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STEEL

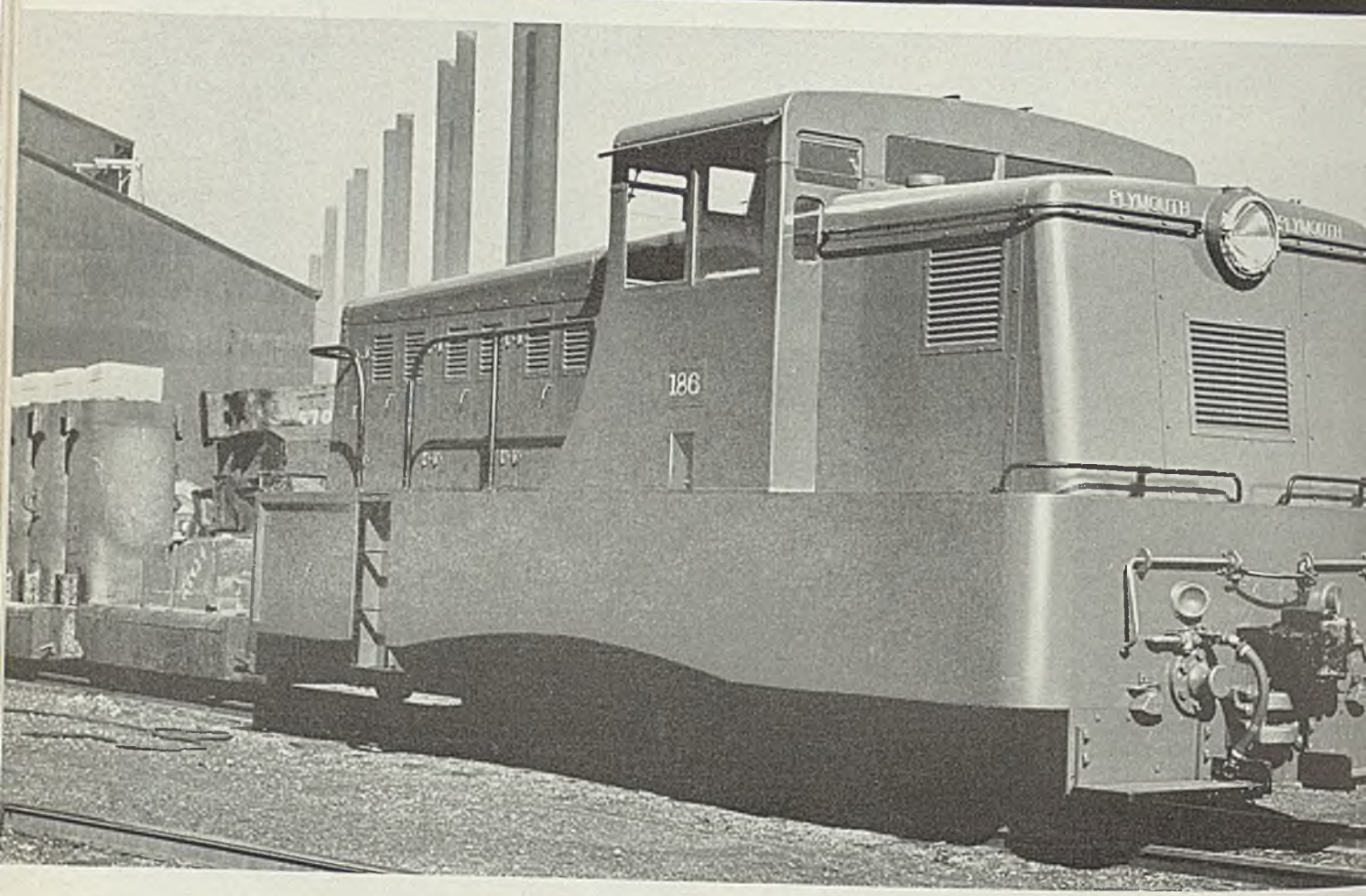
ESTABLISHED 1882

Contents

Volume 106—No. 9 **February 26, 1940**

40% Yearly Return

—that's exactly what we mean



Plymouth 65-Ton Flexomotive in a Prominent Ohio Steel Plant

THERE IS A FLEXOMOTIVE* WORKING NEAR YOU—ASK US ABOUT IT!

*TRADE MARK REG.

This Plymouth Flexomotive can and does save 40% over steam operation on typical mill and blast furnace jobs . . . it has the lowest fuel consumption per 100 horse power per hour of any heavy duty diesel locomotive in service. It is the most ruggedly constructed diesel locomotive in America.

PLYMOUTH LOCOMOTIVE WORKS
Division of The Fate-Root-Heath Company
Plymouth, Ohio.

PLYMOUTH FLEXOMOTIVE

As the Editor Views

The News

■ STEEL production (p. 19) moved down 2 points last week to 67 per cent of ingot capacity. Steel buying (p.77) is steadier and prospects for a leveling off in steelmaking during March are brighter. This is because the outlook for buying is more encouraging. The relatively high rate of automobile production has yet to take the form of heavy steel purchases by that industry; assemblies last week (p. 18) increased substantially, unusual for this time of year. Farm equipment sales are expected to be 20 to 25 per cent higher this year than last. Steel export business is active and is marked by waiving of all or most premiums over domestic prices which makers previously had obtained.

. . .

60-Day Stock Favored

Steel mills are encouraging customers to maintain inventories equivalent (p. 18) to 60 days' requirements in order to prevent recurrence of a buying wave like that of last September. . . . The aviation industry opposes plans (p. 25) that virtually would conscript its capacity for England and France. The industry is insistent on national policies which will enable it to hold its domestic and Latin American business. . . . More "Modern pioneers" were honored last week (p. 30) in recognition of inventions and research achievements which have contributed vastly to employment and living standards in this country; the speakers saw new American frontiers, to be exploited only through the free enterprise system.

. . .

New Industry In Northwest

Harnessing of the Columbia river (p. 13) apparently heralds important industrial development in the Northwest. An electric smelting plant for production of pig iron is slated to begin production May 1, with part of its output going into the manufacture of cast iron soil pipe. Establishment of a projected aluminum plant already had been announced. Local authorities do not expect a big iron and steel development in that region but they do expect substantial production of alloys. . . . Steel producers (p. 17) oppose extension of the reciprocal trade agreements program, holding it promotes dislocations in domestic iron and steel markets; the senate (p. 23) is to begin hearings on this matter today.

. . .

