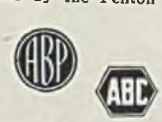
Published by The Penton Publishing Co., Penton Building, Cleveland, Ohio. E. L. Shaner, President and Treasurer; G. O. Hays, Vice President; F. G. Steinebach, Secretary.

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

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

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



STEEL

ESTABLISHED 1882

Contents

Volume 108—No. 9 **March 3, 1941**

READER COMMENTS 4
HIGHLIGHTING THIS ISSUE 19
NEWS
- Steel's "Reliable Capacity" Adequate for All Needs, OPM Survey Shows 21
- Excess Profits Tax Provisions To Benefit Steel, Aircraft Producers 23
- Unions Press for Recognition, Higher Wages; Strikes Disrupt Output 24
- Steelworks Operations for Week 25
- Men of Industry 26
- New Engineering Building Is Air Conditioned 28
- Organization Diagram of Priorities Division 29
- Priorities Board Seeks To Avoid Labor, Industrial Dislocations 33
- Nickel Demand "Higher Than Actual Consumption" 33
- Activities of Steel Users, Makers 38
- GM Preparing To Produce Shells, Cartridge Cases 39
- Fifty Years of Manufactured Abrasives; Anniversary Has Significance 40
- Meetings 41
- "Community Pooling" for Defense Material Production Spreading 42
- Government Defense Awards 43
- France "Undergoing Great Revolution" 48
- Obituaries 139

WINDOWS OF WASHINGTON 30
MIRRORS OF MOTORDOM 35
EDITORIAL—Planning for "After-the-War" 52
THE BUSINESS TREND 53
TECHNICAL
- Training Within Industry—a Must—By Guy Hubbard 56
- Best Equipment for Machining High-Explosive Shell—By Arthur F. Macconochie 58
- Detroit Show To Reveal How Better Tooling Aids Production for Defense 64
- Things To Remember When Stack Cutting with the Oxyacetylene Torch 83
- Devises Formula for Predicting Yield of Coke and By-Products 84
- Flexible Bearing Also an Overload Device 112

Progress in Steelmaking
- Between Heats with Shorty 62
- Bessemer Steelmaking Practice 78

Joining and Welding
- High Production Welding Machine Set-up Speeds Housing Fabrication 68

Heat Treating
- Carburizing Small Parts with All Factors Precisely Controlled—By Reginald Trautschold 73

Materials Handling
- Valuable Hints on Handling Abrasive Wheels—By E. T. Larson 86
- Improved Handling Methods for Storing Steel—By Don Partridge 89

INDUSTRIAL EQUIPMENT 100
MARKET REPORTS AND PRICES 117
BEHIND THE SCENES 132
CONSTRUCTION AND ENTERPRISE 141
INDEX TO ADVERTISERS 170

PRODUCTION • PROCESSING • DISTRIBUTION • USE

DESPATCH

CONTRIBUTES TO DEFENSE INDUSTRIES

★ **FURNACES** Ferrous — Non-ferrous — Solution heat treating, normalizing, tempering, annealing, drawing and aging. Improved heating systems — straight line temperature control — furnace uniformity guaranteed ∓5°F. Temperature range 275°F. to 1200°F.

★ **OVENS** Core baking, mold drying, coil and armature, preheating, finish baking and drying, curing, solder sweating ovens. New developments for greater speed — more oven dependability — more capacity per oven — new economy of fuel and floor space.

★ **LABORATORY EQUIPMENT** Culture cabinets, drying ovens, moisture cabinets, test baking ovens, proofing cabinets, laboratory furnaces in temperature range 275°F. to 1200°F. All laboratory equipment is designed for absolute dependability for research and testing purposes. *Write today for latest edition of improved processing in your industry.*

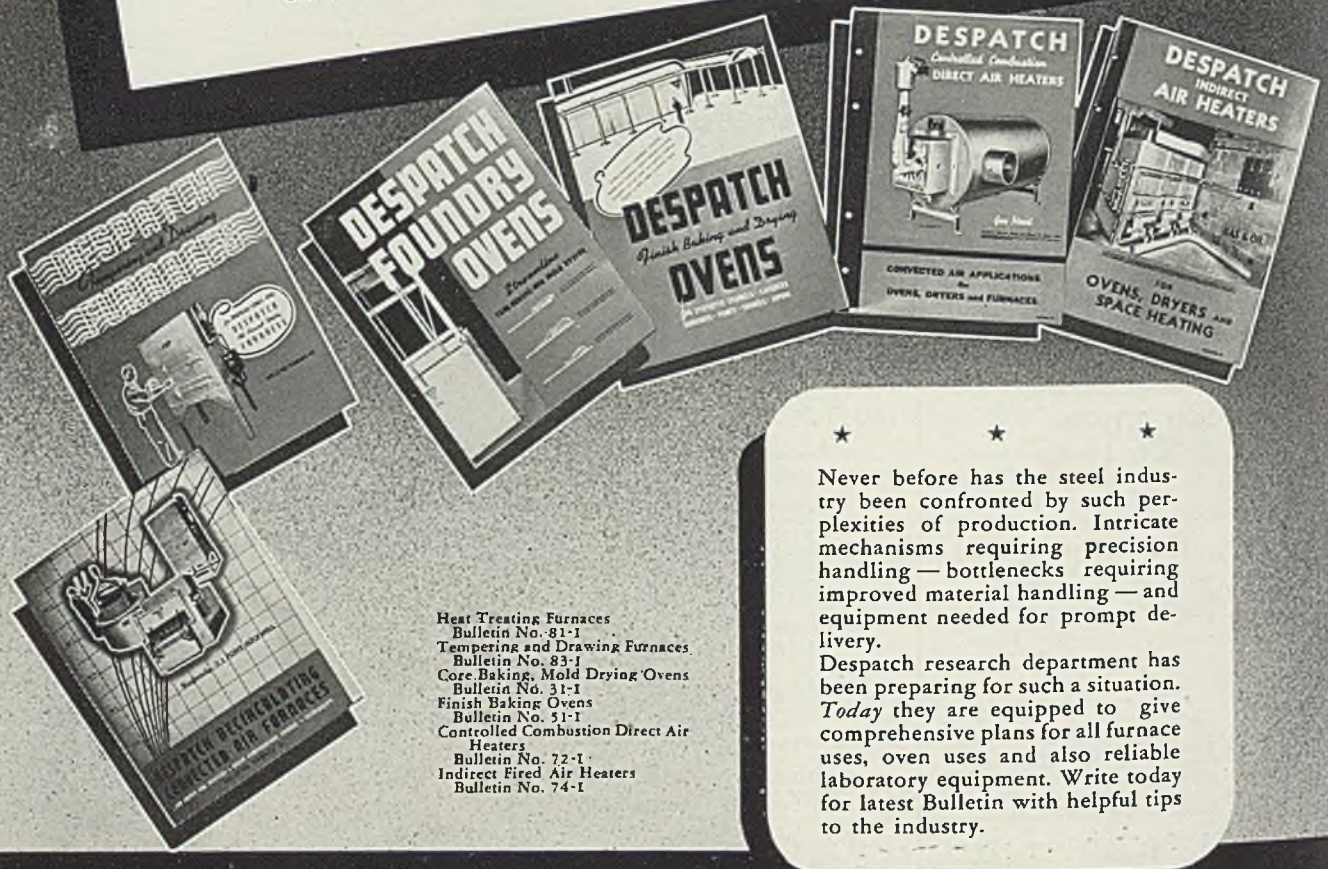
NEW SPEED

★

NEW PRECISION

★

NEW ECONOMY



Heat Treating Furnaces
Bulletin No. 81-1
Tempering and Drawing Furnaces
Bulletin No. 83-1
Core Baking, Mold Drying Ovens
Bulletin No. 31-1
Finish Baking Ovens
Bulletin No. 51-1
Controlled Combustion Direct Air Heaters
Bulletin No. 72-1
Indirect Fired Air Heaters
Bulletin No. 74-1

★ ★ ★

Never before has the steel industry been confronted by such perplexities of production. Intricate mechanisms requiring precision handling — bottlenecks requiring improved material handling — and equipment needed for prompt delivery.

Despatch research department has been preparing for such a situation. *Today* they are equipped to give comprehensive plans for all furnace uses, oven uses and also reliable laboratory equipment. Write today for latest Bulletin with helpful tips to the industry.

DESPATCH OVEN COMPANY

MINNEAPOLIS
MINNESOTA

HIGHLIGHTING THIS ISSUE OF STEEL

■ THE CONTROVERSY over the adequacy of the steel supply has been settled for the moment. Steel supplies are adequate for all purposes, including exports, declared President Roosevelt last Friday, on the basis **(p. 21)** of a report submitted to him by Gano Dunn. Additional coke and pig iron capacity are needed but these are labeled as minor factors. Dunn estimates "reliable" steel capacity as 87,576,099 tons per year; by the end of 1941 "reliable" capacity will be 91,124,718 tons. The President gave assurance that there is no present need for steel priorities. . . . Community "pooling" for intensifying armament production is gaining rapidly **(p. 42)**, reports Walter D. Fuller.

• • •

Buying Exceeds Steel Capacity

Steel production last week **(p. 25)** moved up 2 points to 96½ per cent of ingot capacity. Only threat to production is the delicate labor situation which **(p. 24)** last week halted operations at Bethlehem's Lackawanna plant and which in recent weeks has cut output elsewhere. . . . Steel buying in February **(p. 117)** averaged around 150 per cent of producing capacity. Actually, buying is out of all proportion to consumption and is based on a desire to build up inventories and anticipate shortages—thus leading to the expectation that the buying volume is slated for a dip in the near future. In the meantime no instances are known where manufacturing operations have been slowed down because of a lack of steel.

• • •

"Ersatz" for Civilians?

There will be sufficient nickel to meet all defense and British and Canadian requirements **(p. 33)**, assures Robert C. Stanley. . . . Rapid progress is being made **(p. 117)** in substituting other analyses for nickel steels in civilian work. . . . The age of "ersatz" materials is dawning; housewives are urged **(p. 32)** to buy substitutes for aluminum kitchenware. . . . A new aluminum plant will be erected in the Pacific Northwest. . . . OPM urges use of spiegeleisen as substitute **(p. 32)** for ferromanganese. . . . New tin smelter will be located **(p. 30)** at Texas City, Tex. . . . Tariff commission has ordered investigation **(p. 32)** of copper producing costs. . . . Priorities control was tightened in several directions **(pp. 30, 33)** last week.

• • •

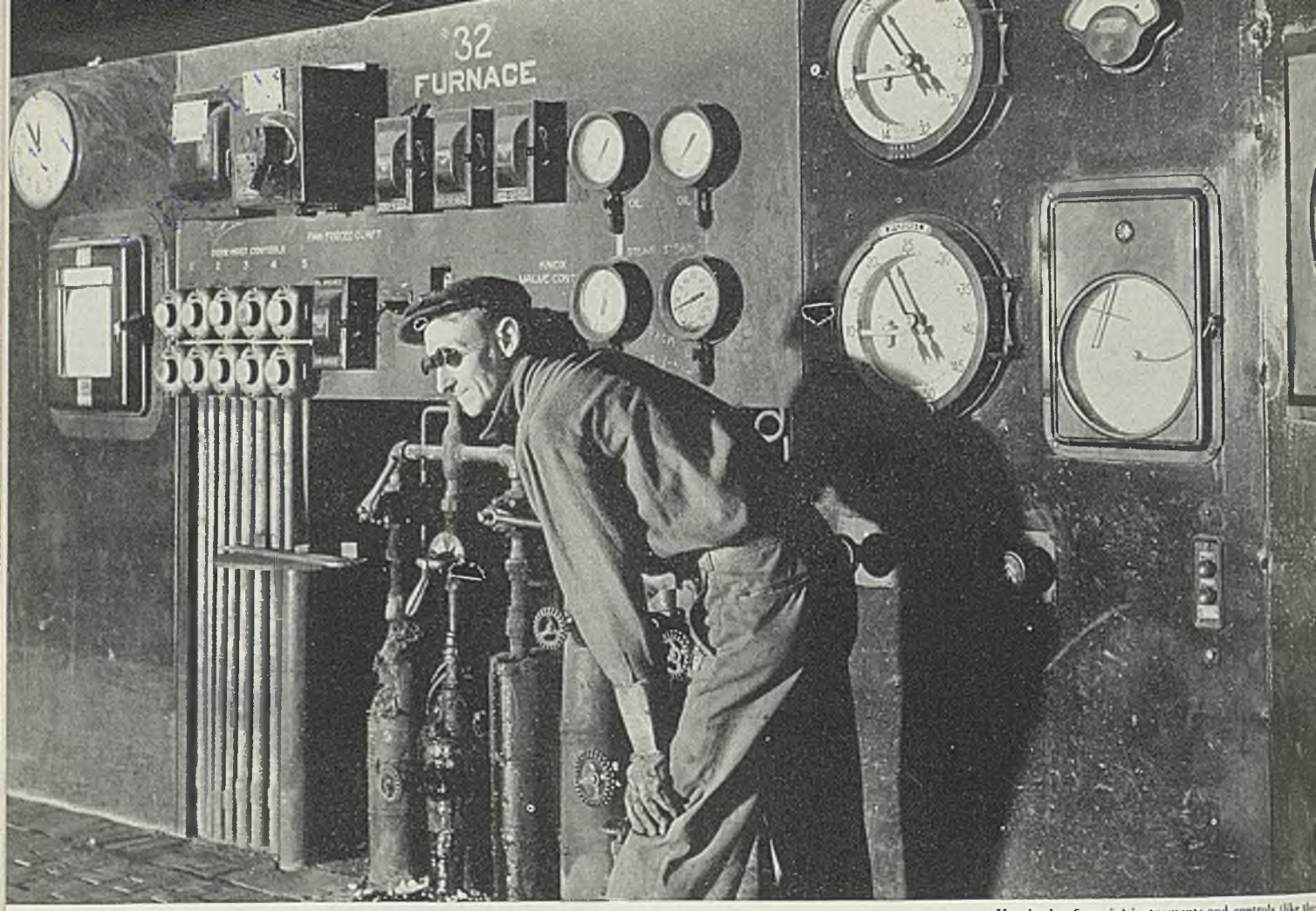
To Need Skilled Men in Hurry

A new device **(p. 76)** quickly locates the center of gravity of any body, thus simplifying design problems. . . . A new, hard tool tip material **(p. 86)** is announced. . . . Guy Hubbard, STEEL's machine tool editor, points out that many manufacturers are going to need more skilled men—and need them in a hurry. He discusses the most effective approach **(p. 56)** on this problem which, he holds, is of far greater importance than many manufacturers seem to think. . . . Reginald Trautschold **(p. 73)** describes the equipment and methods used by the Illinois Tool Works in continuous carburizing of small parts, with precise control of all factors. . . . E. T. Larson **(p. 86)** warns against careless handling of abrasive wheels.

• • •

Steelworkers Prove Human

In this week's installment in his series on production of high-explosive shells, Prof. Arthur F. Macconochie **(p. 58)** discusses equipment employed in the machining operations. In particular, he defines the place of single-purpose machine tools. . . . Many steelworkers may look and act tough but, as is pointed out by John Knox, STEEL's steel plant editor, **(p. 62)**, they are very human under certain conditions. . . . The recently devised method of flame control, and the existing pressure to mobilize all production facilities, have rejuvenated interest in **(p. 78)** the bessemer process. . . . Properties and amounts of coke and by-products obtained from carbonization of coal now **(p. 84)** can be pre-determined.



Hundreds of special instruments and controls (like the open hearth department) are used throughout the Inland

Science, Teamed With Skill, Assures INLAND QUALITY STEEL

EVERY heat of Inland Steel is the product of science teamed with the skill of expert steelmakers. Inland research is constantly seeking better methods for producing special steel, so that when an Inland customer makes known his needs, Inland already knows the best method to produce the steel, its chemical and physical characteristics, and how it will perform during fabrication and in service.

High quality ore, coal and limestone are scientifically blended and measured. Inland engineers, working with America's leading consultants and equipment builders, have selected and supervised the construction of modern blast furnaces, open hearths, rolling mills and vital auxiliary equipment. Years of research and development are back of the extensive laboratory apparatus and the many special instruments used with Inland mill equipment for controlling pig iron and steel production, ingot heating, and the quality of products from rolling mills.

All of this vast background of scientific development, teamed with Inland expert steelmakers, assures maximum production of Inland Quality Steel.

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

INLAND STEEL CO.

Steel's "Reliable Capacity" Adequate For All Needs, OPM Survey Shows

Gano Dunn tells President industry can produce more than was supposed . . . Completion of expansions under way to raise capacity to 91,124,718 tons by end of 1941 . . . Minor expansion of pig iron and coke facilities recommended . . . Mr. Roosevelt says steel priorities unnecessary at present . . . Report expected to end controversy on steel sufficiency

WASHINGTON

■ STEEL SUPPLIES are adequate for all purposes, including export, President Roosevelt declared last Friday, basing his statement on a report prepared for him by Gano Dunn, senior consultant, production division, Office of Production Management.

Some things must be done, he said, referring to additional pig iron and coke capacity, but these should be labeled as "minor."

Based on six weeks of investigation, Mr. Dunn has arrived at a new measure of steel capacity, called "reliable capacity," taking into consideration certain existing facilities for producing steel castings not included in the "reported capacity" figures of the steel industry. It also considers that the period of time normally consumed for repairing facilities can be reduced at a nominal increase in cost to steel companies. This increased expenditure in time-saving is said to be justified by the emergency nature of demands.

The report states reliable capacity at the beginning of 1941, with ample allowance for shutdowns for repairs, was 87,576,099 net tons per year, or about 3 500,000 tons higher than previously supposed.

Completion of additional facilities now under way will raise this capacity to 91,124,718 tons by the end of 1941.

The report states it should be clearly understood these figures represent the maximum rate of operations that could be continued over a maximum period of time.

Mr. Dunn concludes that the industry could under proper conditions operate indefinitely at a rate of slightly more than 102 per cent of *reported capacity,* which heretofore has been the normal measure of steel capacity. He observes that January ingot production of 6,943,084 tons represented only 94.5 per cent of reliable capacity, against 97.1 per cent of reported capacity.

Based on reliable capacity at the end of 1941, January output was only 91 per cent.

The report estimates that on a basis of facilities at the beginning of 1941, there would be a shortage of 1,130,314 tons of pig iron, or 2.3 per cent, if the steel industry were operated at reliable capacity throughout the year.

In 1942, there would be a potential shortage of 544,481 tons of pig iron, on a basis of existing facilities, if the industry were to operate at capacity during that year.

The coke shortage, on the same basis, in 1941 would be about 5,360,315 tons, or 12 per cent, and during 1942, 2,670,906 tons.

Total cost of removing these deficits by construction of additional facilities is estimated at $59,545,975 in 1941 and $29,482,964 in 1942. Some of these facilities are already under way.

Mr. Dunn has recommended that this increase be undertaken, and if it does not occur normally, that it be prorated over the industry by Director General Knudsen.

The recommendation is based on the conviction that a normal relationship between pig iron and scrap going into steel ingots should be maintained and that adequate supplies of coke should be available for both steelmaking and home and commercial heating.

Pending installation of new facilities, it is said shortages should be met by increasing the ratio of scrap to pig iron, and by diverting coke

Gano Dunn

■ Mr. Dunn, president, J. G. White Engineering Corp., New York, is senior consultant to the production division, Office of Production Management. He was born in New York in 1870, graduated from the College of the City of New York, later obtained electrical engineering degree from Columbia university and a master of science degree from C. C. N. Y.

In 1911 with J. G. White he organized the company of which he has been president since 1913. Credited with more than 30 inventions in design and construction of machinery, he was awarded the 1937 Thomas A. Edison medal of American Institute of Electrical Engineers.

from home and commercial uses.

The report strongly emphasizes the necessity of an even distribution of steel orders throughout the industry if maximum overall production is to be reached and maintained.

In other words, one producer must not be allowed to acquire a large backlog of orders for delivery well into the future, while another producer is operating at less than maximum capacity.

This might involve a considerable shifting of orders and require users of steel to deal with different sources of supply than in the past.

Unless such distribution is carried voluntarily by the industry, Mr. Dunn recommends that the director of the division of priorities assume responsibility.

Priorities Not Necessary

When questioned at his press conference Friday, President Roosevelt said there was no necessity for priorities at present.

Mr. Dunn's report finds that capacity for rolled and other steel products generally is well in excess of ingot capacity, ranging from 50 per cent in certain sectors, with an average of 15 per cent. He concludes that if orders are properly distributed, total fabricated requirements can be met without unusual delay.

The report explains, however, that during a period of tremendous industrial expansion, with demand for specific products undergoing frequent change, the development of temporary choke points in certain spots from time to time appears inevitable.

Defense requirements for steel in 1941 are estimated at 3,100,000 tons.

"There is not much controversy over this figure," the report states.

Direct defense needs in terms of steel ingots for the army and navy in the fiscal year ending June 30, 1941, are estimated at 2,800,000 tons, and in fiscal year ending June 30, 1942, at 4,100,000 tons. In addition, it is estimated the Maritime Commission will require 250,000 tons in the fiscal year ending June 30, 1941, and 350,000 in the year ending June 30, 1942.

Exports, mainly to England and Canada, are placed at 13,400,000 tons. Civilian requirements, based on a national income of $80,000,000,000, are estimated at 61,000,000 tons, making a total of 77,500,000 tons, or 10,100,000 tons less than reliable capacity.

If national income in 1941 reaches only $77,000,000,000, it is explained, surplus capacity would be 14,100,000 tons. Surplus capacity in 1942, based on an income of $90,000,000,000, is estimated at 2,100,000 tons. If 1942 income is $87,000,000,000, surplus capacity would be 6,100,000 tons.

The President has asked Mr. Dunn to keep the report up to date, and report to him every three months.

Mr. Dunn included in his report the opinion of 14 leading operating steel men, in support of a reliable capacity of 102½ per cent of rated capacity. The opinion was signed by Quincy Bent, Bethlehem Steel Co.; J. H. Carter, Pittsburgh Steel Co.; Thomas Chalmers, Tennessee Coal, Iron & Railroad Co.; C. R. Cox, National Tube Co.; Frank H. Fanning, American Rolling Mill Co.; W. B. Gillies, Youngstown Sheet & Tube Co.; Harvey B. Jordan, American Steel & Wire Co.; J. E. Lose, Carnegie-Illinois Steel Corp.; S. S. Marshall Jr., Jones & Laughlin Steel Corp.; A. J. McFarland, Wheeling Steel Corp.; J. S. Pastorius, Great Lakes Steel Corp.; Wilfred Sykes, Inland Steel Co.; C. M. White, Republic Steel Corp.; J. S. Williamson, Weirton Steel Co.

Mr. Roosevelt termed the report exceedingly encouraging to the nation and to those foreign nations which are depending on us for steel. He said it is the best thing of its kind to date, and that it is a standard on which the government can rely until better information becomes available.

Mr. Dunn, according to the President, based his estimated consumption in relation to national income, on figures compiled by Melvin de Chazeau, of the Office of Production Management staff.

During the press conference Mr. Roosevelt denied that he had asked steel unions not to press for wage increases lest they cause price increases. He told a questioner that he is not concerned (meaning worried) over the present labor situation.

Shortage of Structural Steel Unlikely; Capacity Sufficient

NEW YORK

An unofficial interpretation of a report on steel capacity now on file with President Roosevelt indicates no shortage of structural steel is likely this year.

Rolling mills have capacity for twice the tonnage of such plain material required by all present known programs.

Despite the sudden rush of orders for construction of defense plants and factories the fabricating industry is not yet fully engaged.

Most defense orders for shapes will be on mill books by early summer, indicating a tapering off after that time. The fabricating industry also has been advised by defense and other government officials no concern is felt about availability of structural steel for any building program now contemplated.

The bulk of defense structural orders have been contracted for and in some instances these orders are being produced more rapidly than they can be accepted on the jobs.

Where delays at the sites have retarded construction schedules fabricators are pressing for acceptance of deliveries to avoid congestion at fabricating shops.

Commercial orders outside defense also are being filled in accordance with predetermined and mutually agreeable delivery.

Overall steel demands have little bearing upon procurement of structural shapes from rolling mills, which represent but approximately 2 per cent of tonnage entering into national steel capacity, according to the Institute of Steel Construction Inc., New York.

Canada's War Awards Aggregate $8,670,381

TORONTO, ONT.

■ Construction of an $8,000,000 shell-filling plant at Pickering, Ont., by Carter-Halls-Aldinger Co., Toronto, will begin immediately, according to J. E. Parke, Ontario manager. Operated by Allied War Supplies Corp. Ltd., a government-owned company, the plant will cover more than 2000 acres. Shells made at other plants will be filled and fitted with fuses.

Department of munitions and supply last week reported 1719 contracts were awarded, with aggregate $8,670,381. Capital expenditure of $2,290,000 for Anaconda American Brass Ltd., New Toronto, Ont., was included. The awards:

Aircraft: Link Manufacturing Co. Ltd., Gananoque, Ont., $267,570; Goodyear Tire & Rubber Co. of Canada Ltd., New Toronto, Ont., $8630; Transport Supply Co., Toronto, $25,407; National Steel Car Corp. Ltd., Malton, Ont., $27,069.

Land Transport: Ross Cycle & Sports Ltd., Toronto, $89,705.

Instruments: Ontario Hughes-Owens Co. Ltd., Ottawa, Ont., $153,225; Neptune Meters Ltd., Toronto, $46,760.

Electrical equipment: Canadian General Electric Co. Ltd., Ottawa, $10,824; Amalgamated Electric Corp. Ltd., Toronto, $35,600; Canadian Telephones & Supplies Ltd., Toronto, $16,126.

Machinery: Canadian Fairbanks-Morse Co. Ltd., Ottawa, $56,325; A. R. Williams Machinery Co. Ltd., Toronto, $6181; Canadian Blower & Forge Co. Ltd., Kitchener, Ont., $8975.

Tools: Robert Mulhall, Ottawa, $5154; Wood, Alexander & James Ltd., Hamilton, Ont., $9113; Greenfield Tap & Die Corp. of Canada Ltd., Galt, Ont., $10,613.

Ordnance: Melody Co., Toronto, $5130; Hamilton Bridge Co. Ltd., Hamilton, Ont., $6500.

Munitions: Dominion Arsenals, Ottawa, $269,500; Renfrew Electric & Refrigerator Co. Ltd., Renfrew, Ont., $6120.

Miscellaneous: General Steel Wares Ltd., Toronto, $11,980; Dominion Rubber Co. Ltd., Ottawa, $34,800; Coulter Mfg. Co. Ltd., Oshawa, Ont., $53,600; B. F. Goodrich Rubber Co. of Canada Ltd., Kitchener, $9800; International Silver Co. of Canada Ltd., Hamilton, $9628; Metal Craft Co. Ltd., Grimsby, Ont., $7774; B. Greening Wire Co. Ltd., Hamilton, $5245; Canadian Comstock Co. Ltd., Toronto, $9800.

Excess Profits Tax Revisions To Benefit Steel, Aircraft Producers

Amendments would ease levies on heavily capitalized "feast and famine" industries and those which experienced rapid expansion of earnings during 1936-39 base period . . . Are designed to alleviate inequalities of hastily-drawn act . . . Would be retroactive on 1940 tax

■ SUBSTANTIAL tax relief may be afforded many steel producers and other metalworking companies by amendments liberalizing the excess profits tax law.

Revisions, estimated by the Treasury Department to reduce corporation taxes by more than $100,000,000 a year ultimately, already have been approved by the house and by the senate finance committee. Early approval by the senate itself is expected.

Chief beneficiaries will be: (1) Industries with large capital investments and widely fluctuating earnings—steel and other heavy industries, and (2) young industries or those that have grown rapidly during the 1936-39 base period—aircraft builders and their suppliers, and to a lesser extent, certain machine tool builders.

Heavily capitalized industries will benefit by a provision for a two-year carry-over of credits against income subject to the excess profits tax. Thus if Company A had a credit or exemption of $15,000,000 in one year and used only $10,000,000 of it, the rest could be carried over for the next two years. On this basis the company could earn as high as $20,000,000 in 1941 before becoming liable for excess profits taxes.

The benefit to steel producers will be actual, not theoretical. For example, 11 leading producers in 1940 earned a total of $242,756,000. Their aggregate exemptions (8 per cent of invested capital) amounted to $265,855,000. Four of the 11 must pay excess profits taxes on 1940 earnings. The other seven have aggregate credits of about $31,000,000 which may be carried over and offset possibly higher earnings in 1941 or 1942.

Companies which experienced rapid expansion of earnings during the base period 1936-39 will benefit by a new formula for computing the average earnings credit. The original law provided that only the average experience during those four years could be counted in determining the excess profits credit based on income. Companies whose facilities, capacity and earning power were substantially increased during the base period were penalized as compared with companies which already had achieved and maintained a high and constant level of production. The new formula will give effect to the ratio of increase during the base period, and allow a greater credit for companies whose 1938-39 earnings were higher than those in 1936 and 1937.

Most aircraft companies will benefit by this provision. Earnings of eight representative planemakers during the four-year base period increased as follows:

1936	$3,238,091	1938	$11,830,783
1937	5,619,840	1939	18,021,125

The increases of 1938 and 1939 for many individual companies were even more spectacular than for the group's average, as one major producer incurred heavy and extraordinary losses in 1938 and 1939.

A few machine tool builders who experienced rapid growth during the base period also will benefit by the new formula. The majority of companies in this field, however, experienced lower earnings in 1938 than in 1936 and 1937 and the sharp upturn in operations in late 1939 did not materially affect earnings for the period.

For most other types of metalworking companies, the poor earnings of 1938 will to a large extent nullify the advantages that might be gained under the new formula.

Further Revisions Probable

The amendments are retroactive on 1940 incomes and were drafted by the Treasury Department and congressional tax experts to relieve some of the inequalities imposed by the hastily-drawn original bill. Treasury and congressional spokesmen last week said further revisions in the law probably would be necessary.

Briefly, the amendments provide:

1.—Two-year carry-over of credits against income subject to the excess profits tax. Original law permitted only a one-year carry-over and that only on corporations with income of $25,000 or less.

2.—Specific deductions for abnormal income in the four-year base period. Certain specific deductions were permitted in the original law, but the modification provides for general abnormal deductions, both as to type of income and amount.

3.—Abnormal income in the taxable year. Original law permitted

■ Layout for the new Chrysler Corp. tank arsenal, Detroit, is developed by the plant's engineers, lower right. First heavy duty machinery already has been installed in the 500 x 1380-foot building which by early fall will be producing five 25-ton tanks daily on a one-shift basis. Left, engineers study the intricate and heavy castings to be used in the tanks

deductions for such income only on six specific types. The amendments retain the original deductions and also allow adjustments on account of any income considered abnormal, with respect either to kind or amount.

4.—Manner of computing average earnings credit. Original act provides for averaging income over four-year period 1936-39. Amendment provides alternative method for averaging income to benefit "growth" corporations which earned more in the last two years of the base period than in the first two years.

5.—Joint returns. Insurance companies other than life or mutual companies are permitted to file joint returns with noninsurance companies with which they are affiliated.

5.—Recapitalization of advertising and other good-will expenses claimed for the four-year base period.

7.—Revision of income categories affecting the excess profits tax base in years now subject to statute of limitations. Despite what may have been previously reported in income tax returns, the excess profits taxpayers may, under this amendment, report true income for such years, provided back taxes plus penalties and interest are paid.

8.—Revision of the general relief section of the original act to permit corporations with abnormally low incomes in one or more of the four base years to adjust their base-period credit upward.

A senate finance committee amendment would permit corporations to file under both the average earnings and the invested capital methods in determining excess profits and permit the one most beneficial to the company to stand as its elected method of filing. Under the original law, a company is required to choose one or the other and is not permitted to change even though it may later prove that it used the wrong method.

Unions Press for Recognition, Higher Wages; Strikes Disrupt Defense Output

■ STRIKES continued to interrupt armament materials production last week while national defense officials groped for a solution to the labor problem. Evidence rapidly is accumulating that union stoppages threaten to become the No. 1 reason for a bogging down in the defense program—more important than a lack of machines, raw materials or trained men.

Majority of stoppages to date have been relatively brief—that at Allis-Chalmers Mfg. Co., Milwaukee, being a notable exception. Office of Production Management officials still are hoping that patriotism and conciliation will prevent the problem from becoming too acute.

Major developments last week:

Bethlehem Steel Co.'s Lackawanna plant near Buffalo was struck by the CIO's Steel Workers Organizing Committee. Five thousand pickets gathered before the plant's gates and minor violence occurred. Strike apparently ended Friday when unionists accepted a three-point settlement proposal, offered by William S. Knudsen and Sidney Hillman, director and associate director of OPM, providing:

1.—All employes be reinstated with seniority.

2.—Conference be held to seek adjustment of differences.

3.—OPM "explore" with the national labor relations board the possibility of holding an election to determine a bargaining agent.

Bethlehem holds more national defense contracts than any other company in the country.

Further efforts to settle the six-week-old tieup at Allis-Chalmers were launched late in the week by Mr. Hillman, who announced a new conference had been arranged between company management and CIO's United Automobile Workers leaders. Allis-Chalmers, which holds $45,000,000 in defense orders, was closed by a jurisdictional dispute.

Ford Strike Threatened

Ford Motor Co. was threatened with strikes at its Lincoln, Rouge and Highland Park plants in Michigan by the CIO-UAW. The union filed formal notice of intent to strike with the state Labor Mediation Board. Michigan law now requires a five-day "cool-off" period between filing of notice and beginning of any strike, and a 30-day period where national defense contracts are involved.

In many other plants working on defense orders work was halted or slowed by labor disputes, generally involving demands for increased wages or union recognition.

Before an educators' meeting in Atlantic City, N. J., Philip Murray, CIO president, charged the Army, Navy and National Defense Advisory Commission with "the rankest kind of discrimination" by awarding defense contracts to a few favored corporations. Mr. Murray assailed employers for their refusal "to make wage concessions of any description."

"Plant Management Is Company's Obligation"

"We think it necessary for the union to recognize the fundamental principle that management has the undivided obligation to manage the plant and to maintain a successful business," declared S. G. McAllister, president, International Harvester Co., Chicago, in a letter to stockholders, issued last week in conjunction with the company's annual earnings report.

Mr. McAllister presented the company's views on recent labor disturbances at International Harvester plants.

"Only a successful business," he continued, "can adequately serve the interests of employes, stockholders and customers."

Discussing union demands for abolition of piece work and substitution of a minimum hourly rate at the Chicago Tractor Works, he cited figures showing Tractor Works employes' earnings averaged $1824 in 1940. This was exclusive of managerial and office employes. It was higher, said Mr. McAllister, than the average for the steel industry, and compared with average earnings of $1804 for "the biggest company in the automobile industry."

Two primary causes of the labor difficulties, Mr. McAllister's letter states, have been demands for higher wages and disputes between rival unions in their efforts to promote unionization. Organized labor groups, he explained, refuse to take into consideration the fact prices have not been raised, and no huge defense profits are in prospect. Effect of higher taxes and increased operating costs have likewise been discounted.

Tungsten Steel Makers To Fill Defense Orders First

■ Agreement of tungsten tool steel producers to fill defense orders ahead of all others has been announced by minerals and metals priorities group of Office of Production Management.

At a meeting attended by Dr. S. S. Stratton, general assistant director of group, and Walter Tower, producers' representative on the steel priorities committee, industry representatives agreed to make every effort to use substitutes for tungsten, and to suggest desirability of such substitutes to their customers.

This would include molybdenum tool steels, or other alloy combinations which are acceptable.

OPM will keep "a close check on the tungsten situation to take more drastic preference action when necessary," it was said.

Iron and Steel Scrap Stocks Slightly Higher

■ Domestic stocks of iron and steel scrap at consumers' and suppliers' plants and in transit at the end of December approximated 7,843,000 net tons, compared with 7,832,000 tons at the close of September, according to the quarterly report of the Bureau of Mines.

Known stocks held by consumers and suppliers Dec. 31 were equivalent to seven weeks' supply at the rate of consumption in December, a position only slightly changed from that at the end of the third quarter.

Although total stocks increased, those on hand at suppliers' yards and in transit thereto decreased 8 per cent from Sept. 30 to Dec. 31, while stocks on hand at and in transit to consumers' plants increased 4 per cent.

While suppliers' stocks Dec. 31 amounted to 2,191,000 tons, compared with 2,392,000 Sept. 30, consumers' stocks were 5,652,000 tons and 5,402,000 tons, respectively. Inventories held by larger suppliers reporting in both canvasses decreased 19 per cent; railroad stocks dropped 26 per cent.

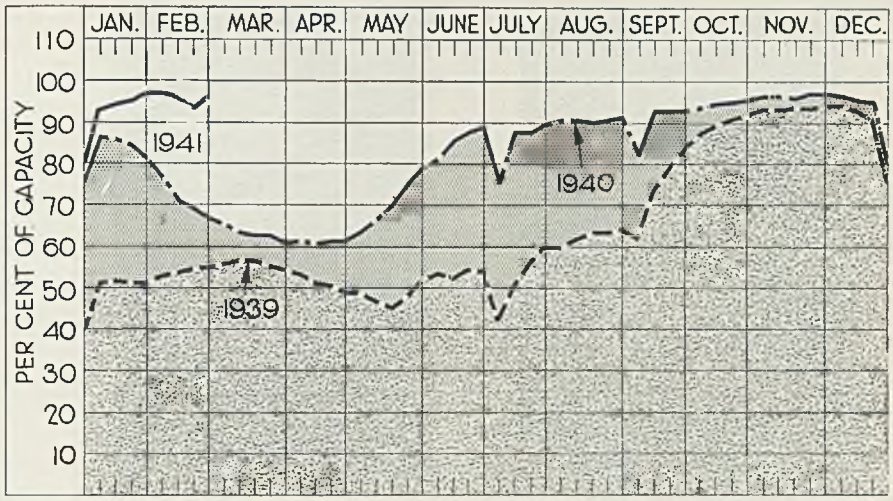
American Railroads Set To Meet Traffic Demands

■ American railroads will meet all demands in handling freight volume incident to the defense program in 1941 and 1942, declared Ralph Budd, president, Chicago, Burlington & Quincy railroad, and member of the Advisory Commission to the Council of National Defense, in charge of transportation, addressing a dinner meeting of the Western Society of Engineers in Chicago, Feb. 24.

Mr. Budd was presented with the Washington award for 1941 "for vision and courageous leadership in advancing technical frontiers of high-speed railroad transportation." The award was founded in 1916 by John Watson Alvord and is administered by the Western Society of Engineers, on recommendation by a commission representing several other engineering societies.

Mr. Budd stated the railroads are expected to transport 39,780,237 carloads this year, a gain of 9.4 per cent over 1940, and 42,493,982 carloads in 1942, a gain of 16.9 per cent over 1940. He pointed out the all-time freight transportation peak was 53,100,000 carloads in 1926, with the 1929 record not quite 53,000,000 carloads.

Since September, 1939, he said, railroads have placed in service 84,117 new freight cars and 620 new locomotives. Now under construction are 54,557 cars and 238 locomotives.



PRODUCTION . . . . Up

■ STEELWORKS operations last week increased 2 points to 96½ per cent. Five districts advanced, one declined and six were unchanged. A year ago the rate was 65½ per cent; two years ago it was 56 per cent.

Youngstown, O.—Up to 7 points to 97 per cent, with 76 open hearths and three bessemers producing. The same schedule is expected this week. Carnegie-Illinois Steel Corp. has blown out No. 6 blast furnace at Ohio works for relining.

Detroit—Reduced 3 points to 92 per cent.

Birmingham, Ala.—Unchanged at 100 per cent, the ninth week. The rate will drop to 90 per cent this week as two furnaces are withdrawn to balance a blast furnace to be blown out for relining.

St. Louis—Steady at 93 per cent, 25 of 28 open hearths being active.

Cincinnati—Advanced 2½ points to 97½ per cent. Two producers have operated all their open hearths for the past three weeks.

Central eastern seaboard—Held at 95 per cent.

Pittsburgh—Gained 1½ points to 96 per cent on return of repaired open hearths.

Wheeling—Continued at 88 per cent, pending completion of open hearth rebuilding.

Chicago—Up 3½ points to 99 per cent, nearly balancing 4-point loss the preceding week.

Buffalo—Production last week averaged 90½ per cent, unchanged from the preceding week, labor difficulties at one plant having held output in check.

New England—Unchanged at 92 per cent, two producers operating at 100 per cent.

Cleveland—Addition of an open hearth by one producer and slight reduction by another netted a gain of 1 point to 85.5 per cent.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended Mar. 1	Change	Same week 1940	Same week 1939
Pittsburgh	96	+ 1.5	63	50
Chicago	99	+ 3.5	59	56.5
Eastern Pa. ...	95	None	65	37
Youngstown ...	97	+ 7	40	47
Wheeling	88	None	94	71
Cleveland	85.5	+ 1	71	51
Buffalo	90.5	None	58	32.5
Birmingham ..	100	None	90	83
New England..	92	None	56	60
Cincinnati	97.5	+ 2.5	57	55
St. Louis	93	None	63.5	55
Detroit	92	— 3	94	76
Average	96.5	+ 2	65.5	56

Henderson Moves Office

■ Leon Henderson, chief of the price stabilization division, National Defense Advisory Commission, has moved his headquarters from the Army Munitions building on Constitution avenue, Washington, to a private residence at 2000 Massachusetts avenue, N.W.

Mr. Henderson and all of his associates now located in uptown Washington can be reached on the telephone on Republic 5050.

■ May 18-24, inclusive, has been scheduled as "National Foreign Trade Week" by the Chamber of Commerce of the United States, Washington. According to E. L. Bacher, manager, foreign commerce department, "much of the 1941 observance will have a 'preparedness' angle to it—preparedness to safeguard America's foreign trade against the untoward factors in the world situation, both present and future; also preparedness to make every contribution that foreign trade can to America's defense program."

MEN of

Ernest J. Poole Jr.

Frank R. Palmer

Thomas E. Dunn

E. F. Billin

T. I. Phillips

■ **ERNEST J. POOLE JR.,** general superintendent, Carpenter Steel Co., Reading, Pa., has been elected vice president in charge of manufacture, and **Frank R. Palmer,** assistant to president, has been named vice president in charge of sales.

Mr. Poole, son of the late E. J. Poole Sr., former vice president and general manager of the company, served as superintendent of maintenance until November, 1937, when he became acting general superintendent.

Mr. Palmer has been affiliated with the company since 1917, serving first as foreman, electric furnace melting department, and later being transferred to the metallurgical department.

♦

Thomas E. Dunn has resigned as a director and works manager, Bullard Co., Bridgeport, Conn., because of ill health. His capacity as works manager will be filled by **Foster P. Whitworth.** He joined the company in 1917, and served sucessively as night superintendent, Bullard Engineering Works; assistant production manager, Bullard Machine Tool Co., production manager, assistant works manager and works manager. Mr. Dunn was instrumental in the development of the Bullard-Dunn electro-chemical descaling process.

♦

E. F. Billin, Page Steel & Wire division, American Chain & Cable Co. Inc., Monessen, Pa., has been elected secretary, Page Fence Association.

♦

T. I. Phillips, general works manager, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been named assistant to the president. He will continue in charge of the headquarters manufacturing staff, small motor, lighting and transformer divisions and construction department. He joined Westinghouse in 1915 and was named general works manager in 1935.

♦

Charles T. Ramsden, associated with the Beloit Iron Works, Beloit, Wis., 45 years, the past 27 years as consulting engineer, has been elected a vice president.

♦

H. Y. Bassett has been promoted to superintendent of tube manufacture, Wolverine Tube Co., Detroit. **J. S. Rodgers** has been placed in charge of the technical department, with supervision of laboratories and mill control.

♦

A. A. Dahms has been made manager of the Davenport, Iowa, branch office of Allis-Chalmers Mfg. Co., Milwaukee. He formerly was associated with the company's Chicago office many years. Mr. Dahms will be assisted by **E. A. Rensch** and **C. J. Schutty.**

♦

Frank Pardee, former geologist and mining expert for the state of Michigan, is being sent by the Bureau of Mines, Department of the Interior, to Rio de Janeiro, where he will study problems connected with the extraction and shipment of minerals from Brazil.

♦

J. C. Merwin, vice president since 1924 and treasurer since 1939, Chain Belt Co., Milwaukee, was elected president at the company's annual meeting Feb. 26. He succeeds the late C. R. Messinger. **G. M. Dyke,** assistant treasurer, was named treasurer, and **A. F. Kessler,** also an assistant treasurer, was elected comptroller, a new office. **Walter Karsten,** president, First Wisconsin National Bank of Milwaukee, was elected a director to succeed Mr. Messinger.

♦

Addison C. Armstrong has joined Worthington Pump & Machinery Corp. as manager of the ordnance division, Holyoke, Mass. He was formerly affiliated with Truscon

INDUSTRY

Herbert S. Simpson

Dr. Tracy C. Jarrett

Steel Co., Youngstown, O., as a departmental manager, and before that was associated with Bartlett-Hayward Co. and Campbell Metal Window Corp., both of Baltimore.

♦

Dale W. Brown has been transferred from the Peoria, Ill., office of Carnegie-Illinois Steel Corp., to Cleveland as assistant to F. Royal Gammon, district manager of sales. Prior to going to Peoria he was identified with the corporation's Milwaukee office.

♦

R. E. Lewis, the past six years resident sales manager at Pittsburgh for Tennessee Products Corp., Nashville, Tenn., has been made director of sales, with headquarters at Nashville. He has been associated with the corporation in a sales capacity over 18 years.

♦

H. F. Schotters has been appointed by Hobart Brothers Co., Troy, O., to supervise the distribution of its arc welders in northern Indiana and western Michigan, with headquarters at Koontz-Wagner Electric Co., South Bend, Ind. Local distributors appointed to date include C. H. Antrim, Grand Rapids, Mich.; Hoosier Oxygen Service, Fort Wayne, Ind., and Bingrods Inc., Kalamazoo, Mich.

♦

S. Allen Jacobs, general sales manager, Inca Mfg. division of Phelps Dodge Copper Products Corp., New York, has been elected a vice president of the corporation. Mr. Jacobs assisted in the formation of Inca Mfg. Co. in Fort Wayne, Ind., and became sales manager when that company was incorporated. He remained in that position when Inca was consolidated with Phelps Dodge. He will continue to maintain headquarters at Fort Wayne.

♦

Comfort Avery Adams, consulting engineer, Edward G. Budd Mfg. Co., Philadelphia, has been awarded the 1940 Lamme medal of the American Institute of Electrical Engineers, "for his contributions to the theory and design of alternating current machinery and his work in the field of electric welding." The medal and certificate will be presented to Mr. Adams at the annual summer convention of the institute in Toronto, June 16-20.

♦

Clarence B. Tilton has been elected vice president in charge of production, Safety Grinding Wheel & Machine Co., Springfield, O.

♦

The nominating committee of the American Foundrymen's Association has presented to its members for election at the annual convention to be held in New York, May 12-15, the following:

For president to serve one year: **H. S. Simpson**, president, National Engineering Co., Chicago.

For vice president to serve one year: **Duncan P. Forbes**, president and general manager, Gunite Foundries Corp., Rockford, Ill.

For directors to serve three years: **L. N. Shannon**, vice president and works manager, Stockham Pipe Fittings Co., Birmingham, Ala.; **M. J. Gregory**, factory manager, foundry division, Caterpillar Tractor Co., Peoria, Ill.; **W. J. Corbett**, vice president and works manager, Atlas Steel Casting Co., Buffalo; **James G. Coffman**, plant manager, Los Angeles Steel Casting Co., Los Angeles; **R. J. Allen**, metallurgist, Worthington Pump & Machinery Corp., Harrison, N. J.

Mr. Shannon is completing his year's service as president, and Mr. Simpson now is vice president.

♦

W. P. Munnikhuysen, formerly president, Wood Preserving Corp., Pittsburgh, has been elected vice president, Koppers Co., Pittsburgh, and general manager of the Wood Preserving division. **H. R. Condon** and **E. J. McGehee**, formerly vice presidents, Wood Preserving Corp., have been elected vice presidents, Wood Preserving division, Koppers Co.

♦

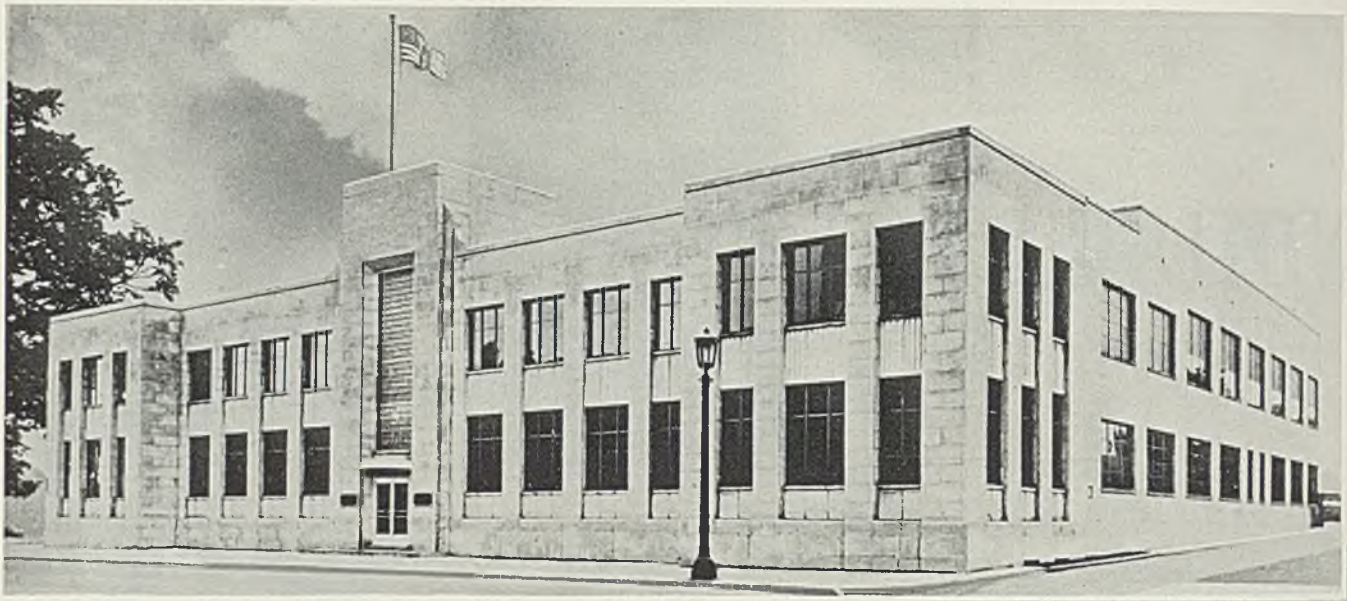
Dr. Tracy C. Jarrett, formerly assistant metallurgist, American Optical Co., has been named chief metallurgist for Koppers Co., American Hammered Piston Ring division, Baltimore. Dr. Jarrett received his Bachelor of Science degree in metallurgy from South Dakota School of Mines in 1932, and during 1931 and 1932 was a laboratory instructor in metallurgy there. He also was an instructor in metallurgy at Harvard as assistant to the late Prof. Albert Sauveur, from which school he received his Master of Science and Doctor of Science degrees. He is a member, American Society for Metals and American Institute of Mining and Metallurgical Engineers.

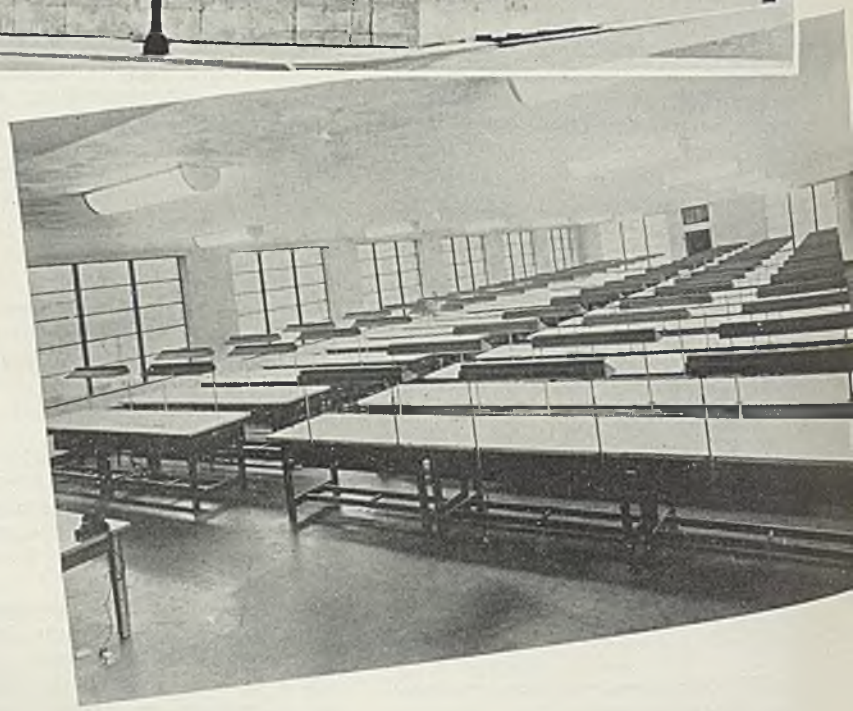
♦

F. H. Lindus, formerly Los Angeles branch manager in charge of the service-sales division of Timken Roller Bearing Co., has been transferred to the home office at Canton, O., where he is engaged in general sales promotional work. **L. J. Halderman**, branch manager, service-sales division, Chicago, succeeds Mr. Lindus at Los Angeles, while **Jack Gelomb**, heretofore Detroit manager, service-sales division, has filled the vacancy at Chicago. **Joe Jesseph**, resident salesman at Portland, Oreg., succeeds Mr. Gelomb at Detroit.

♦

C. I. MacGuffie has been appointed manager of sales, electric welding section, General Electric Co., Schenectady, N. Y. He succeeds **L. D. Meeker**, now associated with the Smith-Meeker Engineering Co., New York. Mr. MacGuffie has been identified with General Electric since graduation from Pennsylvania State College in 1925. In 1929 he was made welding specialist of the Atlantic district, and left Philadelphia for Schenectady in 1939 to become assistant to Mr. Meeker.





New Engineering Building Is Air Conditioned

New fireproof building which houses the administrative, sales, accounting, purchasing, clerical and a portion of the engineering organization of the Arthur G. McKee & Co., Cleveland, and one of the drafting rooms showing the fluorescent lighting facilities

ALL of the latest improvements and facilities have been incorporated in the design and construction of Arthur G. McKee & Co.'s new headquarters at 2300 Chester avenue, Cleveland. Brick, steel and concrete were used throughout in order to make the building as fireproof as possible. It is air conditioned for year-round operations and is equipped with fluorescent lighting. Approximately 34,000 square feet of floor space is provided.

As shown in the illustration the structure is two stories high and is built with wings at either end. Drafting rooms, two in number, occupy the second floor of the wings, each accommodating 80 draftsmen. Estimating and other engineering offices are located on the second floor immediately above the main building. Space has been provided on the ground floor of one of the wings for about 50 tracers. The remainder of the first floor space of both the main building and wings is occupied by the administrative, sales, accounting, purchasing and clerical departments of the company.

It is expected that both the company's new facilities and former offices at 2422 Euclid avenue, Cleveland, will be fully utilized at least during the duration of the present national emergency period.

The dollar volume of contracts taken by the company covering design and construction of blast furnaces, steel plants and oil refineries during the past year was twice that of the largest previous year in its history. One contract calls for a complete steel plant near Rio de Janeiro, Brazil. It will include coke ovens,

A 1000-ton blast furnace, an open-hearth shop with annual capacity of 350,000 tons, and rolling mills designed for a complete range of steel products from rails and structural material to finished sheets and tin plate.

Most of the contract work obtained last year is still incomplete as approximately half of it was obtained during the fourth quarter of 1940. The company also now has a large volume of new contract work under negotiation.

The company is now increasing its force of engineers, designers and draftsmen to meet the additional needs for current and pending contracts. In this connection, it has established an engineering personnel division whose function will be to plan for future needs of engineers for both office and field work.

ORGANIZATION DIAGRAM OF PRIORITIES DIVISION

OFFICE OF PRODUCTION MANAGEMENT

TENTATIVE

PRIORITIES BOARD
W. S. Knudsen, ex officio
Sidney Hillman, ex officio
E. R. Stettinius, Jr., Chairman
I. D. Biggers
D. M. Nelson

Advisory Representatives
Under Secretary of War
Under Secretary of Navy
Army, Maj. Gen'l. R. C. Moore
Navy, Capt. A. B. Anderson
Defense Commissioners

DIRECTOR OF PRIORITIES
E. R. Stettinius, Jr.

EXECUTIVE ASSISTANT
R. J. Lynch
Hayden Raynor

LEGAL

ASSISTANT DIRECTOR (Policy)
Blackwell Smith

PUBLIC RELATIONS
S. E. Fitzgerald

ASSISTANT DIRECTOR (Operations)
J. F. Towers

SPECIAL CONSULTANTS
Labor, Isador Lubin
Prices, J. E. Hamm
Consumers, B. W. Lewis
Agriculture, C. V. Gregory

CONSULTANTS
C. E. Adams
P. D. Reed

PLANNING
E. B. George

RESULTS CONTROL
J. D. East

SECRETARY
W. S. A. Pott

DEPUTY DIRECTOR LIAISON
A. C. C. Hill, Jr.

MINERALS AND METALS GROUP
E. M. Hopkins, Chairman
G'p Executive
Gen'l Ass't Dir., S. S. Stratten
Admin. Ass't Dir., E. C. Laird
Labor Consultant
Consumer Cons., E. T. McCormick

COMMITTEES

STEEL PRIORITY COMMITTEE
Chairman, E. M. Hopkins
Army, Lt. Col. H. C. Minton
Navy, Capt. Paul Hendren
Producers, Walter Tower
Ind. Consumers, Carl Conway
Labor
Prod. Div'n Cons., W. A. Hauck
Purch. Div'n Cons.

ALUMINUM AND MAGNESIUM PRIORITY COMMITTEE
Chairman, E. M. Hopkins
Army, Col. A. J. Lyon
Navy, Lt. Com'd'r. D. M. Logan
Producers, R. G. Farrell
Ind. Consumers, E. J. Barney
Labor
Prod. Div'n Cons., F. B. Cliffe
Purch. Div'n Cons.

NON-FERR. METALS & MINERALS PRIORITY COMMITTEE
Chairman, E. M. Hopkins
Army, Col. W. R. Slaughter
Navy, Com'd'r R. J. Walker
Producers, I. H. Cornell
Ind. Consumers, H. L. Erlicher
Labor
Prod. Div'n Cons., J. A. Church
Purch. Div'n Cons.

FERROUS MINERALS AND ALLOYS (MANGANESE, TUNGSTEN, CHROMIUM, ETC.)

CHEMICALS GROUP
H. E. Howe, Chairman
G'p Executive
Assistant
Labor Consultant
Consumer Cons.

COMMITTEES

CHEMICALS PRIORITY COMMITTEE
Chairman, H. E. Howe
Army, Maj. C. V. Morgan
Navy, Lt. H. S. Prime
Producers, Warren Watson
Ind. Consumers, E. T. Trigg
Labor
Prod. Div'n Cons., D. P. Morgan
Purch. Div'n Cons.
Sp'l Tech. Cons., T. C. Whitmore

COMMERCIAL AIRCRAFT GROUP
A. D. Whiteside, Chairman
G'p Executive
Assistant, Charles Halcomb
Labor Consultant
Consumer Cons.

COMMITTEES

COMMERCIAL AIRCRAFT PRIORITY COMMITTEE
Chairman, A. D. Whiteside
Army, Col. A. J. Lyon
Navy, Capt. D. C. Ramsey
CAB, Col. D. H. Connolly
Producers, Col. J. H. Jouett
Ind. Consumers, C. R. Smith
Labor
Prod. Div'n Cons., M. C. Meigs
Purch. Div'n Cons.

TOOLS AND EQUIPMENT GROUP
D. S. Kimball, Chairman
G'p Executive, R. E. Flanders
Assistant, L. R. Hawkins
Labor Consultant
Consumer Cons.

COMMITTEES

MACHINE TOOLS PRIORITY COMMITTEE
Chairman, D. S. Kimball
Army, Col. T. J. Hayes
Navy, Capt. E. C. Almy
Producers, F. V. Geier
Ind. Consumers, E. D. Gangwere
Labor
Prod. Div'n Cons., Mason Britton
Purch. Div'n Cons.

OTHER TOOLS AND MILL SUPPLIES

OTHER EQUIPMENT AND SUPPLIES

GENERAL PRODUCTS GROUP
W. E. Wickenden, Chairman
G'p Executive
Assistant, C. H. Matthiessen, Jr.
Labor Consultant
Consumer Cons.

COMMITTEES

RUBBER PRIORITY COMMITTEE (Natural and Synthetic)
Chairman, W. E. Wickenden
Army, Maj. G. K. Heiss
Navy, Com'd'r H. M. Shaffer
Producers, A. L. Viles
Ind. Consumers
Labor
Prod. Div'n Cons., W. L. Finger
Purch. Div'n Cons.

HIDES, SKINS AND LEATHER PRIORITY COMMITTEE
Chairman, W. E. Wickenden
Army, Lt. Col. R. McG. Littlejohn
Navy, Com'd'r F. P. Delahanty
Producers, Ralph Pope
Ind. Consumers, B. A. Gray
Labor
Prod. Div'n Cons., M. A. Watson
Purch. Div'n Cons.

AGRICULTURAL AND FOREST PRODUCTS

LIAISON WITH OTHER PRODUCTION DIVISON GROUPS

SHIPBUILDING
C. W. Flesher

ORDNANCE

CONSTRUCTION

■ Latest official organization chart of OPM's priorities division, charged with the rationing of materials needed in the defense program, when and if necessary. Additional personnel, especially labor consultants, will be added from time to time. A list of important raw materials, metals and other commodities on which some form of priority action has been taken, appears on page 33

Windows of WASHINGTON

By L. M. LAMM
Washington Editor, STEEL

British orders given priority rank equal with Army's . . . New tin smelter to be built on Gulf . . . Nickel stocks to be surveyed by Bureau of Mines . . . Investigation of copper production costs ordered . . . Aluminum production in Pacific Northwest to be expanded . . . Tungsten steel makers to give preference to defense needs before all others

WASHINGTON

■ PRIORITIES division, Office of Production Management, has issued instructions that orders for aluminum and machine tools to be used directly or indirectly in filling British defense requirements should be given equal standing with orders for the Army and Navy.

E. R. Stettinius Jr., director of priorities, said this instruction supplements the action taken on Feb. 24, when producers of aluminum and machine tool makers were put under a mandatory priorities status. (See page 33).

Designed to avoid any misunderstanding as to the handling of orders for British defense, Mr. Stettinius' letter said:

"Referring to our communication of Feb. 24 and to avoid any possible misunderstanding, please note that it is the intent of the priorities division that orders for aluminum (or machine tools as the case may be) to be used directly or indirectly in filling British defense orders shall be given the same priority status as that granted for similar material to be used in, or in the making of, corresponding products for the Army and Navy.

"If this result cannot be achieved without our assistance, please communicate the known facts directly to this office and we will advise you how to deal with the matter."

Texas City Selected as Site For American Tin Smelter

United States' new tin smelter will be erected on the Texas City channel at Texas City, Tex., across the bay from Galveston, according to Jesse Jones, federal loan administrator. Deciding factors in selecting the site were low-cost gas, availability of hydrochloric acid from a nearby refinery, terminal, port and warehouse facilities, and transportation facilities both for the South American ores and for finished tin.

Smelter will be built by Tin Processing Corp., New York, a subsidiary of N. V. Billiton Maatschappij, Dutch East Indies.

Smelter will have capacity of 50,000 tons of tin concentrates, or 18,000 tons of fine tin annually. It will cost $3,500,000 and will be owned by and operated for the government.

Continued Stockpiling of Tin Necessary, Says Bureau of Mines

Continuation of the policy of accumulating reserve stocks of tin is necessary to insure the United States against an acute shortage in the event access to overseas supplies is cut off, the Bureau of Mines states in a report which showed that domestic deposits are capable of supplying only negligible quantities of tin ore.

Under authority of the strategic materials act, the Bureau of Mines, in co-operation with the Geological Survey, has carried out extensive sampling and exploration of two of the larger known domestic deposits, to determine if substantial reserves exist. The results, the bureau says, strengthen the conviction maximum output from domestic deposits would be an inconsequential factor in supplying the essential requirements of defense and related industries.

Since more than 99 per cent of the virgin tin consumed in this country is derived from overseas sources, it is fortunate that stocks of the metal now on hand in the United States are sufficient to last about 15 months at the current rate of demand, and that measures are being taken for the accumulation of additional reserves.

Only the discovery of new domestic deposits and the development of substitutes for this metal, the Bureau of Mines stated, can obviate the need for the stockpiling program.

Tin plate, solder, and bearing metals account for around 80 per cent of the tin consumed and require from 50,000 to 70,000 tons annually, the bureau reported. These materials or their equivalent are vital elements in the national defense program.

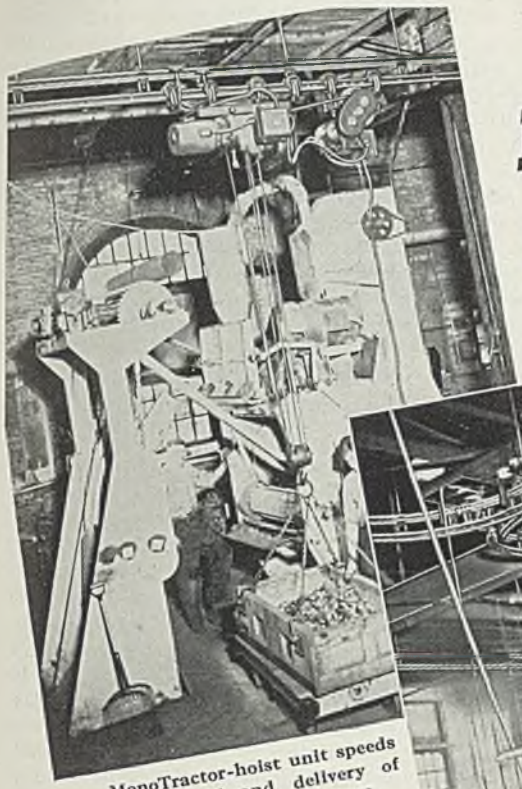
Chief use for tin plate is in food containers. For some foods other materials can be used, generally at higher cost and a sacrifice of convenience in packing and handling. For others no satisfactory substitute has been found. Furthermore, the food packing industry is equipped to use tin containers and the retooling required to change over to substitute materials might be difficult at a time when every effort is being made to expand defense industries.

Substitutes for many applications of solder and bronze have been developed, likewise for the most part more costly and in some instances less suitable than the tin-bearing materials customarily used. It is believed that the maximum substitution possible without too great sacrifice of industrial efficiency would not exceed 25 to 30 per cent of normal requirements.

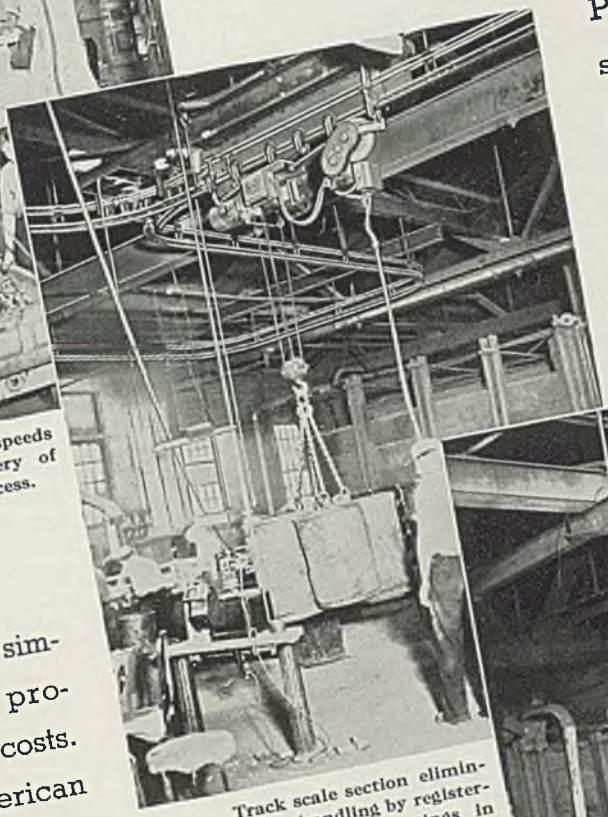
Tin ranks high among the strategic metals because although it is essential to the national economy, domestic production never has approached even 1 per cent of current

MECHANIZE your simple jobs!

Power operation will speed up your production and cut down handling costs.



MonoTractor-hoist unit speeds up removal and delivery of castings to cleaning process.



Track scale section eliminates rehandling by registering weight of castings in transit.

Heavy loads are easily and quickly moved by power operated equipment.

It's the time-consuming, simple jobs that tie up production and pile up costs. Hence, when an American MonoTractor with electric hoist takes over the handling operations, bottlenecks disappear, materials move smoothly between process and costs inevitably fall.

With their specialized experience, American MonoRail engineers are often able to discover hidden possibilities for the application of simple handling systems that bring an immediate return from a small investment. This service is available from district offices located in every industrial center.

How Problems are Solved!

Write for copy of this "Blue Book" containing hundreds of illustrations showing solutions to a wide variety of handling problems.

THE AMERICAN MONORAIL CO.

13102 ATHENS AVENUE, CLEVELAND, OHIO

needs and known resources are too meager to provide any material increase in output.

OPM Asks Survey of Nickel Stocks Held by Consumers

Comprehensive survey of the amount of nickel held by industrial consumers is being undertaken by the Bureau of Mines at the request of Office of Production Management through W. A. Harriman, chief of the materials branch.

Survey is being made as a result of frequent reports that a tight situation exists in the supply of nickel.

Mr. Harriman pointed out that approximately 85 per cent of all nickel produced in the world is obtained from Canada and previous estimates have indicated that sufficient supplies would be available for all defense and civilian requirements. Nickel consumption during the last quarter of 1940 averaged 14,000,000 pounds per month but imports for the year were at the rate of 10,000,000 pounds per month. At the present time imports are at the rate of 14,500,000 pounds per month.

Informal investigations of complaints of shortages have led to the belief that some consumers are seeking to acquire unnecessarily large inventories.

Tariff Commission Orders Investigation of Copper

United States Tariff Commission has ordered an investigation into cost of production of copper in United States. Investigation was ordered at the request of the price stabilization division of the Advisory Commission to the Council of National Defense. In making the request, the division stated that it finds it necessary to give consideration to the relationship of costs, prices, and wages in the copper industry.

Aluminum Allocation System Sought by Defense Officials

Sales and production data of Aluminum Co. of America were examined by Office of Production Management officials as Priorities Director E. R. Stettinius Jr. sought to work out an allocation formula between defense and civilian purchasers.

Figures were brought here by the aluminum company representatives for the meeting with Mr. Stettinius, which also was attended by James F. Towers and Blackwell Smith, assistant priorities directors, and Ernest Hopkins, chairman, minerals and metals section.

Other aluminum producers, fabricators and extrusion companies will be called in later to furnish similar information, which will determine amount of aluminum to be made available to makers of nondefense goods.

If a satisfactory allocation system results from the meeting with Aluminum company, it may be adopted for entire industry after consultation with smaller producers, OPM officials said.

Meanwhile, Harriet Elliott, defense commission's consumer advisor, opened a publicity drive through the press and retail and wholesale trade associations to divert housewives from purchasing aluminum kitchenware. Miss Elliott urged enamelware, heat-proof glass, cast iron and earthenware be substituted until aluminum production expands sufficiently for military and civilian needs.

Pacific Northwest Aluminum Production To Be Increased

Bonneville and Grand Coulee dams will step up production of aluminum vital for defense needs by delivery of Columbia River power to a new plant to be constructed by the Reynolds Metals Co. in the Pacific Northwest.

A 20-year contract to supply 40,000 kilowatts of hydroelectric power has been signed by R. S. Reynolds, president of the company, and Bonneville Power Administrator Paul R. Raver.

Exact site upon which the new electrolytic plant will be built has not been determined by Reynolds Co. Construction of the aluminum plant will be started immediately, and it will have an initial capacity of 40,000,000 pounds of aluminum a year.

Production of pig aluminum in the new plant is scheduled to begin June 15, 1941, according to Mr. Reynolds. Company contemplates expanding operations to include not only the production of virgin aluminum, but also the manufacture of finished products in that field.

Signing of this contract raises the amount of aluminum to be produced with Columbia River power to 190,000,000 pounds a year. Earlier contracts signed by the Bonneville authorities with the Aluminum Co. of America provide production at the rate of 150,000,000 pounds annually by Sept. 1.

Reconstruction Finance Corp. has increased Reynolds' loan by $4,400,000 to finance building an aluminum pot room of 60,000 tons annual capacity at Bonneville. Loans to Reynolds now total about $20,000,000.

Information Service

■ Service and Information Office, Department of Commerce building, has been set up by Jesse Jones to aid business men who go to Washington on any phase of business.

Hundreds of business men are going to Washington in connection with defense work. The advice given is: "Don't, if you can possibly avoid it." Many of the calls relate to priorities. Official Priorities Bulletin, outlining full procedure, may be obtained free by addressing Director of Priorities, New Social Securities building, Washington.

Spiegeleisen Suggested as Ferromanganese Substitute

Use of spiegeleisen as a substitute for ferromanganese, and emergency conservation of manganese through consumer-producer co-operation are suggested in a report issued by John D. Biggers, director of the production division, Office of Production Management.

Twenty per cent of the consumption of ferromanganese could be saved by emergency conservation, according to the report, which was prepared by the technologic committee on manganese of the National Academy of Sciences. The committee, made up of ranking scientists, was appointed last summer to review projects for the development of new processes for recovery of manganese from low grade domestic ores.

In discussing substitution of spiegel for ferromanganese, the committee points out that certain domestic ores are available for production of spiegel and production facilities could be built in sufficient time to cover the emergency. Spiegel is an alloy containing about 20 per cent manganese.

The American iron and steel industry requires annually about a million tons high grade manganese ore, containing 50 per cent manganese, when operating at a rate corresponding to the production of about 70,000,000 tons of ingots. Substantially all of this ore is imported.

Members of the committee who prepared the report are: Clyde Williams, director, Battelle Memorial Institute, Columbus, O., chairman; A. C. Fieldner, chief, technologic branch, United States Bureau of Mines, secretary; Dr. Fred G. Cottrell, Washington; James Critchett, vice president, Union Carbide & Carbon research laboratories, New York; John V. N. Dorr, Dorr Co., Westport, Conn.; Charles H. Herty Jr., metallurgist, Bethlehem Steel Co., Bethlehem, Pa.; Donnel F. Hewett, principal geologist, United States Geological Survey, Washington; John Johnston, director of research, United States Steel Corp., Kearny, N. J.; and Gilbert Seil, director of research, E. J. Lavino Co., Philadelphia.

Priorities Board Seeks To Avoid Labor, Industrial Dislocations

■ PRIORITIES division, Office of Production Management, last week issued a classified list of important raw materials, metals and other commodities on which priority action has been taken to aid defense.

E. R. Stettinius Jr., director of priorities, pointed out that the list does not cover "automatic" assignment of preference ratings by the Army and Navy Munitions Board and officers and inspectors of these two services. The latter, for administrative efficiency, are authorized to grant certain "automatic" preference ratings for items on the "critical list."

This list, jointly maintained by the armed services and the priorities division, sets forth specifically those items on which such "automatic" ratings may be granted. The list is chiefly made up of completed military items and does not include raw materials and many other commodities ordinarily used in civilian channels.

All other priority questions are administered directly by the priorities division. Actions taken so far by the division fall into three broad classes:

I. *Formal Priorities.* Cases in which priority ratings have been formally applied by the division.

II. *Allocations.* Cases in which the principle has been employed on a broad scale, action being taken in the form of specific allocations, with or without actual issuance of ratings.

III. *Co-operation.* Cases in which the general principle of the system has been applied informally and on a voluntary basis.

The list given out by Mr. Stettinius follows:

I. Formal Priorities

A. *Machine Tool Builders.* Because of the vital necessity for rapid expansion of the machine tool making industry, many machine tool builders have been given a blanket priority privilege for the acquisition of machinery and other equipment. Manufacturers of gages also were given a blanket rating for the acquisition of equipment. This blanket status expires March 31, 1941, though it can be extended.

B. *Machine Tools.* The makers of machine tools were requested on Jan. 31 not to fill orders for customers without priority ratings after the end of this month (February). This action has now been made mandatory. Requests for ratings from a number of schools and other educational institutions engaged in training workers have not been granted, on the ground that the equipment is more essential in defense plants. Efforts are being made to handle this phase of the problem by aiding such institutions to locate and acquire second-hand tools.

C. *Aluminum.* Aluminum producers have been ordered to serve defense needs ahead of civilian needs, except as otherwise directed on specific allocation, based on submission of order books to the priorities division once each month, as described below under the heading of allocations.

D. *Foreign Orders.* A number of orders placed in this country by foreign governments, largely in the machinery and equipment field, have been granted priority ratings, and certificates have been issued.

II. Allocations

A. *Aluminum.* Certain aluminum forgings and fabricated parts are on the critical list, and therefore subject to automatic rating by the army and navy. In addition, aluminum generally has now been subjected to mandatory priority action to make sure that defense needs get first call. Aluminum producers have been ordered to submit all order books once each month, for allocations of available aluminum in the interests of defense, an action which, in the light of the present short-

(*Please turn to Page* 51)

Nickel Demand "Higher Than Actual Consumption"; Supplies Are at Peak

■ SUPPLIES of nickel available to the United States have been brought to record heights," said Robert C. Stanley, chairman and president, International Nickel Co. of Canada Ltd., in commenting last week on the market situation. "Beginning in the latter half of 1940, the rate of deliveries has been about double that of any previous year.

"Greatly increased supplies have been made possible through progressive expansion by International Nickel in mining, milling, smelting and refining capacity. Despite the loss of the Falconbridge nickel refinery, in the invasion of Norway, the entire nickel matte production of that company is now being refined in Canada for British and United States markets. The British Empire and the United States together are sharing all of the supplies of nickel which prior to the war were serving the needs of the rest of the world.

Demand Inflated

"The immediate calls for nickel by the nickel consuming industries in the United States are considerably larger than the supply which is now being provided. It is questionable, however, whether actual United States needs for nickel as reflected by the consumption of the products of the nickel-consuming industries, exceed the available supply.

"It seems apparent that there is an inflation of demand as compared with real consumption. The calls have been temporarily inflated through the tying up of substantial quantities of nickel in process and in intermediate products with each addition of new units producing alloy steels and other nickel-containing industrial products.

"Each unit put into operation in connection with the industrial expansion program requires the delivery of much larger quantities of nickel at the outset as compared with the quantities thereafter required to maintain a constant output.

"There are evidences also of overbuying out of regard to precautionary and speculative considerations, and orders for nickel-containing products not immediately required have been crowded into the producing plants earlier than necessary.

"Studies which are in progress in co-operation with large consumers indicate that the nickel supply will be ample for the needs of the national defense program and British and Canadian orders placed in the United States, and also should provide for a volume of commercial requirements.

"The supply is being allocated to consumers as equitably as possible after consideration of the many relevant factors. Consumers in turn are co-operating and exercising the responsibilities of regulating their use of the quantities received so that the requirements of the national defense program and British and Canadian orders will be assured of preference, and other commercial applications will be taken care of in an orderly fashion, with as little delay as possible."

Seeking an ideal steel for steam ends on high pressure pumps, a manufacturer selected cast Nickel-Molybdenum.

A simple heat treatment develops physical properties that permit light sections. The castings, though involved, pass high pressure hydrostatic tests with no rejects. And, in addition, the steel machines well and finishing produces a smooth, wear resistant surface in the cylinders that actually improves with use.

A copy of our technical book, "Molybdenum in Steel" will gladly be sent without charge to interested Production Executives.

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

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

MOLY

Mirrors of *MOTORDOM*

By A. H. ALLEN
Detroit Editor, STEEL

Aluminum pistons may be saved by likelihood of increasing amounts of secondary aluminum becoming available from defense projects . . . Light metal producers showing exemplary fortitude in situation where some consumers are becoming disturbed . . . Three spectrographic laboratories being set up in steel mills for control of residual elements in open-hearth heats

DETROIT

■ DAILY the production problems of the auto industry, and particularly advance work on 1942 models, grow more complicated. Materials and specifications experts are being confronted with a long list of headaches because of the impact of the defense program on metals supplies.

One of the latest worries is in regard to aluminum pistons, used by all builders except Chevrolet, Pontiac and Ford, with Ford using some aluminum pistons in commercial engines and replacements. These three, it is true, account for over half of total automobile production at current levels, but there are still some quarter of a million cars a month being built which require aluminum pistons. This means, roughly, 2,000,000 pistons a month, counting in some replacement parts, or 2,500,000 pounds of aluminum, since pistons average about 1¼ pounds as cast.

Aluminum casting alloys used for pistons vary between different makes. Some suppliers use virgin metal almost altogether; others use a high percentage of scrap or secondary aluminum. Amplex division of Chrysler, for example, over the past five years has used upward of 60 per cent secondary aluminum in piston mixtures.

A typical piston alloy is one containing 0.8 per cent copper, 0.8 iron, 12 silicon, 1 magnesium, 2.5 nickel and the balance aluminum. Another eliminates nickel and shows about 5 copper and 5 silicon.

It might be reasoned that the establishment of mandatory priorities on aluminum would affect the availability of aluminum for pistons. This appears to be only partially true. It is pointed out that the defense program requires virgin aluminum (for casting) with purity of 99 per cent plus, and rigid control is practiced over such metal. Naturally, in all defense work, scrap metal originates in casting, machining and finishing operations, this metal being returned to the source.

10 Per Cent Scrap Loss

One estimate of the amount of such scrap is 10 per cent of the gross weight involved. Now, this scrap cannot be remelted for defense work and hence becomes available for commercial uses, and in increasing quantities. There is no reason for suspecting that all aluminum pistons for automotive work could not be made practically 100 per cent from secondary or scrap aluminum, particularly when the quality of this remelt is increasing. Further, secondary aluminum, under present limitations, is not adaptable to defense needs and hence should not come under priority regulations.

One aluminum supplier here takes the viewpoint that if the motor companies do not get panicky and rush into redesigns there will be ample aluminum for their piston needs. At the same time, however, at least one motor company right now is studying the problem of switching to cast iron as a stopgap, money having been appropriated for the change.

Cast iron, weighing about 2.8 times as much as aluminum, volume for volume, is of course readily adaptable to piston use, but it is problematical whether a change could be made without appreciable motor redesign, retooling for machining and grinding, and expansion of foundry facilities.

Iron pistons used by Chevrolet and Pontiac are given a tin coating to improve initial run-in action. With tin likewise a "strategic" metal, a change in this coating method may be necessary. Changes in cooling systems might also be called for by substitution of cast iron pistons for aluminum and the aluminum people also maintain steps would be required to overcome motor sluggishness resulting from a change in pistons without compensating revisions in motor design.

Flat-rolled aluminum is used in considerable quantities in bus construction, and here the effect of priorities likely may be felt more severely. Substitution of cold-rolled steel sheets in buses designed for aluminum appears almost out of the question since it would change axle loads, assembly methods and a host of other detail. Lack of aluminum sheet will simply mean shutdown of aluminum bus construction, it is felt. The long-range outlook for aluminum is good, additional facilities now being rushed to completion which should make plenty of material available for both defense and consumer needs.

Attitude of the Aluminum Co. of America in these trying times is noteworthy. The company is taking particular pains to tell industry and the public that "if you can't get all the aluminum you want when you want it, remember aluminum is helping you by helping to meet the national emergency."

Even the remelt aluminum interests are hopeful of avoiding constriction of supplies. National Smelting Co. declaring that "with volun-

tary action from all of us (secondary aluminum suppliers) no industrial plants need be shut down, no metal need be commandeered, and perhaps no restrictive price controls need be imposed."

Three-Phase Current Adapted To Aluminum Welding

Shortly to be announced in Detroit is a revolutionary new process for spot welding of aluminum which, it is believed, may help to pave the way for acceptance of welded aluminum to a greater extent in aircraft construction. Several types of welding equipment now are on the market for aluminum welding, including the familiar "stored energy" method of welding, involving the use of condenser banks to prevent undue power drainage during the welding interval. The new process does not use condensers, centering around the adaptation of three-phase current in such a way that peak currents can be built up through a transformer, vacuum tubes and related control equipment. First announcement of the equipment will be made at the Machine & Tool Progress exhibition here the week of March 23.

Spectrograph Proves Useful Tool for Open-Hearth Control

Use of the spectrograph as a control instrument in the steel industry is a relatively new development, and three recent installations have been made, one at Weirton Steel Co., Weirton, W. Va., one at Inland Steel Co., South Chicago, and one at the Ford Motor Co. steel mill here. Equipment was supplied by the H. W. Dietert Co., Detroit.

Advantage of the spectrograph is that a close control of "residuals" in heats of steel is possible. Elements such as aluminum, copper, zinc, chromium, nickel and cadmium, present in quantities less than 0.5 per cent, can be measured with a accuracy of plus or minus 3 per cent and at a speed of substantially one element per minute. Of course, each determination on a sample includes a number of elements and several samples can be analyzed at one "sitting." A sample is burned in the electric arc under controlled conditions and a photograph of the resulting spectrum taken. This, compared with the spectrum of a sample of known analysis, yields a quick check on the unknown sample. About 18 minutes is required to run a determination and photograph, ten samples being photographed at a time.

Appreciable savings in time over chemical analysis are possible, the latter requiring from ½ to 4 hours, depending upon the number of elements to be run. Ford engineers estimate a saving of at least ½-hour per heat of steel. The spectrographic laboratory being built at the Ford open-hearth plant will be ready in June. It will be complete with a telautograph system connecting the laboratory with the open-hearth melter, another innovation, superseding the pneumatic tube system now used in open hearth and foundry for transmission of reports.

Inland's spectrographic laboratory is in full operation, with the Weirton installation to be ready about the end of this month. The equipment, of course, is not used for carbon determinations, nor for the metalloids sulphur and phosphorus. It appears to mark a distinct advance in open-hearth control methods.

Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

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

Estimated by Ward's Reports

Week ended:	1941	1940†
Feb. 1	124,400	101,240
Feb. 8	125,000	95,985
Feb. 15	127,500	95,050
Feb. 22	129,240	102,570
March 1	126,550	100,855

†Comparable week.

"Sleeper Cab" Bodies Developed For General Motors Trucks

A line of "sleeper cab" bodies for General Motors trucks has been developed by the special body division of Hydro Mfg. Co. here, under direction of Elmer Wetlauffer, an experienced body engineer who has been associated with many of the leading body companies. Equipment is being installed for production of these bodies at a rate of 10 per day, floor space in the Hydro plant being doubled to accommodate the new business.

Sleeper cabs are so named because of the shelf or platform just back of the drivers' seat on which one operator can sleep while the other drives on long truck hauls. Tools, jigs and fixtures for the various panel and frame stamping which go into the welded steel assembly were turned out in record time and involved a number of new ideas in interchangeable die sections and dies built up of welded steel units. Operations will be under way by April 1.

Thousands of Men and Millions Of Dollars Oil Defense Machine

At least 150,000 men will be working on national defense contracts of auto companies by the latter part of the year and an estimated 100,000-200,000 more will be employed by the time the industry's bomber parts program is in full swing, according to an illustrated progress report issued by the Automobile Manufacturers Association.

