being active. Foundry demand is good, although most pressure is coming from steelworks.

Chicago — June ended with shipments decidedly in excess of those of May, due chiefly to expanded operations of nonintegrated mills. Shipments still are on the increase, as foundry requirements also are larger. Foundry melt, however, may be smaller because of shut-downs over the July 4 weekend, while some agricultural equipment plants also will close down for longer periods, due to vacations. Buying of iron has dwindled as all major consumers are comfortably covered for third quarter.

Boston — Most pig iron consumers having covered through third quarter, buying continues to slacken and shipments against commitments are barely maintained. Melters have built up inventories in many instances, notably those who for many weeks have been operating with small stocks frequently buying small lots for prompt delivery. Foundry melt is holding, but is somewhat spotty. The Everett, Mass., blast furnace is scheduled to go into blast during July.

New York — Pig iron specifications this month will be the heaviest this year, according to most sellers. New orders, while moderately good, will be down from last month, when there was considerable contracting. Export demand has dropped off noticeably, although England is believed to be taking substantial shipments against orders placed a month or so ago. Considerable secrecy has surrounded English buying, with a result that is difficult to estimate the present movement. Some scattered inquiry is still being figured from South America.

Philadelphia—No price change in pig iron is indicated in the East, according to producers, despite announcement of an increase of $1 per ton by a Utah producer. June specifications were the best this year. Shortage in low phosphorus iron is said to be developing, with England unable to purchase here in quantities of this grade desired.

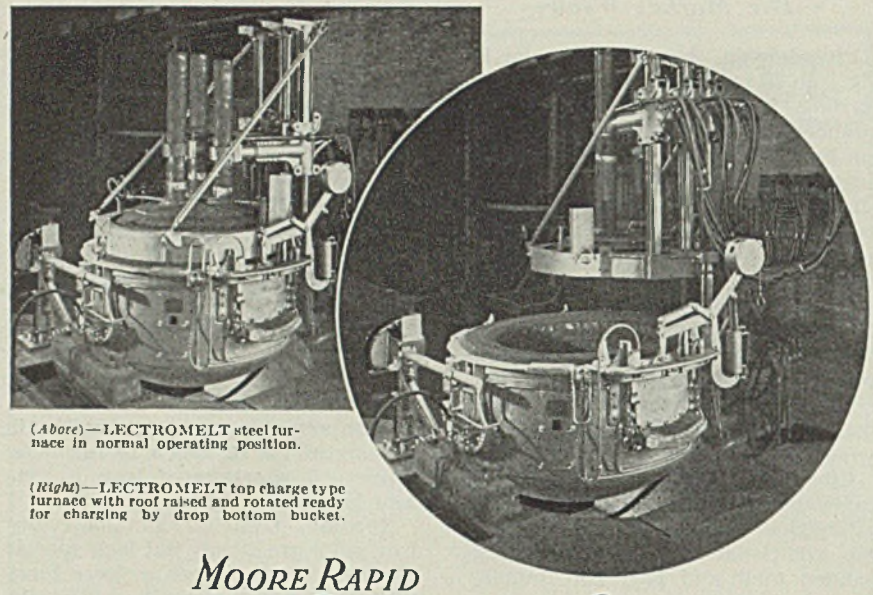
Buffalo—Shipments for June were 10 to 15 per cent better than for May, despite a slackening during the past two weeks. Most consumers are covered for third quarter but refuse to place releases far beyond immediate requirements.

Cincinnati—Pig iron shipments continue at the accelerated pace established early in June, part of the additional tonnage for an expanded melt and part for foundry stocks. With most foundries covered moderately well for third quarter, buying has receded to occasional carloads.

St. Louis—Buying of pig iron has decreased noticeably as contrasted with two weeks or ten days ago. Melters are hesitant, owing to the uncertainties at home and abroad. On the other hand, all classes of melters are specifying freely, and shipments are on a liberal scale. Aggregate for June will doubtless exceed that of May by a fair margin.

Birmingham, Ala.—Pig iron production remains unchanged with all but one of the district's 18 furnaces active. A shortage of iron is evident in some quarters.

Toronto, Ont. — Merchant pig iron sales are steady but lack special feature. Some larger melters have booked for third quarter, while oth-



(*Above*)—LECTROMELT steel furnace in normal operating position.

(*Right*)—LECTROMELT top charge type furnace with roof raised and rotated ready for charging by drop bottom bucket.

Moore Rapid

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Furnaces

LECTROMELT furnaces are built in sizes ranging from 25 pounds to 50 tons. Both door charge and top charge types are available. Rugged and durable construction. Rapid and economic operation.

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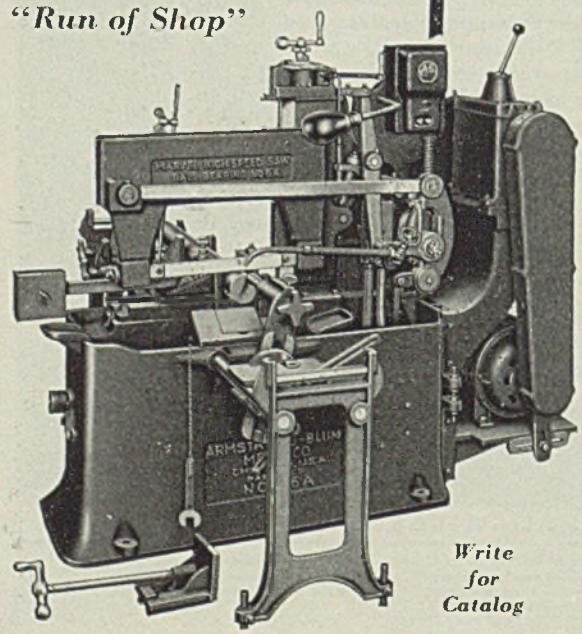
High Speed Production or "Run of Shop"



● The MARVEL 6A or 9A heavy duty all-ball bearing Hack Saws with automatic bar pushup are the fastest hack saws built. In cutting-off identical pieces from bars, they are unequalled, floor to floor, by any other cutting-off machine tool of comparable accuracy . . . unequalled either in speed (out-put) or labor cost (they require no more attention than an automatic screw machine.)

Automatic production can be interrupted at any time for single-cut or miscellaneous work by simply dropping off the bar-feed belt; hence MARVEL Automatic Saws are fully multi-purpose, are always ready for either automatic quantity production or plain work.

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ers have not got beyond inquiries, and there is no rush to make known requirements to the end of September. Producers are giving good delivery on spot orders and as there is no indication of early price advances, nor shortage of iron, many melters are satisfied to place orders as demands dictate.

Seattle—Effective July 1, Columbia pig iron, which is generally used in this area, will advance $1 to $22 base, Ironton, Utah. This reflects strength in Eastern markets. Foundry operations, recently hampered by labor troubles, are slightly improved but consumption of pig has not noticeably increased. The new price is effective for third quarter. No foreign iron is being received here.

Scrap

Scrap Prices, Page 82

Pittsburgh—Prices of scrap suffered last week from a temporary abundance of material and lack of interest on the part of buyers. Downriver mills continue buying at approximately the same levels, and while No. 1 steel has been marked down 50 cents to reflect this activity, it does not indicate a definite trend and May reverse itself shortly.

Cleveland—Scrap prices are easier, some grades being off 50 cents and the market is listless in spite of a high rate of steel production.

Chicago—No. 1 heavy melting steel fell from $19 to $18 last week, the latter price confirmed by a sizable mill purchase. This grade is now quoted at $17.50 to $18, with current dealer-broker trading within that range. Other heavy melting steels and some railroad specialties also went lower. Due to uncertainty of the market many scrap values are highly nominal.

Boston — Some reaction has taken place in iron and steel scrap prices, notably for Eastern Pennsylvania shipment, and the upward trend has halted with some grades off 25 to 50 cents from the recent highs. This has also tended to retard further advances in active grades for export. For shipment to New England foundries cast grades remain firm with material coming out slowly.