Weldability Investigated

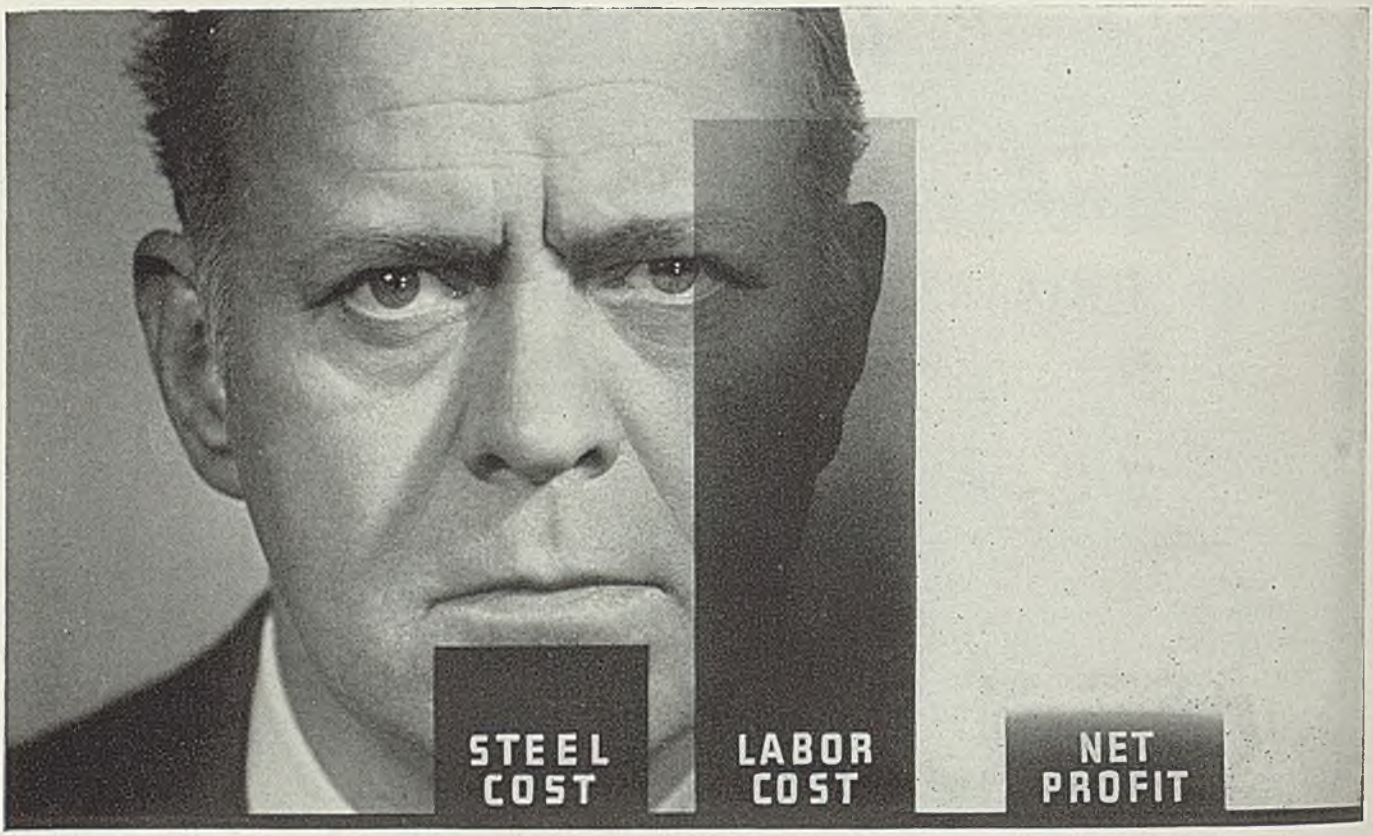
J. H. Hruska (p. 40) discloses results of what is believed to be the first real investigation of the weldability of high sulphur steels, hitherto considered principally in reference to machineability. . . . Recent studies of wear phenomena (p. 44) show that irons with flake graphite give longest life in cast iron cylinder bores, that wear in irons with much ferrite increases as the amount of ferrite is raised, that coarse graphite results in porous bores. . . . One of the handicaps to accurate and continuous feeding, as in blending iron ores, has been the lack of a feeder which could easily and instantly respond to changes asked for by control equipment; this deficiency (p. 48) has been remedied.

. . .

Benefit From Slag Control

A new panel system applicable to auto, truck and railroad car bodies and other uses (p. 52) is in tension through wedge action as the parts are tightened during assembly, resulting in a skin-stressed structure. It is especially advantageous in attaching armor plate as no holes through the armor are necessary. . . . Although much is yet to be learned about open-hearth slags, and though no exact rules cover all conditions (p. 56), the benefits to be derived from slag control justify its extended use. . . . Interesting press operation (p. 62) is that entailed in production of oil pans for Ford V-8 engines. . . . Available (p. 66) is a new air-hardening die steel.

E C Kreutzberg



Consider Labor Costs When Buying Steel

On most jobs, shop labor costs are the biggest single factor—and they depend to a large degree on the steel used. If bars are too hard for bending or forming—or have hard spots to break or dull tools—if some shapes are not straight—or if in the case of alloy steel the required properties are not developed by the first heat treatment—then up go costs, down go profits.

Purchasing steel that is uniform and has the properties most desirable for your particular use often pays big dividends in the form of decreased shop costs. You do not have to pay any more for this kind of steel—so why not get it?

For several years Ryerson has been building up stocks of these better, more uniform steels. Careful selection, checking, testing and inspecting assure the uniform high quality necessary for Ryerson Certification. Try Ryerson Certified Steels on your hardest job—and check the labor costs. Many have told us that it pays.

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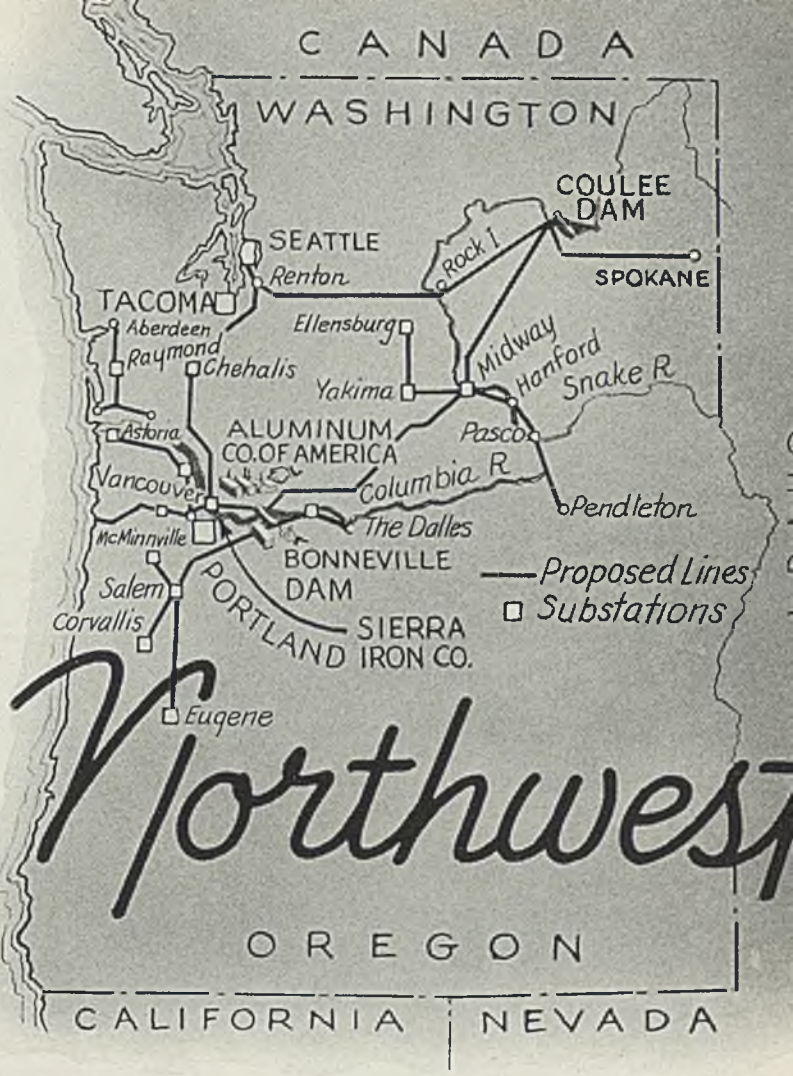
Principal products in stock for Immediate Shipment include—Bars, Structurals, Plates, Iron and Steel Sheets, Tubing, Shafting, Strip Steel, Alloy Steels, Tool Steels, Stainless, Babbitt, Welding Rod, etc.

Industrial Development in Pacific Northwest



By R. C. HILL
Seattle Representative, STEEL

SEATTLE

■ HARNESSING the mighty Columbia river to make available abundant and cheap power has brought to the Pacific Northwest possibilities for important industrial development.

What has been a dream since pioneer days has become a realization with the completion of the Bonneville dam, 40 miles from Portland, Oreg., and the soon to be completed larger Coulee dam, 100 miles west of Spokane. An important power grid, linking the two projects on the Columbia river with practically all of Washington and Oregon, is nearly completed. Fingers from the 220,000-volt transmission lines will radiate into hundreds of villages and farm homes.

Already two metal producing companies have signed contracts for Bonneville power and announced plans for constructing plants near Vancouver, Wash. The Sierra Iron Co. of Nevada plans to start construction immediately on a plant for the manufacture of pig iron by electric smelting of ore. First unit is scheduled to start production by May 1.

The Aluminum Co. of America recently announced plans for a plant in the Columbia valley, also near Vancouver. Bonneville project officials believe other metals companies soon will locate in the region.

Three objectives prompted the two projects: Irrigation, navigation and power.