Oldsmobile announces it has passed the 75,000-mark on cars equipped with Hydra-Matic drive, since the feature first was introduced on 1940 models. About half of current production is being equipped with the drive.

Willys-Overland currently is making deliveries of $1,500,000 worth of steel forgings for aircraft and trucks on American and British contracts. Work has started on parts for navy machine guns on a $1,912,000 contract, as well as on a $6,000,000 order for shell hoists. Shipments against an $8,862,000 shell order for the army are slated to start April 10, and deliveries of the first four-wheel drive reconnaissance cars are planned for June 20. Grueling tests still are being given these midget cars to determine whether they will meet specifications.

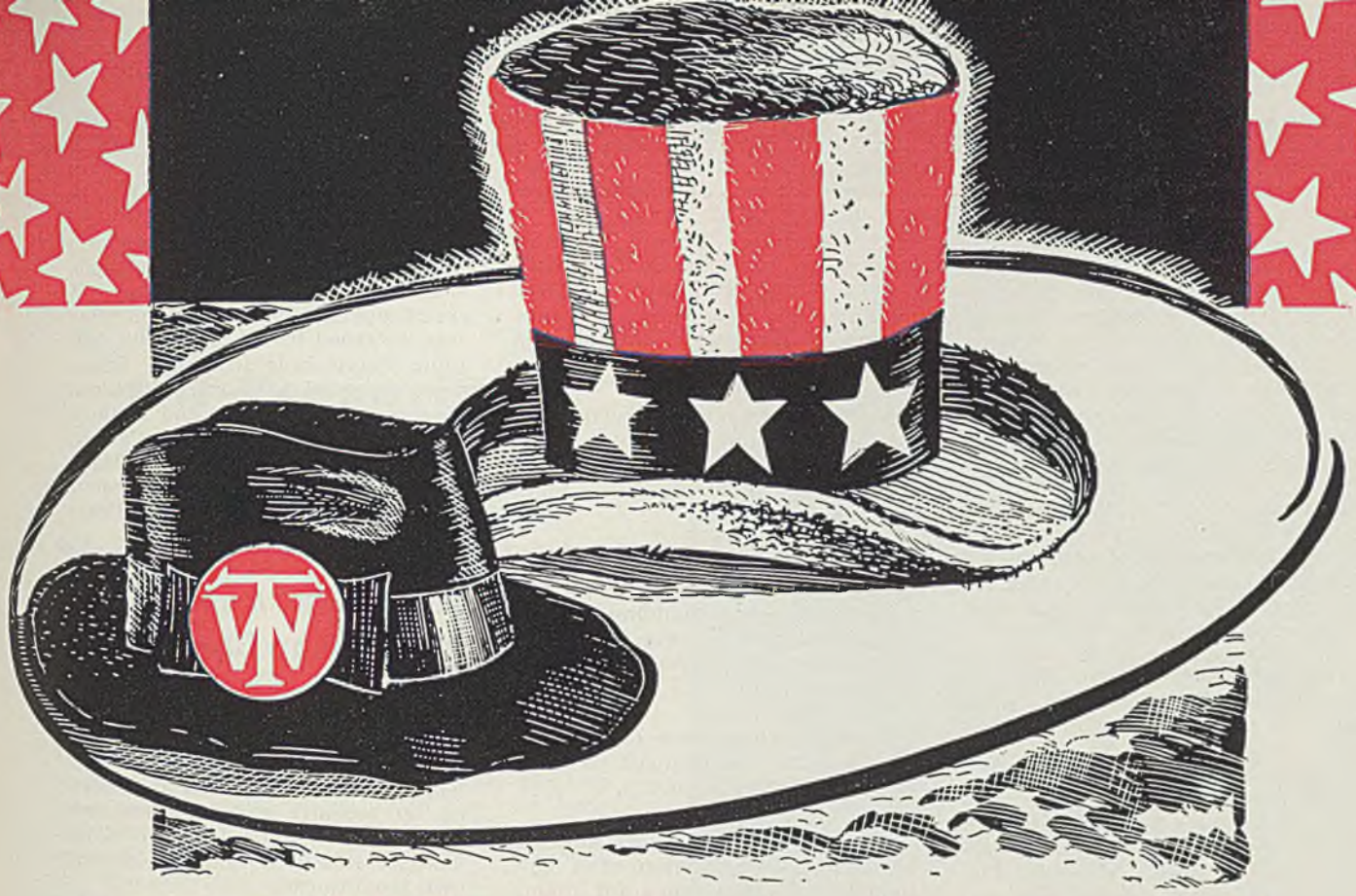
Nash has introduced a two-door "slipstream" sedan body, closely patterning the sharply sloping bodies introduced by General Motors on 1941 models. The new Nash body will be available in both the 600 series and Ambassador Six line.

Foundry Educational Lectures Scheduled

■ Detroit chapter, American Foundrymen's Association has scheduled a series of six educational lectures on the subject "Production of Better Castings." Problems and techniques will be surveyed by eight nationally known foundry engineers and metallurgists at the Chemistry building auditorium, University of Detroit, Feb. 28, March 7, 14, 21, 28 and April 4. Applications for registration should be addressed to E. K. Smith, Electro Metallurgical Co., Ford Building, Detroit, chairman of the chapter's educational committee. Nominal charge will be made for attendance.

Ordnance Office Moved

■ Offices of the Chicago Ordnance District of the war department are being moved from 433 West Van Buren street, Chicago, to the First National Bank building, 38 South Dearborn street. Col. Donald Armstrong is executive officer.



OUR HAT'S *in the Ring, too!*

Our Stamping Division, like many other industrial concerns, is actively engaged in Defence Program production. This work here---as in nearly every assigned plant---gets the green light.

These national emergency demands have, however, effected our normal schedules.

So, we ask you---if you are planning a pressed steel part or product which you intend to order from us or ask us to quote--to anticipate your delivery requirements in advance.

TRANSUE & WILLIAMS

ALLIANCE, OHIO

Deep Drawn Stampings

SALES OFFICES New York, Philadelphia, Chicago, Detroit, Indianapolis, Cleveland

Activities of Steel Users, Makers

■ LINK-BELT CO. was host Feb. 17-18 in Chicago to district managers and other executives of its stoker division for a conference introducing a new line of stokers, covering models in three price ranges. At the same time a reduction of $20 on the special model was announced. J. E. Martin, manager, stoker division, and G. W. Ostrand, general manager, explained the new stoker series and the sales plan.

♦

Container Corp. of America, Chicago, has acquired the assets of Reed Container Co., Baltimore. G. H. Linde, heretofore assistant sales manager at Philadelphia, has been named manager of the new plant.

♦

Ingersoll Steel & Disc Division, Borg-Warner Corp., Chicago, is engaged in a $270,000 expansion program at its Newcastle, Ind., and Kalamazoo, Mich., plants. Enjay Construction Co., Chicago, is general contractor on both jobs. An addition costing $185,000, including new cranes, electric furnaces and other equipment, will provide 40,000 square feet at Newcastle, while a new building at the Kalamazoo plant will require an expenditure of about $85,000. The company is just completing a $465,000 expansion at its West Pullman, Ill., plant.

♦

Blaw-Knox Co., Pittsburgh, has received an order for four giant ore buckets for a mid-western steel plant, each to weigh about 44,000 pounds and pick up 23 tons of ore. This is believed to be a larger load capacity than has ever been handled by an ore bucket.

♦

Hamilton Tool Co., Hamilton, O., has moved to new quarters at Ninth and Hanover streets.

♦

Gar Wood Industries Inc., hoist and body division, Detroit, has appointed the following hoist and body distributors: W. T. Stringfellow & Co., Nashville, Tenn.; Southern Equipment & Tractor Co. Inc., Monroe, La.; Oden Equipment Co., Albuquerque, N. Mex., and Fruehauf Trailer & Equipment Co., Seattle and Portland, Oreg.

♦

A. Jay Hofmann, Narberth, Pa., has been appointed exclusive distributor by Norbom Engineering Co., Darby, Pa., of its Lysholm plate punch tables.

♦

United States Machine Corp., Lebanon, Ind., maker of stokers, has leased a five-story building at 1614 South Wabash avenue, Chicago, which after alterations will be used as a warehouse.

♦

Bredouw Aeromotive Corp., Kansas City, Mo., has changed its name to Missouri Aviation Corp.

♦

Kinney Iron Works, Los Angeles, has started construction of a new foundry and forge shop for manufacture of aluminum alloy castings and forgings, to be known as the Kinney Aluminum Foundry Co., and managed by Brant E. Myers, formerly associated with Kinney Iron Works.

♦

Kester Solder Co., Chicago, has purchased the property now occupied by its Newark, N. J., division. F. C. Engelhart, president, reports production at the highest level. Expansion and improvements are planned at Newark.

Steel Constructors Name Bridge Design Winners

■ Prizes in the annual students' bridge design competition of the American Institute of Steel Construction, have been awarded as follows: first, $200, Vincent W. SeeBach, New York University; second, $100, R. Kenneth Kendall, Iowa State College; third, $50, M. R. Harrison Jr., Iowa State College.

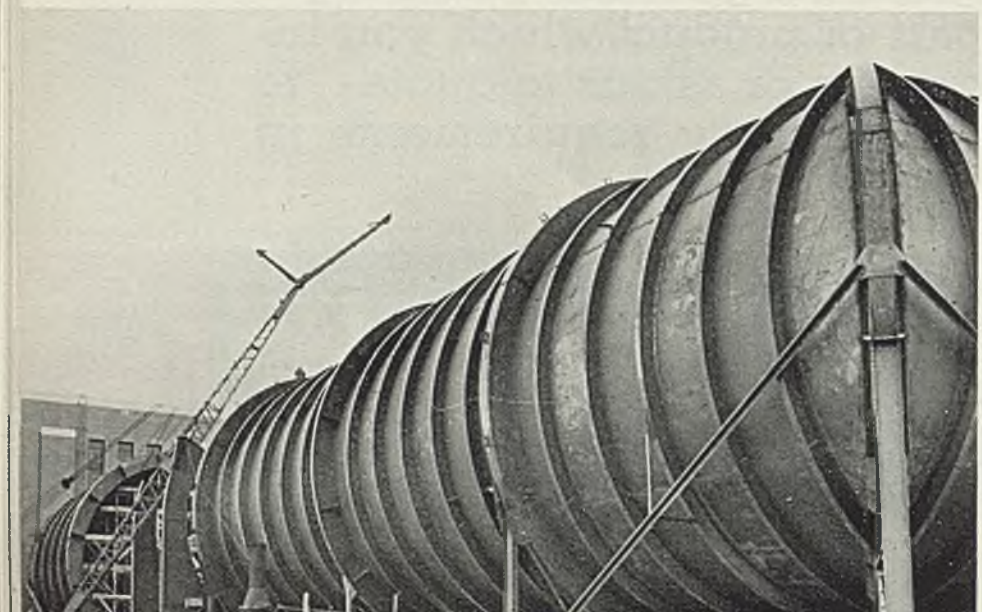
The problem was to design a steel overpass bridge carrying a single track railroad over a highway. A certificate of first honorable mention was awarded to Frank H. Hill, Virginia Polytechnic Institute. Others were awarded to Carmen Vetuschi, New York University, and to three other students of Iowa State College, Eugene Groshong, Curtis C. Marston, and Carlton Mueller. Sixty-four students, representing 13 colleges participated.

Koppers To Broaden Research on Chemicals

■ The creation of new and improved chemicals from coal, a fruitful frontier of industrial chemistry, is receiving accelerated attention by Koppers Co., Pittsburgh, as indicated by recently expanded research activities at Mellon Institute of Industrial Research and at Koppers' own laboratories.

The research staff has been increased to 67 during the past year and will be enlarged to about 100 during 1941. Scientists of national and international reputation recently have been added to the department and others are to join shortly. Activities concern coal-gas products, gas purification, synthetics, tar treatment, and the upgrading of various coal-tar and light oil fractions by steps such as distillation and crystallization, with the object of devising processes for making more valuable products from these materials.

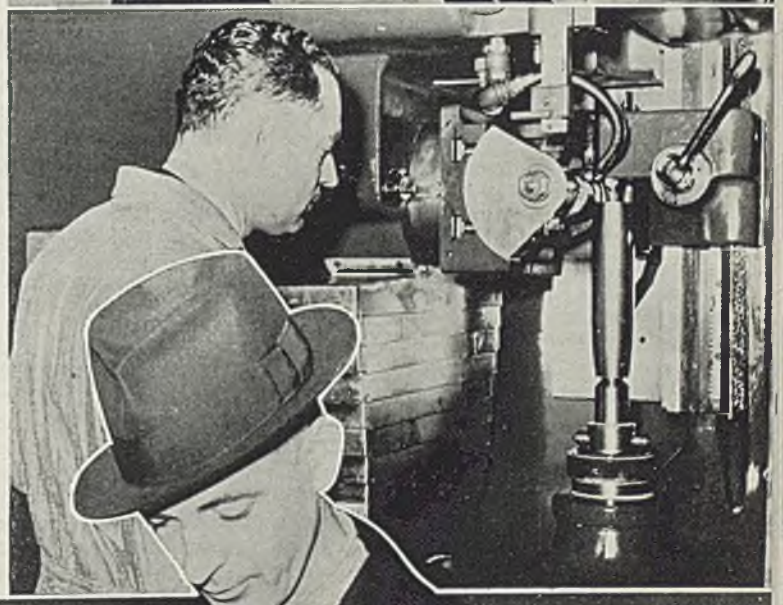
There also will be research on the development of agricultural products from coal. The examination of various types of coal to determine their fitness as the source of coke, as well as of coal-tar products, will be continued and expanded, as will be the basic study of coal carbonization and processing.



"Largest" Wind Tunnel

■ Steel tubes for the wind tunnel nearing completion at Wright field, Dayton, O., reputed to be the world's largest, are 40 feet in diameter. With a 40,000-horsepower electric motor to supply power, flying speeds of 400 miles an hour can be simulated. Throat of the test chamber has a diameter of 20 feet and can test scale models of modern combat planes up to 15 feet in wing span. Wide World photo

GM Preparing To Produce Shells, Cartridge Cases

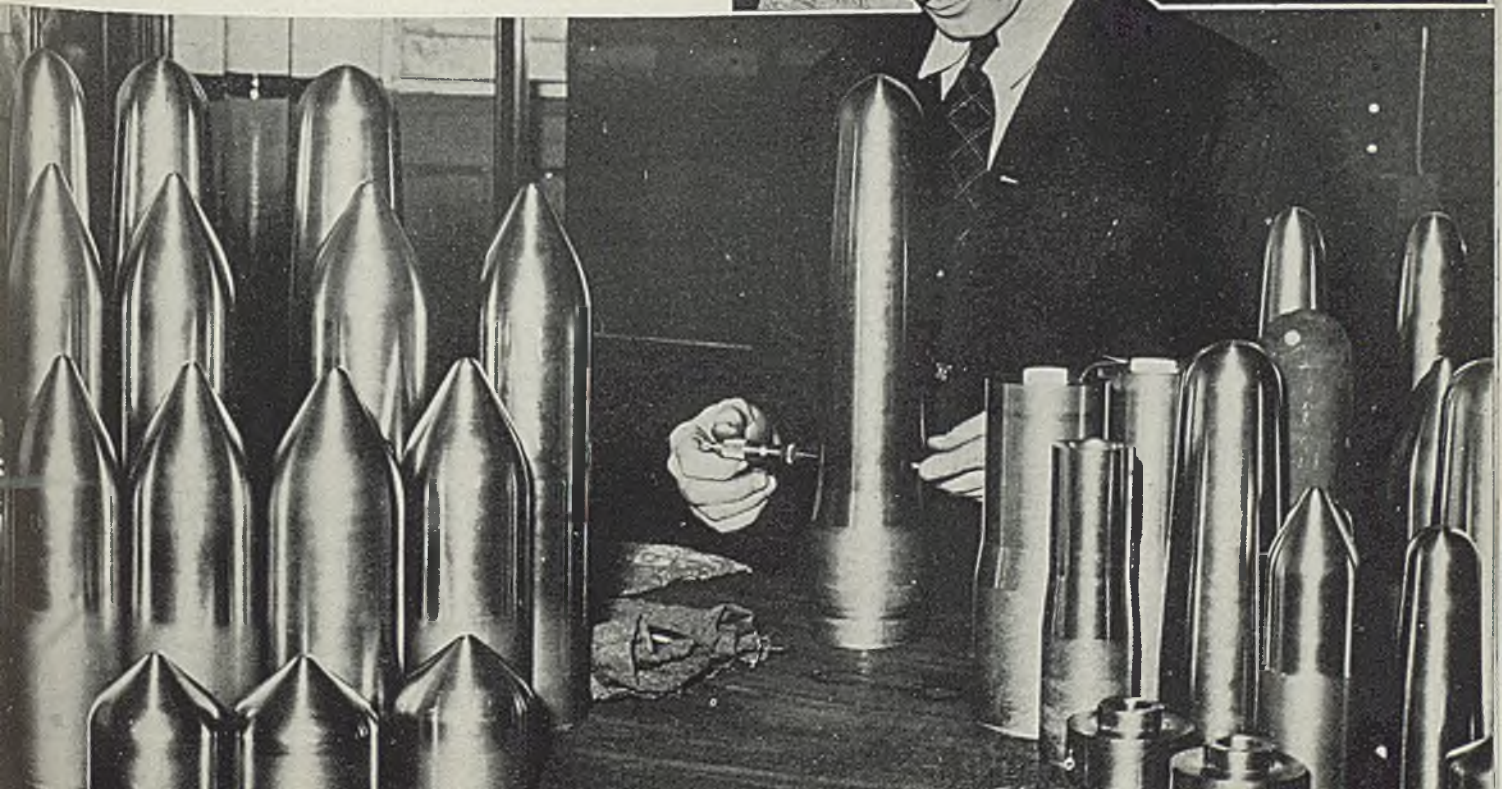


GENERAL MOTORS CORP. is preparing to produce 75 and 105-millimeter shells in large quantities in its recently acquired Olds Motors Works forge plant at Lansing, Mich., shown above. First test runs have been completed. Modern machinery, originally intended for the manufacture of automobile crankshafts and other parts, has been converted to shell and die production.

Cartridge cases will be produced at GM's Guide Lamp Division at Anderson, Ind. Photo, upper right, shows a steady flow of cases emerging from a stress annealing process.

At center right, is shown a 75-millimeter shell being finished turned on a new rigid turning lathe at the Lansing plant.

Below, die room inspector checks tools necessary for the forging of 105-millimeter shells at the Olds plant. GM's shell and cartridge case orders from the United States government total $14,400,000. Uninterrupted production will be under way about May 1



Fifty Years of Manufactured Abrasives; Anniversary Has Economic Significance

Silicon carbide, discovered "by mere chance" in March, 1891, first cost $880 a pound—How Acheson's manufacturing ideas extended its use throughout metalworking industries, making low-cost, high-quality products possible

By FRANCIS D. BOWMAN
Advertising Manager, The Carborundum Co.

■ MARCH, 1941, marks the fiftieth anniversary of an invention which directly and indirectly has been of great importance to the metalworking industries.

In March of 1891 Dr. Edward G. Acheson first made a new product, which is not found in nature—silicon carbide, an abrasive which is next to the diamond in hardness.

Until then, grinding wheels had been made of sandstone, of corundum, or emery—which is corundum with a varying amount of impurities. Those wheels could do a passable job of sharpening ordinary tool steels, but they were practically useless when it came to sharpening the very hard, high-speed steels that were then coming into use.

They were of no use as material removing tools on a production basis. The "grinding" of a metal product was actually merely a polishing process, which, while it improved the appearance of the part, usually glossed over surface imperfections. Nor was it possible, with them, to get anything approaching precision of dimension or shape.

In the course of experiments to determine the effect of fusing clay with coke, Dr. Acheson found that he had produced a minute quantity of hard sharp crystals. His experiments had been made with a plumber's solder pot through which a heavy current was passed. He built a larger furnace, with which he was able to produce a few carats of the crystals. He found that they would not only scratch glass, but that they would lap diamonds. The first crystals were sold to gem polishers at $880 a pound.

At first he thought he had produced a compound of carbon and corundum—a natural aluminum oxide—so he called the substance "Carborundum." Subsequent chemical analysis showed that the substance was silicon carbide, a new chemical compound. The coined name "Carborundum" was later applied as a trade-mark to products of The Carborundum Co., which developed as a result of his discovery.

He tried to get the established manufacturers of wheels to use his silicon carbide in place of the natural emery, but they believed successful wheels could not be made with it. So he began to make wheels—thousands of them, with his own hands, as he states in his autobiography.

Acheson's experiments and his early manufacture of Carborundum were carried on in a small plant in Monongahela City, Pa. In August, 1891, The Carborundum Co. was incorporated in Pennsylvania, with $150,000 capital stock. One-third of the stock went to stockholders of the Monongahela Electric Light Co., for services rendered to The Carborundum Co.

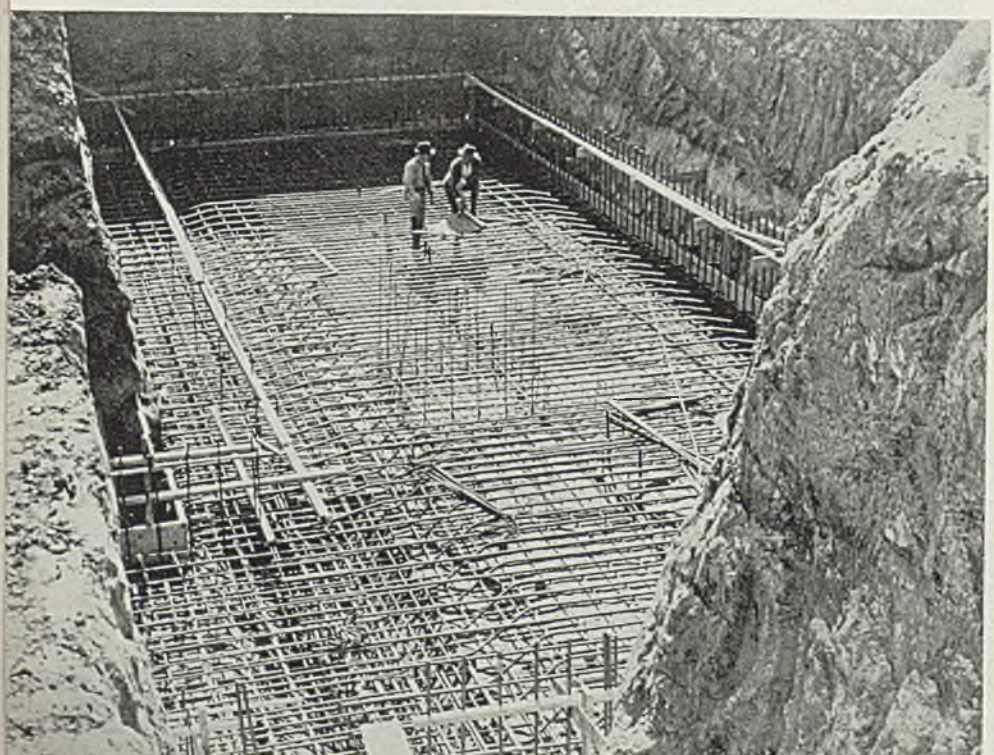
In 1895 Acheson was impressed by the low cost of power at the new Niagara Falls development and proposed to his board of directors that they move the company there. At that time, largely because of the high cost of power at Monongahela, the cost of producing Carborundum was so high that only about half the amount of the plant's capacity could be sold. As Acheson wrote: "In view of this condition my Niagara Falls scheme was too much for the conservative directors, and they resigned and left the room."

He organized a new board and went to Niagara Falls. The new plant started in the fall of 1895. It was the second company to sign power contracts with the Niagara Falls Power Co., first being the Pittsburgh Reduction Co., now the Aluminum Co. of America.

In 1906 the company built a plant at Dusseldorf, Germany; in 1913 one at Manchester, England. The plant at Niagara Falls, Ont., was built during 1916 and 1917, and the one at Shawinigan Falls, Quebec, during 1917 and 1918.

The company's first works manager was Frank J. Tone, who has been president since 1919.

A few years after Dr. Acheson discovered silicon carbide, Charles B. Jacobs invented a process for manufacturing aluminum oxide in the electric furnace. Silicon carbide is hard, sharp and brittle. Alumi-



Underground Powerhouse

■ From transformers far underground will come the power for Douglas Aircraft Co.'s large new "blackout" airplane factory under construction at Long Beach, Calif. Pictured is one of the underground vaults whose steel and concrete walls will protect the plant's power. Similar vaults will protect other essential supplies. NEA photo

num oxide is not so hard, but tougher. Both are manufactured by The Carborundum Co. Between them they provide a range of abrasive qualities which meet all grinding, polishing and lapping requirements of all types of materials.

Modern manufactured abrasives have affected the steel industry directly by reducing costs and by improving quality of products, thus increasing their consumption. The use of grinding wheels for grinding out defects in ingots, slabs and billets not only improves the quality of the finished product, but is cheaper than the old methods.

The grinding of rolls, some of them to an ultra-finish whose roughness is measured by a few millionths of an inch, makes possible the production of sheets and strip of such surface perfection that they can be used for products which require a fine finish, without polishing.

But the use of grinding by industries which buy their raw materials from steel mills, has had an even greater influence in increasing consumption of steel.

Mass production of steel products —for example, the automobile—depends upon the ability to produce, cheaply, parts to such close tolerances and of such fine surface qualities that they are completely interchangeable. This can be done cheaply only by grinding. So, to the extent that grinding has made possible mass production, and consequently expanded purchasing, through better quality at lower cost, the steel and other metalworking industries have benefited.

MEETINGS

Metal Congress Will Meet In Los Angeles, May 19-23

■ AMERICAN Society for Metals will sponsor the Western Metal Congress and Metal Exposition, May 19-23, in Los Angeles. Technical sessions will be held in the Biltmore hotel and Pan-Pacific auditorium.

Sales Problem Symposium By Eastern Advertisers

A symposium on "The Challenge to Sales Management" and "The Coordination of Production and Inventory, Market Research, Advertising and Sales" will be conducted by the Eastern Industrial Advertisers, March 13, at the Manufacturers and Bankers club, Philadelphia, starting at 3 p. m. The program has been arranged to be of special interest to managing directors of industrial organizations.

Forum by Westinghouse on Tool Electrification

Mutual problems of machine tool builders and electrical engineers will be discussed at the sixth Machine Tool Electrification Forum at Westinghouse Electric & Mfg. Co.'s East Pittsburgh, plant April 14-16. Defense production requirements will be considered by machine tool delegates, members of the machine tool division, National Defense Advisory Committee and Westinghouse representatives.

Preview Dinner for Machine And Tool Progress Exhibit

A special preview dinner is to be held the day before the opening of the Machine and Tool Progress Exhibition at Convention hall, Detroit, March 24-29. The dinner will be attended by an invited number of the country's prominent executives, engineers, educators, and army and navy officers engaged in national defense work.

The principal speaker will be Major General C. M. Wesson, chief of ordnance, United States Army, who will talk on "The Job Facing Industry in Arming This Nation." The toastmaster will be L. C. Hill, manufacturing manager, Murray Corp., who will introduce A. H. d'Arcambal, consulting metallurgist, Pratt & Whitney Co. and president of the American Society of Tool Engineers.

Chemical Society To Discuss Defense Aid

Scientific problems in national defense, including production of synthetic rubber and other materials and fortifying of food with minerals and vitamins, will be featured at the meeting of the American Chemical Society, Hotel Jefferson, St. Louis, April 7-11.

Fourteen special symposia and numerous papers will be presented before 17 of the society's 18 divisions.

Wendell E. Whipp To Address Detroit Marketers

Wendell E. Whipp, president, Monarch Machine Tool Co., Sidney, O., will address the Industrial Marketers of Detroit, chapter of the National Industrial Advertisers Association at a luncheon meeting March 6, in Hotel Statler, Detroit. Mr. Whipp, a past president of the National Machine Tool Builders Association, will discuss the problem of industrial concerns which are booked to capacity for months ahead and face important questions in the direction of their sales and advertising problems.

Convention Calendar

March 3-7—American Society for Testing Materials. Committee week and regional meeting, Hotel Mayflower, Washington. C. L. Warwick, 260 S. Broad street, Philadelphia, is secretary.

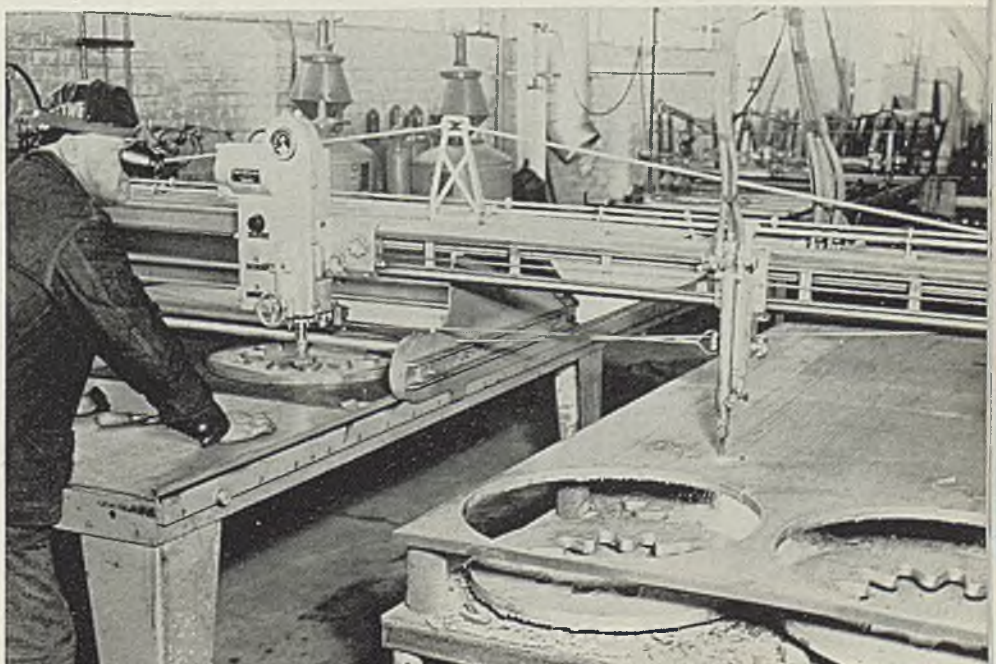
March 13-14—Society of Automotive Engineers. National aeronautic meeting, Washington hotel, Washington. R. Buckley, 29 W. 39th street, New York, is secretary.

March 13-14—American Gas Association. Annual conference at Lord Baltimore hotel, Baltimore. K. R. Boyes, 420 Lexington Ave., New York, is secretary.

March 17-22—Oil Burner Institute. Annual meeting, Benjamin Franklin hotel, Philadelphia. G. Harvey Porter, 30 Rockefeller Plaza, New York, is managing director.

March 24-29—American Society of Tool Engineers. Fourth annual convention and machine and tool progress exposition, Convention hall, Detroit. Ford R. Lamb, room 428, Boulevard Temple building, Detroit, is executive secretary.

April 2-4 — International Acetylene Association. Forty-first annual convention at Netherland Plaza hotel, Cincinnati. Indefinitely postponed.



■ Sprockets for combat cars or light tanks are gas cut from flat plate. Photo by United States Army Signal Corps

"Community Pooling" for Defense Material Production Spreading

■ DEVELOPMENT of community co-operation in defense work is "the newest thing industrially" in the nation today. It is "mushrooming," according to Walter D. Fuller, president, National Association of Manufacturers, New York, in a report to 150 manufacturers' associations.

Small towns from Maine to Texas are using their local inventories as a basis for co-operative enterprise, in which all manufacturing units participate to bid on primary or subcontracts.

Manufacturers are doing more than sub-contracting defense orders, he states. They are contributing three-fold to the stability of the nation during a period of industrial stress:

"First, by utilizing our existing machine tools, plants and shipyards, we remove the need for building others and over-expanding our plant needs.

"Second, by making known and ready those tools and yards, contracts may be placed which will employ local labor.

"Third, by keeping that labor employed and at home, we will complete the full social and economic advantage to the community, and to the nation as a whole, by eliminating unnecessary migration of labor and, thus, the creation of housing crises."

In describing whole-hearted support of the defense sub-contractor plan Mr. Fuller cites a letter from a Kentucky manufacturer, stating: "We are not seeking a changed program, but can and are willing to cancel all outstanding obligations in order to assist in the protection of our national interest."

The majority of plants now registering facilities for defense are not among the 10,000 major corporations already surveyed by the Army and Navy departments for possible prime contract purposes. They are those of small contractors who might be geared into the vast production job as sub-contractors.

A machine shop in Kansas finds it can make gear parts on its partly idle milling machines for a primary contractor in Ohio who is making turret lathes. A maker of wooden boxes in New York says he can build crates for shipping airplane engines made in Connecticut.

Majority Lack Defense Jobs

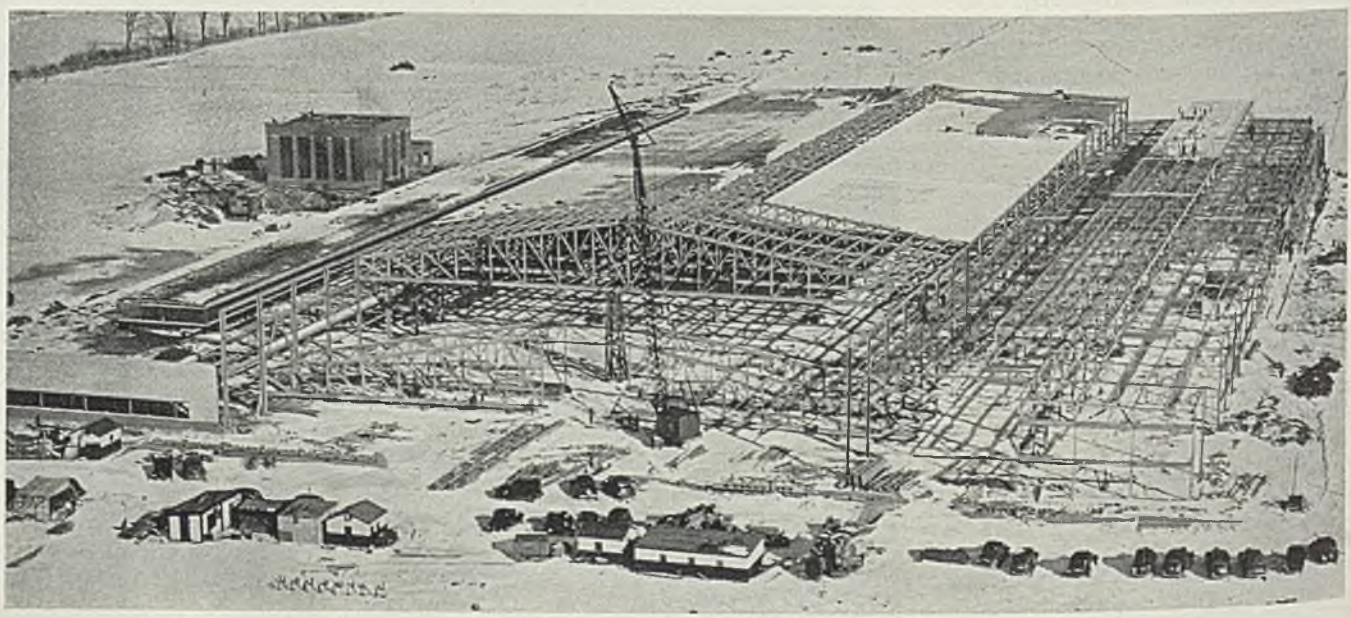
From reports to date from major industrial states it is found that more than 66 2/3 per cent of the manufacturers reporting do not have defense contracts, nor are they subcontractors. About 10 per cent are primary contractors; approximately 20 per cent sub-contractors. Of the 66 2/3 per cent who are not making defense goods and who have offered their services for that purpose, about half believe they have the type of machinery that may be converted or applied to defense production.

The first 50 returns from the Michigan questionnaire, random selections, revealed four primary contractors, 11 sub-contractors and 34 not having defense contracts but, in most cases, willing to abandon domestic production to make defense equipment. Thus 68 per cent were "standing by" for defense orders. The same 50 Michigan returns revealed as available 478 machine tools of wide variety and 146 other types of machinery ranging from wood-working to wire-drawing equipment.

The governors of Louisiana, Colorado, Michigan, Oregon, Kansas and Iowa are only a few of those sponsoring state-wide co-operation with active local communities seeking to keep reports up to date. The Pennsylvania State Department of Commerce has taken the experience of York, Pa., where "community pooling" originated (STEEL, Feb. 17, p. 44) and organized similar pools in 35 other small cities.

Plant Rises in Snow

■ **Steelwork for Bell Aircraft Corp's $1,500,000 assembly plant at Niagara Falls, N. Y., is rising rapidly. Four of eight 35-ton trusses spanning the 200-foot final assembly bay already have been erected by the Austin Co., Cleveland, designers and builders. More than 2000 tons of structural steel will go into the 300,000-square-foot building, two-thirds of which already is under roof**



Dravo Corp. Will Take Over Hunter Steel Co.

■ Plant and facilities of the Hunter Steel Co., Neville Island, Pa., will be taken over May 1 by Dravo Corp. Dravo will thus be provided with additional fabrication and structural shop facilities to meet increasing defense orders. It will complete Hunter's orders, including 20 to 30 barges.

The plant has a shop area of about 120,000 square feet and 200 to 250 men are employed.

Defense Contracts Total $54,250,191; More Plant Expansion Awards Reported

■ CONTRACTS for defense last week reported awarded by the Departments of War and the Navy aggregated $54,250,191. Most awards were small, with purchases of the quartermaster corps and ordnance department in the Army and the bureau of supplies and accounts for the Navy comprising a large part of the total.

Navy department reported a $9,150,000 cost plus fixed fee contract was awarded F. H. McGraw & Co., Hartford, Conn., and Purdy & Henderson Co. Inc., New York, for aviation facilities at the naval air station, Bermuda.

Defense Plant Corp. contracts were reported by the War department as follows: Reynolds Alloys Co., Sheffield, Ala., $9,801,211 for construction of a building and equipment for manufacture of sheet aluminum and structural aluminum shapes; Vickers Inc., Detroit, $895,000 for a building and equipment for fabrication of hydraulic controls and other products for the aircraft industry.

McDonnell Aircraft Corp., St. Louis, $496,717, building and equipment for manufacture of tail surfaces and other airplane parts; W. F. & John Barnes Co., Rockford, Ill., $500,000, plant and equipment for machine tool manufacture; and Gunite Foundries Corp., Rockford, Ill., $200,000, plant and equipment for manufacture of machine tool castings. Gunite Foundries is to work in conjunction with the Barnes Co.

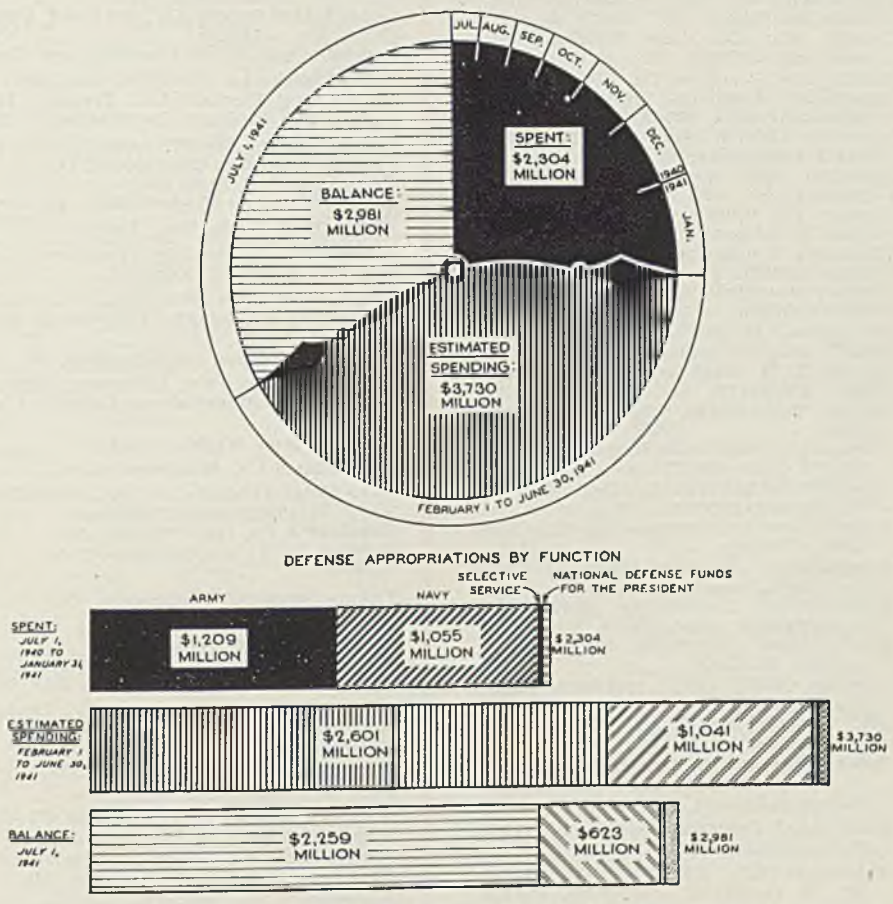
Brecon Loading Co., Wilmington, Del., was awarded a $14,394,001 contract, on a cost plus fixed fee basis, for management services, training personnel and operation of an artillery ammunition bag-loading plant at Childersburg, Ala. Negotiations for construction of the plant are underway.

War department last week reported the following:

Ordnance Department Awards

Adirondack Foundries & Steel Co. Inc., Watervliet, N. Y., castings, $1055.40.
Air Reduction Sales Co., New York, electrodes, $1260.
Allen Electric & Equipment Co., Kalamazoo, Mich., equipment, $1153.50.
Aluminum Co. of America, Pittsburgh, aluminum, $7389.71.
American Brake Shoe & Foundry Co., Chicago, steel forgings, $111,600.
American Brass Co., Waterbury, Conn., brass rod, small arms ammunition, $317,134.16.
American Car & Foundry Co., Berwick, Pa., castings, $2762.48.
American Manganese Bronze Co., Holmesburg, Pa., bronze, $5499.
American Saw Mill Machinery Co., Hackettstown, N. J., tools, $3500.
Apex Tool & Cutter Co. Inc., Shelton, Conn., cutters, $3394.20.
Armstrong, G. R., Co., Boston, tools, $1526.40.
Associated Spring Corp., Wallace Barnes Co. division, Bristol, Conn., springs, $72,946.80.
Austin-Hastings Co. Inc., Cambridge, Mass., bolt threader, $1431.
Bausch & Lomb Optical Co., Rochester, N. Y., reticule blanks, $2625.
Bearings Co. of America, Lancaster, Pa., bearings, $9911.19.
Bendix Aviation Corp., Bendix Products division, South Bend, Ind., carburetors and assemblies, $6436.10.
Bendix-Westinghouse Automotive Air Brake Co., Pittsburgh, parts for brake, $3996.78.
Bethlehem Steel Co., Bethlehem, Pa., steel, $1345.33.
Bliss, E. W., Co., Brooklyn, N. Y., presses, $25,115.
Bliss & Laughlin Inc., Buffalo, steel rod, $2104.25.
Bridgeport Rolling Mills Co., Bridgeport, Conn., ammunition, $31,080.
Brown Instrument Co., Philadelphia, tools, $5285.52.
Brown & Sharpe Mfg. Co., Philadelphia, hand screw machines, $3508.
Buda Co., Chicago, jacks, $1867.60.
Budd Wheel Co., Detroit, assemblies, $4018.
Buffalo Forge Co., Buffalo, presses, drills, $8731.
Building Products Co., Davenport, Iowa, trucks, $1250.
Carboloy Co., Philadelphia, tools, $2272.50.
Carnegie-Illinois Steel Corp., Gary, Ind., steel, $8996.49.
Chase Brass & Copper Co., New York, brass, $1561.70.
Chisholm-Moore Hoist Corp., Tonawanda, N. Y., hoists, $2107.50.
Christiansen, C. B., Co., Newark, N. J., punches, $3144.
Cincinnati Milling Machine & Cincinnati Grinders Inc., Cincinnati, eliminators, $1260.
Cleveland Automatic Machine Co., Cleveland, lathes, $4131.70.
Cleveland Tool Engineering Co., Cleveland, grinding machines, $1256.97.
Cleveland Twist Drill Co., Cleveland, reamers and drills, $3343.88.
Collins Co., Collinsville, Conn., mattocks, $1620.32.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., components for automatic pistols, $9031.
Consolidated Steel Warehouse Co., Philadelphia, iron strapping, $1742.
Continental Can Co., Jersey City, N. J., cans, $2437.50.
Continental Motors Corp., Muskegon,

Defense Appropriations, Expenditures for Fiscal Year



■ Total appropriations for national defense—$9,015,000,000—represent all enacted amounts to Jan. 31, 1941, available for current fiscal year, but exclude contract authorizations and estimated cost for the two-ocean navy (except for amounts directly appropriated). Additional appropriations will be necessary to pay for contracts already awarded. Expenditures since last July have totaled $2,304,000,000 and have increased steadily from $177,000,000 in July to $572,000,000 in january. Chart by National Industrial Conference Board

Mich., assemblies, $2736.
Coulter & McKenzie Machine Co., Bridgeport, Conn., pickling and washing units, $9900.
Crafts, Arthur A., Co. Inc., Boston, gages, $18,777.50.
Dana Tool-D Nast Machinery Co., Philadelphia, hack saw blades, $2093.
DeLisser Machine & Tool Corp., New York, gages, $2120.
Doehler Die Casting Co., Pottstown, Pa., artillery ammunition components, $7490.34.
Duro Metal Products Co., Chicago, wrenches, $23,826.15.
Eclipse Fuel Engineering Co., Rockford, Ill., furnaces, $5340.
Electric Auto-Lite Co., Port Huron, Mich., ignition cable, $4200.
Elliott-Lewis Electric Co., Philadelphia, wire, $2393.
Equipment Co., Detroit, cutters, $3897.40.
Exact Weight Scale Co., Columbus, O., scales, $6679.80.
Ex-Cell-O Corp., Continental Tool Works division, Detroit, mills, $2750.
Ferracute Machine Co., East Bridgeton, N. J., presses, $4285.
Firth-Sterling Steel Co., Philadelphia, steel, $5563.94.
Fox Munitions Corp., Philadelphia, gages, $1181.80.
General Drop Forge Co. Inc., Buffalo, drop forgings, $1189.
General Electric Co., Philadelphia, motors, $1525.04.
General Fireproofing Co., New York, desks, $1212.
Gleason Works, Rochester, N. Y., surface hardening machines, $6185.
Goefert & Buck, New York, hardware, $1953.82.
Graybar Electric Co., Philadelphia, wire, $1079.22.
Greene-Wolf Co. Inc., Brooklyn, N. Y., brass, $5305.27.
Grenby Mfg. Co., New Britain, Conn., grinders, $1928.80.
Griffin Mfg. Co., Erie, Pa., steel, $1185.
Haarmann Steel Co., Holyoke, Mass., structural steel, $8662.
Hamilton Watch Co., Lancaster, Pa., small arms materiel, $23,400.
Hannifin Mfg. Co., Chicago, chucks, $1148.
Hanson Van Winkle Munning Co., Matawan, N. J., generators, $3575.
Hanssen's, Louis, Sons, Davenport, Iowa, files, $1811.52.
Hendley Machine Co., Torrington, Conn., lathes, $7541.
Honeyman, H. W., & Son, Providence, R. I., artillery materiel, $4926.
Howes, S. M., Co., Boston, bronze castings, $33,264.12.
Illinois Tool Works, Chicago, broaches, $1800.
Independent Pneumatic Tool Co., Chicago, electric drills, $1317.
Ingersoll Milling Machine Co., Rockford, Ill., cutters, $2567.40.
Inland Steel Co., Indiana Harbor, Ind., steel, $5705.87.
International Business Machines Corp., New York, recorders, $3296.
International Engineering Works Inc., Framingham, Mass., racks, $1500.
International Harvester Co., Chicago, tractors, $2113.88.
Johnson Claflin Corp., Marlboro, Mass., gages, $4625.28.
Jolly, J. & W., Inc., Holyoke, Mass., halfnuts, $1530.
Jones & Lamson Machine Co., Springfield, Vt., automatic thread grinder machines, $17,086.60.
Karp Metal Products Co. Inc., Brooklyn, N. Y., chests, $4512.13.
Klobanhes Metal Stamping Corp., Brooklyn, N. Y., swivel assemblies, $10,000.
Krueger, H. R., & Co., Detroit, drilling machines, $15,478.
Larkin Packer Co., Davis Boring Tool division, St. Louis, boring bars, $1305.50.
Leeds & Northrup Co., Hartford, Conn., modernization of controllers; control equipment, $3080.50.
Lewis-Shepard Sales Corp., Moline, Ill., lumber trucks, $2400.
Lincoln Engineering Co., St. Louis, fittings, $1361.60.
Lindberg Engineering Co., Chicago, furnaces, $4855.
Logan Co., Louisville, Ky., conveyor sections, $1811.30.
Lyon .Metal Products Co., Aurora, Ill., shelving, $3496.75.
McDowell Mfg. Co., Pittsburgh, containers, $5215.77.
McGill Mfg. Co., Washington Factory Branch, Washington, bearings, $2331.
Magna Mfg. Co. Inc., Haskell, N. J., magnesium powder, $20,850.05.
Magnus Tool & Die Co., Newark, N. J., gages, $5075.
Maxson, W. L., Corp., New York, amplifiers, $1800.
Metal Goods Corp., St. Louis, brass, $7875.97.
Midvale Co., Philadelphia, steel forgings, $7033.
Miller Co., Meriden, Conn., brass strips, $8550.40.
Mohawk Machine & Tool Co., New York, gages, $5555.
Morgan Machine Co., Rochester, N. Y., nailing machines, $2970.88.
Murphy, A. F., Die & Machine Co., Boston, artillery materiel, $1555.09.
Nathan Trotter Co., Philadelphia, pig tin, $5135.
National Tube Co., McKeesport, Pa., gages, $2550.96.
New Britain Machine Co., New Britain

PURCHASES UNDER

Iron and Steel Products	Commodity	Amount
Allis-Chalmers Mfg. Co., Milwaukee	Shafts	$23,052.00
Aluminum Co. of America, Pittsburgh	Rivets, nuts	18,896.54
American Bridge Co., Denver	Gates	65,567.00
American Car & Foundry Co., New York	Plug cocks	25,299.00
American Chain & Cable Co. Inc., Bridgeport, Conn.	Cable, wire rope	44,202.00
American Locomotive Co., Schenectady, N. Y.	Forgings	78,050.00
American Stove Co., Cleveland	Ranges	74,937.50
Barnes Mfg. Co., Mansfield, O.	Pipe flanges	23,850.28
Beall Pipe & Tank Corp., Portland, Oreg.	Tanks	16,950.00
Bethlehem Steel Co., Los Angeles	Steel bars	23,103.71
Bethlehem Steel Export Corp., New York	Plate steel	24,417.73
Blickman, S., Inc., Weehawken, N. J.	Coffee urn batteries	133,939.00
Boston & Lockport Block Co., East Boston, Mass.	Steel blocks	10,908.00
Brach, L. S., Mfg. Corp., Newark, N. J.	Junction boxes	39,960.00
Carter Waters Corp., Kansas City, Mo.	Wire mesh	13,790.70
Chicago Bridge & Iron Co., Birmingham, Ala.	Tanks	17,000.00
Collins Co., Collinsville, Conn.	Machetes in sheaths	12,850.00
Commercial Shearing & Stamping Co., Youngstown, O.	Superstructure hoists	75,375.00
Consolidated Supply Co., Portland, Oreg.	Iron pipe	61,340.75
Crane Co., Chicago	Flanges	12,244.00
Crucible Steel Co. of America, New York	Steel sheets	16,390.01
Detroit-Michigan Stove Co., Detroit	Ranges	32,512.50
Dulien Steel Products Inc., Treasure Island, Calif.	Valves, tees	38,991.64
Duro Metal Products Co., Chicago	Wrenches	23,826.15
Edison General Electric Appliance Co. Inc., Chicago	Fryers	74,972.20
Electric Auto-Lite Co., Toledo, O.	Booster, fuse parts	1,917,006.60
Erie Forge Co., Erie, Pa.	Shafts	23,188.50
Eureka Vacuum Cleaner Co., Detroit	Eyerings	29,311.50
Fisher Boat Works Inc., Detroit	Hull, fittings	257,000.00
Glesener, A. J., Co., San Francisco	Nuts	41,539.00
Griswold Mfg. Co., Erie, Pa.	Deep fat fryers	79,680.00
Hager, C., & Sons Hinge Mfg. Co., St. Louis	Hinges	66,171.39
Harrisburg Steel Corp., Harrisburg, Pa.	Air system separators	21,300.00
Hazel-Atlas Glass Co., Wheeling, W. Va.	Grommet rings	136,473.45
Independent Lock Co., Fitchburg, Mass.	Fuse parts	965,000.00
International-Stacey Corp., Columbus, O.	Searchlight towers, steel buildings	182,372.00
Isaacson Iron Works, Seattle	Structural steel	20,135.00
Jessop Steel Co., Washington, Pa.	Bar steel	25,009.09
Karp Metal Products Co. Inc., Brooklyn, N. Y.	Boxes	79,814.00
Klein, Mathias, & Sons, Chicago	Pliers	15,000.00
Kraeuter & Co. Inc., Newark, N. J.	Pliers	25,780.75
Kuljian, H. A., & Co., Philadelphia	Boiler and accessories	145,723.00
Lukens Steel Co., Coatesville, Pa.	Steel plates	*27,714.73
Majestic Mfg. Co., St. Louis	Ranges	52,150.76
Mills-Morris Co., Washington	Saws, clamps, cutters	78,121.90
Mocoroa Arzuaga, M., Inc., San Juan, P. R.	Pipes, valves	12,994.74
Mundt, Charles, & Sons, Jersey City, N. J.	Brass	15,592.53
National Machine Products Co., Detroit	Nuts	51,391.25
National Stamping Co., Detroit	Angletubes	114,975.00
National Tube Co., Pittsburgh	Flasks, steel tubing	103,255.63
Norwalk Tank Co. Inc., South Norwalk, Conn.	Tanks	25,678.30
Pick Mfg. Co., West Bend, Wis.	Target frames	163,370.00
Pittsburgh Forgings Co., Coraopolis, Pa.	Forgings	19,793.75
Republic Steel Corp., Cleveland	Nickel steel, steel	268,241.70
Revere Copper & Brass Inc., Baltimore	Bullet jacket cups	789,770.00
Rice Bros. Corp., East Boothbay, Me.	Hull, fittings	272,800.00
Scovill Mfg. Co., Waterbury, Conn.	Cases, fuses, boosters	6,007,530.00
Scrimgeour, Wm., Washington	Dishwashing baskets	14,730.00
Standard Gas Equipment Corp., Baltimore	Ranges	51,429.32
Steel Improvement & Forge Co., Cleveland	Forgings	59,885.00
Storms Drop Forging Co., Springfield, Mass.	Forgings	28,802.60
Uchtorff Co., Davenport, Iowa	Chests	77,264.04
Ulmer, A. J., New York	Cases, snaps, stakes	42,576.90

Gridley Machine division, New Britain, Conn., chucking machines, $181,032.
Niles-Bement-Pond Co., Pratt & Whitney division, West Hartford, Conn., cutters, $5969.
Noble & Westbrook Mfg. Co., East Hartford, Conn., marking and knurling machines, $8267.40.
Norton Co., Worcester, Mass., grinders, $8033.14.
Oliver Iron & Steel Corp., Pittsburgh, bolts, $10,939.30.
Oliver Machinery Co., Grand Rapids, Mich., sander, saws and planers, $3478.55.
Pangborn Corp., Hagerstown, Md., blasting machines, $3424.80.
Parent Metal Products Inc., Philadelphia, work benches, drafting tables, $3470.80.
Phoenix Mfg. Co., Catasauqua, Pa., forgings, $1732.78.
Precise Tool & Mfg. Co., Farmington, Mich., gages, $2930.
Reasoner Tool Supply Co., Boston, power hacksaw blades, $5662.37.
Reliable Tool Co. Inc., Irvington, N. J., punches and dies, $2965.
Remington Arms Co., Peters Cartridge division, Bridgeport, Conn., small arms materiel, $253,468.53.
Republic Steel Corp., Cleveland, chromium steel, steel bars, nickel steel, $245,585.40.
Revere Copper & Brass Inc., New York, manganese, bronze and brass bars, brass, $133,039.68.
Rockwell, Stanley P., Co. Inc., Hartford, Conn., furnaces, $10,500.
Rogers Lunt & Bowlen Co., Greenfield, Mass., rings, $1941.57.
Root, B. M., Co., York, Pa., belt sanding machines, shapers, $3840.
Rumsey Electric Co., Philadelphia, lamps and steel conduit, $1071.68.
Ryerson, Joseph T., & Son Inc., Chicago, steel, $1944.72.
S. K. F. Industries Inc., Philadelphia, roller bearings, $8221.50.
Sall, George, Metals Co., Messina, N. Y., aluminum alloy rod, $3196.15.
Scovill Mfg. Co., Waterbury, Conn., small arms ammunition, $84,000.
Seamless Products Co. Inc., New York, oil cans, $1836.50.
Sellers, William, & Co., Philadelphia, grinding machines, $11,513.
Sheffield Gage Corp., Dayton, O., gages, $16,844.99.
Shipley, W. E., Machinery Co., Philadelphia, shapers and lathes, $121,419.25.
Sier-Bath Co. Inc., New York, gears, $32,826.
Somerville Machine & Foundry Co., Somerville, Mass., castings, $17,010.
Starrett, L. S., Co., Athol, Mass., calipers, $3642.98.
Sterling Products Co. Inc., Moline, Ill., bolts, $1079.10.
Stokes, F. J., Machine Co., Philadelphia, rotary presses, $11,550.
Strong Steel Foundry Co., Buffalo, castings, $4918.87.
Swind Machinery Co., Philadelphia, lathes, $33,240.
Taft-Peirce Mfg. Co., Woonsocket, R. I., gages, grinders, $15,755.34.
Thomson-Gibb Electric Welding Co., Philadelphia, machines, $6474.
Timken-Detroit Axle Co., Wisconsin Axle division, Oshkosh, Wis., cases, $1223.50.
Tools & Gages Inc., Cleveland, gages, $6185.
Troy Tool & Gage Co., Detroit, gages, $1920.
Tube Co., Lorain, O., pipe, $7089.72.
Tube Distributors Inc., Long Island City, N. Y., seamless steel, $3610.26.
Tubular Service Corp., Pittsburgh, seamless steel, $7974.30.
U. S. Tool Co. Inc., East Orange, N. J., millers, $3535.
Uchtorff Co., Davenport, Iowa, chests, $77,264.04.
Union Spring & Mfg. Co., New Kensington, Pa., springs, $6107.50
Union Twist Drill Co., Athol, Mass., hobs, end mills, drills, $4285.34.
Universal Drafting Machine Co., Cleveland, drafting machines, $1300.88.
Utilities Engineering Co., Philadelphia, electric installation, Frankford arsenal, Philadelphia, $6990.
Vandyck Churchill Co., New York, hacksaw machines, $1118.
Vinco Corp., Detroit, gages, $26,065.60.
Veit & Young, Philadelphia, tools, $21,896.
Walter Bros. Co. Inc., New York, fenders, $2419.20.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., printing machines, $81,138.
Weldon Tool Co., Cleveland, cutters, $1136.40.
West & Dodge Thread Gauge Co. Inc., Boston, gages, $1512.54.
Westinghouse Electric & Mfg. Co., Davenport, Iowa, controls, $6095.
White Motor Co., Cleveland, spare parts, kits, $301,794.
Wyckoff Drawn Steel Co., Ambridge, Pa., steel bars, $24,110.56.
Zimmerman Steel Co., Bettendorf, Iowa, steel castings, $3773.30.

WALSH-HEALEY ACT

	Commodity	Amount
Iron and Steel Products		
Union Steel Chest Corp., LeRoy, N. Y.	Tool boxes	$32,760.00
United States Steel Export Co., New York	Structural steel	*11,984.44
Utica Drop Forge & Tool Corp., Utica, N. Y.	Nippers, pliers	128,519.33
Veit & Young, Philadelphia	Stems, dies	16,707.00
Weaver Mfg. Co., Springfield, Ill.	Towing bars	29,625.00
Weinstein, S., Supply Co., New York	Hinges	11,118.53
Wells Mfg. Co., San Francisco	Fryers	18,615.00
White Motor Co., Cleveland	Cable kits	17,670.00
Williams, J. H., & Co., Buffalo	Forgings	17,850.71
Woodings-Verona Tool Works, Verona, Pa.	Crow bars	10,528.13
Nonferrous Metals and Alloys		
Aluminum Co. of America, Pittsburgh	Aluminum tanks	$19,682.40
American Smelting & Refining Co., New York	Copper, pig lead	78,972.50
Calumet & Hecla Consolidated Copper Co., New York	Ingot copper	54,225.00
Diecasters Inc., Ridgefield, N. J.	Die castings	11,894.64
Doehler Die Casting Co., Toledo, O.	Nozzles	41,595.00
International Nickel Co. Inc., New York	Nickel-copper alloy	30,666.25
Mueller Brass Co., Port Huron, Mich.	Brass forgings	95,268.05
Ohio Chemical & Mfg. Co., Cleveland	Mask assemblies	134,076.60
West Bend Aluminum Co., West Bend, Wis.	Pitchers	13,200.00
Machinery and Other Equipment		
Air Reduction Sales Co., New York	Oxy-acetylene machines	$18,458.16
Allis-Chalmers Mfg. Co., Milwaukee	Pumps	10,444.00
American Bosch Corp., Springfield, Mass.	Engine parts	167,113.75
American Chain & Cable Co. Inc., Bridgeport, Conn.	Hoists	151,500.00
American Machine & Metals Inc., East Moline, Ill.	Washing machines	26,887.00
Ames Baldwin Wyoming Co., Parkersburg, W. Va.	Shovels	36,170.88
Austin-Hastings Co. Inc., Cambridge, Mass.	Shapers	125,850.72
Bay City Shovels Inc., Bay City, Mich.	Cranes	25,900.00
Bird Machine Co., South Walpole, Mass.	Centrifugal classifier	11,174.00
Bliss Co., E. W., Brooklyn, N. Y.	Presses	16,435.00
Brown & Sharpe Mfg. Co., Providence, R. I.	Grinders	13,083.00
Buda Co., Harvey, Ill.	Engine parts	10,951.00
Bullard Co., Bridgeport, Conn.	Turret lathes	26,288.14
Busch Sulzer Bros. Diesel Engine Co., St. Louis	Cylinders	18,706.94
Case Crane & Kilbourne Jacobs Co., Columbus, O.	Hand trucks	10,155.40
Caterpillar Tractor Co., Peoria, Ill.	Graders	153,150.00
Cincinnati Milling Machine & Cincinnati Grinders Inc., Cincinnati	Milling machines	10,390.00
Cleveland Tractor Co., Cleveland	Tractors	22,364.00
Continental Motors Corp., Muskegon, Mich.	Chargers	70,960.00
Cooper-Bessemer Corp., Mt. Vernon, O.	Air compressors	88,682.00
DeVilbiss Co., Toledo, O.	Compressors, respirators	194,447.50
Dewey & Almy Chemical Co., Cambridge, Mass.	Lime manufacturing equipment	27,000.00
Dockson Corp., Detroit	Welding, cutting equipment	10,873.00
Eagle Crusher Co. Inc., Galion, O.	Rock crushers	12,638.15
Edwards, John, Inc., Brooklyn, N. Y.	Generator parts	19,876.00
Euclid Crane & Hoist Co., Euclid, O.	Cranes	20,635.00
Ex-Cell-O Corp., Detroit	Pumps	440,473.80
Fairbanks, Morse & Co., Chicago	Pumping units, engines, gear units	29,316.00
Frick Co. Inc., Waynesboro, Pa.	Refrigerating equipment	16,149.00
Fruehauf Trailer Co., Detroit	Trailers, dollies	556,950.00
Galion Iron Works & Mfg. Co., Galion, O.	Road rollers	161,800.00
Gardner-Denver Co., Quincy, Ill.	Compressors	193,512.00
General Motors Corp., Harrison Radiator division, Lockport, N. Y.	Oil coolers	12,381.25
Gisholt Machine Co., Madison, Wis.	Lathes	47,600.50
Globe Industries Inc., Dayton, O.	Turntable assemblies	45,105.50

(*Please turn to Page* 46)

Quartermaster Corps Awards

Aqua Systems Inc., New York, air corps gasoline fueling system, Salina, Calif., $30,393.
Automatic Gas Co. of Columbus Inc., Columbus, Ga., automatic gas systems, Ft. Benning, Georgia, $3391.08.
Buck, Thomas C., Stockton, Calif., con-

trol tower, Stockton airport, California, $5200.
Central California Construction Co., San Francisco, Air Corps gasoline fueling system, Salt Lake municipal airport, Utah, $139,990.
Chicago Bridge & Iron Co., Chicago, steel water tank, Ft. Jackson, South Chicago, Ill., $9900.
Coleman, Walter J., Jersey City, N. J., low tension underground line, Raritan arsenal, New Jersey, $2285.
Dunn, Louis C., Inc., San Francisco, two temporary buildings, Hamilton field, California, $29,572.
General Motors Corp., Chevrolet division, Detroit, trucks, $12,296.23.
Gramm Motor Truck Corp,, Delphos, O., semi-trailers, $7380.45.
Hertel, John W., Grand Rapids, Mich., bridge and water main, Ft. Custer, Michigan, $18,840.
Hindley, W. F., Co., Trenton, N. J., toilet facilities for infirmaries, Ft. Dix, New Jersey, $6500.
Jardine & Wardman Inc., Colorado Springs, Colo., air conditioning, Fitzsimons general hospital, Denver, $65,470.
Kutsche, A. W., Detroit, motor supply warehouse, Ft. Wayne, Mich., $629,700.
Martin, N. W., & Bros., Rosslyn, Va., roofing, sheet metal work, and iron work, army medical center, District of Columbia, $15,800.
Merando Co. Inc., Washington, addition to neuropsychiatric ward, Walter Reed hospital, Washington, $227,591.
Olson Construction Co. and Dobson & Robinson, Lincoln, Nebr., elevated water tank, shell loading plant, Ogden ordnance depot, Utah, $36,000.
Ryan Construction Co., Tampa, Fla., radio control tower, Orlando air base, Florida, $8200.
Savory Inc., Newark, N. J., kitchenware, $7120.
Scrivener, Charles R., Co. Inc., Baltimore, guard house, Curtis Bay ordnance depot, Maryland, $16,985.
Walters Construction Co. Inc., Woodside, N. Y., gasoline and oil central stations, Ft. Hancock, New Jersey, $4233.

Chemical Warfare Service Awards

Associated Spring Corp., Raymond Mfg. Co. division, Corry, Pa., wire clamps, $3745.
Chase Brass & Copper Co. Inc., Waterbury, Conn., brass, $2960.98.
Fischer, Charles, Spring Co., Brooklyn, N. Y., wire clamps, $4900.
General Electric Co., Pittsfield, Mass., diaphragm spacer, $2491.62.
Miller Co., Meriden, Conn., brass, $8122.70.
Myers, F. E., & Bros. Co., Ashland, O., machinery, $4801.20.
Proctor & Schwartz Inc., Philadelphia, screw machines, $24,060.
Revere Copper & Brass Inc., Baltimore, brass, $1121.74.
United-Carr Fastener Corp., Cambridge, Mass., dies and tools, $3697.14.

Medical Corps Awards

Acme Shear Co., Bridgeport, Conn., bandage scissors, $43,910.
Blickman, S., Inc., Weehawken, N. J., carriages, $68,222.32.
Bramhall-Deane Co., New York, laboratory autoclaves, $15,800.
Conray Products Co. Inc., New York, instrument sterilizers, $4980.
Dittmar, F., & Co. Inc., Philadelphia, tissue retractors and snare wire, $7218.75.
Harris Hub Bed & Spring Co., Cicero, Ill., bedside tables, $66,850.
Picker X-Ray Corp., New York, X-Ray field units, $187,785.
Ritter Dental Mfg. Co. Inc., Rochester, N. Y., operating unit, $220,572.
Sklar, J., Mfg. Co., New York, suction apparatus, $7687.50.
Ulmer, A. J., New York, boxes, $2255.
White, S. S., Dental Mfg. Co., New York, dental lathes, $1536.

Signal Corps Awards

American Automatic Electric Sales Co., Chicago, equipment, $2303.46.
Branch, L. S., Mfg. Corp., Newark, N. J., junction boxes, $5750.
Eastman Kodak Stores Inc., Rochester, N. Y., printers, $1298.34.
Electric Arc Cutting & Welding Co., Newark, N. J., generator sets, $2085.
General Electric Co., Newark, N. J., lamps, $840.
Graybar Electric Co., Point Breeze, Md., cable, cable reels, protectors, $27,388.84.
Kellogg Switchboard & Supply Co., Chicago, equipment, telephones, $38,031.72.
Leach Co., Oshkosh, Wis., reel units, $273,557.
Link, Fred M., New York, radio sets, $91,320.
Onan, D. W., & Sons, Minneapolis, power units, $21,565.60.
Stone, J. M., receiver for Operadio Mfg. Co., St. Charles, Ill., jack boxes, $635.70.

Corps of Engineers Awards

Addressograph-Multigraph Corp., Cleveland, duplicating machines and attachments, $7943.32.
American Instrument Co., Silver Spring, Md., signal lamps, $9034.80.
Aqua Systems Inc., New York, gasoline fueling system, Drew field, Tampa, Fla., $28,882.
Atlas Press Co., Kalamazoo, Mich., bench shapers, $2389.50.
Austin-Western Road Machinery Co., Aurora, Ill., road graders, loader for

WALSH-HEALEY PURCHASES

(*Concluded from Page* 45)

Machinery and Other Equipment	Commodity	Amount
Gosiger, C. H., Machine Co., Dayton, O.	Woodworking equipment	$24,150.00
Gould & Eberhardt, Newark, N. J.	Shapers, hobbing machine	78,815.00
Greenberg's, M., Sons, San Francisco	Valves, globes	16,284.00
Harnischfeger Corp., Milwaukee	Bridge cranes	317,780.00
Hart, Earle, Woodworking Machine Co., Chicago	Mortisers	24,640.00
Heald Machine Co., Worcester, Mass.	Grinders	74,126.80
Heller, S., Elevator Co., Milwaukee	Elevators	37,375.00
Hendey Machine Co., Torrington, Conn.	Lathes	11,848.00
Ingersoll-Rand Co., New York	Starting units	11,863.50
International Engineering Inc., Dayton, O.	Cooling units	74,880.00
Jones & Lamson Machine Co., Springfield, Vt.	Thread grinding machine	17,086.60
Kearney & Trecker Corp., Milwaukee	Milling machines	118,101.90
Lloyd & Arms Inc., Philadelphia	Drills, honing machines	71,556.43
Machinery & Specialties Inc., Dayton, O.	Woodworking equipment	22,800.00
Malabar Machine Co., Huntington Park, Calif.	Jacks	17,618.00
Modern-Bond Corp., Wilmington, Del.	Slides, blocks	12,330.00
Moore Machinery Co., San Francisco	Boring, drilling machine	15,636.00
National Supply Co., Pittsburgh	Engines	21,366.65
Niagara Machine & Tool Works, Buffalo, N. Y.	Shearing machines	17,748.00
Niles-Bement-Pond Co., West Hartford, Conn.	Drilling machines	49,160.32
Ohio Locomotive Crane Co., Bucyrus, O.	Crane	19,233.00
Onan, D. W., & Sons, Minneapolis	Gasoline generators	15,170.00
Orton Crane & Shovel Co., Chicago	Locomotive cranes	89,455.00
Osborne & Sexton Machine Co., Columbus, O.	Woodworking equipment	14,886.11
Pacific Marine Supply Co., Seattle	Pumps	24,148.05
Precise Tool & Mfg. Co., Farmington, Mich.	Pin gages	36,531.20
Pump Engineering Service Corp., Cleveland, O.	Gear drives	30,725.00
Purcell, Hugh G., Seattle	Cast iron pipe	15,187.52
Rex Body Corp., Canastota, N. Y.	Shackle assemblies	14,821.50
Rockford Machine Tool Co., Rockford, Ill.	Slotter machines, shapers	57,682.40
Rogers Bros. Corp., Albion, Pa.	Trailers	36,720.00
St. Joe Machines Inc., St. Joseph, Mich.	Presses, tumblers	20,740.00
Schlosser Mfg. Co., Philadelphia	Gages	51,086.00
Sellers, Wm., & Co., Philadelphia	Grinding machines	11,513.00
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.	Cranes	159,680.25
Shipley Machine Co., Philadelphia	Grinders	198,956.14
Sier-Bath Co. Inc., New York	Gears, shafts	32,826.00
Skinner Engine Co., Erie, Pa.	Steam engines	74,650.00
South Bend Lathe Works, South Bend, Ind.	Lathes	52,599.01
Stewart-Warner Corp., Chicago	Generator assemblies	18,400.00
Stockham Pipe Fittings Co., Birmingham, Ala.	Machining shell	571,200.00
Swind Machinery Co., Philadelphia	Drills	71,034.00
Tidewater Supply Co. Inc., Norfolk, Va.	Lathes	32,402.30
Tinius Olsen Testing Machine Co., Philadelphia	Testing machines	32,775.00
United States Hoffman Machine Corp., New York	Tumblers, extractors	11,877.00
Variety Aircraft Corp., Dayton, O.	Stand assemblies	198,000.00
Vulcan Iron Works, Wilkes-Barre, Pa.	Locomotive	205,000.00
Walker Mfg. Co. of Wisconsin, Racine, Wis.	Lifting jacks	30,327.00
Weinman Pump Mfg. Co., Columbus, O.	Pumps	93,255.15
Yale & Towne Mfg. Co., Philadelphia	Electric trucks	33,062.00
Yates-American Machine Co., Beloit, Wis.	Moulders	18,716.42
York Ice Machinery Corp., York, Pa.	Refrigerating units	134,960.00

*Estimated.

power grader, $22,495.20.
Bruning, Charles, Co. Inc., New York, drafting machines and surveying equipment, $6659.56.
Bucyrus-Erie Co., South Milwaukee, Wis., well drilling equipment, $10,098.
Buda Co., Harvey, Ill., modifying earth augers, $5616.60.
Carey Machinery & Supply Co., Baltimore, bench lathes, $9913.08.
Chicago Bridge & Iron Co., Chicago, water storage tank, Middletown air depot, Pennsylvania, $17,450.
Dietzgen, Eugene, Co., Washington, surveying equipment, $1399.
Emerson Electric Mfg. Co., St. Louis, ceiling fans, $1362.06.
G. & O. Mfg. Co., New Haven, Conn., cooling units, $4633.04.
Gates, Geo. W., & Co. Inc., Franklin Square, Long Island, N. Y., transformers, $5011.20.
General Electric Supply Co., Washington, lighting fixtures, $16,423.99.
Gurley, W. & L. E., Troy, N. Y., tripods, $13,064.86.
Link-Belt Co., Philadelphia, sewage disposal plant, Drew field, Tampa, Fla., $12,810.
Muskogee Iron Works, Muskogee, Okla., fabricated structural steel, $343,490.
Revolvator Co., North Bergen, N. J., electric elevators, $1190.
Teufel & Carlson, Seattle, temporary construction air base, McChord field, Washington, $453,428.
Wagner, Charles, Hoboken, N. J., off-set presses, $5000.
Wallace & Tiernan Co. Inc., Jacksonville, Fla., chlorinator, Drew field, Tampa, Fla., $2160.

♦

Navy department reported the following:

Bureau of Supplies and Accounts Awards

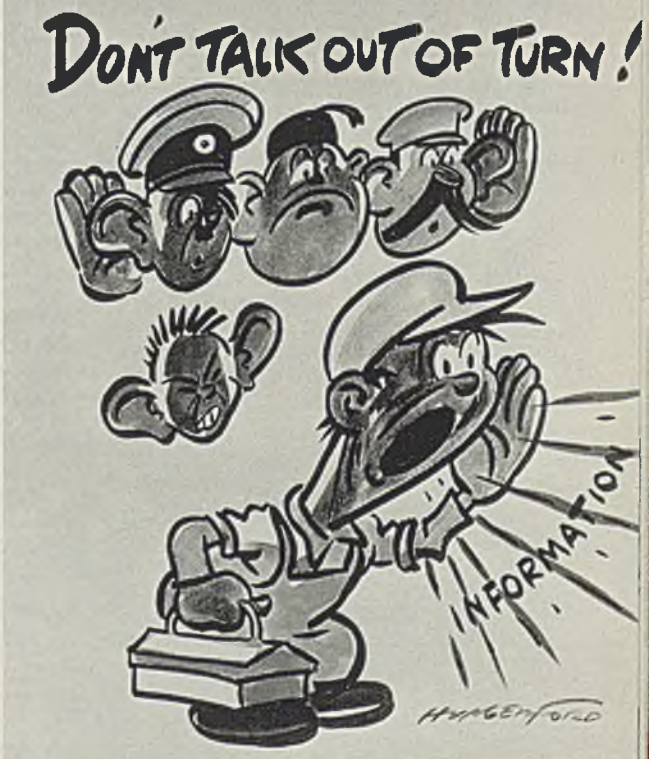
Air Reduction Sales Co., New York, tractor-truck, $14,860.
Ajax Electrothermic Corp., Trenton, N. J., crucibles, $1522.80.
Aluminum Cooking Utensils Co., New Kensington, Pa., aluminum pans, $130,560.
American Brass Co., Waterbury, Conn., brass, $1,050,000.
American Chain & Cable Co. Inc., American Chain division, York, Pa., chains and fittings, $5907.08; Page Steel & Wire division, Monessen, Pa., brass wire, $9561.65.
American Smelting & Refining Co., Cambridge, Mass., weights, $1440.
American Steel & Wire Co., Cleveland, electric cable, round magnet wire, $133,281.27.
Anaconda Wire & Cable Co., New York, marine and electric cable, $148,293.02.
Apollo Steel Co., Apollo, Pa., sheet steel, $11,051.48.
Atlas Tack Corp., Fairhaven, Mass., rivets, $7292.41.
Auto Ordnance Corp., Bridgeport, Conn., small arms materiel, $2,576,123.27.
Babcock & Wilcox Tube Co., Beaver Falls, Pa., steel tubing, $19,460.86.
Baldt Anchor, Chain & Forge Corp., Chester, Pa., chains and fittings, $71,740.
Barrow, H., Co. Inc., New York, canisters, $6030.
Belknap Hardware & Mfg. Co., Louisville, Ky., hardware, $1476.41.
Bendix Radio Corp., Baltimore, aircraft radio, $74,476.55.
Bohn Aluminum & Brass Corp., Detroit, artillery ammunition components, $566,950.
Boston Insulated Wire & Cable Co., Boston, electric cable, $25,990.
Breeze Corp. Inc., Newark, N. J., aircraft starters, $540,260.
Buffalo Bolt Co., North Tonawanda, N. Y., machine bolts and nuts, $5530.42.
Buffalo Scale Co. Inc., Buffalo, weighing scales, $19,250.
Chase Brass & Copper Co. Inc., New York, copper wire cloth, brass wire, $16,659.43.
Cincinnati Shaper Co., Cincinnati, universal shapers, $8774.
Coatesville Plate Washer Co., Philadelphia, iron or steel washers, $17,189.31.
Collyer Insulated Wire Co., Pawtucket, R. I., electric cable, $283,664.60.
Commercial Engineering Co., Washington, centrifugal purifiers. $26,721.75.
Crescent Insulated Wire & Cable Co., Trenton, N. J., electric cable, $10,710.
Crucible Steel Co. of America, Pittsburgh, steel, $1304.05.
Electric Industrial Equipment & Supply Corp., Baltimore, lighting and power wire and cable, $56,805.47.
Fargo Motor Corp., Detroit, motor trucks, $7330.26.
Gary Screw & Bolt Co., Chicago, rivets, $2310.32.
General Cable Corp., New York, submarine cable, electric cable, motor-generator sets, rheostats and spare units, $408,111.95.
Gold Seal Electric Supply Co., Philadelphia, lighting and power wire, $10,823.60.
Gould & Eberhardt, Newark, N. J., gear hobbing machines, shapers, $47,392.
Graybar Electric Co. Inc., New York, telephone wire, $8342.92.
Hadley Special Tool Co. Inc., Boston, tools, $15,767.05.
Hanson-Van Winkle-Munning Co., Matawan, N. J., motor generator sets, $90,850.
Hanssen's, Louis, Sons, Davenport, Iowa, hardware, $1859.18.
Hercules Food Service Equipment Inc., New York, boilers and sieves, $5106.
Hobart Mfg. Co., Troy, O., kitchen and cake machines, $14,633.36.
Hudson Wire Co., Winsted division, Winsted, Conn., round magnet wire, $25,017.75.
Illinois Coil Spring Co., Chicago, springs, $1774.50.
Ingersoll-Rand Co., New York, air compressors, $17,700.
Jones & Laughlin Steel Corp., Pittsburgh, steel, $5457.81.
Jones-Motrola Sales Co., Stamford, Conn., portable tachometers, $11,000.
Katzinger, Edward, Co., Chicago, steel bread pans, $9334.85.
Kearney & Trecker Corp., Milwaukee, milling machines, $40,496.40.
Kennecott Wire & Cable Co., Phillipsdale, R. I., soft copper wire, $8475.51.
Kennedy-Van Saun Mfg. & Engineering Corp., Danville, Pa., artillery ammunition, $819,072.
Kreamer, A., Inc., Brooklyn, N. Y., boxes, graters, $9666.
LaSalle Steel Co., Hammond, Ind., steel, $4432.08.
Laughlin, Thomas, Co., Portland, Me., shackles, $9639.
Lidgerwood Mfg. Co., Elizabeth, N. J., crane machinery, $180,000.
Lloyd & Arms Inc., Philadelphia, radial drills, $17,255.
McKay Co., Pittsburgh, chains and fittings, $279,859.30.
March, Jas. P., Corp., Chicago, pressure gages, $78,454.44.
Marietta Hollow Ware & Enameling Co., Marietta, Pa., kettles, $6600.
Marlboro Wire Goods Co., Marlboro, Mass., wire baskets, broilers, $6712.50
Midway Electric Supply Co. Inc., New York, light and power cable, $21,591.08.
Minneapolis-Moline Power Implement Co., Minneapolis, tractors, $20,315.14.
Nathan Mfg. Co., New York, water gages, $5075.
National Electric Products Corp., Pittsburgh, electric cable, $296,372.70.
Neu-Bart Stamping & Mfg. Co., Los Angeles, steel ladles, $33,330.
New Haven Copper Co., Seymour, Conn., sheet copper, $8659.96.
New York Thread Grinding Corp., New York, gages, $1010.
Niles-Bement-Pond Co., Pratt & Whit-

(*Please turn to Page* 140)

♦

Warns Workers Against Spies

■ First of a series of 12 posters warning industrial workers not to confide information on national defense material manufacture to strangers has made its appearance in Pittsburgh district plants. Posters are drawn by Cy Hungerford, Pittsburgh Post-Gazette cartoonist, and are believed to be the first series of its kind to be distributed in America during the present emergency. Similar posters have been distributed widely in Great Britain. Carnegie-Illinois Steel Corp. and Westinghouse Electric & Mfg. Co. were among the first to display them



An innocent remark made to the wrong person at the wrong time, may spell disaster. Be suspicious of the pleasant stranger who trys to "pump" you. Just imitate a Clam, and pass your suspicions along to the proper Authorities. *Keep Safe! Keep Mum!*

You are a PRODUCTION SOLDIER...

FRANCE "Undergoin

Free Exchange and Liberty

■ One of the most pitiable stories of modern times is that of France during the present war. Believed by her citizens, her industrialists and her allies to be strong, well prepared and organized, the trials of war and invasion revealed her to be a country woefully disorganized and ill prepared. That the mistakes of France may be avoided, STEEL presents M. Jaudoin's account of what the French learned "too late".

The author says: "We are undergoing a great revolution. The time of free exchange and liberty of management is over. We are going beyond the planned economy; we are getting nearer to a totalitarian organization." Nevertheless, the nation, working under tremendous difficulties, is attempting to organize its trade and its industry and is trying to solve its problems as best it can.

M. Jaudoin's article was written and dispatched in time for STEEL'S Yearbook of Industry, published Jan. 6. Like other letters from Europe, it was intercepted, and after long delay in a censor's office reached the United States late in February.

PARIS

■ SO CATACLYSMIC were events in France during the past year that it is possible to give only a brief outline of how they affect the iron, steel and metalworking industries.

No output figures are available, this information still being considered confidential.

Moreover, the new laws that are to rule the French industries are too recent and their applications have been too partial to appraise their effects.

Two quite different periods marked the year 1940—before and after the French-German armistice.

During the war period, until June 25, the French steel and metalworking industries strove for maximum production and efficiency. The industry worked at a high rate, despite difficulties pertaining to its coal supply.

Yearly consumption of coal in France was about 80,000,000 tons. The output of the French mines (mines near the German border were closed at the beginning of the war) was 51,000,000 tons. To cover the difference between output and consumption, 6,000,000 tons were supplied by Belgium and Holland. The remainder was to be shipped from Great Britain, but from September, 1939, to March, 1940, this country delivered only half the tonnage expected. Consequently, France was obliged to burn the largest part of its emergency reserves, accumulated before the war.

The situation was difficult for iron and steel plants as their coke supply was not always sufficient. Some tonnage of coke was delivered by Belgium in exchange for iron ore. Fortunately this exchange was always possible as the extraction of ore in the Briey district did not decrease.

Scrap was not lacking. All over the country the collection of scrap was organized and results were satisfactory. Old stoves, pieces of steel, horseshoes, tin plate boxes, and similar items were heaped in the railway stations.

For many other things, however, it was necessary to improvise in the matter of steel production. Most Frenchmen thought the industrial mobilization was perfectly set up, but it was not so. Rationing of the different manufactures would have been easy to solve in peace time by the *Comptoir Siderurgique*, but during the war too many problems required attention. Consequently many works made the same articles where a better result would have been obtained through better organization.

But it was in the establishment of priorities for delivery of the orders that complaints arose. As a principle, the minister of armament through his departments fixed these priorities, but it soon appeared his choice was not what it should have been, and heavy tonnages piled up in the yards of plants not yet completed, while others that were able to work lacked these same materials. The result was delay from which national defense suffered heavily.

In this case as in military matters unpreparedness was manifest. Doubtless if the war had lasted long the numerous branches of the administration would have taken their right places and as during the other great war production would have reached the necessary rate. But the *blitzkrieg*, which many did not believe possible, did not give the government time to realize the truth of the situation.

Necessity for decentralization of plant was foreseen and a certain number of industries in the northern part of France and in the Paris

Great Revolution . . . . .

Management Is Over"

By LEON JAUDOIN
French Correspondent, STEEL

■ Shaded area shows unoccupied France, ruled by the Petain government. The remainder of France, including all the channel coast facing England, is ruled by Germany

district moved to south of the Loire.

Nevertheless, after May 20, the abandonment of a large part of the eastern and northern territories took from France many works and reduced its potential output by 30 per cent. All shops in the Ardennes that specialized in the manufacture of miscellaneous forged and cast iron articles disappeared and were not replaced. Belgium, for a long time an important supplier of finished steel products, ceased its deliveries.