New York—Prices have weakened on most grades for domestic shipment 50 cents to $1 per ton, with export quotations unchanged. Buying for Eastern Pennsylvania has slackened and little material is moving from this district. Three ships are loading about 20,000 tons at Jersey City, N. J., mainly for England. This material had been accumulated previously and scrap originally destined for Italy on barges and in

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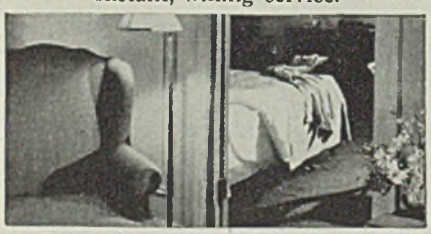

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Convenience that saves time and taxi fare. Hotel Cleveland adjoins the Union Terminal and Terminal group, and is at the very heart of Cleveland, Ohio.

HOTEL CLEVELAND Cleveland

yards is being diverted to other export destinations and on domestic orders.

Philadelphia—Most scrap prices have declined 50 cents to $1 per ton, following substantial offerings attracted by current quotations and backing up of supplies gathered for export. General belief is the weakness will be temporary. Export outlook is better, England increasing scrap releases. Japan is buying more freely.

Buffalo—Following recent large sales an easier tone has developed with a sale of approximately 8000 tons of No. 2 heavy melting and No. 2 bundles reported at 50 cents a ton below peak levels for the recent upward movement. Some dealers report No. 1 steel available at $19 to $19.50 a ton. More than 50,000 tons has been bought from eastern sellers originally consigned to Italy and France.

Detroit—Minor adjustments downward have been effected in prices of busheling, forge flashings and turnings. Some sentiment exists for a general reduction of 50 cents throughout the list but this is offset by contrary opinion that strengthening in prices is not far off. Automotive lists closing in the past few days have been sharply reduced, the average being about 15 per cent of normal volume.

Cincinnati — Dealers in iron and steel scrap lowered some grades 50 cents in a partial retirement from their recent long, speculative position. The reaction was attributed largely to international developments, especially uncertainty on export conditions. Foundry grades were sustained at recent levels.

St. Louis—The past few days have witnessed a sharp reversal in scrap sentiment. Country dealers and other holders, who had held firm views, suddenly began to offer accumulations in such quantity that the price structure could not stand the strain. Quotations were marked downward 50 cents to $1 per ton, and these are nominal, as the situation has not adjusted itself, and test sales on the several grades are lacking.

Birmingham, Ala. — Scrap continues strong, but prices are unchanged, with heavy melting at $16. All specifications are in consistently good demand.

Seattle — Although volume of sales is nominal, the market shows firmness, due to conditions in the East. Japan continues to buy in small lots, ocean space being easier. Rolling mills are taking only occasional shipments and foundry demand is slow. Receipts are increasing. Export prices are quoted $14.50 to $16, according to grade.

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Photo—Warner & Swasey

. . . by furnishing him with BISCO Alloy and Tool Steel tubing that meets your exacting requirements for such items as ring dies, bushings, forming rolls, etc. With the right combinations of inside and outside diameters stocked for immediate shipment, long, costly hours of lathe work on solid rounds are no longer necessary.

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Seattle Transportation Commission has rejected bids for the sale of steel rails, switches, car wheels and other street railway equipment because bidders would not guarantee the material would not be devoted to war use. Local dealers state they cannot purchase except for export as domestic consumption is limited.

San Francisco—Further advances in scrap prices is expected although no change has occurred in the price of heavy melting steel, which continues at $13.00 to $13.50 a net ton, f.o.b. cars, metropolitan areas of San Francisco and Los Angeles, with No. 2 quoted at $12.00 to $12.50. It is reported that some bottoms are now being loaded in the Los Angeles district with material for export to Japan.

Nonferrous Metals

New York — Tightness of nonferrous metal supplies for prompt delivery was evident last week. Results of the Republican national convention were considered bullish and a stronger price tone developed on Friday, especially in copper.

Copper — After breaking through the 11-cent level on Thursday, a partial recovery was made on the following day with custom smelters raising electrolytic to 11.12½c, delivered Connecticut Valley. A contributing cause of the improvement was the pending advance of five per cent in the price of paper-covered cable which brought in substantial buying. Mine producers again held at 11.50c.

Lead—Sales declined below the production and shipment rates since consumers are well-covered. This was balanced by the well-sold position of producers who maintained prices at the 4.85-cent East St. Louis level. A pickup in buying is expected to develop when August books are opened within a few days.

Zinc—Consumers appear to have placed all the business they cared to, although one or two sellers were unable to offer deliveries desired by some customers. With galvanized sheet output rising to 63 per cent of capacity, a new high since last January, prime western remained strong at 6.25c, East St. Louis.

Tin—Heavy liquidation of speculative holdings in London and the Far East, stimulated by political developments abroad, forced prices lower. Straits spot closed at 52.62½c compared with 55.12½c at the end of the previous week.

Nonferrous Metal Prices

	Copper			Straits Tin, New York							
June	Electro. del. Conn.	Lake, del. Midwest	Casting, refinery	Spot	Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
22	*11.25	11.50	11.00	54.50	53.25	5.00	4.85	6.25	19.00	14.00	35.00
24	*11.25	11.50	11.00	53.50	51.50	5.00	4.85	6.25	19.00	14.00	35.00
25	*11.12½	11.50	11.00	52.25	49.75	5.00	4.85	6.25	19.00	14.00	35.00
26	*11.00	11.50	10.75	52.25	49.87½	5.00	4.85	6.25	19.00	14.00	35.00
27	*11.00	11.50	10.75	53.00	50.50	5.00	4.85	6.25	19.00	14.00	35.00
28	*11.12½	11.50	10.75	52.62½	50.25	5.00	4.85	6.25	19.00	14.00	35.00

*Based on sales by custom smelters; mine producers unchanged at 11.50c.

MILL PRODUCTS

F.o.b. mill base, cents per lb., except as specified. Copper brass products based on 11.50c Conn. copper

Sheets

Yellow brass (high)	18.56
Copper, hot rolled	20.12
Lead, cut to jobbers	8.25
Zinc, 100 lb. base	11.50

Tubes

High yellow brass	21.31
Seamless copper	20.62

Rods

High yellow brass	13.55
Copper, hot rolled	16.62

Anodes

Copper, untrimmed	17.37

Wire

Yellow brass (high)	18.81

OLD METALS

Nom. Dealers' Buying Prices

No. 1 Composition Red Brass

New York	7.00-7.25
Cleveland	8.00-8.25
Chicago	7.50-7.75
St. Louis	7.75-8.25

Heavy Copper and Wire

New York, No. 1	8.62½-8.87½
Cleveland, No. 1	9.00
Chicago, No. 1	8.75-9.00
St. Louis	8.75-9.25

Composition Brass Turnings

New York	6.62½-6.87½

Light Copper

New York	6.62½-6.87½
Cleveland	7.00
Chicago	6.75-7.00
St. Louis	6.75-7.00

Light Brass

Cleveland	4.25-4.50
Chicago	4.37½-4.62½
St. Louis	4.25-4.50

Lead

New York	4.50-4.60
Cleveland	3.90-4.15
Chicago	3.90-4.10
St. Louis	4.00-4.25

Zinc

New York	3.50-3.75
Cleveland	3.00-3.25
St. Louis	3.25-3.50

Aluminum

Misc., cast, Cleveland	8.00
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	12.25
Standard No. 12 aluminum	14.25-14.75

Warehouse

Warehouse Prices, Page 81

Cincinnati—Warehouse sales are improving. An influx of sheet sales tends to indicate slower mill deliveries. Jobbers' inventories are adequate although a tighter delivery situation is developing on some items. Prices are firm.

New York—Effective July 1 new cutting and shearing extras on hot-rolled, cold-finished and alloy bars will be made by warehouses, which in most instances will result in reductions to customers. The new extras are in line with those recently adopted by jobbers in the Buffalo and Pittsburgh areas.

Seattle — Effective July 1, local houses have agreed to advance jobbing prices on shapes, plates and galvanized sheets $5 a ton, new prices as follows: Shapes, 3.75c; plates, 3.65c; galvanized 5.00c. This follows a cut rate market here for last 15 months. The new list does not bring prices up to Portland levels. Settlement of a local machinist strike has stimulated warehouse buying and volume of sales is satisfactory, showing a gain over May.

Chicago — Better volume of orders is maintained. June ended with tonnage slightly higher generally than in May. Bars and bar shapes are most active, with narrow strip, sheets, and plates also in demand.

Buffalo — Aggregate business for June is about 10 per cent better than that of the previous month, despite some recent decline in demand. Structural and plate items continue to lag while a minor increase is noted in sheets and bars.