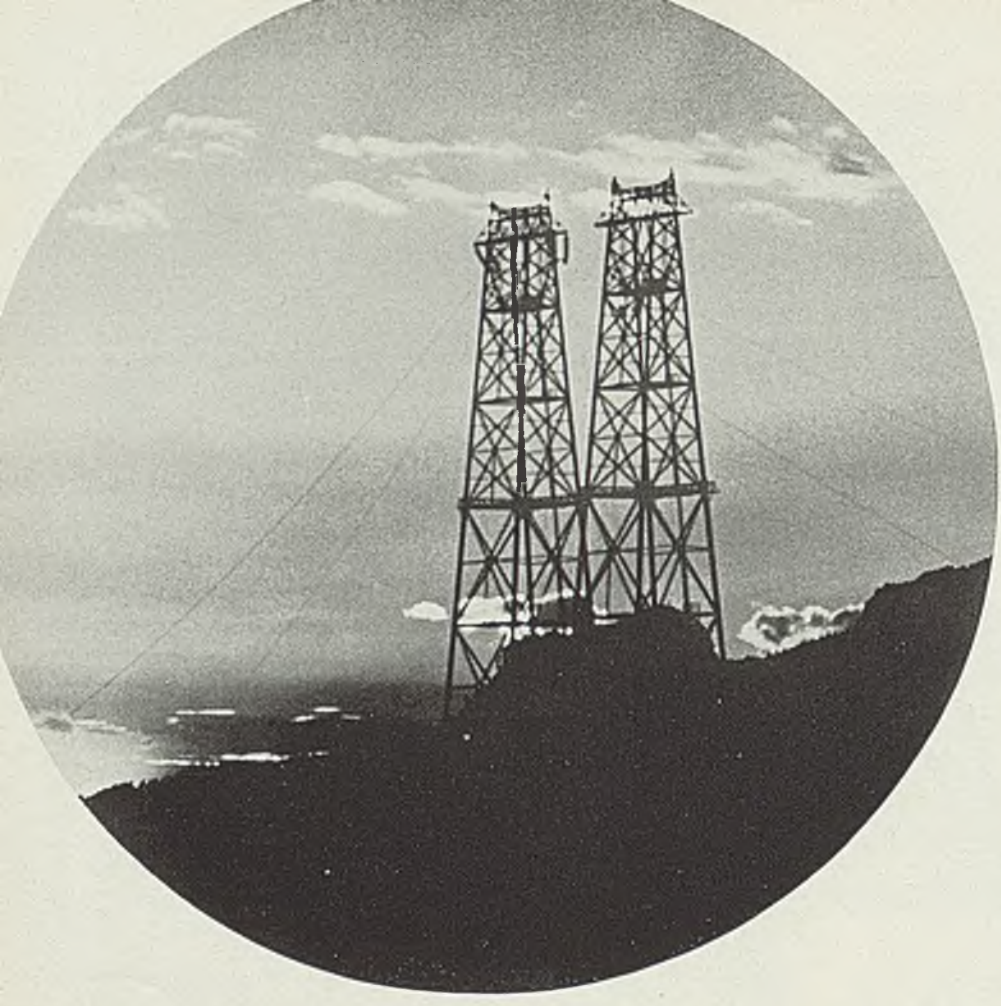
Industrial development is expected to center in the lower Columbia river area adjacent to Bonneville, built primarily for power and to aid navigation. This structure, with substations and transmission lines, represents an investment of between $75,000,000 and $80,000,000. It will develop 504,000 kilowatts. Power sales during fiscal year ending June 3, 1940, are estimated at $1,000,000, and at $2,225,000 during the succeeding 12 months. When the ten generating units are completed and loaded within the next several years, it is expected to earn $10,000,000 annually, twice the fixed charges.

Bonneville also is expected to stimulate river traffic. The government is deepening and improving the channel below the dam. Deep sea vessels already have been locked through but primarily the route will serve smaller craft, mostly tugs and barges, freighting oil and general merchandise from tidewater and bringing down wheat and other farm products.

The Coulee project, scheduled for completion late next year, is twofold in purpose. It will deliver 1,890,000 kilowatts of power and also furnish water for irrigating 1,200,000 acres of fertile but now arid land in the upper Columbia district. In this improvement the government will have invested an estimated $186,000,000. Power generation will be the first accomplishment. The irrigation project will not be completed for three years or more as an extensive system of canals first must be designed and constructed.

But it is from industrial development that Pacific Northwesterners expect greatest benefits. Availability of cheap power combined with the area's agricultural and mineral resources is the foundation of hopes for the region's future prosperity.

First large manufacturer to locate in the Bonneville area is the Aluminum Co. of America, which has acquired a 215-acre tract near Vancouver, Wash., on which a new metal producing plant will be erected as part of the company's $18,000,000 program to better producing divisions. A 20-year power contract for 32,500 kilowatts has been signed with the Bonneville project on a basis of two mills or $17.50 per kilowatt year. As far as known



■ Towers at Bradford Island, Columbia river, are part of the power grid carrying low-cost power to practically all of Washington and Oregon

the West has no substantial deposits of bauxite. Alumina will be shipped from East St. Louis, Ill., and Mobile, Ala.

The Sierra Iron Co.'s contract calls for delivery of successive blocks of Bonneville power up to 6000 kilowatts during the next year and contemplates additional deliveries up to a total of 30,000 kilowatts within two years.

Amount of money to be spent for plant construction has not been revealed. Program contemplates a capacity of 500 tons daily and ultimately will employ 400 men. Process to be used involves electric smelting of ore to be obtained from ore deposits in Oregon. Some magnetite ore will be shipped from California.

Part of the production will be used for the local manufacture of cast iron soil pipe.

A second large national firm is reported to have purchased a site in the lower Columbia region and is negotiating a power contract. Bonneville officials say current inquiries point to further industrial development on a large scale soon.

Suggestion by President Roosevelt that an iron and steel industry should be established in the Northwest has aroused much interest here. Practical steel men believe there is no occasion for enlarging production of basic iron and steel, but that development in alloys and the lighter metals might be entirely feasible.

Dr. Paul J. Raver, Bonneville administrator, says:

"The Columbia river area at present has no steel production capacity although seven steel mills are located at other points along the Pacific coast with a total capacity of 689,700 long tons of hot-rolled products annually. Market surveys indicate the Pacific coast domestic, territorial and Pacific foreign export requirements of finished and semifinished steel products are roughly 1,380,000 long tons annually, principally in bars, structurals, sheet and tin plate, steel pipe and tubing and other rolled, drawn, cast and forged products.

"Deficiency is made up by overland rail and intercoastal water from eastern centers. These deficiency products are largely in the sheet and tin plate, and the steel pipe and tubing classifications which market studies indicate amounted to over 480,000 long tons in 1934.

"The establishment of iron and steel capacity on the Columbia river is believed to be feasible for the production of iron and steel for local requirements of bar and structurals and other hot-rolled, drawn and cast products that can be distributed in the western market. Such a plant would be small, but could grow in proportion to its ability to supply the western market deficiencies. It could also serve to supply this area with steel and alloys for shipbuilding and ordnance manufacture in the interest of the nation's Pacific coast defenses.

"If a tin plate mill were contemplated to supply the deficiency in this product, consideration should be given to the installation of a continuous strip mill which would involve large capacity, probably with complete integration of ore, coal and limestone mining, coking ovens, iron smelting, steelworks and rolling mills. It is believed that all the raw materials for such an operation could be assembled in the area from sources within economical rail and water transportation distance and that all other elements for successful operation of the plant are favorable or could be satisfactorily arranged."

On the other hand, experienced steel men point out that practically all steel items that can be produced economically on this coast already are manufactured here. These include bars, light structurals, sheets, tin plate, wire, nails, tie plates and universal plates. Rails, plates and heavy shapes are not produced by western mills. The Pacific coast market, with only 10 per cent of the population west of the Rockies, does not have the consuming capacity to warrant the heavy investments necessary to turn out these heavier items. With an advantageous water freight rate averaging $6 a ton, it is deemed the part of wisdom to center production in the large plants in the East.

Estimated investment in Pacific coast steel mills is $50,000,000. Producing capacity (in gross tons):

Columbia Steel Co.	
Torrance, Calif	171,500
Pittsburg, Calif.	192,000
Bethlehem Steel Co.	
Los Angeles	85,000
San Francisco	155,000
Seattle	140,000
Judson Steel Corp., Oakland, Calif.	76,500
Northwest Steel Rolling Mills Inc., Seattle....	*15,000
Total	835,000

*Electric furnace ingots.