More serious was the invasion of the coal district in the departments of the north and Pas-de-Calais.

The economic situation was already alarming; France was required to buy abroad most products indispensable for war manufactures. An effort was made to reorganize what remained of the French industry, but the dreadful rush of the German army left only one course open.

The armistice on June 25 created a new state of affairs in dividing the country into different zones:

1. First, Lorraine and Alsace returned to the Reich, and the numerous metallurgical industries of these regions were cut off from the French production. Their capacity is estimated at 2,000,000 tons of steel and that increased the German facilities by the same amount. The coal mines of Sarre and Moselle, and iron mines of the Briey district are no longer French.

2. The rest of the country was divided into three parts: (a) The unoccupied zone; (b) the zone occupied by German troops; (c) the occupied and reserved zone. The latter is considered war territory, consequently special authorization is necessary either to live in or go into this district.

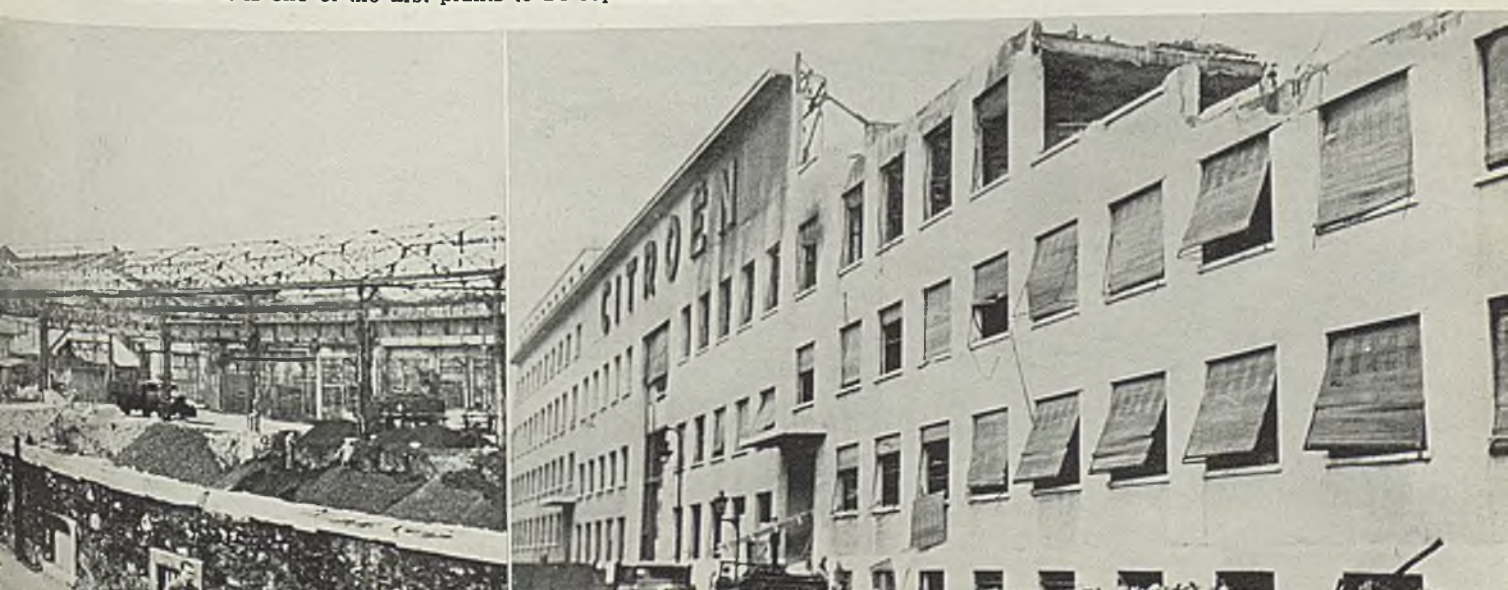
About 25,000 tons of steel per month is made in the unoccupied zone. Consumption is about 60,000 tons. Therefore, to counterbalance this deficiency every plant in this zone, which usually manufactured alloy and tool steels, turned to producing largest possible tonnage of ordinary steel. Some plants which were closed have re-started.

The occupied zone which includes Paris and its suburbs is supplied with iron and steel by plants in the Longwy and Ardennes districts, those in the Nancy region, the Societe Normande de Metallurgie, the works of Trignac and Le Creusot and Le Boucaut. Only three blast furnaces are active in the Longwy district. The Societe Normande de Metallurgie which used imported coal is now unable to obtain it. The others are producing very little, and they sell in their own neighborhoods. This means that in this zone steel production is more deficient than in the unoccupied zone, and that very soon steel will not be available.

Some plants in the northern district of the occupied but reserved zone are working. This is true of Acieries du Nord et de l'Est, Denain-Anzin and Escaut et Meuse. But output is only a part of what it was before the war, and is taken by local works. This zone is in the best position as regards to supplies.

In general, iron and steel production is very low. This is not because plants have been destroyed; damage is not very serious and most of it

■ Damaged in German air raids last June the Citroen automobile plant, Paris, is being rebuilt by French authorities in collaboration with German military authorities. It is one of the first plants to be repaired in the French rehabilitation



has been repaired. Coke is scarce due to transportation difficulties; French railways are used by German troops, and more than 100,000 trucks have been given to Germany under armistice terms. Mines in the North and Pas-de-Calais departments which have not suffered heavy damage are extracting coal which is stored at the rate of 500,000 tons per month. An improvement may occur when the canals are again in good condition and it becomes possible to ship by barge.

Each zone has its production and sales organization.

The Lorraine works and those of the Nancy district are managed by the Herman Roechling concern. The Longwy and Ardennes works are under the control of C.O.L.A. (Commercial Office of the Longwy and Ardennes district), which stems from the Comptoir Siderurgique in Paris. The works of the northern district of the reserved zone are tied to Sidenor at Lille which receives directions from the Belgo-German organization in Brussels. The Center-West group includes the whole occupied zone and is managed by the *Comptoir-Siderurgique.*

But above all these divisions, new laws deeply transform old habits by ruling and controlling production, distribution, labor conditions and business management.

We are undergoing a great revolution. The time of free exchange and liberty of management is over. We are going beyond the planned economy; we are getting nearer to a totalitarian organization.

A transformation of the French economy was doubtless indispensable. Since September, 1939, business was mastered by the priority given to war production. The end of the fight brought the end of the armament manufactures. The adaptation of works to new conditions created by the armistice is particularly unsatisfactory, due to the separation between unoccupied zone and the occupied zone, and also to the fact France is not able to import or export any material.

The state alone has means of action and authority, and that is limited. An industrial organization bill is under consideration. It foresees that economic activity will be assumed by co-operation of state representatives and qualified delegates of employers and employes. However, as the wording and passage of such a bill will take time, it has been decided to establish a temporary organization.

Committees Appointed

In each branch of industrial or commercial activity, where the situation requires, a committee on organization will be appointed. On authority of the production and labor ministry this committee will be in charge of:

1. Setting up the list of firms and of their means of production, their supplies and workmanship.
2. Fixing a program of manufacture and production.
3. Organizing the purchase and the distribution of raw material and products which are needful to the fabrication of the considered branch of activity.
4. Establishing rules to be assigned to the firms. The rules will be related to the general conditions of their activity, their care for quality, the use of workmanship, the routine for the exchange of products and services, and the establishment for fair competition.
5. Proposing to "the right public authorities" for agreement prices for products and services.

Members of the committee on organization are appointed by the minister. He himself is represented by a government commissioner. Decisions by the committee are to be applied, unless the commissioner does not accept them.

At the committee's proposal the minister may requisition raw material, machinery and even the firms themselves. In such case the firm or firms would be managed by a director appointed by the government.

Any infringement of these rules is to be punished by fines, and the manager is no longer allowed to manage any firm.

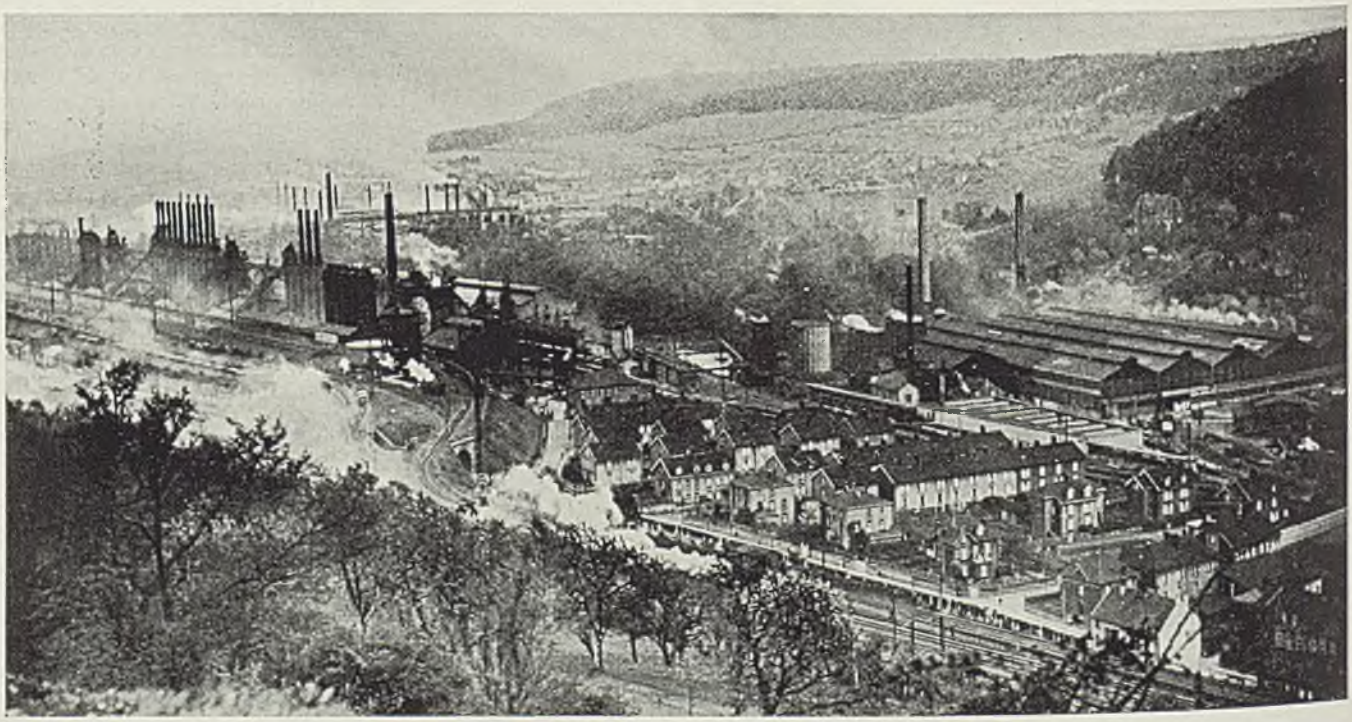
The office of distribution of industrial products and its departments give the state the power to supervise the committee on organization—besides the control assured to the government, through the commissioner.

The office has to know the quantity of raw material available and the needs of industry. Its duty is to distribute the various products impartially.

The main office has departments under its command. Already established are departments for steel products; for liquid fuels and for coal.

The distributor who manages the department is assisted by a consulting committee, appointed by the government.

Questions of financing have been



De Wendel iron and steel works, below, is one of the many French plants now controlled by the Germans. NEA photo

settled by "letters of agreement."

From now on, if a manufacturer wants to undertake the manufacture of a new product he must advise the minister of production of his desire and ask for an "agreement."

This letter of agreement points out the kind, quality, quantity, delivery, and the sale price of the goods that the manufacturer is permitted to make. The minister can request a manufacturer to undertake a definite line of fabrication.

With the letter, the manufacturer can receive the necessary funds to undertake his task. If his goods are not sold, he can get money by warranting his products as they go on stock.

Staggered by the war, French economy is running at a low rate. Unemployment is increasing. In the Paris district alone 800,000 men are on the dole list. Everything is done to reduce it, but raw materials are lacking, and a great number of technical men—now prisoners of war in Germany—are necessary.

The division of the country into zones makes difficult the distribution of resources according to local needs. Many firms are short of cash as the settlement of war contracts is far from complete. They do not receive payments from their customers in the unoccupied zone. The government tries to solve these problems the best it can.

The penance of defeat already is beneficial and its effects are easy to observe. France did not suffer heavy casualties during the war; its potential is safe. It is understanding itself, organizing its trade, its agriculture, its industry. It wants to work and no doubt will become active and prosperous again.

Lists Priority Actions

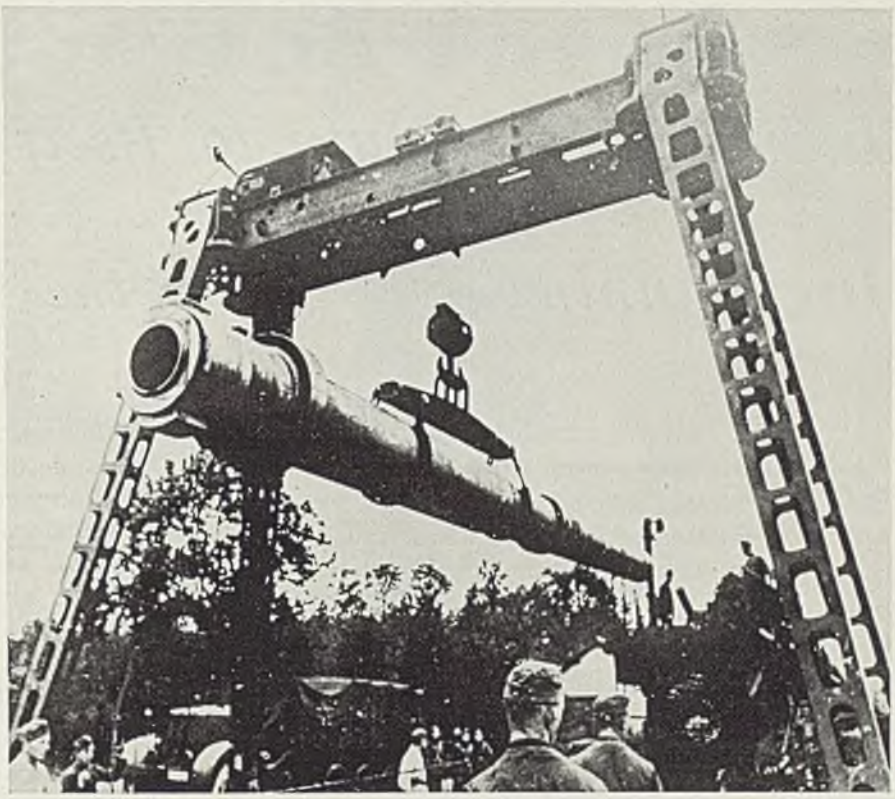
(*Concluded from Page* 33)

age, will mean some diminution in the supply available for ordinary civilian purposes. Additional action has been initiated to see that all necessary scrap flows promptly to defense channels.

B. *Magnesium.* This metal, like aluminum an important defense commodity, has been given complete preferential status for defense needs. In mid-February producers were instructed to fill only defense orders for the following ninety days.

C. *Neoprene.* The priorities division has supervised the allocation of this synthetic rubber, highly useful in defense production, to see that it is properly distributed to defense purposes.

D. *Commercial Aircraft.* While it is obvious that the military aircraft program is of paramount importance, it is the policy of the priorities division to see that the reasonable needs of the civil aviation industry are met and to aid the air lines in maintaining their high safety standards and their standards of maintenance.



■ **Germans move a heavy gun into position on the channel coast. Similar guns have been emplaced at many points on the coast, in preparation for an attempt to invade England. NEA photo**

III. Co-operation

A. *Zinc.* The tight situation in the production and the industrial utilization of zinc has led to general but informal action by the division. Zinc producers, after conferences with officials of the division, have taken effective steps to facilitate flow of zinc into military brass, and non-defense consumers have been urged to co-operate voluntarily and to effect substitutions and economies. So far, no formal priority action has been taken, though the question is still under consideration.

B. *Potassium Perchlorate.* This chemical enters into both military and civilian channels. Producers have agreed to supply all military needs first, to take care of manufacturers making safety flares, and to make necessary cuts in the quantities flowing to non-defense purposes.

C. *Structural Steel Shapes.* Efforts to expedite the flow of structural steel shapes into defense construction were inaugurated when consumers began to experience difficulties in obtaining these necessary construction supplies on short delivery. As a result of a conference between representatives of the division and the steel companies, producers have undertaken to fill defense orders as promptly as possible.

D. *Stainless Steel.* This product, into which nickel enters as an important part, is widely used for both defense and civilian purposes. Slow deliveries have developed, and the priorities division is taking preliminary steps to try to ease this situation. No formal priority action has been taken. The leading producers of stainless and other nickel steels, at the request of the division, have agreed to give first call to defense needs and to give technical advice to their clients which may help to reduce the amount of nickel required under present specifications.

Other metals, probably due for some degree of priority action, but not yet formally acted upon, are nickel itself and tungsten.

Mr. Stettinius said that the list represents merely the present approach being followed in the specific cases mentioned. The action in any case can be quickly modified, relaxed or strengthened, and it is apparent that a number of changes may have to be made.

He added that while every priority action taken is almost certain to cause difficulty for someone, at least temporarily all efforts are being made, with the aid of labor advisers and other consultants, to avoid unnecessarily throwing men out of work or injuring established industrial activities.

Industry Has Duty to Itself

In Planning for "After-the-War"

■ . . . . "We must have more ships, more guns, more planes—more of everything.

"It can only be accomplished if we discard the notion of 'business as usual'. . . . Our defense efforts must not be blocked by those who fear the future consequences of surplus plant capacity. . . .

"After the present needs of our defense are past, a proper handling of the country's peacetime needs will require all of the new productive capacity—if not more."

♦ ♦ ♦

The foregoing excerpt from President Roosevelt's fireside chat of Dec. 29, 1940, was significant for two reasons:

First, it served notice to numerous new deal theorists and to some others that they no longer could lean on the convenient prop of "business as usual" to justify the continuance of fantastic experiments.

Secondly, it gave encouragement to a school of new deal economists who had been promoting the idea that the defense period will be followed by a peacetime boom of unprecedented proportions.

Industry generally applauded the President on his quashing of the "business as usual" foolishness but was skeptical of his prediction that peacetime needs will require all of the new capacity, or more.

♦ ♦ ♦

The events of two months have confirmed industry's appraisal. Increasing restrictions on the use of critical materials have quelled the last lingering hopes of the proponents of "business as usual." Cold common sense has dulled the glamour of the postwar boom—so much so that the President has named a "planning board" to study and anticipate post defense economic problems.

These problems will be largely problems of adjustment. Everybody knows that the task of shifting from an emergency economy to a normal peacetime economy is fraught with tremendous difficulties. Even under the most favorable circumstances, it will tax the resources of the government's planning board and of all of the effort which which industry can put forth, either by individual company or by collective action.

Therefore it behooves the management of industrial corporations to be planning for the day when peace comes to this troubled world.

Even though the company has nothing to sell at this time and its salesmen are not selling, some portion of the organization should be studying means of keeping alive contacts with regular customers, strengthening sales departments, continuing market research, developing improved products for the post defense era, advertising and otherwise promoting the company's regular line to the prospective customers in a normal period, etc.

♦ ♦ ♦

All of these things can be pushed vigorously without interfering with the individual company's contribution to the defense effort. The better one prepares for the postwar situation, the greater will be his contribution to national security.

It is one thing to prepare for war and to win the contest; it is another thing to survive the ordeal.

The survival is as important as the victory—if not more so.

E. L. Shaner

EDITOR-IN-CHIEF

The BUSINESS TREND

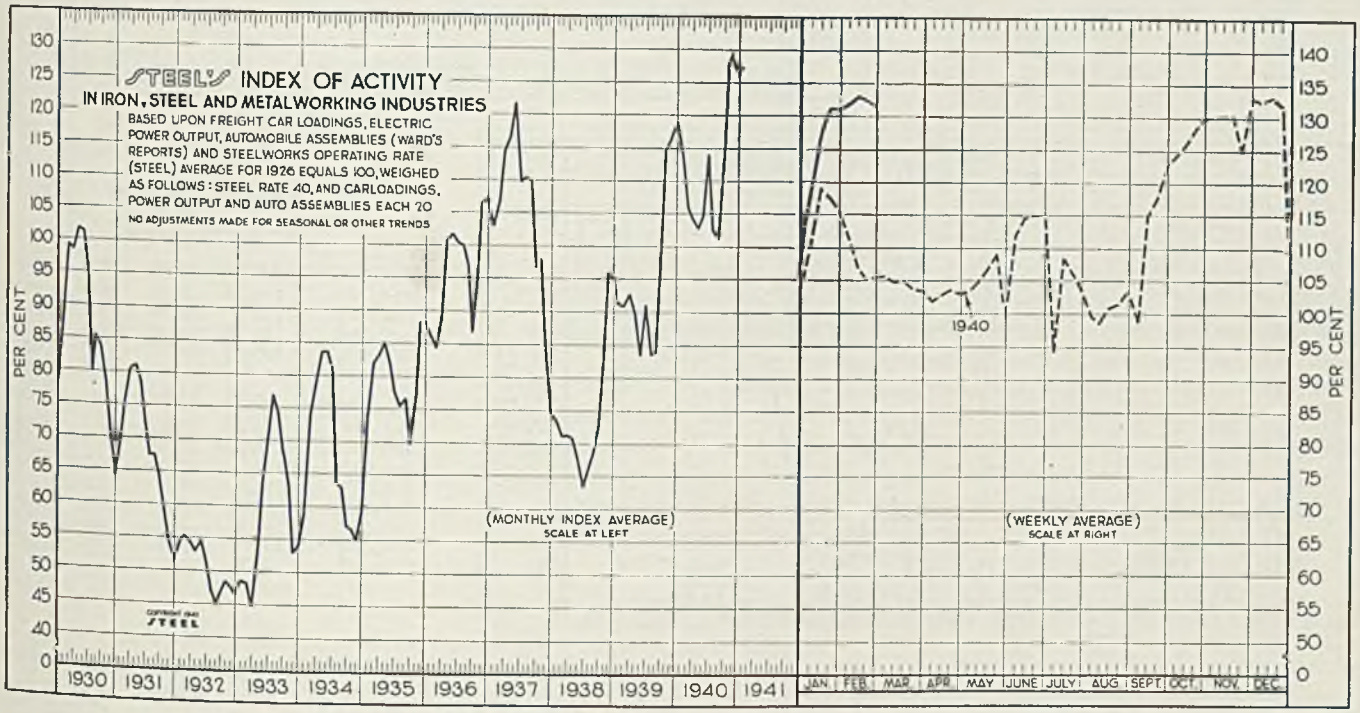
Business Activity Well Sustained by New Demand

■ Production in the capital goods industries is well sustained at practical capacity. Only minor fluctuations in activity have occurred among most industrial groups the past few weeks.

Orders continue to pour in at a record volume. Congestion of business in the defense industries is reflected in a tightening of preference controls. Placing of aluminum and machine tools under mandatory priority status by the priority division of OPM, is the first step in this direction. Zinc and tungsten priorities may follow. Producers are checking new orders carefully against consumers' past requirements.

A decline of 1.1 point to 131.2 was recorded by STEEL'S index of activity during the week ended Feb. 22. In the same period last year the index stood at 105.4 while in the corresponding weeks of 1939 and 1938 it was 89.3 and 70.3 respectively.

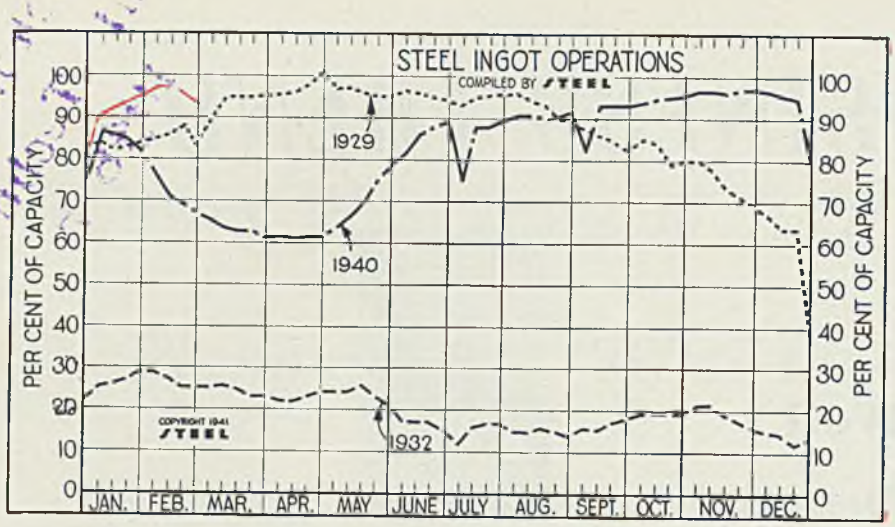
Automobile production in the week ended Feb. 22 moved to a new high level for the current model year. Assemblies in that week totaled 129,240 units, compared with 127,510 the previous period and 102,670 in the like 1940 week. Electric power output also advanced during the latest week, while revenue freight carloadings and steelmaking operations declined.



STEEL'S index of activity declined 1.1 point to 131.2 in the week ended Feb. 22

Week Ended	1940	1939
Dec. 14	132.6	124.2
Dec. 21	132.4	123.4
Dec. 28	107.5	104.0
Week Ended	**1941**	**1940**
Jan. 4	114.5	110.3
Jan. 11	128.2	119.2
Jan. 18	130.8	117.3
Jan. 25	130.7	115.4
Feb. 1	132.0	111.6
Feb. 8	132.7	107.2
Feb. 15	132.3	105.1
Feb. 22	131.2	105.4

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



Steel Ingot Operations

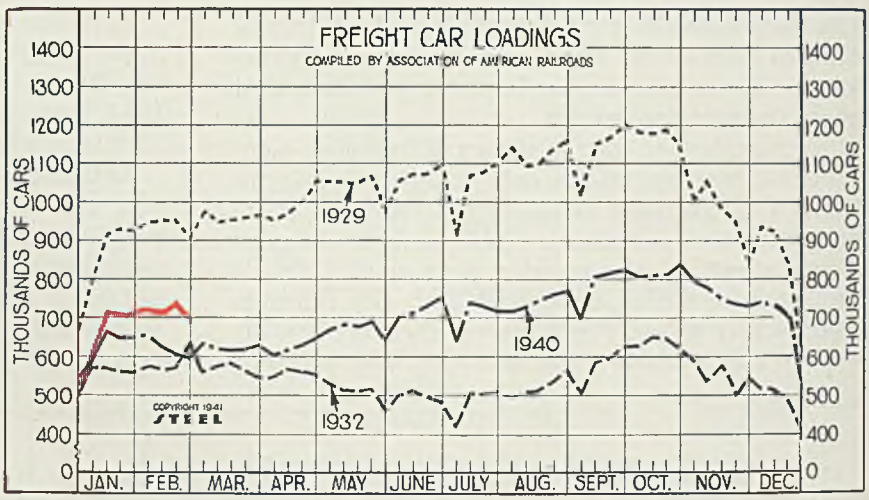
(Per Cent)

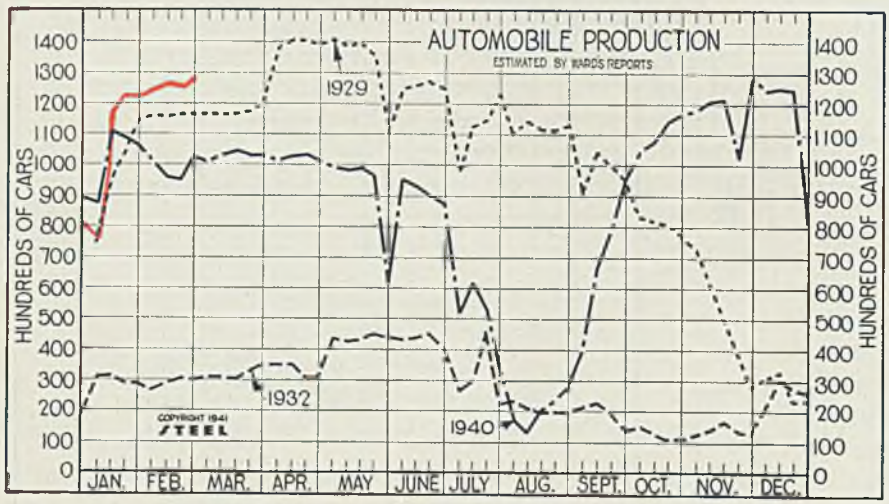
Week ended	1940	1939	1938	1937
Nov. 9....	96.5	93.0	61.5	39.0
Nov. 16....	96.0	93.5	63.0	35.0
Nov. 23....	97.0	93.5	62.0	31.5
Nov. 30....	97.0	94.0	61.0	30.5
Dec. 7....	96.5	94.0	61.0	27.0
Dec. 14....	95.5	92.5	58.0	27.0
Dec. 21....	95.0	90.5	52.0	23.0
Dec. 28....	80.0	75.5	40.0	21.0
Week ended	**1941**	**1940**	**1939**	**1938**
Jan. 4....	92.5	86.5	51.5	26.0
Jan. 11....	93.0	86.0	52.0	29.0
Jan. 18....	94.5	84.5	51.5	30.5
Jan. 25....	95.5	81.5	51.5	33.0
Feb. 1....	97.0	76.5	53.0	31.0
Feb. 8....	97.0	71.0	54.0	30.0
Feb. 15....	96.5	69.0	55.0	31.0
Feb. 22....	94.5	67.0	55.0	30.5

Freight Car Loadings

(1000 Cars)

Week ended	1940	1939	1938	1937
Nov. 16.....	745	771	657	647
Nov. 23.....	733	677	562	559
Nov. 30.....	729	689	649	623
Dec. 7.....	739	687	619	622
Dec. 14.....	736	681	606	603
Dec. 21.....	700	653	574	460
Dec. 28.....	545	550	500	457
Week ended	**1941**	**1940**	**1939**	**1938**
Jan. 4.....	614	592	531	552
Jan. 11.....	712	668	587	581
Jan. 18.....	703	646	590	570
Jan. 25.....	711	649	594	553
Feb. 1.....	714	657	577	565
Feb. 8.....	710	627	580	543
Feb. 15.....	721	608	580	536
Feb. 22.....	678	595	561	512





Auto Production

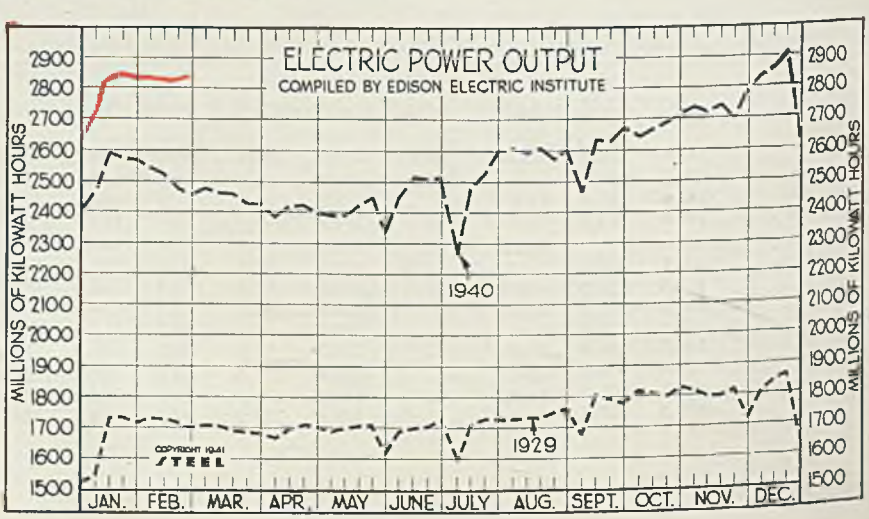
(1000 Units)

Week ended	1940	1939	1938	1937
Nov. 30....	128.8	93.6	97.8	86.2
Dec. 7....	124.8	115.5	100.7	85.8
Dec. 14....	125.6	118.4	102.9	82.0
Dec. 21....	125.3	117.7	92.9	67.2
Dec. 28....	81.3	89.4	75.2	49.6
Week ended	**1941**	**1940**	**1939**	**1938**
Jan. 4....	76.7	87.5	76.7	54.1
Jan. 11....	115.9	111.3	86.9	65.7
Jan. 18....	124.0	108.5	90.2	65.4
Jan. 25....	121.9	106.4	89.2	59.4
Feb. 1....	124.4	101.2	79.4	51.4
Feb. 8....	127.7	96.0	84.5	57.8
Feb. 15....	127.5	95.1	79.9	59.1
Feb. 22....	129.2	102.7	75.7	57.0

Electric Power Output

(Million KWH)

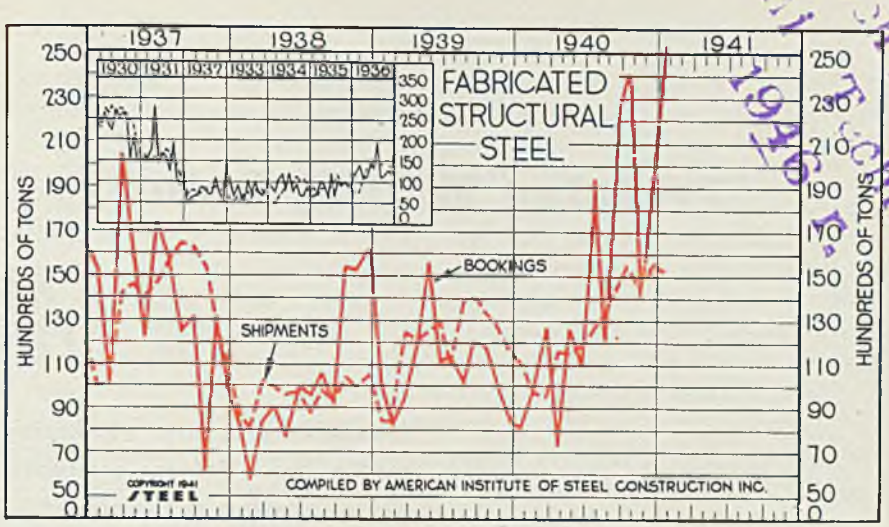
Week ended	1940	1939	1938	1937
Nov. 16...	2,752	2,514	2,270	2,224
Nov. 23...	2,695	2,482	2,184	2,065
Nov. 30...	2,796	2,539	2,285	2,153
Dec. 7...	2,838	2,586	2,319	2,196
Dec. 14...	2,862	2,605	2,333	2,202
Dec. 21...	2,911	2,641	2,363	2,085
Dec. 28...	2,623	2,404	2,121	1,998
Week ended	**1941**	**1940**	**1939**	**1938**
Jan. 4...	2,705	2,473	2,169	2,140
Jan. 11...	2,835	2,593	2,270	2,115
Jan. 18...	2,844	2,572	2,290	2,109
Jan. 25...	2,830	2,566	2,293	2,099
Feb. 1...	2,830	2,541	2,287	2,082
Feb. 8...	2,824	2,523	2,268	2,052
Feb. 15...	2,810	2,476	2,249	2,059
Feb. 22...	2,820	2,485	2,226	2,031

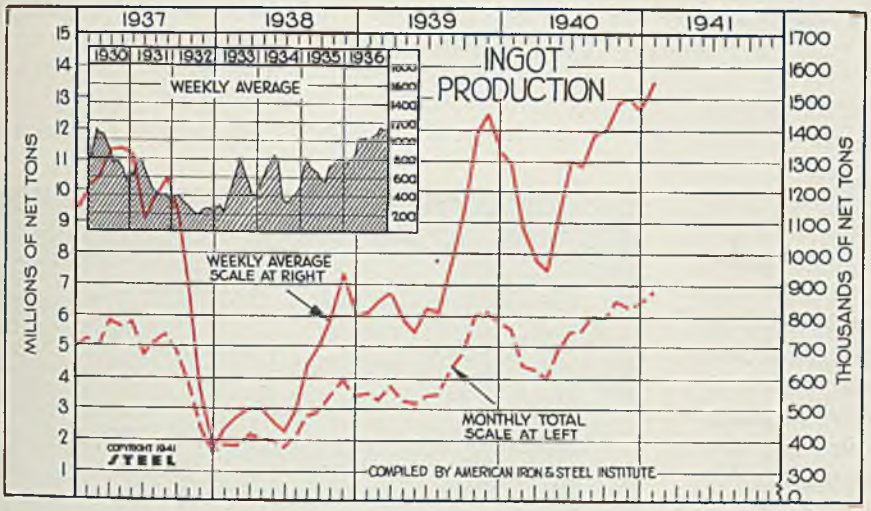


Fabricated Structural Steel

(1000 tons)

	Shipments			Bookings		
	1941	1940	1939	1941	1940	1939
Jan.	150.4	110.9	84.3	258.5	81.7	101.7
Feb.		97.2	84.4		98.9	82.7
Mar.		95.9	125.3		128.3	95.1
Apr.		116.3	120.9		73.8	118.3
May		115.6	125.9		126.8	156.9
June		119.1	130.1		109.7	111.6
July		127.1	110.5		194.9	114.1
Aug.		134.9	139.7		122.5	100.9
Sept.		142.8	140.8		225.5	121.4
Oct.		153.2	133.8		233.1	118.8
Nov.		147.0	128.2		141.9	99.3
Dec.		155.5	116.2		203.1	84.4
Tot.		1515.5	1440.1		1748.1	1305.0





Steel Ingot Production

(Unit 100 Net Tons)

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

†Weekly average.

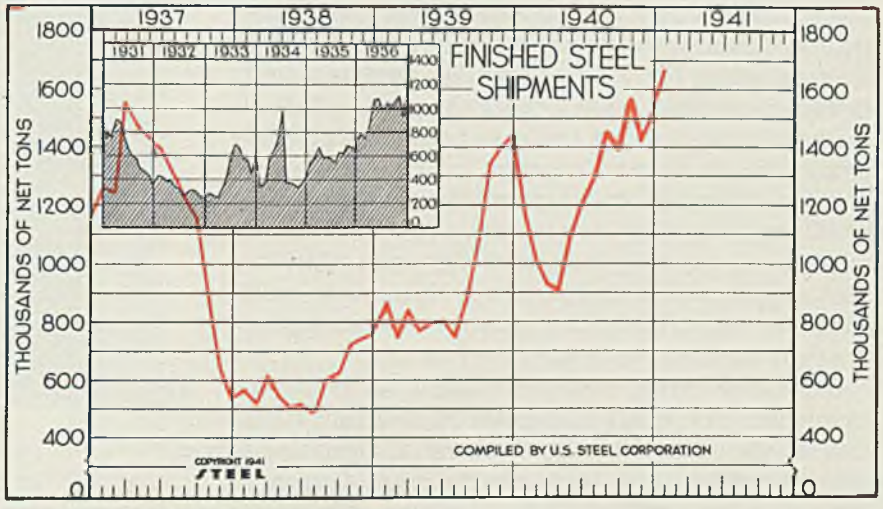
Finished Steel Shipments

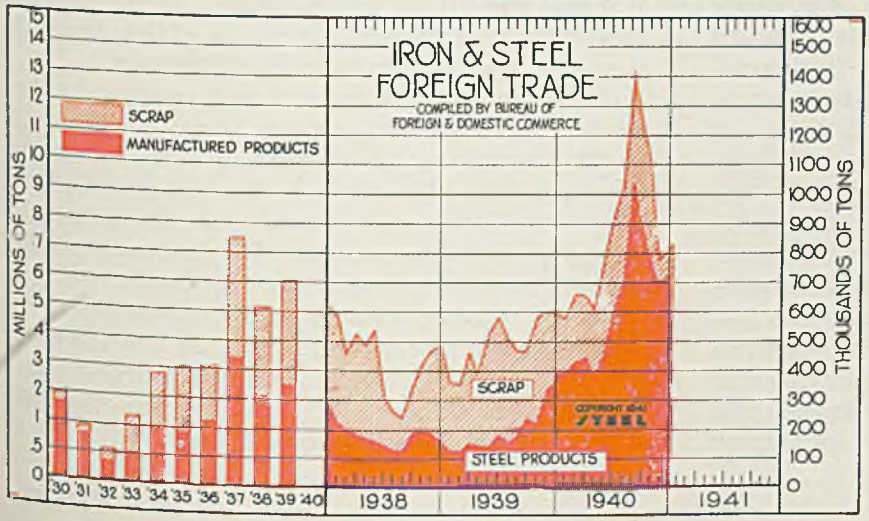
U. S. Steel Corp.

(Unit 1000 Net Tons)

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

†After year-end adjustments.





Iron and Steel Exports

(Thousands of Gross Tons)

	Steel Products		Scrap		Total
	1940	1939	1940	1939	1940
Jan.	396.1	134.8	187.5	227.9	583.5
Feb.	436.6	134.8	234.7	224.9	671.3
Mar.	457.1	162.1	206.9	312.3	664.0
April	391.8	153.9	221.2	240.1	612.9
May	471.5	147.8	312.5	384.9	784.0
June	617.7	190.0	318.4	398.9	936.0
July	707.8	163.6	327.1	350.1	1034.9
Aug.	1046.1	185.2	346.1	291.9	1402.1
Sept.	965.4	244.9	251.1	330.7	1221.1
Oct.	846.6	255.1	258.5	336.8	1105.5
Nov.	713.8	332.9	74.3	272.7	788.2
Dec.	735.2	394.0	70.0	206.4	805.2
Total	7,785.5	2,499.0	2,823.1	3,577.4	10,608.6

Training Within Industry

A MUST!!

Industries just now awakening to tremendous implications of "all out" national defense production—and there are thousands of them—are awakening at the eleventh hour as far as the chances of obtaining highly trained workers are concerned. From now on everything depends upon "training within industry"

By GUY HUBBARD

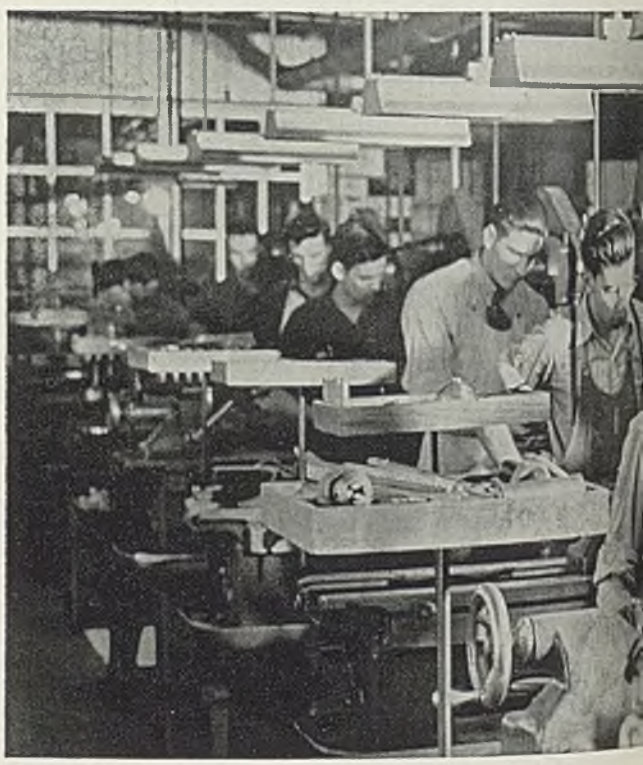
Machine Tool Editor

■ CHALK THIS up as a certainty. Thousands of American plants now engaged in manufacturing the most "peaceful" of peacetime products, will enter into —or will be drawn into—defense production during this year 1941, many of them within the next few weeks. In some cases their executives realize this, and are to the best of their ability making active preparations to cope with drastic changes in nature and volume of their output, this by logical planning for expanded plant and increased personnel.

Many others, however, can well be compared to complacent canoeists drifting along the bosom of a great river of whose future character they profess unworried ignorance even while a mounting roar, and clouds of spray rising beyond the next bend, unmistakably indicate rapids ahead. American industry as a whole is destined to "run these rapids" successfully—just as it did in 1917-1918—but it certainly does look like tough going for many individual companies which are allowing themselves to drift in with inadequate equipment, untrained crews and with no navigation plans or any other kind of plans.

Experience during the first world war punctured the idea which had been promulgated by a certain statesman, to the effect that: "In the event of any national crisis, a million Americans can be counted upon to spring to arms over night!" Nothing was, or is, wrong with American patriotic spirit. The difficulty was, and is, that assuming the arms are there to "spring to" the immediate result would be confusion in its worst form. The same thing applies to sudden, unplanned industrial mobilization.

No one today questions the value of a certain amount of standardized training in converting quickly a horde of rookies into an orderly and efficient military unit. A surprising number of people, however—many of them executives in manufacturing plants—don't seem to realize that some kind of standardized training is just as important in quick conversion of hordes of industrial rookies into orderly and efficient industrial units. They seem to have the idea that all



that will be necessary is to pry off that "No Help Wanted" sign which has been nailed to the employment office door since 1930, hang up a "Help Wanted" sign—and wait for the rush of skilled men.

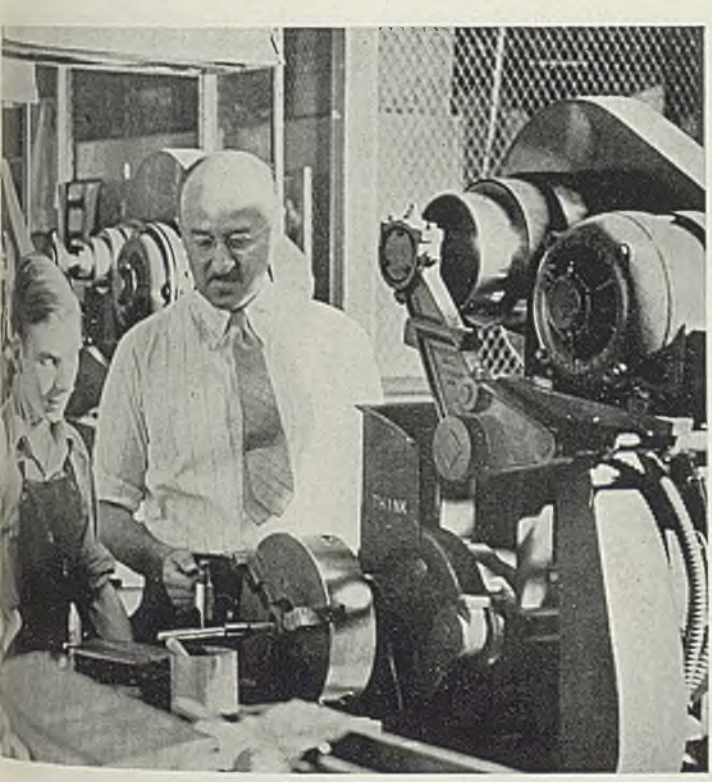
If the plant is pleasant and well equipped, if the work is attractive and—let's be literal—especially if it has possibilities for warranting draft exemption, there may be a rush of men to the employment office. They will not be trained men, however, unless by chance some similar plant in the near vicinity happened to have burned down the night before.

No sane machinery builder at any time would expect to put in an order for a carload of pig iron and have it arrive at his plant in the form of castings to his specifications. He would expect it as raw material which he would have to convert himself.

He has no more reason today to expect that the human material which comes in response to his "Help Wanted" call, will be anything but raw material. The best that he can hope for is that it may be a reasonably good grade of raw material. The rest is largely up to him. He must shape this raw material in his own plant to suit his special purposes.

If he is reasonably fortunate in the quality of raw material with which he has to deal, if he sorts it out with reasonable care before starting to process it and if he follows a logical plan in fitting this material to his needs, he will in a surprisingly short space of time find himself with a far more effectve and more loyal working force than anything which could be assembled by the questionable method of "raiding" other organizations and stealing their trained men.

It should not be forgotten that "raiding"—like price cutting—is a game that all can play. Once started, it is apt in the end to injure the one who started it far more than it does his original victims. Hence the



The entire "Training Within Industry" program now being promoted throughout the United States is built around the principle that the quickest way to make new workers effective in defense production is through organized, intensive instruction right on the job. War department photo, courtesy National Defense Commission

theory of "Getting something for nothing", is just as unsound in the labor market as it is anywhere else.

Awakening of industry to the employment exigencies of America's defense production program has been a progressive phenomenon over a considerable period. Some, including machine tool builders and aircraft manufacturers, awakened to it before the collapse of France and even before the actual outbreak of the present war. Other divisions of industry—and they represent a very large part of industry—are just now awakening to the situation. They are awakening at the eleventh hour as far as the skilled labor market is concerned. The familiar sources upon which they have depended since 1930 have been drained dry.

Engineering colleges, technical high schools and all kinds of trade schools, both public and privately supported, not only have been working overtime for more than a year, but their output—even their "emergency" short term output—long since has been spoken for by industry for many months ahead. The same is true of groups in training under systems such as that sponsored by the American Society of Tool Engineers.

As industry now begins to explore the highways and byways for help capable of meeting defense production demands, it is high time that several platitudes of the last eleven years be tossed into the ashcan and forgotten. Here are a few examples. "We hire no one over forty years old." "We hire no one who ever has been on WPA." "We hire no one who ever has been on relief." "We hire no one who has not had previous experience in our line of work." "We hire no one who—formerly skilled—has been away from our kind of work for any length of time."

This list could go on and on and all adds up to saying: "We will hire none but those trained and highly skilled in our own regular line of work." Today, that almost amounts to saying: "We are not interested in producing for national defense." That attitude is one which sooner or later is bound to arouse the critical and penetrating interest of Uncle Sam in the affairs of any company, regardless of what its "regular product" may be. The thing which we are up against today is bigger than any political party and industry's disapproval of certain conditions and institutions which have developed since 1932 will have to be modified.

What I am leading up to is this. The time has come to forget the symbol of WPA as a middle-aged unemployable on a useless project leaning on his shovel, and think of it as a young fellow—eager for a job in industry—who is learning, let us say, to run a lathe in a school supported by public money (yours and mine). If you can get him, grab him quickly. Someone else will if you don't. The same revision of thinking applies also to the Civilian Conservation Corps.

Then there is that institution called the National Youth Administration—usually called NYA. For some reason this has become confused in the minds of many industrialists with a national youth congress which lately gained unsavory and widespread publicity. As a matter of fact, the National Youth Administration is doing a thoroughly business-like job in many industrial centers of the United States, in the quick training of young men (and young women) in various branches of industrial work, including welding; pattern making; machine tool operation; toolmaking; inspection and assembly; and drafting.

Get in touch with the NYA center nearest you. Two things are possible. One is that right now there may be a group in training which will fit into your scheme of things. The other possibility is that NYA can "put through to your order," an individual or a group trained especially to suit your needs.

(*Please turn to Page* 113)

What Equipment Is Best for

MACHINING High-Explosive

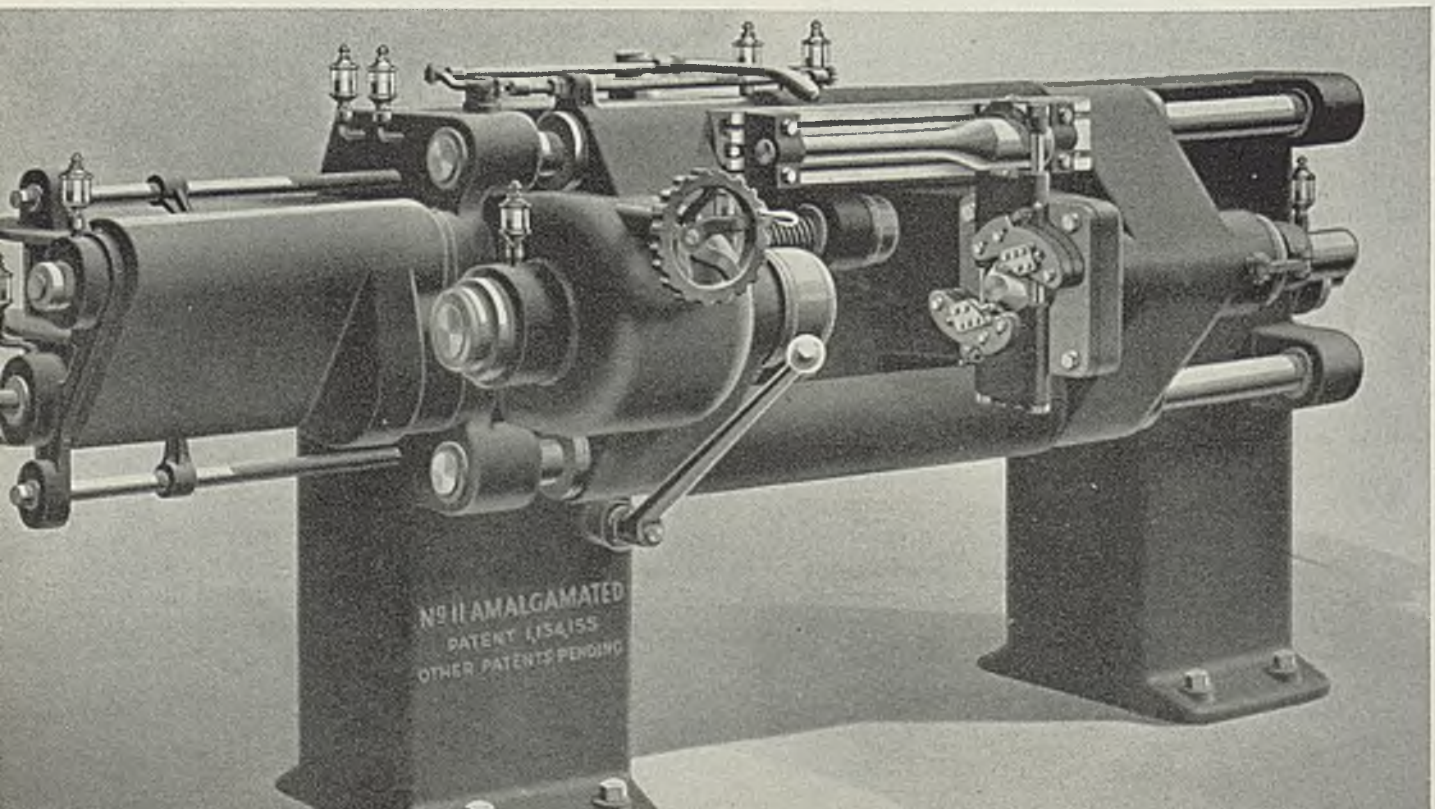
■ This series of weekly articles on shell production started Jan. 27, 1941. Section one presented a background on shell; section two, types of shell and their metallurgy; section three, parting off the billets and heating for forging; section four, forging problems and their solution; section five, trends in shell forging, the Baldwin-Omes and upsetter forging machines.

Next week, section seven will describe various types of shell machining equipment and will present a complete detailed step-by-step description of all operations involved in a highly developed sequence of machining operations employed at plants of S. A. Woods Machine Co., Boston.

According to Professor Macconochie, if we could afford to disregard the time and effort required to build them, the ideal machine tools for shell work might well be multi-spindle automatics. However, we can disregard neither the time required nor the manufacturing facilities necessary to build such machine tools. Therefore single-purpose machine tools, easily and quickly built and capable of being operated by unskilled labor after a short training period, offer an important alternative. Present intense production needs appear to afford no choice but to use the latter type

■ ADVANCES in the art of cutting metals have had a much more profound effect on human destiny than any formal historical narrative would suggest. Perhaps we have come too far. That is a question on which machine tool builders are rather sharply divided. One cause for such differences of opinion may be lack of clear cut distinction between such terms as "labor-saving machinery" and "time-saving machinery." Another angle that needs much light is the relation of these factors in a nation at peace and primarily interested in securing the highest possible standard of living for its people; and

Fig. 2—Unique design of the No. 11 Amalgamated shell turning lathe built by the Prescott Co., Menominee, Mich. Shell is mounted between centers in a carriage which moves past the tools. Note carriage slides on heavy bars, not on ways



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

Shell

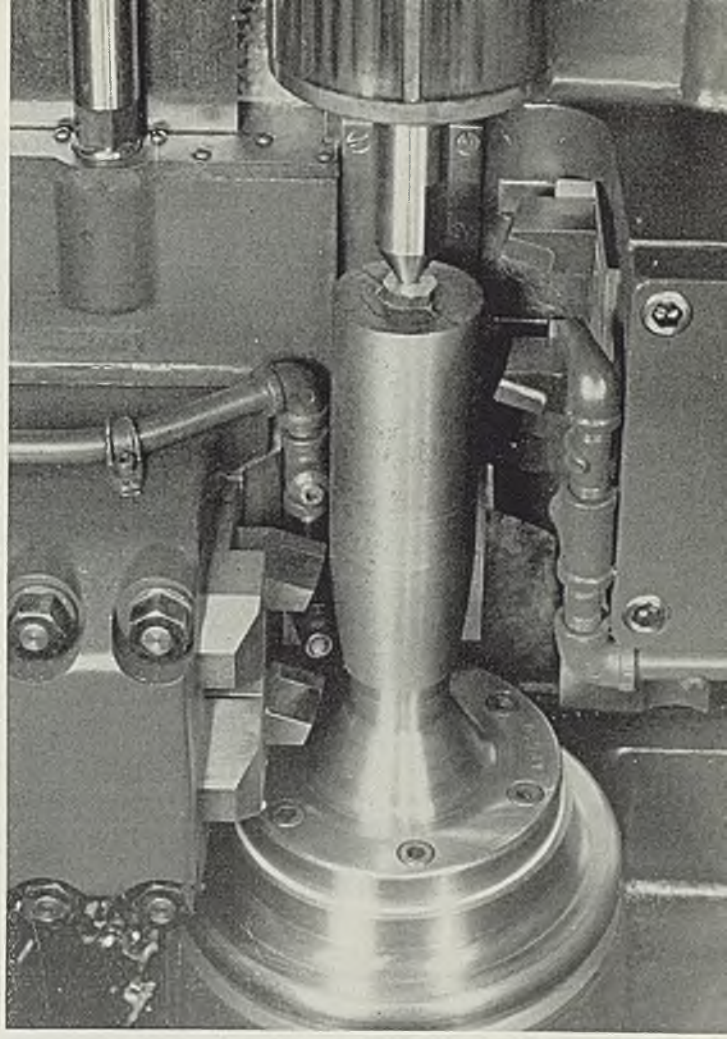


Fig. 1—Closeup of Ex-Cell-O automatic vertical lathe for machining shell. While doing an excellent machining job at high speed, they cost at least $10,000 each, which compares with an estimated cost of $4000 for ordinary single-purpose machines

the same nation when exposed to the menace of attack and keenly—if not desperately—interested in *saving* such time as it may be able to *buy*.

"Time-saving" conveys the idea of increasing worker output per unit of time without necessarily rendering his task any lighter. All handicraft tools certainly fall within this category, while some machine tools may and others may not. The great Industrial Revolution marked an important break from the preceding period in which the tool was regarded as an adjunct to the skill of the worker. Thereafter invention tended more and more to transfer human skills to the machine. Thus the skill of the worker became progressively an adjunct of the power driven tool.

Too Much Complexity? It is possible that this process may have over-reached itself, for in recent years machine tool operation has made greater and greater demands on the intelligence and dexterity of the worker as the machine has assumed more and more complex tasks. If such a machine did not take too long to build, it might still be a "time-saver," though not necessarily a "labor-saver" if the labor to build it be included. Yet it might fail of its purpose because of increasing complexity of operation and our inability to provide attendants possessing the necessary mental efficiency and manual skill required.

Shell making primarily involves turning operations and their derivatives—work requiring a lathe. It perhaps is difficult to recognize in the modern high-speed multi-spindle automatic machine the same essential features of the original lathe of oriental origin, which boasted of no more parts than a couple of centers, a rest for the tool and a bow, the string of which was passed once around the work. Working the bow back and forth caused the work to rotate, the tool being applied only while the piece turned toward the operator.

But a multi-spindle automatic is merely a group of single lathes set up in a vertical position around a common axis for convenience in applying power and for simplicity in the transfer of the work from one operation to the next.

Between these two historical extremes we find the western adaptation in its simplest known form—a definite "bed" with headstock and tailstock. A treadle furnished the power through a cord passed around the work as before but from there to an overhead spring pile, thus freeing the operator's hands for better manipulation of the tool. Lathes of this type were used in New England in the 1850's. The next—a most obvious step—was to continuously rotate the work through crank and connecting rod, dispensing with the spring pole.

Skill Transferred to the Machine: The next advance involved an important transfer of skill from the operator to the machine in the shape of a carriage driven by a lead screw in a direction parallel to the axis of the lathe. Further, the cutting tool could be adjusted in a direction at right angles to this and thus a true cylinder of any diameter within the capacity of the machine could be cut, without any dependence on the ability of the machine operator. The original lathe of this type, constructed by Henry Maudslay about 1800, may be seen in the Kensington Museum in London.

To America, however, belongs the credit of another considerable advance in the transfer of skill to the machine in the person of Henry Stone of Windsor, Vermont, who designed the first turret. By mounting a series of tools in a revolving turret, any one of them can be brought into operation on the piece as it is fed

through the hollow headstock spindle. Once the job has been set up, the lathe may be operated by a semi-skilled attendant.

Again we are indebted to Yankee ingenuity for the final step in lathe development which brings us right down to this present moment; namely, the invention of the cam wheel or "brain" wheel which transforms the semi-automatic turret into the modern automatic. This development completes the process of transferring thought from the man of skill to the machine. The author of this device was Christopher Miner Spencer of Connecticut.

Do More by Thinking Less: Philosophy underlying the reason for transferring intelligence from man to the machine may best be exemplified by pointing out the fallacy

(*Please turn to Page* 95)

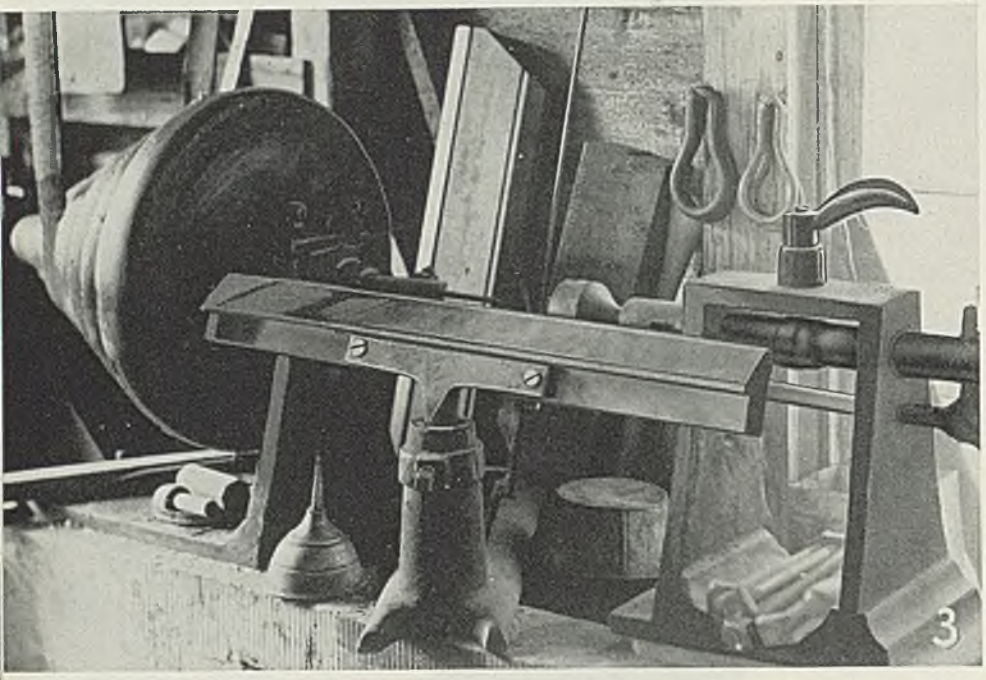


Fig. 3—Hand Guided Tool: Typical of the era before "skill and intelligence" had been built into machine tools, is this 140-year old lathe with wooden bed —originally built for foot-power drive. Shape and accuracy of work depended entirely upon ability of workman in guiding hand turning tool along the tool rest

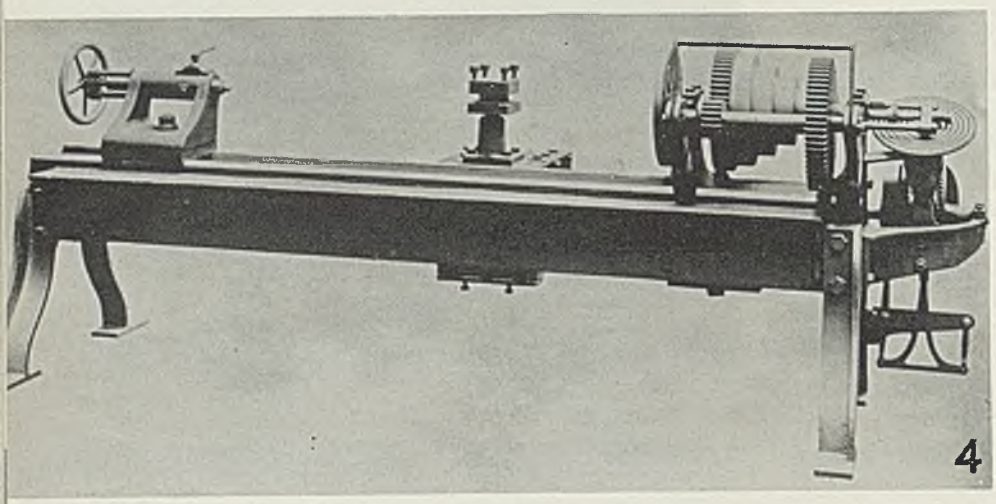
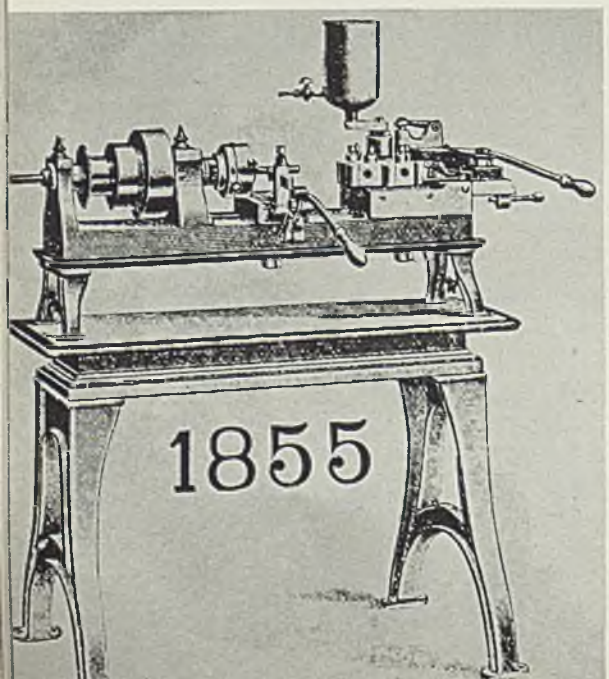


Fig. 4—First Guided Tool: One of the earliest "engine lathes" in which skill of the workman has in a measure been incorporated into the machine itself. This lathe, built by Richard Roberts in England in 1817, has positively guided power-driven tool carriage and back gears

Fig. 5—First Turret: Designed and built in 1855 by Henry D. Stone, Richard S. Lawrence and Frederick W. Howe of the Robbins & Lawrence Co. was this first commercial turret lathe. In this machine, skill and also some degree of intelligence is embodied—by mounting the tools on a turret for handling several machining operations in sequence under control of stops



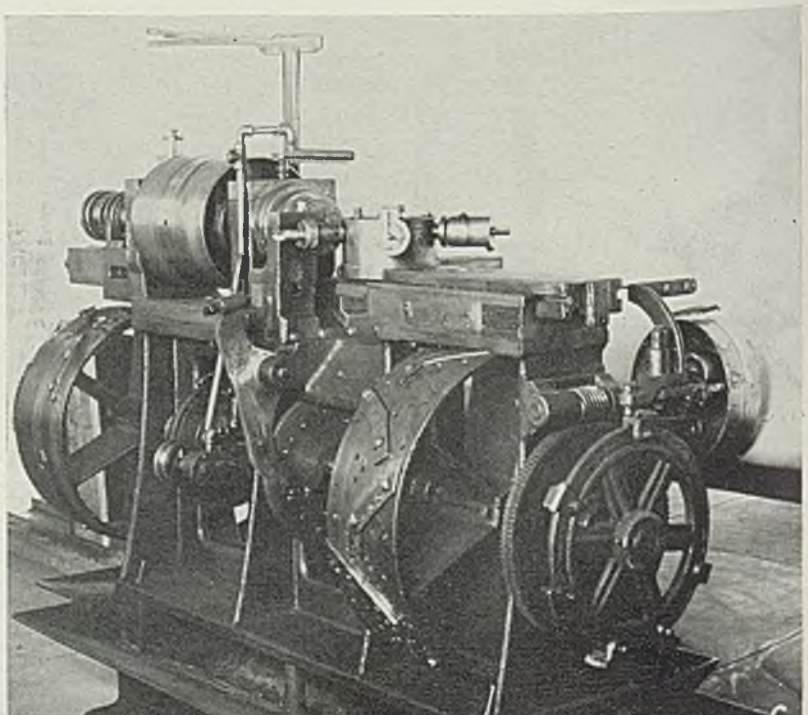
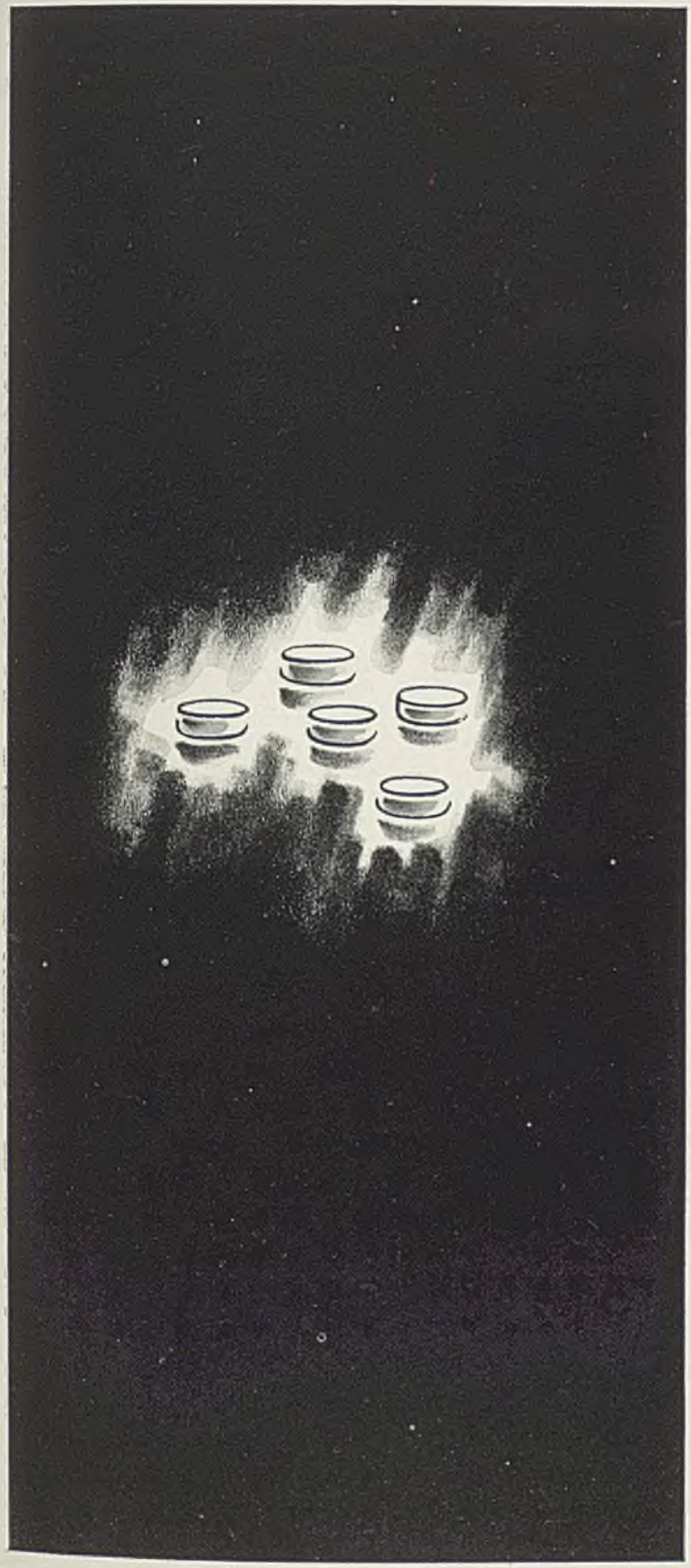


Fig. 6—First Cam Control: Original automatic as invented by Christopher M. Spencer in 1872. Through control cams this machine—which essentially is a turret lathe—is made self-acting, going through its entire cycle without intervention of its operator. This represents complete transfer of the skill and intelligence of the expert set-up man to the machine itself



Metals need vitamins, too!

● Much as vitamins fortify the body with greater vitality and resistance, minute and controlled amounts of substances added to metals and alloys greatly increase their efficiency, usefulness and life.

The research laboratories of Revere Copper and Brass Incorporated have made an intensive study of this metal "vitalizing" process. It has resulted in many improved applications of copper and its alloys. Three of these applications are especially notable.

1. A condenser tube notably resistant to "dezincification."

2. A sheet copper with a high resistance to "season cracking."

3. Brasses, bronzes and other alloys with finer "working" and "machining" qualities.

The Revere Technical Advisory Service is armed with much specialized knowledge of new developments in the copper family. Its services are available at no obligation for individual problems to which copper or copper base alloy may be the answer.

REVERE

COPPER AND BRASS INCORPORATED

Executive Offices: 230 Park Avenue, New York, N. Y.

Sales offices and distributors in most of America's major cities

MILLS: BALTIMORE, MD. • TAUNTON, MASS. • ROME, N. Y. NEW BEDFORD, MASS. • DETROIT, MICH. • CHICAGO, ILL.

BETWEEN HEATS

WITH *Shorty*

■ Say Fellers:

Over at the plate mill the other day Andy Morrow, one of the shearmen, was chinin' with Bill Peer, an inspector, while the rest of the fellers on the mill were wrestlin' with a cobble in No. 2 finishin' stand. I was passin' through the mill at the time 'n when opposite the hot bed I heard somebody yell. It was Andy over at the shears. 'N as I looked his way he beckoned me to join him 'n Bill Peer. That's what I did 'n mebbe I didn't get a 'lift' from listening to the conversation. Sorta made me sorry when the whistle blew for the mill to start rollin' again.

"Y' know, Bill," sez Andy, "I was jus' thinkin' of the warehouse boys at the Riverside plant of Otis Steel Co. up in Cleveland 'n 'specially Art Hogue."

"What about 'im?" asked Bill.

"Plenty. The story I get is somethin' like this. One Sunday in January Art Hogue was on 'is way to Massillon, O. When jus' outside Barberton, O., on Route 21, he stopped his truck to lend a hand to a motorist who had driven into a ditch. He got 'em out alright 'n then he started toward his truck to continue 'is journey. But he didn't get far 'for another truck struck 'im down. They took 'im to the Barberton Citizens hospital with both legs broken and 'is right leg crushed as well, and cuts on 'is hips and head."

"Sorry to hear that, Andy. Jus' goes to show that in a troubled world such as this, no man can tell jus' what surprise may be ambushed in the gray lanes and dusty highways of everyday life," I sez.

"How's he gettin' along by this time?" asked Bill.

"He gotta 'long alright for awhile but he suddenly got worse 'n had to have a blood transfusion. The doctor hadda sent out a call for blood donors."

"Did they get any volunteers?"

"Did they? Say, y' shoulda heard 'is buddies when the news spread 'round the warehouse at Otis. Y' know how 'tis 'round steel plants, Shorty. Y' get in an argument with some guy on your turn 'bout some little thing that happens in the mill and he'll take a swing at y', 'n 'fore y' know it hellsappoppin. But let somethin' happen that sorta gets y' inside—say, you'll go on a journey of mercy with the guy that took a swing at y' hangin' on your arm.

"Sure, I know. Y' can always expect somethin' exceptional comin' from the hearts of the boys who keep the steel mills runnin'. Somehow or other, such hearts run where others walk with slow step. Tell us more, Andy."

Gives Some Advice

"Well, when Art Hogue's buddies at the warehouse heard he needed a donor, y' jus' couldn't hold 'em. One of Art's buddies started talkin' and he sez, 'we all want to be stars; few of us want to be lanterns. After all, fellers, on a muddy road at night, the lantern 's more useful than a star. Course we'd all like to stand in palaces and be cup-bearers to the king, but why don't we follow orders and 'give a cup of cold water in My name.' Let's take a plain cup 'n give Art a drink. We don't need a golden goblet. Whadda y' say?'

"That was Feb. 18. The next day the gang was workin' the 11 p. m. to 7 a. m. trick. Not much was said during the whole turn. The fellers moved 'bout the floor doin' their 'bit' 'n plenty of tonnage was handled that night, y' betcha. 'N when the whistle blew in the morning, the fellers went to their lockers, put on their good clothes and headed toward the main gate— every one with spring in their step."

"How many were there in the gang?" asked Bill.

"All told there were 80. They boarded a couple of chartered buses and headed toward Barberton. Arrivin' at the hospital every last man offered the doctors their blood for Art Hogue. Only three of Art's buddies were tested for blood type. Of these one was chosen—William Valatorni, 6113 Lawn avenue N. W., Cleveland."

"Boy, it sorta makes y' stick your chest out to think you're workin' with a bunch of fellers like that, hey?"

"Sure does. But listen. After the transfusion was made the gang gathered in a huddle outside the window of Art's room 'n they let go with some yells like they do in the warehouse when they get on a high-horse. 'N they kept it up 'till Art's nurse propped 'im up in bed so as the gang could see 'im. 'N when 'is head came into view, the whole gang grabbed their hats from their heads 'n waved them to their buddy. 'Course they hollowed some things to 'im in steelmakin' language 'n he understood, alright."

"That's the way it always works, Andy. Open out a spring of joy in somebody else and a similar spring begins to flow in you," I sez.

The Mrs. Speaks Her Piece

"Yeh. Me 'n the Mrs. were talkin' about how nice it was of the fellers to go to Art's bedside and she sez, 'there's a time when our deeds must be done, or they can't be done. We must sow in the seed-time, for when this is past there's no use in scatterin' the grain upon the fields. Y' gotta put wheat in the mill while there's water in the race, for when it's gone 'y can't grind. 'N so we gotta visit our sick friends while they're sick, for there's no use goin' with kindness when they're well.' "

"I sez to her, Art's buddies did that alright. They showed their stuff while trouble was on 'im, for they figured it woudn't be worthwhile when he starts workin' again."

"Then the Mrs. sez, 'I know a Friend who's always on the road. What kind of a road? Every sort of a road. On a road like Route 21, through fields 'n by quiet waters, by steep 'n rugged paths, along the shining way to the steelmaker's home. This Friend is on every road. He brings counsel when roads are flinty, bathes bleeding feet, gives courage when the horizon is gloomy. Perhaps the removal of the thinnest veil will bring us face to face with Him. Art's buddies in the warehouse gang at the Otis' Riverside plant know somethin' 'bout what I'm tellin' you.' "

"Yea, it's jus' as Art Hogue sez, when 'is sight fails and 'is hearing grows faint—a large part of 'is mind's wealth will be in its memories. 'After what my buddies did for me, I feel rich with an inner fortress of comfort which nothing can disturb.' "

Well, so long, fellers, be seein' ya.

"Shorty" Long

"MORE STEEL!"

McKee can increase your facilities to meet this demand without interrupting your present production

WHETHER your production requirements call for blast furnace, open hearth, or other steel plant alterations, additions or new construction, Arthur G. McKee & Company can handle your job quickly, economically and efficiently.

Thirty-six years of Iron and Steel plant engineering have developed an experienced organization capable of meeting your requirements in a minimum of time.

The McKee method of operating under a *single lump sum contract* gives you all engineering and cost details *in advance.* It also eliminates the necessity of sacrificing your executive time for construction supervision.

Close coordination within our organization prevents duplication of effort and expedites completion of your project at the earliest possible date.

Speed and efficiency are assured by the knowledge and experience gained by McKee engineers throughout the world.

One of the Engineering Department's two main drafting rooms in the new McKee Building.

Air conditioning and modern lighting and equipment provide "built in" efficiency that speeds up McKee service to the Iron and Steel Industry.

Arthur G. McKee & Company

★ *Engineers and Contractors* ★

2300 CHESTER AVENUE • CLEVELAND, OHIO

Detroit Show To Reveal . . . . . .

How Better Tooling Aids Production for Defense

■ ANY OBSERVER visiting the Machine and Tool Progress exhibition to be held in Detroit throughout the last week of March in conjunction with the annual meeting of the American Society of Tool Engineers cannot help seeing the great strides made by the makers of tools and accessories. Such progress is especially important in view of the needs for defense production now confronting many manufacturers all over the country.

Yet with all the pressure brought upon them from both defense and peacetime work, tool engineers have "squeezed in" enough time, here and there, to bring about significant new developments. These are bound to play a great part in increasing the tempo of production for defense, as they speed the making of such essentials as tanks, guns, aircraft, ships and munitions.

Typical of the developments which will be on parade at the show is a new automatic Micro-O-Size control unit for the final finish processing of bores, new broaches for cutting T-slots, broaches for cored or pierced holes in castings and forgings, new collapsible taps which permit close to bottom tapping, and gages for checking anything from the inside bores of guns to the dimensions of cartridge cases and shell bodies—as well as many others.

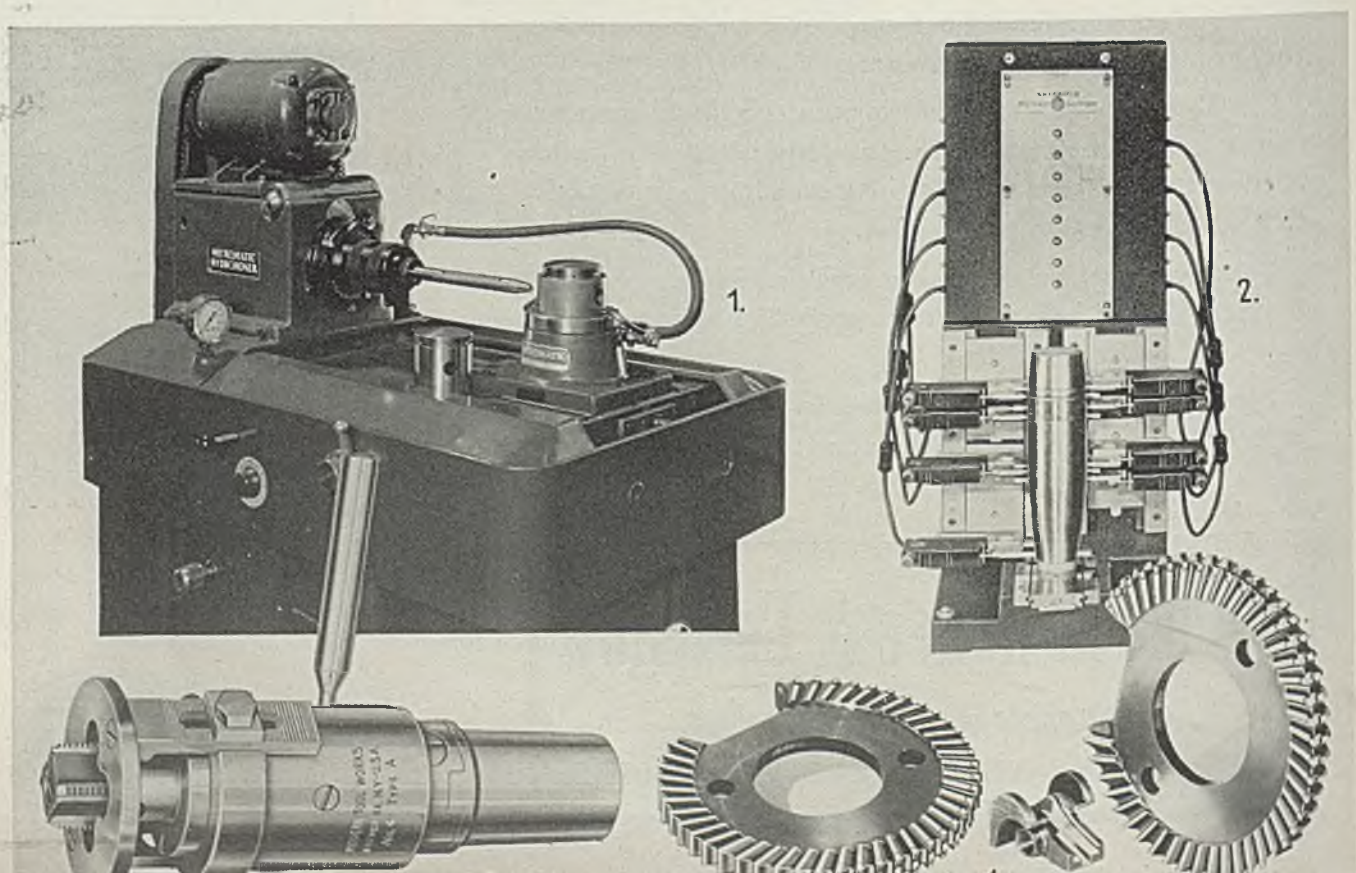
A development of Micromatic Hone Corp., 1345 East Milwaukee avenue, Detroit, the automatic Micro-O-Size control unit mentioned is capable of generating accurate sizing, in high production, uniformly within limits from 0.0002 to 0.0005-inch, reducing the tolerance range and number of selective fits. The mechanism, Fig. 1, is arranged with visual dials to facilitate setup, adjustment and complete operating control. In automotive engine pistons, it can remove 0.0005 to 0.0001-inch stock from a 0.750-inch diameter by 13/16-inch long piston pin hole in one operation.

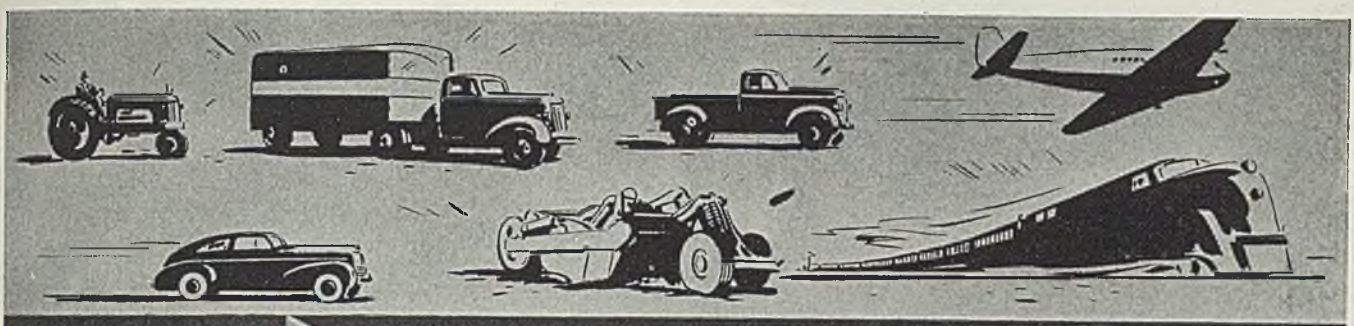
Two new Red Ring broaches being introduced by National Broach & Machine Co., Detroit, tend both to decrease costs and increase production. One of these, the circular broach Fig. 4, cuts a 0.037-inch circular T-slot at one revolution at a production rate of approximately 100 per hour. The other, a double jump broach, is for working cored or pierced holes in castings and forgings which in broaching require relatively heavy cuts in order to keep the cutting edges of tools below the hard scale on the inside surface of the hole.