St. Louis—Indications point to aggregate June volume being the largest this year. Demand is well diversified, both as to commodities and customers.

Philadelphia — June warehouse sales were about on a parity with May but relatively, jobbing activity is not nearly as good as mill demand. Prices are unchanged.

Ferroalloys

Ferroalloy Prices, Page 80

New York—Ferromanganese shipments this month will be the heaviest since last September, when a $20 advance was announced for the following quarter, as has been the case this time. Consumers are protecting against the higher price which goes into effect July 1, for at least a month and longer in a number of cases, it is believed, although sellers have been endeavoring to limit protective covering to the needs of a few weeks.

A special spurt in activity is also noted in other manganese alloys, ferrosilicon and certain specialties, which also have been increased in price. However, there is scarcely an alloy that has not been moving more actively this month than previously, due to the sharp increase in steel production and to prospects for

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rigid joints that won't loosen

✓ a completely filled hole
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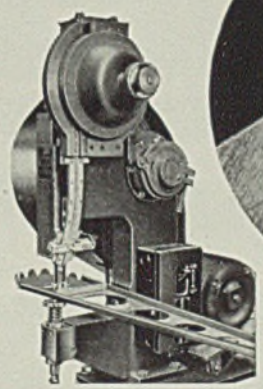
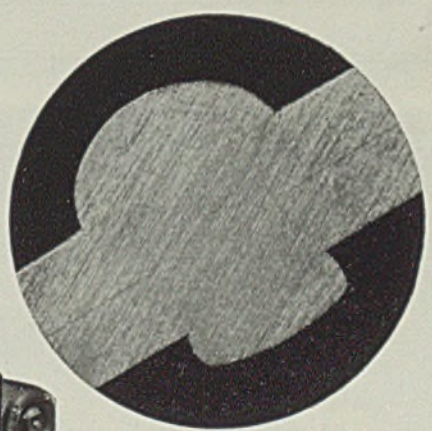
put in at an average rate of 1500 per hour. Approach to the maximum of 3200 per hour depends on the ease with which the work can be handled.





This is a ¼" diameter rivet joint section—enlarged. You can see for yourself just how rigid these joints are. Send along two or three samples of your work, a handful of rivets and specify the type of riveted head required. They will be "RIVITORed" promptly and returned for your inspection.

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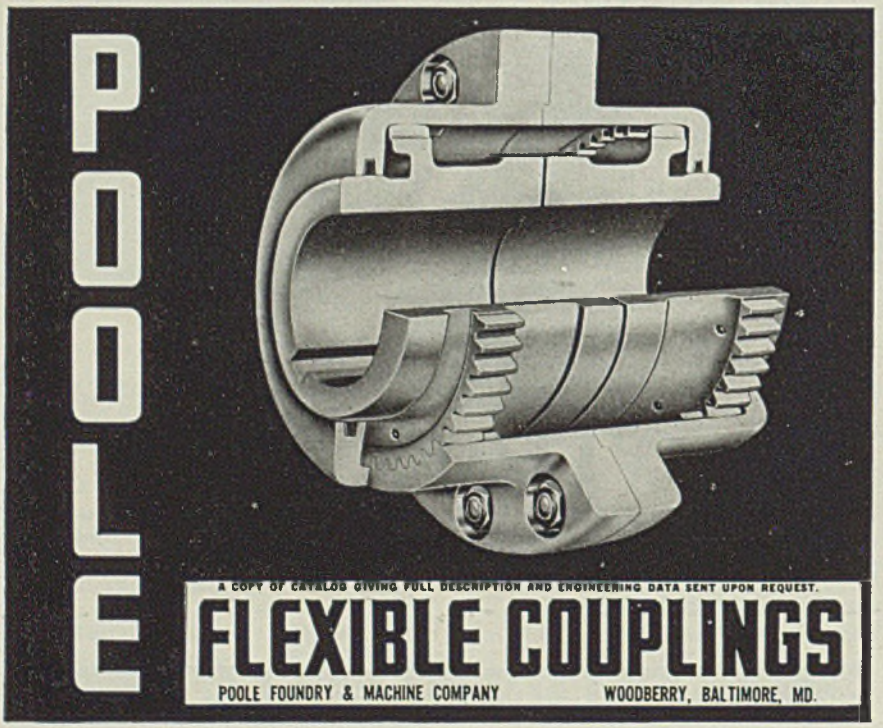
maintenance of higher operations for a considerable time.

Ferrotungsten prices are unchanged, but the undertone is exceedingly strong, owing particularly to the increasingly complicated political situation in the Far East and its effect on tungsten ore. An increase would not prove surprising to the trade. In general, prices on this alloy are not set up on a contract basis for a period of three months, as in ferromanganese, spiegeleisen and most other alloy products, but rather is sold on a spot basis and in close alignment with the ore market.

Beginning July 1 both spot and contract business in ferromanganese is quotable at $120, duty paid, Atlantic and Gulf ports; and spiegeleisen at $36, Palmerton, Pa., on 19 to 21 per cent material and $49.50, on 26 to 28 per cent.



Equipment

New York—Priority in machine tool building and shipments is expected by most producers shortly as new purchases and inquiry continue to swamp shops. Without waiting for official action some dealers and builders are not taking orders for definite delivery except for machines for the defense program. Requirements and buying by the aircraft industry continue to increase. Substantial part of the French business on shop books is likely to be diverted to the British, with some units going to domestic shops with armament orders.

Chicago—Inquiries, which already had been coming in at a brisk rate, are reported being received in even heavier volume. Orders, while increased also, are not improved in ratio to inquiries. There is feeling that many inquiries are feelers from concerns preparing to turn out government work. Increasing extension of machine deliveries indicates the rush that is being encountered. Foreign developments have had little effect on the equipment market here yet.

Seattle—Public works are furnishing a larger volume than private interests, turnover being somewhat better than normal for the season. Com. R. E. Thomas, Puget Sound navy yard, has called bids July 17 for extension of fire protection, electric and water facilities at Keyport torpedo station, Wash. Everett, Wash., opens bids June 24 for a diesel crawler tractor and equipment, Spokane, June 27, for air compressor, and J. R. Ummel, department purchasing agent, Seattle, June 21, for a light plant for Kanakanak, Alaska.

Coke Oven By-Products

Coke By-Product Prices, Page 79

New York — Toluol has been advanced two cents per gallon to 27.00c for two-degree material in tank car lots. Nitration grade in car tanks is 28.50c, drum lots being 33.50c. Industrial grade in drum lots is quoted 32.00c a gallon for third quarter shipment. Toluol is used in the production of T.N.T. and vital industrial chemicals, the advance in price being the first in more than two years. Leading distributors have lowered pure and 90 per cent benzol one cent to 15.00c per gallon and industrial xylol and solvent naphtha one cent a gallon to 26.00c. Nitration grade of xylol is now 44.00c. Demand for distillates remains heavy and current supplies are moving directly into production with little accumulation.

Construction and Enterprise

Ohio

AKRON, O.—Firestone Tire & Rubber Co., 1278 South Main street, is considering erection of a plant for the manufacture of a synthetic rubber recently prefected. W. B. Early, care owner, is in charge of plans.

ALLIANCE, O.—Davis Engineering Co., formed by Oscar A. Davis, 849 Parkway boulevard, has bought patterns, drawings and similar property of A. G. Reeves Steel Construction Co. and will continue production of its products, kilns, coolers, dryers, creosote cylinders and similar devices, at location not yet determined.

CLEVELAND — Wagner Rustproofing Co., J. O. Wagner, manager, 7708 Quincy avenue, is building a factory addition costing $10,000. J. L. Hunting Co., Ninth-Chester building, has general contract.

CLEVELAND — Formweld Products Co., A. C. Woellert, president, has started production of sheet metal products at 6545 Carnegie avenue, where about 7000 square feet of floor space has been leased.

CLEVELAND—Electric Products Co., 1725 Clarkstone avenue, Maxwell R. Berry, president, will build a new plant 40 x 145 feet, opposite present plant, to enlarge capacity. H. M. Morse Co., 1500 Superior avenue, architect, is receiving bids.

DOVER, O.—LaDel Conveyor & Mfg. Co., 338 South Broadway, New Philadelphia, O., is negotiating for purchase of part of the old plant of American Sheet & Tin Plate Co. in Dover. As alternative an addition to present plant may be built to increase production.