During the last decade, Pacific coast mills have not averaged in excess of 50 per cent of capacity operations.

That any development of the metal industry on the Pacific coast will be in the production of alloys and special alloy steels is generally agreed. Raw materials are available and with cheap power, the fu-

ture seems to trend in this direction.

Dr. Henry K. Benson, professor of chemical engineering, University of Washington, states:

"Our future in the metal industry will not be devoted to the manufacture of iron and steel but rather to reworking iron into special steel products by the electric furnace process. This can be done from the crude ores or by remelting and refining the proper grades of pig iron to produce stainless steel and alloys for which there is an increasing market in this region. The pulp and paper plants use stainless steel heaters, digesters and piping. The need for special steel alloys in the airplane industry is well known. Such a plant probably could be economically operated to supply the existing wants on the Pacific coast."

Public agencies have explored possibilities of utilizing natural resources and from Thomas B. Hill, supervisor, division of mines and mining, department of conservation and development, state of Washington, comes the following comment:

"The greatest opportunity presented to the Northwest by reason of the development of power is in the alloy industry. In Stevens county, in this state, are large deposits of magnesite which contain commercial quantities of magnesium.

"Recently a process has been developed by the United States bureau of mines, in co-operation with the state electro-metallurgical laboratory at the Washington State college, by which magnesium metal can be recovered from this magnesite. By the process, magnesium metal can be produced at an estimated cost of about 7 cents. Market price is 28 to 30 cents a pound.

"Within the last two years, these same agencies have developed a process for the recovery of metallic manganese from our unlimited reserves of manganese ore on the Olympic Peninsula. By this process manganese metal may be recovered at a cost of about 7 cents a pound, as against an average market price of 40 cents. Both of these processes are dependent upon large amounts of electrical energy. It would appear that the age of light metals into which we are entering will create a heavy demand for both magnesium and manganese metals.

"Then we have in the state substantial deposits of tungsten, molybdenum, chromite and possibly nickel. In addition, we have found what we believe are extensive deposits of alunite."

Principal objections to the establishing of a basic iron and steel industry in this area are the limited markets, the enormous investment, and the excess of present producing capacity. Other considerations are the cheap water haul from Atlantic centers and the availability of pig iron from Provo, Utah.

No large deposits of the proper grade of iron ore have been uncovered that can be economically mined.

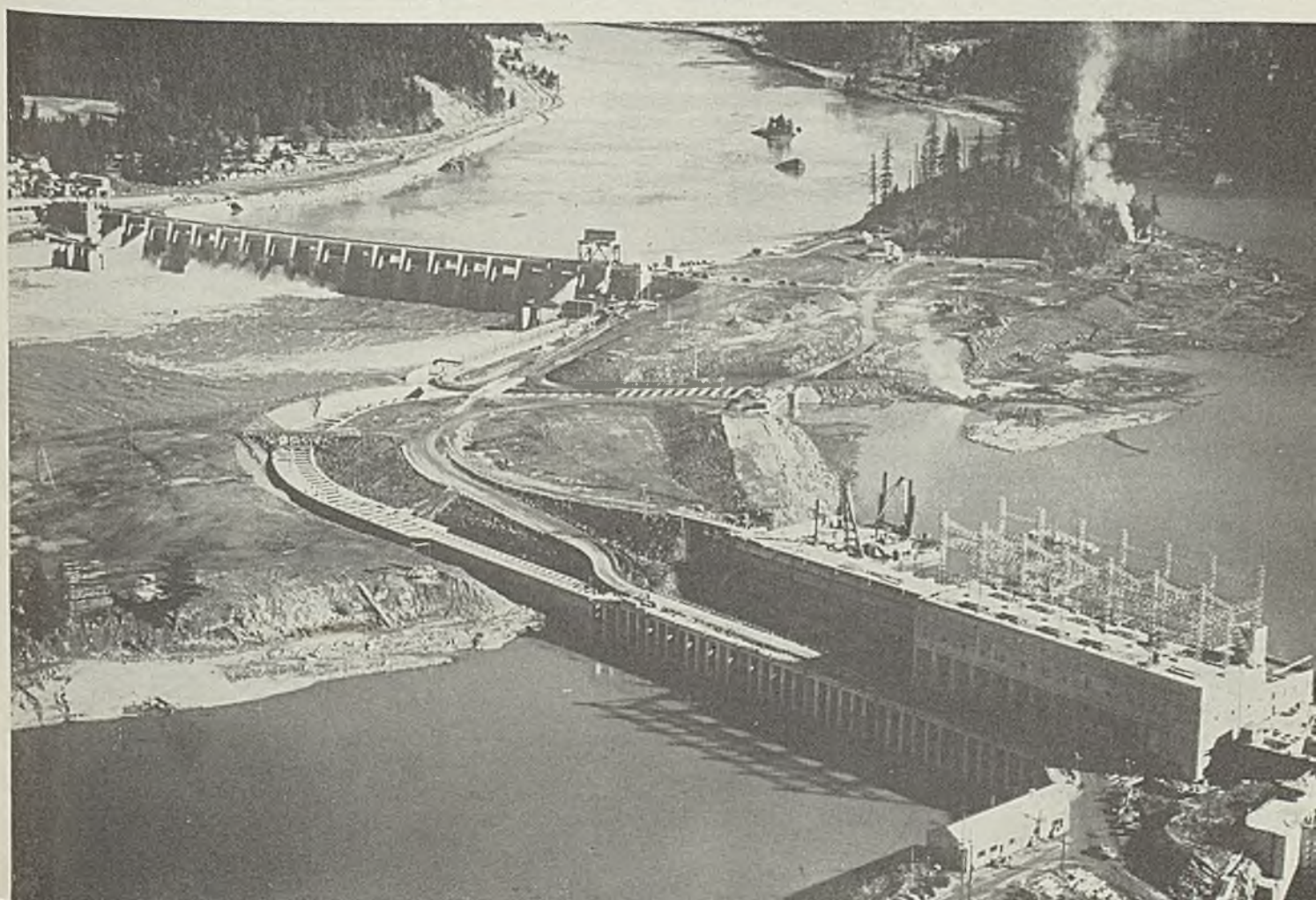
Limestone is available in sufficient quantities.

However, coast coals do not possess good coking qualities, containing 82 to 85 per cent of fixed carbon and excess quantities of sulphur and phosphorus. Dr. Benson says that by careful selection of coal and close attention to coking processes, coke that would meet fixed specifications could be produced in this area. He is also authority for the statement that suitable charcoal for producing high grade steel can be made from logging waste of which there are unlimited supplies. At present there is no market for charcoal but the raw materials are available.

Dr. Benson continued: "The principal development following the availability of cheap electric power here will be the production of calcium carbide, first for manufacturing acetylene, used in welding, and second as a material from which can be produced synthetic chemicals, including synthetic rubber, power alcohol and synthetic acetic acid. For this we need electric power, limestone and coke. Cheap power will determine the future of this industry. The second de-

(*Please turn to Page* 96)

Airplane view of Bonneville dam and powerhouse on the Columbia river



MEETINGS

STEEL ENGINEERS SPRING CONFERENCE IN CINCINNATI

■ ASSOCIATION of Iron and Steel Engineers will hold its annual spring conference at Hotel Netherland Plaza, Cincinnati, April 1-2. It is anticipated that more than a thousand steel mill executives and operating engineers will attend. First day's program will provide technical sessions morning and evening and a plant visitation in the afternoon; all of the second day will be devoted to plant visitations.

Papers scheduled for the opening session include: "Electrical Features of the Armco Slabbing Mill," by A. F. Kenyon, steel mill engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.; "Factors to be Considered in Modernizing Existing Rolling Mills," by C. H. Hunt, consulting engineer, Pittsburgh; "Strip Mill Finishing Equipment," by D. A. McArthur, chief engineer, Wean Engineering Co., Warren, O.; and "Ward-Leonard Control for Strip Mill Auxiliary Drives," by E. S. Murrah and H. W. Poole, steel mill section, industrial department, General Electric Co., Schenectady, N. Y.

The following papers will be presented at the evening session: "Improvements in Open Hearth Design and Operation," by L. F. Reinartz, manager, Middletown division, American Rolling Mill Co., Middletown, O.; and "Problems in the Operation of Wide Strip Mills," by G. D. Tranter, general superintendent, same company.