Bottom hole tapping with standard chasers is one of the features of the new collapsible tap, Fig. 3, to be shown at the booth of Modern Tool Works of Rochester, N. Y. It is made of a one-piece body which has a solid end. Thus there is no end plate or cap required and the regular chasers extend beyond the

(*Please turn to Page* 111)

Fig. 1—Arrangement of dials on this automatic Micro-O-Size control unit facilitate setup, adjustment and complete operating control. It is capable of accurate sizing within limits from 0.0002 to 0.0005-inch. Fig. 2—This Multichek Electri-gage will handle work parts as large as desired. It can be used to good advantage for checking cartridge cases and shell bodies. Fig. 3—Chasers in this tap are set in on an angle and can be removed by taking out one screw. It also can be adjusted to cut large or small threads. Fig. 4—This circular broach cuts circular T-slots at one revolution and at a production rate of about 100 per hour





THE VITAL ELEMENT IN ALLOY STEEL EXPERIENCE

Youngstown Alloys are a combination of fine materials, excellent production equipment, and highly skilled men. And the greatest of these is men!

Anybody can buy machinery and materials but the skill in a man's hands must be built by years of the most painstaking effort -- an effort that must be continuous, untiring, and inspired by ambition and loyalty.

That this is the stuff of which Youngstown's steel makers are made has been recognized by many of our steel mill visitors, who never cease to marvel at the obvious spirit of cooperation that inspires this force. We in the sales department know of it, of course, which is one very important reason why we are proud to offer you Youngstown Alloys as products that are uniform, high in quality and well fitted to your needs.

★

Sheets - Plates - Pipe and Tubular Products - Conduit - Tin Plate - Bars - Rods - Wire - Nails - Tie Plates and Spikes

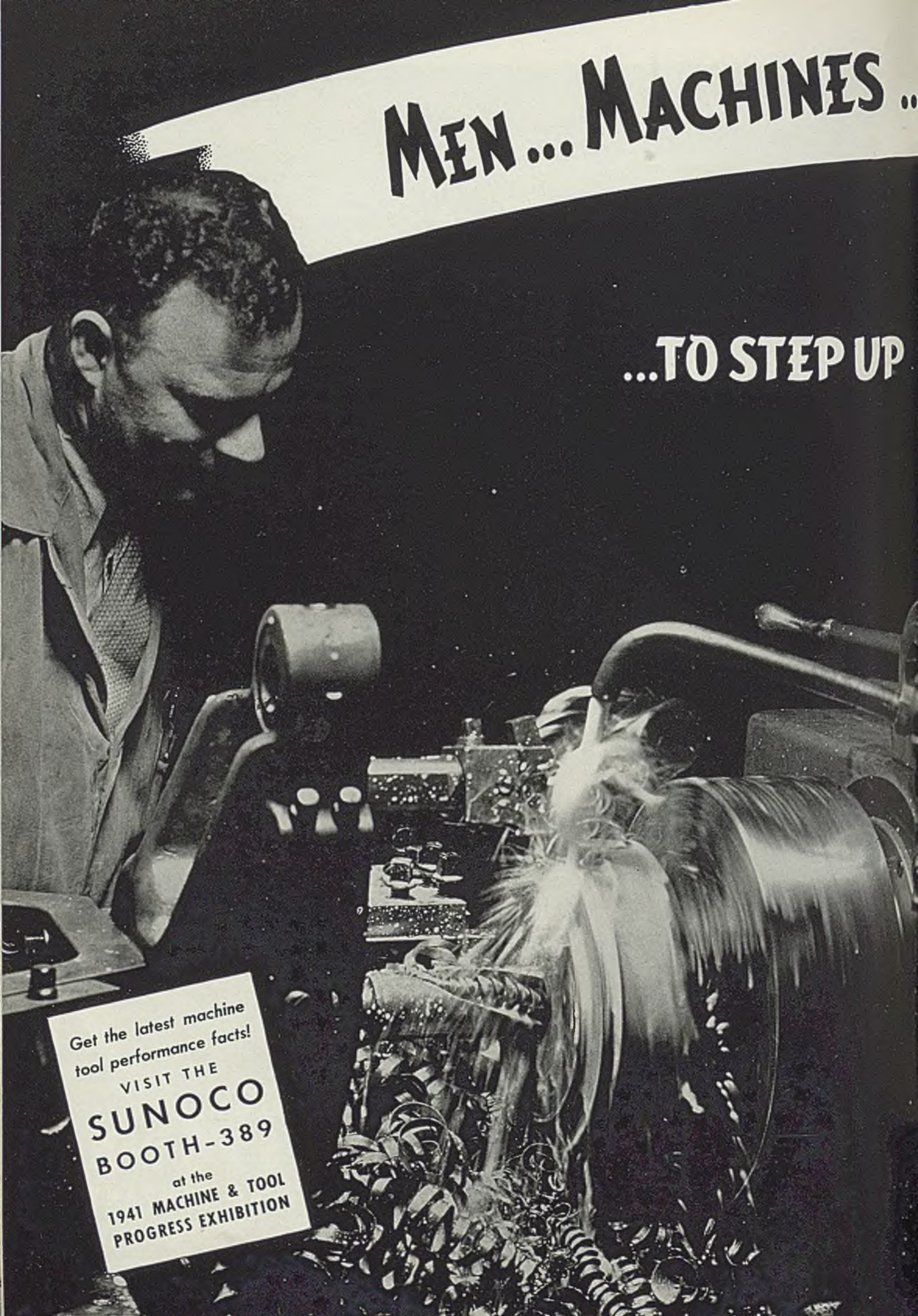
4-4D

ALLOY YOUNGSTOWN STEEL

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steels

General Offices - YOUNGSTOWN, OHIO


MEN... MACHINES..
...TO STEP UP
Get the latest machine tool performance facts!
VISIT THE
SUNOCO
BOOTH-389
at the
1941 MACHINE & TOOL PROGRESS EXHIBITION

MANAGEMENT... RELY ON SUNOCO

MACHINE TOOL OUTPUT

In every type of plant . . . under all kinds of working conditions SUNOCO is the choice of leaders in the metal working industry.

SKILLED MECHANICS are quick to appreciate that SUNOCO Emulsifying Cutting Oil has the qualities so vital in a cutting lubricant to provide ease of operation and fast accurate trouble-free production.

MACHINE TOOL production at "rated capacity" is made possible by SUNOCO's high lubricating and heat absorbing qualities. It prevents the tools from chipping or burning and permits heavy cuts at high speeds and helps to establish new highs in machine tool efficiency.

WORKS MANAGERS know that when it is essential to maintain present day production schedules SUNOCO Emulsifying Cutting Oil will aid in reducing waste production time . . . material . . . and man hours.

On performance and performance alone SUNOCO has won recognition. Test SUNOCO in your own shop . . . under your own working conditions and you'll know why "IT'S THE CHOICE OF THE LEADERS OF INDUSTRY." For full information, write

SUN OIL COMPANY, Philadelphia

Fast stock removal without increasing wheel wear is possible with SUNOCO.

Milling cutters will not burn, chips will not seize and cuts will be clean and even when SUNOCO is used.

Clean cuts and high efficiency in machine tool output may be established with use of SUNOCO.

SUNOCO

EMULSIFYING

CUTTING OIL

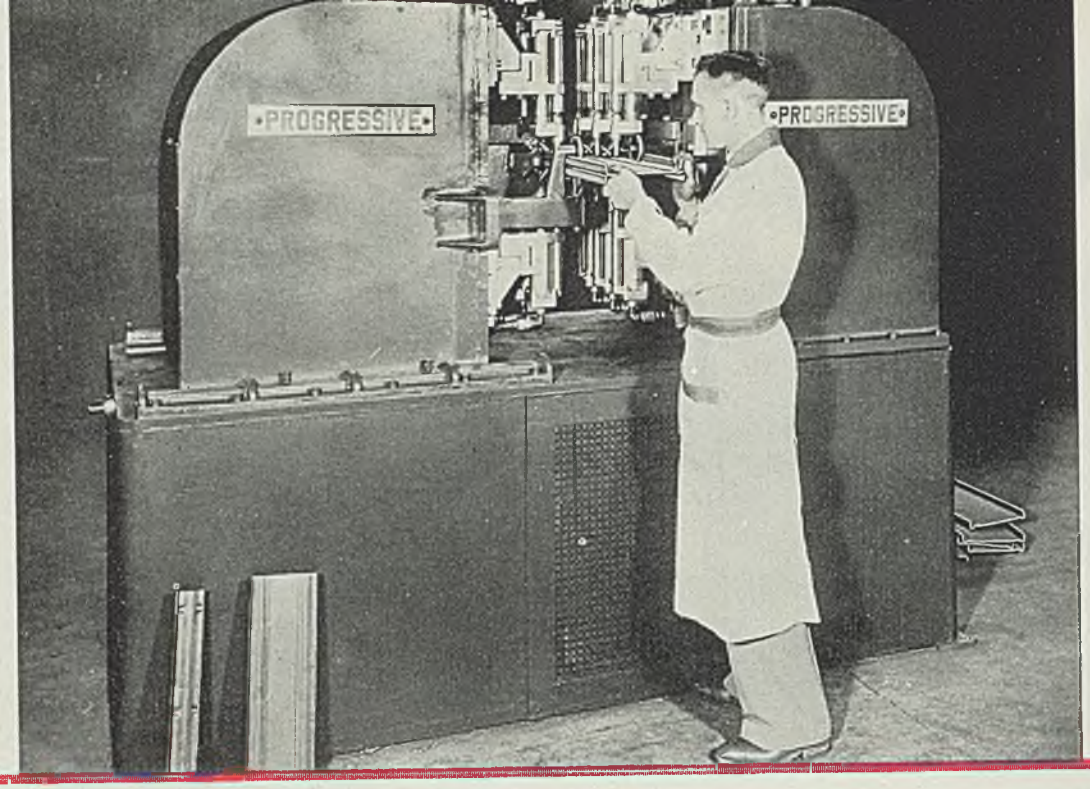


Fig. 1—One of two Progressive spot welding machines capable of spot welding a total of upwards of 2400 lineal feet of Stran-Steel framing members per hour employs twelve vertically opposed sliding contact guns short-coupled with six transformers mounted in the base and sides of the machine

High Production Welding Machine

Setup Speeds Housing Fabrication

Special production setup is made from standard welding guns and obtains excellent production speeds, easily handling outputs up to 2400 lineal feet of structural steel members per hour. Extreme flexibility of equipment permits material to be welded in five different gages, in any number of widths and with any spacing between welds that may be desired—all on the same machine. Six welds are made automatically at each positioning of the work as it is fed through the machine

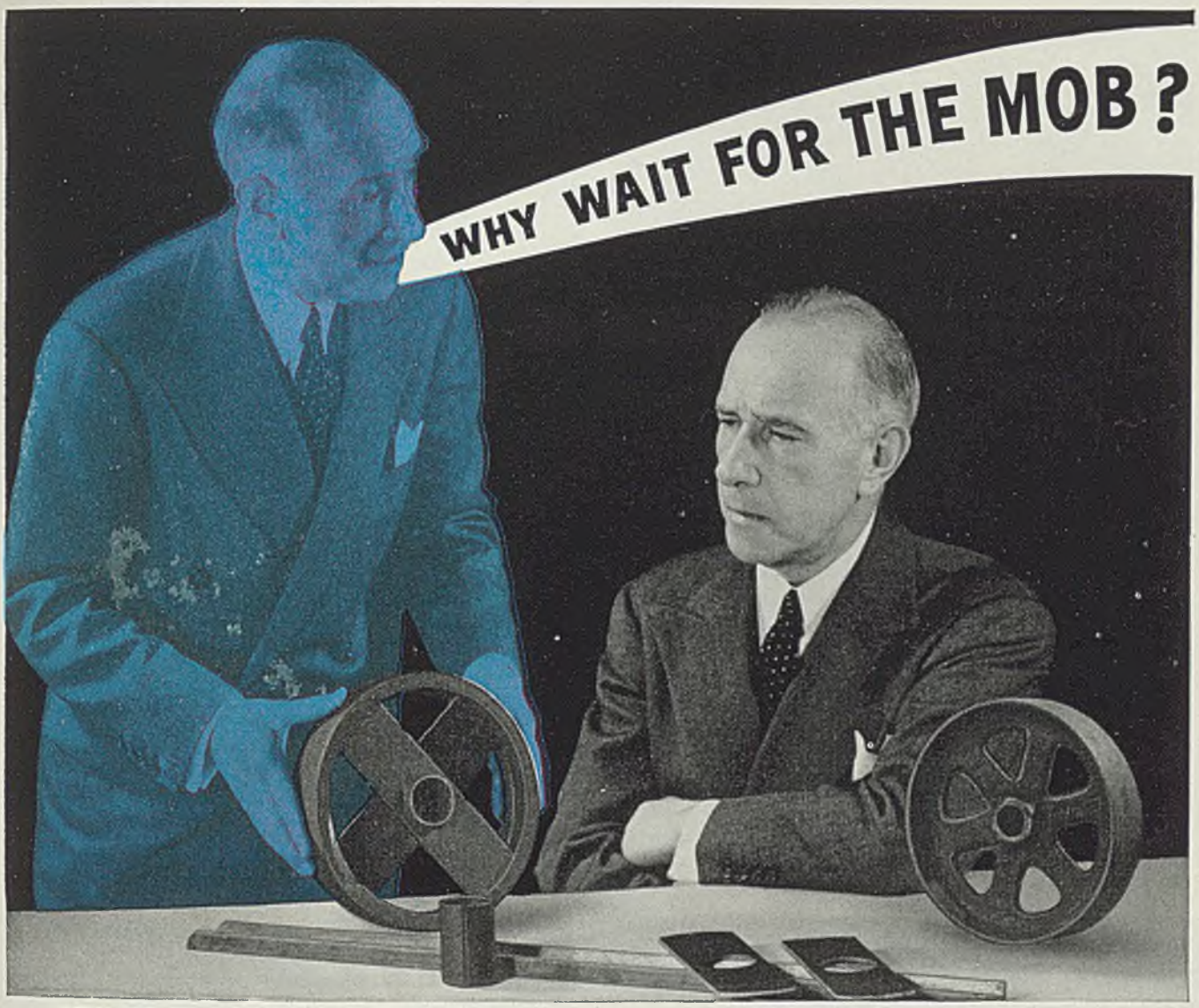
■ THE DEFENSE program has necessitated large volume production of housing units for training camps—an opportunity for makers of prefabricated steel houses. One company greatly enlarging its production facilities for making steel houses is Stran-Steel division of Great Lakes Steel Corp., Detroit. (See STEEL, Dec. 30, 1940, p. 13.) With large orders for defense housing, the company recently obtained two new multiple-spot welding machines to speed production. They were designed and built by Progressive Welder Co., 3031 East Outer Drive, Detroit and have a combined production total of 2400 lineal feet of Stran-Steel members per hour under present operating methods.

The new equipment is extremely flexible as it can handle all the numerous combinations of Stran-Steel sizes, shapes, etc., and so places the fabrication of all such material on a mass production basis. See STEEL, July 9, 1934, p. 23, for a description of the Stran-Steel method of making prefabricated elements for houses.

Previously riveted and later spot welded by means of a single spot machine, the entire line of Stran-Steel joists, studs, half studs, and narrow studs of light gage copper bearing steel is first formed into angles or channels and then so joined as to provide a nailing space along the entire length of each member. Projections formed by bubbles stamped at regular intervals along one section separate the two halves of each section a small distance to provide this nailing space.

Both welding machines are identical. Each employs 12 vertically opposed sliding contact guns and six welding transformers—two guns and six welding transformers—two guns and one transformer for each spot weld made. An air-hydraulic booster with a large reservoir and high pressure capacity is actuated by air to supply sufficient hydraulic pressure for the simultaneous operation of the 12 guns.

To accommodate any of the various width Stran-Steel members, provision is made to adjust the distance between the two rows of guns. Also, the guns may be moved for the proper spacing between spots longitudinally. Provision, too, is made for cutting out the guns on



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

Welded steel wheel.
Weight—11 lbs.
Cost—42c

Former wheel
Weight—17.5 lbs.
Cost—87.5c

ALTER EGO: So, you're still luke-warm about welding?

Well—some of our competitors use it and some of our customers are asking for it. But—I don't know—Let's make a survey of welding opinion.

ALTER EGO: Oh, so you want the mob to do your thinking? Don't you realize that progress thumbs its nose at the rut-bound crowd?

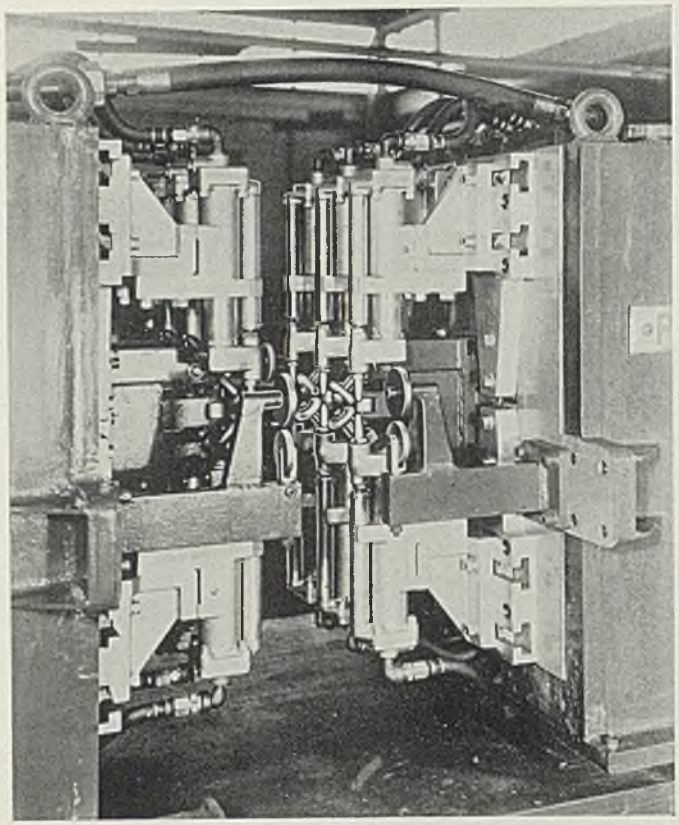
Well, far be it from me to get rooted in a rut.

ALTER EGO: Look how we got our wheels out of the rut. By thinking in terms of welding—using a piece of channel for the rim—two punched bars for spokes—a piece of pipe for the hub, we've saved 45 cents per wheel, 6.5 lbs. dead weight, and cut out delivery delays. That's Progress!

From now on let's do our own thinking for dozens of other parts like we did for the wheel. One at a time, so as not to hinder production. Let's out-maneuver the mob!

• •

LINCOLN SUGGESTS: *Faith* and *determination* will give you the full benefits of a welding program. Appoint a man with these qualifications and give him authority to get things done *quicker, better,* at *less cost* with arc welding. We *guarantee* your success. Write for "A Guarantee of Profits."



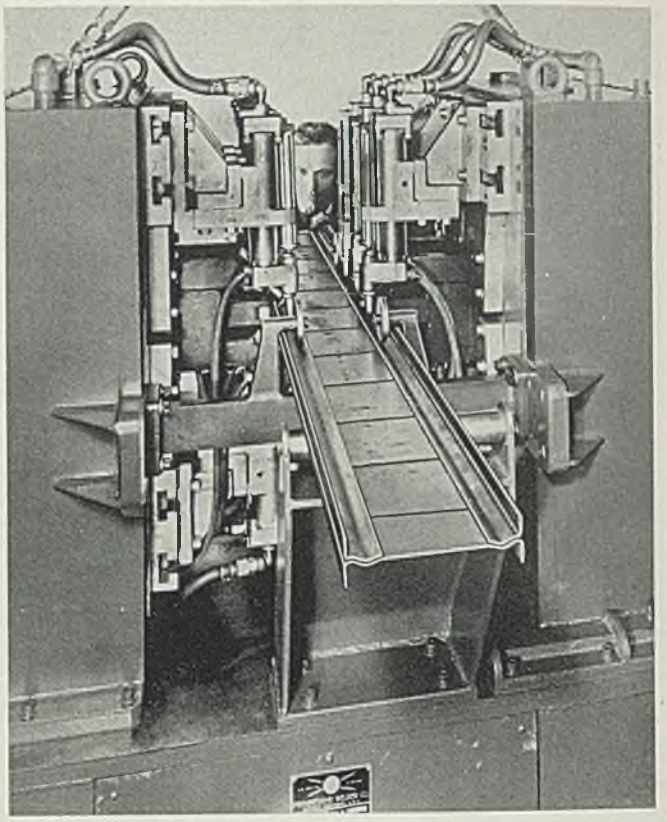


Fig. 2—Series of guide and rest rolls align the work during welding, left, while twelve sliding contact guns weld simultaneously

Fig. 3—Welds are located when bubbles in the underside of the channel section, right, drop onto guide rolls. Adjustment for various width shapes as well as for distance between welds is provided

either side, permitting the machine to be used for welding the half-stud members. These arrangements make each machine capable of welding almost any of the Strain-Steel sections.

Since the varying gages of metal require different welding pressure, weld time, and welding current, provision for adjusting each of these factors is made. Joists, for instance, are made up in 11, 12, 13, 14 and 16 gages.

Indicative of the versatility of the machines is the wide range of sizes handled: Web widths of members vary from about 2½ and 3½ inches per narrow stud and standard stud respectively up to 9 inches for the joist. Half studs, made up of two angle sections and welded with one set of guns only, are about 2 inches over all in web width. Flange widths for all are 2 inches.

One set of small rolls mounted inside the two rows of guns supports the work midway between the upper and lower welding points. These rolls also serve to locate the position of the spot welds which are made through each bubble in the member. Another set of rolls positions the work laterally.

When the work is placed in the welding machine, the section having the bubbles is on the under side. As the part is moved through the machine, these bubbles drop onto the rolls, thus positioning the work for welding.

Most of the members are studs made of two channel sections welded together to form an I-beam section.

Joists are made up by welding two angles to a single channel section. The operation for manufacture of both types is identical with only the preparation for welding being different.

Assembly of the sections prior to welding is done by the welder's helper, who places the angles for the joists in position and clamps them. The clamped assembly, usually measuring some 30 feet in length, then is started through the welding machine. The section is pushed through until the first bubble on each side of the section is in position at the first welding gun station, a weld is made and the "C" clamps removed.

The three bubbles on each side of the section are then positioned for welding by the three sets of guns. The operator closes the pilot and the 12 guns come together on the work making the six welds simultaneously, three at each side of the section. This is repeated until the entire section has been welded. The section is then cut into lengths required.

1940 Aircraft Exports Totaled $311,757,326

■ Exports of aeronautical equipment in 1940 totaled $311,757,326, according to a report recently issued by the Department of Commerce. This was 46 per cent of $677,606,199, aggregate of aeronautical exports since they were first separately reported in 1911.

Included in last year's exports and their combined value were: 3064 powered landplanes, $170,070,953; 72 landplanes minus engines, $3,436,465; 361 partial shipments of landplanes to be assembled abroad, $21,295,094; 26 seaplanes and amphibians, $1,541,156; partial shipments of seaplanes or amphibians to be assembled abroad, $3557; and nine gliders or lighter-than-air craft, $5090.

Other exports: 4986 engines, $49,873,823; engine parts and accessories, $19,724,433; instruments and parts, $7,303,386; propellers and parts, $9,967,196; parachutes and parts, $31,068,779; and other parts and accessories, $27,467,394.

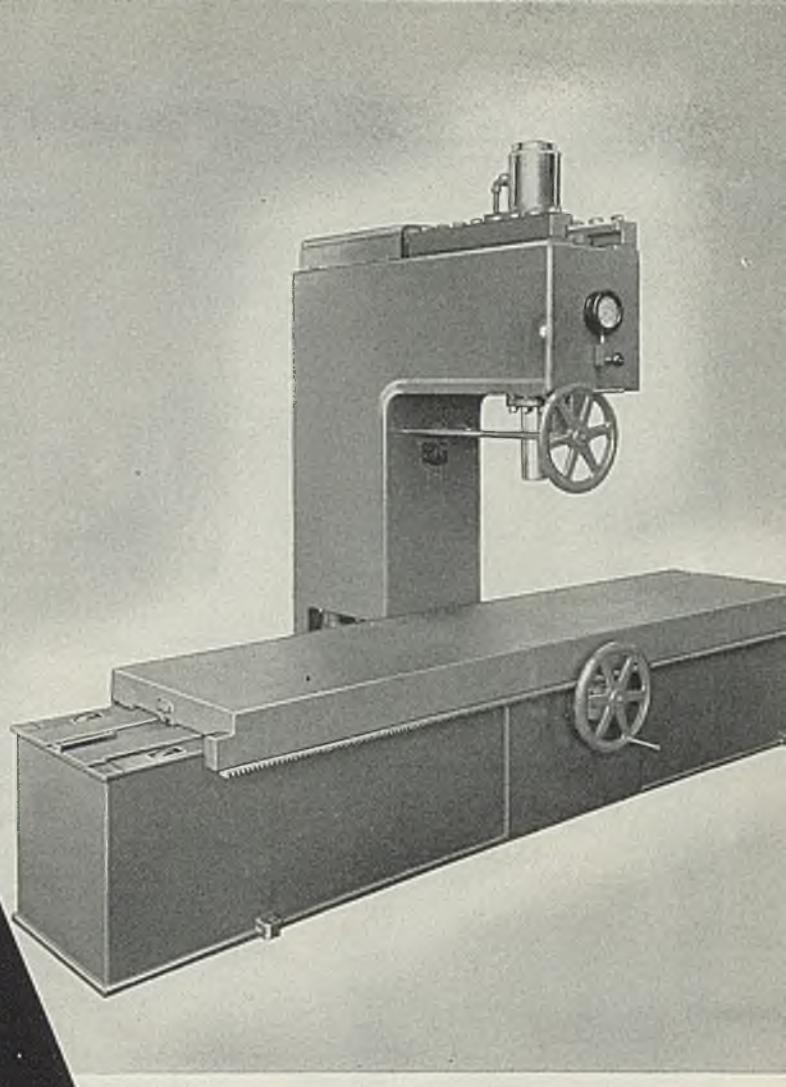
Fourteen large markets accounted for 96.2 per cent of the year's exports, remainder went to 70 other markets. Principal purchasers: United Kingdom, $134,543,037; France, $75,463,921; Canada, $33,994,473; Australia, $15,887,718; China, $11,087,467; Netherlands Indies, $6,128,729; Sweden, $5,231,384; Finland, $4,303,299; Union of South Africa, $4,033,849; Brazil, $3,013,606; Turkey, $2,458,860; Norway, $1,468,591; Argentina, $1,179,609; and Belgium, $1,150,083.

FIND OUT HOW MUCH YOU CAN SAVE

Stepped up production schedules call for speeding up machine performance and lowering costs. That's where Watson-Stillman are in a position to meet and solve the problems incurred by present peak loads.

For hydraulically operated machinery of any type—machines designed to achieve fast, high-quality, low-cost production—you may safely consult W-S engineers. W-S fits each machine to its intended task—including faster operation, with improved accuracy, positive control, plus endurance.

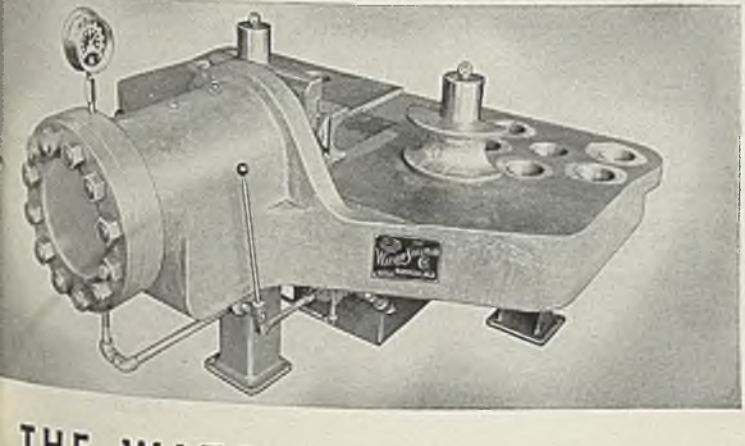
For more than 85 years Watson-Stillman has built hydraulic machines of all types to meet every industrial use. Watson-Stillman engineers may have the answer to that hydraulic problem which requires quick solution. A request will bring prompt attention.

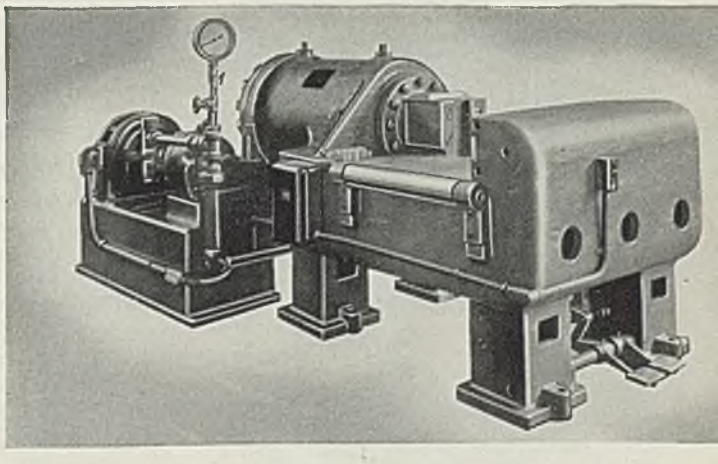


WATSON-STILLMAN

DESIGNED TO MEET MANY NEED

There are Watson-Stillman presses for forming, forcing, forging, extruding, bending, straightening, stamping, die sinking, plastic molding, dehydrating, assembling, briquetting and a host of other uses.





What more conclusive evidence could be asked of W sound design, experience, engineering and compete workmanship than is shown in the accompanying phot graphs. Top photo shows a 50-ton W-S Straighteni Press. Photo #2 shows a 250-ton W-S Double-Acting Ben ing Press. Bottom photo shows a 200-ton W-S Pipe Bend

LOOK into your PLANT

There are probably many jobs that could be handled FASTER . . . BETTER . . . and at LESS COST with

Hanna Cylinders

MODEL 4

MODEL 14

MODEL 17

TODAY'S production schedules demand the greatest possible efficiency from both men and machines. Check over operations in your plant — perhaps much of the work that's now being done slowly by sheer physical effort or obsolete methods could be performed more quickly, safely and economically by a Hanna Cylinder.

For example, the practicability of Hanna Cylinders has been demonstrated in improving the operation of equipment such as presses — shears — clutches — valves — brakes — strip reel pushers — hopper gates — furnace and oven doors — material handling equipment — assembly fixtures — furniture clamps — damper regulation — hoists — any place where a push or pull is needed, either directly or through levers or toggles.

Hanna Cylinders are built in a wide range of sizes, for pneumatic or hydraulic operation. Write for complete details.

HANNA ENGINEERING WORKS

1765 ELSTON AVENUE • CHICAGO, ILLINOIS

Air and Hydraulic RIVETERS	Air HOISTS	Air and Hydraulic CYLINDERS

Carburizing Small Parts

With Case Depth and Carbon Concentration Precisely Controlled

From 100 to 150 pounds of small steel parts are carburized effectively and economically in equipment which permits precise control of all factors, thus assuring uniform and accurately controlled results

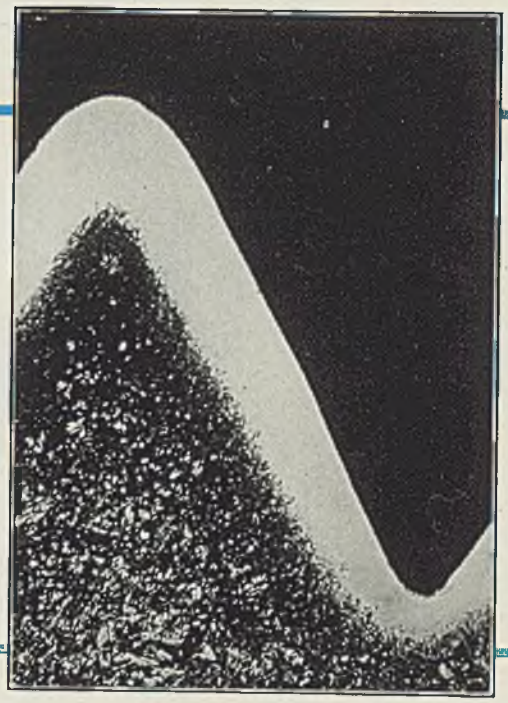


Fig. 1—Micrograph at 50 diameters showing cross section of carburized tapping screw thread as quenched. Depth of case is 0.007 to 0.008-inch. Figs. 1 and 2 by the courtesy of Illinois Tool Works, Chicago

By REGINALD TRAUTSCHOLD
Consultant

■ CONTINUOUS carburizing, as conducted at the plant of the Illinois Tool Works, Chicago, of shakeproof tapping screws—screws employed to fasten oil pans under automobile engines—has resulted in marked economies and close regulation of both depth of case and in uniformity of carbon concentration. A rotary-retort continuous heating machine, built by the American Gas Furnace Co., Elizabeth, N. J., is used. The work is discharged from the furnace directly into an adjacent tank of quenching oil. The carburizing medium is Chicago city gas, which is a mixture of 60 to 65 per cent natural gas and the balance producer gas, 800 to 850 B.t.u. per cubic foot.

The rotating gas-fired retort through which the work charge passes is a high nickel-chromium casting about 6 feet long and 10 inches in diameter inside. Internal spiral ribs advance the work through the furnace as it revolves and longitudinal ribs constantly tumble the work as it passes through the heating and carburizing zones. Actuated by an adjustable variable-speed drive at an average speed of 1 revolution per minute, the spiral ribs roll a work charge —50 to 75 pounds—through the heating zones in a matter of 25 or 30 minutes, the constant gentle tumbling of the work in passage preventing the deposition of any free carbon or soot, or the formation of a stagnant film of gas, on the work—the avoidance of such insulites being essential for uniformity in case formation.

The horizontal retort is heated by a series of gas burners located along one side of the machine. The products of combustion circulate freely around the rotating cylinder. The discharge end of the cylinder has an automatic trap door through which the advancing charge of carburized work falls into a chute leading to the quench tank. The carburizing gas is fed into the retort through a central covering plate at the discharge end, traveling against the flow of work. The spent gas passes through a vented valve in the removal cover at the loading end of the retort where it is burned.

During approximately one-quarter of each revolution of the retort, the trap door is open or partially open for the timed ejection of the treated work. In this interval a limited amount of the furnace gas from the surrounding combustion chamber enters the retort. The infiltration of this furnace gas, consisting of about 12 per cent carbon dioxide with the balance chiefly nitrogen and water vapor, serves to temper the over-rich carburizing city gas and prevent the formation of excess soot in the retort.

Cracking of Hydrocarbons: The carbon dioxide in the diluting furnace gas combined with the methane of the carburizing gas supply in the hot retort to form carbon monoxide and liberate hydrogen. During the carburizing of the work as it passes through the retort, there is a marked decrease in the methane component of the carburizing gas and an attendent increase in the hydrogen present in the spent gas, indicative of a cracking of the hydrocarbons, the CH_4 going to C plus $2H_2$.

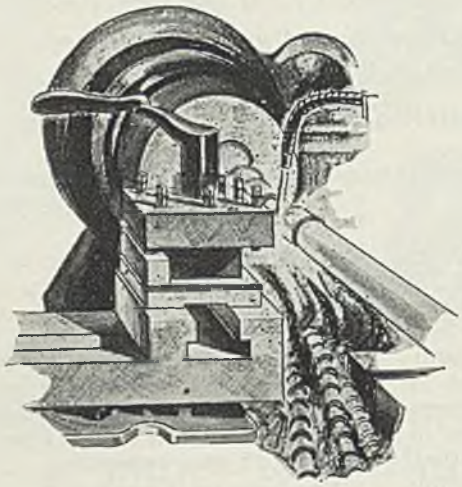
The presence of water vapor in the gas, however, serves in a measure to restrain the breakdown of the methane, as evidenced by the high residual methane and water contents of the gas leaving the retort. See the analyses in Table I.

Furnace Capacity and Operating Procedure: Some 100 to 150 pounds of screws per hour are carburized, a charge of 50 to 75 pounds being fed to the retort each half hour on an automatic time signal. To recharge, the operator first extinguishes the flame of the escaping spent carburizing gas, removes the feed hopper cover and flashes the gas trapped in the hopper and then shovels in a couple of 75-pound scoopfuls of fresh screws. Next the hopper cover is replaced, the gas vent relighted and another charge of work is made up for the next half hour loading of the machine.

Temperature is controlled automatically in both the heating and carburizing zones of the rotating retort and the quality of the steel used

TABLE I—Volumetric Contents of Carburizing Gas in Per Cent

Component	At Retort Inlet	At Retort Outlet
Methane—CH_4	64.3	30.9
Hydrogen—H_2	22.0	46.9
Carbon Monoxide—CO	5.6	9.3
Carbon Dioxide—CO_2	1.1	1.2
Oxygen—O_2	1.5	1.4
Nitrogen—N_2	4.7	8.9
Water Vapor—H_2O	0.8	1.4
Total	100.0	100.0



. . . PRODUCTION WAS SPEEDED UP. . .

REPAIRS CUT DOWN !

...when they switched to TYCOL CUTTING OIL

For the past four years a well-known machine tool builder has been using Tycol Non-Tarnishing Sulphurized Cutting Oil for all general purpose cutting and forming operations in screw machine work. In addition to proving satisfactory for a wide range of steels, this *sulphurized* oil is used in machining bronze without tarnishing the metal. This desirable characteristic eliminated the necessity of holding machine schedules to one type of metal. The result was increased machine production with a wide range of metals thus eliminating waste. » » » Other plant managers have speeded up production with Tycol Cutting Oils and have found these products an insurance against frequent tool regrinding and tarnishing of work and have enjoyed increased production.

Speed Up Production . . .

Tide Water representatives will be glad to assist you in selecting the proper Tycol Cutting Oil "engineered to fit your needs". Write today for full details.

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

TIDE WATER ASSOCIATED OIL COMPANY

EASTERN DIVISION

17 Battery Place • New York, N. Y.

INDUSTRIAL TYCOL OILS-GREASES

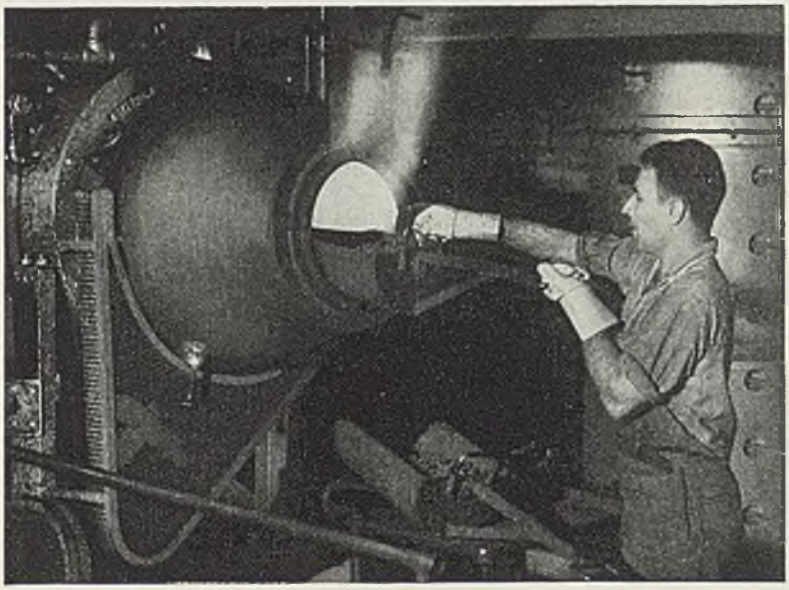


Fig. 2—Operator opens and removes hopper cover, flashes gas trapped in retort, and shovels in 75 pounds of screws. Then retort is closed and gas escaping through vent ignited

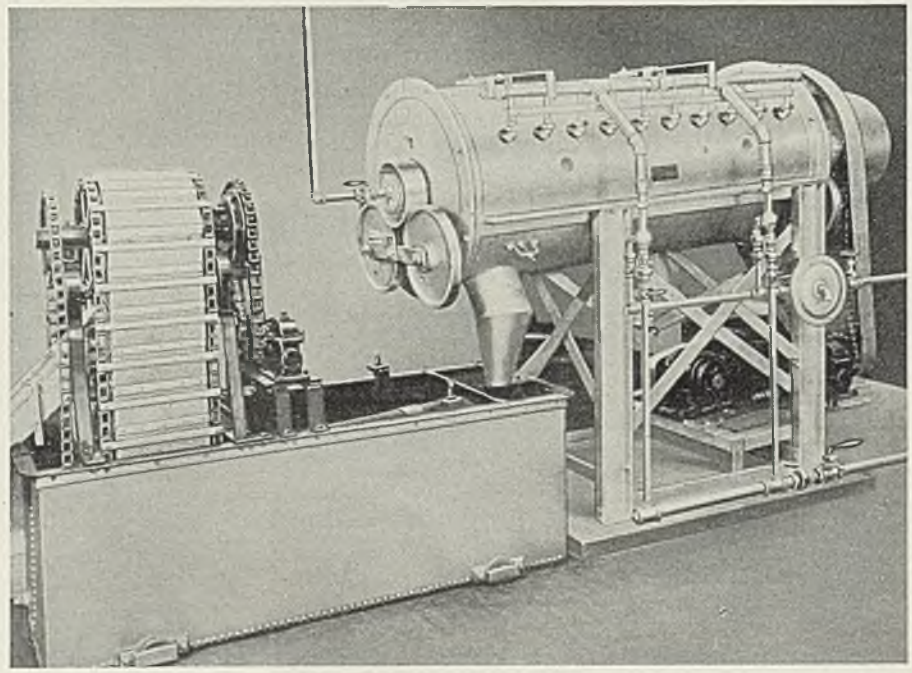
for the tapping screws is such that the direct oil quench follows a closely-timed carburizing heat of 1750 degrees Fahr.

A manometer in the gas supply line shows the rate of flow of carburizing gas, 15 to 25 cubic feet being required for each 150-pound charge of tapping screws. Extremely accurate regulation of the temperatures in the heating and carburizing zones is secured automatically by pyrometer control instruments at either end of the retort. At the discharge end, the thermocouple that maintains the proper carburizing temperature extends through the end of the retort well into the carburizing zone, while the thermocouple for the inlet end is located near the center of the heating zone in the combustion chamber.

Flexible Control: These thermocouples and their associated control equipment exercise exceptionally precise control over the hardening temperatures. This control combined with suitable gas atmospheres subjects each individual tapping screw to exactly the same carburizing cycle. Thus the work on withdrawal from the quenching tank is protected by a uniform case of evenly carburized steel to a substantially constant depth of 0.007 to 0.008-inch.

The depth of case is governed, of course, by the speed at which the retort is rotated and the temperature of the furnace. Since both of these factors are susceptible to close adjustment and since the concentration of carbon is well controlled, the results can be held precisely at the point wanted.

Fig. 3—Continuous carburizing machine made by American Gas Furnace Co., Elizabeth, N. J., has rotary-type retort and discharges directly into oil quench tank without contacting the air. Note conveyor lifting work from quench and discharging it over a draining screen



Device Determines Center of Gravity

■ A device which determines the center of gravity quickly and accurately is offered by Soweigh Scale Co., Delavan, Ill. Similar to a platform scale in appearance, it will locate the center of gravity of any object placed on its platform and at the same time give the weight of the object without changing its position on the platform.

With the device, accurate design assumptions may be determined for units which are to be used in the assembly of airplanes, watercraft or in any transport device where balance and trim are an important factor. Location of center of gravity also may be determined in huge castings in which close control is impossible, or determinations may be made accurately on a loaded airplane to insure safety in flight. The company is making preparations to offer units up to 100 tons capacity.

Safety Code Issued For Foundry Industry

■ *Code of Recommended Good Safety Practices for the Protection of Workers in Foundries,* 1940, published by the American Foundrymen's Association, 222 West Adams street, Chicago, for $2.50 to nonmembers and $1.25 to members.

This code of recommended good safety practices has been developed to cover necessary engineering and good housekeeping requirements, as well as specifications for personal protection, wherever such operations may be carried on in the gray iron, malleable, steel and nonferrous branches of the foundry industry. The code also covers prime movers, the pattern, machine and maintenance departments, which are considered as a part of the foundry in their operation.

This is the fifth of a series of recommended good safety practice codes developed by the American Foundrymen's Association industrial hygiene codes committee, approved by the board of directors as recommended practices for the foundry industry. The work of the codes committee provides an exceptional service to the foundry industry as a whole.

BESSEMER

Steelmaking Practice

Manufacturers of bessemer steel in their efforts to increase production are stressing the importance of maintaining a high standard of quality. Any measure to insure a closer control over steelmaking variables will also aid in the revitalization of the bessemer process. Various important phases of the bessemer process of steelmaking on a quality basis are discussed in the accompanying article including the newly devised method of flame control

■ WITH steelmaking capacity of the nation operating at a maximum rate, increased attention to technical and metallurgical details involved in the production of bessemer steel is bearing considerable more fruit than in recent years. Recapture of fields of application once considered the birthright of bessemer steel, but in recent years supplanted by open-hearth grades appears possible.

This fact was brought out at the 154th meeting of the American Institute of Mining and Metallurgical Engineers, New York, Feb. 17-20, by L. D. Woodworth, chief metallurgist, and E. E. McGinley, metallurgist, Carnegie - Illinois Steel Corp., Youngstown district, Youngstown, O.

Combined properties of good weldability, machinability and stiffness are admitted which fully explain the strong entrenchment of bessemer steels in certain fields, these merits being well understood; among them screw steels machines in automatics, skelp for small-diameter buttwelded conduit and various tin plate applications.

Justification of old ideas of inferiority of bessemer steels in respect to physical properties for some uses is challenged by Mr. Woodworth, who points out the lack of metallurgical knowledge at the time such claims were accepted, which caused investigators of service failures to ascribe them, for want of a better reason, to the fact that a part was of bessemer steel. Outlining a series of tests on the physical properties of bessemer vs. open-hearth steels with Mr. McGinley, he found that contrary to general belief, impact strengths of bessemer are fairly comparable for any given ultimate strength even though bessemer steel will tend to have a coarser structural grain size because of deoxidation practice utilized and finishing mill practice purposely employed to acquire other desirable properties.

Tests were made with bars in "as rolled" condition, and, determining tensile strength for equivalent carbon content, bessemer showed an average of 15,000 p.s.i. greater, and conversely for the same tensile strength, bessemer requires on an average 0.14 per cent less carbon. Average phosphorus content for bessemer was 0.090 per cent while for open hearth it was 0.013 per cent and it would appear the higher strength is attributable to the higher phosphorus content.

Temperature Control Important

As in any steelmaking process, Messrs. Woodworth and McGinley stress the importance of temperature control and degree of oxidation in bessemer production. Material advancements in both directions have been made in recent years. Several devices to aid in controlling steel temperature in the vessel are available to the blower. Every effort is made to confine the teeming temperatures within recommended ranges, and, by constantly checking temperatures from heat to heat, the blower is informed of any variation in temperature. When necessary, corrective measures can be applied on succeeding blows.

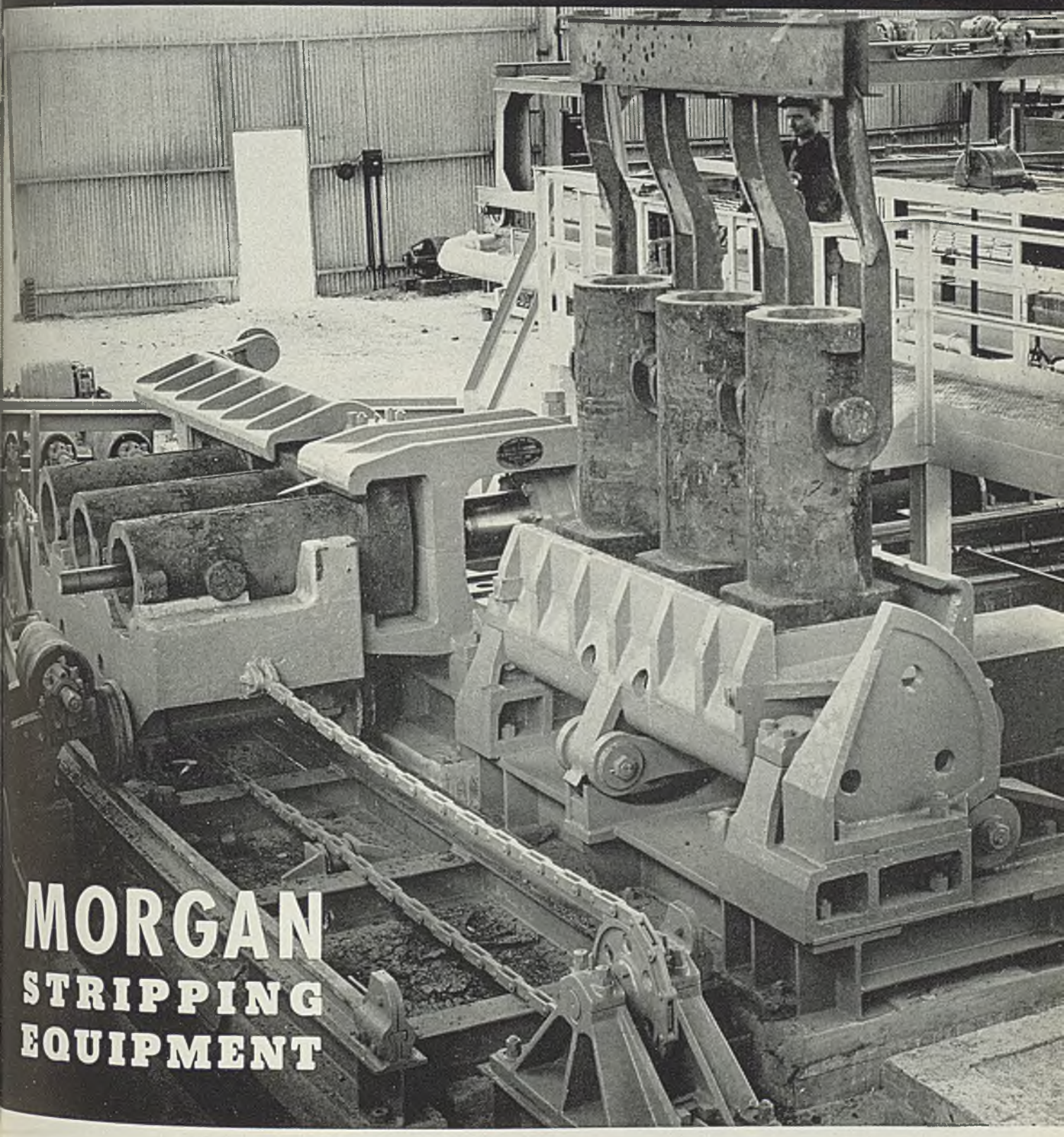
Variations in the chemical analysis (particularly silicon) and physical heat of the iron must be compensated for if uniform temperatures are to be obtained. The addition of a regulated amount of scrap to the metal bath in the early part of the blow is the best corrective measure for temperature control, they claim. During the course of the blow other measures can be taken—the introduction of steam into the blast main as a coolant or the tipping of the vessel for side-blowing to increase the temperature. Either of these two methods are to be avoided, since they introduce several additional variables.

Warning against either extremes of temperature, Mr. Woodworth cited difficult pouring, scabby ingots and skulls resulting from low temperatures while extremely high heats are detrimental to both quality and economical operation. High heats are also bad for the surface of the semifinished product in the making of rimmed or capped steel. Delayed rimming action will result and also the lenticular blow holes, notably in the lower portion of the ingot will extend almost to the surface. These will be exposed and appear as flaws and seams on the semifinished product in subsequent heating and rolling operations. Hot heats are also difficult to properly deoxidize in the semikilled grades. Erratic mill yields, inferior surface, stripping delays and other objectionable production problems also arise from extremely high heats.

Existence of an optimum teeming range, 2860 to 2890 degrees Fahr. is indicated by extensive studies on screw steel. Influence of teeming temperature on surface quality is found to be the same for this grade of steel as for capped and rimmed steels. Also the teeming temperature of screw steels exerts a marked influence on the internal soundness of ingots and the tendency toward piping as reflected in decreasing blooming mill yields. Most of these steels are made semikilled to attain maximum machinability, necessitating the addition of a deoxidizer to the steel in the molds.

Effectiveness of this deoxidizer is directly dependent on the teeming

BUILT BY MORGAN *Engineering*



MORGAN STRIPPING EQUIPMENT

Above is shown equipment for stripping alloy hot top ingots, consisting of two hydraulically operated ingot mold tilting machines, one 100-ton hydraulic stripper, and one mold car, all controlled by one operator. • Molds with ingots are transferred three at a time from pouring platform tilter, are locked in position and tilted onto transfer car. • The ingot car conveys molds to stripper where they automatically engage with stripper head and are stripped, one at a time, to conveyor table. • After stripping, the molds are moved to second tilter to be returned to original upright posi-

★ DESIGNERS • MANUFACTURERS • CONTRACTORS

BLOOMING MILLS • PLATE MILLS • STRUCTURAL MILLS

★ ELECTRIC TRAVELING CRANES • CHARGING MACHINES

INGOT STRIPPING MACHINES • SOAKING PIT CRANES

★ ELECTRIC WELDED FABRICATION • LADLE CRANES

STEAM HAMMERS • STEAM HYDRAULIC FORGING

PRESSES • SPECIAL MACHINERY FOR STEEL MILLS

★

THE MORGAN ENGINEERING CO., Alliance, Ohio

temperature, the amount necessary varying for different conditions. Large fluctuations in teeming temperature make it difficult to gage the proper amount of deoxidizer to use. Close co-operation between the metallurgical observer and the blower has, on the average, been found to result in a high percentage of the blows falling between the optimum pouring temperature range. Over a period of observation, Messrs. Woodworth and McGinley found approximately 87 per cent of the capped skelp blows fell within the temperature range of 2870 to 2910 degrees Fahr. with 7.5 per cent higher and 5.5 per cent below this pouring range. For screw steel the distribution is slightly wider, 87 per cent of the blows falling within the range of 2850 and 2900 degrees Fahr., while 7.5 per cent are higher and 5.5 per cent lower than this range.

The bessemer process well exhibits the physical-chemical reactions between oxygen and metalloids when brought into contact at high temperatures. Oxygen in the air entering the tuyeres oxidizes the iron to FeO which in turn oxidizes the silicon, manganese and carbon in the pig iron in the order mentioned. While these reactions are taking place simultaneously, speed of the reactions for the removal of each element differs greatly. Before the oxidation of the carbon develops to material degree, silicon and manganese are practically eliminated. As elimination of these metalloids proceeds the iron oxide content increases slowly until the end point of the blow is reached; silicon has been eliminated while the carbon and manganese are down to such a point that further elimination is at a less accelerated pace. Oxide content of the bath starts to increase rapidly and may double in 10 or 15 seconds. Close control is important at this period of the heat.

Observation of a number of heats of skelp and screw steel (SAE X-1112) reveals several interesting points when the blow of screw steel is "young" and skelp steel "full", or turning down of the vessel shortly after the end point in the first case, and carrying the blow further along, in the second. The tests are taken from the stream while pouring from ladle to mold. A large difference in the iron oxide exists between skelp and screw steel. While this difference is influenced to a certain degree by the higher manganese specification for screw steel (usually 0.60 to 0.90 per cent manganese as compared with 0.35 to 0.50 manganese for skelp), the biggest factor contributing to the difference is the blowing time after the end point. Iron oxide samples taken before and after the manganese addition, for both skelp and screw steel, showed the iron oxide content of the molten steel was reduced approximately 50 per cent by the manganese addition.

Analysis of Studies

It would appear that for skelp 87 per cent of the blows studied fell within the range of 55 to 75 per cent manganese efficiency, while for screw steel 88 per cent of the blows fell within the range of 70 to 85 per cent manganese efficiency.

Another feature receiving considerable study by Messrs. Woodworth and McGinley is the amount of nitrogen in bessemer steels and the factors controlling it. It has generally been thought that the factors governing the amount of nitrogen pickup in blowing are:

(a) The length of (1) total blowing time and (2) time interval from end point to turn down.
(b) Temperature of the blow.
(c) Carbon content of the bath.

Some experimental work has been done regarding the relation between blowing time and nitrogen content at the plant, but the results so far have been negative.

Data that have been published and the experiences of different Carnegie-Illinois bessemer plants indicate that different plants produce a slightly different nitrogen range. Thus, one plant may average 0.011 per cent nitrogen and another may average 0.015 per cent. The reasons for this are probably tied up with the individual plant's equipment, raw materials used, and practices, according to Mr. Woodworth.

Method of controlling the bessemer steelmaking process by means of photocells was described by H. K. Work, manager, research and development, Jones & Laughlin Steel Corp., Pittsburgh. The practice gives rapid and quantitative indication of changes in flame which are recorded for each heat.

Dealing primarily with the acid bessemer process in bottom-blow converters, photocell control data obtained are also applicable to considerable degree to basic and side-blow vessels. Touching on the definite metallurgical limitations to the use of bessemer steel due to physical properties conferred by nitro-

(*Please turn to Page 92*)

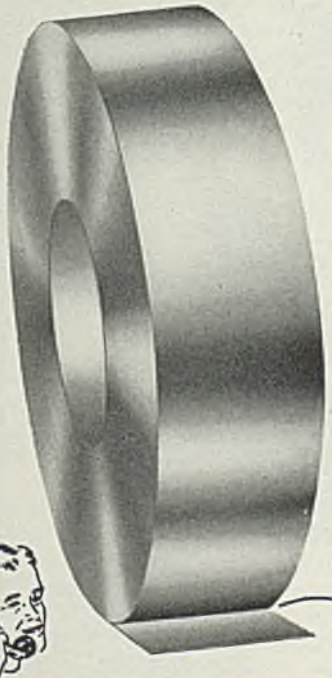
Pedettes for the Pedal Extremities

■ **With the donning of a pair of Pedettes designed by Protex Products, Jersey City, N. J., wet or cold feet no longer need be the lot of those workers whose duties expose them constantly to these uncomfortable experiences. Made of Goodyear's Pliofilm, these foot-shaped slippers are thin, pliable, extremely light in weight but tough and semiplastic. They conform to the shape of the foot and do not crowd even in snug shoes. Being waterproof and airtight, they retain the body heat**

THE SAME OLD STORY...

AND HOW IT WAS CHANGED BY..

CMP STRIP



It was a typical case and costly, too — 600,000 automotive parts were involved for a special job, and then came the upset in the production schedule.

The P.A. thought the required amount of special analysis steel had been ordered. But unfortunately the strip made by mill "A" was rolled on the heavy side of gauge. Although the weight was there, the footage wasn't — so excuses had to take the place of finished parts and full profits. Perhaps, the P.A. was at fault for not emphasizing gauge accuracy, but by then it was too late to matter who was at fault.

Now CMP strip is specified, and orders meet all requirements, including footage, because gauge accuracy is a CMP specialty — definitely mentioned or not, CMP strip is rolled to very close limits. The more accurate to gauge, the more feet per pound and the more finished parts per 100 pounds.

You can always depend on CMP strip giving extra values. Request a CMP representative to call — he will be glad to make recommendations for your consideration.

Phone Youngstown 4-3184

Talk to a CMP executive right at the mill for real cooperative service. Large stocks of CMP strip in regular carbon and spring steel analyses and tempers in various finishes and sizes, are ready for quick shipment.

CMP PRECISION COLD ROLLED

STRIP STEEL

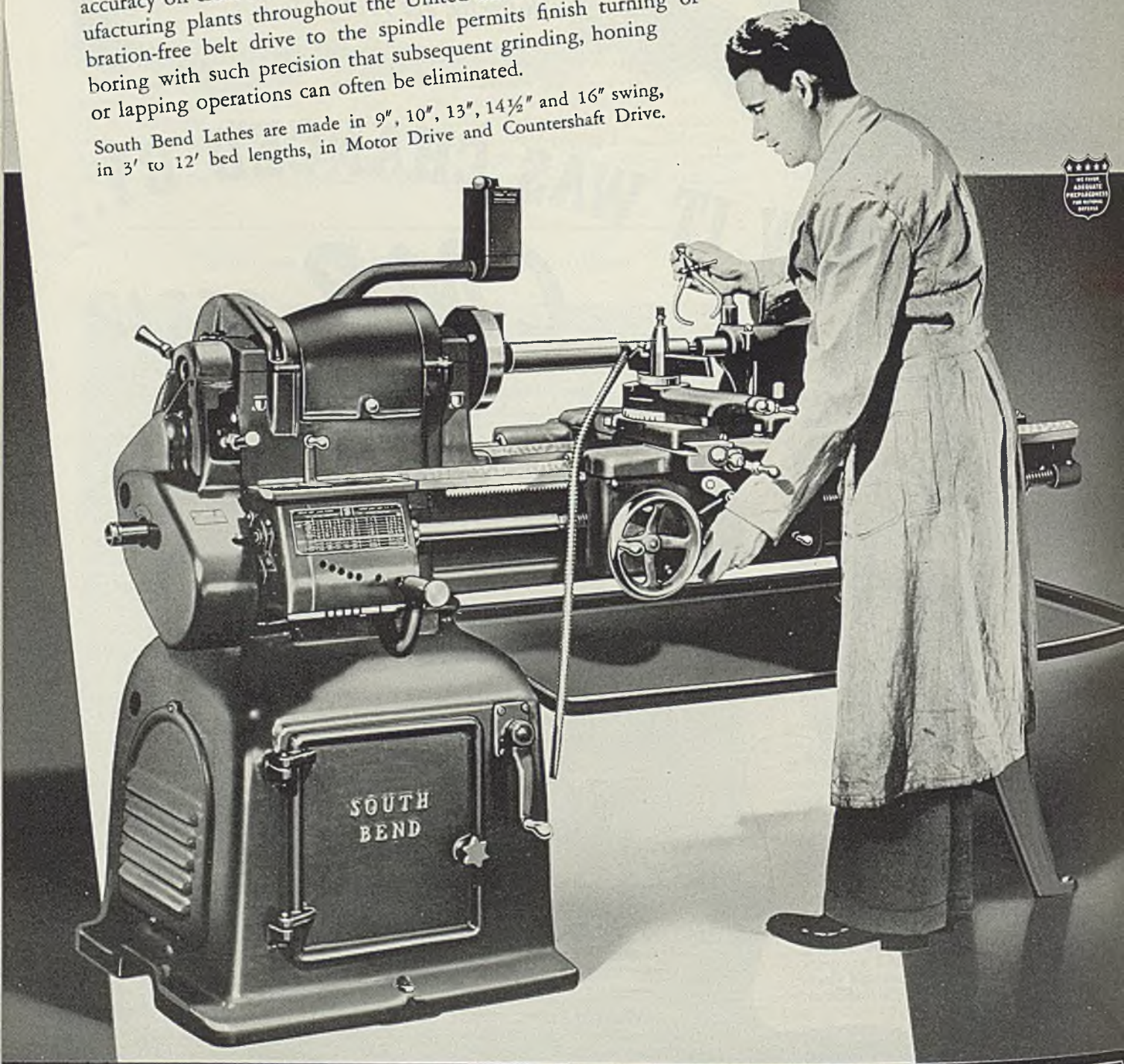
THE COLD METAL PROCESS COMPANY
YOUNGSTOWN • OHIO

THE *Precision* REQUIRED FOR MODERN INDUSTRY

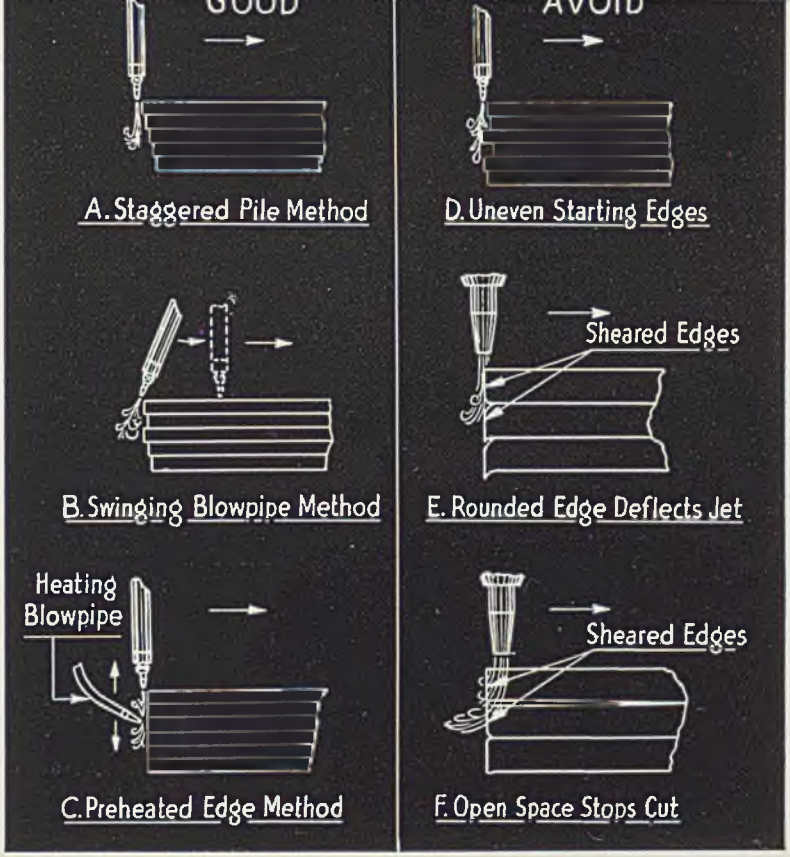
SOUTH BEND LATHES

South Bend Lathes are designed and built to provide the extreme precision required in modern industry. They are giving tool room accuracy on close-tolerance production work in hundreds of manufacturing plants throughout the United States. The smooth, vibration-free belt drive to the spindle permits finish turning or boring with such precision that subsequent grinding, honing or lapping operations can often be eliminated.

South Bend Lathes are made in 9″, 10″, 13″, 14½″ and 16″ swing, in 3′ to 12′ bed lengths, in Motor Drive and Countershaft Drive.



SOUTH BEND LATHE WORKS



Good starting practices are shown in A, B and C. Poor starting practices such as shown in D, E and F should be avoided. Arrows indicate the direction of the blowpipe motion

Things To Remember

WHEN STACK CUTTING

With the Oxyacetylene Torch

Preparations to bring about efficient results in using the cutting torch for stack cutting may only prove to be wasted effort if the operator makes one false move during the cutting procedure. Anyone involved in this type of work may profit from the accompanying hints which The Linde Air Products Co., New York, recommends as good practice for accomplishing a successful job

■ IN ANY stack-cutting operation certain advance preparations, such as proper cleaning, stacking and clamping of the plates or sheets, are necessary to obtain satisfactory results. This preparatory work, however, may be wasted as far as results are concerned if the cut is not started properly. A false start usually damages the edges of several plates, and produces conditions that make a second start extremely difficult. For this reason, in some respects, the starting of the cut on stacked plates is the most important part of the operating technique. To guard against mishap at the beginning of the cut, several methods of starting are commonly employed, as shown in the accompanying sketches.

Sketch A illustrates one of the most simple methods—the staggered-pile method. Here the plates are piled so that each plate in the stack projects slightly beyond the one below. Although the individual plates are well aligned with one another, the edge of the stack at which the cut is to be started slopes slightly inward from top to bottom.

Plate or sheet stacked in this way is cut in the same manner as a single piece of metal. The cutting action, however, starts in the top plate first, and gradually progresses down through the stack, plate by plate, as the blowpipe advances. This starting procedure consistently yields cut surfaces of high quality.

The swinging-blowpipe method is another cut-starting method which is used extensively. The stack is prepared and clamped in the normal manner, but the cutting machine is fitted with a special attachment for holding the blowpipe. This provides for adjustment of the blowpipe at an angle along the line of cut.

The starting procedure is the same as in other machine-cutting operations, except that the blowpipe nozzle is slanted away from the stack at the start, as in B, referring to the sketches. Cutting progresses downward through the stack as the nozzle advances at the set angle. When the cut pierces through the whole stack, the blowpipe is adjusted back to vertical for the remainder of the cut. This adjustment must be completed while still cutting in the scrap material.

Starting a cut by this method has the advantage of requiring less care in the alignment of the plates in the stack, but requires extra blowpipe manipulation during cutting.

A third starting procedure, identified as the preheated-edge method, is the simplest of all and is highly effective provided the edges of the plate or sheet in the stack are straight and square. The stack of

plates is built up to the desired height and arranged so that the starting edges are aligned vertically before clamping. Uneven edges like those in D are avoided.

As soon as the cutting blowpipe has been lighted and adjusted, and the cutting machine is ready to be started, the flame of a welding blowpipe is played on the edge of the stack at the starting point of the cut. As indicated in sketch C, the heating blowpipe is moved up and down across the edge of the stack until the edges of the plate are brought to the kindling temperature. Then the cutting machine is moved into position and the cut is started.

Improper piling of sheared plates often makes the starting of a cut difficult. Plate edges cut with the average shear are slightly rounded at the top and have a deformed bottom edge which has been distorted downward by the action of the shear blade.

If the sheared plates are piled so that the rounded edges face upward, these rounded edges will have a tendency to deflect the cutting jet, as in E, and result in a false start. On the other hand, wherever deformed bottom edges face each other in the stack, open spaces are formed between the plates, as shown in sketch F. Such open spaces usually will stop the cut.

One way of avoiding both of these difficulties is to select plate which has at least one oxyacetylene-cut edge at which to start the cut. When this is not practicable, stack the sheared plates so that all of the *rounded* edges face *downward* and cut by any of the methods previously described.

Conditions also often arise where cutting cannot be started from the edge of the stack. Under these circumstances a drilled hole serves as a starting point and special care must be exercised to avoid a false start.

First of all, burrs should be removed from the edges of the drilled holes; second, the plates should be stacked carefully so that the sides of the holes are in vertical alignment.

If the drilling operation is accomplished after the plates are clamped in position, alignment of the holes is no problem but, where this is impracticable, alignment is easily assured by inserting a bolt or drift pin of proper diameter through the holes to hold the plates in position until they are clamped together. Upon removal of the bolt or drift pin, the cut can be started at the hole without difficulty.

Devises Formula for Predicting Yield of Coke and By-Products

■ PROPERTIES AND AMOUNTS of coke and by-products obtained from carbonization of coal can now be predetermined, Dr. H. H. Lowry, director of the Coal Research Laboratory of Carnegie Institute of Technology, Pittsburgh, announced recently. Dr. Lowry's method establishes for the first time a formula whereby an analysis of coal, correlated with the temperature at which it is to be coked (carbonized), accurately forecasts the resulting qualities and amounts of coke and its by-products of tar, gas, and ammonium sulphate. His research is considered as offering industry increased economy and scientific control over the results of the coking process. The economy results from the elimination of costly oven tests which may be replaced by the much simpler and cheaper analysis of the particular coal used. The control results from the ability to forecast what results any type of coal will give under coking.

The culmination of six years of research, with assistance from H. G. Landau and Leah L. Naugle in the coal research laboratory at Carnegie Tech, Dr. Lowry's paper was released before a meeting of the American Institute of Mining and Metallurgical Engineers, New York.

One large steel company, Dr. Lowry revealed, by using his formula for the past year, has been able to save many thousands of dollars in the single item of eliminating the sulphur analysis of coke.

Dr. Lowry's research also assures more accurate planning in the production of the coking by-products, all of which are important in the industrial defense effort. The chief by-products are tar, gas, ammonium sulphate, and light oil. Toluol, from which TNT is produced and a shortage of which caused grave difficulties in America's World War I program, is one of the important constituents of light oil.

May Boost Pig Iron Production

What yields of these by-products may be obtained from various coals under various temperatures may be figured from Dr. Lowry's formulas, assuring maximum production.

Carrying Dr. Lowry's work a step further, M. A. Mayers and H. G. Landau, also of Carnegie Tech's Coal Research Laboratory, announced before the A.I.M.M.E. a method for controlling the properties of pig iron and the economy of its production in blast furnace operation. This method ascertains the particular qualities in the coke necessary to produce certain qualities and quantities of pig iron under specific conditions of operation and ore analysis.

The research showed that as the "shatter index" of coke was improved the amount of coke needed to produce a ton of pig iron decreased and the production capacity in a given period increased. In the furnace where tests were run, it was found that improving the "shatter index" by one point increased the rate of production by 3 per cent, while the amount of coke required to produce a ton of iron decreased.

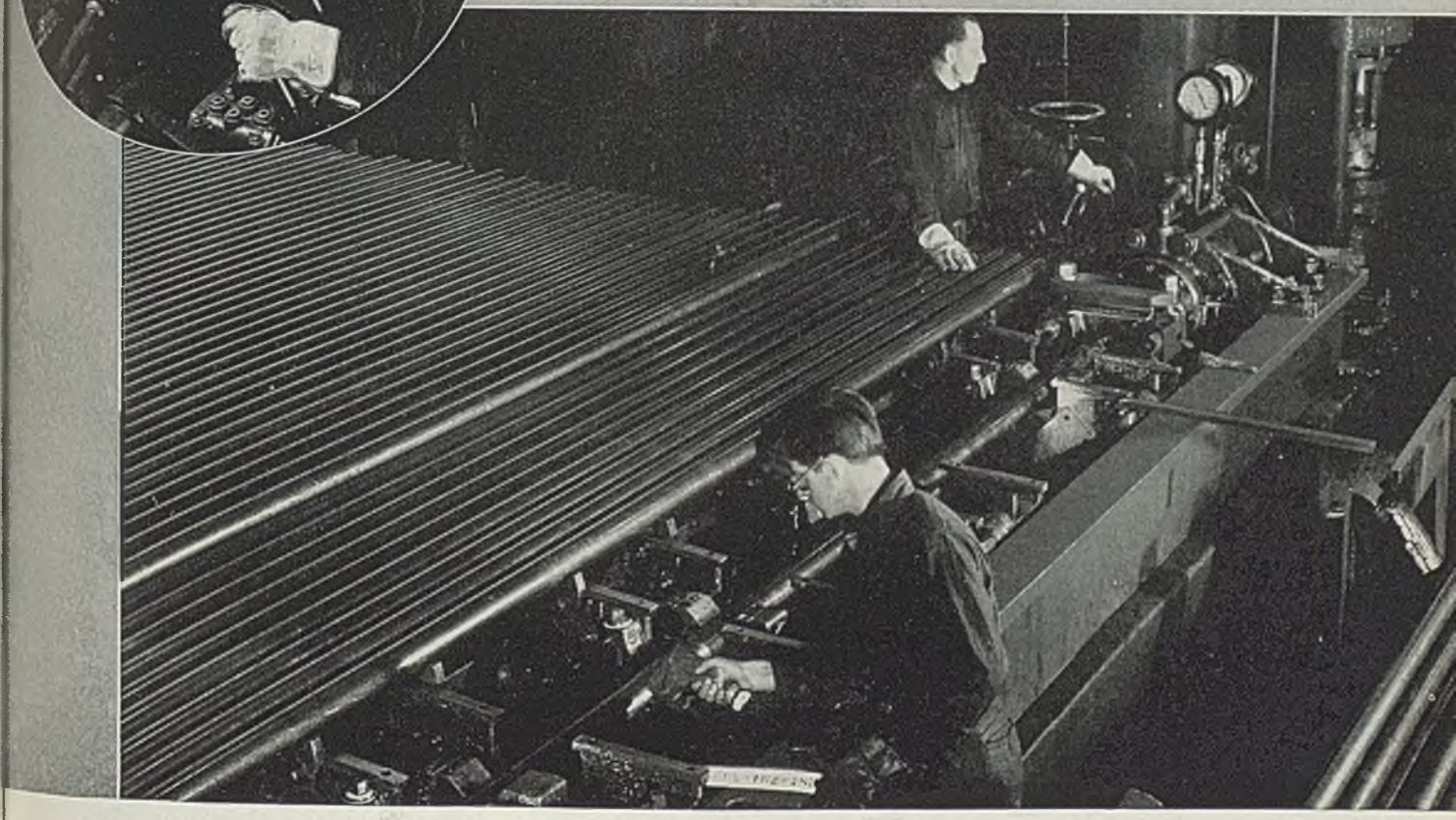
Formulas were developed in this research whereby for the first time

Saucepans that "Went Through a Fire"

■ These two stainless steel saucepans were among those taken from the ruins of a warehouse fire. The steel was turned blue by the intense heat, and the Carrollton Metal Products Co., Carrollton, O., was able to reclaim them without difficulty after the pans had been returned by the customer. The one at the right, which was reclaimed by polishing, shows that the heat discoloration was purely superficial. Slight heat-tint appearing from accidental overheating can be removed easily with ordinary scouring powder

This moving finger writes:

"INSURANCE AGAINST SHUT-DOWNS"



● Up goes the indicator on the dial—up, up past the 1000-pound mark to 2000, 3000, 4000, 5000 pounds or more, depending upon the size and gauge of the Republic ELECTRUNITE Tube being tested hydrostatically. The tube is vibrated while under pressure. Then the pressure is released and down comes the indicator—a finger that has written "SAFETY" for another boiler user.

Why is this test made at pressures so far in excess of the 1000-pound A. S. M. E. code requirement? To provide insurance against shut-downs by making certain that every ELECTRUNITE Tube will be capable of carrying as much overload as the steel itself can withstand.

ELECTRUNITE tests are made at pressures within 20% of the minimum yield point of the steel. For example, a 3″ x 12 ga. tube is tested at 1900 pounds, a 2″ x 13 ga. at 2550 pounds and a 1″ x 13 ga. at 5700 pounds. And, although extremely high in test value, such pressures are safe to use because they are held below the point where the steel or tube structure might be weakened by excessive strain.

The next time you buy, build or retube a boiler, think of this test made to provide you with better tubes. It is only one of a long series that insure easy installation, low costs, long life and protection against shut-downs when you use ELECTRUNITE Boiler Tubes. There are many other interesting facts in the full story. Why not ask us to send you literature? Steel and Tubes Division, Republic Steel Corporation, Cleveland, Ohio.

REPUBLIC

REG. U. S. PAT. OFF.

ELECTRUNITE

ELECTRIC

blast furnace operators may calculate the quality, economy, and rate of production of pig iron from the properties of the coke used. For these calculations preliminary data, defined in the paper, must be collected on each specific blast furnace operation.

Although the importance of coke properties in pig iron production was always realized, no previous scientific method for forecasting results had been worked out because of the many variable conditions involved.

Reaffirms Practice on Open Web Steel Joists

■ The division of simplified practice of the National Bureau of Standards announces that simplified practice recommendation R94-30, "Open Web Steel Joists," has again been reaffirmed without change by the standing committee of the industry.

This recommendation establishes a simplified schedule of sizes for joists ranging from 8 to 16 inches in depth and not longer than 24 times their depth, and also specifies properties and allowable loads in pounds per linear foot. Designations, stresses, resisting moments in inch-pounds and maximum end reaction in pounds are included.

The program was originally effective Oct. 1, 1930, and was reaffirmed without change in 1933, 1935 and 1937. Copies of the recommendation may be obtained from the superintendent of documents Government Printing office, Washington, for 5 cents each.

Announces New Hard Tool Tip Material

■ A new grade of Kennametal tungsten-titanium carbide alloy known as grade K3H, recommended as a tool tip material for light finishing cuts and for fairly heavy continuous cuts on steel of all hardnesses up to 550 brinell is announced by McKenna Metals Co., Latrobe, Pa. It has shown a hardness of 79.0 rockwell C and a strength of 210,000 pounds per square inch when subjected to the transverse rupture test.

The material is being supplied in the form of tool tips in three standard shapes or in special shapes made to specifications. Tools on which tips have already been brazed also are available.

Handle Abrasive Wheels as You Would Glass

By E. T. LARSON
Norton Co.
Worcester, Mass.

■ CARELESS handling and improper storage of grinding wheels not only causes excessive breakage but can seriously affect their cutting action and safety of operation. Grinding wheels are essentially cutting tools and merit the same care as expensive reamers or milling cutters.

Safety also warrants careful handling since dropping a wheel just a short distance or accidentally striking it against a hard object may easily produce a crack which could cause the wheel to break when mounted and brought up to speed. What makes this hazard all the more serious is the fact that the crack may not even be visible on casual examination.

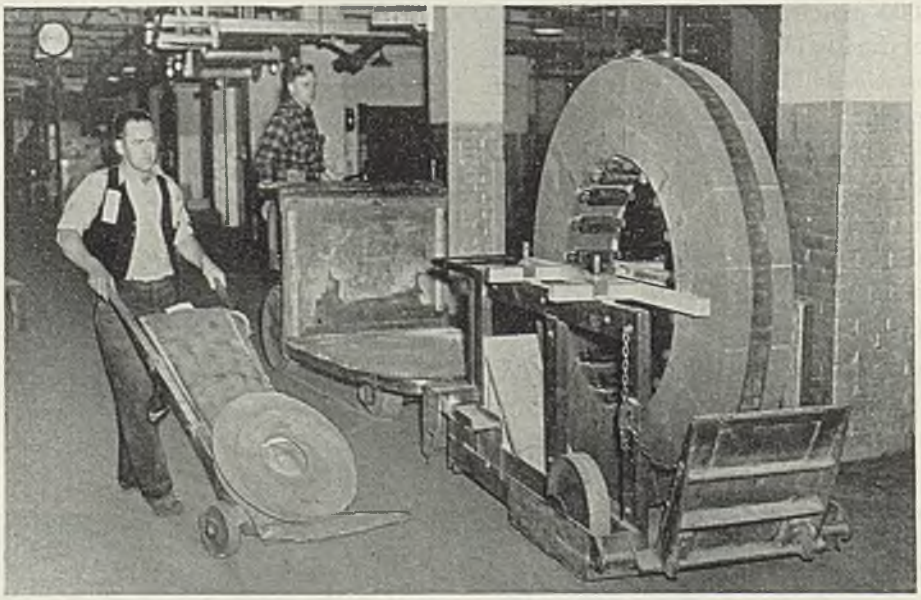
Grinding wheels when shipped are always packed carefully to withstand the roughest type of treatment in transit but care should be employed when unpacking. After they are unpacked, each wheel should be tapped lightly with a wooden mallet or handle of a screw driver to be sure it is of sound structure, as will be evidenced by a clear ring. If no clear ring is obtained on tapping, it is well to be on the safe side and reject the wheel. Of course the wheel should be perfectly dry and free from sawdust when tapped. It should be noted that organic bonded wheels do not emit as clear a ring as vitrified and silicate wheels. The wheels also should be inspected to see that size, grain, grade and other specifications correspond to the original order.

Grinding wheels are extremely fragile and may easily be chipped or otherwise damaged in moving them from one place to another. This is especially true of thin wheels and those having thin edges or faces.

Small wheels may easily be moved in wooden boxes, and larger wheels on trucks faced with wood or linoleum being sure there are no nails or bolts extending through to chip the wheel. Always remember abrasive wheels must be handled with the same care as if they were glassware.

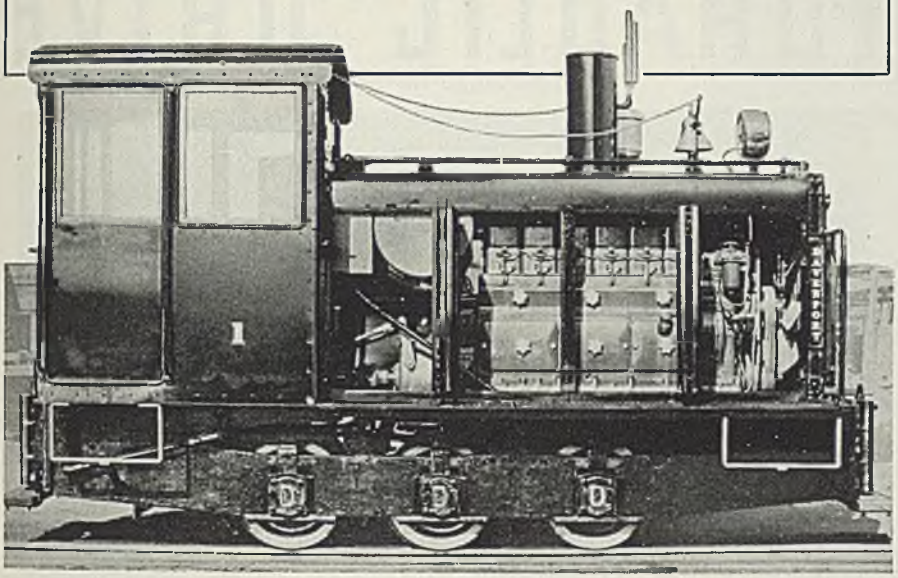
Large wheels sometimes are rolled on their faces. This should only be done on a padded and clean floor. Two strips of heavy floor linoleum make an ideal padding as they can be moved progressively along in front of the wheel to provide protection all the way. Never roll a grinding wheel directly on a bare floor.

In trucking wheels larger than 18 inches and up to 36 inches in diameter, do not move them on edge, but tilt them back about 15 degrees with boards or corrugated paper between them. Wheels larger than 36 inches in diameter should be moved about in a vertical position on a special truck designed to support them firmly.



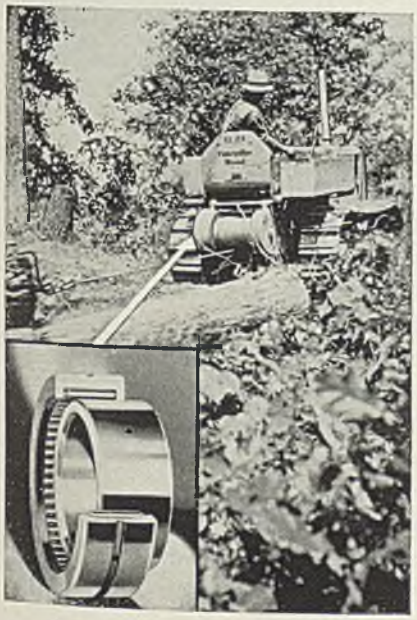
Left, transporting grinding wheels on a 2-wheel truck padded with heavy linoleum. Right, large and heavy wheels for safety should only be moved about in a specially constructed trailer unit like the one shown here

In the News WITH BANTAM BEARINGS

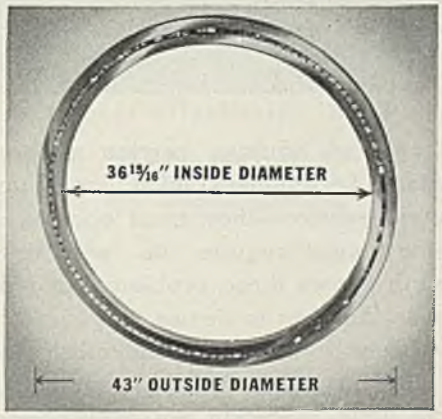


UP-TO-THE-MINUTE LOCOMOTIVE of the industrial type is this unit designed and built by Davenport Besler Corp. for hauling sugar-cane in Puerto Rico. Locomotive replaces steam unit previously used, is powered by 6-cylinder Fairbanks-Morse Diesel engine. Bantam Quill Bearings, used on the wrist pins of the Diesel, are the recognized standard for this service, where their small size and high capacity in oscillating loads are outstanding advantages.