ELYRIA, O.—Romec Pump Co., 333 East Bridge street, W. L. Davis, plant manager, will double capacity by new plant or addition to meet enlarged demand for airplane fuel pumps and other aircraft parts.

TIFFIN, O.—Tiffin Gray Iron & Semi-Steel Co., will be incorporated by Andrew Heilman, 4144 East 100th street, Cleveland, and has purchased a site for foundry, 50 x 80 feet. N. B. Biggs,secretary, Tiffin chamber of commerce, is interested.

New York

BUFFALO—Worthington Pump & Machinery Co., Clinton and Roberts streets, will build a one-story plant 114 x 145 feet, general contract to Austin Co., 16112 Euclid avenue, Cleveland. Cost about $50,000.

SCHENECTADY, N. Y.—Airport Commission Schenectady county, J. Westlin, chairman, court house, will build hangars at airport at cost of over $100,000.

Pennsylvania

CORRY, PA. — Corry-Jamestown Mfg. Corp., D. A. Hillstrom, secretary and manager, will build a three-story metal products plant 41 x 144 feet, to cost about $60,000. General contract has been let to Rogers Structural Steel Co., Corry.

ERIE, PA.—Standard Stoker Co., H. P. Farrington, president, 1701 Gaskell avenue, is taking bids on a one-story plant addition 15 x 100 feet. (Noted June 24).

LANCASTER, PA.—Specialty Screw Machine Products Co., South West End avenue, is taking bids on a two-story plant 50 x 130 feet. J. Wickersham, Duke street, is engineer.

LOCK HAVEN, PA.—Piper Aircraft Corp., W. T. Piper, president, will build two 50 x 400-foot assembly buildings and a 48 x 100-foot connecting building. Hunting, Davis & Dunnells, Century building, Pittsburgh, are architects.

OLD FORGE, PA.—Morgan Coal Co., care P. Miniechello, 48 Wilson street, Pittston, Pa., will build an anthracite coal breaker with 1500 to 2000 tons per day capacity, to cost over $100,000.

PHILADELPHIA—York Safe & Lock Co., 711 Chestnut street will build a munitions factory at cost of over $40,000.

Michigan

DOLLAR BAY, MICH.—Foley Copper Products Co. has been incorporated with $100,000 capital to deal in metal products, by John E. Foley, Dollar Bay.

HILLSDALE, MICH. — Purcell-Evans Tool Co. has been incorporated with $50,000 capital to manufacture tools and dies, by F. T. Rubisch, 4696 Twenty-eighth street, Detroit.

MUSKEGON HEIGHTS, MICH.—Morse Mfg. Co. has been incorporated with $10,000 capital to manufacture metal window screens, by Richard K. Morse, 1440 Howden street.

Illinois

CENTERVILLE, ILL.—Illinois Pipe Line Co., Findlay, O., will lay 50 miles 8-inch crude oil gathering pipe lines from Centerville to Bridgeport and build

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Rhode Island

PROVIDENCE, R. I.—Craven-Whitaker Co. Inc., 61 Peath street, will build a one-story addition 42 x 80 x 80 and 40 x 42 feet. General contract to H. M. Soule, 110 Armistice boulevard, Pawtucket, R. I.

New Jersey

PATERSON, N. J.—Silk City Iron & Metal Co. has been incorporated with 300 shares no par value by Harry S. LaPoff, 5 Colt street, Paterson.

West Virginia

HUNTINGTON, W. VA.—International Nickel Co. will build a machine shop addition 80 x 100 feet at cost of $250,000 for building and equipment.

Alabama

MOBILE, ALA.—Alabama Power Co., Birmingham, receives bids July 5 for construction of power plant building.

MUSCLE SHOALS, ALA.—Tennessee valley authority, Knoxville, Tenn., will modernize nitrate plant No. 2 at Muscle Shoals at cost of several million dollars to produce ammonium nitrate and ammonia in connection with preparedness program.

Missouri

KANSAS CITY, MO.—Porterfield Aircraft Corp., 2809 East Fourteenth street, E. E. Porterfield Jr., manager, has leased a building at 1409 Kansas avenue and will equip as wing production shop.

KANSAS CITY, MO.—Black, Sivalls & Bryson Inc., 7500 East Tenth street, will double its machine shop by an addition 60 x 120 feet and an addition to its office building 40 x 40 feet at its Blue Valley plant here.

NEVADA, MO.—City will vote July 2 on $450,000 bonds to finance municipal electric light plant.

ST. LOUIS — Carter Carburetor Co., 2840 North Spring avenue, will build a four-story factory and boilerhouse costing $250,000, general contract to L. O. Stocker Co., Arcade building, St. Louis. (Noted June 24)

Oklahoma

OKLAHOMA CITY, OKLA. — New-Era Cotton Machinery Co. has been incorporated with $55,000 capital by William N. Smith, W. H. Brown and Albert G. Kulp, Oklahoma City.

Wisconsin

BELOIT, WIS.—Beloit Iron Works, manufacturer of papermill machinery, has awarded general contract to Cunningham Bros. for three-story plant addition 65 x 125 feet.

MILWAUKEE—Geuder, Paeschke & Frey Co. is building a two-story addition to its machine shop at 1502 West St. Paul avenue.

MILWAUKEE — Logemann Bros Co., manufacturer of hydraulic presses, pumps, shaft straighteners and similar products, has let general contract to E. C. Knuth & Co. for a one-story plant addition. E. R. & Carl Liebert are architects.

WAUKESHA, WIS.—Waukesha Motor Co., manufacturer of motors, will build a two-story storage plant 75 x 180 feet.

Minnesota

MINNEAPOLIS, MINN.—Modern Pattern Co., Ralph C. Hitchcock, president, will build a one story factory addition. General contract has been given R. H. McGuffie.

Texas

PORT ARTHUR, TEX.—Bayonne Steel Barrel Co., Bayonne, N. J., will build a plant for the manufacture of steel drums and similar products on a site on the ship channel.

Kansas

KANSAS CITY, KANS.—Armour Packing Co., Eighteenth and Central streets, will build a two-three and four-story beef packing plant 124 x 220 feet, costing $245,000. General contract has been let to Swenson Construction Co., Victor building, Kansas City, Kans.

Iowa

CEDAR RAPIDS, IOWA—Midland Rubber Co., B. A. Ruhling, president, will build one-story factory 60 x 150 feet for manufacture of molded and mechanical rubber goods.

Montana

GREAT FALLS, ONT.—Great Falls Breweries Inc. has given contract to Floyd Pappin & Son Inc., for construction of a malting plant. Cottier & Herrington are architects.

California

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GARAGE IN CONNECTION

Boiler Works has been organized by Eda Hurst and associates to conduct a metal fabricating plant

LONG BEACH, CALIF.—Great Lakes Carbon Corp. will build an industrial ship loading terminal at Pier D, to cost $30,000.

LOS ANGELES—Vulcan Ornamental Iron Co., 8922 National boulevard, has been organized by Robert M. Bennett and associates.

LOS ANGELES—U.S. Spring & Bumper Co. is building a steel frame factory building at 4951 Magnolia street, 75 x 240 feet, costing $18,000.

LOS ANGELES—Steelform Construction Co. is building a warehouse at 837 East Gage avenue, 50 x 100 feet, costing $4500.

LOS ANGELES—North American Aviation Co. is building a plant addition at 5701 Imperial highway, 25,420 feet, costing $24,000.

SAN DIEGO, CALIF.—Modern Tool & Instrument Co. has been organized with 6000 shares no par value by Cassius Hunter, 1219 Hunter street, and associates. Richmond Jackson, 1130 San Diego Trust & Savings building, is representative.

Washington

SEATTLE—Todd Seattle Dry Docks will build a $40,000 machine shop 80 x 160 feet at its plant here.

SEATTLE—Pacific Car & Foundry Co. has been given general contract for coal bunkers for Puget Sound Power & Light Co., costing about $20,000.

SEATTLE—Richfield Oil Co. starts work soon on oil terminal, including offices, warehouse, boiler, foamite, switch and pump houses, loading racks, pier 40 x 200 feet and 11 steel tanks requiring about 5000 tons of plates.

TOPPENISH, WASH. — Utah-Idaho Sugar Co. is installing new motors and other equipment, to increase capacity for the fall season.