The inspection trip on the afternoon of April 1 will be to the Andrews Steel Co., Newport, Ky.; those on the second day will be to the properties of American Rolling Mill Co., at Hamilton and Middletown, O.

FIFTH PORCELAIN ENAMEL FORUM SET FOR OCTOBER

Porcelain Enamel institute, Chicago, announces Oct. 16-18 as the date for its fifth annual forum. This will be held at the University of Illinois, Urbana, Ill. The program will provide a varied and thorough coverage of current problems of interest to shop men in the porcelain enameling and related industries.

ANNUAL COAL EXPOSITION IN CINCINNATI IN MAY

Seventeenth annual coal convention and exposition of the American Mining Congress will be held in Music Hall, Cincinnati, April 29-May 3. The exposition, under sponsorship of the Manufacturers' division, will feature mine equipment and supplies. Practically all space in the four exhibit areas has been engaged.

Keynote of convention sessions will be the continued progress in mine modernization. Among topics for discussion are: Loading and conveying, maintenance of equipment, safety, and national economic problems.

DATE SELECTED FOR FORUM ON TOOL ELECTRIFICATION

Westinghouse Electric & Mfg. Co., has established May 6-8 as the date for its annual machine tool electrification forum. Sessions over the three-day period will be held at the company's works in East Pittsburgh, Pa.

FINANCIAL

SHARON STEEL CORP. NETS $255,497 PROFIT IN 1939

■ SHARON Steel Corp., Sharon, Pa., reports net 1939 profit of $225,497, equal to $4.28 a share on convertible $5 preferred stock, compared to net loss of $95,324 in 1938. Fourth quarter net earnings, based on nine months' and year's reports, were $455,525, against $267,655 in corresponding 1938 period.

January operations were maintained at capacity, said Henry A. Roemer, president, although booking of new business has fallen considerably compared to fourth quarter. Backlog of unfinished orders is diminishing, he said.

♦

United States Steel Corp., New York, has changed date of annual stockholders' meeting from first Monday in April to first Monday in May. Meeting this year will be held May 6. Annual election of executive officers, by corporation's directors, held day after stockholders' meeting, will be changed accordingly. Change in meeting date was made to provide more time for compilation of data required under new securities and exchange commission regulations.

♦

Application of General Steel Castings Corp., Eddystone, Pa., for listing $17,000,000 first mortgage 5½ per cent series A bonds, due July 1, 1949, has been approved by St. Louis stock exchange. Securities and exchange commission's approval is expected to make bonds eligible for trading March 16.

Consumers Show Increase in 1939 Net Earnings

■ SIXTY-THREE iron and steel consumers reporting year's earnings had an aggregate net income of $62,198,180 in 1939, compared to $13,482,385 for the same companies in 1938. Only four reported a net loss for the year, compared to 24 that incurred a deficit in 1938. STEEL's tabulation, Feb. 19, p. 29, included 26 companies; 37 are listed below:

	Fourth 1939	Fourth 1938	1939	1938
Altorfer Bros. Co., Peoria, Ill.	$.....	$.....	$101,476	$95,535*
Animal Trap Co. of America, Lititz, Pa.	.....	.....	73,336	58,016
Baldwin Locomotive Works, Philadelphia	.....	.....	542,026	1,032,641*
Bath Iron Works Corp., Bath Me.	.....	.....	660,703	129,744
Buckeye Steel Castings Co., Columbus, O.	.....	.....	708,471	235,834*
Chapman Valve Mfg. Co., Indian Orchard, Mass.†	182,876	42,819	414,341	571,390
Chicago Flexible Shaft Co., Chicago†	894,117	555,572	1,583,670	1,557,061
Clark Equipment Co., Buchanan, Mich	478,365	93,229	1,182,067	280,354
Cleveland Hobbing Machine Co., Cleveland	.....	.....	147,619	30,892
Continental Roll & Steel Foundry Co., East Chicago, Ind.	421,782	.....	301,269	213,393*
Electrolux Corp., New York	545,468	527,782	1,658,468	2,040,922
Electromaster Inc., Detroit	24,489*	61,243*	98,242*	185,783*
Ferry Cap & Set Screw Co., Cleveland	.....	.....	21,929	76,763*
General Steel Castings Corp., Eddystone, Pa.†	341,167	561,673*	5,661	1,808,693*
Hoskins Mfg. Co., Detroit†	167,804	126,892	483,259	300,005
Hunter Steel Co., Pittsburgh	31,051	.....	219,646*	169,059*
Hussman-Ligonier Co., St. Louis	.....	.....	260,199	200,414
Iron Fireman Mfg. Co., Portland, Oreg.	.....	.....	611,761	606,901
Landis Machine Co., Waynesboro, Pa.	.....	.....	56,154	59,218
Lunkenheimer Co., Cincinnati	.....	.....	384,512	179,070
Motor Products Corp., Detroit†	153,131*	368,879*	475,000*	619,718*
Motor Wheel Corp., Lansing, Mich.†	757,469	534,256	1,849,239	621,780
Muskegon Piston Ring Co., Muskegon, Mich.†	102,348	113,160	400,782	226,645
New York Air Brake Co., New York	374,239	100,939	747,858	170,628*
Parker Wolverine Co., Detroit	.....	.....	215,747	20,768*
Pittsburgh Screw & Bolt Corp., Pittsburgh†	417,573	20,568*	533,259	350,948*
Savage Arms Corp., New York†	119,929	27,873	349,307	60,434
Simonds Saw & Steel Co., Fitchburg, Mass.†	563,476	138,437	1,167,047	357,003
Trane Co., La Crosse, Wis.†	268,007	122,376	530,533	196,625
Twin Coach Co., Kent, O.†	223,479	135,713	660,818	159,972
Underwood Elliott Fisher Co., New York†	697,621	569,354	1,857,080	1,767,596
Union Twist Drill Co., St. Athol, Mass.	.....	.....	666,761	231,075
United Stove Co., Ypsilanti, Mich.	.....	.....	251,346	187,175
Viking Pump Co., Cedar Falls, Iowa	.....	.....	266,657	182,366
Vogt Mfg. Corp., Rochester, N. Y.	.....	.....	306,660	170,694
Wayne Pump Co., Ft. Wayne, Ind.	.....	.....	935,925	1,065,205
Yellow Truck & Coach Mfg. Co., Pontiac, Mich.†	1,488,337	150,633	3,276,474	514,983

* Loss; † fourth quarter statements based on the nine months' and year's statements.

Institute Filed Briefs Opposing Reciprocal Trade Agreements

■ WHILE much favorable sentiment has been heard particularly in steel export circles as to the reciprocal trade agreements as a whole, the steel producing interests of the country have expressed their opposition to the agreements through the medium of briefs by the American Iron and Steel institute.

Although not submitting testimony at the recent hearings before the house ways and means committee in Washington, the institute has filed briefs in this connection from time to time with the committee for reciprocity information, the latest being in connection with proposed revision in the treaty with Belgium, filed Sept. 25, 1939.

Other briefs related to Belgium, Oct. 19, 1934; Sweden, Oct. 26, 1934; Netherlands, Jan. 25, 1935; Canada, March 9, 1935; and United Kingdom, Feb. 17, 1938.

One of the points especially emphasized has been the substantial advantage of foreign steel producing companies in one of the chief items of cost as compared with producers in the United States, because of the much lower level of wages paid to labor in these foreign countries.

American Wages High

In the brief filed in connection with proposed changes in the Belgian treaty, it was brought out that the average hourly earnings of American iron and steel workers in 1938 amounted to 83 cents, which figure, according to the institute's latest information was approximately three and one-half times the average hourly rate in Belgium, and nearly three times as much as the general average for all foreign iron and steelmaking countries.

"Any tariff concessions on iron and steel products granted under the proposed revision of the Belgian agreement will, of course, serve only to give foreign producers a further advantage in competing with domestic producers in the United States market," the institute pointed out. "Moreover, any such advantage will, of course, accrue not only to Belgian producers, but also to iron and steel producers of all other foreign countries with which commercial treaties of the United States provide for most-favored-nation treatment."

The institute also pointed out that while it is true that iron and steel products commonly constitute only a small fraction of total domestic consumption and that the sale or use of such imports is largely confined to seaboard areas, the ultimate competitive effect, nevertheless, may be widespread, for the reason that distributors or users of such products who are not located on the seaboard are in direct competition with inland distributors or users.