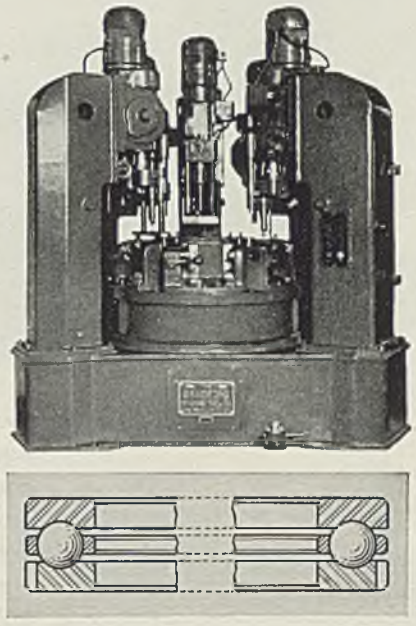
BANTAM'S NEEDLE ROLLERS can be assembled into anti-friction bearings of exceptionally high capacity in proportion to size and cost. Bantam's metallurgical processes provide the hardness necessary for maximum capacity, yet retain needed ductility. Needle Rollers round out Bantam's line of anti-friction bearings—straight roller, tapered roller, self-retained needle, and ball.



LOGGING OPERATIONS in rough, hilly country put towing equipment to the severest test. Willamette Hyster Co. improves efficiency, lengthens service life of its HYSTER D2 Towing Winches by using Bantam Quill Bearings on idler gear and reverse idler gear—where space is so limited that no other type of anti-friction bearing could be successfully employed. Moreover, the Quill Bearing is low in cost and easy to install. For further information on this compact, high-capacity bearing, write for Bulletin H-104.



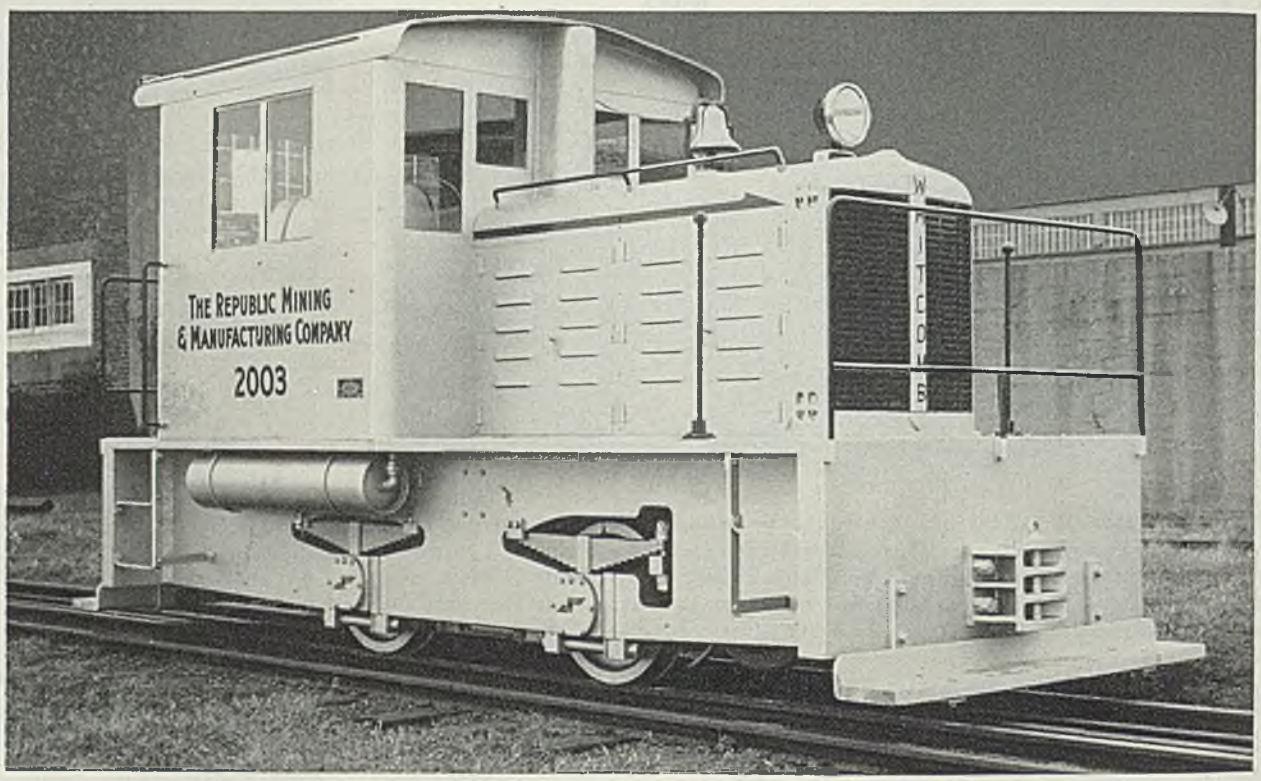
THIS GIANT ROLLER BEARING has a radial capacity of 225,000 pounds at 100 RPM, uses 125 rollers 1" long and 1" in diameter. It is one of a group specially engineered by Bantam for use by Ohio Oil Company in central station pumping equipment, to provide high radial capacity and reduce need of servicing.



6-STATION DRILLING MACHINE built by The Bradford Machine Tool Company turns on Bantam indexing table bearing of the ball thrust type, measuring 30" O.D., 27" I.D., 2" thick. Here is another typical instance of the way Bantam serves industry with custom-built bearings in large sizes or special types. If you have an unusual bearing problem, TURN TO BANTAM.

Whitcomb

HYDRAULIC DRIVE



Switching and haulage service makes great demands upon equipment. Locomotives must stand up under long hours of continuous service—they must operate with the greatest economy—they must require the least in maintenance attention. Whitcomb knows these problems, and their engineers are constantly on the alert to devise ways and means of providing better service at lower costs. The most recent development along these lines has been the application of fluid drive in their mechanical units, replacing the conventional clutch. This arrangement provides a smooth, continuous flow of power through a Hydraulic Coupling. Torsional vibrations or shock loads are eliminated due to the absence of any mechanical connection between the driving and driven members: this reduces wear on engine and mechanical parts of the locomotive. No clutch maintenance required—no engine stalling encountered.

BLW THE BALDWIN GROUP

DIESEL or GASOLINE POWER

MECHANICAL, HYDRAULIC, or ELECTRIC DRIVE

THE WHITCOMB LOCOMOTIVE CO.

ROCHELLE, ILL.

Subsidiary of THE BALDWIN LOCOMOTIVE WORKS

Improved Handling Methods For

STORING STEEL

Fig. 1—This shows how cross bars are hinged to permit removal of steel from lower sections—a novel arrangement facilitating access to all the steel

Handling efficiency is improved greatly by unique racking system, sheet-handling platforms and other innovations in a west coast warehouse. Platforms, when stacked, form racks which protect sheet effectively. No chains or cables touch sheet in handling. Wood roof is employed to prevent condensation. Methods are applicable anywhere steel is to be stored

By Don Partridge

■ AN EFFICIENT and rapid method of handling steel products in several unique ways is to be found in the steel distributing warehouse of George R. Borrmann Steel Co., 25 Eighth street, Oakland, Calif. This company, established in 1919 and a pioneer steel jobber on the east side of San Francisco bay, is now operating one of the most modern distributing plants in the country.

As one can well imagine, a black or red balance on the ledger of a warehouse depends largely upon the efficiency of handling operations since warehouse activity consists almost entirely of receiving, storing and shipping. Features employed at this plant include patented storing racks for bars, flats, channels, angles, etc.; special roofing for warehouse bays; a method of handling both carbon and stainless grades of sheets, wherein crane hooks of chains never come in contact with the material; and an unusual specially built sheet ladder for warehouse trucks. While developed primarily for warehouse use, the methods described here also will increase the efficiency of any plant's storage department.

Each of the patented storing racks contains six compartments which permit a crane to remove or store quantities of steel ranging from ½ to 5 tons, thus eliminating the costly and laborious method of hand storing of incoming material and hand pulling of outgoing orders. The dividing uprights of these racks are constructed of 4-inch channels. The cross bars for the two lower divisions of the rack are welded to the uprights to assure additional structural strength to the whole rack assembly. These two compartments are used for storing material that moves casually.

Those three cross bars, separating the upper four compartments, are attached to a connecting rod and all four cross bars for each division simultaneously tilt up and backward, permitting free access for the crane to load or unload, as shown in Fig. 1. In this particular instance, the material in the upper two compartments has been removed by crane and stored, temporarily elsewhere. All the movable cross bars are notched. When the bars are lowered into position, these notches fit over lugs welded onto the back end of the cross bars ahead.

Provision is made so crane hooks or chains never touch low-carbon or stainless grades of sheet steel. Incoming material is placed on solidly built wooden platforms, as shown in Fig. 2. The platforms or racks are so constructed that one

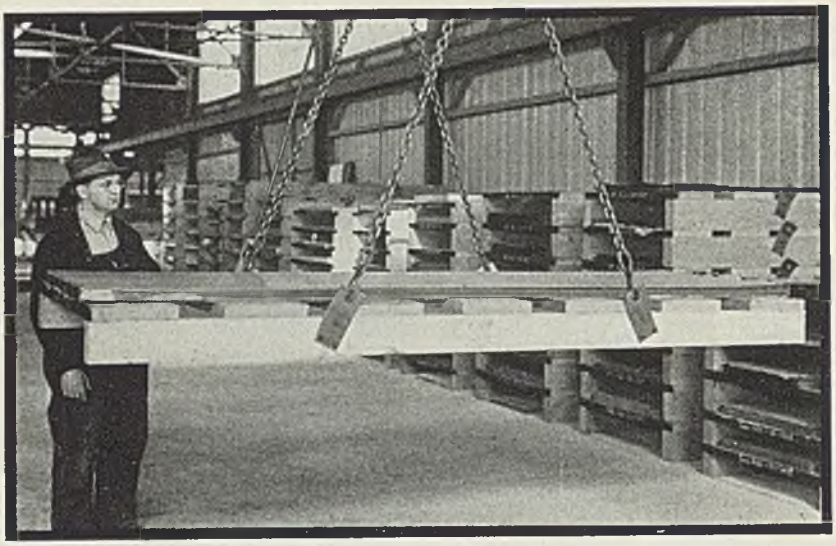


Fig. 2—Closeup of sheet platform and lifting plates, left. Note in background how the platforms stack to form racks

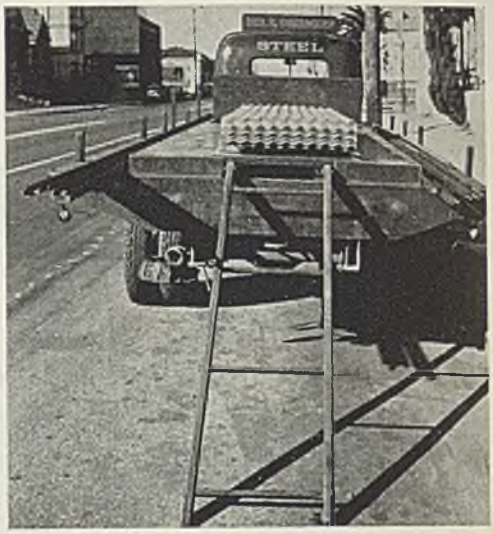


Fig. 3—Delivery trucks, right, have a 4-inch raised platform in center for sheet, preventing bars and structurals from rolling against it. Ladder at rear pushes into back of platform and locks in position

fits perfectly upon the top of another one, making it possible to stack eight to ten sections, forming a succession of drawers, which protects the steel on all sides.

These platforms are equipped with four steel lugs, two on each side, in which crane hooks are inserted for lifting and transporting. A single platform or an entire section can easily be moved without touching the steel stored. If the bottom rack of steel be required, the crane is hooked to the lugs of the platform immediately above it and the entire section lifted off. The crane then picks up the desired rack of steel and carries it to the point of fabrication or shipment.

An added feature of this method of storing permits the delivery to a client of an entire platform when specified, the platform being picked up from the customer at a later date.

Another feature of the plant is the method used to handle stainless steel sheets. The material remains in the original shipping container. When required, the crane lifts the platform, container and steel and moves it to the desired location. The shipping container is then opened and the necessary sheets removed. The remaining sheets are left in the original package and returned to the storage section. Thus, steel sheets are never exposed to weather or surface damage, regardless of the length of time in storage.

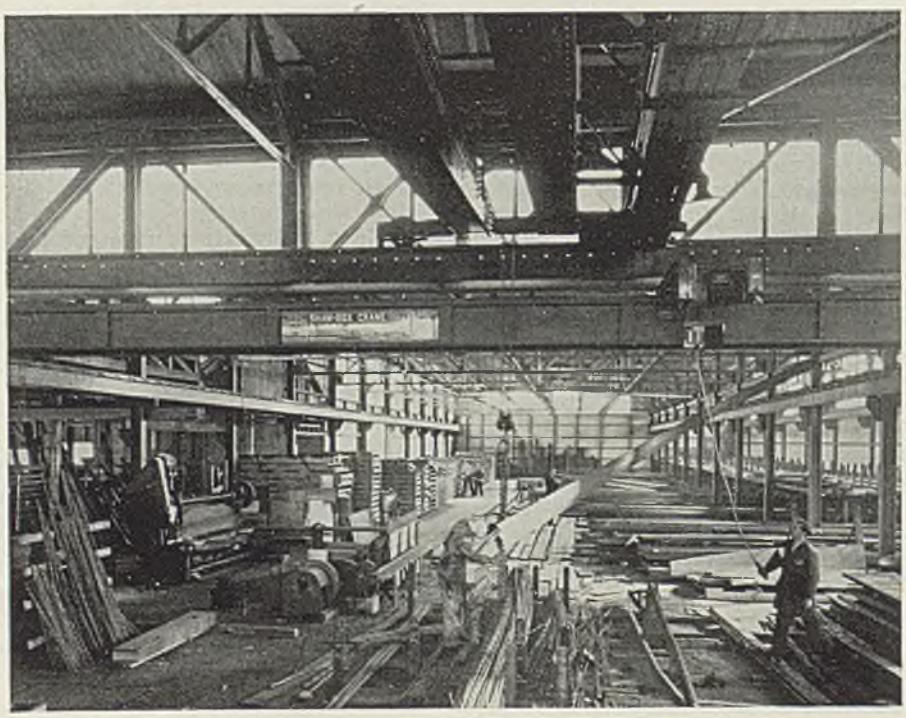
To assure the perfect condition of material stored in the warehouse bays, the company has installed a 2-inch wooden roof with the composition covering, thus eliminating condensation and enhancing the value of the service to its clients.

A sheet or plate ladder to assist in unloading material from delivery trucks of the company is shown in Fig. 3. The ladder cannot be removed from the truck nor can it slide out during transit for when not in use it is shoved back into the body of the truck and slips over lugs which hold it in place. The center part of the truck is built up 4 inches high and extends to the back of the cab. Bars, channels and angles, etc., are placed on one of the side runways of the truck, while cold-rolled and other greased material is placed in the other runway, thus preventing contact with the sheets.

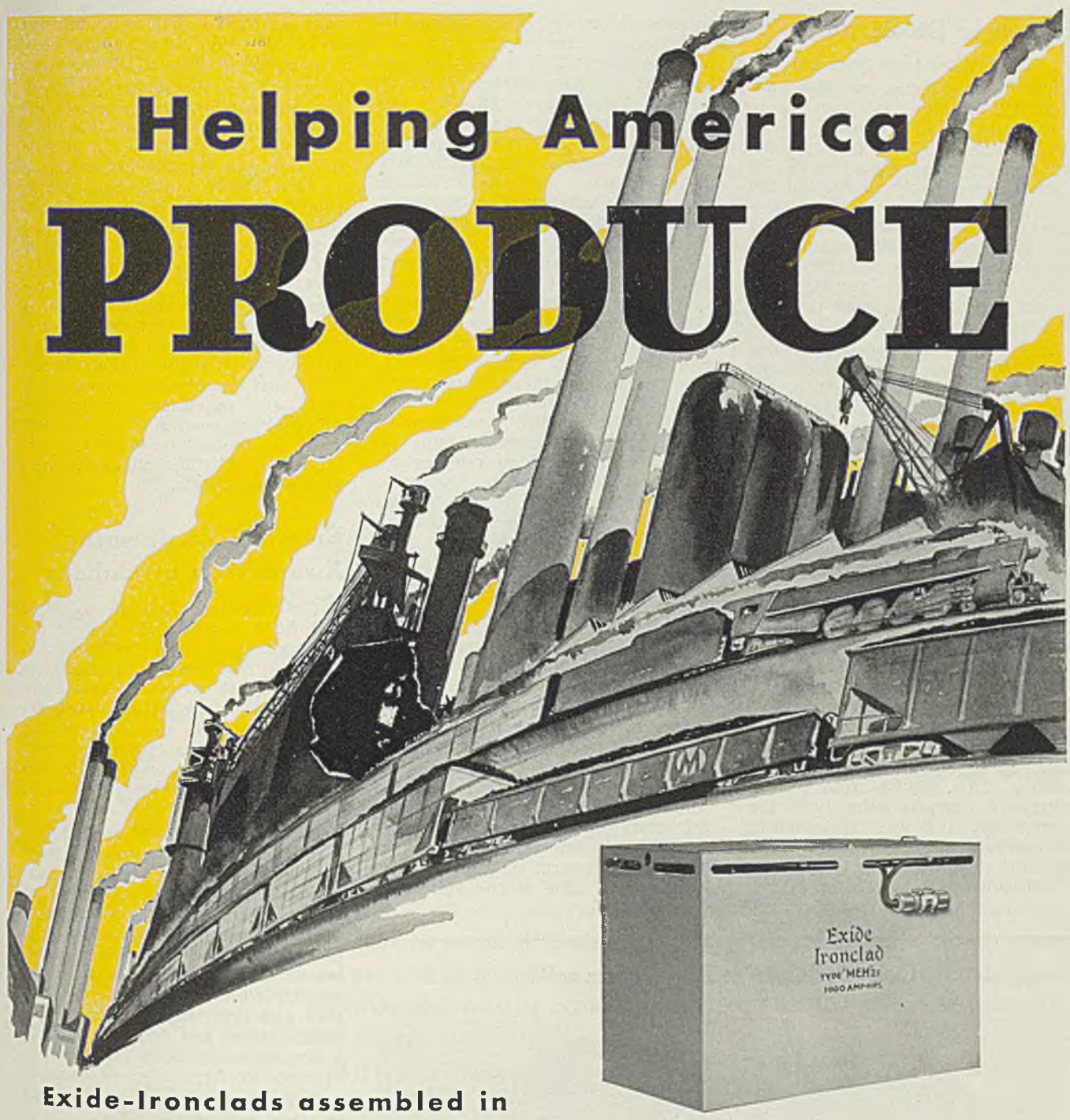
The plant is located on sloping terrain and the railroad spur track enters the warehouse on the Seventh street entrance on the level. Ground toward the Eighth street or main entrance has been filled in. Here trucks are able to load and unload at truck height.

The main bay is 70 x 200 feet and runs from Eighth to Seventh street. The cutting bay is a part of the main bay and parallel to it, measuring 30 x 100 feet. Two side bays extend at right angles and contain storage space for sheets and structural items. The structural bay is 20 x 100 feet and the sheet warehouse 50 x 200 feet. A 5-ton Shepard-Niles crane services the main bay while a 3-ton Shaw-Box crane handles the sheet bay and a 2-ton crane operates in the structural bay.

Fig. 4—Looking from the main bay directly into the sheet-storage bay and the structural bay to the right of it. Note overhead crane which serves main bay and the smaller crane serving the sheet bay and operating on a runway beneath the other crane



Helping America PRODUCE



Exide-Ironclads assembled in steel trays give a giant boost to materials handling . . . . .

All of American industry must speed up if it is to stay abreast of the mountainous needs of defense. Keeping pace with other operations in your mill, your electric industrial trucks must be able to handle more and heavier steel coils per turn. This they can do with the help of Exide-Ironclad Batteries assembled in steel trays.

This great advance in battery construction increases both the capacity and speed of your handling service. It permits the installation of a higher capacity, higher voltage Exide-Ironclad in the battery compartment of your truck. You get a livelier truck, with more pep, power and pick-up . . . you get more coils handled with greater ease in less time.

Exide IRONCLAD BATTERIES

An additional contribution to the service is the Exide System, which minimizes delays, simplifies battery maintenance, and prolongs battery life. Write for free booklet, "The Exide System for Better Material Handling."

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

Bessemer Steelmaking

(*Concluded from Page 80*)

gen and phosphorus, and also variability from blow to blow due in part to the relatively small size of bessemer heats, Mr. Work pointed out a given shipment of bessemer steel is more likely to contain the product of several heats than a shipment of the open-hearth grade. Each may have slightly different characteristics. Rapidity of refining is also a factor. More accurate control of the blow has been the goal of research with photocells.

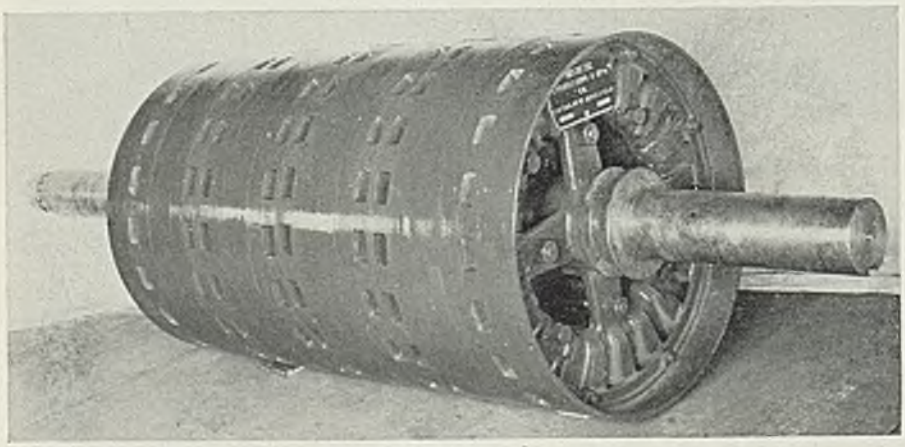
While control depends on one man, the blower, four essentials for an adequate control method are speed, quantitative accuracy, reference points and records. Use of photocells for following the flame has involved the most practical method of converter control, according to Mr. Work.

Selection of photocells, he said, was predicated on the fact they were able to give an instantaneous and quantitative record of the flame behavior, and it was felt that, if suitable reference points could be found upon which to base the control, the method would be far superior to one relying on the human eye. In spite of the speed of reaction of the eye and its ready adaptability to varying conditions, it has one serious fault—it is not quantitatively accurate. This results from certain inherent characteristics of the human eye. It is well recognized in photographic work that accurate estimating of light values is extremely difficult, as is illustrated by the various tables and exposure meters developed for the assistance of the photographer. This is primarily because of the self-adjusting character of the human eye, whereby the pupil automatically adapts itself to light levels over a wide range. In addition the eye varies from person to person, has a limited wave-length coverage, is affected by fatigue and by the physical condition of the individual. Even the most careful selection of blowers for their vision and judgment of small changes—and it is reasonable to suppose that the blowers are probably well above average—leaves much to be desired. Furthermore, Mr. Work pointed out, the eye produces no permanent record of what has taken place. As a result, it is difficult if not impossible, to make a scientific study of the flames of a large number of blows to determine the optimum blowing practices. Photocells do not have these objections and they retain many of the desirable features of the human eye.

Powder metallurgical processes lend themselves well to the manufacture of complex alloys, according to P. R. Kalischer, chemical and metallurgical department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Reviewing experiments in the production of aluminum-nickel-iron alloys by powder metallurgy, Mr. Kalischer concludes high successful application of metal hydrides to the problem of reducing refractory metal oxides is notably significant. Importance of both high unit pressures in forming and long enough time at the sintering temperature to allow solid diffusion to be complete, giving a completely homogeneous product, was stressed.

In the production of alloys by powder metallurgical processes, according to Mr. Kalischer, it is often necessary or desirable to include one or more components that tend to form stable oxides. Included in this group of metals are aluminum, manganese, magnesium, silicon, and a few others. In many cases it is not necessary for the sintered compact to have full density and the other physical characteristics of a cast alloy and in that event no undue precautions need be taken. If, however, it is required that the sintered part be entirely homogeneous, and have maximum density and physical properties, some method must be found to reduce the surface films of oxide which are always present on metals.

Ore Crusher's Big "Helper"



■ Weighing approximately 1600 pounds and measuring 42 inches in diameter and 64 inches wide, this magnetic pulley, developed by Magnetic Engineering & Mfg. Co., Clifton, N. J., is believed to be one of the largest ever built. It is used as a head pulley for a 60-foot wide conveyor belt carrying lump ore. Its job is to remove spikes, nuts, coupling pins, nails, cutting knives and other miscellaneous iron pieces that would damage a crusher. Radial and horizontal openings through the pulley allow free air movement. Uniform magnetic pull across the face of the pulley is obtained by specially designed pole pieces, integrally cast with the pulley

Emerson Engineering Award Won by Cubans

■ Collaborators Luis Perez Daple and Rene Montero Prado won the $1000 grand prize of the first E. A. Emerson engineering award, it was reported last week by Armco International Corp., Middletown, O., Mr. Emerson is president of the corporation, sponsor of the contest. The winners are engineering students at the University of Havana, Cuba.

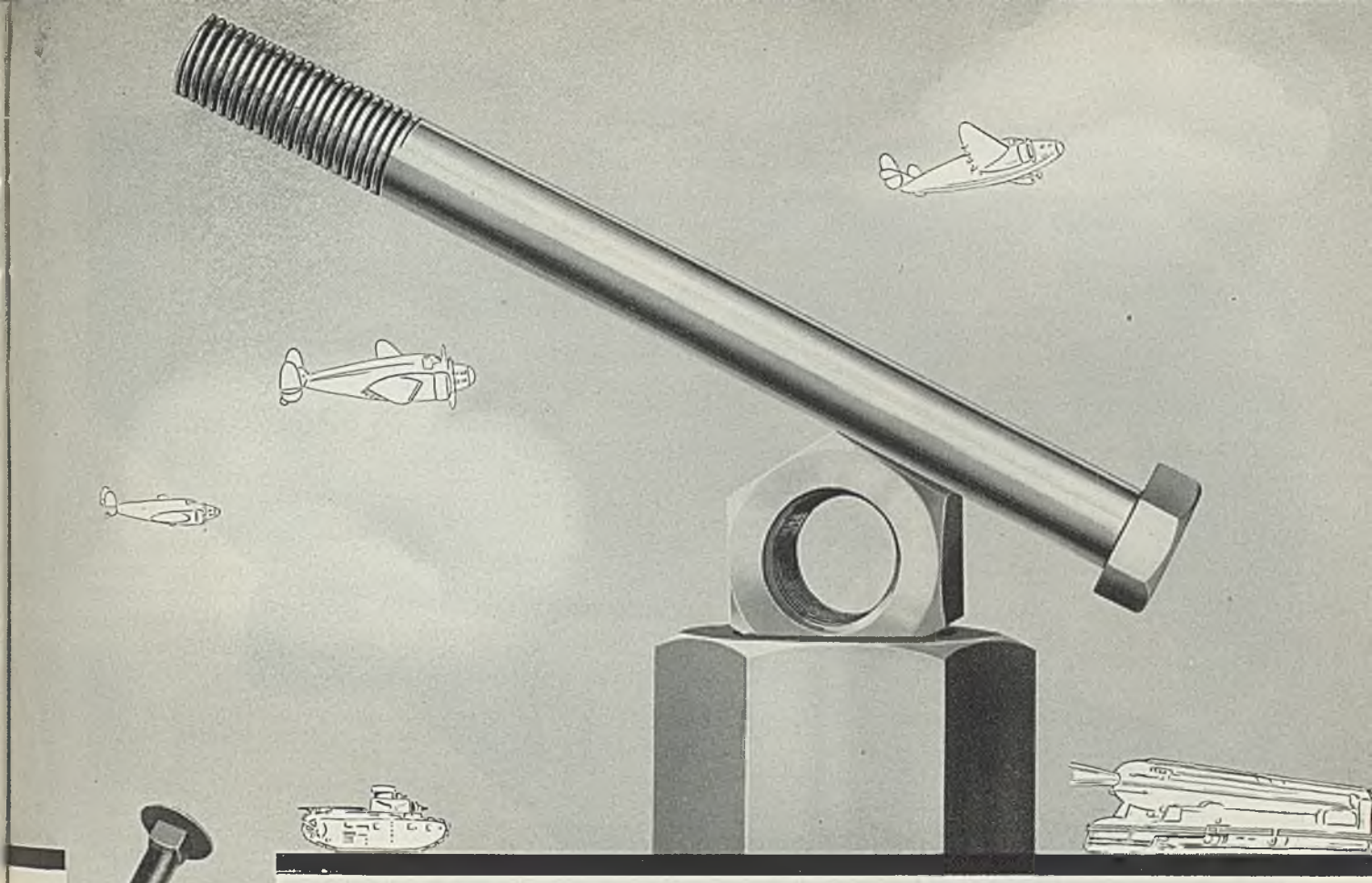
The contest, which opened last March, was to encourage closer technical relations between the Americas through development of a more standardized vocabulary of engineering terms in Spanish. Prize of $100 was awarded the engineering student in each Latin American country who submitted the best report and criticism on terminology, metric tables and formulae used in a drainage handbook published in Spanish by Armco International.

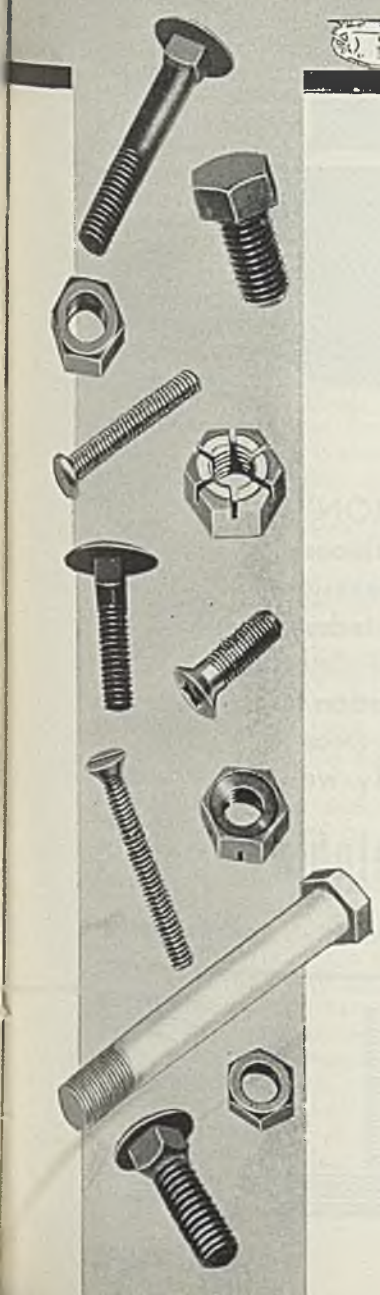
Similar contests will be conducted in other engineering fields.

Earlier Graduation of Technical Students Urged

■ Graduation of engineering classes in technical schools three months in advance of the normal date in 1942 was advocated by William A. Hanley, president, the American Society of Mechanical Engineers, in speaking before engineering groups at Syracuse, N. Y. recently.

He suggested that schools continue through summer months of 1941 to allow for graduation in February, 1942, because of urgent need of such graduates in industry. He said that 14,000 will finish engineering schools in 1941, but many more will be needed.





GUARDIANS OF INDUSTRY

Throttle the supply of bolts, nuts, machine screws, and other threaded industrial fastenings, and our defense program would halt. There is no plane, no tank, no gun, no ship, no machine tool, no box car that does not contain scores of such important products. For the "lowly" bolt and nut and its modifications provide industry with its only standardized fastening that may be accurately adjusted and that permits disassembly and reassembly at will.

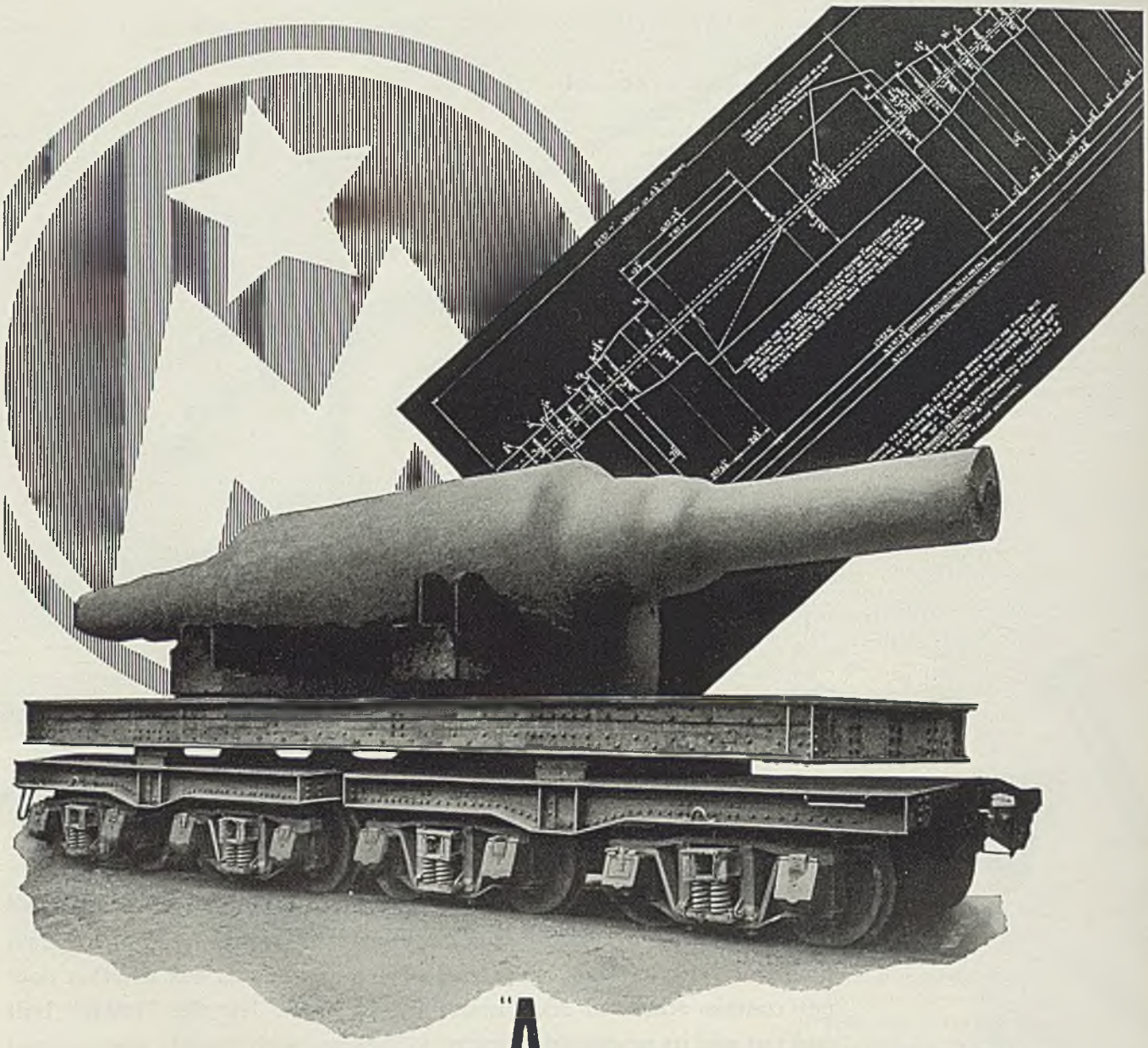
RB&W is continuing plant expansion and product improvement, as well as adding to service facilities, in order that the pace of progress in the bolt and nut industry may be not only maintained, but substantially accelerated.

Since 1845, through years of war and years of peace, through booms and depressions, RB&W has provided industry with stable facilities for EMPIRE Bolts, Nuts, Rivets, and other Threaded Industrial Fastenings. In the future, as well as in the past, RB&W quality and RB&W service will be maintained.

RUSSELL, BURDSALL & WARD
BOLT AND NUT COMPANY

PORT CHESTER, N.Y. ROCK FALLS, ILL. CORAOPOLIS, PA.

BOLTS
EMPIRE



"ACCORDING TO SPECIFICATION"—whether a special alloy to meet conditions of heat, corrosion or stress—whether dimensions that must meet micrometer exactness—industry of all types today requires scientific precision. Midvale has earned a justified reputation for meeting unusual specifications—the reason it also does the usual job unusually well.

The Midvale Company, Nicetown, Philadelphia

OFFICES: *New York · Chicago · Pittsburgh · Washington · Cleveland · San Francisco*

MIDVALE

STEEL

High-Explosive Shell

(*Concluded from Page 60*)

of the old copybook maxim which insists that we should think about what we are doing. Nothing is farther from the truth. Civilization —and along with it the machine tool industry—advances as we increase the number of things we can do *without* thinking. Thus, having once thought through the sequence of operations required to machine a shell and having translated these conclusions into the solid realities of cams and gears and slides, we need think about them no more than may be necessary to maintain them. This permits a man (or perhaps a woman) to attend one or perhaps a number of such units without any long or costly training.

No one questioned the value of these beliefs until *time-saving* became of more consequence than *labor-saving* in the production of tens of millions of high-explosive shells.

Obviously the question is, "How much skill should be incorporated into the machine?" The present dividing point appears to exist at that point where the automatic lathe is assembled in a group to form a multispindle unit. Some users favor the "single purpose" type, others advocate the multispindle automatic. Perhaps we have taken for granted that the tools required to fulfill shell contracts will have to be specially built. No doubt they should in most cases, so as not to tie up lathes urgently required for other defense work.

Consider "Total" Time: Thus time to build the lathe as well as time required to operate it must be combined in any attempt at analysis of "saved" time.

Some such considerations as the foregoing no doubt caused the Ordnance Department in 1939 to request the National Machine Tool Builders' Association to design a line of single-purpose lathes for turning shell. These machines were to be inexpensive, easy to build in machine shops of limited facilities and capable of producing shell in the hands of an untrained operator. A year after this assignment was undertaken, the Studebaker Corp. had built the first of these machines and was testing it. This machine will be described in a separate article next week. It is a machine that can readily be produced in large numbers and at low cost. Its availability offers a certain guarantee against shortage of shell-machining facilities.

The Ordnance Department's above use of the phrase "in the hands of an untrained operator" indicates it believes transfer of skill should be virtually complete as far as the unit is concerned, but that no attempt should be made to save operating labor by automatic transfer of the component from one station to the next such as characterizes multi-station machines. Further, the advantages of interchangeability arising from standardization which have so cheapened and simplified manufacture in many other lines would apply in this case also. Actually the total number of such automatic lathes required to carry the entire shell program need not exceed perhaps a couple of thousand if the productive rate of a "shell a minute" is maintained over a high percentage of the total hours per week, unless the present program of the Ordnance Department suffers a drastic revision upward.

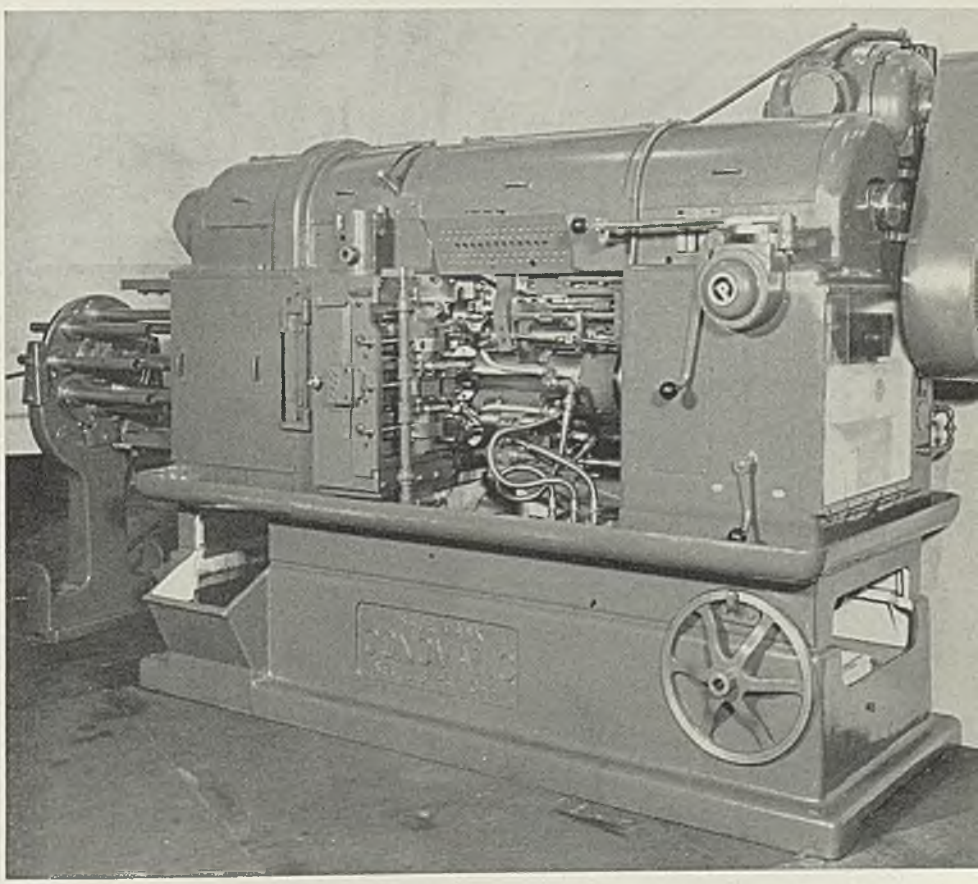
Not only has the multi-station type of automatic been regarded as being too time-consuming to produce, but the designs of existing single-spindle automatics have been quite radically modified not only by the Machine Tool Builders' proposals but also by the Prescott Co. of Menominee, Mich. These machines, especially designed for the production of shell, present some interesting contrasts to the more elaborate, carefully tooled and expensively fitted machines of the type which have been developed to meet the needs of the normal market.

Consider, for example, Fig. 2 showing the No. 11 Amalgamated

Other Articles on Production of Ordnance

■ **This is another article in the series being presented by STEEL on ordnance manufacture. For others already published, see issue of Feb. 24, 1941, p. 58, for Controlling Metal Flow in Forging Shell; Feb. 17, 1941, p. 58, for Methods of Forging Shell; Feb. 10, 1941, p. 54, for Heating Billets for Shell Forging at National Steel Car Corp. Ltd., Hamilton, Ont.; Feb. 3, 1941, p. 54, for Composition and Metallurgy of High-Explosive Shell; Jan. 27, 1941, p. 44, for Background Information on Shell Making; March 11, 1940, p. 38, for Design and Modern Methods of Making Shrapnel Shell; Dec. 2, 1940, p. 50, for Operation and Construction of Bofors Anti-aircraft Guns; Oct. 14, 1940, p. 160, and Jan. 6, 1941, p. 219, for How Technical Progress Aids Defense; Jan. 13, 1941, p. 48, for Some Typical Shell-Forging Methods; Jan. 20, 1941, p. 54, for Recommendations on Heating Billets for Shell Forging; Jan. 20, 1941, p. 74, for Making Cylinders for Packard V-12 Torpedo-Boat Engines; Feb. 10, 1941, p. 67, for New Method of Checking Gun Bores.**

Fig. 7—Multiple Spindles: Modern version of the automatic, in which Spencer's cam control is applied to a machine having eight spindles instead of one spindle. This permits all tools on the turret (tool slide) to operate at once instead of one at a time, thus producing the finished part in approximately the time of the longest single operation



shell turning lathe manufactured by the Prescott Co. Instead of holding the work in a fixed longitudinal relation to the bed as in the ordinary lathe, the shell is mounted between centers in a carriage which moves past the tools. This carriage slides not upon the familiar flat bed or V-shaped guides, but upon ground and polished high-carbon steel bars, 2 15/16 inches in diameter. Since the overall dimensions of the sliding carriage are of the order of 2 x 5 feet, the arrangement is extremely rigid. The carriage drive consists of a feed screw of 4 pitch, Acme thread, 2 7/16 inches in diameter, working in a nut 7¼ inches long, which can be controlled through helical gears by a handwheel seen in the foreground of Fig. 4.

Unique Machine Tool: The cuting tools in the Prescott machine are carried on a knee which projects from the bed casting between the two ways. Any convenient number of tools can be mounted in straight turning operations. For the contour work required on a shell nose, the tool head has two tools opposite one another as shown. These tools are under control of the former seen directly above the tool head. This former engages two rollers, one on either side. As the former forces the rollers apart, the tools come closer together and vice-versa. Therefore the former will be the reverse of the part being machined.

In practice a model of the part to be turned is used as a master former to generate the former itself. Again one is impressed with the simplicity and mechanical advantages of the arrangement. Not only can two cuts be taken simultaneously, thereby obtaining the same fine cut as would be secured with half the feed of a single tool, but there is no bending moment on the former while in action.

To save the expense of a motor for each machine, flexible couplings may be mounted on the extensions of the drive shaft and each lathe connected to its neighbor in the line. The drive shaft is heavy enough to transmit 100 horsepower at 400 revolutions per minute from a single motor. However, each machine may be driven separately if desired, using a standard motor mounted on a rear bracket and provided with a V-belt or chain drive.

In operation, the shell forging to be turned is inserted between the live spindle driving fixture, right, and the tailstock center, on left, when the carriage is farthest to the left and while the spindle is at rest. The tailstock center is advanced by the air-piston contained within it and the spindle clutch lever and feed lever are thrown into engagement. On completion of the turning operation, the feed automatically stops, the spindle is stopped and the tailstock thrown into reverse and the rapid traverse returns the carriage to its original position ready for another shell.

The Ex-Cell-O double-tool vertical-type turning machine, Fig. 5, is capable of performing a wide range of work. It is hydraulically operated and is completely automatic except that the work must be inserted and removed by hand and the machine cycle started by manual movement of the control lever. The two tool slides are mechanically interlocked to insure the uniform rate of feed for both tools. These slides have a built-in tool retracting device which withdraws the tools from contact with the work at the end of the feed stroke while the slide returns rapidly to its original position and thereafter advances them to the cutting position.

These machines are hydraulically operated and completely controlled through a pilot valve equipped with a handle for manual interruption of the operation at any point in the cycle. The electric controls are interlocked, controlled and operated from the pilot control valve. A force-feed lubricating pump is hydraulically operated and delivers oil under pressure to the work spindle, the tailstock, the slides, ways and dove-tail—actually metering the oil at the various points of lubrication through metering nozzles.

Refinements vs. Simplicity: Of course the average operator would rather handle the latter machine. But the refinement and excellent design of machines in the class of the Ex-Cell-O, *if we have to build them*, may not be *time-savers* over a relatively short period such as we hope the duration of the present emergency will be; in fact, they may not even be *labor-savers* on the same basis. They would, presumably, justify themselves in a normal economy—but the present situation is a far different situation than under "normal" times.

In commenting on recent trends in machine tool design at a recent meeting of the American Society of Mechanical Engineers, a well known machine tool designer observed that these included ready-made variable-speed-drive devices, lubrication systems of elaborate design, ground gears to eliminate noise, electric and hydraulic combined controls, hydraulic chucking, cemented carbide tools, wider spacing of columns and ways, hardened wearing surfaces, built-in lighting fixtures and such items as indicating instruments.

He also noted that the price of machine tools had advanced many fold in little more than a generation and suggested that it might be better if the trend toward more and more complete transfer of intelligence to the machine were changed to a simpler concept involving many of the advantages of the division of labor.

Skilled Men, the Key: To make this clear, suppose a single operator, provided with an ordinary engine lathe and the necessary tools, could produce a shell from a forging. Considerable skill would be required. Next suppose the work is broken down into individual operations and a production line of "single-purpose" machines of the simplest possible design provided. Such machines could be operated by intelligent but not highly skilled labor—each operator handling one simple step. Through such a division of labor, each operator develops skill by constant repetition of a single operation. The next step involves the elimination of that labor in greater or less degree and its replacement by a "skilled" machine. However, the design and construction of such units would require skilled men.

Right here is the nucleus of the difficulty . . . for there is a lamentable shortage of such skilled men because of the huge number needed, the neglect of our apprentice system, the drifting of men away from the skilled trades in times of depression and a certain lack of public interest in the development of manual dexterity along with Latin, mathematics and literature.

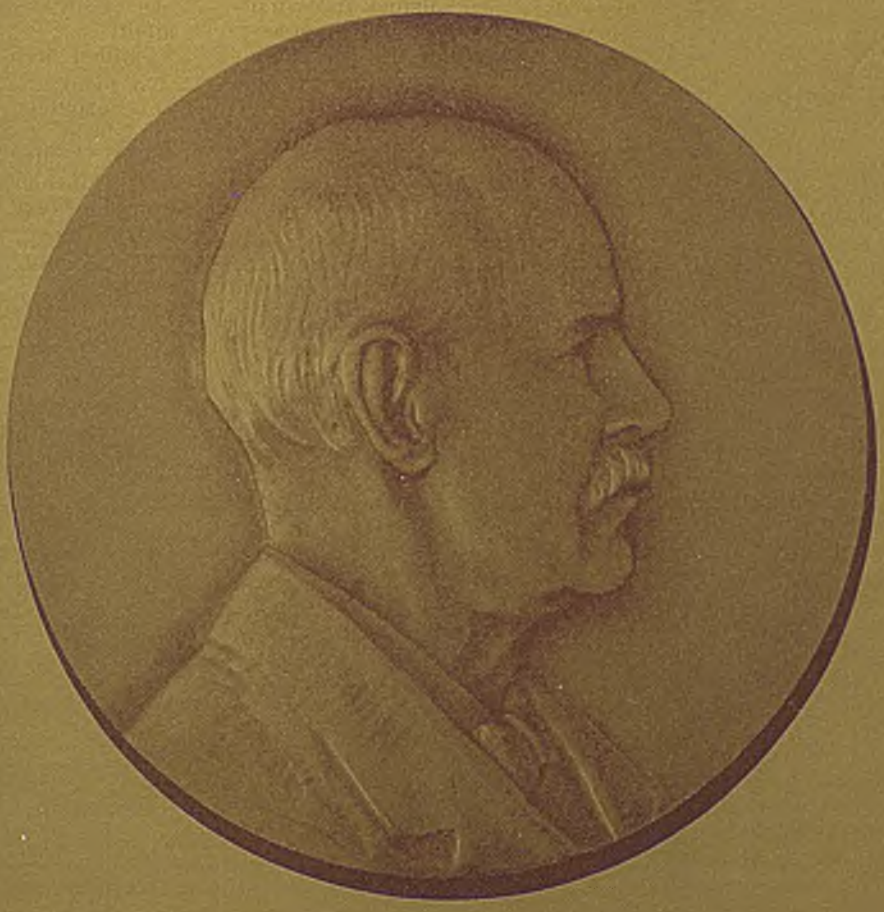
Do We Have Any Choice? Regardless of whether one believes that increased complexity of a mechanism increases the possibilities of trouble or that a reduction in the total number of man hours required by defense work could be attained by employing a high level of "machine intelligence"—we appear to have little or no choice. While we have many men with little or no skill, there are relatively few men with a high degree of skill. In either case, time is all too limited.

Glorifies Salesmen in America's Upbuilding

■ *Salesmen Built America*, by George A. Hughes; laminated covers, 96 pages, 6 x 9 inches; published by the Dartnell Corp., Ravenswood and Leland avenues, Chicago, at $1.50.

The author is chairman of the board, Edison General Electric Appliances Co. Inc., and to his gift for salesmanship the present popularity of electric appliances is largely due. The volume persents a sales philosophy rooted in his accomplishments.

His theme is that in America are the greatest resources in the world but without salesmanship and salesmen we would not have gained or be able to hold our position as the world's greatest country. Its message should make salesmen realize the important part they have in the future of America.



DR. EDWARD GOODRICH ACHESON WHOSE INVENTIVE GENIUS IN CREATING THE FIRST MAN-MADE GRINDING MATERIAL GAVE SUCH IMPETUS TO THE DEVELOPMENT OF ABRASIVE PRODUCTS THAT THEY HAVE BECOME ALL IMPORTANT FACTORS IN MAKING POSSIBLE VASTLY INCREASED PRODUCTION AND GREATER PRECISION THROUGHOUT ALL INDUSTRY

50 Years

Never before in history has life been so enriched by scientific discovery and industrial progress as in the half century just completed. We have seen amazing strides in means of transportation . . . the automobile, the airplane, the streamlined train of stainless steel. The electric furnace has given industry new chemicals, new steels, new alloys. We have witnessed the creation of new synthetics, the perfection of the machine tool, the enormous development of mechanical efficiency in every field, and the production of countless commodities that promote and protect our way of life.

Of all these varied advances none surpass the progress made in the abrasive field. When Dr. Edward Goodrich Acheson created the first man-made abrasive fifty years ago, little did he foresee that modern abrasive products would become one of industry's most important tools for the shaping, grinding and finishing of almost every device of the useful arts. It shapes the tiny balances of our watches. It smooths the massive casting. It grinds tons of wood pulp for paper making. It fashions marble and stone, finishes wood and leather and sharpens the tools of every craft.

In other words manufactured abrasives are intimately integrated with the very structure of industrial life . . . meeting its fundamental needs, furthering its progress, translating yesterday's luxuries into today's commonplace necessities.

It is with justifiable pride, therefore, that we of The Carborundum Company pay tribute to the late Dr. Edward Goodrich Acheson in commemorating the Fiftieth Anniversary of his creation of silicon carbide, trade named "Carborundum", the first man-made abrasive. It is fitting also that we choose this occasion to acknowledge the splendid cooperation of our friends in industry in bringing his work to fruition and to rededicate this Company's efforts to a continuing service to industry and to the betterment of America's way of life.

Frank J. Tone

FRANK J. TONE, President,
THE CARBORUNDUM COMPANY,
NIAGARA FALLS, N. Y.

OF FIRST IMPORTANCE—

Design

THIRTY-SIX years of Roller Bearing manufacture have proved that design is the most important element in a bearing.

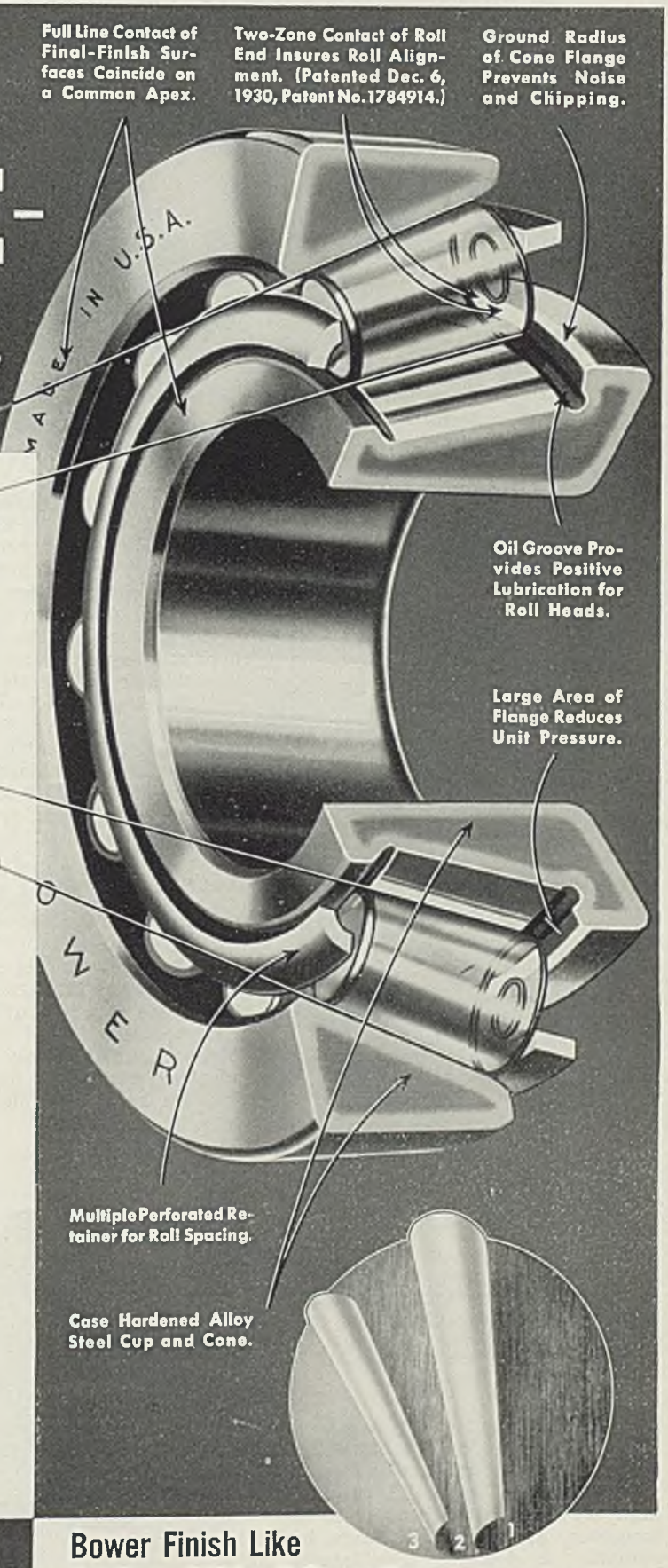
Likewise, the use of many millions of Bower Roller Bearings as original equipment over a period of many years in America's leading large-production automobiles has proved the correctness of BOWER DESIGN.

Bearing users will appreciate that the exacting standards of the automotive industry and the severe usage of bearings in automobiles offer a challenge that no roller bearing can meet unless it possesses the highest degree of quality known to the bearing industry.

One of the secrets of Bower's leadership is the fact that its technical men have never waited upon the ingenuity of other men. Bower engineers push relentlessly ahead—far beyond the needs of the moment—to make new technical discoveries and to apply them always in ADVANCE.

This Tapered Roller Bearing is a leading example of Bower design. It embodies important advantages that no other bearing possesses—advantages that Bower engineers discovered and incorporated ahead of all others.

For more detailed information on Bower design, ask us for a copy of the folder, "Secrets of Bower Roller Bearing Design and Quality."



Bower Finish Like A "Face-Lifting" Operation

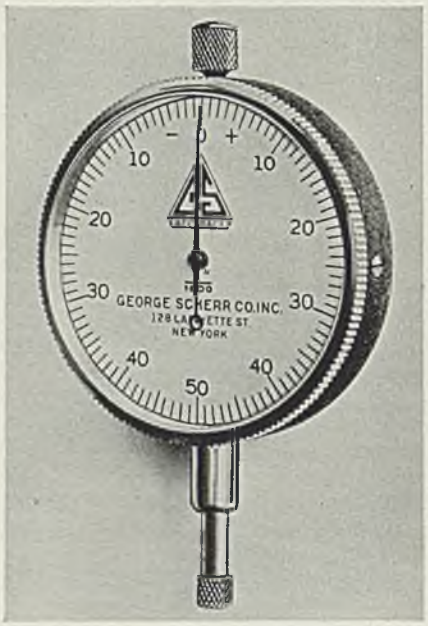
1. ROUGH GROUND—Photomicrograph—25 diameters—showing amorphous film with roughness of approximately 15 micro-inches (millionths of an inch). **2.** FINISH GROUND—More but finer scratches—surface finish of approximately 10 micro-inches composed of amorphous metal left by finish grinding—Photomicrograph of 25 diameters. **3.** FINAL FINISH—25-diameter photomicrograph showing amorphous metal and grinding marks removed, baring hard surface and smoothness of approximately 3 micro-inches—scratches below surface.

BOWER
ROLLER BEARING CO.
Detroit, Michigan

Industrial Equipment

Dial Test Indicator

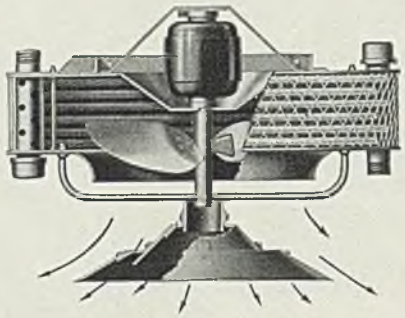
■ George Scherr Co., 128 Lafayette street, New York, has introduced a new GS dial test indicator with simplified lever movement. Instead of the usual rotating multiple gear and pinion trains, it utilizes a lever arm. The dial is graduated in 1/1000-inch



with a plunger travel of 3/16-inch. The indicator can be supplied with universal ball joint back which permits a wide range of indicator settings on all types of machines. The indicator movement is mounted between separate top and bottom plates and the hair spring is mounted between two flat plates and cannot interfere with the lever rack.

Unit Heater

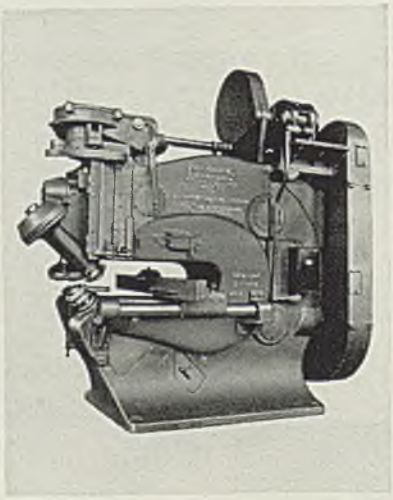
■ B. F. Sturtevant Co., Hyde park, Boston, has introduced a downblast speed heater particularly suited for installation in buildings with high ceilings, above crane rails, or wherever an unusually high installation is desired. The largest size heater will provide effective heating even when suspended 40 feet above the floor level. Where a comparatively low installation is desired, deflection cones, illustrated in the sectional drawing, are left on, resulting in wider diffusion of the heated air stream and temperature reduction at the working level. For high installations, deflection cone can be removed easily to secure greater downward velocity. Structurally the heater consists of a circular extended surface heating element protected by a screen guard,



with copper tubes brazed into copper headers forming a homogeneous unit. Fins are of aluminum. Room air is drawn into the heater through the heating coil and projected downward by an aluminum fan. Headers on both sides of the coil permit rapid clearing of condensate. These have threaded connections at either end, allowing steam lines to be connected to whichever side is most convenient. The heater is available in twelve sizes with capacities ranging from 40,000 to 400,000 B.t.u. per hour at two pounds steam, 60 degrees entering air.

Rotary Shear

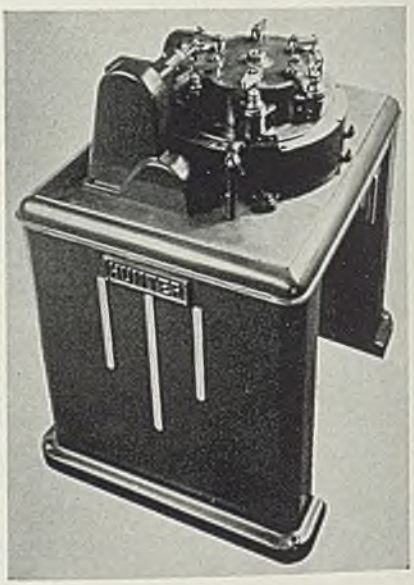
■ Quickwork-Whiting division, Whiting Corp., Harvey, Ill., has developed a new model 62A rotary shear that cuts through 2-inch mild steel plates at a high rate of speed. It is especially suited for the shipbuilding, tank-building and other industries engaged in the armament program because of its power. It



also is equally adaptable for the production cutting of thinner sections. For straight cutting of 2-inch plates having a tensile strength of 65,000 pounds per square inch, it can shear at speeds up to 50 feet per minute. The same machine also will shear 1-inch plates with a tensile strength of 130,000 pounds per square inch at an equal rate. In addition, attachments available with the machine makes possible the cutting of circles and irregular shapes at speeds comparable to the straight slitting operation. Beveling and joggling operations also can be performed with this unit.

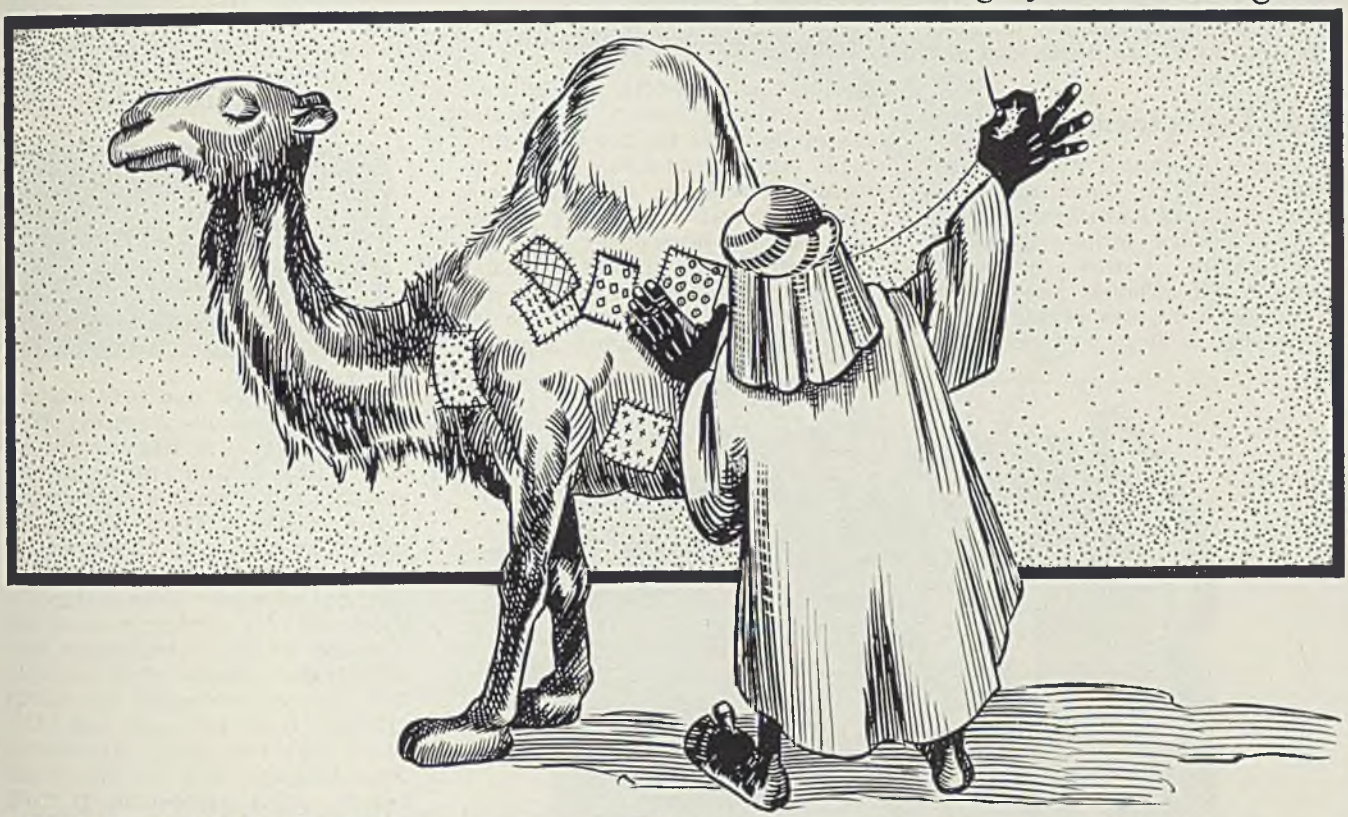
Hobbing Machine

■ Hunter Engineering Co., Riverside, Calif., announces a new hobbing machine designed to hob worm gears from plain die cast zinc alloy blanks at a rate of 960 pieces per hour. Its turret has six work holding spindles, each with an overarm which automatically swings over and drops to clamp the blank throughout the cut. These arms are operated by cams which also lift



and swing the arms to leave open one spindle for ejection and two for reloading at all times. Another cam operates to eject the blanks automatically. Not shown in the picture is a chute which is attached to the right side of the machine to collect the finished gears. The gears are hobbed without coolant, although a coolant supply and return system can be included. To speed up the machine, a rapid traverse between cuts is provided. The spindle housings are shaped as cones to actuate a limit switch. This switch controls a 2-way electric clutch which connects the turret shaft to a low-speed countershaft throughout the cut and to a high-speed countershaft for rapid traverse between cuts. Mounted on the lower end of each work spindle is a worm gear. Just before the work reaches the hob, this worm gear engages a worm which is connected through a gear train to the hob shaft. This synchronizes the blank with the hob. A heavy ribbed table casting is used

THOUGHTS ON POPULAR COATS NO. 10 *By Hanlon-Gregory Galvanizing Co.*



THE CAMEL'S COAT

Persons who take a peculiar delight in unearthing unimportant facts to astound the public hit the jack pot when they turned their attention to the camel. They tell us that the camel's skin is practically insensible, and when it suffers from boils, cuts, sores or bites the skin doesn't heal rapidly—so the camel's owner actually sews patches on the animal's hide. When a camel herder patches up a sick camel, he isn't kidding: he sticks those patches on with a cross herringbone stitch, and sometimes the patches outlast the hide. HANLON-GREGORY HOT DIP GALVANIZING is another type of protection: it is designed to protect ferrous metals, but instead of being applied in patches, it is put on over all. The HOT DIP PROCESS makes the zinc coating an inseparable part of the base metal, and the entire piece challenges the forces of rust and corrosion for many, many years. HOT DIP GALVANIZING is the best method yet devised for the protection of ferrous metals, and as expert galvanizers, HANLON-GREGORY qualifies with the best.

HANLON-GREGORY GALVANIZING CO.
PITTSBURGH, PA.

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

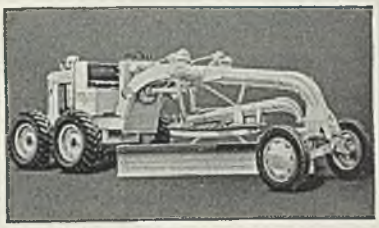
to mount the foregoing working parts. The finished gear the machine produces is 18 tooth, 24 pitch, 0.833-inch outside diameter. The hob is 0.617-inch outside diameter 0.1309 pitch and 0.2618-inch lead with four gashes.

Safe Transformer

■ Wagner Electric Corp., 6400 Plymouth avenue, St. Louis, announces a new Noflamol transformer for installing indoors without the need of fire vaults. It uses a noninflammable synthetic liquid developed as an improvement over regular transformer liquid. It is because of the noninflammable characteristic of this liquid that transformers of this type can be installed without any other protection.

Heavy-Duty Grader

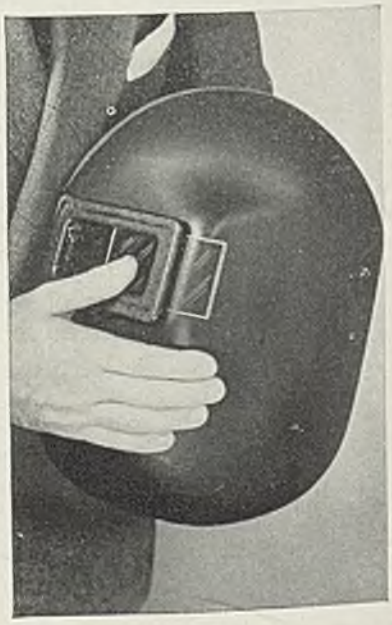
◪ Allis-Chalmers Mfg. Co., Milwaukee, annunces model AD motor grader designed for heavy grading, bank cutting, ditching (both forward and reverse), oil mixing and snow removal. Weighing 21,500 pounds, its 75-horsepower diesel engine combined with its greater clearance under the front axle and circle permits it to move greater loads. The Hi-arch front axle has 22 inches of clearance with 6¾ inches of clearance being provided between the Roll-away blade and the circle. The grader's 2-cycle engine delivers as much power as an engine twice its size. It offers the advantages of unit injection, 4-way cooling, faster acceleration,



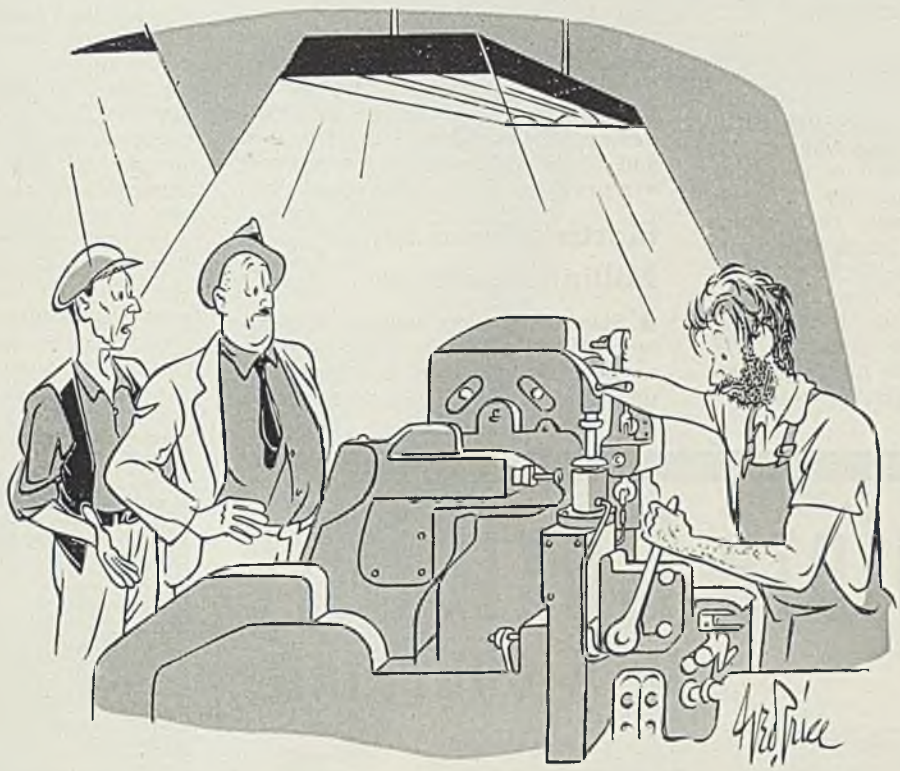
smoother power, and easy starting. The transmission features short, heavy shafts. It has a range of six forward and three reverse speeds, and with throttle control, forward speeds from 1.48 to 16.6 miles per hour and reverse speeds from 1.75 to 6.15 miles per hour can be selected. Standard equipment includes electric starting and lighting, leaning wheel front axle, adjustable radiator shutters, muffler, 12-foot moldboard, two 7.50-24 (10 ply) front tires and four 12.75-24 (8 ply) rear tires. For special conditions 10 and 14 foot moldboards, 2-foot extensions, 11 tooth scarifiers, all steel canopy top or all steel cab and a V-type snow plow are available.

Welding Helmet

◪ Boyer Campbell Co., 6540 Antoine street, Detroit, has placed on the market a welding helmet which enables the glass to be removed and inserted from the outside and the



head band to be adjusted on the head without removing gloves. This is made possible by a unique nonmetallic holder which holds the glass. The slot through which all



"We've been trying to get him to go home for weeks, but he won't believe it's night since we put in the new G-E Fluorescent Lighting!"

THE picture, we admit, is a trifle far-fetched. But it *is* hard to realize it's night outside when you have G-E Fluorescent Lighting *inside!*

Once this new kind of light has been properly installed in your plant or office, nobody can help feeling happier, making fewer mistakes, doing better, faster work with less fatigue . . . from the General Manager on down!

Scientists could give a dozen reasons for this. But the fact is, *our eyes were built for outdoor seeing.* And Fluorescent Lighting is the *closest practical approach yet to real daylight.*

The evidence is overwhelming

Mills, factories, machine shops are enjoying increased production, fewer rejects, better morale under this cooler, more abundant light. In offices, gloom goes out the window. Clerks get less tired, typists make fewer errors. Even the boss does better work in less time.

Where to go for best results

Call your G-E lamp man. Or see your G-E lamp distributor. He can show you certified fixtures, styled to fit *any* requirement of your business, complete with G-E MAZDA F (fluorescent) lamps, ready to hang up and turn on. He can draw on all the experience of General Electric to give you the best possible fluorescent lighting *properly engineered* to your needs—at *low cost!* Your lighting company is also ready to give you valuable up-to-the-minute advice.

1. ***Be sure you get certified fixtures*** with certified ballasts and starters to provide good power factor. General Electric does not make fixtures, but is glad to recommend Certified Fixtures bearing the Fleur-O-Lier or RLM tag.

2. ***Be sure you order G-E MAZDA Flamps*** . . . not just "fluorescent tubes". Benefit from the latest achievements of G-E Research and Development, which already, since 1938, have increased light output of G-E MAZDA F lamps as much as 40% and reduced prices as much as 45%! Like all other G-E lamps, they are *made to stay brighter longer . . . give maximum light for current consumed!*

For free illustrated booklet, "Fluorescent — What it Means in Your Plant," write General Electric Co., Dept. 166-S-C, Nela Park, Cleveland, Ohio.

NEW LOW PRICES announced January 1st, 1941, on G-E MAZDA "F" lamps. New 5 foot 100 watt size is latest addition to the complete line.

G-E MAZDA LAMPS

GENERAL ELECTRIC

LOWER PRICES ON QUANTITY PURCHASES OF G-E MAZDA LAMPS—*$5 worth for $4—$15 worth for $11.25!*
Also new larger discounts for contract purchasers! See your G-E lamp distributor today!

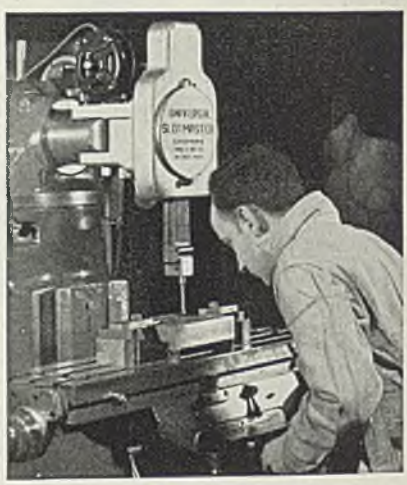
of the glass must pass, is inside of the helmet except when glass is being inserted or replaced.

Precision Shaper

■ Machinery Mfg. Co., 1915 Fifty-first street, Vernon, Los Angeles, has placed on the market a new precision shaper featuring a rigid "modernized" pedestal base which allows the operator more foot room when working close to the machine. An innovation is a hand wheel to change motor speeds. It is located on the front of the pedestal. Removal of louvre side plates provide proper motor ventilation and easy access to the interior. The heavy metal structure eliminates noise and dampens vibration. Both motor and hanging base mountings are cast integrally with the pedestal to assure alignment. The shaper has a maximum stroke of 11¼ inches. The ram length is 21 inches, and 50 to 150 strokes per minute are provided by variable speed unit.

Slotting Head for Milling Machines

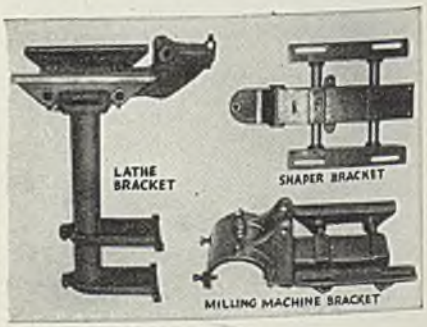
■ Special Machine division, Experimental Tool & Die Co., 12605 Greiner avenue, Detroit, has introduced a universal slotting head that can be used on all types of milling machines for precision work. Its ram stroke is adjustable from 0 to 4 inches and the adjustment may be made quickly. The head which is equipped with a ¼-horsepower motor has four speed changes. These range from 50 to 250 or from 100 to 580 strokes per minute. Constructed as the clapper-box type, the tool holder can be turned in any position desired. Featuring a "modernized" external appearance the slotter's housing is polished cast aluminum, and all working parts are made of graphitic steel. Preloaded Timken bearings are used throughout. Versatile in its work,



the unit can be used for cutting keyways, templets, splines, internal gears and for slotting out precision blanking dies or wherever sharp corners and special shapes must be machined. Its overall length is 18 inches, width 8 inches and depth 12 inches. It is available complete with pulleys, motor, belt and with the mounting adaptor for whatever milling machines specified.

Mounting Brackets

■ Western Mfg. Co., 3428 Scotten avenue, Detroit, has placed on the market a multi-motor mounting which provides individual motor installations on all types of used machine tools. It accommodates all NEMA frames Nos. 204 to 326 (1-15 horsepower at 1800 revolutions per minute) including practically all Canadian, British, South American and overseas motors, together with



"• • • the more Wire Rope Service Records our customers keep • • • the more TRU-LAY Preformed we sell."

"Yes sir—practically every user who keeps the same sort of performance records on his wire rope that he does on his motor trucks, man hours, etc.—is sold on TRU-LAY Preformed. He knows, from his own records, that TRU-LAY far outlasts ordinary non-preformed. He knows that it repays its slight premium cost over and over again in easier, safer handling; faster reeving; better spooling—*longer service.*" • American Cable engineers encourage the keeping of rope performance records. . . . For two reasons: first, they tell the user exactly what rope construction is best suited for his job; second, for the selfish reason that performance records make repeat orders for TRU-LAY Preformed automatic. . . . Write today for a supply of WIRE ROPE SERVICE RECORD FORMS. They are free. Their use will help increase production and lower costs. They are free of cost and obligation—and may be used with any type or make of wire rope. Prove to yourself that American Cable TRU-LAY Preformed is even *better* than we say it is.

In Business for Your Safety

AMERICAN CABLE DIVISION • WILKES-BARRE • PENNSYLVANIA

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

AMERICAN CHAIN & CABLE COMPANY, Inc.

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

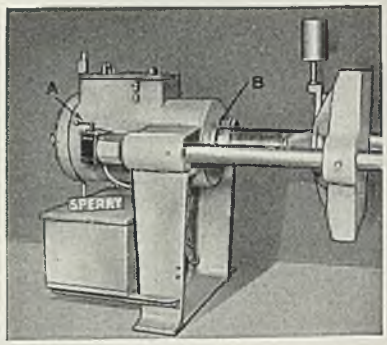
older and special motors up to 10 horsepower used in the United States. No extra plates or rails are necessary, motor installation time is reduced to a minimum and provision is made for the take-up of V belts between motor and transmission. Three models, a lathe mounting bracket, standard shaper bracket and milling machine bracket are available. The milling machine bracket comes in two sizes, 7 and 9-inch.

Squirrel-Cage Motors

■ Westinghouse Electric & Mfg. Co., department 7-N-20, East Pittsburgh, Pa., has placed on the market new open-type sleeve-bearing squirrel-cage induction motors for general purpose drive applications such as machine tools, pumps and auxiliary drives. Known as CS motors they are available in ratings from ½ to 5 horsepower, at speeds from 875 to 3600 revolutions per minute for operation on 110, 220, 440, and 550 volts, 2 and 3 phase alternating current. The rigid complete-cast frames of these units maintain a constant air-gap between stator and rotor, assuring high efficiency operation. Frame improvements include new sealed sleeve bearings having a combination vestibule and felt washer seal and a larger oil reservoir capacity. Oil filler cups may be inserted on either side of the motor. A new wire insulation gives maximum dielectric strength, toughness and flexibility. Combination slot cells, with reinforced cuffs, protect windings from abrasion, and coil ends are taped for reinforcement against strains of full voltage starting.

Closing Device for Filter Presses

■ D. R. Sperry & Co., Batavia, Ill., announce a new electrically-operated hydraulic closing device for filter presses. Known as type EHC, it incorporates mechanical features which provide easier, more economical operation and more precise control of the press. It can be applied to existing filter press installations without much trouble. A mere substitution of the cross head is all that is necessary to make the change. As shown in the illustration, the press is controlled by adjustments at only two places. To open controller handle (A) is moved forward. Locknut (B) is loosened. Filler block is then swung upward, and the movable head is pulled back into open position. The hydraulic medium used is oil, operating in a closed circuit.



Paging Microphone

■ Shure Bros., 225 West Huron street, Chicago, have developed a special microphone suitable for paging and call systems, and for commercial communications. Known as the model 730S Uniplex Cardioid crystal microphone, it employs the

U·S·S Steels-

Ready for delivery in your own community

U·S·S WAREHOUSE PRODUCTS INCLUDE:

- CARBON AND ALLOY BARS (Including S.A.E. grades)
- PLATES
- STRUCTURAL SHAPES
- HOT ROLLED SHEETS
- COPPER STEEL SHEETS
- GALVANIZED SHEETS
- ROOFING AND SIDING
- TIN PLATE
- STEEL MINE TIES
- STAINLESS SHEETS AND STRIP
- TERNE SHEETS
- HIGH TENSILE STEELS

WHEN you need steel in a hurry call your local jobber or warehouse handling U·S·S Steels. They stock all the common forms of steel and many specialties.

For months before the preparedness rush started, U·S·S jobbers and warehouses were stocking up with the most important types of steel. Now you can get better deliveries by placing your orders locally.

During the past 10 years the capacity of our mills has been systematically increased to handle emergencies like this. Our jobbers are in a strong position to take care of your needs and every effort is being made to keep them well supplied.

CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
COLUMBIA STEEL COMPANY, *San Francisco*
TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham*
United States Steel Export Company, New York

UNITED STATES STEEL

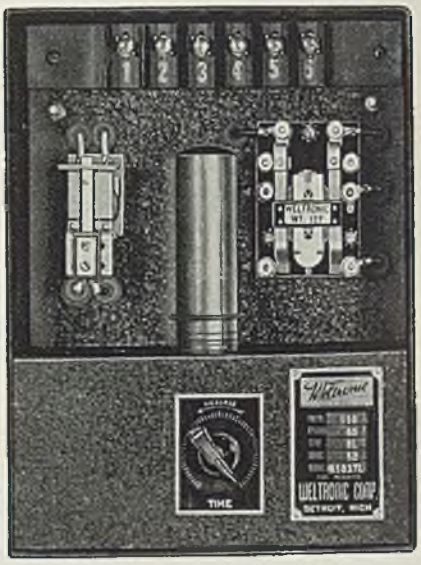
Uniphase principle. The device is sensitive at the front but dead at the rear. It cuts down room noise pick-up, eliminates echoes, cleans up voice transmission, makes break-in phone easy. It gives clear, crisp speech signals that cut through noise and static. A built-in filter protects it against burnouts. The unit is available complete with 7-foot super-shielded cable.

Open-End V-Belting

■ B. F. Goodrich Co., Akron, O., announces a new line of open-end V-belting for application on drives where endless V-belts cannot be applied or can be put on only at considerable expense and trouble in tearing a machine apart to get at the sheaves. Made in maximum 50-foot lengths the belting is made in top widths of 21/32, ⅞ and 1¼ inches and in thicknesses of 7/16, ⅝ and ¾-inch. Angle in each case is 40 degrees. Metal fasteners are used.

General Purpose Timer

■ Weltronic Corp., 3082 East Outer drive, Detroit, has introduced a new general purpose timer, capable of providing extremely accurate automatic timing control for virtually any requirement where cycling or sequencing must be controlled in seconds or fractions of seconds. Known as model 52, its accuracy is based on the electronic principle of timing which employs a vacuum tube as the essential timing element. Once set to the required time control, the timer never varies. A feature of this timer is the rapidity of adjustment afforded by the selector knob by which the operator may set the timer by merely "dialing." This can be done whether the front of the timer is open or closed. The unit has a wide timing



range for its type, the limits being from 1/30 of a second to 120 seconds. It is available for 110 or 220 volts and for any commercial frequency. To provide completely foolproof control, the timer is available with a maintaining circuit. Mounted in a cabinet with hinged cover, the entire unit measures approximately 4 x 8 x 10 inches.

Toggle Pliers

■ Knu-Vise Inc., 16841 Hamilton, Detroit, has introduced a new rapid action model No. 450 toggle pliers

which features a 1½ x 3-inch throat capacity. This capacity permits

Gas fired Radiant tube atmosphere furnace—Surface Combustion Corporation—in plant of Vlchek Tool Company, Cleveland, Ohio.

Clean hardening without scale or decarburization made possible with GAS prepared atmosphere

Pliers, chisels, punches, screwdrivers, socket wrenches and other drop forged mechanics' tools are being clean hardened with Gas by the Vlchek Tool Company, leading manufacturer of automotive hardware in Cleveland, Ohio.