VANCOUVER, WASH. — George H. Buckler Co., Portland, Oreg., is low to Great Western Malting Co., for erection of proposed storage elevator of 500,000 bushels capacity.

Canada

FORT WILLIAM, ONT.—Canadian Car & Foundry Co. Ltd., Montreal, Que., has given contract to Clayton Co. Ltd., Graham Horne boulevard, for a plant addition on Montreal street, costing $50,000.

HAMILTON, ONT.—Cub Aircraft Ltd., 2 Adam street, has let general contract to Canadian Engineering & Contracting Co. Ltd., 25 Hughson street South, for a one-story airplane manufacturing plant at the Civic Airport.

NORTH YORK TOWNSHIP, ONT.—DeHaviland Aircraft of Canada Ltd., postal station L., Toronto, will build plant addition on Sheppard avenue. Structural steel has been awarded to Dominion Bridge Co. Ltd., 1139 Shaw street, Toronto.

ST. CATHARINES, ONT.—McKinnon Industries Ltd., Ontario street, will build a foundry addition of 6500 square feet, general contract to Newman Bros., 127 St. Paul street.

TORONTO, ONT.—John Inglis Co. Ltd. is having plans drawn for an ordnance plant at 14 Strachan avenue, to cost $80,000.

TORONTO, ONT.—McColl Frontenac Oil Co. Ltd., Yardley building, has given contract to Toronto Iron Works Ltd., 629 Eastern avenue, for oil tanks to cost $65,000.

TORONTO, ONT.—Atlas Engineering & Machine Co. Ltd., 28 Eastern avenue, has let general contract for a plant addition to C. McGregor Ltd., 96 Bloor street West. H. H. Angus, 1221 Bast street, is mechanical engineer.

TORONTO, ONT.—Atlas Engineering & Machine Co. Ltd., 28 Eastern avenue, is taking bids through W. L. Somerville, architect, 30 Bloor street West, for a plant addition 50 x 165 feet. Tools and equipment will be purchased later.

LACHINE, QUE.—Dominion Engineering Works Ltd., First avenue, has awarded general contract to Hyde & Miller, 1500 Guy street, for a plant addition costing $50,000.

LACHINE, QUE.—Standard Railway Equipment Mfg. Co. of Canada Ltd., 84 Broadway, will build addition to plant here, costing $25,000, for which equipment will be required.

MONTREAL, QUE.—Montreal Light, Heat & Power Co., 107 Craig street West, is having plans prepared for a new plant.

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Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Maryland Dry Dock Co., Baltimore, Md.

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Bliss & Laughlin, Inc., Harvey, Ill.
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Columbia Steel Co., San Francisco, Calif.
Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co., McKeesport, Pa.
LaSalle Steel Co., Dept. 4-A, P. O. Box 6800-A, Chicago, Ill.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
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Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
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Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

BARS (Brass, Bronze or Copper)
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Republic Steel Corp., Dept. ST, Cleveland, O.
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Youngstown Sheet & Tube Co., The, Youngstown, O.

BARS (Iron)—See IRON (Bar)

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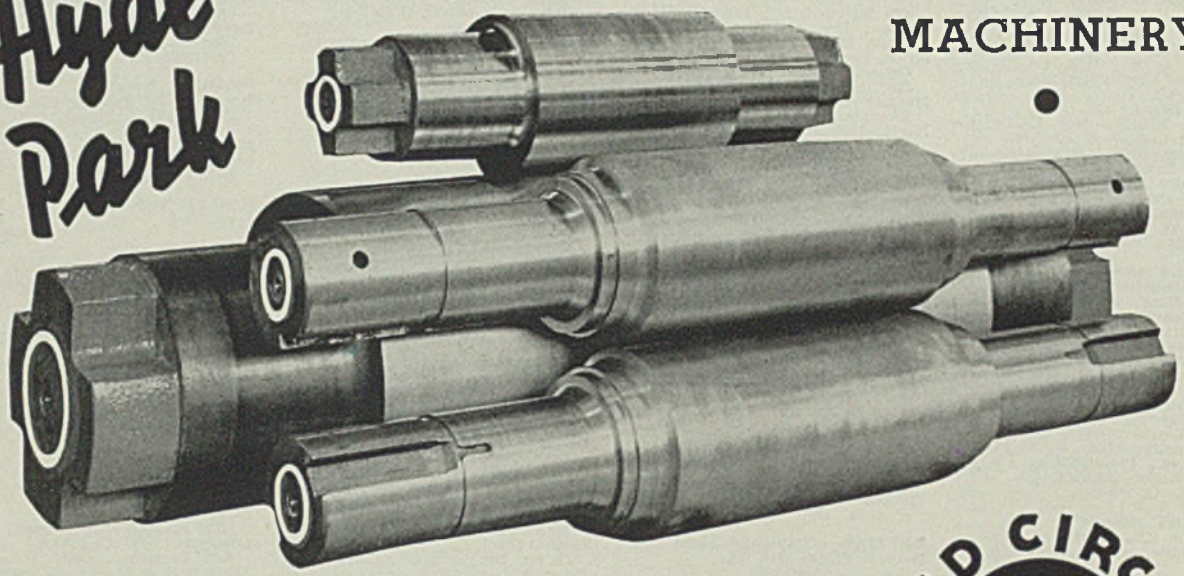

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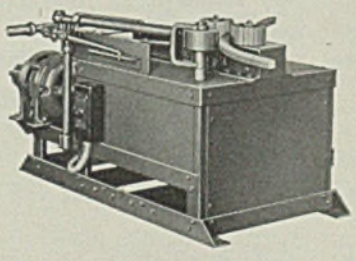
This is a powerful and fast machine for heavy duty work in both fabricating plants or in the field where large tonnage is required. It will handle as high as 20 tons a day. Circles of any size required in concrete reinforcing work from 18 inches in diameter up can be bent on this machine. It will bend bars with two or more radius on the same bar without stopping the machine.



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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., 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.
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)
Peabody Engineering Corp., 580 Fifth Ave., New York City.

BLAST FURNACE SPECIALTIES
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brassert, H. A., & Co., 310 S. Michigan Ave., Chicago, Ill.
Broslus, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

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.
Trufio 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.

BOARDS (Drop)
Irwin, H. G., Lumber Co., 822 E. 8th St., Erie, Pa.

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
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O
Landis Machine Co., Inc., Waynesboro, Pa.

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.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., Waterbury, Conn.

BOLTS (Track)—See TRACK BOLTS

BOOKS
International Correspondence Schools, Box 9375, 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.

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.

BRAKES (Electric)
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Cutler-Hammer, Inc., 1267 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.
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.

BRUSHES
Fuller Brush Co., The, Steelgript Div., 3582 Main St., Hartford, Conn.

BUCKETS (Charging)
Heltzel Steel Form & Iron Co., Warren, O.

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-617, 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.
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.
Pennsylvania Engineering Works, New Castle, Pa.

CARS (Cinder 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., New York City.
Ampco Metal, Inc., Dept. S-617, 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-617, 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.

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.
Erie Malleable Iron Co., W. 12th & Cherry Sts., Erie, Pa.
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)
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.

» » » WHERE-TO-BUY « « «

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.
*Mildvale 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-617, 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.
Norton Company, Worcester, Mass.

CEMENT (High Temperature Hydraulic)

Atlas Lumnite Cement Co., Dept. S-4, Chrysler Bldg., New York City.

CEMENT (Refractory, High Temperature)

Johns-Manville Corp., 22 E. 40th St., New York City.

CENTRAL STATION EQUIPMENT

Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

CHAIN (Conveyor and Elevator)

Baldwin Duckworth Div., 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., 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)

Broslus, 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.

CLEANER (Floor-Oil Absorbent)

Sta-Brite Mfg. Co., 3914 So. Wabash Ave., Chicago, Ill.

CLEANING EQUIPMENT (Metal)

Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.

CLEANING SPECIALTIES

American Chemical Paint Co., Dept. 310, Ambler, Pa.
Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.
Pennsylvania Salt Mfg. Co., Dept. E., Pennsalt Cleaner Div., Philadelphia, Pa.
Sta-Brite Mfg. Co., 3914 So. Wabash Ave., Chicago, Ill.

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., 1267 St. Paul Ave., Milwaukee, Wis.