The competitive advantage which a seaboard competitor may gain through the use of foreign iron and steel products, the institute claimed, is often so considerable as to render his inland competitor unable to meet that competition. That situation may again be repeated through other links in the competitive chain, thus, by a process of infiltration extending the effect of iron and steel imports far inland.

Furthermore, it was pointed out, the seaboard areas, which are directly exposed to active competition from imports, are among the principal steel markets in this country.

"We believe that after all," the institute said, "there is no real economic necessity or reason for imports of foreign iron and steel products into the United States, either from Belgium or from any other country, because the production capacity of the iron and steel industry in the United States is now, and has long been, ample to supply the demand.

"It seems to us that perhaps the sole ground which could be urged for such imports is one of price only, as made possible largely by low wage levels in foreign countries. But in any consideration of such price, the fact must not be forgotten that American wage levels and a fair return to the investors who have furnished the capital for the iron and steel industry are inseparably involved."

The institute stated the return on the industry's invested capital over the past two decades had shown a steadily downward trend. During the 10-year period, 1919-1928, there was a modest average return of 5.1 per cent. However, in the following decade, 1929-1938, such return fell off to 2.4 per cent. It was also revealed that during 1938 taxes exceeded available net earnings by nearly 18 per cent, causing a net loss to industry of $15,000,000.

Porcelain Enameled Steel Use in Building Rises

■ Production of 32 companies now manufacturing porcelain enameled steel for architectural purposes should exceed $2,000,000 this year.

Statistics compiled by census bureau, and just released, indicate aggregate sales of porcelain enameled parts for building purposes reported by 26 manufacturers last year totaled $1,509,367. This was an increase of approximately 30 per cent over 1938 and 33 per cent over 1937.

New Shipyard On West Coast

■ Tall massive steel structures will form main support for large traveling cranes over ship ways at Tacoma-Seattle shipbuilding yards. Tacoma, Wash., now nearing completion. Wide World photo

What's New at Pittsburgh . . .

By R. L. HARTFORD, Pittsburgh Editor, STEEL

■ ENCOURAGING factor in the present market impasse is the status of customer inventories. Always a subject watched with interest by steelmakers, particular care has been used lately by some mills here in an effort to judge accurately the position of their customers in regard to inventories and their possible effect on 1940 buying.

Extensive survey work shows that while customers generally regard normal inventory needs at 60 days, current stocks average only 52 days. This is a healthy sign in itself, but becomes considerably more important when contrasted with the position of the steel buyers during the market decline in the fall of 1937. Buying fell sharply that September, and after three months, the buyers reported nearly 160 days' stocks remained.

Customers who supplied these figures represent approximately one-half the capacity of the mills that did the surveying, showing that in the main steel buying must be expected in fair volume before spring production gets very far under way. Sellers here report they are making an effort to persuade buyers to maintain a 60 days' supply in order to prevent a return of the rush of last September.

Steel companies do not want to be forced again to revert to old high cost mills in order to hold customers and meet delivery dates, and for this reason they are urging customers to maintain reasonable stocks.

♦

January River Shipments Low

Although skies brightened last week over Pittsburgh and ice jams disappeared from local rivers, there was a reminder of bad January conditions in the tonnage statement by the United States engineer's office here. Total shipments on the three rivers dropped sharply during January, due in part, of course, to decline in business but mainly the result of ice which tied up all river shipping for many days.

Shipments on the Ohio dropped from 1,442,000 tons in December to 314,800 tons in January. This is the lowest tonnage on record since the canalization program of 1929, with the exception of two months in 1934 and 1936 when ice jams cut off river transportation. On the Monongahela tonnage dropped from 2,658,200 to 1,280,900, while the Allegheny dropped from 214,000 to 59,800 tons.

Iron and steel shipments dropped more than proportionately, with tonnage falling from 220,400 net tons in December to 31,700 in January on the Ohio. Monongahela steel shipments dropped from 137,500 to 47,500 while only 1400 tons of steel moved on the Allegheny against 10,100 tons in December.

Little if any improvement can be expected in February totals. This month ice jams have held up navigation on all three rivers consistently.

♦

Pittsburgh will become the arms center of America, has already become the most vital reserve in the national defense system, according to Louis A. Johnson, assistant secretary of war. Speaking before the Engineers' Society of Western Pennsylvania last week, Mr. Johnson said the government's "modest" defense program is well under way. Pittsburgh is supplying much material now being used. Steel, said the secretary, is still the basic element, but the district is also supplying bombs, gun tubes and tank armor plate. In any emergency, additional materials which will be requisitioned by the defense forces from Pittsburgh mills will include plate glass, optical and testing equipment, machine tools, gas defense equipment and troop barges.

Current Events In Chicago . . .

By J. F. POWELL, Chicago Editor, STEEL

■ FARM equipment sales are expected to be 20 to 25 per cent higher than last year. One manufacturer's schedule calls for sales of 3000 more large combines than in 1939, and within a few weeks will place the steel required.

Total cash farm income for the first half will be appreciably above that for the first six months last year. For one thing, the proportion of several important 1939 crops held over for sale this year has been somewhat larger than usual. For another, prices are above those prevailing a year ago.

For the whole year, farm income may be influenced by the extent of foreign demand for our agricultural products. Up to now, the effect of the war has been to diminish, rather than increase, farm exports. Continuation of hostilities through the summer likely would cause higher demand for foodstuffs.

♦

Reports $8,000,000 Backlog

American Steel Foundries backlog was approximately $8,000,000 at the end of 1939, compared with $1,900,000 a year previous. This assures an encouraging rate of operations throughout this quarter, it is stated, but further operations will depend largely on railroad business. Company is at work on new designs for railroad freight car trucks for high speed service, and on improvement of draft gears.

♦

More Warehouse Expansions

Increase in local steel warehousing facilities, mentioned previously in this column, is continuing. Last week two more steel warehouse interests announced expansions. Century Steel Co. has taken a ten-year lease on a building at 620 West Forty-first street, Chicago, which provides 40,000 square feet of space. The building is owned by Federated Metals division, American Smelting & Refining Co., which now is housed in a new modern plant at nearby Whiting, Ind. The Century company moves from a location of 25,000 square feet in the Globe industrial district, Chicago. Expansion of the facilities of Steel Warehousing Corp., also located in the Globe district, involves taking over the space vacated by Century. Steel Warehousing Corp.'s facilities will then total 70,000 square feet.

♦

Anticipate Construction Increase

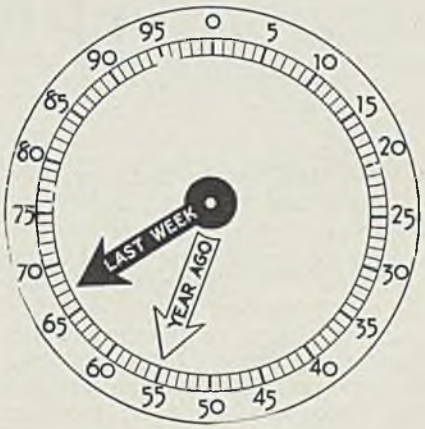
Structural and reinforcing steel interests are anticipating an increase in private construction this year involving considerable industrial expansion. Michigan Bell Telephone Co. announces it will spend nearly $18,000,000 on new construction in 1940. Company's largest program since 1930, it runs approximately $5,500,000 more than in 1939.

Auto Production Up

■ Automobile production for week ended Feb. 24 totaled 102,570, compared with 95,050 in the week ended Feb. 17, and 74,960 in the week ended Feb. 25, 1939. Comparisons:

	Week ended Feb. 24	Feb. 17
General Motors	43,955	37,355
Chrysler	25,865	25,790
Ford	20,350	20,600
All others	12,500	11,305

PRODUCTION . . .



Steelworks Operations Drop Two Points to 67 Per Cent of Capacity

■ STEELWORKS operations last week dropped 2 points to 67 per cent. Declines were registered in six districts, small gains in two and four were unchanged. A year ago the rate was 55 per cent; two years ago 30.5 per cent.

Youngstown, O.—Down 3 points to 40 per cent, with two bessemers and 38 open hearths producing. Youngstown Sheet & Tube Co. will close its bessemer department this week and Republic Steel Corp. will resume bessemer production. No change in open hearth activity is indicated. The rate this week is expected to be unchanged.