Straight carbon and alloy steels (chrome-vanadium, chrome-molybdenum, chrome-nickel)—all are being hardened without scale or decarburization in a new type Gas-fired furnace using a prepared atmosphere produced in a generator which is part of the furnace layout.

The furnace, with a rated capacity of 800 pounds per hour and a maximum operating temperature of 1750 degrees F., is heated by means of Gas-fired radiant tubes. Quenching is automatic.

Whether in controlled atmosphere or direct-fired furnaces, Gas is the preferred fuel for the heat-treating of metals.

Why not investigate Gas for your own heat-treating problems? Ask your Gas company for detailed information on the greatly improved modern Gas equipment now available.

AMERICAN GAS ASSOCIATION
INDUSTRIAL and COMMERCIAL GAS SECTION
420 LEXINGTON AVE., NEW YORK

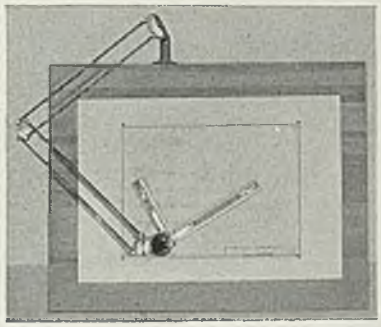
work being held several inches from the edge of the sheet or board. The pliers are not bolted or welded to a fixture, but are manually applied by squeezing the handles, automatically locking in position, but releasing instantly when desired. They will not creep and are quickly adjustable to accommodate different thicknesses by means of a small screw in the upper jaw.

Transmission Belting

■ Manheim Mfg. & Belting Co., Manheim, Pa., has introduced a new Octopus flat transmission belt featuring great pulley grip and resilience. It is said to keep machinery up to speed and run at low tension to protect bearings and provide long service. The action of the belt is due to a new method of combining 34 ounce duck with a special impregnating material. The belt requires no dressing and is not recommended for oily drives.

Drafting Machine

■ Drafto Co., 253 Walnut street, Cochranton, Pa., announces a new Master-Drafto model No. 60 drafting machine suitable for handling sheets 24 x 36 inches in size. Light in weight, it is built to stand hard use. The arms are of seamless steel tubing, fitted with solid bearings. The scale blades are designed so that any scale can be inserted. These scales will fit tightly into the blades without deviating from the necessary 90-degree angle. For center mounting the machine on a drafting board or table, a cast aluminum bracket is used. This contains a screw for leveling the scales parallel to the drafting surface. The stainless steel protractor plate provided is graduated in 2 degrees and can be set accurately for ½-degree read-



ings by use of the graduated vernier. The protractor can be locked at any degree, but for speed and convenience, it is fitted with a latching spring to lock the scales at 0, 30, 45, 60 and 90 degrees on either side of the 0 degree reading.

Temperature Indicator

■ Leeds & Northrup Co., 4934 Stenton avenue, Philadelphia, has placed on the market a new 8667 temperature indicator in which increased accuracy has been provided by calibrating only a small portion of the range on a continuously adjustable slidewire. The remainder, adjustable in fixed steps, is on a dial switch of ten highly accurate resistors. Its range is from 0 to 111 millivolts with a limit of error of plus or minus 0.1 millivolt. Completely self-contained, this potentiometer is

light and compact. No additional accessories are required except the thermocouple and an ice bath for the reference-junction. Built into this unit are coarse and fine battery rheostats, pointer galvanometer, standard cell, battery, galvanometer key and standardizing key.

Detroit Show

(*Concluded from Page* 64)

tap body permitting close to bottom tapping.

The design also adds to the rigidity and strength of the tap as the chaser slots cannot spread, and chasers are securely and accurately held in position. Collapsing is positive and always at the same point, being effected by an adjustable hardened steel trip plate coming in contact with the work. This causes the chasers to collapse quickly, leaving the threads clean and unmutilated. The stationary tap is fitted with a handle for resetting after collapsing while the rotary type has a sleeve for this purpose. Thus the former can be converted easily to the rotary type by removing the handle and replacing the sleeve.

Sheffield Gage Corp. of Dayton, O., will show several gages suitable for a number of varied applications. One of these, the Precisionaire air gage, will check rapidly, out of round and bell mouth condition of long bores. It can be used extensively for checking gun bores, see STEEL, p. 67, Feb. 10, 1941. Another unit, the Multichek Electrigage, shown in Fig. 2, is capable of checking a number of dimensions simultaneously showing by individual signal lights whether each dimension is undersized, oversized or within prescribed tolerances. Other units to be shown by this company include a thread lead checking instrument for checking screw lead or rack teeth quickly and accurately with precision gage blocks as the direct reference, and a visual gage for tool room checking.

Classification of Tool Steels Under Way

Standardization and classification of tool steels used in the production of tools, fixtures and gages, etc., is being undertaken by a committee of representatives of leading engineering societies as well as governmental bureaus under the sponsorship of the American Society of Tool Engineers.

Designated as Project B-52 by the American Standards Association, the standardization work will attempt to do for such steels what already has been done on general steel types —permitting purchasers of tool steels to specify the exact type of steel desired for any given purpose.

Invited to participate in this standardization work are the following technical organizations and government departments: American Institute of Bolt, Nut and Rivet Manufacturers, American Society for Testing Materials, Association of American Railroads, Manufacturers Standardization Society of

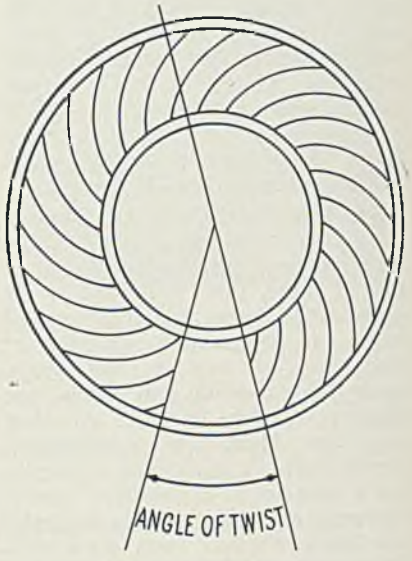
the valve and fittings industry, American Standards association, Telephone group, National Bureau of Standards, National Electrical Manufacturers association, the navy department, Society of Automotive Engineers, War department, Aeronautics boards, Metal Cutting institute, American Society for Metals, National Machine Tool Builders association, Farm Equipment institute and American Petroleum institute.

A committee is at present being appointed to organize the work. Included on this committee will be E. W. Ernest, General Electric Co.; C. E. Ives, Ives Engineering Laboratories (Chicago); and Carl J. Oxford, National Twist Drill Co. as representatives of the American Society of Tool Engineers.

Flexible Bearing Also An Overload Device

■ Although originally designed and used as a vibration dampener, shock absorber or noise eliminator, capacity tests made recently in the laboratories of Harris Products Co., 5435 Commonwealth avenue, Detroit, have shown its Torflex flexible bearing to be applicable as an overload device for various types of power driven equipment liable to only occasional overload of short duration. Thus not only is it capable of compensating for parallel or angular misalignment, the bearing also transmits power.

The tests showed that when the bearing is greatly overloaded, the mechanical bond between the rubber wall and the inner sleeve will slip intermittently. This slippage is momentary, however, and the moment the overload is reduced, the rubber wall resumes its grip on the inner metal tube with its original load capacity. Under overload conditions, the fibers of the rubber (or neoprene) wall are twisted. The twisting or "winding up" of the fibers of the rubber has the effect of contracting the thickness of the rubber, thus permitting slip to occur.



Under torsional load the fibers of the rubber wall in this flexible bearing are twisted or "wound up" as shown. Momentary overloads continue the twisting action until the mechanical bond between rubber wall and inner sleeve is momentarily broken but immediately resumed after overload is lifted

Due to the method of manufacture, there is a mechanical rather than a chemical bond between the rubber and the inner or outer metal walls. In the process of manufacture, rubber is stretched between the inner and outer walls and then permitted to seek its original state. The forces exerted by the rubber at this point exert a high-capacity mechanical bond which is present under all operating conditions excepting elevated temperatures.

Use of the bearing as a clutch is not recommended since the heat generated by more constant slip would not only destroy the holding force exerted by the rubber, but the rubber itself. Neoprene can be substituted instead of rubber where corrosive conditions exist.

Training in Industry

(*Concluded from Page* 57)

Within the past few days I have made a first-hand study of these possibilities at the NYA center in Cleveland. Speaking as a conservative, I must admit that not only have I been surprised, but also very favorably impressed. Apparently I am not alone in the latter reaction. I find that several leading industries in the Cleveland area now are taking full advantage of the possibilities which I have just outlined.

As emphasized earlier in this article, however, it is now largely up to industry to train its own new workers as far as the rank and file are concerned. Therefore, the several agencies just mentioned should now be considered primarily in the light of training schools for the "officers and non-commissioned officers" of America's defense industries, whose main duties in these industries from now on will be to hasten the training of masses of the wholly untrained.

Organized Training Effective

Military training of untrained masses of volunteers and draftees is thoroughly and minutely covered by various drill manuals and manuals covering the care and operation of arms and other military equipment. Training in line with such organized methods is much quicker and more effective than would be the haphazard method of mixing untrained men in with trained men in the hope that in time they would blunder their way into military proficiency. That is especially true when there isn't much time to blunder around.

By the same token, an organized, standardized method of assimilating untrained workers into industry, is much quicker and more effective than simply tossing the untrained in with the trained and hoping for the best. It may be possible to teach a boy to swim by shoving him into a deep pool in which there are some expert swimmers who may or may not be interested in his plight. Certainly, however, there are better and more humane ways of doing it, even though a reasonable degree of immersion of a learner is desirable.

"It is all very well to suggest industrial training 'according to Hoyle,' but where—may we ask—are we to look for the rules for any such organized training within industry?" That certainly is a fair question, for which, fortunately, there is an effective answer. Practical rules already have been promulgated, and they rapidly are being organized on the basis of actual working experience, by a government bureau aptly named, "Training Within Industry." This is a branch of the Labor division Advisory Commission to the Council of National Defense at Washington. Local offices of "Training Within Industry" are now being organized as rapidly as possible in the principal industrial centers of the United States, in order to effect direct, personal co-operation with industry in its tremendous problem of rapidly assimilating masses of untrained workers.

In the meantime, you undoubtedly can obtain a set of these rules—as far as they are now codified—by writing direct to Washington—in case the local office has not yet been organized in your locality. I have before me, as I write this, a set of "Training Within Industry" bulletins setting forth the rules. As one who began his career in the shop at the beginning of the first world war, when all over the United States thousands of untrained were simply being "flung into the industrial pool," so to speak, the writer feels reasonably qualified by that experience to say that the people who have mapped out this system of training within industry very definitely know what they are talking about.

They understand the psychology of beginners, and likewise of the experienced workers upon whom

to a large degree you will now have to depend for coaching of beginners in the "tricks of your trade." They point out how these two groups can be made to co-operate instead of clashing. They emphasize the importance of a logical system of "upgrading" of workers older in experience, in order to build up the needed supervisory personnel needed to staff greatly expanded organizations. They understand how complicated operations can be broken down into simple units to expedite quick training in limited skills and at the same time to make for more effective interchangeable manufacturing in the big quantity lots demanded under the defense program. They understand that invariably there is a right way—and a number of wrong ways—to perform every shop operation; that it is just as easy for the beginner to *learn* the right way as it is to *pick up* one of the wrong ways, and that once a wrong way becomes habitual it seldom if ever can be "unlearned."

There is, for example, a right way and a number of wrong ways, to use a machinist's hammer, just as there is a right way, and a lot of wrong ways, to swing a golf club. Don't forget that the number of hammers which will be "choked to death" in your shop will give a good indication of whether or not your beginners are given proper instruction in simple but important fundamentals. Take council with "Training Within Industry" and correct handling of tools will be learned just as quickly and easily by the new workers in your shop, as is the manual of arms by the newcomers in a training camp.

The Advisory Commission to the Council of National Defense designates this particular phase of its activity as: "A service designed to assist defense industries to meet their man-power needs by training within industry each worker to make the fullest use of his best skill up to the maximum of his individual ability, thereby enabling production to keep pace with defense demands." In few words, this sets forth a large order, but there is every reason to believe that this organization is going to be able to deliver the goods.

If you do not yet have a system of training mapped out, you certainly should take immediate advantage of this service. If you do have a training plan—even a time-tried plan—you will do well to check it against the methods recommended by "Training Within Industry." Your time-tried plan may need renovating to cope effectively with today's employment conditions, just as many time-tried machine tools lately have had to be redesigned completely to meet new production demands.

Selling Technique as Engineering Function

■ *Sales Engineering*, by Bernard Lester; cloth, 200 pages, 5½ x 8½ inches; published by John Wiley & Sons Inc., New York, at $2.

Written especially for sales engineers, this volume covers methods for selling equipment and services which require engineering skill in their selection, application and use. It outlines in detail the sales strategy and technique and the special use made of training and experience of the sales engineer.

The book offers in simple terms the principles of sales engineering. It indicates importance of this work and suggests opportunities in the present industrial organization.

Points of importance and special problems are illustrated by a series of actual case studies. The experienced engineer will recognize problems similar to some he has had to solve in actual practice. The young engineer will find parallels to situations he meets.

Skill to produce has outdistanced skill to distribute efficiently. The problem of industrial management is not design, fabrication or production of goods but effective and economical distribution. This is the field open to sales engineers. The new volume by Mr. Lester points the way.

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*

Bridgeport Phosphor Bronze Employed in Schick "Whisk-it"

Bridgeport New Phosphor Bronze is used to give lifetime spring qualities to the "Whisk-it" for the Schick Captain Dry Shaver—an application typical of the many ways in which manufacturers are utilizing the superior resilience and fatigue resistance of Bridgeport New Phosphor Bronze.

The strength, workability, corrosion, and resilience of Bridgeport New Phosphor Bronze are the result of careful manufacturing control and modern processing methods. Bridgeport New Phosphor Bronze is cast in large bars, and rolled on 4-high tandem mills under expert supervision, resulting in a phosphor bronze that meets the highest standards of quality.

Memos on Brass—No. 19

An outstanding reason for the widespread use of brass is its unique combination of ductility, strength, and corrosion resistance. Brass can be subjected to severe cold forming operations, and acquires great strength in the process. For normal conditions of service, it has excellent resistance to corrosive attack. For more severe conditions, Duronze* may be used.

Ledrite Helps Boost Screw Machine Output

In the current demand for high-speed production, manufacturers of automatic screw machine parts can benefit by the advantages of Bridgeport Ledrite* Free-cutting Brass Rod.

The composition of Ledrite has been evolved after exhaustive tests, both in the laboratory and under actual production conditions. It has been demonstrated that in most cases the use of Ledrite allows faster operation of screw machines and reduces wear on tools, and that parts formed from Ledrite are more uniform in dimensions.

The standard composition of Ledrite meets ASTM and Navy specifications for free cutting rod, and meets most Federal specifications as well. Modifications of Ledrite can be supplied where necessary to meet more rigid specifications, or where severe cold-forming operations are involved in addition to machining.

Ledrite Rod is made in a wide variety of sizes in round, square, and hexagon shapes. A folder giving additional information and the Rod-O-Graf chart, for estimating the quantity of Ledrite required for screw machine parts, are available on request.

Precautions in Use of Lubricants Help to Prevent Stains on Brass

Proper Attention to Straining of Lubricant and Cleaning of Work Assists in Avoiding Fabricating Difficulties

While the use of lubricants is essential in the fabrication of brass parts, it is also essential to observe certain precautions to prevent difficulties that may arise if the lubricants are not properly applied. Because requirements vary in individual plants and for specific jobs, the precautions outlined in this article must be rather general in nature.

The selection of proper lubricants was discussed in last month's issue of the COPPER ALLOY BULLETIN. As a preliminary precaution, it is advisable to check shipments of lubricants in order to maintain standards and to prevent error.

Mixing of Soap Solutions

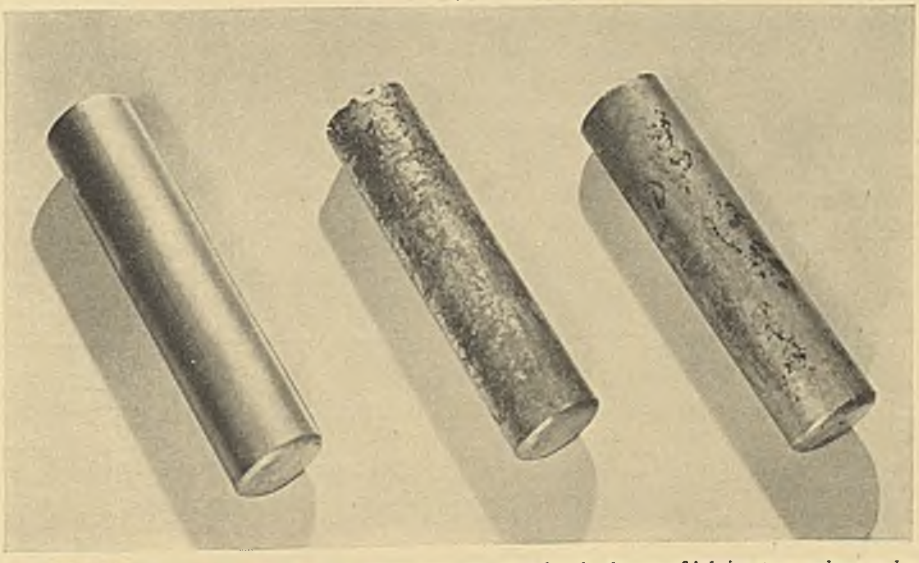
When lubricants such as soap solutions are employed, which require mixing with water, it is desirable to provide suitable mixing equipment. A steam-heated kettle with agitating devices is helpful. If the lubricant is improperly mixed, variations in lubricating qualities will result, and undissolved particles may clog up the circulating system.

When lubricants are properly selected, mixed, and made ready for use, the most important precaution is to maintain a clean solution. There are two ways in which lubricants may become contaminated. Usually this occurs from running the solution in dirty containers or by pick-up from the bed of the machine. However, foreign matter may also be picked up from dirty work. This is most likely to happen in redraw work where the parts are immersed in the solution. Any foreign matter on the parts may be washed off into the solution and later be carried into the tools, resulting in scoring of the tools or the parts during the operation. The solution may also be contaminated by acid from previous pickling operations which had not been removed by subsequent washing operations. Acid solutions containing copper may break down soap emulsions, resulting in an insoluble metallic soap which appears as a green scum that cannot be washed away and may cause trouble in subsequent annealing operations.

Straining of Lubricants

Soap solutions may also pick up metallic chips and other foreign matter from the machines, and it is advisable to provide strainers to remove as much of such material as possible. Small particles, however, are difficult to remove, and efforts should be made to prevent their inclusion in the solution.

(Continued on page 2 col. 2)



The difficulties that may result if proper precautions are not taken in the use of lubricants may be seen by comparing the three cups illustrated, which were drawn, annealed, and acid pickled. The cup at the left, from which the lubricant was removed immediately after drawing, is bright and clean. The second cup shows the presence of red stains—result of allowing the lubricant to remain on the brass. The cup at the right shows both red stains and carbonization.

COPPER ALLOY BULLETIN

ALLOYS OF COPPER

This is the twenty-first of a series of articles on the properties and uses of copper alloys, and continues the subject of modifications of the copper-zinc alloys.

ADDITIONS OF SILICON TO COPPER-ZINC ALLOYS

The addition of silicon to the copper-zinc alloys produces a number of desirable characteristics. Most of these additions are covered by patents which are held directly or by license granted in the various manufacturing plants.

There are a number of elements which, on being added to the copper-zinc alloys, radically change the alpha-beta phase boundary relationship of the binary alloy. Silicon is one of the most effective in this respect. The addition of about 1% silicon to the common 67% copper-zinc alloy, which is normally an alpha solid solution alloy, will change it to a two-phase alloy very similar in structure and physical properties to a simple Muntz metal. Such an addition therefore makes it possible to hot work an alloy of practically the same composition as Common High Brass, although the properties of such an alloy would be more nearly those of Muntz metal than of High Brass.

Effect on Conductivity

The addition of silicon also lowers the thermal and electrical conductivity. This effect has made possible the use of a copper alloy containing more than 80% copper which is suitable for spot welding operations, and a considerable quantity has been used in this way. Normal binary copper-zinc alloys with copper contents above 80% are difficult to spot weld because of their high thermal and electrical conductivities.

Use in Welding Rod

The addition of silicon also produces another effect which has been extremely valuable. When the copper-zinc alloys of the Muntz metal types are used for welding rod, considerable inconvenience and annoyance are caused the welder by the presence of zinc oxide fumes from the molten welding rod. A very small quantity of silicon has the effect of reducing the fuming to a remarkable degree. The mechanism of this action is not entirely understood. It may be due either to film formation or to an increase in the boiling point of the solution.

It is apparent from these points that silicon is a useful member of the group of elements which in small quantities produce certain desirable effects in the various copper-zinc alloys.

Precautions in the Use of Lubricants

(Continued from page 1 col. 3)

After each operation involving a lubricant it is desirable to remove the lubricant as soon as possible. Some lubricants, if allowed to stand too long, may attack the surface of the brass, forming an etched spot under the corrosion product. Fatty oils, such as lard oil, are particularly active in this respect, and if the brass is subsequently annealed, red stains may be formed on the surface.

Staining by Soap Solutions

Soap solutions may produce red stains or dezincified spots on the surface of the annealed brass. The extent to which red staining will take place depends on a number of factors, but it is always possible when either alkaline or acid materials are allowed to stand on the surface of the brass or the parts are placed in an annealing furnace when coated with such solutions.

Brass parts that have been fabricated with heavy oil lubricants and require low-temperature annealing should also be cleaned to prevent the formation of carbon deposits which result from distillation of oils at low annealing temperatures.

Cleanliness Most Essential

The question of whether fabricated brass should always be cleaned before annealing cannot be answered dogmatically, because of the variables which exist in the requirements of each individual job. The operation of removal is an added item of cost which may or may not be justified, depending on these requirements. If, however, the question of red stains is a source of difficulty, it is very probable that removal of the lubricant as soon as possible after fabrication will relieve the situation. Dilute soap solutions can be removed by hot water rinses, while oil or oil-soap compounds require alkali cleaners. When clean oil lubricants are used, the fabricated parts may be cleaned by degreasing operations.

Of all the problems involved in handling the lubrication of brass, the most pressing is that of general cleanliness. The mechanical equipment should be kept clean, the work and the lubricants should be kept clean. These requirements are usually mutually interdependent, and if they are fulfilled, much of the difficulty with lubricants can be eliminated.

NEW DEVELOPMENTS

A countersink cutter is said to utilize an increased angle in the face of the teeth, resulting in curling the chip and allowing the cutter to operate more freely. It is also claimed that the cutter is designed to eliminate chattering. Sizes range from ¼ to 2 inches in diameter. **(No. 170)**

A new clamp is described as suitable for holding a pair of metal sheets in position for riveting operations. The clamp is applied by means of special pliers, and remains in position when the pliers are released. A gasket is said to prevent marring of the metal sheet around the hole. **(No. 171)**

Multiple drilling units can be built up out of sectional tables that can be added or removed to meet changing operating requirements, it is reported. Each section takes two drilling units. **(No. 172)**

Spring leaf blades for switches are now available for assembly by the purchaser, it is announced. Blades are of tinned bronze, in thicknesses ranging from .006 to .020 inch, and are provided with seven contact-point holes. Blades can be supplied with silver contact buttons if desired. **(No. 173)**

A new paint said to be suitable for protecting fume ducts in plating rooms uses a polyvinyl chloride base and is liquid at room temperatures, according to the maker. Though not recommended for constant immersion in liquids, it is said that the paint is not affected by and does not contaminate most plating solutions. **(No. 174)**

A new nut design is said to prevent loosening even if the bolt elongates. Design is reported to consist of a main nut, with a retainer nested in a counterbored section. Retainer is provided with lugs that prevent independent rotation while the nut is being wrenched into position. Retainer is elliptical in shape. When the nut is fully assembled on the bolt, the retainer is partially brought back to its round shape, and becomes, in effect, part of the bolt. **(No. 175)**

A cutting-off tool is said to be designed to give maximum support to the blade for cutting heavy stock, and to have a safety slip arrangement to prevent blade breakage. **(No. 176)**

A hand punch is said to be provided with a toggle linkage mechanism that permits exerting pressures up to 10,000 pounds. The punch is said to be suitable for riveting operations also. **(No. 177)**

Sheet metal layout is said to be facilitated by a new angle meter that permits quick laying out of any angle from 9 to 90 degrees. Meter is reported to be adaptable to pipe as well as to sheet metal, and to be suitable for draftsmen's use in making templates. **(No. 178)**

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.

No General Priorities In Steel Are Expected

Steelmakers hastening substitute analyses on alloy steels. Age of "ersatz" materials for civilians beginning. February sales new high.

MARKET IN TABLOID ★

Demand
Largest on record.

Prices
Strong.

Production
Up 2 points to 96½.

■ THOUGH priorities in varying degrees of completeness are being imposed on several items inside and outside the steel industry, with changes in the status of key items more rapid, steel so far is fairly free of government rationing regulations. No one, however, can foresee what the future may bring about. Among items now regulated are aluminum, magnesium, zinc, steel structural shapes, steel plates, stainless steel, commercial aircraft, machine tools, each being subject to special regulation.

With all consumers by now aroused, orders break all records in volume. A leading independent with large variety of products reports that the short February has reflected an all-time high on sales, while shipments are among the best. Sales are at around 150 per cent of capacity.

There is possibility of an impending falling off in orders, partly because consumers have built up inventories despite precautions against over-sales on part of producers. Consumers, holding larger inventories, and observing shipments from mills coming through fairly smoothly, should henceforth be less insistent to buy.

It becomes more evident that civilians must resort to "ersatz" materials, which may not necessarily be inferior to the originals. Several makers of consumers' goods have already announced shortening of lines of models, such as refrigerators, especially where scarce nonferrous metals are involved.

Certain automobile makers, using foresight, had long ago planned alternate analyses and steels for use when one alloying material or another might become scarce. Many are therefore in a position to adjust themselves to the present situation without undue difficulties. Often consumers of alloy steels are giving considerable latitude to steelmakers by specifying first, second and third preferences. There is some concern lest the substitute materials, such as chromium and molybdenum, will themselves become scarce.

Considerable tonnage of steel stampings will be used in 1942 automobile models in place of die castings. These will be chromium plated. Automobile makers are already loading up on 1942 model steel. First steel releases are for May and first models will be announced in June, earlier than ever before, if present plans materialize.

One of the greatest runs recently has been on steel sheets where earliest delivery is often September, with July sometimes possible. Sheet demand permeates both mill and warehouses, with makers of army truck bodies conspicuous buyers.

The present acute situation in nickel may be cleared in June when new production becomes effective. Relief may come even earlier as a result of substitution. Other nickel capacity now under construction will be ready in 18 months, believed early enough to take care of the aircraft engine and shell production peak slated for them.

Business has been booked so fast in recent months that often an entire month is omitted in delivery promises. Thus a mill suddenly awakens that, say, June bookings are at least double what can be produced that month. Accordingly no July delivery promises are made, August being the next booking month.

Because of shortage of zinc, makers of galvanized pipe usually insist that certain tonnage of black pipe accompany a galvanized order. One of the few instances of improving deliveries is fabricated structurals, where many fabricators are catching up on schedules.

Large companies often farm out open-hearth production to small makers whose furnaces are not yet fully engaged. Often where idle furnaces exist there is a lack of pig iron or scrap.

Automobile production for the week ended March 1 is scheduled to drop 2690 units to 126,550, comparing with 100,855 for the corresponding week of 1940.

Steel production gained 2 points to 96½ per cent of capacity last week, making up exactly the previous week's loss. Pittsburgh gained 1½ points to 96, Chicago 3½ points to 99, Cleveland 1 point to 85½, Cincinnati 2½ points to 97½ and Youngstown 7 points to 97. Detroit fell 3 points to 95. Unchanged were eastern Pennsylvania at 95, Wheeling at 88, Buffalo at 90½, Birmingham at 100, New England at 92 and St. Louis at 93.

All of STEEL's price composites for last week were unchanged, iron and steel at $38.23, finished steel at $56.60 and steelworks scrap at $19.91.

COMPOSITE MARKET AVERAGES

	Mar. 1	Feb. 22	Feb. 15	One Month Ago Feb., 1941	Three Months Ago Dec., 1940	One Year Ago Mar., 1940	Five Years Ago Mar., 1936
Iron and Steel	$38.23	$38.23	$38.23	$38.22	$38.30	$37.07	$33.20
Finished Steel	56.60	56.60	56.60	56.60	56.60	56.50	52.32
Steelworks Scrap..	19.91	19.91	19.91	19.95	21.37	16.47	14.48

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

	Mar. 1, 1941	Feb. 1941	Dec. 1940	Mar. 1940
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.47
Iron bars, Chicago	2.25	2.25	2.25	2.25
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.225	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
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	2.10
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	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to ⅜-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron

	Mar. 1, 1941	Feb. 1941	Dec. 1940	Mar. 1940
Bessemer, del. Pittsburgh	$25.34	$25.34	$24.95	$24.34
Basic, Valley	23.50	23.50	23.10	22.50
Basic, eastern, del. Philadelphia	25.34	25.34	24.84	24.34
No. 2 fdry., del. Pgh., N. & S. Sides	24.69	24.69	23.69	23.69
No. 2 foundry, Chicago	24.00	24.00	23.75	23.00
Southern No. 2, Birmingham	19.38	19.38	19.38	19.38
Southern No. 2, del. Cincinnati	24.06	23.56	23.06	23.06
No. 2X, del. Phila. (differ. av.)	26.215	26.215	25.715	25.215
Malleable, Valley	24.00	24.00	23.60	23.00
Malleable, Chicago	24.00	24.00	23.75	23.00
Lake Sup., charcoal, del. Chicago	30.34	30.34	30.34	30.34
Gray forge, del. Pittsburgh	24.17	24.17	23.35	23.17
Ferromanganese, del. Pittsburgh	125.33	125.33	125.33	105.33

Scrap

Heavy melt, steel, Pitts.	$20.75	$20.75	$22.75	$17.05
Heavy melt, steel, No. 2, E. Pa.	18.50	18.50	19.75	15.90
Heavy melting steel, Chicago	19.25	19.25	20.70	15.50
Rails for rolling, Chicago	24.25	23.75	25.00	18.25
Railroad steel specialties, Chicago	23.25	23.55	23.95	18.40

Coke

Connellsville, furnace, ovens	$5.50	$5.50	$5.50	$4.75
Connellsville, foundry, ovens	6.00	6.00	6.00	5.75
Chicago, by-product fdry., del.	11.75	11.75	11.75	11.25

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Except when otherwise designated, prices are base, f.o.b. cars.

Sheet Steel

Hot Rolled

Pittsburgh	2.10c
Chicago, Gary	2.10c
Cleveland	2.10c
Detroit, del.	2.20c
Buffalo	2.10c
Sparrows Point, Md.	2.10c
New York, del.	2.34c
Philadelphia, del.	2.27c
Granite City, Ill.	2.20c
Middletown, O.	2.10c
Youngstown, O.	2.10c
Birmingham	2.10c
Pacific Coast ports	2.65c

Cold Rolled

Pittsburgh	3.05c
Chicago, Gary	3.05c
Buffalo	3.05c
Cleveland	3.05c
Detroit, delivered	3.15c
Philadelphia, del.	3.37c
New York, del.	3.39c
Granite City, Ill.	3.15c
Middletown, O.	3.05c
Youngstown, O.	3.05c
Pacific Coast ports	3.70c

Galvanized No. 24

Pittsburgh	3.50c
Chicago, Gary	3.50c
Buffalo	3.50c
Sparrows Point, Md.	3.50c
Philadelphia, del.	3.67c
New York, delivered	3.74c
Birmingham	3.50c
Granite City, Ill.	3.60c
Middletown, O.	3.50c
Youngstown, O.	3.50c
Pacific Coast ports	4.05c

Black Plate, No. 29 and Lighter

Pittsburgh	3.05c
Chicago, Gary	3.05c
Granite City, Ill.	3.15c

Long Ternes No. 24 Unassorted

Pittsburgh, Gary	3.80c
Pacific Coast	4.55c

Enameling Sheets

	No. 10	No. 20
Pittsburgh	2.75c	3.35c
Chicago, Gary	2.75c	3.35c
Granite City, Ill.	2.85c	3.45c
Youngstown, O.	2.75c	3.35c
Cleveland	2.75c	3.35c
Middletown, O.	2.75c	3.35c
Pacific Coast	3.40c	4.00c

Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.

Chrome-Nickel

	No. 302	No. 303	No 304
Bars	24.00	26.00	25.00
Plates	27.00	29.00	29.00
Sheets	34.00	36.00	36.00
Hot strip	21.50	27.00	23.50
Cold strip	28.00	33.00	30.00

20% Ni.-Cr. Clad

Plates	18.00
Sheets	19.00

Straight Chromes

	No. 410	No. 416	No. 430	No. 442
Bars	18.50	19.00	19.00	22.50
Plates	21.50	22.00	22.00	25.50
Sheets	26.50	27.00	29.00	32.50
Hot strip	17.00	18.25	17.50	24.00
Cold stp.	22.00	23.50	22.50	32.00

Steel Plate

Pittsburgh	2.10c
New York, del.	2.29c-2.44c
Philadelphia, del.	2.15c-2.30c
Boston, delivered	2.43c-2.57c
Buffalo, delivered	2.33c
Chicago or Gary	2.10c
Cleveland	2.10c
Birmingham	2.10c
Coatesville, Pa.	2.10c
Sparrows Point, Md.	2.10c
Claymont, Del.	2.10c--2.25c
Youngstown	2.10c
Gulf ports	2.45c
Pacific Coast ports	2.65c

Steel Floor Plates

Pittsburgh	3.35c
Chicago	3.35c
Gulf ports	3.70c
Pacific Coast ports	4.00c

Structural Shapes

Pittsburgh	2.10c
Philadelphia, del.	2.21½c
New York, del.	2.27c
Boston, delivered	2.41c
Bethlehem	2.10c
Chicago	2.10c
Cleveland, del.	2.30c
Buffalo	2.10c
Gulf ports	2.45c
Birmingham	2.10c
St. Louis, del.	2.34c
Pacific Coast ports	2.75c

Tin and Terne Plate

Tin Plate, Coke (base box)

Pittsburgh, Gary, Chicago	$5.00
Granite City, Ill.	5.10

Mfg. Terne Plate (base box)

Pittsburgh, Gary, Chicago	$4.30
Granite City, Ill.	4.40

Roofing Ternes

Pittsburgh base, package 112 sheets 20 x 28 in., coating I.C.

8-lb.	$12.00	25-lb.	$16.00
15-lb.	14.00	30-lb.	17.25
20-lb.	15.00	40-lb.	19.50

Bars

Soft Steel

(Base, 20 tons or over)

Pittsburgh	2.15c
Chicago or Gary	2.15c
Duluth	2.25c
Birmingham	2.15c
Cleveland	2.15c
Buffalo	2.15c
Detroit, delivered	2.25c
Philadelphia, del.	2.47c
Boston, delivered	2.52c
New York, del.	2.49c
Gulf ports	2.50c
Pacific Coast ports	2.80c

Rail Steel

(Base, 5 tons or over)

Pittsburgh	2.15c
Chicago or Gary	2.15c
Detroit, delivered	2.25c
Cleveland	2.15c

Buffalo	2.15c
Birmingham	2.15c
Gulf ports	2.50c
Pacific Coast ports	2.80c

Iron

Chicago	2.25c
Philadelphia, del.	2.37c
Pittsburgh, refined	3.50-8.00c
Terre Haute, Ind.	2.15c

Reinforcing

New Billet Bars, Base

Chicago, Gary, Buffalo, Cleve., Birm., Young., Sparrows Pt., Pitts.	2.15c
Gulf ports	2.50c
Pacific Coast ports	2.60c

Rail Steel Bars, Base

Pittsburgh, Gary, Chicago, Buffalo, Cleveland, Birm.	2.15c
Gulf ports	2.50c
Pacific Coast ports	2.60c

Wire Products

Pitts.-Cleve.-Chicago-Birm. base per 100 lb. keg in carloads

Standard and cement coated wire nails	$2.55
(Per Pound)	
Polished fence staples	2.55c
Annealed fence wire	3.05c
Galv. fence wire	3.40c
Woven wire fencing (base C. L. column)	67
Single loop bale ties, (base C.L. column)	56
Galv. barbed wire, 80-rod spools, base column	70
Twisted barbless wire, column	70

To Manufacturing Trade

Base, Pitts.-Cleve.-Chicago Birmingham (except spring wire)

Bright bess., basic wire	2.60c
Galvanized wire	2.60c
Spring wire	3.20c

Worcester, Mass., $2 higher on bright basic and spring wire.

Cut Nails

Carload, Pittsburgh, keg.. $3.85

Cold-Finished Bars

	Carbon	Alloy
Pittsburgh	2.65c	3.35c
Chicago	2.65c	3.35c
Gary, Ind.	2.65c	3.35c
Detroit	2.70c	*3.45c
Cleveland	2.65c	3.35c
Buffalo	2.65c	3.35c

*Delivered.

Alloy Bars (Hot)

(*Base, 20 tons or over*)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem 2.70c

Detroit, delivered 2.80c

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.35	3100	0.70
2100	0.75	3200	1.35
2300	1.70	3300	3.80
2500	2.55	3400	3.20

4100 0.15 to 0.25 Mo. 0.55
4600 0.20 to 0.30 Mo. 1.50-2.00 Ni. 1.20
5100 0.80-1.10 Cr. 0.45
5100 Cr. spring flats 0.15
6100 bars 1.20
6100 spring flats 0.85
Cr. N., Van. 1.50
Carbon Van. 0.85
9200 spring flats 0.15
9200 spring rounds, squares 0.40
Electric furnace up 50 cents.

Alloy Plates (Hot)

Pittsburgh, Chicago, Coatesville, Pa. 3.50c

Strip and Hoops

(*Base, hot strip, 1 ton or over; cold, 3 tons or over*)

Hot Strip, 12-inch and less

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, Birmingham	2.10c
Detroit, del.	2.20c
Philadelphia, del.	2.42c
New York, del.	2.46c
Pacific Coast ports	2.75c
Cooperage hoop, Young., Pitts.; Chicago, Birm.	2.20c
Cold strip, 0.25 carbon and under, Pittsburgh, Cleveland, Youngstown	2.80c
Chicago	2.90c
Detroit, del.	2.90c
Worcester, Mass.	3.00c

Carbon	Cleve., Pitts.
0.26—0.50	2.80c
0.51—0.75	4.30c
0.76—1.00	6.15c
Over 1.00	8.35c

Worcester, Mass. $4 higher.

Commodity Cold-Rolled Strip

Pitts.-Cleve.-Youngstown	2.95c
Chicago	3.05c
Detroit, del.	3.05c
Worcester, Mass.	3.35c

Lamp stock up 10 cents.

Rails, Fastenings

(*Gross Tons*)

Standard rails, mill	$40.00
Relay rails, Pittsburgh 20—100 lbs.	32.50-35.50
Light rails, billet qual., Pitts., Chicago, B'ham.	$40.00
Do., rerolling quality	39.00

Cents per pound

Angle bars, billet, mills	2.70c
Do., axle steel	2.35c
Spikes, R. R. base	3.00c
Track bolts, base	4.15c
Car axles forged, Pitts., Chicago, Birmingham	3.15c
Tie plates, base	2.15c

Base, light rails 25 to 60 lbs., 20 lbs., up $2; 16 lbs. up $4; 12 lbs. up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base plates 20 tons.

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller	68 off
Do., ⅝ and ⅝ x 6-in. and shorter	66 off
Do., ¾ to 1 x 6-in. and shorter	64 off
1⅛ and larger, all lengths	62 off
All diameters, over 6-in. long	62 off
Tire bolts	52.5 off

Stove Bolts

In packages with nuts separate 73-10 off; with nuts attached 73 off; bulk 81 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts	60 off
Plow bolts	68.5 off

Nuts

Semifinished hex.	U.S.S.	S.A.E.
½-inch and less	66	70
⅝-1-inch	63	65*
1⅛-1½-inch	61	62
1⅝ and larger	60	--

Hexagon Cap Screws

Upset 1-in., smaller ..... 68 off

Square Head Set Screws

Upset, 1-in., smaller	74.0 off
Headless set screws	64.0 off

Piling

Pitts., Chgo., Buffalo .. 2.40c

Rivets, Washers

F.o.b. Pitts., Cleve., Chgo., Bham.

Structural	3.40c
½-inch and under	65-10 off

Wrought washers, Pitts., Chi., Phila., to jobbers and large nut, bolt mfrs. l.c.l. $5.40; c.l. $5.75 off

Welded Iron, Steel, Pipe

Base discounts on steel pipe. Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less on lap weld, 1 point less on butt weld. Chicago delivery 2½ and 1½ less, respectively. Wrought pipe, Pittsburgh base.

Butt Weld

Steel

In.	Blk.	Galv.
½	63½	54
¾	66½	58
1—3	68½	60½

Iron

¾	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

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

Iron

	Blk.	Galv.
⅜ butt weld	25	7
1 and 1¼ butt weld	29	13
1½ butt weld	33	15½
2 butt weld	32½	15
1½ lap weld	23½	7
2 lap weld	25½	9
2½ to 3½ lap weld	26½	11½
4 lap weld	28½	15
4½ to 8 lap weld	27½	14
9 to 12 lap weld	23½	9

Boiler Tubes

Carloads minimum wall seamless steel boiler tubes, cut-lengths 4 to 24 feet; f.o.b. Pittsburgh, base price per 100 feet subject to usual extras.

Lap Welded

Sizes	Gage	Steel	Charcoal Iron
1½"O.D.	13	$ 9.72	$23.71
1¾"O.D.	13	11.06	22.93
2" O.D.	13	12.38	19.35
2¼"O.D.	13	13.79	21.68
2¼"O.D.	12	15.16	....
2½"O.D.	12	16.58	26.57
2¾"O.D.	12	17.54	29.00
3" O.D.	12	18.35	31.36
3½"O.D.	11	23.15	39.81
4" O.D.	10	28.66	49.90
5" O.D.	9	44.25	73.93
6" O.D.	7	68.14	....

Seamless

Sizes	Gage	Hot Rolled	Cold Drawn
1" O.D.	13	$ 7.82	$ 9.01
1¼"O.D.	13	9.26	10.67
1½"O.D.	13	10.23	11.79
1¾"O.D.	13	11.64	13.42
2" O.D.	13	13.04	15.03
2¼"O.D.	13	14.54	16.76
2¼"O.D.	12	16.01	18.45
2½"O.D.	12	17.54	20.21
2¾"O.D.	12	18.59	21.42
3" O.D.	12	19.50	22.48
3½"O.D.	11	24.62	28.37
4" O.D.	10	30.54	35.20
4½"O.D.	10	37.35	43.04
5" O.D.	9	46.87	54.01
6" O.D.	7	71.96	82.93

Cast Iron Pipe

Class B Pipe—Per Net Ton

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

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

Semifinished Steel

Rerolling Billets, Slabs

(*Gross Tons*)

Pittsburgh, Chicago, Gary, Cleve., Buffalo, Youngs., Birm., Sparrows Point	$34.00
Duluth (billets)	36.00
Detroit, delivered	36.00

Forging Quality Billets

Pitts., Chi., Gary, Cleve., Young, Buffalo, Birm.	40.00
Duluth	42.00

Sheet Bars

Pitts., Cleveland, Young., Sparrows Point Buffalo, Canton, Chicago	34.00
Detroit, delivered	36.00

Wire Rods

Pitts., Cleveland, Chicago, Birmingham No. 5 to ⅝-inch incl. (per 100 lbs.)	$2.00
Do., over ⅝ to 47/64-in. incl.	2.15

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

Skelp

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

Shell Steel

Pittsburgh, Chicago, base, 1000 tons of one size, open hearth

3-12-inch	$52.00
12-18-inch	54.00
18-inch and over	56.00

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur.	$5.00- 5.75
Connellsville, fdry.	5.25- 6.00
Connell. prem. fdry.	6.00- 6.60
New River fdry.	6.50- 7.00
Wise county fdry.	5.50- 6.50
Wise county fur.	5.00- 5.25

By-Product Foundry

Newark, N. J., del.	11.85-12.30
Chicago, outside del.	11.00
Chicago, delivered	11.75
Terre Haute, del.	11.25
Milwaukee, ovens	11.75
New England, del.	13.00
St. Louis, del.	11.75
Birmingham, ovens	7.50
Indianapolis, del.	11.25
Cincinnati, del.	11.00
Cleveland, del.	11.55
Buffalo, del.	11.75
Detroit, del.	11.50
Philadelphia, del.	11.63

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	14.00c
Toluol, two degree	27.00c
Solvent naphtha	26.00c
Industrial xylol	26.00c

Per lb. f.o.b. Frankford and St. Louis

Phenol (less than 1000 lbs.)	13.75c
Do. (1000 lbs. or over)	12.75c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers	7.00c

Per ton, bulk, f.o.b. port

Sulphate of ammonia	$30.00

Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25 sil.; 50c diff. below 1.75 sil. Gross tons

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$25.00	$25.50	$24.50	$26.00
Birmingham, Ala.§	20.38	....	19.38	25.00
Birdsboro, Pa.	25.00	25.50	24.50	26.00
Buffalo	24.00	24.50	23.00	25.00
Chicago	24.00	24.00	23.50	24.50
Cleveland	24.00	24.00	23.50	24.50
Detroit	24.00	24.00	23.50	24.50
Duluth	24.50	24.50	....	25.00
Erie, Pa.	24.00	24.50	23.50	25.00
Everett, Mass.	25.00	25.50	24.50	26.00
Granite City, Ill.	24.00	24.00	23.50	24.50
Hamilton, O.	24.00	24.00	23.50	....
Neville Island, Pa.	24.00	24.00	23.50	24.50
Provo, Utah	22.00	....	....	....
Sharpsville, Pa.	24.00	24.00	23.50	24.50
Sparrow's Point, Md.	25.00	....	24.50	....
Swedeland, Pa.	25.00	25.50	24.50	26.00
Toledo, O.	24.00	24.00	23.50	24.50
Youngstown, O.	24.00	24.00	23.50	24.50

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

Delivered from Basing Points:				
Akron, O., from Cleveland	25.39	25.39	24.89	25.89
Baltimore from Birmingham	25.78	....	24.66	....
Boston from Birmingham	25.12	....	....	....
Boston from Everett, Mass.	25.50	26.00	25.00	26.50
Boston from Buffalo	25.50	26.00	25.00	26.50
Brooklyn, N. Y., from Bethlehem	26.50	27.00	....	....
Canton, O. from Cleveland	25.39	25.39	24.89	25.89
Chicago from Birmingham	†24.22	....	....	....
Cincinnati from Hamilton, O.	24.44	25.11	24.61	....
Cincinnati from Birmingham	24.06	....	23.06	....
Cleveland from Birmingham	24.32	....	23.82	....
Mansfield, O., from Toledo, O.	25.94	25.94	25.44	25.44
Milwaukee from Chicago	25.10	25.10	24.60	25.60
Muskegon, Mich., from Chicago, Toledo or Detroit	27.19	27.19	26.69	27.69
Newark, N. J., from Birmingham	26.15	....	....	....
Newark, N. J., from Bethlehem	25.53	26.03	....	....
Philadelphia from Birmingham	25.46	....	24.96	....
Philadelphia from Swedeland, Pa.	25.84	26.34	25.34	....

Pittsburgh dist.: Add to Neville Island base, North and South Sides, 69c; McKees Rocks, 55c; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, 84c; Monessen, Monongahela City, 97c (water); Oakmont, Verona, $1.13; Brackenridge, $1.24.

	No. 2 Fdry.	Malleable	Basic	Bessemer
Saginaw, Mich., from Detroit	26.31	26.31	25.81	26.81
St. Louis, northern	24.50	24.50	24.00	....
St. Louis from Birmingham	†24.12	....	23.62	....
St. Paul from Duluth	26.63	26.63	....	27.13

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50, base; $30.74 delivered Philadelphia.

Gray Forge		Charcoal	
Valley furnace	$23.50	Lake Superior fur.	$27.00
Pitts. dist. fur.	23.50	do., del. Chicago	30.34
		Lyles, Tenn.	26.50

†Silvery

Jackson county, O., base: 6-6.50 per cent $29.50; 6.51-7—$30.00; 7-7.50—$30.50; 7.51-8—$31.00; 8-8.50—$31.50; 8.51-9—$32.00; 9-9.50—$32.50; Buffalo, $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base; Prices are the same as for silveries, plus $1 a ton.

†The lower all-rail delivered price from Jackson, O., or Buffalo, is quoted with freight allowed.

Manganese differentials in silvery iron and ferrosilicon, 2 to 3%, $1 per ton add. Each unit over 3%, add $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$60.80

First Quality

Pa., Ill., Md., Mo., Ky.	47.50
Alabama, Georgia	47.50
New Jersey	52.50

Second Quality

Pa., Ill., Ky., Md., Mo.	42.75
Georgia, Alabama	34.20
New Jersey	49.00

Ohio

First quality	39.90
Intermediate	36.10
Second quality	31.35

Malleable Bung Brick

All bases	$56.05

Silica Brick

Pennsylvania	$47.50
Joliet, E. Chicago	55.10
Birmingham, Ala.	47.50

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$28.00
Wire cut	26.00

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$50.00
Chem. bonded chrome	50.00
Magnesite brick	72.00
Chem. bonded magnesite	61.00

Fluorspar

Washed gravel, duty pd., tide, net ton	$25.00-$26.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	20.00-21.00
Do. barge	20.00
No. 2 lump	20.00-21.00

Ferroalloy Prices

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

Spiegeleisen, 19-21% dom. Palmerton, Pa., spot 36.00

Ferrosilicon, 50%, freight allowed, c.l. 74.50
Do., ton lot 87.00
Do., 75 per cent 135.00
Do., ton lots 151.00
Spot, $5 a ton higher.

Silicomanganese, c.l., 3 per cent carbon 113.00
2½% carbon 118.00
2% carbon, 123.00; 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
less than 200 lb. lots 12.25c

67-72% low carbon:

	Carloads	Ton lots	Less ton
2% carb.	17.50c	18.25c	18.75c
1% carb.	18.50c	19.25c	19.75c
0.10% carb.	20.50c	21.25c	21.75c
0.20% carb.	19.50c	20.25c	20.75c

Spot ¼c higher

Ferromolybdenum, 55-65% molyb. cont., f.o.b. mill, lb. 0.95

Calcium molybdate, lb. molyb. cont., f.o.b. mill 0.80

Ferrotitanium, 40-45%, lb., con. 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. carlots, bulk 7.00c
Do., ton lots 7.50c
Do., less-ton lots 7.75c
Do., less 200 lbs. 8.00c
Spot ¼c lb. higher

Tungsten Metal Powder, according to grade, spot shipment, 200-lb. drum lots, lb. $2.50
Do., smaller lots 2.60

Vanadium Pentoxide, contract, lb. contained $1.10
Do., spot 1.15

Chromium Metal, 98% cr., contract, lb. con. chrome, ton lots 80.00c
Do., spot 85.00c

88% chrome, cont. tons. 79.00c
Do., spot 84.00c

Silicon Metal, 1% iron, contract, carlots, 2 x ⅛-in., lb. 14.50c
Do., 2% 13.00c
Spot ¼c higher

Silicon Briquets, contract carloads, bulk, freight allowed, ton $74.50
Ton lots 84.50
Less-ton lots, lb. 4.00c
Less 200 lb. lots, lb. 4.25c
Spot ¼-cent higher

Manganese Briquets, contract carloads, bulk freight allowed, lb. 5.50c
Ton lots 6.00c
Less-ton lots 6.25c
Spot ¼c higher

Zirconium Alloy, 12-15%, contract, carloads, bulk, gross ton 102.50
Do., ton 108.00

35-40%, contract, carloads, lb., alloy 14.00c
Do., ton lots 15.00c
Do., less-ton lots 16.00c
Spot ¼c higher

Molybdenum Powder, 99%, f.o.b. York, Pa. 200-lb. kegs, lb. $2.60
Do., 100-200 lb. lots 2.75
Do., under 100-lb. lots 3.00

Molybdenum Oxide Briquets, 48-52% molybdenum, per pound contained, f.o.b. producers' plant 80.00c

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials

	Soft Bars	Bands	Hoops	Plates ¼-in. & Over	Structural Shapes	Floor Plates	Sheets: Hot Rolled	Sheets: Cold Rolled	Sheets: Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars: Carbon	Cold Drawn Bars: S.A.E. 2300	Cold Drawn Bars: S.A.E. 3100
Boston	3.98	4.06	5.06	3.85	3.85	5.66	3.71	4.48	5.11	3.46	4.13	8.88	7.23
New York (Met.)	3.84	3.96	3.96	3.76	3.75	5.56	3.58	4.60	5.00	3.51	4.09	8.84	7.19
Philadelphia	3.85	3.95	4.45	3.55	3.55	5.25	3.55	4.05	4.65	3.31	4.06	8.56	7.16
Baltimore	3.85	4.00	4.35	3.70	3.70	5.25	3.50	....	5.05	....	4.05	....	....
Norfolk, Va.	4.00	4.10	....	4.05	4.05	5.45	3.85	....	5.40	....	4.15	....	....
Buffalo	3.35	3.82	3.82	3.62	3.40	5.25	3.25	4.30	4.75	3.22	3.75	8.40	6.75
Pittsburgh	3.35	3.60	3.60	3.40	3.40	5.00	3.35	....	4.65	....	3.65	8.40	6.75
Cleveland	3.25	3.50	3.50	3.40	3.58	5.18	3.35	4.05	4.62	3.20	3.75	8.40	6.75
Detroit	3.43	3.43	3.68	3.60	3.65	5.27	3.43	4.30	4.84	3.20	3.80	8.70	7.05
Omaha	3.90	4.00	4.00	3.95	3.95	5.55	3.65	....	5.50	....	4.42	....	....
Cincinnati	3.60	3.67	3.67	3.65	3.68	5.28	3.42	4.00	4.92	3.47	4.00	8.75	7.10
Chicago	3.50	3.40	3.40	3.55	3.55	5.15	3.25	4.10	4.60	3.30	3.75	8.40	6.75
Twin Cities	3.75	3.85	3.85	3.80	3.80	5.40	3.50	4.35	5.00	3.83	4.34	9.09	7.44
Milwaukee	3.63	3.53	3.53	3.68	3.68	5.28	3.18	4.23	4.73	3.54	3.88	8.38	6.98
St. Louis	3.64	3.74	3.74	3.69	3.69	5.29	3.39	4.12	4.87	3.61	4.02	8.77	7.12
Kansas City	4.05	4.15	4.15	4.00	4.00	5.60	3.90	....	5.00	....	4.30	....	....
Indianapolis	3.60	3.75	3.75	3.70	3.70	5.30	3.45	....	5.01	....	3.97	....	....
Memphis	3.90	4.10	4.10	3.95	3.95	5.71	3.85	....	5.25	....	4.31	....	....
Chattanooga	3.80	4.00	4.00	3.85	3.85	5.68	3.70	....	4.40	....	4.39	....	....
Tulsa, Okla.	4.44	4.34	4.34	4.49	4.49	6.09	4.19	....	5.54	....	4.69	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.88	3.45	....	4.75	....	4.43	....	....
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	4.80	5.00	4.60	....	....
Houston, Tex.	3.75	5.95	5.95	3.85	3.85	5.50	4.20	....	5.25	....	6.60	....	....
Seattle	4.00	4.00	5.20	4.00	4.00	5.75	4.00	6.50	5.00	....	5.75	....	....
Portland, Oreg.	4.25	4.50	6.10	4.00	4.00	5.75	3.95	6.50	5.00	....	5.75	....	....
Los Angeles	4.15	4.60	6.45	4.15	4.15	6.40	4.30	6.50	5.25	....	6.60	10.55	9.80
San Francisco	3.75	4.25	6.00	3.75	3.75	5.60	3.75	6.40	5.40	....	6.80	10.65	9.80

	S.A.E. Hot-rolled Bars (Unannealed): 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.28	7.75	6.05	5.80	7.90
New York (Met.)	4.04	7.60	5.90	5.65	....
Philadelphia	4.10	7.56	5.86	5.61	8.56
Baltimore	4.45	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.35	5.65	5.40	7.50
Pittsburgh	3.40	7.45	5.75	5.50	7.60
Cleveland	3.30	7.55	5.85	5.85	7.70
Detroit	3.48	7.67	5.97	5.72	7.19
Cincinnati	3.65	7.69	5.99	5.74	7.84
Chicago	3.70	7.35	5.65	5.40	7.50
Twin Cities	3.95	7.70	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.84	7.72	6.02	5.77	7.87
Seattle	5.85	....	8.00	7.85	8.65
Portland, Oreg.	5.70	8.85	8.00	7.85	8.65
Los Angeles	4.80	9.55	8.55	8.40	9.05
San Francisco	5.25	9.65	8.80	8.65	9.30

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300-4999 pounds in Portland; 300-9999 Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in B'ham., Memphis.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Kansas City and St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 750-4999 in San Francisco; 300-4999 in Portland, Seattle; any quantity in Twin Cities; 300-1999 Los Angeles.

Galvanized Sheets: Base, 150-1499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 150-1049 in Los Angeles; 300-4999 in Portland, Seattle; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis, Tulsa; 1500 and over in Chattanooga; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; 25 to 49 bundles in Philadelphia; 750-4999 in San Francisco.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco, 1000 and over in Portland, Seattle; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

CURRENT IRON AND STEEL PRICES OF EUROPE

Dollars at $4.02½ per Pound Sterling

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	BRITISH Gross Tons f.o.b. U.K. Ports	£ s d
Merchant bars, 3-inch and over	$66.50	16 10 0
Merchant bars, small, under 3-inch, re-rolled	3.60c	20 0 0
Structural shapes	2.79c	15 10 0
Ship plates	2.90c	16 2 6
Boiler plates	3.17c	17 12 6
Sheets, black, 24 gage	4.00c	22 5 0
Sheets, galvanized, corrugated, 24 gage	4.61c	25 12 6
Tin plate, base box, 20 x 14, 108 pounds	$ 6.29	1 11 4

British ferromanganese $120.00 delivered Atlantic seaboard duty-paid.

Domestic Prices Delivered at Works or Furnace—

		£ s d
Foundry No. 3 Pig Iron, Silicon 2.50—3.00	$25.79	6 8 0(a)
Basic pig iron	24.28	6 0 6(a)
Furnace coke, f.o.t. ovens	7.15	1 15 6
Billets, basic soft, 100-ton lots and over	49.37	12 5 0
Standard rails, 60 lbs. per yard, 500-ton lots & over	2.61c	14 10 6
Merchant bars, rounds and squares, under 3-inch	3.17c	17 12 0††
Shapes	2.77c	15 8 0††
Ship plates	2.91c	16 3 0††
Boiler plates	3.06c	17 0 6††
Sheets, black, 24 gage, 4-ton lots and over	4.10c	22 15 0
Sheets, galvanized 24 gage, corrugated, 4-ton lots & over	4.70c	26 2 6
Plain wire, mild drawn, catch weight coils, 2-ton lots and over	4.28c	23 15 0
Bands and strips, hot-rolled	3.30c	18 7 0 ††

(a) del. Middlesbrough 5s rebate to approved customers. ††Rebate of 15s on certain conditions.

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.	18.00
Bos. dock No. 1 exp.	17.00
New Eng. del. No. 1	18.00-18.50
Buffalo, No. 1	20.50-21.00
Buffalo, No. 2	18.50-19.00
Chicago, No. 1	19.00-19.50
Chicago, auto, no alloy	18.00-18.50
Cincinnati, dealers.	18.25-18.75
Cleveland, No. 1	20.00-20.50
Cleveland, No. 2	19.00-19.50
Detroit, No. 1	†16.50-17.00
Detroit, No. 2	†15.50-16.00
Eastern Pa., No. 1	20.00
Eastern Pa., No. 2	18.50
Federal, Ill., No. 2	16.50-17.00
Granite City, R. R. No. 1	17.50-18.00
Granite City, No. 2	16.50-17.00
Los Ang., No. 1 net	14.50-15.00
Los Ang., No. 2 net	13.50-14.00
N. Y. dock No. 1 exp.	†16.50
Pitts., No. 1 (R. R.)	21.00-21.50
Pittsburgh, No. 1	20.50-21.00
Pittsburgh, No. 2	19.50-20.00
St. Louis, No. 1	17.50-18.00
St. Louis, No. 2	16.50-17.00
San Fran., No. 1 net	15.00-15.50
San Fran., No. 2 net	14.00-14.50
Seattle, No. 1	15.00
Toronto, dlrs., No. 1	12.25-12.50
Valleys, No. 1	21.00-21.50

COMPRESSED SHEETS

Buffalo	18.50-19.00
Chicago, factory	18.50-19.00
Chicago, dealers	17.50-18.00
Cincinnati, dealers.	17.00-17.50
Cleveland	20.00-20.50
Detroit	†17.25-17.75
E. Pa., new mat.	20.00
E. Pa., old mat.	17.00
Los Angeles, net	12.50-13.00
Pittsburgh	20.50-21.00
St. Louis	13.50-14.00
San Francisco, net	13.00-13.50
Valleys	20.50-21.00

BUNDLED SHEETS

Buffalo, No. 1	18.50-19.00
Buffalo, No. 2	17.00-17.50
Cleveland	15.00-15.50
Pittsburgh	19.50-20.00
St. Louis	12.50-13.00
Toronto, dealers	10.00-10.50

SHEET CLIPPINGS, LOOSE

Chicago	13.50-14.00
Cincinnati, dealers.	12.50-13.00
Detroit	†13.50-14.00
St. Louis	12.00-12.50
Toronto, dealers	9.00

BUSHELING

Birmingham, No. 1.	16.00
Buffalo, No. 1	18.50-19.00
Chicago, No. 1	18.00-18.50
Cincin., No. 1 deal.	14.25-14.75
Cincin., No. 2 deal.	7.75- 8.25
Cleveland, No. 2	14.00-14.50
Detroit, No. 1 new.	†16.50-17.00
Valleys, new, No. 1.	20.50-21.00
Toronto, dealers	7.00- 7.50

MACHINE TURNINGS (Long)

Birmingham	9.50
Buffalo	14.00-14.50
Chicago	13.50-14.00
Cincinnati, dealers.	10.00-10.50
Cleveland, no alloy.	13.50-14.00
Detroit	†11.00-11.50
Eastern Pa.	14.50
Los Angeles	4.00- 5.00
New York	†10.50-11.00
Pittsburgh	15.50-16.00
St. Louis	10.75-11.25
San Francisco	5.00
Toronto, dealers	†8.75- 9.00
Valleys	15.50-16.00

SHOVELING TURNINGS

Buffalo	15.00-15.50
Cleveland	14.50-15.00
Chicago	14.25-14.75
Chicago, spcl, anal.	15.50-16.00
Detroit	†12.00-12.50
Pitts., alloy-free	17.00-17.50

BORINGS AND TURNINGS

For Blast Furnace Use

Boston district	†8.50- 9.50
Buffalo	14.50-15.00
Cincinnati, dealers.	9.25- 9.75
Cleveland	16.00-16.50
Eastern Pa.	14.00
Detroit	†12.00-12.50
New York	†10.50-11.00
Pittsburgh	16.00-16.50
Toronto, dealers	†8.75- 9.00

AXLE TURNINGS

Buffalo	16.50-17.00
Boston district	†12.50-13.00
Chicago, elec. fur.	20.00-20.50
East. Pa. elec. fur.	19.50-20.00
St. Louis	13.50-14.00
Toronto	†7.75- 8.00

CAST IRON BORINGS

Birmingham	8.50
Boston dist. chem.	†10.75-11.25
Buffalo	14.50-15.00
Chicago	14.25-14.75
Cincinnati, dealers.	9.25- 9.75
Cleveland	16.00-16.50
Detroit	†12.00-12.50
E. Pa., chemical	16.50-17.00
New York	†11.50-12.00
St. Louis	11.00-11.50
Toronto, dealers	†8.75- 9.00

RAILROAD SPECIALTIES

Chicago	23.00-23.50

ANGLE BARS—STEEL

Chicago	23.00-23.50
St. Louis	21.25-21.75

SPRINGS

Buffalo	25.00-25.50
Chicago, coil	24.00-24.50
Chicago, leaf	23.50-24.00
Eastern Pa.	26.00-26.50
Pittsburgh	27.00-27.50
St. Louis	21.50-22.00

STEEL, RAILS, SHORT

Birmingham	20.00
Buffalo	27.00-27.50
Chicago (3 ft.)	23.25-23.75
Chicago (2 ft.)	24.25-24.75
Cincinnati, dealers.	25.25-25.75
Detroit	†22.50-23.00
Pitts., 2 ft. and less	24.00
St. L. 2 ft. & less.	23.50-24.00

STEEL RAILS, SCRAP

Birmingham	18.00
Boston district	†15.75-16.00
Buffalo	22.00-22.50
Chicago	19.00-19.50
Cleveland	24.00
Pittsburgh	22.00
St. Louis	19.50-20.00
Seattle	18.00-18.50

PIPE AND FLUES

Chicago, net	14.00-14.50
Cincinnati, dealers.	13.25-13.75

RAILROAD GRATE BARS

Buffalo	14.50-15.00
Chicago, net	13.75-14.25
Cincinnati, dealers.	12.75-13.25
Eastern Pa.	19.00-19.50
New York	†13.00-13.50
St. Louis	14.00-14.50

RAILROAD WROUGHT

Birmingham	16.00
Boston district	†11.75-12.25
Eastern Pa., No. 1.	20.50-21.00
St. Louis, No. 1	14.00-14.50
St. Louis, No. 2	16.25-16.75

FORGE FLASHINGS

Boston district	†13.50-13.75
Buffalo	18.50-19.00
Cleveland	18.50-19.00
Detroit	†16.50-7.00
Pittsburgh	20.00-20.50

FORGE SCRAP

Boston district	†12.75-13.00
Chicago, heavy	23.50-24.00

LOW PHOSPHORUS

Buffalo, plates	26.00-26.50
Cleveland, crops	26.00-26.50
Eastern Pa., crops	25.50-26.00
Pitts., billet, bloom, slab crops	27.00-27.50
Toronto, dealers	13.50-14.00

LOW PHOS. PUNCHINGS

Buffalo	25.00-25.50
Chicago	23.50-24.00
Cleveland	22.00-22.50
Detroit	†18.75-19.25
Eastern Pa.	25.50-26.00
Pittsburgh	26.50-27.00
Seattle	15.00

RAILS FOR ROLLING

5 feet and over

Birmingham	19.00
Boston	†18.50-19.00
Chicago	24.00-24.50
New York	†19.00-19.50
Eastern Pa.	26.00-26.50
St. Louis	22.00-22.50

STEEL CAR AXLES

Birmingham	18.00
Boston district	†20.00-20.50
Chicago, net	24.75-25.25
Eastern Pa.	27.50-28.00
St. Louis	25.75-26.25

LOCOMOTIVE TIRES

Chicago (cut)	23.50-24.00
St. Louis, No. 1	19.50-20.00

SHAFTING

Boston district	†19.50-19.75
New York	†21.00-21.50
Eastern Pa.	25.00-25.50
St. Louis, 1¼-3¾".	19.50-20.00

CAR WHEELS

Birmingham iron	18.00
Boston dist., iron	†16.50-17.00
Buffalo, steel	24.50-25.00
Buffalo iron	20.50-21.00
Chicago, iron	20.00-20.50
Chicago, rolled steel	22.75-23.25
Cincin., iron deal.	19.50-20.00
Eastern Pa., iron	23.00-23.50
Eastern Pa., steel	26.00-26.50
Pittsburgh, iron	22.00-22.50
Pittsburgh, steel	27.00-27.50
St. Louis, iron	21.00-21.50
St. Louis, steel	21.50-22.00

NO. 1 CAST SCRAP

Birmingham	18.50
Boston, No. 1 mach.	†18.00-19.00
N. Eng., del. No. 2.	19.25-19.50
N. Eng. del. textile	22.00-23.00
Buffalo, cupola	20.50-21.00
Buffalo, mach.	22.00-22.50
Chicago, agri. net.	16.00-16.50
Chicago, auto net.	18.50-19.00
Chicago, railr'd net.	17.50-18.00
Chicago, mach. net.	20.00-20.50
Cincin., mach. deal.	21.50-22.00
Cleveland, mach.	24.00-24.50
Detroit, cupola, net.	†17.50-18.00
Eastern Pa., cupola.	24.00-24.50
E. Pa., No. 2	20.50
E. Pa., yard fdry.	21.50-22.00
Los Angeles	16.50-17.00
Pittsburgh, cupola.	22.50-23.00
San Francisco	14.50-15.00
Seattle	14.00-15.00
St. L., agri. mach.	19.50-20.00
St. L., No. 1 mach.	20.50-21.00
Toronto No. 1 mach., net dealers	†21.50-22.00

HEAVY CAST

Boston dist. break.	†16.50-16.75
New England, del.	20.00-20.50
Buffalo, break.	18.00-18.50
Cleveland, break, net	18.50-19.00
Detroit, auto net.	†18.00-18.50
Detroit, break.	†16.00-16.50
Eastern Pa.	22.50
Los Ang., auto, net.	13.00-14.00
New York break.	†17.50

STOVE PLATE

Birmingham	13.50
Boston district	†14.50-15.00
Buffalo	17.50-18.00
Chicago, net	14.25-14.75
Cincinnati, dealers.	13.00-13.50
Detroit, net	†11.00-11.50
Eastern Pa.	19.00-19.50
New York fdry.	†14.00-14.50
St. Louis	15.00-15.50
Toronto dealers, net.	†17.50-18.00

MALLEABLE

New England, del.	22.00-23.00
Buffalo	24.00-24.50
Chicago, R. R.	23.50-24.00
Cincin. agrl., deal.	18.00-18.50
Cleveland, rail	25.00-25.50
Eastern Pa., R. R.	23.00-23.50
Los Angeles	12.50
Pittsburgh, rail	25.50-26.00
St. Louis, R. R.	21.50-22.00

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% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Chinese wolframite, net ton, duty pd.	$23.50-24.00
Brazil iron ore, 68-69%, ord.	7.50c
Low phos. (.02 max.)	8.00c

F.O.B. Rio Janeiro.

Scheelite, imp.	23.50-24.00
Chrome ore, Indian, 48% gross ton, c.i.f.	$43.00-46.00

Manganese Ore

Including war risk but not duty, cents per unit cargo lots.

Caucasian, 50-52%	
So. African, 48%	57.00-60.00
Indian, 49-50%	60.00-63.00
Brazilian, 46%	54.00-55.00
Cuban, 50-51%, duty free	67.50

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

SHEET SCRAP?

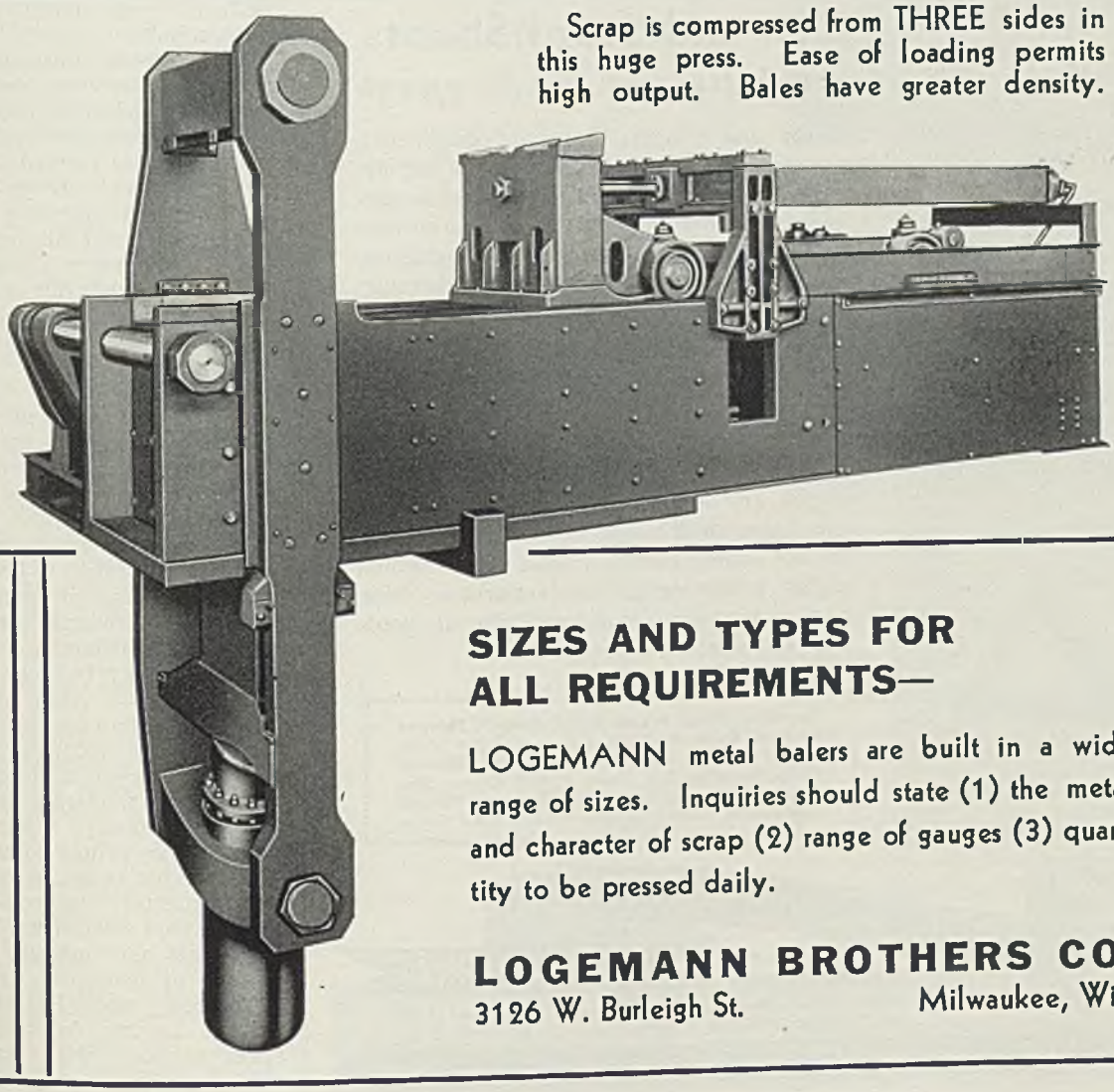
Bale it in a

LOGEMANN SCRAP PRESS

"Hydraulic-compressed" scrap pressed in LOGEMANN metal balers, commands the best price at all times. It can be more conveniently stored and more economically handled.

It can be readily held for favorable markets. It practically eliminates corrosion, saves much heat in remelting. It easily loads cars to capacity.

Scrap is compressed from THREE sides in this huge press. Ease of loading permits high output. Bales have greater density.



SIZES AND TYPES FOR ALL REQUIREMENTS—

LOGEMANN metal balers are built in a wide range of sizes. Inquiries should state (1) the metal and character of scrap (2) range of gauges (3) quantity to be pressed daily.

LOGEMANN BROTHERS CO.
3126 W. Burleigh St. Milwaukee, Wis.

Sheets, Strip

Sheet & Strip Prices, Pages 118, 119

Pittsburgh—While sheet and strip production continues at record levels, galvanized operations have dropped another point to 77 per cent, principally due to shortage of zinc. Specifications for 1942 automotive models have been coming in; volume is heavy, although specified delivery does not begin until May.

Cleveland — Sheets have become one of the most prolonged delivery items, often worse than wide plates. September delivery is the earliest obtainable from many sources. One maker finds February sales largest for any month in history. On stainless and alloy sheets many are virtually out of the market, pending clarification of alloy raw materials situation.

Boston—With second quarter capacity sold out in most departments, orders for narrow cold strip are heavy for third quarter shipment. Incoming tonnage is ahead of shipments and capacity. Steel strip is being substituted and coated for brass products in some instances. Most producers have for weeks been on a voluntary priority basis on stainless strip, but deliveries are extended, hot strip being 12 to 15 weeks.

Chicago—No decrease in demand for sheets and strip is observed. Near-capacity operations in the automobile industry are partly responsible for the tight situation. Hot-rolled, 20-gage and lighter, are in late August delivery; 20-gage and heavier in late October delivery; cold-rolled and enameling iron in late October.

New York — Most leading sheet sellers here claim regular customers have covered largely for third quarter, with some, particularly jobbers, placing specifications for fourth quarter. In fact, there has been considerable fourth quarter specifying. However, not all sellers are willing to book that far ahead, and in at least one important instance, not beyond the end of first half. Narrow cold strip bookings are now mostly for delivery in late second or third quarter at open prices. Forward buying is heavy and incoming tonnage continues above shipments and capacity. Buying is also well diversified with relatively an increasing volume of specialties, including alloys, on which preferential ratings apply. Hot strip deliveries are more extended on most finishes.

Philadelphia—Second quarter producing capacity in sheets and strip is largely absorbed, particularly hot and cold-rolled sheets, for which delivery extends beyond midyear. Galvanized sheets are in even worse position and stainless material is not available at all unless for defense purposes. Consumption is sustained or heavier in most directions, although the peak in automotive needs is thought to have been reached.

Cincinnati — Sheet mill books are nearly filled for second quarter, last week's orders representing three times capacity production for one week, a record tonnage for the current buying movement. Tonnage is being allotted, much rejected, and other means taken to keep schedules elastic in case of heavier defense demands. Galvanizing equipment is at capacity although a shortage in materials may be near.

St. Louis — While shipments of sheets and strip continue in extraordinary large volume, the flow of new orders remains unchecked, and mills report moderate gains in backlogs. Automotive releases on strip are of large proportions. Considerable interest is being manifested in third quarter requirements. During the past several weeks, fabricating plants have placed a substantial volume of protective orders.

Toronto, Ont.—Sustained heavy volume buying features Canadian sheet markets with war industry taking the major proportion. Ware-

house operators are placing large orders for long term delivery and are receiving delivery at such times as supply exceeds war requirements.

Birmingham, Ala. — Sheet orders are unabated. Virtual capacity production remains in effect, and strip orders are heavy.

Plates

Plate Prices, Page 118

Pittsburgh—There is no appreciable change in the plate situation. Virtually all tonnage now on books carries defense priority and it is merely a question of determining which defense order requires shipment first.

Cleveland—Plate production increases as more mills get into action and as non-defense projects are abandoned. Rapid ship sinkings by Germany promise to keep plates scarce for some time.

Boston—Miscellaneous plate fabricating shops are becoming pinched for material in some instances. This is especially true of small-lot buyers, some of whom failed to appreciate the tight situation with mills until recently. Warehouses have substantial specifications with producers on which they are pressing for shipment. For shipbuilding, however, heavy forward orders account for most tonnage, increased further by additional purchases for smaller yards. Deliveries on new business extend well into second quarter on most sizes and grades.

New York—The situation in plates continues to tighten. Orders continue in excess of shipments and deliveries on the light narrow gages are becoming almost as extended as on the wide heavy specifications. Consumers declare that it is now exceedingly difficult to obtain sheared plates for delivery much before August. Shipyard specifications expanded considerably this month, due in part to heavy navy releases and will probably be stepped up considerably along the eastern seaboard in March, as releases are expected to begin to appear for the 200 government cargo ships for which formal steel orders are expected to be awarded soon.

Philadelphia—Producers are making no headway against heavy backlogs since orders match or exceed shipments. Deliveries generally are 14 weeks or more. Wide sections of heavy plates are not obtainable before next fall. Mills are taking only a portion of the export tonnage obtainable.

Seattle — Construction of merchant freighters and naval vessels calls for a heavy tonnage of plates but due to regulations the awards and quantities are not made public. The smaller shops report a good

run of jobs involving less than 50 tons each for tank, boiler and smokestack work. No important projects are up for figures.

Toronto, Ont.—New plate orders continue to expand with heavy orders overhanging the market. Steel will be ordered immediately in connection with the 750 freight cars placed by the Canadian National Railways. Shipbuilding and war tank construction require heavy tonnages of plate.

Birmingham, Ala. — Demand for plates continues high and producers are pushed on deliveries, with no evidence of any immediate slump in orders. Large backlogs remain.

Plate Contracts Placed

3000 tons, 10 tanks, Gulf Oil Corp., Gulfport, Staten Island, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.

1672 tons, including 161 tons structural steel grillage, for machinery room deck, Panama, schedule 4787, to United States Steel Export Co., New York, total, $232,732.29; delivery within 160 days, bids Feb. 14, Washington.

1000 tons, 14 and 16-inch welded steel pipe, McMinnville, Oreg., to Beall Tank & Pipe Co., Portland, Oreg.

Plate Contracts Pending

200 tons, schedule 5234, Mare Island navy yard, Calif.; bids opened at Washington.

Bars

Bar Prices, Page 118

Pittsburgh—Specifications on hot-rolled carbon steel bars continue far in excess of production. Much of this material, however, is merely to assure the buyer a place on producers' books and is not scheduled for delivery until late in second or third quarter.

Cleveland—Producers continue to turn down business and voluntary rationing is stricter. Many believe that Washington-controlled priorities are not far off, at least in alloy bars. Third quarter is about the best delivery except where an order fits a rolling schedule.

Chicago—Orders for steel bars are increasing, and some complications in alloy grades are arising because of nickel shortage. No business is being lost on this account, but mills are not certain that orders can be filled unless more adequate supplies can be obtained. Bar deliveries are now in July, August and September, depending upon size and grade.

Boston—Buyers of steel bars, notably alloys, find it increasingly difficult to get on mill books, regardless of deliveries. Jobbers have orders with producers for shipment in third and fourth quarters, but much new tonnage being offered is being allocated and some turned down.

New York—Deliveries on carbon bars before Aug. 1 are the exception, with many consumers now covered for third quarter and in some cases beyond that. Where alloy bars or bars of most analyses are scheduled for special heat treatment, deliveries are extended many months—in some cases into next year, it is said. Cold-drawn carbon bar shipments in the main are about two weeks more extended than hot carbon bars.

Philadelphia—Deliveries on carbon bars are about the same, some mills offering June shipment on limited tonnages of certain sizes, with third quarter the more usual period for which orders now are being booked. Movement against old commitments is sufficiently close to schedule to meet consumers' needs without interrupting operations.

Toronto, Ont.—Merchant bar sales show further improvement with orders widely diversified. Delivery dates are receding and bookings now run into third quarter on some materials. Mills are maintaining production at capacity.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 119

New York—While some larger bolt and nut producers can still offer reasonably good deliveries, due to the fact that they have heavy inventories, smaller manufacturers

along the eastern seaboard are finding deliveries much more extended. Inventories have been considerably reduced and they have increasing difficulty in getting steel from mills.

Pipe

Pipe Prices, Page 119

Pittsburgh — Operations continue at capacity in standard pipe, mechanical tubing, and, in most cases, pressure tubing. Considerable idle capacity remains in oil country goods. There is some evidence of forward buying on the part of oil country jobbers.

Cleveland—Makers of galvanized merchant pipe now insist that consumer must also contract for a large proportion of black pipe as well. Demand for merchant pipe is unabated and one of the liveliest steel items. Line pipe, casings and other oil country goods, which may have been quiet previously, have turned decidedly active.

Boston — Merchant steel pipe distributors as a rule have well rounded stocks to meet improved demand and consignments from mills for replacements are more prompt as to delivery than most finished steel products. Resale prices are firmer, but still somewhat uneven.

New York—Increasing volume of government construction work is reflected in merchant pipe, although it has not offset the lag in demand resulting from light private construction. Demand for boiler and mechanical tubing is heavy, with deliveries well extended.

Birmingham, Ala. — Miscellaneous pipe buying is holding up well, although large orders are few. Smaller sizes continue in greatest demand. Mills still are heavily booked.

San Francisco—While cast iron pipe awards were limited to lots of less than 100 tons over 2400 tons are pending. So far this year 5013 tons have been booked, compared with 4631 tons for the corresponding period in 1940. Bids open on March 3 for 425 tons for the Menlo Park district, Portland, Oreg.

Cast Pipe Placed

405 tons, 24-inch, class 150, Concord, N. H., to R. D. Wood & Co., Florence, N. J.

200 tons, estimated, blanket contract, Milton, Mass., to Warren Pipe Co., Everett, Mass.

175 tons, 12-inch, Stoughton, Mass., to Warren Pipe Co., Everett, Mass.

165 tons, 6-inch, cement-lined, bell and spigot, Panama, schedule 4794, class 2, to United States Pipe & Foundry Co., Burlington, N. J., bids Feb. 14, Washington.

100 tons, 6-inch, Fort Devens, Mass., to

Warren Pipe Co., Everett, Mass.

100 tons, 8-inch, Lynn, Mass., to Warren Pipe Co., Everett, Mass.

Cast Pipe Pending

1000 tons, various sizes, class 250, airports; Bangor, Me. and Manchester, N. H.

380 tons, 12 and 16-inch, class 150, for Seattle; bids Feb. 28.

200 tons, 8 and 10-inch, for Pendleton, Oreg.; new bids asked Feb. 28.

Steel Pipe Placed

Bureau of Reclamation, Denver, 1000 tons pipe and bends; about 725 tons to Laclede Steel Co., St. Louis; about 275 tons to Mine & Smelter Supply Co., Denver.

Wire

Wire Prices, Page 119

Pittsburgh — Incoming specifications on manufacturers' wire products are considerably larger than production. Most of this material is being scheduled for delivery at mills' convenience. Some is believed to be for 1942 model automobiles.

Cleveland—Conditions are calmer and some producers would welcome more business in certain products, such as fencing. Wire rods are scarce only in the larger sizes. Nails are brisk, but by no means sold out. A big run on cold-rolled strip is noted. Manufacturers' wire is active. Demand from southern farm regions is gradually working north.

Chicago—National defense manufacture is accelerating orders for wire and wire products and mills are operating close to capacity levels. Deliveries now, with mills carrying heavy backlogs, are in the midsummer range. Makers of fine wire are confronted with an acute shortage of diamonds for dies.

Boston — Wire bookings and shipments in February were above January with most wire mill departments, and aggregate backlogs are higher. While buying is widely diversified with more volume appearing for defense needs on which priority slips apply, continued heavy specifications by the automotive trade are outstanding. Mills are by no means taking all tonnage offered, in most cases covering regular customers first and turning down some volume unless covered by emergency defense preferentials.

New York—Tonnage being booked by wire mills tops current high production despite the fact sellers are turning down some orders. Producers in other cases are out of the market on galvanized goods, taking volume only when priorities provide for the purchase of zinc. Inquiry is broadly diversified, spring wire and specialties included. No capacity is open for first quarter delivery, new bookings being at open prices for shipment in second quarter.

Birmingham, Ala. — Production continues at capacity at the Ensley wire mill, and a full-schedule is being maintained. Orders, however, have not prevented restocking.

Rails, Cars

Track Material Prices, Page 119

Railroad car building shops continue good buyers of plates and light shapes, following recent heavy bookings. Shops are well engaged, although not entirely on car work, considerable national defense production of tanks and heavy equipment for the government being undertaken. One railroad which is building a large number of freight cars in its own shops and which has specified nickel steel plates is having trouble placing the order.

Locomotives Placed

American Brass Co., Waterbury, Conn., one 45-ton locomotive of special type, to Heisler Locomotive Works, Erie, Pa.

Atchison, Topeka & Santa Fe, two 5400-horsepower freight and one 2000-horsepower passenger locomotives, to Electro-Motive Corp., La Grange, Ill.