COAL OR COKE

Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Koppers Co., Gas & Coke Div., 300 Koppers Bldg., Pittsburgh, Pa.
Koppers Coal Co., 300 Koppers Bldg., Pittsburgh, Pa.
New England Coal & Coke Co., Boston, Mass.
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.

COILERS (Rod and Bar)

Sommerfeld Machine Co., Corey Ave., Braddock, Pa.

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-4, 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., 1267 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.

WHERE-TO-BUY

COPPERING COMPOUND
American Chemical Paint Co., Dept. 310, Ambler, Pa.

CORRESPONDENCE COURSES
International Correspondence Schools, Box 9375, Scranton, Pa.

COTTER PINS
Hindley Mfg. Co., Valley Falls, R. I.
Hubbard, M. D., Spring Co., 413 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., 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.
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 (Creeper, Erection)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
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.
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.
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.
Ohio Locomotive Crane Co., Bucyrus, O.

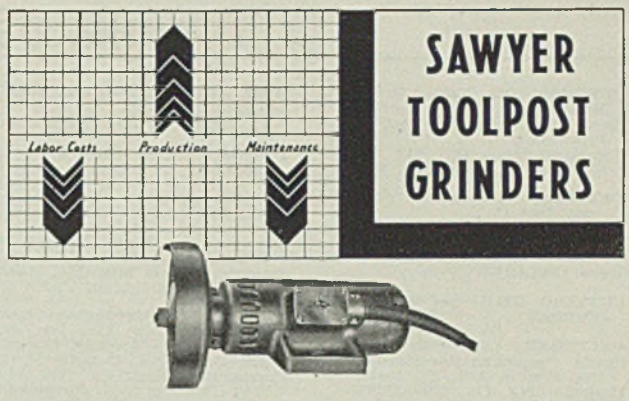
CRANES (Monorail)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

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.

CUSHIONS (Pneumatic)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.



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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
Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.
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-617, 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 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.

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., 310 S. Michigan Ave., Chicago, Ill.
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., 310 So. Michigan Ave., Chicago, Ill.
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Lindemuth, Lewis B., 134 E. 47th St., New York City.
Loftus Engineering Corp., 509 Oliver Bldg., Pittsburgh, Pa.
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.

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
Broslus, 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.

FORGING BILLETS—See BILLETS

FORGING MACHINERY
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.

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-617, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.

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.
*Mildvale 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., 310 So. Michigan Ave., Chicago, Ill.
Pennsylvania Engineering Works, New Castle, Pa.

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.
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.
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.
Heltzel Steel Form & Iron Co., Warren, O.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.
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)

Brassert, H. A., & Co., 310 S. Michigan Ave., Chicago, Ill.
Criswell, James, Co., Keenan Bldg., Pittsburgh, Pa.
Pennsylvania Engineering Works, New Castle, Pa.
Lindemuth, Lewis B., 134 E. 47th St., New York City.

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 1888, Pittsburgh, Pa.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

FURNITURE (Tubular Steel)

Harter Corp., The, Sturgis, Mich.

GAGE BLOCKS

Dearborn Gage Co., 22036 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.
Diamond Expansion Bolt Co., Inc., Garwood, N. J.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Fanner Mfg. Co., The, Cleveland, O.
John Finn Metal Works, San Francisco, Calif.
Gregory, Thomas, Galvanizing Works, Maspeth, N. Y.
Hanlon-Gregory Galvanizing Co., 5515 Butler St., Pittsburgh, Pa.
Hubbard & Co., Oakland, Calif.
Independent Galvanizing Co., Newark, N. J.
International 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., 310 So. Michigan Ave., Chicago, Ill.
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-617, 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.

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.

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-617, 3830 W. Burnham St., Milwaukee, Wis.
National-Erie Corp., Erie, Pa.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

GUNS (Blast Furnace Mud)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., 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.

HEATERS (Air)
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

HEATERS (Electric Space)
Cutler-Hammer, Inc., 1267 St. Paul Ave., Milwaukee, Wis.

HEATERS (Unit)
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Grinnell Co., Inc., Providence, R. I.

HELMETS (Blast Cleaning)
Pangborn Corp., Hagerstown, Md.

HITCHINGS (Mine Car)
American Chain & Cable Co., Inc., Bridgeport, Conn.

HOBS
Brown & Sharpe Mfg. Co., Providence, R. I.

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., 1996 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 (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.

WHERE-TO-BUY

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-4, Chrysler Bldg., New York City.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.

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.

INSULATION (Building)
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.

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.
Pennsylvania Engineering Works, New Castle, Pa.
Petroleum Iron Works Co., Sharon, Pa.

LAMPS (Industrial)
General Electric Co., Dept. S-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, 2691 Madison Rd., Cincinnati, O.
Monarch Machine Tool Co., Sidney, O.
South Bend Lathe Works, 859 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.
Somerfeld Machine Co., Braddock, Pa.

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 (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)

LIGHTING (Industrial)
General Electric Co., Dept. S-E, 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.

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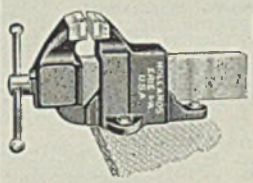
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Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

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)
Acheson Colloids Corp., Port Huron, Mich.
American Lanolin Corp., Railroad St., Lawrence, Mass.
Gulf Oil Corp. of Penna., Gulf Refining Co., 3813 Gulf Bldg., Pittsburgh, Pa.
New York & New Jersey Lubricant Co., 292 Madison Ave., New York City.
Penola, Inc., 34th & Smallman Sts., Pittsburgh, Pa.
Pure Oil Co., The, 35 E. Wacker Dr., Chicago, Ill.
Shell Oil Co., Inc., 50 W. 50th St., New York City.
Socony Vacuum Oil Co., Inc., 26 Broadway, New York City.
Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.
Tide Water Associated Oil Co., 17 Battery Place, New York City.

LUBRICANTS (Graphite)
Acheson Colloids Corp., Port Huron, Mich.

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.
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., 1267 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.

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)
International Nickel Co., Inc., The, 67 Wall St., New York City.

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.

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.

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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.

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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.
Parkin, Wm. M., Co., The, 1005 Highland Bldg., Pittsburgh, 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.
Ceilcote 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., 38 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)
American Rolling Mill Co., The, 2040 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.
Hollands Mfg. Co., 342-352 E. 18th St., Erie, Pa.

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.

PLANTS (Industrial)
Foster, Frank B., 829 Oliver Bldg., Pittsburgh, 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.
*American Rolling Mill Co., The, 2040 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., 413 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.
Hollands Mfg. Co., 342-352 E. 18th St., Erie, Pa.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.

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.

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.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PRESSES (Forming and Braking)
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, 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., 1267 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.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

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.

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-4, Chrysler Bldg., 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
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., Unson 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.

RODS (Drill)
Firth-Sterling Steel Co., McKeesport, Pa.

RODS (Rounds, Flats and Shapes) (*Also Stainless)
*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.

ROLL TABLES
Sommerfeld Machine Co., Braddock, Pa.

WHERE-TO-BUY

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.
Foster, Frank B., 829 Oliver Bldg., Pittsburgh, Pa.
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.

ROLLING MILL EQUIPMENT (Used and Rebuilt)
Foster, Frank B., 829 Oliver Bldg., Pittsburgh, Pa.

ROLLS (Bending and Straightening)
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

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, 2040 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.

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.
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 (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.
United Engineering & Fdry Co., First National Bank Bldg., Pittsburgh, Pa.

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.

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SAWS (Inserted Tooth, Cold)
Huther Bros. Saw & Mfg. Co., 1190 University Ave., Rochester, N. Y.
Simonds Saw & Steel Co., Fitchburg, Mass.

SAWS (Metal Cutting)
Brown & Sharpe Mfg. Co., Providence, R. I.
Simonds Saw & Steel Co., Fitchburg, Mass.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SCAFFOLDING (Tubular)
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.

SCALES
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Fairbanks, Morse & Co., Dept. 96, 600 So. Michigan Ave., Chicago, Ill.
Kron Co., The, Bridgeport, Conn.
Toledo Scale Co., 3216 Monroe St., Toledo, O.

SCALES (Monorail)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Kron Co., The, Bridgeport, Conn.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

SCALING TOOLS (Pneumatic)
Ingersoll-Rand Co., 11 Broadway, New York City.