New England—Unchanged at 63 per cent for the third week.

St. Louis—Withdrawal of two open hearths by one interest lowered the rate 4½ points to 63½ per cent.

Cincinnati—Touched a new low for the year at 59 per cent, down 2 points.

Cleveland—Increased 1½ points to 68 per cent. An upturn by one producer more than offset a slight reduction by another.

Chicago—Dropped 5 points to 63½ per cent, the fifth consecutive weekly decline. One large interest continued unchanged, one increased and four others decreased.

Detroit—Continues at 92 per cent with 24 of 26 open hearths in production.

Birmingham, Ala.—Unchanged at 90 per cent for fourth consecutive week, with 21 open hearths active.

Central eastern seaboard—Holds at 68 per cent.

Buffalo—Dropping of an open hearth for repairs cut the rate 3 points to 67 per cent.

Pittsburgh—Declined 3 points to 63 per cent with little change indicated for this week.

Wheeling—Up 8 points to 94 per cent as one plant resumed.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended Feb. 24	Change	Same week 1939	1938
Pittsburgh ...	63	— 3	48	28
Chicago	63.5	— 5	53.5	24.5
Eastern Pa...	68	None	37	30
Youngstown .	40	— 3	47	29
Wheeling	94	+ 8	68	38
Cleveland	68	+ 1.5	54	31
Buffalo	67	— 3	32.5	21
Birmingham .	90	None	83	61
New England	63	None	70	27
Cincinnati ...	59	— 2	55	35
St. Louis	63.5	— 4.5	55	28
Detroit	92	None	86	43
Average ...	67	— 2	55	30.5

Future Shells For Great Britain

■ Old metal for munitions is the object of "Scrap Week" recently sponsored in London by ministry of supply. Here is a local collector receiving metal articles from a householder in the Acton section. Other "scrap weeks" soon will be held throughout Great Britain. Acme photo

Foundry Equipment Orders Show Increase

■ Foundry equipment orders in January, reported by Foundry Equipment Manufacturers' association, Cleveland, were greater than in December but shipments were less, leaving a larger total of unfilled orders. All indexes were much higher than in January, 1939. Comparisons follow, indexes based on 1922-24:

	Jan. 1940	Dec. 1939	Jan. 1939
Net orders	197.9	164.8	122.3
Shipments	193.2	200.1	96.3
Unfilled orders	231.2	222.4	151.4
3 mos. av. gross orders	188.9	196.5	118.0

MEN of INDUSTRY

■ P. A. ABE, works manager, Monarch Machine Tool Co., Sidney, O., has been elected vice president in charge of engineering and production, and J. A. Raterman, purchasing agent, has been elected vice president in charge of purchasing and plant engineering. Mr. Abe joined Monarch in 1915, advancing through the ranks as toolmaker, toolroom foreman, general foreman, superintendent and works manager. Mr. Raterman has been associated with the company since 1917, serving as a salesman, superintendent in charge of assembly, head of production control department and purchasing agent. Both men are directors.

♦

C. F. Christopher, heretofore chief metallurgist, American Locomotive Co., Latrobe, Pa., has joined Steel Co. of Canada Ltd., Hamilton, Ont., in a similar capacity.

♦

Willard C. Cornelius Jr. has been elected treasurer, Parker Rust Proof Co., Detroit. He succeeds his father who continues as president.

♦

H. L. Hubbell, since 1937 assistant manager, real estate and insurance department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been promoted to manager of that department.

♦

M. W. Lightcap, the past 15 years associated with Pittsburgh Plate Glass Co., Pittsburgh, has been appointed manager of maintenance sales, Devoe & Raynolds Co., New York.

♦

Herman W. Falk, founder of the Falk Corp., Milwaukee, has been advanced from president to chairman of the board. He is succeeded as president by Harold S. Falk.

♦

Chester C. Isekeit, formerly assistant treasurer, Lunkenheimer Co., Cincinnati, has been elected treasurer and a director.

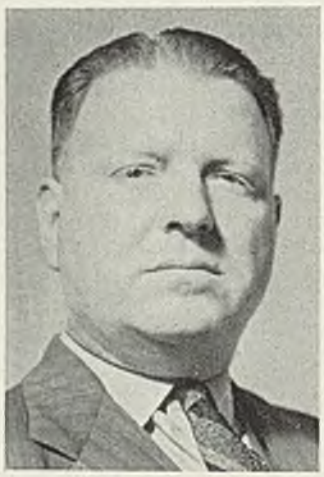
♦

Carl T. Bergstrom, director of purchases, Dahlstrom Metallic Door Co., Jamestown, N. Y., has been elected vice president and a director.

♦

William Feiten, president, William E. Feiten Inc., Cleveland, has been elected president, Ohio Sheet Metal and Roofing Contractors association. D. A. Mannen, Mannen & Roth, Cleveland, has been elected treasurer, and A. E. Bogen, Columbus, O., and C. M. Gundlach, Gundlach Sheet Metal Works, Sandusky, O., have been re-elected vice president and secretary, respectively.

P. A. Abe



J. A. Raterman

Ernest T. Weir

Chairman of the board, National Steel Corp., Pittsburgh, and president, American Iron and Steel Institute, New York, last week was appointed chairman, finance committee of the Republican national committee

♦

S. W. Rolph, vice president and general manager, Willard Storage Battery Co., Cleveland, has been named a director, Electric Storage Battery Co., Philadelphia, affiliate of Willard.

♦

Ralph E. Roscoe has been elected vice president in charge of operations, Bessemer Limestone & Cement Co., Youngstown, O. Harry G. Hinson has been elected assistant secretary and assistant treasurer, and Harry E. Reed has been named general superintendent.

♦

John S. Isdale, 144 Curtis street, Meriden, Conn., has been named representative in Connecticut for Ajax Electric Co. Inc., Philadelphia.

♦

William Jackson, the past six years, porcelain enamel consultant, Republic Steel Corp., Youngstown, O., has been named sales representative in the Detroit territory for Porcelain Enamel & Mfg. Co., Baltimore.

♦

Keith T. Davis, since 1937 assistant chief engineer, L. J. Mueller Furnace Co., Milwaukee, active in development of heating and air conditioning equipment, has been named chief engineer.

♦

Millard Fisher, formerly secretary, Republic Rubber Co., Youngstown, O., has become associated with Quaker City Rubber Co., Philadelphia, in sales of mechanical rubber goods in the Pittsburgh and West Virginia district.

♦

Friedrick Birschel Jr., Gaspar Campos, 1550, Vincente Lopez, F. C. C. A., Argentina, has been named representative in South America for American Foundry Equipment Co., Mishawaka, Ind.

♦

Lee Raley, Dallas, Tex., will represent the McGill Mfg. Co., Valparaiso, Ind., in Colorado, Utah, New Mexico and Wyoming, effective April 1, in addition to the company's regular southwest area that he has covered for some time.

♦

George E. Law, formerly in the application engineering department of Reliance Electric & Engineering Co., Cleveland, has been transferred to Chicago as a sales engineer. J. W. Eakins, who has specialized in motor applications in the marine field for the company, has been

transferred to Philadelphia. He will continue to devote a major share of his time to marine work.

♦

Howard Terbeek, former assistant advertising manager, Pump Engineering Service Corp., Cleveland, has been appointed advertising manager. M. J. Phillips has joined the company as engineer in charge of hydraulics. He formerly was with Glenn L. Martin Co., Baltimore.

♦

L. A. McQueen has been named vice president in charge of sales, General Tire & Rubber Co., Akron, O. S. S. Poor has been made vice president in charge of retail merchandising, and T. Spencer Shore, heretofore treasurer, has become vice president and treasurer.

♦

William A. Barr, associated with Foote Bros. Gear & Machine Corp., Chicago, since 1929, recently as executive vice president and general manager, has been elected president. He formerly had been vice president in charge of manufacturing for eight years.

♦

George T. Ladd, president and general manager, United Engineering & Foundry Co., and John T. Tierney, president and chairman of the executive committee of the board of trustees, Koppers United Co., have been elected directors, Westinghouse Air Brake Co., Wilmerding, Pa.