Canadian National Railways, two northern-type freight, for high-speed service in United States, to American Locomotive Co., New York.

Connecticut Light & Power Co., one 45-ton special-type locomotive for Devon,

Conn., plant, to Heisler Locomotive Works, Erie, Pa.

Navy, Washington, four 180-horsepower, to Vulcan Iron Works, Wilkes-Barre, Pa.

New York, New Haven & Hartford, ten 660-horsepower diesel-electric switch engines, to American Locomotive Co., New York.

Panama railroad, three oil-burning steam locomotives, to H. K. Porter Inc., Pittsburgh.

Locomotives Pending

Canadian Pacific, 50 locomotives, half of 4-6-2 type and half of 4-8-4 type, contemplated.

Purchasing officer, navy, New York, three 45-ton diesel-electric locomotives, sch. 3485; bids March 4.

Car Orders Placed

Baltimore & Ohio, 1000 seventy-ton gondolas, to two unstated builders.

Central Railroad of New Jersey, 50 cement cars, 25 cabooses, to shops of Reading Co., subject to court approval; in addition to 525 cars recently awarded to same shops.

Chicago & North Western, 25 streamlined passenger cars, to Pullman Standard Car Mfg. Co., Chicago.

Minneapolis, St. Paul & Sault Ste. Marie, 100 flat cars to Pullman-Standard Car Mfg. Co., Chicago; 50 ballast cars to American Car & Foundry Co., New York.

Car Orders Pending

Baltimore & Ohio, 1000 seventy-ton gondolas, 150 automobile cars, 50 mill-type gondolas, 15 all-steel cabooses.

Bureau of Supplies and Accounts, Navy department, five steel flat cars, schedule 5581; bids March 11, delivery, Dahlgren, Va.

Chicago, St. Paul, Minneapolis & Omaha, 700 fifty-ton box cars; bids asked.

Chicago, Rock Island & Pacific, 25 seventy-ton covered hopper cement cars; bids asked.

Delaware & Hudson, 1000 freight cars, contemplated.

Wabash, 150 automobile cars, 50 mill type gondolas and 15 steel caboose cars, bids asked.

Shapes

Structural Shape Prices, Page 118

Pittsburgh—Inquiries in connection with the defense program continue heavy. Shipments are considerably behind bookings, although the situation is not as bad as might be thought, as much of the tonnage now being placed will not be required on the job until summer.

Cleveland—Plain material is still brisk, with delivery promises in third quarter. Fabricated business here has become livelier, both as to large and small projects. Goodyear will build an airplane hangar at Akron, O. taking 5000 tons. General Electric and Bell Telephone are constructing several buildings in Ohio. Promised deliveries are improving, three to four months ruling. The largest potential job is the $11,000,000 ordnance plant at Sandusky, O., plans for which will come out by mid-April.

Chicago—Structural steel orders and inquiries are light. Fabricating shops have plenty of work and are pressing mills for delivery. Mills have heavy backlogs, and deliveries move off week by week.

Boston—Additional shipyard construction, including piling, approximates 11,000 tons and structural contracts for industrial expansions total 500 tons, including a Worcester, Mass., machine tool shop. While most small district fabricating shops have more tonnage than usual, most of them could take on additional work. Plain material deliveries are somewhat further extended.

Philadelphia — Defense projects dominate structural orders and pending business. Principal award is 3000 tons for the Alabama ordnance plant. Placing of 2100 tons for rehabilitation work at Cramp Shipbuilding yards here is due shortly. For two buildings at New York Shipbuilding 500 tons is pending.

New York — Fabricated structural steel contracts closed in January totaled 258,499 tons, against 81,689 tons the same month last year. Shipments were 150,375 tons this January against 110,919 last.

Bookings in January represented an increase of 130 per cent above average monthly bookings for the industry during the last ten years, according to the American Institute of Steel Construction.

Toronto, Ont.—While structural lettings last week fell below the high average of the preceding three or four weeks, volume continued high. Awards totaled approximately 7500 tons, with about 12,000 tons pending for early closing. Small lot orders ranging up to 500 tons were prominent.

Seattle — Fabricating capacity is at maximum operation, with heavy backlogs, and new business is not being sought. Deliveries are a problem in some instances although agencies here are getting fine co-operation from eastern steel mills. Most steel requirements are coming by water to the North Pacific but rush shipments are being forwarded overland.

Shape Contracts Placed

10,000 tons, ordnance plant to be operated by Remington Arms Co. Inc., war department, Denver, Broderick & Gordon, Denver, contractor, to Bethlehem Steel Co., Bethlehem, Pa.

3000 tons, ordnance plant, Childersburg, Ala., built and operated by E. I. duPont de Nemours & Co., to Virginia Bridge Co., Roanoke, Va.

2500 tons, various naval and shipbuilding projects, to Colby Steel & Engineering Co., Seattle.

2500 tons, warehouse, 16th & Folson street, San Francisco, for Columbia Steel Co., to Columbia Steel Co., San Francisco.

1600 tons, buildings, fleet destroyer base, San Diego, Calif., to Pacific Iron & Steel Co., San Diego, Calif.

1500 tons, storage facilities, naval net depot, Hampton Roads, Va. to Norfolk, Va., fabricator; Doyle & Russell, Hampton Roads, Va., contractors.

1100 tons, two warehouses fleet supply base, San Diego, Calif., to Minneapolis-Moline Power Implement Co., Minneapolis.

1000 tons, engines, cranes, etc. for defense projects to Washington Iron Works, Seattle.

1000 tons, plant, Nordberg Mfg. Co., Milwaukee, Austin Co., Chicago, contractor, to Ingalls Iron Works Birmingham Ala.

900 tons, cracking tower, Standard Oil Co. of New Jersey, Baytown, Tex., to American Bridge Co., Pittsburgh.

800 tons, sheet steel piling, turning basin, Cuyahoga river straightening, Cleveland, to Bethlehem Steel Co., Bethlehem, Pa.

800 tons, ramp connection, Board of Transportation, subway, Brooklyn, N. Y. to Bethlehem Steel Co., Bethlehem Pa.; Rusciano Construction Co., New York, contractor; bids Feb. 4.

750 tons, additional for Alaskan air bases, to Pacific Car & Foundry Co., Seattle; Siems, Drake, Puget Sound, Seattle, contractor.

740 tons, powerhouse, state hospital, Deer Park, N. Y., to Belmont Iron Works, Philadelphia, through Silverblatt & Lasker Co., New York.

600 tons, factory building, Maggi Co., New Milford, Conn., to Lehigh Structural Steel Co., Allentown, Pa.

600 tons, air corps warehouse units 1-5, Patterson field, Ohio, to R. C. Mahon Co., Detroit; J. H. Marchbank Construction Co., Chicago, contractor.

570 tons, building, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., to American Fabricated Steel Co. Inc., Philadelphia, through Day & Zimmermann Inc., Philadelphia, contractor.

500 tons, three warehouses, McClellan Field, Sacramento, Calif., awarded on joint contract to Palm Bridge & Iron Works, Sacramento, Calif., and Moore Drydock Co., Oakland, Calif.

350 tons, cyclotron building, University of California, Berkeley, Calif., to Moore Drydock Co., Oakland, Calif.

325 tons, mill, American Brass Co., Ansonia, Conn., to American Bridge Co., Pittsburgh.

322 tons, state highway bridge, Dallas, Tex., to Central Texas Iron Works, Waco, Tex.

250 tons, state bridge, South Fork Lick-

Shape Awards Compared

	Tons
Week ended March 1	34,101
Week ended Feb. 22	23,782
Week ended Feb. 15	21,129
This week, 1940	43,070
Weekly average, 1941	40,782
Weekly average, 1940	28,414
Weekly average, Jan.	51,215
Total to date, 1940	188,755
Total to date, 1941	367,042

Includes awards of 100 tons or more.

ing river, Falmouth, Ky., to American Bridge Co., Pittsburgh.

225 tons, bridge widening, Grand Concourse, Bronx, N. Y., to American Bridge Co., Pittsburgh, through F.P.S. Contracting Co., New York.

225 tons, Chrysler building, San Leandro, Calif., to Judson-Pacific Co., San Francisco.

225 tons, building, Parish Pressed Steel Co., Reading, Pa., to Belmont Iron Works, Philadelphia.

210 tons, plant, Mansfield, O., Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. to Mansfield Structural & Erecting Co.

200 tons, storage building, Sinclair Refining Co., Wellsville, N. Y., to the American Bridge Co., Pittsburgh.

184 tons, state highway bridge, Leverett, Mass., to Phoenix Bridge Co., Phoenixville, Pa.; Peter Salvucci, Waltham, Mass., contractor; Northern Steel Co., Boston, 74 tons, reinforcing bars.

175 tons, bulb angle curbing, Third avenue, Brooklyn, N. Y., Triboro Bridge authority, to American Bridge Co., Pittsburgh.

150 tons, transformer testing building, Cornell university, Ithaca, N. Y., to American Bridge Co., Pittsburgh.

150 tons, laboratory, Northeastern University, Boston, to Lehigh Structural Steel Co., Allentown, Pa.; McCutcheon Co., Boston, contractor.

140 tons, additional unit, Reed-Prentice Corp., Worcester, Mass., to United Structural Steel Corp., Worcester; E. J. Cross Co., Worcester, contractor.

110 tons, angles, channels and I-beams, Panama, schedule 4763, class 3, to U. S. Steel Export Co., New York; bids Feb. 10, Washington.

100 tons, plant addition, Hewitt Rubber Co., to Ernst Iron Works, Buffalo.

100 tons, armory, Springfield, Mass., to Haarmann Structural Steel Co., Holyoke, Mass.

100 tons, machinery supports, asphalt plant, Manhattan, N. Y., to Lehigh Structural Steel Co., Allentown, Pa.

100 tons, one-story addition, annealing division, Atlantic Wire Co., Branford, Conn., to Berlin Construction Co., Berlin, Conn.; Leo F. Caproni, New Haven, engineer.

Unstated tonnage, one-story plant, Wright Aeronautical Corp., near Caldwell, N. J., to Lukenweld, Inc., Coatesville, Pa.; John W. Ferguson Co., Paterson, N. J., contractor.

Shape Contracts Pending

6000 tons, piling, pier, navy yard, Boston; Fitzgerald Construction Co., Boston, contractor.

5000 tons, airplane hangar, Goodyear Rubber Co., Akron, O.; bids in.

5000 tons, precision instrument factory, Indianapolis, for navy.

4500 tons, flood protection project, Massillon, O., for army engineers' office.

4000 tons, shipway extension, Fore River Shipbuilding Co., Quincy, Mass.

3750 tons, two swing bridges and viaduct approach, schedule 4650, Panama, over Miraflores locks, near Balboa; bids Mar. 2.

3000 tons(Government dam at Norfork, Ark.; Utah Construction Co., San Francisco and Morrison-Knudson Co., Boise, Idaho, low on general contract.

2900 tons, including 2200 tons steel bearing piles, shipways, Sun Shipbuilding Corp., Chester, Pa.

2033 tons, sheet steel piling, in addition to 140 tons of shapes, specification HD 108, Long Beach, Calif., bids Mar. 4.

1805 tons, including 768 ton of sheet piling, improvement Los Angeles River between Atlantic and Randolph streets, Los Angeles; bids about March 3.

1500 tons, boiler house and turbine room extension, Detroit Edison Co., Marysville, Mich.

1200 tons, plant addition, Cleveland Graphite Bronze Co., Cleveland.

1200 tons, manufacturing buildings, Norberg Mfg. Co., Milwaukee.

1100 tons, apartment house, L. Victor Well, New York.

1000 tons, plant, Bucyrus, O., General Electric Co., Schenectady, N. Y.; bids in about a month.

900 tons, storage building and welding shop, Bath Iron Works, Bath, Me.

700 tons, building, Maggi Co., Milford, Conn.

629 tons, steel superstructures, Illinois Central railroad bridge over Kentucky dam powerhouse and spillways; bids Mar. 17, Tennessee Valley Authority, Knoxville.

525 tons, tunnel supports, Colorado-Big Thompson project, Colo., near Estes Park; S. S. Magoffin Co. Inc., Santa Fe and West Oxford street, Englewood, Colo., low on general contract at $784,710.

500 tons, two buildings, New York Shipbuilding Corp., Camden, N. J.; bids March 4.

450 tons, 1941 bridge requirements, various locations, Illinois Central system.

425 tons, automotive repair shop, Aberdeen, Md.

350 tons, building No. 61, National Aniline & Chemical Co., Buffalo.

320 tons, galvanized, switch structures, Watts Bar dam, Tenn.; bids March 3, Tennessee Valley Authority, Knoxville.

310 tons, state bridge, contract 2126, Wheatland, Ind.

Behind the Scenes with STEEL

Professor Shrdlu Conducts a Quiz

■ Here is a chance to win yourself a two-bit seegar, test your industrial I. Q., and have a little fun all at the same time. Listed below are 10 questions dealing with recent developments in the industry and the national defense program—all covered, incidentally, in the last two issues of STEEL. Jot down your answers on a post card and send it in. Any grade of 90 or better wins a long-filler Havana—and no cribbing allowed:

1. Charles R. Hook, president, American Rolling Mill Co. recently announced his company:
   1. *Was discontinuing pig iron production.*
   2. *Would build a 1000-ton blast furnace at Ashland, Ky.*
   3. *Will not accept any more defense orders.*

2. Newly elected president of National Roll & Foundry Co., Avonmore, Pa., is:
   1. *William H. Seaman*
   2. *Robert P. Turner*
   3. *Otto W. Winter*

3. Stocks of new cars in the hands of automobile dealers is estimated to be:
   1. 2,000,000
   2. 124,000
   3. 500,000

4. The director of OPM's production division is:
   1. *William S. Knudsen*
   2. *Leon Henderson*
   3. *John D. Biggers*

5. Last week STEEL's composite of steelworks scrap prices:
   1. *Remained unchanged for the third successive week.*
   2. *Fell off $1.42 due to lack of demand.*
   3. *Shot up $4.00.*

6. The tensile strength of copper-bearing high-tensile steels can be increased by:
   1. *Carburizing.*
   2. *Solution hardening.*
   3. *Precipitation hardening.*

7. OPM has announced the enforcement of priorities on:
   1. *Magnesium and aluminum.*
   2. *Machine tools and aluminum.*
   3. *Steel and machine tools.*

8. The Machine & Tool Progress exposition will be held in Detroit, March 24-29 by:
   1. *The American Society for Testing Materials.*
   2. *The American Society of Tool Engineers.*
   3. *The American Society of Mechanical Engineers.*

9. Maximum creep strength of carbon-molydenum steels has been found to have a definite relationship to:
   1. *Tensile strength.*
   2. *Grain size.*
   3. *Endurance limit.*

10. To complete the defense contracts authorized through December 1940 will require:
    1. *Three million man hours.*
    2. *Four billion man hours.*
    3. *Eighteen billion man hours.*

SHRDLU.

300 tons, state highway bridge, Rockport, Mo.

275 tons, beam spans, Pratt, W. Va., for state.

270 tons, bridge, Washington-Fayette counties, Pennsylvania.

270 tons, nurses home, Lexington, Ky., Sisters of Charity of Nazareth.

260 tons, bridges 180 and 80, Hilliard and Arthur, Mo., Missouri Pacific railroad.

250 tons, warehouse, Southbridge Finishing Co., Southbridge, Mass.

225 tons, generator house extension, Washington Gas Light Co., Washington.

200 tons, hospital addition, Home for Aged and Infirm Hebrews, New York.

200 tons, building, Reading Sheet Metal Products Co., Reading, Pa.; bids March 4.

190 tons, alterations to rotunda building, Ford Motor Co., Dearborn, Mich.

190 tons, warehouse, Owens-Illinois Distributors, Long Island City, N. Y.

175 tons, factory, South Amboy Realty Co., South Amboy, N. J.

165 tons, repair of truss and plate girder viaduct, Washington and Fayette counties, Pennsylvania; bids to state highway department, Harrisburg, Pa., March 7.

160 tons, foundry, Geneva Foundry Corp., Geneva, N. Y.

160 tons, extension to building 49, General Electric Co., Schenectady, N. Y.

155 tons, substructure, State street bridge, City of Chicago; bids March 20.

150 tons, shop, Lake Superior Shipbuilding Co., Superior, Wis.

145 tons, structural steel trash racks for Watts Bar dam, Tenn.; bids March 4, Tennessee Valley Authority, Knoxville.

140 tons, Edison office building, Ohio Bell Telephone Co., Rocky River, O.

134 tons, building, Bellevue, O., General Electric Co., Schenectady, N. Y.; bids Feb. 26.

120 tons, extension to still house, Bakelite Corp., Bound Brook, N. Y.

116 tons, deck steel girder bridge, Greenlee county, Ariz., for state; bids Mar. 5.

110 tons, building, Euclid Road Machinery Co., Euclid, O.; Albert M. Higley, Cleveland, contractor.

100 tons, including reinforcing and wire mesh, two-unit laundry building, Fort Lewis, Wash., cantonment; Sound Construction & Engineering Co., Seattle, low.

Unstated, building, Fedders Manufacturing Co., Buffalo.

Reinforcing

Reinforcing Bar Prices, Page 119

Pittsburgh—Placements have been somewhat lighter, largely because producers are well booked and are not taking tonnage as rapidly as before. There remains about the same amount of unplaced tonnage in the market, with inquiries continuing active. Prices are strong, although reports of weaker prices in eastern markets continue.

Chicago—Awards of reinforcing bars have dropped sharply in the last week. Larger projects are for national defense. A number of small jobs involving up to 100 tons are beginning to appear.

New York—Preliminary inquiry

for reinforcing steel requirements for several naval bases in the Atlantic are coming out. For the moment prospective inquiry is much heavier than current active needs and awards. Prices are stiffening even on procurement division inquiries on which weakness, if prevalent, usually appears.

Reinforcing Steel Awards

4000 tons, ordnance plant, war department, Denver, Broderick & Gordon, Denver, contractor, to Colorado Fuel & Iron Corp., Denver; bids Feb. 18.

700 tons, deformed rounds, 30-foot lengths, ⅜ to ⅞-inch, Panama, schedule 4794, to Republic Steel Corp., Cleveland; bids Feb. 14, Washington.

441 tons, Panama canal, schedule 4815, to Republic Steel Corp., Cleveland.

425 tons, housing project, Hartford, Conn., to Beacon Steel Products Co., New York, through Cauldwell-Wingate Co., New York.

400 tons, plant, Ohio Edison Co., Akron, O., to Republic Steel Corp., Cleveland, through Truscon Steel Co., Youngstown, O.

280 tons, U. S. army airport, Fort Wayne, Ind., to Great Lakes Steel Corp.; Cooke Contracting Co., contractor.

270 tons, building, purchasing department, city of Cincinnati, Letting 2/18, to Pollak Steel Co., Cincinnati.

267 tons, concrete runways, U. S. army airport, inv. 272-41-25, Fort Wayne, Ind., Cook Construction Co., Detroit, contractor, to Great Lakes Steel Corp., Detroit.

200 tons, storage station, Gulf Oil Corp., Boston, to Northern Steel Co., Boston.

150 tons, U. S. army warehouse, Fort Wayne, Mich., to Great Lakes Steel Corp., A. W. Kutsche Co., contractor.

150 tons, building, Kollmorgan Optical Co., Brooklyn, N. Y., to Republic Steel Corp., Cleveland, through Capitol Steel Corp., of New York, Brooklyn, N. Y.

135 tons, St. Raphael hospital, New Haven, Conn. to Truscon Steel Co., Youngstown, O.

135 tons, addition N-P ward, army medical center, Washington, to Rosslyn Steel & Cement Co., Washington; Merando Co., Washington, contractor.

121 tons, municipal auditorium and armory, Sheboygan, Wis., to Concrete Steel Co., Chicago; bids Feb. 7.

100 tons, municipal airport, Niagara Falls, N. Y., to Bethlehem Steel Co., Buffalo.

100 tons, laboratory, Northeastern University, Boston, to Joseph T. Ryerson & Son Inc., Cambridge, Mass.; McCutcheon Co., Boston, contractor.

100 tons, hangars, buildings and miscellaneous work, airports, Manchester, N. H., and Bangor, Me., to Truscon Steel Co., South Boston, Mass.; D. A. Sullivan & Sons, Northampton, Mass., contractors.

Concrete Bars Compared

	Tons
Week ended March 1	7,274
Week ended Feb. 22	10,325
Week ended Feb. 15	6,238
This week, 1940	6,684
Weekly average, 1941.....	9,885
Weekly average, 1940	9,661
Weekly average, Jan.	10,272
Total to date, 1940	68,001
Total to date, 1941	88,967

Includes awards of 100 tons or more.

Reinforcing Steel Pending

2500 tons, improvement, Los Angeles river between Fourth and Aliso streets, Los Angeles; bids opened.

1800 tons, Government dam, Norfork, Ark.; Utah Construction Co., San Francisco and Morrison-Knudson Co., Boise, Idaho, low on general contract, $10,778,726.

1600 tons, elevated highway section, contract B-19, Brooklyn; Corbetta Construction Co., low, bids to Triborough Bridge Authority, New York.

700 tons, municipal asphalt plant, New York, Lane Construction Co., contractor.

600 tons, navy yard pier, Boston, Fitzgerald Construction Co., contractor.

500 tons, housing project, New Haven, Conn.; LaSalla-Mason Co., Bronx, N. Y., low.

480 tons, relocation projects, U. S. highways, four contracts; bids March 11, Tennessee Valley Authority, Knoxville.

400 tons, substructure, State street bridge, City of Chicago; bids March 20.

300 tons, five highway bridges, state of Indiana; bids Feb. 25.

300 tons, plant, Singer Mfg. Co., Elizabethport, N. J., Austin Co., contractor.

250 tons, DuPont naval powder plant, Indianhead, Md.

217 tons, four bridges near Davis, Solona county, Calif., for the state; bids Mar. 12.

200 tons, naval armory, Milwaukee.

145 tons, addition to office and termi-

nal, United Air Lines, Chicago, bids Feb. 27.

130 tons, Yesler housing project, Seattle; J. C. Boespflug, Seattle, contractor.

121 tons, San Gabriel River bridge, Los Angeles county, Calif., for the state; bids opened.

111 tons, Mokelumne River bridge, San Joaquin county, Calif., for the state; bids opened.

100 tons, apartment and garage, Madison, Wis.

100 tons, schedule 4191, purchasing agent, Los Angeles; bids in.

100 tons, Edison school addition, Seattle; Naramore & Brady architects; bids March 11.

Unstated, army ordnance depot, Hermiston, Oreg.; J. A. Terteling & Son, Boise, Idaho, contractors, low at $7,547,661.

Pig Iron

Pig Iron Prices, Page 120

Pittsburgh — Jones & Laughlin Steel Corp. blew in its idle Aliquippa stack last week. That gives the company full operation and increases the number of active stacks in the district to 43 of 47. Pig iron sellers here report their customers are all being taken care of.

Cleveland — Despite the shorter month, February shipments will be equal to January. The supply becomes ever tighter, though foundries note that skilled labor is scarcer than raw materials. Specifications are unusually brisk. Consumers are not particularly interested in pending second quarter prices, wanting merely assurance of material. Some foundries are consuming double what they had expected.

Chicago—No change has occurred in the pig iron situation which is getting tighter week by week. Furnaces are being pressed by melters and the problem is to keep supplies moving. Foundry activity is expanding and need for iron rising accordingly.

Boston—Although covering for immediate normal needs, plus increases in scatttered instances involving defense contracts, pig iron sellers continue to discourage speculative orders. Pressure on merchant furnaces is heavy and rationing is practically effective to provide all foundries with supplies. Melt is at a high rate, most classes of consumers being active, including jobbing shops.

New York—Pig iron sellers have not opened books for second quarter, refusing to accept tonnage even on the basis of prices ruling at time of delivery. Buying is almost at a minimum, as producers have little tonnage available for delivery in the current quarter. Meanwhile, specifications continue heavy, with some difficulty reported by sellers in delivering iron on promised schedules.

Philadelphia—Heavier orders are being received for second quarter, although sellers have not been soliciting forward business. Some consumers are well protected on current and future needs but in some instances buyers still are actively seeking additional coverage. Foundry operations continue to expand as more plants go to a six-day week.

Cincinnati — Foundry melt has been steadily expanding until many are at practical capacity. Shipments of southern iron continue heavy, but February movement of northern iron from furnace stocks has been much lighter. Furnace policies preclude forward coverage. Prices on by-product foundry coke were reaffirmed for March, at $11, delivered, Cincinnati.

St. Louis — Pig iron sellers are keeping their customers supplied for all current needs, but continue to discourage efforts to accumulate inventories. Specifications in February have been heavy, and indications point to a heavier shipment total than in January, despite the shorter month. Further expansion in melt is noted, with increases at gray iron foundries particularly.

Birmingham, Ala. — Pig iron demand continues brisk, and furnaces maintain high production schedules. Backlogs are heavy. There is no evidence of slackening in demand.

Scrap

Scrap Prices, Page 122

Pittsburgh—Brokers find it virtually impossible to obtain material, although demand is fairly good. Mill stocks have been reasonably high, and as yet there is no pinch. Prices are being maintained on the $21 level, and prices on rails have been revised in accordance with the statements issued in connection with pending railroad lists. Scrap rails are quoted at $22, and cut rails at $24.

New York—Price of scrap rails at $22 will be considered equitable by the price stabilization committee of the OPM, covering March future railroad lists, a $2 reduction under the February ruling, with $23.50 Pittsburgh, for rerolling rails, a reduction of $2.50 per ton. Reflecting these prices rails for rolling have declined here, brokers' buying price being $19 to $19.50. Cast grades are stronger on active foundry demand. No. 1 machinery cast has advanced 50 cents. Steelworks are taking shipments against contracts in the East and foundries are buying actively. Scrap is not coming out freely and shipments would be heavier if material were available on most grades.

Cleveland—Little trading is being done in steel and iron scrap and

supplies are small. Prices are steady on such small business as is being done. Railroad lists closing early in March are moderate.

Chicago—Iron and steel scrap is largely inactive, with no mill purchases. Brokers are forced to pay $19.50 for material to satisfy old orders and insufficient tonnage is available to completely satisfy the need. Foundry grades are strong and unchanged. Although the maximum prices to be paid for railroad scrap for March have been pegged, it is believed that the 50-cent lower prices will have no effect on dealer scrap.

Boston — Iron and steel scrap prices are firm. Slight advances in brokers' buying prices include heavy breakable cast, forge flashings, and skeleton while No. 2 cast delivered to New England points is 25 to 50 cents per ton higher. No. 1 heavy melting steel for district delivery is also higher, from $18 to $18.50 being reported paid on new buying. This is an advance of around $1 a ton.

Philadelphia — Prices remain steady to strong in the absence of appreciable increase in available supplies of most scrap grades. Cast scrap in particular is tight. Offerings of heavy melting steel are rather moderate in relation to consumption, and mills are believed to have made substantial reductions in their stocks the past 90 days. Prices in some instances are nominal, since lack of tonnages preclude the test of actual sales.

Detroit—Scrap continues to mark time, with prices steady, too high to develop buying by brokers and too low to stimulate sales. Mills appear to be awaiting further action by government officials on scrap prices. Dealers are making shipments on earlier orders and are not stocking up to any extent.

Cincinnati—Scrap brokers find offerings have been shrinking. The reason is not readily apparent as the price seems fairly well established and speculative moves subdued. Shipments to mills continue heavy; foundry demand is unabated. Prices are unchanged.

St. Louis—The principal development in the scrap market was the purchase by an east side mill of a substantial tonnage of No. 1 and No. 2 heavy melting steel. The exact amount was not disclosed, but it is said to be above 10,000 tons. The sale was made on a basis of current quotations for 60-day delivery. There have been scattering sales of several grades, including cast and malleable.

Toronto, Ont.—Wide interest and some sensational trading has featured the scrap market since announcement by the Canadian steel controller of maximum prices for consumers on various steel scrap

materials. Demand for all steel grades continues brisk, but dealers have not increased prices to consumers to the allowable limit, nor made further changes in buying prices. Machinery cast is another story. Under persistent heavy buying the price to consumers was jumped to $26.00 per net ton, delivered, Toronto, and there were takers for all tonnage available at this price. The market generally is unsettled and current prices should be considered as on a purely nominal basis, especially cast scrap and stove plate.

San Francisco—Demand for scrap is strong and large lots are being purchased by Pacific Coast open-hearth producers. While the tendency is toward somewhat higher prices no change has occurred.

Warehouse

Warehouse Prices, Page 121

Cleveland—A big run on steel sheets is noted here, largely for making army truck bodies. Demand generally continues large and stocks are becoming smaller, more broken, with many sizes sold completely. Mills promise large deliveries in March and April.

Chicago—Warehousemen are receiving expanding orders for material and find stocks moving out more rapidly than they can be replenished. Demand is good for all products, with principal tightness in alloy and carbon bars and heavier sections.

Boston — Because of better than normal turnover, the result of strong demand for steel out of warehouse, and extended mill deliveries, stock replacements have developed into a major problem with jobbers. Buying is widely spread as to products, demand for alloys, tool steels and specialties being strong. Orders offered by small industrial consumers are numerous.

New York — Volume with most steel warehouses in February was substantially above January despite the shorter month and two holidays. Demand is diversified as to products, both hot-rolled and alloys and cold-finished bars sharing in heavy buying.

Philadelphia — Numerous inquiries to warehouses are prompted by delayed mill shipments. Demand for plates is especially heavy, but distributors' stocks are limited in some sizes and far from substantial in total.

Cincinnati — February warehouse sales were higher than in January. Difficulty in replenishing stocks has brought partial withdrawal from markets where price equalization with other bases was necessary to meet competition.

Buffalo — Current demand holds at a level which distributors claim would be almost impossible to exceed. An increased number of broken lots are reported. Strength dominates prices.

St. Louis—Sales of steel by warehouses are slightly ahead of January. Sheet and plate demand is particularly heavy.

Seattle—Jobbers report strong demand, purchases being well diversified, with plates, bars and sheets favored. This month's volume is about the same as January. The price is firm.

Steel in Europe

Foreign Steel Prices, Page 121

London—(*By Cable*)—Raw materials positions of Great Britain is satisfactory, enabling steelworks to maintain full operation. Stocks of semifinished steel are accumulating while rolling mills are at capacity. Demand for structural shapes is lighter but plates and section requirements for shipbuilding are expanding further. Tin plate exports are greatly restricted and the situation remains obscure. Sheet tonnages available for export are small.

Iron Ore

Iron Ore Prices, Page 122

Cleveland — Oglebay, Norton & Co., Cleveland, announce the charter of the steamer, J. R. SENSIBAR, by the Columbia Transportation Co., the vessel now being in the shipyards of the Manitowoc Shipbuilding Co., Manitowoc, Wis., where it is being fitted to start service about May 1. It is designed to carry coal, stone, sand and gravel and gives Columbia its third self-unloader. Some improvements are now being made.

New York — Due primarily to further sharp increases in ocean freight rates, Indian lump chrome ore has been advanced nominally to $43-$46, per gross ton, c. i. f. seaboard, for 48 to 50 per cent material, and $37-$39 for 43 to 45 per cent. These prices take into account a freight rate of about $26, and bring the market to levels which appear to be far too high to attract the average buyer.

Ocean Rates May Rise

New York — Ocean freight rates from eastern ports to South Africa are scheduled to be increased about 15 per cent March 15. The present rate on steel to Durban, for instance, is around $14.50, it is said.

This follows announcement of a

contemplated revision in freight rates to the Far East April 1, with rates on steel likely to be increased about 33 1/3 per cent. At present the rate to the Philippines, which has been in effect about 18 months, is $15 a ton. The proposed increase would raise the rate to $20 a ton.

I.C.C. Revises Billet And Tin Plate Rates

Interstate Commerce Commission last week granted authority, on conditions, "to establish and maintain a rate of not less than $6.07 per long ton, minimum 80,000 pounds, on iron and steel billets, in carloads, from Lorain and South Lorain, O., to Allentown, Pa., without observing the long and short hauls provision of section 4 of the interstate commerce act."

A tin plate decision has also been handed down by the commission in which it states "proposed reduced rail rates on tin plate, in carloads, from Chicago, St. Louis, Birmingham, Ala., and points respectively grouped therewith, to Dallas, Houston, Beaumont, and Port Arthur, Tex., found not justified as published. Suspended schedules ordered canceled, without prejudice to the filing of new schedules in conformity with the views expressed herein."

Fluorspar

Fluorspar Prices, Page 120

New York—With Spain the principal foreign source of fluorspar for this country, recent reports of German troops in Spain have created speculation with regard to future shipments. However, consumers of Spanish fluorspar, mostly on the eastern seaboard are understood to have at least two or three months supply on hand, and apart from natural inquiry as to long-range prospects they have not pressed importers. Normally consumers stock up for the winter and do not show much interest again before April or early May. Meanwhile the market is nominally unchanged at $25 to $26, duty paid, tidewater, per net ton.

Ferroalloys

Ferroalloy Prices, Page 120

New York—The ferromanganese trade anticipates no change in price for second quarter but no definite action has been taken by any of the leading producers and some trade interests believe that even though there might not be an increase in contract prices, there might be an advance in spot quotations. Naming of prices for next quarter has been more or less expected for the last fortnight and the opinion still holds that action is not far off.

Nonferrous Metals

New York—Nonferrous metal consumption is far above early estimates, tending to increase stringency of supplies. Aluminum has been placed under official priorities while an additional 35,000 tons of Latin American copper have been purchased by the Metals Reserve Co. With the exception of tin which declined sharply, metal prices remained firm to strong.

Copper — Actual consumption of domestic copper jumped to a new record high during January at about 122,000 tons. Fabricators have booked orders requiring 83,000 tons of copper in excess of their holdings. The deficit in domestic copper sup-

Nonferrous Metal Prices

Feb.	Copper, Electro, del. Conn.	Copper, Lake, del. Midwest	Copper, Casting, refinery	Straits Tin, New York Spot	Straits Tin, New York Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
22	12.00	12.00	12.25	53.87½	53.12½	5.65	5.50	7.25	17.00	14.00	35.00
24	12.00	12.00	12.25	53.50	52.25	5.65	5.50	7.25	17.00	14.00	35.00
25	12.00	12.00	12.25	52.50	51.50	5.65	5.50	7.25	17.00	14.00	35.00
26	12.00	12.00	12.25	51.37½	50.75	5.65	5.50	7.25	17.00	14.00	35.00
27	12.00	12.00	12.25	51.25	50.62½	5.65	5.50	7.25	17.00	14.00	35.00
28	12.00	12.00	12.25	51.25	50.87½	5.65	5.50	7.25	17.00	14.00	35.00

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 12.00c Conn. copper

Sheets

Yellow brass (high)	19.48
Copper, hot rolled	20.87
Lead, cut to jobbers	8.90
Zinc, 100 lb. base	12.50

Tubes

High yellow brass	22.23
Seamless copper	21.37

Rods

High yellow brass	15.01
Copper, hot rolled	17.37

Anodes

Copper, untrimmed	18.12

Wire

Yellow brass (high)	19.73

OLD METALS

Nom. Dealers' Buying Prices

No. 1 Composition Red Brass

New York	8.00-8.25
Cleveland	9.25-9.50
Chicago	8.87½-9.12½
St. Louis	8.37½-8.50

Heavy Copper and Wire

New York, No. 1	9.62½-9.87½
Cleveland, No. 1	10.00-10.50
Chicago, No. 1	10.00-10.25
St. Louis	9.62½-9.75

Composition Brass Turnings

New York	7.62½-7.87½

Light Copper

New York	7.62½-7.87½
Cleveland	8.50-9.00
Chicago	8.75-9.00
St. Louis	8.00-8.25

Light Brass

Cleveland	5.00-5.50
Chicago	5.87½-6.12½
St. Louis	5.00-5.25

Lead

New York	4.75-4.90
Cleveland	4.50
Chicago	4.50-4.75
St. Louis	4.25-4.50

Zinc

New York	6.50
Cleveland	5.00-5.50
St. Louis	4.50-4.75

Aluminum

Mis., cast, Cleveland	14.00
Borings, Cleveland	8.50
Clips, soft, Cleveland	16.50
Misc. cast, St. Louis	13.25

SECONDARY METALS

Brass ingot, 85-5-5-5, l.c.l	13.25
Standard No. 12 aluminum (nom.)	19.50

plies will be balanced by importation of foreign refined metal. Two new brass and three new copper wire mills have been ordered, indicating a further increase in consumption of both copper and zinc.

Lead—Leading sellers again balanced their intakes on active demand which developed late in the week. Consumption of around 65,000 tons a month is being supplied by 55,000 tons of domestic metal and 10,000 of imported metal. Prices held at 5.65c, New York, and 5.50c, East St. Louis.

Zinc—Supplies continue inadequate and galvanizing operations have been curtailed further. Copper and brass mills have been forced to produce more of the high-copper content products, thus reducing their zinc requirements. Prime western held at 7.25c, East St. Louis.

Tin—Easing in the tension in the Far East resulted in a sharp drop in prices and tapering in the sales volume from that of the preceding week. Straits spot eased from 54.25c on Feb. 20 to only 51.25c on Feb. 28. The $3,500,000 tin smelter will be erected at Texas City, Tex., and will be operated by the Billiton Tin Processing Corp., a subsidiary of N. V. Billiton Maatschappij.

Equipment

Boston — For ships building at Boston and Charleston, S. C., Westinghouse Electric & Mfg. Co., Pittsburgh, is low on turbine-driven main forced draft blowers and spares at $1,464,530, schedule 5085, and for similar blowers for Puget Sound, Wash., $620,800.

New York — Additional contracts for cranes in connection with expanding facilities at the Brooklyn navy yard include: Harnischfeger Corp., Milwaukee, $102,590, for two 20-ton bridge cranes, building No. 2; one 10-ton extension steel storage runway and two 10-ton, building 63; Shaw-Box Crane & Hoist Co., Muskegon, Mich, $39,994, two 20-ton, building No. 1.

DIED:

■ **R. D. MACKENZIE**, since 1930 district sales manager at Cleveland for Youngstown Sheet & Tube Co., Feb. 22. He was identified with the iron and steel business about 37 years. He joined Garry Iron & Steel Co., Cleveland, as a salesman. Later the Garry company moved to Niles, O., where it controlled Empire Iron & Steel Co. and both were acquired by Brier Hill Steel Co. in 1912. When Brier Hill merged with Youngstown Sheet & Tube in 1923, Mr. MacKenzie remained with the Cleveland sales office of the latter.

♦

Warren A. Clough, 57, transportation application engineer, General Electric Co., Chicago, at his home in Glencoe, Ill., Feb. 21.

♦

John W. Knapp, 58, vice president and manager, Precision Die Casting Co., Syracuse, N. Y., in Syracuse, Feb. 24. He had been associated with the company over 25 years.

♦

Lewis E. Saunders, 67, vice president and a director, Norton Co., Worcester, Mass., and pioneer in the development of electric furnace abrasives, Feb. 20. He was a member, American Electrochemical Society, American Chemical Society, and Society of Chemical Industry.

♦

George R. Meyercord, 66, chairman and former president, Haskelite Mfg. Corp., Chicago, metal-faced plywood manufacturer, Feb. 22, in New York. He was a past president, Illinois Manufacturers' Association and currently a member of its advisory board.

♦

Harry G. Davis, director of re-

search, Farm Equipment Institute, Chicago, Feb. 21, in Des Moines, Iowa.

♦

Joseph B. Edward, 79, retired president, Kellogg Switchboard & Supply Co., Chicago, at his home in Evanston, Ill., Feb. 20.

♦

George M. Strnad, 48, secretary, M. J. Strnad Sons & Co., Chicago, structural steel fabricator, Feb. 21, at his home in Berwyn, Ill.

♦

Fred R. Donaldson, 64, vice president, sales manager and one of the founders of Machined Steel Casting Co., Alliance, O., Feb. 22, in Alliance.

♦

Leo J. Brunner, 83, chairman of the board and president, Brunner Mfg. Co., Utica, N. Y., Feb. 22, in that city.

♦

Hyman Burnstein, 68, a partner for 22 years in Burnstein & Skidmore, Chicago, iron and steel scrap dealers, in that city, Feb. 23.

♦

Charles A. Stone, 74, chairman, Stone & Webster Inc., New York, Feb. 25, in that city. He was co-founder of the company, established 51 years ago.

Government Defense Awards for Week

(*Concluded from Page* 47)

ney division, West Hartford, Conn., gear cutter, $7598.

Okonite Co., Passaic, N. J., marine cable, $17,230.04.

P. M. C. Manufacturing Corp., Phoenicia, N. Y., kitchen utensils, $5287.79.

Phelps Dodge Copper Products Corp., Habirshaw Cable & Wire division, New York, electric and marine cable, $75,312.12.

Pittsburgh Screw & Bolt Corp., Pittsburgh, anchor bolts, $126,295.50.

Pump Engineering Service Corp., Cleveland, master test stands, $39,675.

Reed & Prince Mfg. Co., Worcester, Mass., screws, $136,000.47.

Reiner, John, & Co. Inc., Long Island City, N. Y., diesel engine generator, $9090.

Remington Arms Co., Bridgeport, Conn., small arms materiel, $695,043.25.

Republic Steel Corp., Union Drawn Steel division, Buffalo, steel, $21,786.

Revere Copper & Brass Inc., Baltimore, copper-nickel plates, $20,176.98.

Ritter Pattern & Castings Co., New York, castings, $17,677.44.

Roebling, Donald, Clearwater, Fla., amphibian tractors, $3,240,000.

Roebling's, John A., Sons Co., Trenton, N. J., steel wire cloth, $38,335.93.

Rudolph & West Co., Washington, drills, $2104.22.

Russell Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y., steel nuts, $33,703.37.

Ryerson, Joseph T., & Son Inc., Chicago, steel, $9387.98.

Scovill Mfg. Co., Waterbury, Conn., metal parts, $193,929.20.

Sellers, Wm., & Co. Inc., Philadelphia, milling machine, $65,779.

Shain Mfg. Co., Seattle, ship trimmer, $27,300.

Simplex Wire & Cable Co., Cambridge, Mass., submarine cable, $62,652.10.

Smyser-Royer Co., York, Pa., safety treads, $24,750.

Stedfast & Roulston Inc., Boston, heavy duty shapers, $9092.

Sterling Products Co. Inc., Moline, Ill., screws, $2243.10.

Sullivan Machinery Co., Michigan City, Ind., air compressors, $92,620.

Taft-Peirce Mfg. Co., Woonsocket, R. I., gages, $2455.

Timken Roller Bearing Co., Steel and Tube division, Canton, O., steel, $13,107.43.

Tinius Olsen Testing Machine Co., Philadelphia, testing machine, $6160.

Uehling Instrument Co., Paterson, N. J., pressure gages, $9000.

United States Gauge Co., New York, aircraft suction gages, $13,175.

Universal Power Corp., Cleveland, welder, $1000.

Vickers Inc., Waterbury Tool division, Waterbury, Conn., transmissions, $54,657.84.

Vollrath Co., Sheboygan, Wis., basting spoons, cake turners, $7015.

Vulcan Iron Works, Wilkes-Barre, Pa., diesel-operated locomotives, $71,009.

Walter Bros. Co. Inc., New York, forks, knives, $7014.

Ward Leonard Electric Co., Mt. Vernon, N. Y., rheostats and spare units, $25,923.

Warner & Swasey Co., Cleveland, turret lathes, $84,232.

Western Cartridge Co., East Alton, Ill., small arms ammunition, $1,165,263.26.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., bull gear and shaft, $5110..

Willard Storage Battery Co., Cleveland, storage batteries, $58,750.

Williams, J. H., & Co., Buffalo, wrenches, $53,179.20.

Worthington Pump & Machinery Corp., Harrison, N. J., air compressors, $32,447.

Construction and Enterprise

Illinois

AURORA, ILL.—Aurora Pump Co. has given contract to William H. Sellen for a one-story plant addition 60 x 120 feet. Herbert Spieler is architect.

CHICAGO—B. E. Schonthal & Co. Inc., 28 East Jackson boulevard, has been incorporated with 500 shares $10 par, to deal in iron and steel products, by B. E. Schonthal and associates. William Friedman, 110 South Dearborn street, is correspondent.

CHICAGO — General Electric X-Ray Corp., 2012 West Jackson boulevard, is building an addition costing about $375,000 in which equipment costing $75,000 will be installed, for manufacture of X-ray machines for medical and industrial use. (Noted Feb. 3.)

CHICAGO — Ohmite Mfg. Co., 4835 West Flournoy street, manufacturer of rheostats, resistors and tap switches, is building a one-story 122 x 124-foot plant addition costing about $40,000.

CHICAGO—Charles E. Larson & Sons Inc., 2645 North Keeler avenue, is starting an expansion program to cost about $40,000, including 7000-square foot addition and installation of forging equipment.

CICERO, ILL.—Strom Steel Ball Co., 1842 South Fifty-fourth street, has given contract for one-story top addition to Campbell, Lowrie & Lautermilch, 400 West Madison street, costing about $40,000.

ELGIN, ILL.—McGraw Electric Co. is considering bids for a one-story 100 x 250-foot plant addition and two-story 150 x 230-foot warehouse building. E. O. Sessions, 120 South La Salle street, Chicago, is engineer.

ROCKFORD, ILL. — War department has awarded contract to Gunite Foundries Corp., 302 Peoples avenue, at about $200,000 for manufacture of machine tool castings and to W. F. & John Barnes Co. at about $500,000 for plant to manufacture machine tools, both financed by Defense Plant Corp., 1825 H street N. W., Washington, under lease agreement with RFC, war and navy departments.

ROCKFORD, ILL.—Rockford Machine Tool Co., 2500 Kishwaukee street, has let general contract to Security Building Co., 717 East Jefferson street, for a one-story building 70 x 100 feet, costing about $40,000.

SYCAMORE, ILL.—Ideal Commutator Dresser Co. has let general contract for a plant addition to B. J. Nelson, Sycamore, to cost about $40,000. (Noted Jan. 27.)

Connecticut

BRIDGEPORT, CONN.—Bullard Co. is building a group of one-story structures for tool manufacturing, at cost of about $3,500,000.

NEW LONDON, CONN.—Groton Iron Works shipyard will be modernized for production of steel freighters for the British government.

Massachusetts

FITCHBURG, MASS.—Fitchburg Grinding Machine Corp., Walnut street, plans erection of a manufacturing plant to cost over $40,000.

SPRINGFIELD, MASS. — Springfield Bronze & Aluminum Co., Page boulevard, has let general contract for a one-story plant to A. L. Phelps Inc., 11 Andrew street, to cost about $40,000. H. L. Sprague, 1570 Main street, is engineer.

WATERTOWN, MASS.—Ark-Les-Switch Corp., 459 Watertown street, has let general contract for a two-story plant addition, 150-foot front with two 40 x 120-foot wings, to L. A. Comeau, 9 Cherry street, Belmont, Mass., to cost about $60,000.

Rhode Island

PAWTUCKET, R. I.—National Foundry & Machine Co. Inc. has been incorporated with 100 shares common stock no par value, by Edward G. Fletcher, 29 Cabot street, and associates.

New York

ILION, N. Y.—Remington-Rand Inc., A. M. Ross, vice president in charge,

■ **Additional Construction and Enterprise leads may be found in the list of Shapes Pending on page 131 and Reinforcing Bar Pending on page 133 in this issue.**

plans a three-story addition to plant No. 2, to cost about $100,000.

NIAGARA FALLS, N. Y. — Niagara Alkali Co., 4205 Buffalo avenue, will let contract soon for a three-story 40 x 80-foot plant, to cost about $40,000. W. A. Cannon, 2637 Main street, is architect.

NIAGARA FALLS, N. Y.—International Graphite & Electrode Corp., Packard Road, plans construction of new plant costing about $150.000.

SCHENECTADY, N. Y.—American Locomotive Co., Jay street, will let contract soon for a two-story 50 x 265-foot plant at cost of about $100,000. R. H. White, care owner, is chief engineer.

YONKERS, N. Y.—Habirshaw Cable & Wire Corp., foot of Point street, has let general contract for a manufacturing plant to Brown & Matthews Inc., 122 East Forty-second street, New York, at cost of about $75,000.

New Jersey

NUTLEY, N. J.—Hoffman La Roche Inc., Kingsland road, plans erection of a research laboratory for chemical plant, to cost about $1,000,000.

PATERSON, N. J.—Wright Aeronautical Corp., 1120 East Nineteenth street, has let general contract for a one-story 80 x 150-foot motor test cells building on Beckwith avenue, to Mahony-Troast Construction Co., 657 Main avenue, Passaic, N. J. Albert Kahn Inc., 345 New Center building, Detroit, is engineer.

UNION, N. J.—Geiger Engineering & Mfg. Co., 300 Burnett avenue, will build a one-story 185 x 200 and 40 x 60-foot warehouse addition at cost of about $50,000.

Ohio

AKRON, O.—Wellman Engineering Co., 7000 Central avenue, Cleveland, will reopen a long-idle plant on Ira avenue for manufacture of defense products. Foundry and machine tool equipment probably will be replaced. Little remodeling will be necessary.

CLEVELAND—Cleveland Hobbing Machine Co., 1170 East 152nd street, is considering erection of new plant on East 200th street near Chardon road. Is now negotiating with engineers for design.

CLEVELAND—Thermoy Corp. has been organized by Henry and Robert H. Herzog, with headquarters at 7407 Superior avenue, for manufacture of boiler fittings. Members of firm are associated with Herzog Plumbing & Heating Co., 7407 Superior avenue.

CLEVELAND—Locke Machine Co., H. G. Smith, president, 971 East Sixty-third street, is taking bids on a one-story 30 x 130 and 17 x 105-foot plant addition, estimated to cost $40,000. H. Dercum, 4500 Euclid avenue, is engineer. (Noted Feb. 10.)

FREMONT, O.—Tindall Shear Co. has been incorporated with 250 shares of $100 par value each, by Louis E. and C. E. Tindall, to manufacture cutlery.

CLEVELAND — Star Machine & Tool Co., 9220 Woodland avenue, will build addition containing 4500 square feet floor space. John C. Schurger is president. Edward G. Hoefler, 5005 Euclid avenue, is engineer.

NAVARRE, O.—Lock Joint Pipe Co., Orange, N. J., will build a plant here, starting construction about March 15. Manufacturing building 40 x 60 feet and two curing bins each 20 x 60 feet will be first units, with additional buildings when production gets under way. T. J. Chiverton, superintending construction, is expected to be made manager.

WARREN, O. — Federal Machine & Welder Co., 212 Dana avenue, Charles H. Whittier, superintendent, plans erection of one story addition 80 x 165 feet, with two 10-ton cranes. Keich & O'Brien, Union Savings and Trust building, are architects.

WEST UNION, O.—REA has allotted $228,000 to Adams rural electric co-operative, H. C. Brown, president, for 226 miles of rural lines to serve 746 customers.

Pennsylvania

BEAVER FALLS, PA.—Moltrop Steel Products Co., J. F. Moltrop, president and general manager, Second avenue and Fourteenth street, has let general contract for a one-story 60 x 160-foot plant addition to Pittsburgh Bridge & Iron Works. W. Elmer, Second avenue and Fourteenth street, is owner's chief engineer.

MEADVILLE, PA.—American Viscose Corp., H. O. Davidson, chief engineer, Wilmington, Del., M. Bernard Morgan, chief plant engineer, Meadville, plans construction of a sewage disposal plant, including trickle filter, pumping plant and equipment, settling tanks, etc., costing about $75,000. Havens & Emerson, 1140 Leader building, Cleveland, are engineers.

PHILADELPHIA — Bendix Aviation Corp., Bendix, N. J., plans plant extension on Wissahickon avenue to cost over $40,000.

PHILADELPHIA — Aluminum Co. of America, Gulf building, Pittsburgh, plans plant extension on Elmwood avenue, to cost over $50,000.

YORK, PA.—York Safe & Lock Co. plans a five-unit 100 x 600-foot plant addition in Springettsbury township, near here. General contract has been given Cummins Construction Co., 803 Cathedral

street, Baltimore. Cost is estimated at more than $500,000.

Michigan

IRON MOUNTAIN, MICH.—City, Harold Lindholm, clerk, plans a bond issue to finance a municipal light and power plant to cost about $575,000. Burns & McDonnell, Linwood boulevard, Kansas City, Mo., are engineers.

Indiana

EAST CHICAGO, IND.—Linde Air Products Co., division of Union Carbide & Carbon Co., 30 East Forty-second street, New York, plans a gas manufacturing plant to cost about $800,000.

EAST CHICAGO, IND.—Sinclair Refining Co., 2540 West Cermak road, Chicago, will take bids soon for a one-story 85 x 100-foot 90 x 250-foot oil storage building, costing about $100,000.

INDIANAPOLIS—K B Foundry Co. Inc., 101 East High street, has been incorporated with 150 shares $100 par value, by Charles D. Kinnard and associates.

WABASH, IND. — Standard Foundry Co. Inc., 410 South Carroll street, has been incorporated to operate a foundry, with 500 no par shares, by Elmer F. Mattern, 278 West Maple street, and associates.

Maryland

BALTIMORE—Maryland Sanitary Mfg. Corp., T. T. Alverson, manager, plans rebuilding burned plant at 4500 East Lombard street.

Kentucky

BOWLING GREEN, KY.—REA has allotted $100,000 to Warren rural electric co-operative, Lester Wright, superintendent, for 113 miles rural transmission lines to serve 332 customers.

FLEMINGSBURG, KY.—REA has allotted $97,000 to Fleming-Mason rural electric co-operative, James K. Smith, superintendent, for 111 miles of rural transmission lines to serve 374 customers.

OWENSBORO, KY.—REA has allotted $120,000 to Green river rural electric co-operative for 135 miles of transmission lines to serve 405 customers.

MIDDLESBORO, KY.—Pine Mountain Fuel Gas Corp. has completed survey for a gas pipe line from Knox county gas field to Middlesboro, to cost about $350,000.

Tennessee

ALCOA, TENN.—City is considering installation of a sewage disposal plant and accessories, to cost about $250,000.

UNION CITY, TENN.—City, H. Berry, mayor, is planning installation of a sewage disposal plant costing about $150,000.

Missouri

KANSAS CITY, MO.—W. S. Dickey Clay Mfg. Co., New York Life building, is having plans prepared by Alfred Benberg, architect, for a clay products plant here, costing about $400,000.

ST. LOUIS — Master Plastic Molding Corp., D. B. Blossom, president, 1609 North Broadway, recently incorporated with $25,000 capital, to do custom molding of plastics, has bought plant of Master Tool & Machine Co. and is engaging in machine shop work and diemaking.

ST. LOUIS—Banner Iron Works, 4560 Shaw avenue, will rebuild its core department recently destroyed by a gas explosion.

ST. LOUIS — General Engineering & Mfg. Co., John H. Schreiber, president, 1523 South Tenth street, is building a two-story plant addition, to cost over $40,000, with equipment. Company manufactures special machinery and parts. Addition will contain 7000 square feet floor space. (Noted Feb. 10.)

ST. LOUIS—John Nooter Boiler Works Co., 1401 South Second street, has given contract to Fruin, Colnon Contracting Co., 502 Merchants-Laclede building, for a one-story addition to its boiler manufacturing plant, 60 x 145 feet, 34 x 40 feet and 18 x 63 feet, costing $40,000, with equipment.

ST. LOUIS—Anheuser-Busch Inc., 721 Pestalozzi street, has given general contract to Fruin-Colnon Contracting Co., 512 Merchants-Laclede building, for a stock house 91 x 98 feet, 60 feet high, at cost of about $100,000.

ST. LOUIS—Wrought Iron Range Co., 5661 Natural Bridge avenue, will undertake extensive alterations and additions to its executive offices. William B. Ittner Inc., 408 Board of Education building, is architect.

ST. LOUIS — General Engineering & Mfg. Co., Tenth and Carroll streets, has given general contract to Bumill & Meyersleck, 3407½ South Jefferson avenue, for a two-story 30 x 114-foot addition. Joseph Bungert, 617 Wainwright building, is architect. (Noted Feb. 17.)

Arkansas

NORFOLK, ARK.—Arkansas Power & Light Co., Pine Bluff, Ark., is building a

$50,000 power station here.

Wisconsin

CLEAR LAKE, WIS.—Wisconsin Hydro-Electric Co., R. M. Houger, president, plans construction of generating plant near Clear Lake, to cost about $200,000.

FOND DU LAC, WIS.—Giddings & Lewis Machine Tool Co. has let general contract to Hutter Construction Co., 134 Western avenue, Fond du Lac, for one-story plant addition 100 x 407 feet and 40 x 100 feet. (Noted Dec. 23.)

GREEN BAY, WIS.—Wisconsin Public Service Corp., A. G. Carson, chief engineer, will soon take bids for an addition to its power plant, to cost about $2,600,000, including equipment. Public Utility Engineering & Service Corp., 231 South La Salle street, Chicago, is engineer.

MILWAUKEE—Abbott Tool & Die Co. has been incorporated to manufacture tools, dies and machinery by Albert W. Graf, Edwin J. Grote and Gust S. Krantz.

MILWAUKEE—Blackhawk Mfg. Co., 5325 West Rogers street, manufacturer of lifting machinery, will build a one-story plant addition of 15,000 square feet, to cost $50,000. Company is using 40 per cent of capacity for production of hydraulic jacks for airplanes for the army.

NEENAH, WIS.—Neenah Brass Works Inc., C. R. Rafoth, general manager, has given general contract to Koepke Construction Co., Appleton, Wis., for a foundry addition.

Minnesota

MINNEAPOLIS—G. H. Tennant Co., manufacturer of floor surfacing machines, has given general contract to Field-Martin Co. for a one-story plant addition 60 x 60 feet, in which new equipment will be installed. Samuel C. Wentworth, McKnight building, is architect.

MINNEAPOLIS — Durkee-Atwood Co., manufacturer of automobile accessories, will remodel plant recently purchased at 215 Seventh street N. E., in which considerable new equipment will be installed. Larson & McLaren, Foshay Tower, are architects.

MINNEAPOLIS—Slope-Meter Co. has been organized to manufacture slope-indicating instruments for tractors and road graders.

MINNEAPOLIS — Minneapolis park board, Charles Doell, secretary, will take bids soon on two-story airplane repair shop 30 x 140 feet and steel truss hangar 130 x 147 feet at Wold-Chamberlain municipal airport, to be leased by Mid-Continent Air Lines Inc. as its main shops. Larson & McLaren, Foshay Tower, are architects.

Texas

FORT WORTH, TEX.—Cyclone Fence Co., 1308 East Lancaster avenue will build plant addition and warehouse adjoining present plant, at cost of about $60,000.

PORT ARTHUR, TEX.—Sabine Steel & Construction Corp., 320 Seventh street, is negotiating for a site in West Port Arthur on which it plans to build a steel fabricating plant at cost of $100,000.

Iowa

COUNCIL BLUFFS, IOWA—Standard Oil Co. of Indiana, 910 South Michigan avenue, Chicago, has bought right-of-way of 115 miles for a 6-inch pipeline to transport gasoline from Burlington Junction, Mo., to Des Moines, Iowa, at cost of about $1,500,000.

CRESCO, IOWA—City is considering plans for a municipal electric light and power plant. T. P. Welch is city clerk.

DUBUQUE, IOWA—Interstate Power Co., C. E. Dove, district manager, will take bids about May 1 for a boilerhouse, boiler and auxiliaries, costing about $100,000. Sargent & Lundy Inc., 140 South Dearborn street, Chicago, is consulting engineer.

EARLVILLE, IOWA — Improvements and alterations at the municipal light and power plant to cost about $40,000 are being considered by city officials. A. S. Harrington, Baum building, Omaha, Nebr., is consulting engineer.

GARNER, IOWA — H. V. Reed, city clerk, will receive bids about March 10 for a sewage disposal plant costing about $25,000. Currie Engineering Co., Webster City, Iowa, is engineer.

GRIMES, IOWA—City, Frank M. Briggs, city clerk, will open bids March 17 for a municipal electric light and power plant, including two diesel engine generators and auxiliary equipment. Ralph W. Gearhart, Cedar Rapids, Iowa, is engineer.

SIOUX CITY, IOWA—Sioux City Oil Refinery, care Peters-Guiney agency, W. L. Sloan, president, 202 Security building, plans construction of an oil refinery on the Missouri river, near here.

TRAER, IOWA—G. H. Schwertly, clerk, is considering bids for a sewage disposal plant, to cost about $35,000. E. E. Schenk, 214 Waterloo building, Waterloo, Iowa, is engineer.

WATERLOO, IOWA — Iowa Public Service Co. plans plant and line improvements costing about $600,000.

California

ALHAMBRA, CALIF.—C. F. Braun & Co., 1000 South Fremont avenue, are building a new pattern shop costing $15,000.

LOS ANGELES—Continental Can Co., 3820 Union Pacific avenue, is building a plant addition 140 x 200 feet, costing about $125,000.

LOS ANGELES—Pioneer Boiler Works, 3232 East Fiftieth street, has been formed by George J. Kuhrts and associates.

LOS ANGELES—Superior Welding & Mfg. Co., 1575 Compton avenue, has been formed by L. I. Tuttle and F. C. Carlin.

LOS ANGELES—Valley Tool Co., 5532 Long Beach avenue, has been organized by Andrew J. Seager and John L. Taylor.

SAN DIEGO, CALIF.—Ryan Aeronautical Co., Lindbergh Field, will build an addition 200 x 325 feet, costing about $200,000.

Washington

KLICKITAT, WASH. — Electro Gauge Co. has been organized with $50,000 capital to manufacture machinery and appliances, by Harry C. Thorn and associates.

VANCOUVER, WASH.—Aluminum Co. of America is negotiating for 237 acres to add to the 315-acre site on which its new plant has been erected.

Canada

SAULT STE. MARIE, ONT.—Algoma Steel Corp. has let general contract to L. R. Brown Construction Co., 52 The Drive, for additions and improvements to its coal docks, at cost of about $30,000.

SMITHS FALLS, ONT.—Frost & Wood Co. will lease the plant of North End Malleable Co. which will be equipped for a new war industry, new machinery and equipment to be installed.

TORONTO, ONT.—Dominion Wheel & Foundries Ltd., 17 Eastern avenue, plans erection of $15,000 machine shop at 121 Eastern avenue, for which bids will be called soon. James, Proctor & Redfern Ltd., 36 Toronto street, is engineer.

TORONTO, ONT.—Massey-Harris Co. Ltd., agricultural implements, 915 King street West, will build a one-story addition 60 x 200 feet, general contract to Redfern Construction Co. Ltd., 36 Toronto street.

TORONTO, ONT.—Way Sagless Spring Co. Ltd., 48 Abel street, will build $200,000 plant on Riverside drive, general contract to Henry Davidson, 100 Adelaide street West. Kaplan & Sprachman, 305 Dundas street West, are architects.

WHERE-TO-BUY

A classified list of advertisers according to products. ¶Index to advertisements gives page number of any advertiser.

ABRASIVES (Blast Cleaning)
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., 4839 Harrison St., Pittsburgh, Pa.

ABRASIVES (Polishing)
Carborundum Co., The, Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

ABRASIVES (Wheels)
Bay State Abrasive Products Co., Westboro, Mass.

ACCUMULATORS
Elmes, Chas. F., Engineering Wks., 243 N. Morgan St., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance O.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

ACETYLENE
Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.

ACID-PROOF LININGS
Ceilcote Co., 750 Rockefeller Bldg., Cleveland, O.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

ACIDS (Pickling)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Ampco Metal, Inc., Dept. S-33, 3830 W. Burnham St., Milwaukee, Wis.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

AIR COMPRESSORS—See COMPRESSORS (Air)

AIR CONDITIONING EQUIPMENT
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Worthington Pump & Machinery Corp., Harrison, N. J.

AIRLESS BLAST CLEANING EQUIPMENT
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.

ALKALI CLEANING COMPOUNDS
Cowles Detergent Co., The Heavy Chemical Dept., 7018 Euclid Ave., Cleveland, O.
Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

ALLOYS (Hard Surfacing)
Stoody Co., Whittier, Calif.

ALLOYS—See FERROALLOYS

ANGLES, CHANNELS—See BEAMS, CHANNELS, ANGLES

ANGLE IRON BENDERS
Excelsior Tool & Machine Co., Ridge & Jefferson Ave., E. St. Louis, Ill.

ANNEALING BOXES—See BOXES (Annealing)

ANNEALING COVERS
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.

AXLES
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

BABBITT METAL
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

BALING PRESSES
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

BALL TRANSFERS
Mathews Conveyer Co., 114 Tenth St., Ellwood City, Pa.

BALLS (Brass or Bronze)
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

BALLS (Special Alloy Metals)
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

BAND FILES (Metal)
Continental Machines, Inc., 1324 So. Washington Ave., Minneapolis, Minn.

BAND SAWS (Metal Cutting)
Continental Machines, Inc., 1324 So. Washington Ave., Minneapolis, Minn.

BANDS—See HOOPS AND BANDS

BANDS (Iron and Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

BAR BENDERS
Kardong Bros. Inc., 346 Buchanan St., Minneapolis, Minn.

BAR DRAWER AND STRAIGHTENING MACHINES
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.

BARGES (Steel)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Dravo Corp. (Engin'r'g Works Div.) Neville Island, Pittsburgh, Pa.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Maryland Dry Dock Co., Baltimore, Md.

BARRELS (Steel)
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

BARS (Alloy)
Ampco Metal, Inc., Dept. S-33, 3830 W. Burnham St., Milwaukee, Wis.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co., McKeesport, Pa.
LaSalle Steel Co., Dept. 10-A, P. O. Box 6800-A, Chicago, Ill.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

BARS (Brass, Bronze or Copper)
American Brass Co., The, Waterbury, Conn.
Copperweld Steel Co., Warren, O.
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Sumet Corporation, 1553 Fillmore Ave., Buffalo, N. Y.

BARS (Concrete Reinforcing)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BARS (Iron)—See IRON (Bar)

BARS (Steel)
(*Also Stainless)
*Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
*Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
*Copperweld Steel Co., Warren, O.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
*Rustless Iron & Steel Corp., 3400 E. Chase St., Baltimore, Md.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Weirton Steel Co., Weirton, W. Va.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BATTERIES (Storage)
Edison Storage Battery Div. of Edison, Thomas A., Inc., West Orange, N. J.
Electric Storage Battery Co., The, 19th St. and Allegheny Ave., Philadelphia, Pa.
Graybar Electric Co., Graybar Bldg., New York City.

BATTERY CHARGING APPARATUS
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

BEAMS, CHANNELS, ANGLES, ETC.
(*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Inland Steel Co., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Levinson Steel Co., 33 Pride St., Pittsburgh, Pa.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BEARINGS (Ball)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
New Departure Div., General Motors Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Torrington Co., The, Torrington, Conn.

BEARINGS (Babbitt)
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.

BEARINGS (Brass, Bronze)
Ampco Metal, Inc., Dept. S-33, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.

BEARINGS (Brass, Bronze)—Con.
Lawrence Copper & Bronze, Bessemer Bldg., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.
Sumet Corporation, 1553 Fillmore Ave., Buffalo, N. Y.

BEARINGS (Journal)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Bantam Bearings Corp., South Bend, Ind.
Bower Roller Bearing Co., 3040 Hart St., Detroit, Mich.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Division, General Motors Sales Corp., Harrison, N. J.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Needle)
Torrington Co., The, Torrington, Conn.

BEARINGS (Non-Metallic)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
Ryerson, Jos. T. & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.

BEARINGS (Oilless)
Rhoades, R. W., Metaline Co., P. O. Box 1, Long Island City, N. Y.

BEARINGS (Quill)
Bantam Bearings Corp., South Bend, Ind.

BEARINGS (Radial)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa.
Bantam Bearings Corp., South Bend, Ind.
Bower Roller Bearing Co., 3040 Hart St., Detroit, Mich.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.
Link-Belt Co., 519 No. Holmes Ave., Indianapolis, Ind.
New Departure Div., General Motors Corp., Bristol, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St., and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The Canton, O.

BEARINGS (Roll 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. Harrison, N. J.
Hyatt Bearings Div., General Motors Sales Corp.,
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.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roller)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa.
Bantam Bearings Corp., South Bend, Ind.
Bower Roller Bearing Co., 3040 Hart St., Detroit, Mich.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Rolling Mill)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa.
Bantam Bearings Corp., South Bend, Ind.
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.
Morgan Construction Co., Worcester, Mass.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Thrust)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Link-Belt Co., 519 No. Holmes Ave., Indianapolis, Ind.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BELTING (Chain and Link)
Baldwin-Duckworth Div. of Chain Belt Co., 326 Plainfield St., Springfield, Mass.
Link-Belt Co., 220 So. Belmont Ave., Indianapolis, Ind.

BELTING (Metal, Conveyor, High and Low Temperature)
Cyclone Fence Co., Waukegan, Ill.

BELTING (Rubber)
Garlock Packing Co., The, S 3-40, Palmyra, N. Y.

BENCHES
Challenge Machinery Co., Grand Haven, Mich.

BENCH PLATES
Challenge Machinery Co., Grand Haven, Mich.

BENDING AND STRAIGHTENING MACHINES
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Kardong Bros., Inc., 346 Buchanan St., Minneapolis, Minn.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.

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., 1643 Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BINS (Storage)
Buffalo Wire Works Co., 437 Terrace, Buffalo, N. Y.

BLAST CLEANING EQUIPMENT (Sand)
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.

BLAST FURNACE CLEANING (Gas)
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

BLAST FURNACE HOT BLAST STOVES
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

BLAST FURNACE SPECIALTIES
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brassert, H. A., & Co., 1st National Bk. Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

BLAST FURNACE STOCK HOUSES
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

BLAST FURNACES—See FURNACES (Blast)

BLOCKS (Chain)
Reading Chain & Block Co., Dept. 32, Reading, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

BLOWERS
General Electric Co., Schenectady, N. Y.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
North American Mfg. Co., The, 2901 E. 75th St., Cleveland, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., 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.

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.
National Machinery Co., The, Tiffin, O.

BOLTS (*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp. Pittsburgh-Chicago.
Cleveland Cap Screw Co., 2930 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., 2930 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., 2930 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 Co., 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.

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 9370-B, Scranton, Pa.

BORING, DRILLING & MILLING MACHINES (Horizontal)
Giddings & Lewis Machine Tool Co., Fond Du Lac, Wis.

BORING MACHINES (Precision)
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.
Union Steel Casting Div. of Blaw-Knox 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.

BRAKE SHOES
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.

BRAKE LININGS
Garlock Packing Co., The, S 3-40, Palmyra, N. Y.
Johns-Manville Corp., 22 E. 40th St., New York City.

BRAKES (Electric)
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.

BRAKES (Press)
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Crane & Engineering Co., The, Steelweld Machinery Div., 1125 E. 283rd St., Wickliffe, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.

BRICK—(Insulating)—See INSULATING BRICK

BRICK (Refractory)—See REFRACTORIES, CEMENT, ETC.

BRICK (Ladle)
Globe Brick Co., The, East Liverpool, O.

BRICK (Silicon Carbide)
Bay State Abrasive Products Co., Westboro, Mass.
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.
Ingalls Iron Works Co., The, Birmingham, Ala.
Levinson Steel Co., 33 Pride St., Pittsburgh, Pa.

BROACHING CUTTERS
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

BROACHING MACHINES
Bullard Co., The, Bridgeport, Conn.
Cincinnati Milling Machine & Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Colonial Broach Co., 147 Jos. Campau, Detroit, Mich.

BRUSHES
Fuller Brush Co., The, Industrial Div., Dept. 8C, 3582 Main St., Hartford, Conn.

BRUSHES (Industrial)
Fuller Brush Co., The, Industrial Div., Dept. 8C, 3582 Main St., Hartford, Conn.

BRUSHES (Steelgript)
Fuller Brush Co., The, Industrial Div., Dept. 8C, 3582 Main St., Hartford, Conn.

BUCKETS (Clam Shell, Dragline Grab, Single Line)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Blaw-Knox Co., Blawnox, Pa.
Cullen-Friestedt Co., 1308 So. Kilbourn St., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Owen Bucket Co., 7762 Breakwater St., Cleveland, O.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

BUCKETS (Single Hook, Automatic Dump, Automatic Single Line)
Broslus, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

BUILDINGS (Steel)—See BRIDGES, BUILDINGS, ETC.

BULLDOZERS
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
Beatty Machine & Mfg. Co., 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.
North American Mfg. Co., The, 2910 E. 75th St., Cleveland, O.
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)
American Gas Furnace Co., Elizabeth, N. J.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
North American Mfg. Co., The, 2901 E. 75th St., Cleveland, O.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., 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-33, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
Lawrence Copper & Bronze, Bessemer Bldg., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.
Sumet Corporation, 1553 Fillmore Ave., Buffalo, N. Y.

BUSHINGS (Jig)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

BUSHINGS (Oilless)
Rhoades, R. W., Metaline Co., P. O. Box 1, Long Island City, N. Y.

BY-PRODUCT PLANTS
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

CABINETS (Steel)
Dahlstrom Metallic Door Co., Jamestown, N. Y.

CAISSONS (Pneumatic)
Dravo Corp., (Contracting Div.), Neville Island, Pittsburgh, Pa.

CALCIUM METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.

CAP SCREWS—See SCREWS (Cap, Set, Safety-Set)

CAR DUMPERS
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.

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.
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-33, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., 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.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.

CASTINGS (Alloy Iron)
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.

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 Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
National-Erie Corp., Erie, Pa.
Ohio Steel Foundry Co., Lima, O.
Springfield, O.
Pittsburgh Rolls, Div. of Blaw-Knox Co., Pittsburgh, Pa.
Union Steel Casting Div. of Blaw-Knox 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-33, 3830 W. Burnham St., Milwaukee, Wis.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Lawrence Copper & Bronze, Bessemer Bldg., Pittsburgh, Pa.
Monessen Fdy. & Mach. Co., Monessen, Pa.
Morgan Engineering Co., The, Alliance, O.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.
Sumet Corporation, 1553 Fillmore Ave., Buffalo, N. Y.

CASTINGS (Corrosion Resisting)
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, 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.
Brown & Brown, Inc., 456 So. Main St., Lima, 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.
Etna Machine Co., The, 3400 Maplewood Ave., Toledo, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Ferracute Machine Co., Bridgeton, N. J.
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.
Monessen Fdy. & Mach. Co., Monessen, 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 Div. of Blaw-Knox Co., Blawnox, Pa.
Shenango-Penn Mold Co., Dover, O.

CASTINGS (Malleable)
American Chain & Cable Co. Inc., Bridgeport, Conn.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Lake City Malleable Co., 5026 Lakeside Ave., Cleveland, O.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CASTINGS (Manganese Steel)
Damascus Steel Casting Co., New Brighton, Pa.

CASTINGS (Steel)
(*Also Stainless)
*Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Damascus Steel Casting Co., New Brighton, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.

WHERE-TO-BUY

CASTINGS (Steel)—Con.
Ferracute Machine Co., Bridgeton, N. J.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
National-Erie Corp., Erie, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O.
Springfield, O.
Oil Well Supply Co., Dallas, Texas.
Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh, Pa.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.
Steel Founders' Society of America, 920 Midland Bldg., Cleveland, O.
Strong Steel Fdry. Co., Hertel & Norris Ave., Buffalo, N. Y.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Union Steel Casting Div. of Blaw-Knox Co., 62nd and Butler Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
West Steel Casting Co., 805 E. 70th St., Cleveland, O.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Wear Resisting)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
Shenango-Penn Mold Co., Dover, O.

CASTINGS (Worm and Gear Bronze)
Ampco Metal, Inc., Dept. S-33, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.

CEMENT (Acid Proof)
Pennsylvania Salt Mfg. Co., Dept. E., Pennsalt Cleaner Div., Philadelphia, Pa.

CEMENT (High Temperature)
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., The, Perth Amboy, N. J.
Eagle-Picher Lead Co., The, Cincinnati, O.
Johns-Manville Corp., 22 E. 40th St., New York City.
Norton Company, Worcester, Mass.

CEMENT (High Temperature Hydraulic)
Atlas Lumnite Cement Co., Dept. S-11, Chrysler Bldg., New York City.

CENTRAL STATION EQUIPMENT
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

CHAIN (Conveyor and Elevator)
Baldwin-Duckworth Div. of Chain Belt Co., 326 Plainfield St., Springfield, Mass.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Draw Bench)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Malleable)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Lake City Malleable Co., 5026 Lakeside Ave., Cleveland, O.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Power Transmission)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Roller)
Baldwin-Duckworth Div. of Chain Belt Co., 326 Plainfield St., Springfield, Mass.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Sling)
American Chain & Cable Co. Inc., Bridgeport, Conn.

CHAIN (Sprocket)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Steel-Finished Roller)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Welded or Weldless)
American Chain & Cable Co. Inc., Bridgeport, Conn.

CHARGING MACHINES (Cupola)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.

CHARGING MACHINES (Open Hearth)
Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

CHARGING MACHINES AND MANIPULATORS (Autofloor Type)
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

CHECKER BRICK
Loftus Engineering Corp., 509 Oliver Bldg., Pittsburgh, Pa.

CHECKS (Metal)
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.

CHISELS (Chipping)
Steel Conversion & Supply Co., P. O. Box 537 (Castle Shannon), Pittsburgh, Pa.

CHROME ORE
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

CHROMIUM METAL AND ALLOYS
Chromium Mining & Smelting Corp., Ltd., 700 Bank of Commerce Bldg., Hamilton, Ont.
Electro Metallurgical Co., 30 E. 42nd St., New York City.

CHROMIUM PLATING PROCESS
United Chromium, Inc. 51 E. 42nd St., New York City.

CHUCK OPERATING CYLINDERS
Airgrip Chuck Div., Anker-Holth Mfg. Co., Port Huron, Mich.

CHUCKING MACHINES (Multiple Spindle)
National Acme Co., The, 170 E. 131st St., Cleveland, O.

CLAMPS (Drop Forged)
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

CLEANING EQUIPMENT (Metal)
Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.

CLEANING SPECIALTIES
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Cowles Detergent Co., The, Heavy Chemical Div., 7018 Euclid Ave., Cleveland, O.
Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

CLIPS (Packaging)
Consumer's Steel Products, 6454 E. McNichols Rd., Detroit, Mich.

CLUTCHES (Friction)
Jones, W. A. Fdry. & Mach. Co., 4437 Roosevelt Rd., Chicago, Ill.

CLUTCHES (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Dings Magnetic Separator Co., 663 Smith St., 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.
Wieman & Ward Co., The, Oliver Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The, Youngstown, O.

COAL, COKE, ORE AND ASH HANDLING MACHINERY
Atlas Car & Mfg. Co., The, Waukesha, Wis.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Industrial Brownhoist Corp., Bay City, Mich.

COAL, COKE, ORE, ASH HANDLING MACHY.—Con.
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.

COILS (Furnace)
Production Plating Works, Inc., The, 123-129 Main St., Lebanon, O.

COKE—See COAL OR COKE

COKE OVEN MACHINERY
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 Co., 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., The, 2700 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.
Worthington Pump & Machinery Corp., Harrison, N. J.

CONCRETE (Heat Resistant)
Atlas Lumnite Cement Co., Dept. S-11, Chrysler Bldg., New York City.

CONCRETE REINFORCING BARS —See BARS (Concrete Reinforcing)

CONDENSERS (Surface, Barometric, Multi-Jet)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
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. New Brighton, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

CONTRACTORS—See ENGINEERS AND CONTRACTORS

CONTROL SYSTEMS (Automatic)
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

CONTROLLERS (Electric)
Allen-Bradley Co., 1320 So. Second St., Milwaukee, Wis.
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.

CONTROLS (Combustion)—See COMBUSTION CONTROLS

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., 114 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., 114 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., 114 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 E. 283rd St., Wickliffe, O.
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Reading Chain & Block Corp., Dept. 32, Reading, Pa.

CONVEYORS (Roller—Power and Gravity)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Mathews Conveyer Co., 114 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, Inc., 230 Park Ave., New York City.

COPPERING COMPOUND
American Chemical Paint Co., Dept. 310, Ambler, Pa.

CORRESPONDENCE COURSES
International Correspondence Schools, Box 9370-B, Scranton, Pa.

COTTER PINS
Hindley Mfg. Co., Valley Falls, R. I.
Hubbard, M. D., Spring Co., 424 Central Ave., Pontiac, Mich.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.

COUNTERBORES
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

COUPLINGS (Flexible)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
American Flexible Coupling Co., 18th & Pittsburgh Aves., Erie, Pa.
Baldwin-Duckworth Div. of Chain Belt Co., 326 Plainfield St., Springfield, Mass.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
General Electric Co., Schenectady, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.
Lovejoy Flexible Coupling Co., 4973 W. Lake St., Chicago, Ill.
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.
Poole Fdy. & Mach. Co., Woodberry St., Baltimore, Md.
Waldron, John, Corp., New Brunswick, N. J.

COUPLINGS (Pipe)
Bethlehem Steel Co., Bethlehem, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Oil Well Supply Co., Dallas, Texas
Republic Steel Corp., Dept. ST, Cleveland, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

CRANES, BRIDGE (Ore and Coal Handling)
Dravo Corp. (Engin'r'g Works Div.), Neville Island, Pittsburgh, Pa.
Industrial Brownhoist Corp., Bay City, Mich.

CRANES (Charging)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Crawler, Erection)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.

CRANES (Electric)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Crane & Engineering Co., 1125 E. 283rd 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.
Reading Chain & Block Corp., Dept. 32, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

CRANES (Gantry)
Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Reading Chain & Block Corp., Dept. 32, Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Gasoline and Diesel)
Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.

CRANES (Hand)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd 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.
Reading Chain & Block Corp., Dept. 32, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

CRANES (Jib)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd 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.
Reading Chain & Block Corp., Dept. 32, Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

CRANES (Locomotive)
Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Osgood Co., The, Marion, O.

CRANES (Monorail)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Reading Chain & Block Corp., Dept. 32, Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Traveling)
Industrial Equipment Corp., Pittsburgh, Pa.
Reading Chain & Block Corp., Dept. 32, Reading, Pa.
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.

CUT-OFF MACHINES (Abrasive)
Challenge Machinery Co., Grand Haven, Mich.

CUTTERS (Die Sinking & End Milling)
Brown & Sharpe Mfg. Co., Providence, R. I.

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)
Airgrip Chuck Div., Anker-Holth Mfg. Co., Port Huron, Mich.
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
Hanna Engineering Works 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

CYLINDERS (Hydraulic)
American Hollow Boring Co., 1054 W. 20th St., Buffalo, N. Y.

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.

DIE BLOCKS
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.
Ampco Metal, Inc., Dept. S-33, 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.

WHERE-TO-BUY

DIE CENTERS
McKenna Metals Co., 200 Lloyd Ave., Latrobe, 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.
Eimes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.

DIES (Cast)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Forgings & Castings Corp., 1350 Jarvis St., Ferndale, Mich.

DIES (Punching, Stamping, Blanking)
Columbus Die, Tool & Mach. Co. 955 Cleveland Ave., Columbus, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

DIES (Steel, Embossing)
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.

DOLOMITE—FLUX AND REFRACTORIES
Basic Dolomite, Inc., Hanna Bldg., Cleveland, O.

DOORS & SHUTTERS (Steel, Fire, and Rolling)
Dahlstrom Metallic Door Co., Jamestown, N. Y.
Kinnear Mfg. Co., 1780-1800 Fields Ave., Columbus, O.

DOORS & TRIM (Metal)
Dahlstrom Metallic Door Co., Jamestown, N. Y.

DRAGLINES (Crawler)
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

DRAFT GAGES (Indicating, Recording)
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

DRAFTING ROOM EQUIPMENT
Pease, C. F., Co., The, 2688 W. Irving Park Blvd., Chicago, Ill.

DRILL HEADS (Multiple)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

DRILL RODS—See RODS (Drill)

DRILLING MACHINES (Radial)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

DRILLING MACHINES (Vertical)
Bryant Machinery & Engineering Co., 400 W. Madison St., Chicago, Ill.
Cleereman Machine Tool Co., Green Bay, Wis.

DRILLS (Twist)—See TWIST DRILLS

DRIVES (Chain)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

DRIVES (Cut Herringbone Gear)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

DRIVES (Multi-V-Belt)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

DRIVES (Reciprocating)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

DRUMS (Steel)
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

DRYERS (Compressed Air)
Ruemelin Mfg. Co., 3860 N. Palmer St., Milwaukee, Wis.

DRYERS (Rotary)
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

DUST ARRESTING EQUIPMENT
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Pangborn Corp., Hagerstown, Md.
Ruemelin Mfg. Co., 3860 N. Palmer St., Milwaukee, Wis.

ECONOMIC SERVICE
Brookmire Corp., 551 Fifth Ave., New York City.

ECONOMIZERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

ELECTRIC WELDING—See WELDING

ELECTRIC WIRING—See WIRE AND CABLE

ELECTRICAL EQUIPMENT
Allen-Bradley Co., 1320 So. Second St., Milwaukee, Wis.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
Fairbanks, Morse & Co, Dept. B75, 600 S. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., Graybar Bldg., New York City.

ELECTRODES (Carbon and Graphite)
National Carbon Co., W. 117th St. at Madison Ave., Cleveland, O.

ELECTRODES (Hard Surfacing Welding)
Stoody Co., Whittier, Calif.

ELEVATING AND CONVEYING MACHINERY—See CONVEYORS

ENGINEERS AND CONTRACTORS
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Brassert, H. A., & Co., 1st National Bank Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Uhl Construction Co., 6001 Butler St., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

ENGINEERS (Consulting)
Brassert, H. A., & Co., 1st National Bank Bldg., Bank Bldg., Pittsburgh, Pa.
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Lindemuth, Lewis B., 140 Cedar St., New York City.
Loftus Engineering Corp., 509 Oliver Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.
Wean Engineering Co., Warren, O.

ENGINES (Diesel)
Cooper-Bessemer Corp., Mt. Vernon, O.
Fairbanks, Morse & Co, Dept. B75, 600 S. Michigan Ave., Chicago, Ill.

ENGINES (Gas, Oil)
Fairbanks, Morse & Co, Dept. B75, 600 So. Michigan Ave., Chicago, Ill.
Worthington Pump & Machinery Corp., Harrison, N. J.

ENGINES (Kerosene)
Fairbanks, Morse & Co, Dept. B75, 600 S. Michigan Ave., Chicago, Ill.

ENGINES (Steam)
Oil Well Supply Co., Dallas, Texas.

EXCAVATORS
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

FANS (Crane Cab)
Graybar Electric Co., Graybar Bldg., New York City.
Perkins, B. F. & Son, Inc., Holyoke, Mass.
Truflo Fan Co., 600 Mercer St., Harmony, Pa.

FANS (Exhaust Ventilating)
Graybar Electric Co., Graybar Bldg., New York City.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Truflo 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., Graybar Bldg., New York City.
Perkins, B. F., & Son, Inc., Holyoke, Mass.
Truflo Fan Co., 600 Mercer St., Harmony, Pa.

FANS (Wall)
Graybar Electric Co., Graybar Bldg., New York City.
Perkins, B. F. & Son, Inc., Holyoke, Mass.
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., 1643 Grant Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

FERROALLOY (Briquets)
Electro Metallurgical Co., 30 E. 42nd St., New York City.

FERROALLOYS
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Electro Metallurgical Co., 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.

FERROCHROME
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank & Co., Inc. Harrison Bldg., Philadelphia, Pa.

FERROMANGANESE
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Electro Metallurgical Co., 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 Co., 30 E. 42nd St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Southern Ferro Alloys Co., 2108 Chestnut St., Chattanooga, Tenn.

FERROVANADIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

FILES AND RASPS
Grobet File Corp. of America, 3 Park Place, New York, N. Y.
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 EXTINGUISHERS
Kidde, Walter, & Co., Inc., 140 Rector St., New York, N. Y.

FIRE CLAY—See REFRACTORIES
FIRE DOORS & SHUTTERS—See DOORS & SHUTTERS

FITTINGS (Electric Steel)
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.

FLAME HARDENING
Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., 30 E. 42nd St., New York City.
National-Erie Corp., Erie, Pa.

FLANGES (Welded Steel)
King Fifth Wheel Co., 2915 No. Second St., Philadelphia, Pa.

FLOOR RESURFACING
Flexrock Co., 2330 Manning St., 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.
Open Steel Flooring Institute, Inc., Dept. S-1-20-41, American Bank Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

FLUE DUST CONDITIONERS
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

FLUE GAS ANALYZERS
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

FLUORSPAR
Hillside Fluor Spar Mines, 38 S. Dearborn St., Chicago, Ill.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FLUXES (Soldering, Welding & Tinning)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Kester Solder Co., 4222 Wrightwood Ave., Chicago, Ill.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

FORGING BILLETS—See BILLETS
FORGING MACHINERY
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
National Machinery Co., The, Tiffin, O.

FORGING ROLLS
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.

FORGINGS (Brass, Bronze, Copper)
American Brass Co., The, Waterbury, Conn.
Ampco Metal Inc., Dept. S-33, 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)
American Hollow Boring Co., 1054 W. 20th St., Buffalo, N. Y.
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.
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

FORGINGS (Iron and Steel) (*Also Stainless)
American Forge Div. of The American Brake Shoe & Fdry. Co., 2621 S. Hoyne Ave., Chicago, Ill.
*Atlas Drop Forge Co., Lansing, Mich.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Forgings & Castings Corp., 1350 Jarvis St., Ferndale, Mich.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Oil Well Supply Co., Dallas, Texas.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

FORGINGS (Upset)
American Forge Div. of The American Brake Shoe & Fdry. Co., 2621 So. Hoyne Ave., Chicago, Ill.
Atlas Drop Forge Co., Lansing, Mich.
Bethlehem Steel Co., Bethlehem, Pa.

FROGS AND SWITCHES
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.

FURNACE INSULATION—See INSULATION

FURNACES (Blast)
Brassert, H. A., & Co., 1st National Bank Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

FURNACES (Brazing)
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.

FURNACES (Electric Heating)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1257, Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

FURNACES (Electric Melting)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
General Electric Co., Schenectady, N. Y.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1257, Pittsburgh, Pa.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.

FURNACES (Forging)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., 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., Dept. 112, 5600 Roosevelt Rd., 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., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

FURNACES (Heat Treating, Annealing, Carburizing, Hardening, Tempering)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
American Gas Furnace Co., Elizabeth, N. J.
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Carborundum Co., The, Perth Amboy, N. J.
Despatch Oven Co., 922 Ninth St., S.E., Minneapolis, Minn.
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.
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., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Wean Engineering Co., Warren, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

FURNACES (Laboratory)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.

FURNACES (Non-Ferrous Melting)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.

FURNACES (Open Hearth)
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Brassert, H. A., & Co., 1st National Bank Bldg., Pittsburgh, Pa.
Lindemuth, Lewis B., 140 Cedar St., New York City.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

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.
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.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

WHERE-TO-BUY

GAGE BLOCKS
Dearborn Gage Co., 22036 Beech St., Dearborn, Mich.

GAGES
Brown & Sharpe Mfg. Co., Providence, R. I.
Greenfield Tap & Die Corp., Greenfield, Mass.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.
Sheffield Gage Corp., 1528 E. Third St., Dayton, O.

GAGES (Indicating and Recording)
General Electric Co., Schenectady, N. Y.
Sheffield Gage Corp., 1528 E. Third St., Dayton, O.

GAGES (Pressure & Vacuum Recording)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.

GALVANIZING (Hot Dip)
Acme Galvanizing, Inc., Milwaukee, Wis.
Acme Steel & Malleable Iron Works, Buffalo, N. Y.
American Hot Dip Galvanizers Assoc., Inc., 903 American Bank Bldg., Pittsburgh, Pa.
American Tinning & Galvanizing Co., Erie, Pa.
Atlantic Steel Co., Atlanta, Ga.
Buffalo Galvanizing & Tinning Works, Inc., Buffalo, N. Y.
Cattle, Jos. P., & Bros., Gaul and Liberty Sts., Philadelphia, Pa.
Commercial Metals Treating, Inc., Toledo, O.
Diamond Expansion Bolt Co., Inc., Garwood, N. J.
Enterprise Galvanizing Co., 2507 E. Cumberland St., Philadelphia, Pa.
Equipment Steel Div., of Union Asbestos & Rubber Co., Blue Island, Ill.
Fanner Mfg. Co., The, Cleveland, O.
Finn, John, Metal Works, San Francisco, Calif.
Gregory, Thomas, Galvanizing Works, Maspeth, N. Y.
Hanlon-Gregory Galvanizing Co., 5515 Butler St., Pittsburgh, Pa.
Hill, James, Mfg. Co., Providence, R. I.
Hubbard & Co., Oakland, Calif.
Independent Galvanizing Co., Newark, N. J.
International-Stacey Corp., Columbus, O.
Isaacson Iron Works, Seattle, Wash.
Joslyn Co. of California, Los Angeles, Calif.
Joslyn Mfg. & Supply Co., Chicago, Ill.
Koven, L. O., & Bro., Inc., Jersey City, N. J.
Lehigh Structural Steel Co., Allentown, Pa.
Lewis Bolt & Nut Co., Minneapolis, Minn.
Missouri Rolling Mill Corp., St. Louis, Mo.
National Telephone Supply Co., The, Cleveland, O.
Penn Galvanizing Co., Philadelphia, Pa.
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.

GALVANIZING PRODUCTS
Enterprise Galvanizing Co., 2507 E. Cumberland St., Philadelphia, Pa.

GAS HOLDERS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

GAS PRODUCER PLANTS
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

GAS RECOVERY COKE OVEN AND GAS PLANTS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

GAS SCRUBBERS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Brassert, H. A., & Co., 1st National Bank Bldg., Pittsburgh, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

GASKETS (Asbestos, Metal or Rubber)
Garlock Packing Co., The, S 3-40, Palmyra, N. Y.
Johns-Manville Corp., 22 E. 40th St., New York City.

GEAR BLANKS
Ampco Metal, Inc., Dept. S-33, 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., 2915 No. Second St., 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.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.

GEAR MACHINERY (Lapping, Finishing, Checking)
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

GEARS (Non-Metallic)
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)
Cleveland Worm & Gear Co., 3270 E. 80th St., Cleveland, O.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

GEARS AND GEAR CUTTING
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
General Electric Co., Schenectady, N. Y.
Grant Gear Works, 2nd & B. Sts., Boston, Mass.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Jones, W. A., Fdry. & Mach. Co., 4437 Roosevelt Rd., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466 Pittsburgh, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
National-Erie Corp., Erie, Pa.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., 25th St., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

GENERATING SETS
Electric Generator & Motor Co., 4519 Hamilton Ave., Cleveland, O.
Fairbanks, Morse & Co., Dept. B75, 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.

» » » WHERE-TO-BUY « « «

GENERATORS (Electric)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Fairbanks, Morse & Co., Dept. B75, 600 S. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O.
Reliance Electric & Eng. Co., 1081 Ivanhoe Rd., Cleveland, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

GRABS—FOR SHEETS, COILS, INGOTS
J-B Engineering Sales Co., 1743 Orange St., New Haven, Conn.

GRAPPLES (Scrap Handling)
Owen Bucket Co., 7762 Breakwater St., Cleveland, O.

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 (Foundry Core)
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

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.

GRINDER CENTERS
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

GRINDING COMPOUNDS
Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia, Pa.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

GRINDING MACHINES (Automotive Reconditioning)
Heald Machine Co., Worcester, Mass.

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.

GRINDING MACHINES (Crank Pin, Cam, Piston & Valve Face)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Norton Company, Worcester, Mass.

GRINDING MACHINES (Oscillating)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.

GRINDING MACHINES (Plain and Universal)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
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.
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.
Norton Co., Worcester, Mass.

GRINDING MACHINES (Swing Frame)
Excelsior Tool & Machine Co., Ridge & Jefferson Aves., E. St. Louis, Ill.

GRINDING (Shear Knife)
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.

GRINDING WHEELS
Bay State Abrasive Products Co., Westboro, Mass.
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

GRINDING WHEELS (Segmental)
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Norton Company, Worcester, Mass.

GUARDS (Belt, Machine & Window)
Buffalo Wire Works Co., 437 Terrace, Buffalo, N. Y.

GUIDE SHOES
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

GUIDES (Mill)
Ampco Metal, Inc., Dept. S-33, 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 (Drop)
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 (Power)
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, 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
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Grinnell Co., Inc., Providence, R. I.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

HANGERS (Shaft)
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Division, General Motors Sales Corp., Harrison, N. J.
New Departure Div., General Motors Corp., Bristol, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

HEADING MACHINERY
Ajax Mfg. Co., 1441 Chardon Rd., Cleveland, O.
National Machinery Co., Tiffin, O.

HEATERS (Air)
Airtherm Manufacturing Co., 726 S. Spring Ave., St. Louis, Mo.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

HEATERS (Electric Space)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

HEATERS (Unit)
Airtherm Manufacturing Co., 726 S. Spring Ave., St. Louis, Mo.
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Grinnell Co., Inc., Providence, R. I.

HEAT TREATING
Commercial Metals Treating, Inc., Toledo, O.

HELMETS (Blast Cleaning)
Pangborn Corp., Hagerstown, Md.

HITCHINGS (Mine Car)
American Chain & Cable Co., Inc., Bridgeport, Conn.

HOBS
Brown & Sharpe Mfg. Co., Providence, R. I.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

HOISTS (Chain)
Ford Chain Block Div. of American Chain & Cable Co., Inc., 2nd & Diamond Sts., Philadelphia, Pa.
Reading Chain & Block Co., Dept. 32, Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

HOISTS (Electric)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd 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.
Reading Chain & Block Corp., Dept. 32, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Wright Mfg. Div. of American Chain & Cable Co. Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

HOISTS (Monorail)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Reading Chain & Block Corp., Dept. 32, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

HOISTS (Pneumatic)
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.

HOOKS (Chain)
American Chain & Cable Co., Inc., Bridgeport, Conn.

HOOPS AND BANDS
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

HOSE (Flexible Metal)
American Metal Hose Branch of The American Brass Co., Waterbury, Conn.

HUMIDIFIERS (Industrial)
Grinnell Co., Inc., Providence, R. I.

HYDRAULIC MACHINERY
Alliance Machine Co., The, Alliance, O.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
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
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

INDICATORS (Blast Furnace Stock Line)
Brosius, Edgar E., Inc., Sharpsburg Branch, 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.

INGOT MOLDS
Bethlehem Steel Co., Bethlehem, Pa.
Shenango-Penn Mold Co., Oliver Bldg., Pittsburgh, Pa.
Superior Mold & Iron Co., Penn, Pa.
Valley Mould & Iron Corp., Hubbard, O.

INHIBITORS
American Chemical Paint Co., Dept. 310, Ambler, Pa.

INSTRUMENTS (Electric Indicating and Recording)
Brown Instrument Div. of 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., Graybar Bldg., New York City.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

INSULATING BLOCK
Armstrong Cork Co., 985 Concord St., Lancaster, Pa.
Eagle-Picher Lead Co., The, Cincinnati, O.
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-11, Chrysler Bldg., New York City.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.

WHERE-TO-BUY

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.
Eagle-Picher Lead Co., The, Cincinnati, O.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATION (Building)
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.
Eagle-Picher Lead Co., The, Cincinnati, O.
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATION (Furnace, Boiler Settings, Ovens, Steam Pipe, Etc.)
Armstrong Cork Co., 985 Concord St., Lancaster, Pa.
Eagle-Picher Lead Co., The, Cincinnati, O.
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.

JIG BORERS
Bryant Machinery & Engineering Co., 400 W. Madison St., Chicago, Ill.
Cleereman Machine Tool Co., Green Bay, Wis.

JIGS AND FIXTURES
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.

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.
Ohio Knife Co., Dreman Ave. & B. & O. R.R., Cincinnati, O.

LABORATORY WARE
Bay State Abrasive Products Co., Westboro, Mass.
Norton Company, Worcester, Mass.

LADLES
Hollands Mfg. Co., 342-352 E. 18th St., Erie, Pa.

LAMPS (Industrial)
General Electric Co., Dept. 166-S-C, Nela Park, Cleveland, O.

LAPPING MACHINES
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.
Norton Company, Worcester, Mass.

LAPPING PLATES
Challenge Machinery Co., Grand Haven, Mich.

LARRIES (Coal)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.

LATHE CENTERS
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

LATHE DOGS (Drop Forged)
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

LATHES
Jones & Lamson Machine Co., Springfield, Vt.
LeBlond, R. K., Machine Tool Co., Dept. J-1, Cincinnati, O.
Monarch Machine Tool Co., Sidney, O.
South Bend Lathe Works, 857 E. Madison St., South Bend, Ind.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LATHES (Automatic)
Brown & Sharpe Mfg. Co., Providence, R. I.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vt.
Monarch Machine Tool Co., Sidney, O.

LATHES (Chucking)
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.

LATHES (Engine)
Monarch Machine Tool Co., Sidney, O.
South Bend Lathe Works, 857 E. Madison St., South Bend, Ind.

LATHES (Roll Turning)
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
United Engineering & Fdry Co., First National Bank Bldg., Pittsburgh, Pa.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LATHES (Turret)
Brown & Sharpe Mfg. Co., Providence, R. I.
Bullard Company, The, Bridgeport, Conn.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vt.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LAYOUT SURFACE PLATES
Challenge Machinery Co., Grand Haven, Mich.

LEAD (Tellurium)
National Lead Co. 111 Broadway, New York City.

LEVELING MACHINES
Erie Foundry Co., Erie, Pa.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
McKay Machine Co., Youngstown, O.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

LIFT TRUCKS—See TRUCKS (Lift)

LIFTING MAGNETS—See MAGNETS (Lifting)

LIGHTING (Industrial)
General Electric Co., Dept. 166-S-C, Nela Park, Cleveland, O.
Graybar Electric Co., Graybar Bldg., New York City.

LINERS (Pump and Cylinder)
Shenango-Penn Mold Co., Dover, O.

LOCOMOTIVE CRANES—See CRANES (Locomotive)

LOCOMOTIVES (Diesel-Electric)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.
Plymouth Locomotive Works, Div. Fate-Root-Heath Co., Plymouth, O.
Porter, H. K., Co., Inc., 49th & Harrison Sts., Pittsburgh, Pa.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Diesel Mechanical)
Plymouth Locomotive Works, Div. Fate-Root-Heath Co., Plymouth, O.
Porter, H. K., Co., Inc., 49th & Harrison Sts., Pittsburgh, Pa.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Electric)
Porter, H. K., Co. Inc., 49th & Harrison Sts., Pittsburgh, Pa.

LOCOMOTIVES (Electric Trolley)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Fireless)
Porter, H. K., Co. Inc., 49th & Harrison Sts., Pittsburgh, Pa.

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.

LOCOMOTIVES (Steam)
Porter, H. K., Co., Inc., 49th & Harrison Sts., Pittsburgh, Pa.

LOCOMOTIVES (Storage Battery)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

LUBRICANTS (Industrial)
American Lanolin Corp., Railroad St., Lawrence, Mass.
Gulf Oil Corp. of Penna., Gulf Refining Co., 3800 Gulf Bldg., Pittsburgh, Pa.
New York & New Jersey Lubricant Co., 292 Madison Ave., New York City.
Penola, Inc., 34th & Smallman Sts., Pittsburgh, Pa.
Pure Oil Co., The, 35 E. Wacker Dr., Chicago, Ill.
Shell Oil Co., Inc., 50 W. 50th St., New York City.
Socony-Vacuum Oil Co., Inc., 26 Broadway, New York City.
Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia, Pa.
Tide Water Associated Oil Co., 17 Battery Place, New York City.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, 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.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.

MACHINERY (Special)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Brosius, 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.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa
Morgan Engineering Co., The, Alliance, O.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.
National-Erie Corp., Erie, Pa.
National Roll & Fdry. Co., The, Avonmore, Pa.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Oil Well Supply Co., Dallas, Texas.
Shuster, F. B., Co., The, New Haven, Conn.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

MACHINERY (Used & Rebuilt)
Albert, L., & Son, Whitehead Rd., Trenton, N. J.
Crawbuck, John D., Co., Empire Bldg., Pittsburgh, Pa.
General Blower Co., 404 No. Peoria St., Chicago, Ill.
Keystone Machinery Co., 324 Fourth Ave., Pittsburgh, Pa.
Lang Machinery Co., 28th & A.V.R.R., Pittsburgh, Pa.
Marr-Galbreath Machinery Co., 53 Water St., Pittsburgh, Pa.
Motor Repair & Mfg. Co., 1558 Hamilton Ave., Cleveland, O.
West Penn Machinery Co., 1208 House Bldg., Pittsburgh, Pa.

MAGNESIA (Electrically Fused)
Norton Co., Worcester, Mass.

MAGNETIC SEPARATORS—See SEPARATORS (Magnetic)

MAGNETS (Lifting)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Dings Magnetic Separator Co., 663 Smith St., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland, O.
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

MAGNETS (Separating)
Dings Magnetic Separator Co., 663 Smith St., Milwaukee, Wis.
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

MANDRELS (Expanding)
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa

MANGANESE METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.

MANGANESE ORE
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

MANIFOLDS (Gas)
Production Plating Works, Inc., The, 123-129 Main St., Lebanon, O.

MANIPULATORS
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.

MARKING DEVICES
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.

METAL (Perforated)—See PERFORATED METAL

METAL BLAST ABRASIVES (Shot and Grit)
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., 4839 Harrison St., Pittsburgh, Pa.

METAL CLEANERS
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Cowles Detergent Co., The, Heavy Chemical Div., 7018 Euclid Ave., Cleveland, O.
Pennsylvania Salt Mfg. Co., Dept. E. Pennsalt Cleaner Div., Philadelphia, Pa.

METAL FINISHES
American Nickeloid Co., 1310 N. Second St., Peru, Ill.

METAL SPECIALTIES AND PARTS—See STAMPINGS

METAL STAMPINGS—See STAMPINGS

METALS (Hard Surfacing)
Stoody Co., Whittier, Calif.

METALS (Nonferrous)
American Brass Co., The, Waterbury, Conn.
International Nickel Co., Inc., The, 67 Wall St., New York City.
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.

MICROMETERS
Brown & Sharpe Mfg. Co., Providence, R. I.

MILLING CUTTERS
Brown & Sharpe Mfg. Co., Providence, R. I.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

MILLING MACHINES
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Kearney & Trecker Corp., 5926 National Ave., Milwaukee, Wis.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.

MILLING MACHINES (Milling and Centering Combined)
Jones & Lamson Machine Co., Springfield, Vt.

MILLS (Blooming, Universal, Plate, Sheet, Tin, Bar, Strip, Etc.)—See ROLLING MILL EQUIPMENT

MOLDING MACHINERY (Foundry)
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

MOLDINGS (Metal)
Dahlstrom Metallic Door Co., Jamestown, N. Y.

MOLDS (Ingot)—See INGOT MOLDS

MOLYBDENUM
Climax Molybdenum Co., 500 Fifth Ave., New York City.

MONEL METAL (All Commercial Forms)
International Nickel Co., Inc., The, 67 Wall St., New York City.

MONORAIL SYSTEMS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Reading Chain & Block Corp., Dept. 32, Reading, Pa.
Shenard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

MOTORS (Electric)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Fairbanks, Morse & Co., Dept. B75, 600 So. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., Graybar Bldg., New York City.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O.
Reliance Electric & Eng. Co., 1081 Ivanhoe Rd., Cleveland, O.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

MUCK BAR
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

NAILS (*Also Stainless)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
*Pittsburgh Steel Co., 1643 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.

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.

NUTS (*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Elastic Stop Nut Corp., 2340A 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., 2930 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., 2340A Vauxhall Rd., Union, N. J.

NUTS (Semi-Finished)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2930 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., 3800 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., Dept. 1, 1608 Walnut St., Philadelphia, Pa.
Tide Water Associated Oil Co., 17 Battery Place, New York City
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

OILS (Lubricating)—See LUBRICANTS (Industrial)

OILS (Rust Preventive)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

OPEN-HEARTH FURNACES—See FURNACES (Open-Hearth)

OVENS (Annealing, Japanning, Tempering)
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.

WHERE-TO-BUY

OVENS (Coke, By-Product Recovery)
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

OVENS (Core and Mold)
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.

OXY-ACETYLENE WELDING AND CUTTING—See WELDING

OXYGEN IN CYLINDERS
Air Reduction, 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.

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)
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.

PARALLELS
Challenge Machinery Co., Grand Haven, Mich.

PARTS (Precision)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

PATTERN EQUIPMENT (Wood or Metal)
Wellman Bronze & Aluminum Co., The, 6017 Superior Ave., Cleveland, O.

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 COMPOUNDS
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Pennsylvania Salt Mfg. Co., Dept. E. Pennsalt Cleaner Div., Philadelphia, Pa.

PICKLING CRATES
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Youngstown Welding & Engineering Co., The, Youngstown, O.

PICKLING EQUIPMENT
Buffalo Wire Works Co., 437 Terrace, Buffalo, N. Y.
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 Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

PICKLING TANK LININGS
Ceilcote Co., 750 Rockefeller Bldg., Cleveland, 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. Birmingham, Ala.
Wieman & Ward Co., The, Oliver Bldg., Pittsburgh, Pa.

PIG IRON (Charcoal)
Tennessee Products Corp., Nashville, Tenn.

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 Corp., Dept. ST, Cleveland, O.

PILING (Pressure-Treated Wood)
Wood Preserving Corp., The, 300 Koppers Bldg., Pittsburgh, Pa.

PILLOW BLOCKS (Roller Bearing)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
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 (Taper)
Moltrup Steel Products Co., Beaver Falls, Pa.

PIPE (Brass, Bronze, Copper)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Shenango-Penn Mold Co., Dover, O.

PIPE (Square and Rectangular)
Youngstown Sheet & Tube Co., The, Youngstown, O.

PIPE (Steel)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 940 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.

PIPE (Steel)—Con.
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.
Oil Well Supply Co., Dallas, Texas.
Worthington Pump & Machy. Corp., Harrison, N. J.

PIPE LINES (Riveted and Welded)
Bethlehem Steel Co., Bethlehem, Pa.

PIPE MILL MACHINERY
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

PIPE ROLLS (Magnetic)
Dings Magnetic Separator Co., 663 Smith St., Milwaukee, Wis.

PIPE STRAIGHTENING MACHINERY
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PIPE TOOLS
Greenfield Tap & Die Corp., Greenfield, Mass.

PIPING CONTRACTORS
Grinnell Co., Inc., Providence, R. I.
Power Piping Co., Beaver and Western Ave., Pittsburgh, Pa.

PISTON RINGS
American Hammered Piston Ring Div., Koppers Co., Baltimore, Md.

PISTON RODS
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Heppenstall Co., 47th and Hatfield Sts., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Forge & 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.

PLATE CASTORS
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.

PLATES (Sheared or Universal) (*Also Stainless)
*Alan Wood Steel Co., Conshohocken, Pa.
*Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
*American Rolling Mill Co., The, 940 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.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Levinson Steel Co., 33 Pride St., 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.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.

PLATES (Steel—Floor)—See FLOORING (Steel)

PLATES (Terne and Tin)—See TIN PLATE

PLUGS (Expansion)
Hubbard, M. D., Spring Co., 424 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.

POTENTIOMETERS
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.

POTS (Melting)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.

POWER UNITS (Gasoline, Electric for Industrial Trucks)
Ready-Power Co., The, 3828 Grand River Ave., Detroit, Mich.

PREHEATERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

PRESSED METAL PARTS
American Forge Div. of The American Brake Shoe & Fdry. Co., 2621 S. Hoyne Ave., Chicago, Ill.
Dahlstrom Metallic Door Co., Jamestown, N. Y.
Stanley Works, The, Pressed Metal Div., New Britain, Conn.

PRESSES
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Watson-Stillman Co., Roselle, N. J.

PRESSES (Bending)
Watson-Stillman Co., Roselle, N. J.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Extrusion)
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Watson-Stillman Co., Roselle, N. J.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

PRESSES (Forging)
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
Erie Foundry Co., Erie, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National Machinery Co., The, Tiffin, O.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PRESSES (Forming and Braking)
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Crane & Engineering Co., The, Steelweld Machinery Div., 1125 E. 283rd St., Wickliffe, O.
Watson-Stillman Co., Roselle, N. J.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Hydraulic)
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National-Erie Corp., Erie, Pa.
Progressive Welder Co., 3031 E. Outer Drive, Detroit, Mich.
Watson-Stillman Co., Roselle, N. J.
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.
Progressive Welder Co., 3031 E. Outer Drive, Detroit, Mich.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Riveting)
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
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

PRESSES, BRIQUETING (Turnings & Borings)
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

PRESSURE VESSELS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

PRODUCER GAS SYSTEMS—See GAS PRODUCER PLANTS

PUG MILLS (For Blast Furnaces and Sintering Plants)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.

PULLEYS (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Dings Magnetic Separator Co., 663 Smith St., Milwaukee, Wis.

PULVERIZERS
American Pulverizer Co., 1539 Macklind Ave., St. Louis, Mo.

PUMP HOUSES
Dravo Corp. (Contracting Div.), Neville Island, Pittsburgh, Pa.

PUMPS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Fairbanks, Morse & Co., Dept. B75, 600 S. Michigan Ave., Chicago, Ill.
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)
Fairbanks, Morse & Co., Dept. B75, 600 S. Michigan Ave., Chicago, Ill.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Centrifugal)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Brown & Sharpe Mfg. Co., Providence, R. I.
Fairbanks, Morse & Co., Dept. B75, 600 So. Michigan Ave., Chicago, Ill.
Peerless Pump Div., Food Machinery Corp., 301 West Ave., 26, Los Angeles, Cal.
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 (Fuel Injection)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

PUMPS (Hydraulic)
Brown & Sharpe Mfg. Co., Providence, R. I.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
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)
Fairbanks, Morse & Co., Dept. B75, 600 S. Michigan Ave., Chicago, Ill.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Rotary)
Brown & Sharpe Mfg. Co., Providence, R. I.
Fairbanks, Morse & Co., Dept. B75, 600 S. Michigan Ave., Chicago, Ill.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Vacuum)
Fairbanks, Morse & Co., Dept. B75, 600 S. Michigan Ave., Chicago, Ill.
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., Hammond, Ind.
Chambersburg Engineering Co., Chambersburg, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PYROMETER TUBES
Norton Company, Worcester, Mass.

PYROMETERS
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
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.
Ryerson, Jos. T. & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

REAMERS
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.

WHERE-TO-BUY

REAMERS—Con.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.
Greenfield Tap & Die Corp., Greenfield, Mass.

REBUILT EQUIPMENT
Albert, L., & Son, Whitehead Rd., Trenton, N. J.
Crawbuck, John D., Co., Empire Bldg., Pittsburgh, Pa.
General Blower Co., 404 N. Peoria St., Chicago, Ill.
Keystone Machinery Co., 324 Fourth Ave., Pittsburgh, Pa.
Lang Machinery Co., 28th & A.V.R.R., Pittsburgh, Pa.
Marr-Galbreath Machinery Co., 53 Water St., Pittsburgh, Pa.
Motor Repair & Mfg. Co., 1558 Hamilton Ave., Cleveland, O
West Penn Machinery Co., 1208 House Bldg., Pittsburgh, Pa

RECEIVERS
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
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.
Carter County Fire Clay Corp., 212-214 Kitchen Bldg., Ashland, Ky.
Eureka Fire Brick Co., 1100 B. F. Jones Law Bldg., Pittsburgh, Pa.
Globe Brick Co., The, East Liverpool, O.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.

REFRACTORIES (For High Frequency Furnaces)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Carborundum Co., The, Perth Amboy, N. J.
Norton Company, Worcester, Mass.

REFRACTORIES (Silicon Carbide)
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.

REFRACTORY CONCRETE
Atlas Lumnite Cement Co., Dept. S-11, Chrysler Bldg., New York City.
Johns-Manville Corp., 22 E. 40th St., New York City.

REGULATORS (Pressure)
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

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., The, 2700 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., 2915 No. Second St., 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.

RIVET SETS
Pittsburgh Saw & Tool Co., 78-80 Sycamore St., Etna P. O., Pittsburgh, Pa.

RIVETERS (Hydraulic—Portable and Stationary)
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

RIVETERS (Pneumatic)
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

RIVETING MACHINERY
Chambersburg Engineering Co., Chambersburg, Pa.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Shuster, F. B., Co., The, New Haven, Conn.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

RIVETS (*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
*Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

RODS (Brass, Bronze, Copper, Nickel Silver, Silicon-Bronze)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.

RODS (Drill)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.

RODS (Rounds, Flats and Shapes) (*Also Stainless)
*Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
*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

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
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Cold Metal Process Co., The., 2131 Wilson Ave., Youngstown, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
Morgan Engineering Co., The, Alliance, O.
National Roll & Foundry Co., The, Avonmore, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.
Wean Engineering Co.,Warren, O.
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

ROLLS (Bending and Straightening)
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

ROLLS (Sand and Chilled)
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O.
Springfield, O.
Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

ROLLS (Steel and Iron)
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
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 Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Fdry. Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O.
Springfield, O.
Pittsburgh Steel Foundry Corp., Glassport, 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
Johns-Manville Corp., 22 E. 40th St., New York City.

ROOFING AND SIDING (Corrugated and Plain)
American Rolling Mill Co., The, 940 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.
Jones & Laughlin Steel Corp., 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.

RUST PREVENTIVES
Alrose Chemical Co., 80 Clifford St., Providence, R. I.
American Lanolin Corp., Railroad St., Lawrence, Mass.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

RUST PROOFING PROCESS
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
Junkin Safety Appliance Co., 934 W. Hill St., Louisville, Ky.
Kimball Safety Products Co., 7314 Wade Park Ave., Cleveland, O.

SAFETY DEVICES (Electric)
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.

SALT TABLETS
Morton Salt Co., 310 So. Michigan Ave., Chicago, Ill.

SAND-BLASTING NOZZLES (Borium)
Stoody Co., 1134 W. Slauson Ave., Whittier, Calif.

SAND CONDITIONING AND PREPARING MACHINERY
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

SAWING MACHINES (Hot and Cold)
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
Morgan Engineering Co., The, Alliance, O.
Pittsburgh Saw & Tool Co., 78-80 Sycamore St., Etna P. O., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

SAWING MACHINES (Contour)
Continental Machines, Inc., 1324 So. Washington Ave., Minneapolis, Minn.

SAWS (Band—Metal Cutting)
Huther Bros. Saw & Mfg. Co., 1190 University Ave., Rochester, N. Y.
Simonds Saw & Steel Co., Fitchburg, Mass.

SAWS (Hack)
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
Simonds Saw & Steel Co., Fitchburg, Mass.

SAWS (Hot and Cold)
Huther Bros. Saw & Mfg. Co., 1190 University Ave., Rochester, N. Y.

SAWS (Inserted Tooth, Cold)
Huther Bros. Saw & Mfg. Co., 1190 University Ave., Rochester, N. Y.
Pittsburgh Saw & Tool Co., 78-80 Sycamore St., Etna P. O., Pittsburgh, Pa.
Simonds Saw & Steel Co., Fitchburg, Mass.

SAWS (Metal Cutting)
Brown & Sharpe Mfg. Co., Providence, R. I.
Pittsburgh Saw & Tool Co., 78-80 Sycamore St., Etna P. O., Pittsburgh, Pa.
Simonds Saw & Steel Co., Fitchburg, Mass.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SAWS (Segment)
Pittsburgh Saw & Tool Co., 78-80 Sycamore St., Etna P. O., Pittsburgh, Pa.

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. B75, 600 So. Michigan Ave., Chicago, Ill.
Kron Co., The, Bridgeport, Conn.
Toledo Scale Co., 3216 Monroe St., Toledo, O.

SCALES (Dial & Recording)
Fairbanks, Morse & Co., Dept. B75, 600 S. Michigan Ave., Chicago, Ill.

SCALES (Laboratory)
Fairbanks, Morse & Co., Dept. B75, 600 S. Michigan Ave., Chicago, Ill.

SCALES (Monorail)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Fairbanks, Morse & Co., Dept. B75, 600 So. Michigan Ave., Chicago, Ill.
Kron Co., The, Bridgeport, Conn.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Toledo Scale Co., 3216 Monroe St., Toledo, O.

SCHOOLS
International Correspondence Schools, Box 9370-B, Scranton, Pa.

SCRAP BALING PRESSES—See BALING PRESSES

SCREENS AND SIEVES
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
Buffalo Wire Works Co., 437 Terrace, Buffalo, 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., Inc., 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., 2930 E. 79th St., Cleveland, O.
Continental Screw Corp., New Bedford, Mass.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Cap, Set, Safety-Set)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Cleveland Cap Screw Co., 2930 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., 2930 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.

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.

SCREWS (Hardened Self-Tapping)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Machine)
Central Screw Company, 3517 Shields Ave., Chicago, Ill
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.

SCREWS (Machine, Recessed Head)
American Screw Co., Providence, R. I.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., Waterbury, Conn.

SCREWS (Self Locking)
Shakeproof Lock Washer Co., 2525 N. Keeler Ave., Chicago, Ill.

SCREWS (Sheet Metal, Recessed Head)
American Screw Co., Providence, R. I.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

SCREWS (Socket, Cold Forged)
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Thread-Cutting)
Shakeproof Lock Washer Co., 2525 N. Keeler Ave., Chicago, Ill.

SCREWS (Thumb)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Wood, Recessed Head)
American Screw Co., Providence, R. I.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.

SEAMLESS STEEL TUBING—See TUBES

SEPARATORS (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Dings Magnetic Separator Co., 663 Smith St., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 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.

SHAFTING—Con.
LaSalle Steel Co., Dept. 10A, P. O. Box 6800-A, Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
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 (Brass, Bronze, Nickel Silver)
Dahlstrom Metallic Door Co., Jamestown, N. Y.

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.
Dahlstrom Metallic Door Co., Jamestown, N. Y.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

SHEAR BLADES
American Shear Knife Co., 3rd and Ann Sts., Homestead, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Ohio Knife Co., Dreman Ave, & B. & O. R.R., Cincinnati, O.
Wapakoneta Machine Co., The, Wapakoneta, O.

SHEARS
Beatty Machine & Mfg. Co., Hammond, Ind.
Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.
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.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Fdry. & Mach. Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

SHEARS, ROTARY (Slitting, Beveling, Circling, Flanging)
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

SHEET BARS
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEET LIFTERS AND CARRIERS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago, Ill.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
J-B Engineering Sales Co., 1743 Orange St., New Haven, Conn.

SHEET METAL PRODUCTS—See STAMPINGS

SHEET METAL WORKERS MACHINES
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Excelsior Tool & Machine Co., Ridge & Jefferson Aves., E. St. Louis, Ill.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, 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-33, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.

SHEETS (Corrugated)
American Rolling Mill Co., The, 940 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The Youngstown, O.

SHEETS (Deep Drawing and Stamping)
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., The, 940 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The Youngstown, O.

SHEETS (Electrical)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 940 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc. Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, 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, 940 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.
Weirton Steel Co., Weirton, W. Va.

SHEETS (Hot Rolled and Hot Rolled Annealed)
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., The, 940 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
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.
Levinson Steel Co., 33 Pride St., 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.
Worth Steel Co., Claymont, Del.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Long Terne)
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Republic Steel Corp., Dept. ST. Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Perforated)
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.

SHEETS (Reinforced)
Erdle Perforating Co., 171 York St., Rochester, N. Y.

SHEETS (Roofing)—See ROOFING AND SIDING

SHEETS (Stainless)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 940 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.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, 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, 940 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHELLS (Seamless Drawn)
Crosby Co., The, 183 Pratt St., Buffalo, N. Y.

SHOVELS (Power)
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

SIEVES—See SCREENS AND SIEVES

SIGNALING & INTER-COMMUNICATION EQUIPMENT
Graybar Electric Co., Graybar Bldg., New York City.

SILICO-MANGANESE
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

SILICON METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.

SKELP (Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
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.

SLITTERS
Ohio Knife Co., Dreman Ave. & B. & O. R.R., Cincinnati, O.

SMALL TOOLS
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.

SPINDLES (Lathe)
American Hollow Boring Co., 1054 W. 20th St., Buffalo, N. Y.

SOAKING PITS
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

SOLDER
Kester Solder Co., 4222 Wrightwood Ave., Chicago, Ill.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

SOLENOIDS (Electric)
Cutler-Hammer, Inc., 1211 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.

SPACING TABLES
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.

SPECIAL MACHINERY—See MACHINERY (Special)

SPEED REDUCERS
Cleveland Worm & Gear Co., 3270 E. 80th St., Cleveland, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Grant Gear Works, 2nd & B. Sts., Boston, Mass.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Jones, W. A., Fdry. & Mach. Co., 4437 Roosevelt Rd., Chicago, Ill.
Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
New Departure Div., General Motors Corp., Bristol, Conn.

SPIEGELEISEN
Electro Metallurgical Co., 30 E. 42nd St., New York City.
New Jersey Zinc Co., 160 Front St., New York City.
Samuel, Frank, & Co., Inc., 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)
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
*Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Duer Spring & Mfg. Co., Pittsburgh, Pa.
Hubbard, M. D., Spring Co., 424 Central Ave., Pontiac, Mich.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
Pittsburgh Spring & Steel Co., Farmers Bank Bldg., Pittsburgh, Pa.
*Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Washburn Wire Co., 118th St. & Harlem River, New York City.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

SPRINGS (Alloy)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Pittsburgh Spring & Steel Co., Farmers Bank Bldg., Pittsburgh, Pa.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Coil & Elliptic)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Pittsburgh Spring & Steel Co., Farmers Bank Bldg., Pittsburgh, Pa.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Compression)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Oil Tempered—Flat)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Davis Brake Beam Co., Laurel Ave., & P. R. R., Johnstown, Pa.
Pittsburgh Spring & Steel Co., Farmers Bank Bldg., Pittsburgh, Pa.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Torsion)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Valve)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINKLERS (Automatic)
Grinnell Co., Inc., Providence, R. I.

SPROCKETS
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.

SPRUE CUTTERS
Shuster, F. B., Co., The, New Haven, Conn.

STACKS (Steel)—See BRIDGES, ETC.

STAINLESS STEEL—See BARS, SHEETS, STRIP, PLATES, ETC.

STAMPINGS
American Tube & Stamping Plant, (Stanley Wks.), Bridgeport, Conn.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Crosby Co., The, 183 Pratt St., Buffalo, N. Y.
Dahlstrom Metallic Door Co., Jamestown, N. Y. 442 Central Ave., Pontiac, Mich.
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., 424 Central Ave., Pontiac, Mich.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.
Shakeproof Lock Washer Co., 2525 N. Keeler Ave., Chicago, Ill.
Stanley Works, The, Bridgeport, Conn. New Britain, Conn.
Toledo Stamping & Mfg. Co., 90 Fearing Blvd., Toledo, O.
Transue & Williams, Alliance, O.
Whitehead Stamping Co., 1667 W. Lafayette Blvd., Detroit, Mich.

STAMPS (Steel)
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.

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., The, 2700 E. 79th St., Cleveland, O.

STEEL (Alloy)
Alan Wood Steel Co., Conshohocken, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Columbia Steel Co., San Francisco, Calif.
Copperweld Steel Co., Warren, O.
Crucible Steel Company of America, 405 Lexington Ave., New York City.
Firth-Sterling Steel Co., McKeesport, Pa.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Jessop Steel Co., 584 Green St., Washington, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Simonds Saw & Steel Co., Fitchburg, Mass.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Washburn Wire Co., Phillipsdale, R. I.
Wisconsin Steel Co., 180 No. 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. 10A, P. O. Box 6800-A, Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
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.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.
Superior Steel Corp., Carnegie, Pa.

STEEL (Cold Drawn)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Cold Finished)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
LaSalle Steel Co., Dept. 10A, P. O. Box 6800-A, Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wisconsin Steel Co., 180 No. 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, 940 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.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, 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.
Rustless Iron & Steel Corp., 3400 E. Chase St., Baltimore, Md.
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.

WHERE-TO-BUY

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.
Latrobe Electric Steel Co., Latrobe, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

STEEL (High Speed)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Crucible Steel Company of America, 405 Lexington Ave., New York City.
Firth-Sterling Steel Co., McKeesport, Pa.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop, Wm., & Sons Co., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL (High Tensile, Low Alloy)
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cold Metal Process Co., The, 2131 Wilson Ave., Youngstown, O.
Columbia Steel Co., San Francisco, Calif.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Nitriding)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.

STEEL (Rustless)—See STEEL (Corrosion Resisting)

STEEL (Screw Stock)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
LaSalle Steel Co., Dept. 10A, P. O. Box 6800-A, Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wisconsin Steel Co., 180 No. 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.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Cold Metal Process Co., The, 2131 Wilson Ave., Youngstown, O.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Washburn Wire Co., 118th St. & Harlem River, New York City. Phillipsdale, R. I.

STEEL (Stainless)—See STEEL (Corrosion Resisting)

STEEL (Strip, Copper Coated)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Thomas Steel Co., The, Warren, O.

STEEL (Strip, Hot and Cold Rolled) (*Also Stainless)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
*American Rolling Mill Co., The, 940 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.
Cold Metal Process Co., The, 2131 Wilson Ave., Youngstown, O.
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.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, 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.
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.

STEEL (Structural)—Con.
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.
Levinson Steel Co., 33 Pride St., 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.
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.
Forgings & Castings Corp., 1350 Jarvis St., Ferndale, Mich.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop, Wm., & Sons Co., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Broach & Mach. Co., 5600 St. Jean, Detroit, Mich.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Vanadium Alloys Steel Co., Latrobe, Pa.

STEEL BUILDINGS—See BRIDGES, BUILDINGS, ETC.

STEEL DOORS & SHUTTERS—See DOORS & SHUTTERS

STEEL FABRICATORS—See BRIDGES, BUILDINGS, ETC.

STEEL FLOATING AND TERMINAL EQUIPMENT
Dravo Corp. (Engin'r'g Works Div.), Neville Island, Pittsburgh, Pa.

STEEL PLATE CONSTRUCTION
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Belmont Iron Works, 22nd St., and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
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.

STONES (Honing)
Bay State Abrasive Products Co., Westboro, Mass.

STOOLS
Superior Mold & Iron Co., Penn, Pa.

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., P. O. Box 1, 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.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Lewis Machine Co., 3450 E. 76th St., Cleveland, O.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Medart Co., The, 3520 de Kalb St., St. Louis, Mo.
Shuster, F. B., Co., The, New Haven, Conn.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.

SULPHURIC ACID
Cleveland-Cliffs Iron Co., The, Union Commerce Bldg., Cleveland, O.
New Jersey Zinc Co., 160 Front St., New York City.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

SWITCHES (Electric)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2700 E. 79th St., Cleveland, O.
General Electric Co., Dept. 166-S-C, Nela Park, Cleveland, O.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

TACHOMETERS
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.

TANK LININGS
Cellcote Co., 750 Rockefeller Bldg., Cleveland, O.
National Carbon Co., W. 117th St. and Madison Ave., Cleveland, O.

TANKS (Pickling)
National Carbon Co., W. 117th St. and Madison Ave., Cleveland, O.

TANKS (Storage, Pressure, Riveted, Welded)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
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)
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.

TANTALUM-TUNGSTEN CARBIDE
Vascoloy-Ramet Corp., No. Chicago, Ill.

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.

TERMINALS (Locking)
Shakeproof Lock Washer Co., 2525 N. Keeler Ave., Chicago, Ill.
Thompson-Bremer & Co., 1638 W. Hubbard St., Chicago, Ill.

TERNE PLATE—See TIN PLATE

TESTING MACHINERY (Materials)
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.

THERMOMETERS
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
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 Stanton 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-Illinios Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TIN PLATE MACHINERY
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Wean Engineering Co., Warren, O.

TONGS (Chain Pipe)
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

TONGS (Rail Handling)
Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago, Ill.

TOOL BITS (High Speed)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.
Jessop Steel Co., 584 Green St., Washington, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

TOOL BITS (Tantalum Carbide)
Vascoloy-Ramet Corp., N. Chicago, Ill.

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.

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.
Vascoloy-Ramet Corp., N. Chicago, Ill.

TOOLS (Tantalum Carbide)
Vascoloy-Ramet Corp., N. Chicago, Ill.

TOOLS (Tipped, Carbide)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TORCHES AND BURNERS (Acetylene, Blow, Oxy-Acetylene)
Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
Weldit Acetylene Co., 642 Bagley Ave., Detroit, Mich.

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.

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
Ohio Galvanizing & Mfg. Co., Penn St., Niles, O.

TRAILERS (Arch-Girder)
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRAMRAILS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRANSMISSIONS—VARIABLE SPEED
Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.

TRAPS (Compressed Air)
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

TRAPS (High Pressure Steam)
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

TRAPS (Steam)
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

TREADS (Safety)
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Moore, Lee C., & Co., Neville Island, Pittsburgh, Pa.
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.

WHERE-TO-BUY

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.
Reading Chain & Block Co., Dept. 32, Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRUCK CRANES
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

TRUCKS AND TRACTORS (Electric Industrial)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRUCKS AND TRACTORS (Gasoline Industrial)
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Clark Tructractor Div., Clark Equipment Co., 127 Springfield Pl., Battle Creek, Mich.

TRUCKS (Dump-Industrial)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

TRUCKS (Hydraulic Lift)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

TRUCKS (Industrial)
Ohio Galvanizing & Mfg. Co., Penn St., Niles, O.

TRUCKS (Lift)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Clark Tructractor Div., Clark Equipment Co., 127 Springfield Pl., Battle Creek, Mich.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TUBE MILL EQUIPMENT
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.

TUBES (Boiler)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Michigan Steel Tube Products Co., 9450 Buffalo St., Detroit, Mich.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Pittsburgh Steel Co., 1643 Grant Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Steel and Tubes Division, Republic Steel Corp., Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBES (Brass, Bronze, Copper, Nickel Silver)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.

TUBES (High Carbon)
Ohio Seamless Tube Co., Shelby, O.
Steel and Tubes Division, Republic Steel Corp., Cleveland, O.

TUBING (Alloy Steel) (*Also Stainless)
*Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Michigan Steel Tube Products Co., 9450 Buffalo St., Detroit, Mich.
*National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Pittsburgh Steel Co., 1643 Grant Bldg., Pittsburgh, Pa.
Steel and Tubes Division, Republic Steel Corp., Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

TUBING (Copper, Brass, Aluminum)
American Brass Co., The, Waterbury, Conn.
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Shenango-Penn Mold Co., Dover, O.

TUBING (Seamless Flexible Metal)
American Metal Hose Branch of The American Brass Co., Waterbury, Conn.

TUBING (Seamless Steel)
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Pittsburgh Steel Co., 1643 Grant Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Steel and Tubes Division, Republic Steel Corp., Cleveland, O.
Standard Tube Co., The, 14600 Woodward Ave., Detroit, Mich.
Timken Roller Bearing Co., The, Steel and Tubes Division, Republic Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBING (Square, Rectangular)
Ohio Seamless Tube Co., Shelby, O.
Steel & Tubes Division, Republic Steel Corp., Cleveland, O.

TUBING (Welded Steel)
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Michigan Steel Tube Products Co., 9450 Buffalo St., Detroit, Mich.
Ohio Seamless Tube Co., Shelby, O.
Republic Steel Corp., Dept. ST, Cleveland, O.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Steel and Tubes Division, Republic Steel Corp., Cleveland, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBULAR PRODUCTS
Michigan Steel Tube Products Co., 9450 Buffalo St., Detroit, Mich.
Ohio Seamless Tube Co., Shelby, O.
Steel and 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.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

TUNGSTEN CARBIDE (Tools and Dies)
Firth-Sterling Steel Co., McKeesport, Pa.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TUNGSTEN METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.

TURBINES (Steam)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

TURBO BLOWERS—See BLOWERS

TURNTABLES
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

TURRET LATHES—See LATHES (Turret)

TWIST DRILLS
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, O.
Greenfield Tap & Die Corp., Greenfield, Mass.

VACUUM CLEANERS
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

VALVE CONTROL (Motor Operated Units)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

VALVES (Blast Furnace)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

VALVES (Brass, Iron and Steel)
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.

VALVES (Check)
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.

VALVES (Control—Air and Hydraulic)
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

VALVES (Electrically Operated)
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

VALVES (Gas and Air Reversing)
Blaw-Knox Co., Blawnox, Pa.

VALVES (Gate)
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Crane Co., The, 836 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.
Vickers, Inc., 1400 Oakman Blvd., Detroit, Mich.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

VALVES (Needle)
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.

VALVES (Open Hearth Control—Oil, Tar, Steam & Air)
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

VALVES (Proportioning)
North American Mfg. Co., The, 2901 E. 75th St., Cleveland, O.

VALVES (Steam and Water)
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.

VALVES AND FITTINGS—See PIPE FITTINGS

VANADIUM
Electro Metallurgical Co., 30 E. 42nd St., New York City.

VIADUCTS (Steel)—See BRIDGES, ETC.

WALKWAYS—See FLOORING—(Steel)

WASHERS (Iron and Steel)
Hubbard, M. D., Spring Co., 424 Central Ave., Pontiac, Mich.
Thompson-Bremer & Co., 1638 W. Hubbard St., Chicago, Ill.

WASHERS (Lock)
Shakeproof Lock Washer Co., 2525 N. Keeler Ave., Chicago, Ill.
Thompson-Bremer & Co., 1638 W. Hubbard St., Chicago, Ill.
Washburn Co., The, Worcester, Mass.

WASHERS (Spring)
Barnes, Wallace, Co. The, Div. Associated Spring Corp., Bristol, Conn.
Raymond Mfg.Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.
Shakeproof Lock Washer Co., 2525 N. Keeler Ave., Chicago, Ill.
Thompson-Bremer & Co., 1638 W. Hubbard St., Chicago, Ill.

WELDERS (Electric—Arc)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Hobart Bros., Dept. ST-31, Troy, O.
Lincoln Electric Co., The, Cleveland, O.
Progressive Welder Co., 3031 E. Outer Drive, Detroit, Mich.

WELDERS (Electric-Resistance)
Federal Machine & Welder Co., Dana St., Warren, O.

WELDING
Bartlett-Hayward Div. Koppers Co., Baltimore, Md.
Koch, George, Sons, Inc., 2112 Pennsylvania St., Evansville, Ind.
Lincoln Electric Co., The, Cleveland, O.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

WELDING (Welded Machine Steel Bases)
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.

WELDING AND CUTTING APPARATUS AND SUPPLIES (Electric)
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Hobart Bros., Dept. ST-31, Troy, O.
Lincoln Electric Co., The, Cleveland, O.
Wilson Welder & Metals Co., 60 E. 42nd St., New York City.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

WELDING AND CUTTING APPARATUS AND SUPPLIES (Oxy-Acetylene)
Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
Weldit Acetylene Co., 642 Bagley Ave., 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.
Maurath, Inc., 7311 Union Ave., Cleveland, O.
Metal & Thermit Corp., 120 Broadway, New York City.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.

WELDING RODS (Bronze)
American Brass Co., The, Waterbury, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.

WELDING RODS (Hard Surfacing)
Stoody Co., Whittier, Calif.

WELDING RODS OR WIRE
Air Reduction, 60 E. 42nd St., New York City.
American Agile Corp., 5806 Hough Ave., Cleveland, O.
American Brass Co., The, Waterbury, Conn.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bridgeport Brass Co., Bridgeport, Conn.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Hobart Bros., Dept. ST-31, Troy, O.
Lincoln Electric Co., The, Cleveland, O.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
Maurath, Inc., 7311 Union Ave., Cleveland, O.
Metal & Thermit Corp., 120 Broadway, New York City.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., 1643 Grant Bldg., Pittsburgh, Pa.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Seneca Wire & Mfg. Co., Fostoria, O.
Washburn Wire Co., Phillipsdale, R. I.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Wilson Welder & Metals Co., 60 East 42nd St., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WHEELS (Car and Locomotive)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

WHEELS (Track)
National-Erie Corp., Erie, Pa.

WHEELS (Trolley)
Crosby Co., The, 183 Pratt St., Buffalo, N. Y.

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., 1643 Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Seneca Wire & Mfg. Co., Fostoria, O.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

WIRE (Annealed, Bright, Galvanized)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., 1643 Grant Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Seneca Wire & Mfg. Co., Fostoria, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE (Barb)
Bethlehem Steel Co., Bethlehem, Pa.
Pittsburgh Steel Co., 1643 Grant Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE (Cold Drawn)
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., 1643 Grant Bldg., Pittsburgh, Pa.
Washburn Wire Co., 118th St. & Harlem River, New York City.

WIRE (High Carbon)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., 1643 Grant Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Seneca Wire & Mfg. Co., Fostoria, O.
Washburn Wire Co., 118th St. and Harlem River, New York City.

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.

WHERE-TO-BUY

WIRE (Spring)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., 1643 Grant Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Washburn Wire Co., 118th St. & Harlem River, New York City.

WIRE (Stainless)

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., 1643 Grant Bldg., Pittsburgh, Pa.
Rustless Iron & Steel Corp., 3400 E. Chase St., Baltimore, Md.

WIRE (Welding)—See WELDING RODS OR WIRE

WIRE AND CABLE (Electric)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Graybar Electric Co., Graybar Bldg., New York City.

WIRE CLOTH

Cyclone Fence Co., Waukegan, Ill.
Buffalo Wire Works Co., 437 Terrace, Buffalo, N. Y.
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 DIES

Vascoloy-Ramet Corp., N. Chicago, Ill.

WIRE DRAWING COMPOUND

Cowles Detergent Co., The, Heavy Chemical Div., 7018 Euclid Ave., Cleveland, O.

WIRE FORMS, SHAPES AND SPECIALTIES

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Columbia Steel Co., San Francisco, Calif.
Firth-Sterling Steel Co., McKeesport, Pa.
Hubbard, M. D., Spring Co., 424 Central Ave., Pontiac, Mich.
Ludlow-Saylor Wire Co., The, Newstead Ave. & Wabash R. R., St. Louis, Mo.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.
Seneca Wire & Mfg. Co., Fostoria, O.

WIRE FORMING MACHINERY

Nilson, A. H., Machine Co., The, Bridgeport, oCnn.

WIRE MILL EQUIPMENT

Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Lewis Machine Co., 3450 E. 76th St., Cleveland, O.
Morgan Construction Co., Worcester, Mass.
Shuster, F. B., Co., The, New Haven, Conn.

WIRE NAILS—See NAILS

WIRE PRODUCTS (*Also Stainless)

*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Buffalo Wire Works Co., 437 Terrace, Buffalo, N. Y.
Hubbard, M. D., Spring Co., 424 Central Ave., Pontiac, Mich.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Leschen, A., & Sons Rope Co., 5909 Kennerly Ave., St. Louis, Mo.
Ludlow-Saylor Wire Co., The, Newstead Ave. & Wabash R. R., St. Louis, Mo.
Pittsburgh Steel Co., 1643 Grant Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Seneca Wire & Mfg. Co., Fostoria, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Washburn Wire Co., 118th St. and Harlem River, New York City.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE ROPE AND FITTINGS (*Also Stainless)

American Cable Div. of American Chain & Cable Co., Inc., Wilkes-Barre, Pa.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Broderick & Bascom Rope Co., 4203 N. Union St., St. Louis, Mo.
Hazard Wire Rope Div. of American Chain & Cable Co., Inc., Wilkes-Barre, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Leschen, A., & Sons Rope Co., 5909 Kennerly Ave., St. Louis, Mo.
Macwhyte Co., 2912 14th Ave., Kenosha, Wis.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

WIRE ROPE SLINGS

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Broderick & Bascom Rope Co., 4203 N. Union St., St. Louis, Mo.
Leschen, A., & Sons Rope Co., 5909 Kennerly Ave., St. Louis, Mo.
Macwhyte Co., 2912 14th Ave., Kenosha, Wis.

WIRE STRAIGHTENING AND CUTTING MACHINERY

Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Lewis Machine Co., 3450 E. 76th St., Cleveland, O.
Shuster, F. B., Co., The, New Haven, Conn.

WRENCHES (Drop Forged)

Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

ZINC

New Jersey Zinc Co., 160 Front St., New York City.

ZINC ALLOYS

New Jersey Zinc Co., 160 Front St., New York City.

ZINC (Rolled Sheets, Strips, Coils)

New Jersey Zinc Co., 160 Front St., New York City.

ZIRCONIUM METAL AND ALLOYS

Electro Metallurgical Co., 30 E. 42nd St., New York City.

USED and REBUILT EQUIPMENT
MATERIALS

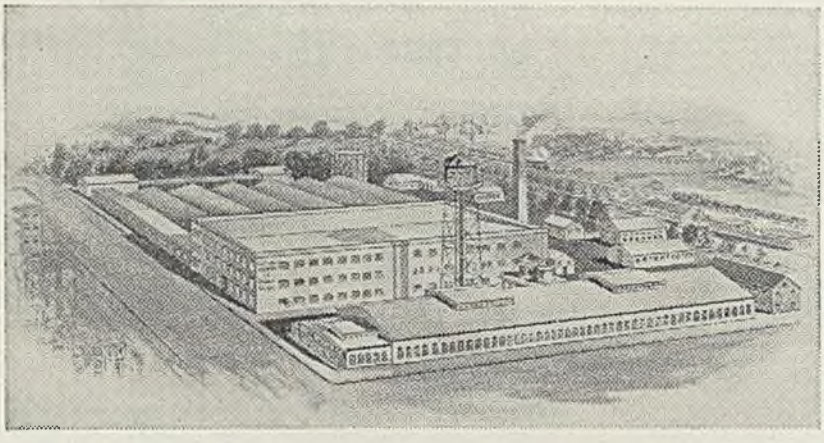
OFFERING AT PRIVATE SALE

Complete Plant of the

WHITE-WARNER CO., INC.

(Manufacturers of Household Stoves and Ranges)

491 WEST WATER ST. **TAUNTON, MASS.**



REAL ESTATE — MACHINERY — FOUNDRY — METAL SHOP — NAME GOODWILL—PATENTS—TRADEMARK—COMPLETELY EQUIPPED OFFICE

REAL ESTATE: Modern daylight plant including 100,000 sq. ft. of floor space in 1 and 3 story interconnected streamlined buildings in well-kept condition, ready for immediate operation and occupancy; automatic sprinklered; brick and wood construction; central heating plant; approx. to railroad; fire proof doors; 2 electric elevators.

COMPLETE MACHINE SHOP, CARPENTER SHOP, POLISHING AND PLATING ROOM, COMPLETE FOUNDRY (30 Ton per day capacity).

ALL MACHINERY SET UP AND READY FOR OPERATION

(Plant Can Be Purchased With or Without Machinery)

PLANT MUST BE DISPOSED OF ON OR BEFORE MARCH 5, 1941

View this plant and make offers at once. Offers to be considered in the order of receipt. Plant subject to prior sale. Plant open now for inspection during business hours. (See Mr. Charles H. Hathaway at the Plant).

(Licensed Real Estate Brokers will be protected for their Commission)

For further information, Apply only to:

AARON KROCK & COMPANY

390 MAIN STREET 3-7261 WORCESTER, MASS.

Established 1915

BORING MILL

4¼" bar Franklin Horizontal Boring, Drilling & Milling Machine (table type) single pulley drive max. table to spindle 36"; Max. face plate to outer support 72"; size of cross table 48"x24". Estimated Wt. 18,000 lbs. Limited service. Excellent condition. Shipment from Pittsburgh stock.

•

MARR-GALBREATH MACHINERY CO.

53 Water St. Pittsburgh, Pa.

FOR SALE

1—OIL BURNING UNIT WITH 10' x 30' Tank 25HP Boiler—Coils and pumps—Complete. Only reason for selling—have no use for it. Address Box 433, STEEL, Penton Bldg., Cleveland.

HORIZ. MILL, 3-3/8" bar Detrick-Harvey
POST MILL, 6-1/2" bar Niles, R.P.T. M.D.
DIE SINKERS, E-3 and E-4 Keller, M.D.
GEAR PLANERS, 54" Gleason, bevel, M.D. (2)
GEAR CUTTER, 84" Newark, M.D.
LEVELLER, Plate, 84" Bertsch, 7 Rolls, M. D.
PRESS, Stoll 79-D, Bed 72"x26", M.D.
PLATE SHEAR, 10' x 3/8" United, M.D.

LANG MACHINERY COMPANY

28th St. & A. V. R.R. Pittsburgh, Pa.

—REBUILT—

BLOWERS - FANS - EXHAUSTERS

Connersville-Roots positive blowers.
Centrifugals for gas and oil burning.
Sand blast, grinder and dust exhausters.
Ventilating fans and roof ventilators.

GENERAL BLOWER CO.

404 North Peoria St. Chicago, Ill.

DIRECT CURRENT BARGAINS

2—175 HP 230 volt G.E. 425 rpm Motors.
2—175 KW 250 V. Engine Generators driven by
2—200/240 HP "VA" Fairbanks Morse Diesels.

Full Control Equipment—All Good Condition.
Located St. Louis. Sell All or Part

MISSISSIPPI VALLEY EQUIPMENT CO.

511A Locust St. St. Louis, Mo.

FOR SALE

No. 1 Standard Forging Hammer, 100 lbs.
No. 3 Williams, White Bulldozer
18" Canton Portable Alligator Shears
12" ram x 15' stroke Hydraulic Accumulator, 1500 lbs. pressure
500 Ton Bethlehem Steel Shell Presses
6x12" HPM Vertical Triplex Pump, 700 lbs. pressure, 200 GPM, NEW. Class JJJ Pump.

Address Box 365
STEEL, Penton Bldg., Cleveland

Rails—"1 Ton or 1000"

NEW RAILS—5000 tons—All Sections—All Sizes.
RELAYING RAILS—25,000 tons—All Sections—All Sizes, practically as good as New.
ACCESSORIES—Every Track Accessory carried in stock—Angle and Splice Bars, Bolts, Nuts, Frogs, Switches, Tie Plates.

Buy from One Source—Save Time and Money
'Phone, Write, or Wire

L. B. FOSTER COMPANY, Inc.

PITTSBURGH NEW YORK CHICAGO

IF YOU WANT TO BUY OR SELL

good used or rebuilt equipment or materials—Place an advertisement in this section. Write STEEL, Penton Bldg., Cleveland, Ohio

CONTRACT WORK

CLASSIFIED

Positions Wanted

EXECUTIVE: UNIVERSITY EDUCATION, 15 years manager purchases large manufacturer heavy machinery, disbursement several million dollars annually. Solicit interview. Address Box 419, STEEL, Penton Bldg., Cleveland.

EXPERIENCED STRUCTURAL AND Plate Shop Superintendent seeking position as Superintendent or General Foreman of a Plant Fabricating a general line of Structural or Welded Plate construction. Address Box 413, STEEL, Penton Bldg., Cleveland.

METALLURGICAL ENGINEER. 33 — 6 years in large steel plant, rolling mills, open hearths, and laboratories—at present in research department—knowledge of latest developments in steel products and processes—can be valuable asset to small growing concern with practical metallurgical problems. Address Box 427, STEEL, Penton Bldg., Cleveland.

SALES REPRESENTATIVE FOR CHICAGO area. Wants steel mill product or allied line on commission basis. Well acquainted with industrial accounts in this district. Best of personal and business references furnished. Address Box 430, STEEL, Penton Bldg., Cleveland.

FORMER MANAGER STEEL WAREHOUSE Detroit:—Desires one or more lines to sell in this trade area. Steel Plates and shapes and/or metalworking and industrial machinery. Address Box 425, STEEL, Penton Bldg., Cleveland.

FACTORY MANAGER OR SUPERINTENDENT. Well balanced experience—machine shop, sheet metal, forging and assembly. Thoroughly familiar with planning, schedule and time study. Established record for cost and scrap reduction and economical plant operation. Address Box 432, STEEL, Penton Bldg., Cleveland.

Help Wanted

EXPERIENCED HEAVY FORGER AND blacksmith. Opening in large California Plant, best of climate and working conditions. Steady work. Good wages. Age under 45. Experience required in crankshaft, straight shaft and general light forgings, alloy and carbon steels. Address Box 389, STEEL, Penton Bldg., Cleveland.

WANTED: TWO BASIC ELECTRIC MELTers to make ordnance steel—5 years' experience—new 7 ton Heroult. Three years' work. Good pay. Only first-class men. No aluminum. Philadelphia district. Send experience and photo. Apply by letter. Address Box 428, STEEL, Penton Bldg., Cleveland.

CORE ROOM FOREMAN. JOBBING MALleable foundry making various sizes of cores. Wants man to take charge of core room. Must have experience with core blowing machines. Write, state qualifications as to past experience, references, salary, etc. Address Box 416, STEEL, Penton Bldg., Cleveland.

WANTED: GENERAL FOREMAN OR SUperintendent, Forge Plant. Write giving experience, references, age, salary expected. Location, East. Address Box 431, STEEL, Penton Bldg., Cleveland.

Employment Service

SALARIED POSITIONS

$2,500 to $25,000

This thoroughly organized advertising service of 31 years' recognized standing and reputation, carries on preliminary negotiations for positions of the caliber indicated above, through a procedure individualized to each client's personal requirements. Several weeks are required to negotiate and each individual must finance the moderate cost of his own campaign. Retaining fee protected by refund provision as stipulated in our agreement. Identity is covered and, if employed, present position protected. If your salary has been $2,500 or more, send only name and address for details. R. W. Bixby, Inc., 110 Delward Bldg., Buffalo, N. Y.

SPECIAL NOTICE

$100 REWARD

I will pay this reward to anyone who advises me with proof, as to who got and who has papers written by me on "Control of Hydrogen in Steel-making" and taken surreptitiously from my house in 1939 and 1940.

Henry D. Hibbard
Plainfield, N. J.

Accounts Wanted

MANUFACTURERS' AGENT FOR FIFteen years in Central New York is interested in contacting manufacturers in metal industry, desires additional line. Address Box 417, STEEL, Penton Bldg., Cleveland.

IF YOUR PRODUCT IS USED BY STEEL mills in the Pittsburgh District we can help you. Would be interested in becoming sales representative for such concerns. Address Box 420, STEEL, Penton Bldg., Cleveland.

LET ME REPRESENT YOU IN CHICAGO Territory; B & S and small screw machine parts; 15 years' experience; commission basis. Address Box 423, STEEL, Penton Bldg., Cleveland.

Castings

OHIO

THE WEST STEEL CASTING CO., Cleveland. Fully equipped for any production problem. Two 1½ ton Elec. Furnaces. Makers of high grade light steel castings, also alloy castings subject to wear or high heat.

PENNSYLVANIA

NORTH WALES MACHINE CO., INC., North Wales. Grey Iron, Nickel, Chrome, Molybdenum Alloys, Semi-steel. Superior quality machine and hand molded sand blast and tumbled.

ADVERTISING INDEX

Where-to-Buy Products Index carried in first issue of month.

A

Acme Galvanizing, Inc. ..... —
Acme Steel & Malleable Iron Works.. —
Ahlberg Bearing Co. ..... —
Airgrip Chuck Division of Anker-Holth Mfg. Co. ..... —
Air Reduction ..... —
Ajax Electrothermic Corp. ..... —
Ajax Flexible Coupling Co. ..... —
Alan Wood Steel Co. ..... —
Allegheny Ludlum Steel Corp. 131
Allen-Bradley Co. ..... —
Allis-Chalmers Mfg. Co. 2, 3
Alrose Chemical Co. 157
American Agile Corp. 149
American Brass Co., The ..... —
American Bridge Co. ..... —
American Cable Division of American Chain & Cable Co., Inc. 105
American Chain & Cable Co., Inc., American Cable Division 105
American Chain & Cable Co., Inc., American Chain Division ..... —
American Chain & Cable Co., Inc., Ford Chain Block Division ..... —
American Chain & Cable Co., Inc., Page Steel & Wire Division ..... —
American Chain Division of American Chain & Cable Co., Inc. ..... —
American Chemical Paint Co. 137
American Engineering Co. ..... —
American Flexible Coupling Co. 104
American Foundry Equipment Co. ... —
American Gas Association 109
American Hollow Boring Co. ..... —
American Hot Dip Galvanizers Association ..... —
American Lanolin Corp. ..... —
American Monorail Co. 31
American Nickeloid Co. ..... —
American Pulverizer Co. 126
American Roller Bearing Co. ..... —
American Rolling Mill Co., The .... —
American Screw Co. 15
American Shear Knife Co. 134
American Society of Tool Engineers.. —
American Steel & Wire Co. ..... —
American Tinning & Galvanizing Co. —
Ampco Metal, Inc. 113
Amsler-Morton Co., The ..... —
Andrews Steel Co., The 124
Apollo Steel Co. .....Front Cover
Armstrong-Blum Mfg. Co. 128
Armstrong Cork Co. ..... —
Atlantic Steel Co. ..... —
Atlas Car & Mfg. Co. 110
Atlas Drop Forge Co. 159
Atlas Lumnite Cement Co. ..... —

B

Babcock & Wilcox Co. ..... —
Bailey, Wm. M., Co. ..... —
Baker-Raulang Co. ..... —
Bantam Bearings Corp. 87
Barnes, Wallace, Co., Division of Associated Spring Corporation ..... —
Basic Dolomite, Inc. ..... —
Bay City Forge Co. ..... —
Bay State Abrasive Products Co. ... 13
Beatty Machine & Mfg. Co. ..... —
Bellevue-Stratford Hotel ..... —
Belmont Iron Works 159
Berger Manufacturing Div., Republic Steel Corp. ..... —
Bethlehem Steel Co. 1
Birdsboro Steel Foundry & Machine Co. ..... —
Bissett Steel Co., The ..... —
Blanchard Machine Co. ..... —
Blaw-Knox Co. 11
Blaw-Knox Division, Blaw-Knox Co. . —
Bliss & Laughlin, Inc. ..... —
Bower Roller Bearing Co. 99
Brassert, H. A., & Co. 157
Bridgeport Brass Co. 115, 116
Bristol Co., The ..... —
Brooke, E. & G., Iron Co. 155
Brosius, Edgar E., Inc. ..... —
Brown & Brown, Inc. 169
Brown & Sharpe Mfg. Co. 8
Brown Instrument Co., The ..... —
Bryant Chucking Grinder Co. ..... —
Buffalo Galvanizing & Tinning Works —
Buffalo Wire Works Co., Inc. 150
Bullard Co., The ..... —
Bundy Tubing Co. ..... —

C

Cadman, A. W., Mfg. Co. 163
Carborundum Co., The 97, 98
Carey, Philip, Co., The 125
Carnegie-Illinois Steel Corp. 107
Carpenter Steel Co., The ..... —
Carter County Fire Clay Corp. 155
Carter Hotel 142
Cattie, Joseph P., & Bros., Inc. ..... —
Cellcote Co., The 159
Central Screw Co. 15
Challenge Machinery Co., The ..... —
Chambersburg Engineering Co. ..... —
Chandler Products Co. 15
Chicago Perforating Co. ..... —
Chicago Rawhide Mfg. Co. ..... —
Chromium Mining and Smelting Corp., Ltd. ..... —
Cincinnati Grinders, Inc. 5
Cincinnati Milling Machine Co. 5
Cincinnati Shaper Co., The ..... —
Clark Controller Co. ..... —
Cleveland Cap Screw Co. ..... —
Cleveland-Cliffs Iron Co. 172
Cleveland Crane & Engineering Co... 133
Cleveland Hotel ..... —
Cleveland Punch & Shear Works Co... —
Cleveland Tramrail Division, Cleveland Crane & Engineering Co. ..... —
Cleveland Twist Drill Co., The ..... —
Cleveland Worm & Gear Co., The .... —
Climax Molybdenum Co. 34
Cold Metal Process Co. 81
Colonial Broach Co. ..... —
Columbia Steel Co. 107
Columbus Die, Tool & Machine Co. .. 149
Commercial Metals Treating, Inc. 157
Cone Automatic Machine Co., Inc. .... —
Continental Machines, Inc. ..... —
Continental Roll & Steel Foundry Co. 15
Continental Screw Co. ..... —
Copperweld Steel Co. ..... —
Corbin Screw Corp. 15
Cowles Tool Co. 151
Crane Co. ..... —
Crawbuck, John D., Co. ..... —
Crosby Co., The 163
Cullen-Friestedt Co. ..... —
Culvert Division, Republic Steel Corp. —
Cunningham, M. E., Co. ..... —
Curtis Pneumatic Machinery Co. 127
Cutler-Hammer, Inc. ..... —

D

Damascus Steel Casting Co. ..... —
Darwin & Milner, Inc. 159
Davis Brake Beam Co. 163
Dearborn Gage Co. ..... —
Despatch Oven Co. 18
Detroit Leland Hotel ..... —
Diamond Expansion Bolt Co., Inc. .... —
Differential Steel Car Co. ..... —
Dings Magnetic Separator Co. 102
Dravo Corp., Engineering Works Div. —
Dravo Corp., Machinery Division .... —
Duer Spring & Mfg. Co. 153

E

Eagle-Picher Lead Co., The ..... —
Edison Storage Battery Div. of Thomas A. Edison, Inc. ..... —
Elastic Stop Nut Corp. 155
Electric Controller & Mfg. Co. ..... —
Electric Furnace Co., The ..... —
Electric Storage Battery Co. 91
Electro Alloys Co., The ..... —
Electro Metallurgical Co. 9
Elmes, Charles F., Engineering Works —
Enterprise Galvanizing Co. 157
Equipment Steel Products Division of Union Asbestos & Rubber Co. ..... —
Erdle Perforating Co., The ..... —
Erie Bolt & Nut Co. ..... —
Erie Foundry Co. ..... —
Eureka Fire Brick Works 155
Ex-Cell-O Corp. ..... —
Excelsior Tool & Machine Co. ..... —

F

Fafnir Bearing Co., The ..... —
Fairbanks, Morse & Co. ..... —
Fanner Mfg. Co. ..... —
Fansteel Metallurgical Corp. ..... —
Farrel-Birmingham Co., Inc. ..... —
Farval Corp., The .....Inside Back Cover
Federal Machine & Welder Co. ..... —
Finn, John, Metal Works ..... —
Firth-Sterling Steel Co. ..... —
Fitzsimons Co., The ..... —
Flexrock Co. ..... —
Ford Chain Block Division of American Chain & Cable Co., Inc. ..... —
Foster, L. B., Co. 168
Foxboro Co., The ..... —
Fuller Brush Co. ..... —

G

Garden City Fan Co. ..... —
Garlock Packing Co., The ..... —
General Blower Co. 168
General Electric Co. ..... —
General Electric Co., Lamp Dept. ... 103
Giddings & Lewis Machine Tool Co. .. 6, 7
Gisholt Machine Co. ..... —
Globe Brick Co., The 130
Granite City Steel Co. ..... —
Grant Gear Works 135
Graybar Electric Co. ..... —
Great Lakes Steel Corp. ..... —
Greenfield Tap & Die Corp. ..... —
Gregory, Thomas, Galvanizing Works —
Grinnell Co., Inc. ..... —
Grobet File Corp. of America 147
Gulf Oil Corporation ..... —
Gulf Refining Co. ..... —

H

Hagan, George J., Co. 147
Hanlon-Gregory Galvanizing Co. 101
Hanna Engineering Works 72
Hanna Furnace Corp. 144
Hannifin Mfg. Co. ..... —
Harnischfeger Corp. ..... —
Harrington & King Perforating Co. ... 143
Hays Corp., The ..... —
Heald Machine Co. ....Inside Front Cover
Heppenstall Co. ..... —
Hevi Duty Electric Co. ..... —
Hill, James, Mfg. Co. ..... —
Hillside Fluor Spar Mines ..... —
Hindley Mfg. Co. ..... —
Hobart Bros. 155
Horsburgh & Scott Co. ..... —
Hubbard & Co. ..... —
Hubbard, M. D., Spring Co. 111
Huther Bros. Saw Mfg. Co. ..... —
Hyatt Bearings Division, General Motors Sales Corporation ..... —
Hyde Park Foundry & Machine Co. .. —

I

Illinois Clay Products Co. 112
Illinois Development Council ..... —
Independent Galvanizing Co. ..... —
Industrial Brownhoist Corp. ..... —
Ingersoll-Rand ..... —
Ingersoll Steel & Disc Division, Borg Warner Corp. ..... —
Inland Steel Co. 20
International Correspondence Schools 167
International Nickel Co., Inc. ..... —
International Screw Co. 15
International-Stacey Corp. ..... —
Isaacson Iron Works ..... —

J

Jackson Iron & Steel Co., The ..... —
James, D. O., Mfg. Co. ..... —
J-B Engineering Sales Co. ..... —
Jessop Steel Co. 136
Jessop, Wm., & Sons, Inc. ..... —
Johns-Manville Corp. ..... —
Johnson Bronze Co. ..... —
Jones & Lamson Machine Co. ..... —
Jones & Laughlin Steel Corp. ..... —
Jones, W. A., Foundry & Machine Co. —
Joslyn Co. of California ..... —
Joslyn Mfg. & Supply Co. ..... —
Junkin Safety Appliance Co., Inc. .... —

K

Kardong Brothers, Inc. 147
Kearney & Trecker Corp. ..... —
Kemp, C. M., Mfg. Co. ..... —
Kester Solder Co. ..... —

ADVERTISING INDEX

Where-to-Buy Products Index carried in first issue of month.

	Page
King Fifth Wheel Co.	140
Kinnear Mfg. Co.	—
Kirk & Blum Mfg. Co.	169
Koch, George, Sons, Inc.	—
Koppers Co.	—
Koven, L. O., & Brother, Inc.	—
Krock, Aaron, & Co.	168
Kron Co., The	142
L	
Laclede Steel Co.	—
Lake City Malleable Co.	—
Lamson & Sessions Co., The	15
Landis Machine Co., Inc.	—
Lang Machinery Co.	168
Lansing Stamping Co.	—
LaSalle Steel Co.	—
Latrobe Electric Steel Co.	—
Lawrence Copper & Bronze	143
LeBlond, R. K., Machine Tool Co., The	—
Leeds & Northrup Co.	—
Lee Spring Co., Inc.	—
Lehigh Structural Steel Co.	—
Leschen, A., & Sons Rope Co.	—
Levinson Steel Co., The	—
Lewis Bolt & Nut Co.	—
Lewis Foundry & Machine Division of Blaw-Knox Co.	11
Lewis Machine Co., The	—
Lincoln Electric Co., The	69
Lincoln Hotel	—
Linde Air Products Co., The	—
Link-Belt Co.	—
Loftus Engineering Corp.	—
Logemann Bros. Co.	123
Lovejoy Flexible Coupling Co.	—
Ludlow-Saylor Wire Co., The	—
Mc	
McKay Machine Co.	—
McKee, Arthur G., Co.	63
McKenna Metals Co.	—
M	
Mackintosh-Hemphill Co.	—
Macwhyte Co.	—
Marr-Galbreath Machinery Co.	168
Mathews Conveyer Co.	—
Maurath, Inc.	—
Medart Co., The	—
Mesta Machine Co.	—
Metal & Thermit Corp.	—
Michigan Tool Co.	—
Midvale Co., The	94
Milwaukee Foundry Equipment Co.	—
Mississippi Valley Equipment Co.	168
Missouri Rolling Mill Corp.	—
Moltrup Steel Products Co.	—
Monarch Machine Tool Co., The	16
Monarch Steel Co.	—
Moore, Lee C., & Co., Inc.	—
Morgan Construction Co.	—
Morgan Engineering Co.	79
Morrison Metalweld Process, Inc.	—
Morris Paper Co.	—
Morton Salt Co.	157
Motor Repair & Mfg. Co.	—
N	
National Acme Co., The	—
National Bearing Metals Corp.	163
National Broach & Machine Co.	—
National Carbon Co., Inc.	—
National-Erie Corp.	108
National Forge & Ordnance Co.	—
National Roll & Foundry Co.	—
National Screw & Mfg. Co.	15
National Steel Corp.	14, 144
National Telephone Supply Co., Inc.	—
National Tube Co.	—
New Departure Division, General Motors Sales Corp.	—
New England Screw Co.	15
New Jersey Zinc Co.	—
New York & New Jersey Lubricant Co.	129
Niagara Machine & Tool Works	—
Nicholson, W. H., & Co.	139
Niles Steel Products Div., Republic Steel Corp.	—
Nilson, A. H., Machine Co.	169
Nitralloy Corp., The	—
Norma-Hoffmann Bearings Corp.	—
North American Manufacturing Co.	—
Northwest Engineering Co.	—
Norton Co., The	—
O	
Ohio Electric Mfg. Co.	149
Ohio Ferro-Alloys Corp.	—
Ohio Galvanizing & Mfg. Co.	153
Ohio Locomotive Crane Co., The	153
Ohio Seamless Tube Co., The	—
Ohio Steel Foundry Co., The	—
Open Steel Flooring Institute, Inc.	—
Oxweld Acetylene Co.	—
P	
Page Steel & Wire Division of American Chain & Cable Co., Inc.	—
Pangborn Corp.	—
Parker, Charles, Co.	15
Parker-Kalon Corp.	15, 138
Pawtucket Screw Co.	15
Pease, C. F., Co., The	—
Penn Galvanizing Co.	—
Pennsylvania Industrial Engineers	147
Pennsylvania Salt Mfg. Co.	—
Penola, Inc.	—
Perkins, B. F., & Son, Inc.	—
Pheoll Mfg. Co.	15
Pittsburgh Crushed Steel Co.	—
Pittsburgh Gear & Machine Co.	—
Pittsburgh Lectromelt Furnace Corp.	137
Pittsburgh Rolls Division of Blaw-Knox Co.	—
Pittsburgh Saw & Tool Co.	147
Pittsburgh Spring & Steel Co.	—
Pittsburgh Steel Co.	—
Plymouth Locomotive Works, Div. The Fate-Root-Heath Co.	—
Poole Foundry & Machine Co.	141
Porter, H. K., Co., Inc.	—
Pressed Steel Car Co., Inc.	—
Pressed Steel Tank Co.	—
Prest-O-Lite Co., Inc., The	—
Production Plating Works, Inc.	—
R	
Raymond Mfg. Co., Division of Associated Spring Corp.	—
Reading Chain & Block Corp.	—
Ready-Power Co.	151
Reliance Electric & Engineering Co.	—
Republic Steel Corp.	85
Revere Copper and Brass, Inc.	61
Rhoades, R. W., Metaline Co., Inc.	135
Riverside Foundry & Galvanizing Co.	—
Roosevelt Hotel	138
Ruemelin Mfg. Co.	153
Russell, Burdsall & Ward Bolt & Nut Co.	15, 93
Rustless Iron & Steel Corp.	—
Ryerson, Joseph T., & Son, Inc.	159
S	
Salem Engineering Co.	—
Samuel, Frank, & Co., Inc.	141
San Francisco Galvanizing Works	—
Sanitary Tinning Co., The	—
Scovill Mfg. Co	15
Scully Steel Products Co.	—
Seneca Wire & Mfg. Co., The	—
Shafer Bearing Corporation	—
Shakeproof Lock Washer Co.	15
Shaw-Box Crane & Hoist Division, Manning, Maxwell & Moore, Inc.	—
Sheffield Gage Corp.	—
Shell Oil Co., Inc.	—
Shenango Furnace Co., The	—
Shenango-Penn Mold Co.	139
Shepard Niles Crane & Hoist Corp.	106
Shuster, F. B., Co., The	151
Simonds Gear & Mfg. Co.	149
Simonds Saw & Steel Co.	—
Sinton Hotel	—
SKF Industries, Inc.	12
Snyder, W. P., & Co.	—
Socony-Vacuum Oil Co., Inc.	—
South Bend Lathe Works	82
Southington Hardware Co.	15
Standard Galvanizing Co.	—
Standard Steel Works	—
Stanley Works, The	—
Steel & Tubes Division, Republic Steel Corp.	85
Steel Conversion & Supply Co.	147
Steel Founders' Society of America	—
Steelweld Machinery Division, Cleveland Crane & Engineering Co.	—
Stewart Furnace Division, Chicago Flexible Shaft Co.	—
Stoody Co.	114
Strong Steel Foundry Co.	—
Sturtevant, B. F., Co.	—
Sun Oil Co.	66, 67
Superior Mold & Iron Co.	140
Superior Steel Corp.	—
Surface Combustion Corp.	—
Sutton Engineering Co.	77
T	
Tennessee Coal, Iron & Railroad Co.	107
Thomas Machine Mfg. Co.	—
Thomas Steel Co., The	—
Thompson-Bremer & Co.	—
Tide Water Associated Oil Co.	74, 75
Timken Roller Bearing Co.	Back Cover
Timken Steel & Tube Division, The Timken Roller Bearing Co.	—
Tinnerman Products, Inc.	—
Toledo Stamping & Mfg. Co.	—
Torrington Co., The	—
Townsend Co.	—
Transue & Williams	37
Tri-Lok Co., The	—
Truscon Steel Co.	—
U	
Union Carbide & Carbon Corp.	9
Union Drawn Steel Div. Republic Steel Corp.	—
United Chromium, Inc.	—
United Engineering & Foundry Co.	—
United States Steel Corp., Subsidiaries	107
American Bridge Co.	
American Steel & Wire Co.	
Atlas Lumnite Cement Co.	
Carnegie-Illinois Steel Corp.	
Columbia Steel Co.	
Cyclone Fence Co.	
Federal Shipbuilding & Dry Dock Co.	
National Tube Co.	
Oil Well Supply Co.	
Scully Steel Products Co.	
Tennessee Coal, Iron & Railroad Co.	
United States Steel Export Co.	
Universal Atlas Cement Co.	
Virginia Bridge Co.	
United States Steel Export Co.	107
V	
Valley Mould & Iron Corp.	—
Vanadium-Alloys Steel Co.	—
Vascoloy-Ramet Corp.	—
Voss, Edward W.	—
W	
Waldron, John, Corp.	147
Wapakoneta Machine Co.	—
Warner & Swasey Co.	—
Washburn Wire Co.	10
Watson-Stillman Co., The	71
Wean Engineering Co., Inc.	—
Weinman Pump & Supply Co., The	151
Weirton Steel Co.	14
Weldit Acetylene Co.	—
Wellman Bronze & Aluminum Co.	169
Wellman Engineering Co.	—
Westinghouse Electric & Mfg. Co.	—
West Penn Machinery Co.	—
West Steel Casting Co.	163
Wheeling Steel Corporation	159
Whitcomb Locomotive Co., The	88
Whitehead Stamping Co.	—
Whitney Screw Corp.	15
Wickwire Brothers, Inc.	—
Wickwire Spencer Steel Co.	—
Wieman & Ward Co.	155
Wilcox, Crittenden & Co., Inc.	—
Williams, J. H., & Co., Inc.	—
Wilson, Lee, Engineering Co.	—
Wilson, Lee, Sales Corp.	—
Wisconsin Steel Co.	—
Witt Cornice Co., The	—
Wood, R. D., Co.	—
Worthington Pump & Machinery Corp.	—
Worth Steel Co.	—
Wyckoff Drawn Steel Co.	—
Y	
Yale & Towne Mfg. Co.	—
Youngstown Alloy Casting Corp.	—
Youngstown Sheet & Tube Co., The	65
Z	
Zeh & Hahnemann Co.	—