SCHOOLS
International Correspondence Schools, Box 9375, Scranton, Pa.

SCRAP BALING PRESSES—See BALING PRESSES

SCREENS AND SIEVES
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
Chicago Perforating Co., 2443 W. 24th Pl. Chicago, Ill.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.
Koppers Co., Engineering & Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Ludlow-Saylor Wire Co., The, Newstead Ave. & Wabash R. R., St. Louis, Mo.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

SCREENS (Vibrating)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

SCREW EXTRACTORS
Greenfield Tap & Die Corp., Greenfield, Mass.

SCREW MACHINE PRODUCTS
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn
Hindley Mfg. Co., Valley Falls, R. I.
National Acme Co., The, 170 E. 131st St., Cleveland, O.

SCREW MACHINES (Automatic, Single and Multiple Spindle)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cone Automatic Machine Co., Windsor, Vt.
National Acme Co., The, 170 E. 131st St., Cleveland, O.

SCREW PLATES
Greenfield Tap & Die Corp., Greenfield, Mass.

SCREW STOCK—See STEEL (Screw Stock)

SCREWS
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp., 194-200 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. Keelor 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. Keelor 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., 1267 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. 4A, P. O. Box 6800-A, Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
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, 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.
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.
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.
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-617, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.

SHEETS (Corrugated)
American Rolling Mill Co., The, 2040 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, 2040 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.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Electrical)
American Rolling Mill Co., The, 2040 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, 2040 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.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Hot Rolled and Hot Rolled Annealed)
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., The, 2040 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.

SHEETS (Roofing)—See ROOFING AND SIDING

SHEETS (Stainless)
American Rolling Mill Co., The, 2040 Curtis St., Middletown, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Massillon, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

SHEETS (Stainless Clad)
Granite City Steel Co., Granite City, Ill.

SHEETS (Tin)—See TIN PLATE

SHEETS (Tin Mill Black)
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

SHEETS—HIGH FINISH (Automobile, Metal Furniture, Enameling)
American Rolling Mill Co., The, 2040 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.

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
Criswell, James, Co., Keenan Bldg., Pittsburgh, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

SOLENOIDS (Electric)
Cutler-Hammer, Inc., 1267 St. Paul Ave., Milwaukee, Wis.

SOLVENT (Degreasing)
Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

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.
Duer Spring & Mfg. Co., Pittsburgh, Pa.
Fort Pitt Spring Co., P. O. Box 1377, Pittsburgh, Pa.
Hubbard, M. D., Spring Co., 413 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. E., 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., 413 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. Keelor Ave., Chicago, Ill.
Stanley Works, The, Bridgeport, Conn.
New Britain, Conn.
Toledo Stamping & Mfg. Co., 90 Fearing Blvd., Toledo, O.
Whitehead Stamping Co., 1667 W. Lafayette Blvd., Detroit, Mich.

STAPLES (Wire)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STARTERS (Electric Motor)
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.

STEEL (Alloy)
Alan Wood Steel Co., Conshohocken, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.

STEEL (Alloy)—Con.

Columbia Steel Co., San Francisco, Calif.
Copperweld Steel Co., Warren, O.
Crucible Steel Company of America, 405 Lexington Ave., New York City.
Firth-Sterling Steel Co., McKeesport, Pa.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Jessop Steel Co., 584 Green St., Washington, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Simonds Saw & Steel Co., Fitchburg, Mass.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Washburn Wire Co., Phillipsdale, R. I.
Wisconsin Steel Co., 180 No. 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. 4A, P. O. Box 6800-A, Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
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.
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. 4A, P. O. Box 6800-A, Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
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, 2040 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)

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)

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. 4A, P. O. Box 6800-A, Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wisconsin Steel Co., 180 No. 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, 2040 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.

STEEL PLATE CONSTRUCTION—Con.

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., 1267 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.

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., 1640 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)

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.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TOOLS (Tipped, Carbide)

Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

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 (Steam and Radiator)

Johns-Manville Corp., 22 E. 40th St., New York City.

TREADS (Safety)

Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Dravo Corp. (Machinery Div.,) 300 Penn Ave., Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

TROLLEYS

American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Ford Chain Block Div. American Chain & Cable Co. Inc., 2nd & Diamond Sts., Philadelphia, Pa.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Wright Mfg. Div. of American Chain & Cable Co., Inc. York, Pa.
Yale & Towne Mfg. Co., 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.

TUBE MILL EQUIPMENT

Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.

TUBES (Boiler)

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.
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)

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.
*National Tube Co., Frick Bldg., Pittsburgh, Pa.
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)

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 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.
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
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)
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., 1267 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.
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.
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 (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.

VISES (Bench)
Hollands Mfg. Co., 342-352 E. 18th St., Erie, Pa.

WALKWAYS—See FLOORING—STEEL

WASHERS (Iron and Steel)
Hubbard, M. D., Spring Co., 413 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. Keelor 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. Keelor 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-640, Troy, O.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-25.
Welding Equipment & Supply Co., 2720 E. Grand Blvd., Detroit, Mich.

WELDING
Bartlett-Hayward Div. Koppers Co., Baltimore, Md.
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-640, Troy, O.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-25.
Wilson Welder & Metals Co., 60 E 42nd St., New York City.
Welding Equipment & Supply Co., 2720 E. Grand Blvd., Detroit, Mich.
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 Equipment & Supply Co., 2720 E. Grand Blvd., Detroit, Mich.

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 Equipment & Supply Co., 2720 E. Grand Blvd., Detroit, Mich.

WELDING RODS (Bronze)
Revere Copper & Brass Co. Inc., 230 Park Ave., New York City.
Welding Equipment & Supply Co., 2720 E. Grand Blvd., Detroit, Mich.

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-640, 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.
Welding Equipment & Supply Co., 2720 E. Grand Blvd., Detroit, Mich.
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 (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)
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., 413 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 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., 413 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.

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New Jersey Zinc Co., 160 Front St., New York City.
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Electro Metallurgical Sales Co., 30 E. 42nd St., New York City.

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CLEVELAND OHIO, U. S. A.
"He Profits Most Who Serves Best"
Better Steel Castings

GREY IRON, SEMI-STEEL & ALLOY IRON CASTINGS
SPECIAL WOOD PATTERNS
Commercial and Industrial Stokers
THE CANTON PATTERN & MFG. CO.
CANTON, OHIO

FORGINGS
HAMMERED STEEL FORGINGS
up to 6,000 lbs. each
ALL TYPES
Smooth Forged Finished — Rough Turned Hollow Bored
and Heat Treated to Specifications
CRANK SHAFTS, CONNECTING RODS, SHAFTING
Roll—Gear Blanks—Pinions and Miscellaneous Forgings
BAY CITY FORGE CO.
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Over a Quarter of a Century of Dependable Service and Quality Products

HOT DIP GALVANIZING

• GALVANIZED PRODUCTS FURNISHED
Finest Work—for over 40 Years
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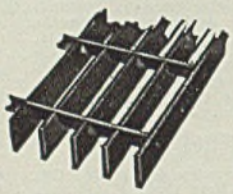
EUREKA FIRE BRICK WORKS
1100 B. F. Jones Law Bldg. PITTSBURGH, PA. AT 0642-0643
Patent Covered Hot Tops and Bottom Plugs for Ingot Molds for Alloy Steels
High Grade Clay and Fire Brick for Furnaces, Boilers, Cupolas, Coke Ovens, etc. Edge Pressed Brick for accurate sizing.
Difficult Shapes a Specialty
Works: Mt. Braddock, Fayette Co., Pa. Dunbar, Pa.—2581

Stampings and Press Work
10 Gauge and Lighter to 20" x 40"—Hot Pressings
Legs and Base Units for Stoves, Refrigerators and Institutional Equipment
OIL TEMPERED (Flat) SPRINGS
DAVIS BRAKE BEAM COMPANY
Laurel Ave. & P.R.R. Johnstown, Pa.



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Grating and Treads
Steel — Aluminum — Brass
No Rivets, Bolts or Welds
Manufactured by
The Tri-Lok Co., Pittsburgh, Pa.
National Distributors
DRAVO CORPORATION, Machinery Division
300 Penn Ave. Pittsburgh, Pa.

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Accounts Wanted

MANUFACTURERS REPRESENTATIVE Established in Detroit and vicinity, contacting steel producers and fabricators, automotive parts and equipment manufacturers. Address Box 230, STEEL, Penton Bldg., Cleveland.

MANUFACTURERS' AGENTS AND DISTRIBUTORS, long established, desire additional lines for industrial concerns in Buffalo, Niagara Falls, and Western New York. Address Box 228, STEEL, Penton Bldg., Cleveland.

MANUFACTURER'S AGENT ESTABLISHED in Philadelphia would like to have one additional line to sell to capital goods industries. Address Box 250, STEEL, Penton Bldg., Cleveland.

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WANTED: SALESMAN — BY SEAMLESS tubing manufacturer—under 35 years old —technical school graduate with steel sales experience. Supply photograph and complete record. Address Box 237, STEEL, Penton Bldg., Cleveland.

WANTED: A DAY FOREMAN FOR A steel foundry; one with steel mill experience and also foundry experience on steel mill rolls. Apply Box No. 244, STEEL, Penton Bldg., Cleveland.

DESIGNERS AND DRAFTSMEN—EXPErienced on Blast Furnace work; plate work, structural and mechanical; state first letter salary, age, etc. Only applications giving full details of experience will be considered. Arthur G. McKee & Co., 2422 Euclid Ave., Cleveland, Ohio.

Help Wanted

REPRESENTATIVES WANTED — BY EStablished Chain Link Fence Manufacturer. Profitable account for firms or individuals now selling Industrial, Utilities, Municipalities, Etc. Direct Mill Shipment of all material. In writing give full particulars including territory covered and products which you now represent. Address Box 249, STEEL, Penton Bldg., Cleveland.

WANTED — EXPERIENCED GENERAL Manager for Forging Plant, location east, must be thoroughly familiar with die design, heat treating, hammer operations, estimating and sales, prefer technically trained man with considerable sales experience. State references, experince, salary expected. Address Box 252, STEEL, Penton Bldg., Cleveland.

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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.
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L. B. FOSTER COMPANY, Inc.
PITTSBURGH NEW YORK CHICAGO

—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.

PLATE SHEAR

No. 5 Hilles & Jones. Capacity 90" x ¾". Throat 36". Hold down-gauges. Motor drive. A-1 condition. In stock.

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SHEAR

One Newbold Rotary Shear with Circle Cutting Attachment ⅝" mild steel plates 96" diameter circles—New—Immediate delivery.

THE HILYARD COMPANY
Norristown Pennsylvania

Bids Wanted

Federal Works Agency, Public Buildings Administration, Washington, D. C., June 19, 1940.—Sealed proposals in duplicate will be publicly opened in this office at 1 P.M., Standard Time, July 23, 1940, for the construction of the U.S.P.O. at Irwin, 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.

Bids Wanted

Federal Works Agency, Public Buildings Administration, Washington, D. C., June 25, 1940.—Sealed proposals in duplicate will be publicly opened in this office at 1 P. M., Standard Time, July 16, 1940, for construction (except elevator) of the U. S. P. O. and Court House at Fairmont, W. Va. Upon application, two sets 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 $10 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.

Federal Works Agency, Public Buildings Administration, Washington, D. C., June 24, 1940.—Sealed proposals in duplicate will be publicly opened in this office at 1 P. M., Standard Time, July 17, 1940, for alterations to the U. S. Court House at Philadelphia, 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.

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AGGRESSIVE ENGINEERING GRADUATE with experience as chemist, metallurgist, plant manager, sales service, and production. Temporarily employed as buyer, desires connection with progressive manufacturer. Available within two weeks. Address Box 241, STEEL, Penton Bldg., Cleveland.

STEEL PLATE PRODUCTS MANUFACTURER can obtain services of capable man thoroughly experienced in all phases of manufacture. Have been layer out, foreman, inspector and superintendent. Write Box 235, STEEL, Penton Bldg., Cleveland.

REPRESENTATION—CLEVELAND AREA Want another exclusive, repeat line of materials or production supplies to sell manufacturers. Must be quality product. Address Box 251, STEEL, Penton Bldg., Cleveland.

Castings

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THE WEST STEEL CASTING CO., Cleveland. Fully equipped for any production problem. Two 1½ ton Elec. Furnaces. Makers of high grade light steel castings, also alloy castings subject to wear or high heat.

PENNSYLVANIA

NORTH WALES MACHINE CO., INC., North Wales. Grey Iron, Nickel, Chrome, Molybdenum Alloys, Semi-steel. Superior quality machine and hand molded sand blast and tumbled.

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ADVERTISING INDEX

Where-to-Buy Products Index carried in first issue of month.

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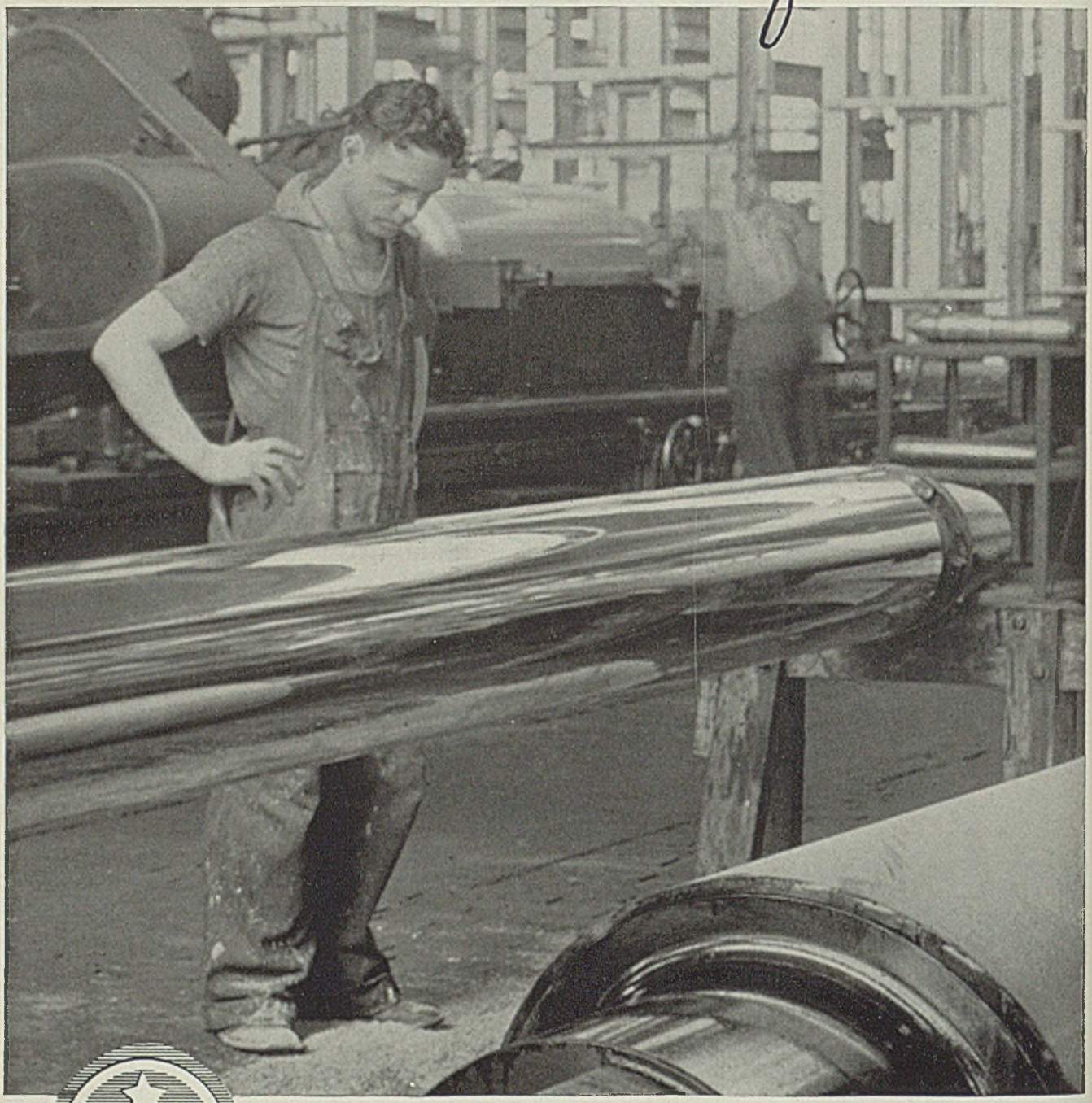

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