♦

Carl F. Obermaier, the past 29 years manager of General Electric Co.'s York wire works, York, Pa., has retired in accordance with the company's retirement policy. F. R. Kaimer, Mr. Obermaier's assistant the past ten years, has been named general superintendent, and has assumed his predecessor's place on the management committee. Mr. Obermaier, in association with L. A. Graneline, is forming the Penn Textile Corp., to manufacture narrow fabrics.

♦

Alfred C. Sanger, for several months sales manager, household refrigerator section, General Electric Co., Schenectady, N. Y., has been named manager of the company's heating device and fan section, succeeding C. J. Hendon, resigned. L. H. Miller, manager of merchandising services since consolidation of G. E. appliance activities at Bridgeport, Conn., succeeds Mr. Sanger as refrigerator sales manager.

♦

Charles S. Belsterling, heretofore vice president in charge of traffic, United States Steel Corp., New York, has been appointed general commerce counsel. Associated with the Steel corporation and its subsidiaries many years, he was originally in the general sales department of the A. & P. Roberts Co.,

Mark A. Gardner

Who has been named sales manager, Wasmer Bolt & Nut Co., Cleveland, as reported in STEEL, Feb. 19, page 30. He formerly was with W. Bingham Co., Cleveland, 17 years, the past 11 in capacity of steel buyer

upon formation of American Bridge Co., he became executive head of the traffic department. Later he was made a member of the legal staff of the Steel corporation in capacity of general commerce attorney in charge of traffic and transportation.

♦

Albert P. Craig Jr. has been appointed director of Westinghouse Electric & Mfg. Co.'s exhibit at the New York world's fair. He was assistant director of the company's world's fair activities in 1939. Mr. Craig succeeds E. H. Sniffin, retired.

♦

H. A. Brassert has been elected president and chairman of the board, H. A. Brassert & Co., with offices at 60 East Forty-second street, New York. Other officers: Assistant to the president, C. A. Brassert; executive vice president, E. L. Ives; vice presidents, A. J. Boynton and J. J. Seaver; secretary-treasurer, A. B. Markus. These latter men will be located in the main office at 310 South Michigan avenue, Chicago. S. P. Kinney has been appointed Pittsburgh district manager, with offices in the Koppers building.

Died:

■ FREDERICK R. STILL, Feb. 14 at his home in Jackson Heights, L. I. In 1887 he became a draftsman with the Huyett Smith Mfg. Co., soon thereafter being named chief engineer. In 1895 when the company became the American Blower Co., he was made vice president, recently heading the export division in New York. He was a member, Detroit Engineering society, American Society of Mechanical Engineers and American Society of Naval Architects and Marine Engineers.

♦

Vital Ouellette, 73, for 25 years president of Grant Bros. Foundry Co., Detroit, in that city, Feb. 15.

♦

Robert E. Creighton, 57, vice president, Vonnegut Moulder Corp., Indianapolis, recently.

♦

Harold A. Osgood, 54, vice president, Fulton Iron Works Co., St. Louis, in that city recently.

♦

August Duna, 70, a specialist in ornamental iron work until his retirement in 1930, Feb. 17 in Jersey City, N. J.

♦

T. Monte Carpenter, 58, vice president and general manager, Jackson Crankshaft division of Muskegon Motor Specialties Co., Feb. 20 in Jackson, Mich.

♦

Ray B. Needham, 65, Cleveland representative for Alliance Steel Tank Co., Alliance, O., Feb. 18 at his home in Lakewood, O. Mr. Needham was manager of the structural steel department of Van Dorn Iron Works Co. 17 years.

♦

Otto Lundell, 60, president, Michigan Tool Co., Colonial Broach Co., and Detroit Tap & Tool Co., Detroit, in Fort Lauderdale, Fla., Feb. 22. Born and educated in Sweden, he came to this country in 1906, became associated with Barber-Colman Co., Rockford, Ill., where for six years he was a department superintendent. In 1915 he went to Detroit where he was instrumental in organizing the Michigan, Colonial and Detroit companies. He was active in management of these three companies until illness forced his retirement about a year ago.

♦

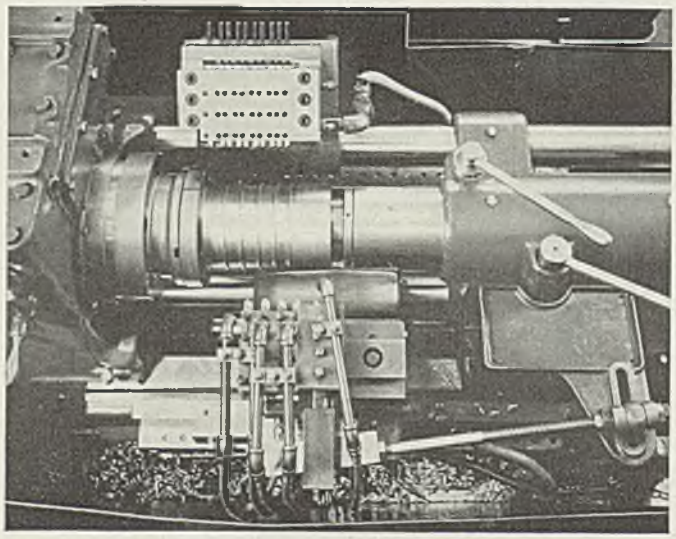
William Durham Sargent, chairman, Trucktor Corp., Orange, N. J., in Miami Beach, Fla., Feb. 15. He had served as director and member of the executive and finance committees of American Steel Foundries, American Brake Shoe & Foundry Co., and Wheeler Electric Mfg. Co. He was a member, American Society of Mechanical Engineers and Society of Automotive Engineers.

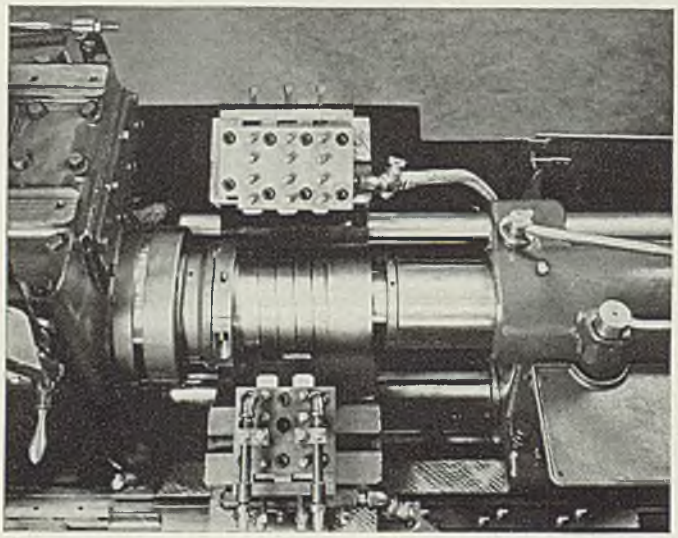
♦

Peter H. Nebe, 78, a pioneer in tin plate production, in Gary, Ind., Feb. 14. Born in Germany, Mr. Nebe came to this country in 1892. He became employed as tinhouse foreman in the old Demmlar works at McKeesport, Pa., where he remained until 1910. Leaving McKeesport, Mr. Nebe went to Illinois where until 1920, the year of his retirement, he worked as tinhouse superintendent for Granite City Steel Co.

THOUSANDS

Of Human Lives Depend Upon The Reliability of Aircraft Engines



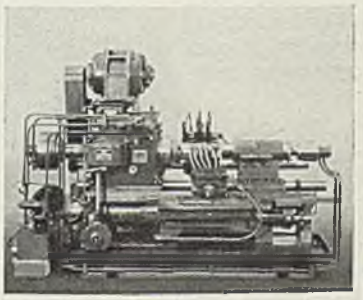


That is why the manufacturers of the component parts of these engines insist upon the highest possible quality of finish in their products.

Accuracy and quality of finish combine with economy of production on Jones & Lamson Fay AUTOMATIC LATHES. Their design and construction allow the heaviest turning, facing and forming cuts to be taken at the highest speeds and feeds the material and tools will stand, without vibration or chatter, to produce a quality of finish that will meet the most exacting demands *in quantities that assure the greatest economy.*

Five models of Fay Automatic Lathes in various lengths are manufactured by the Jones & Lamson Machine Company to machine a great variety of work. Catalogs of all models will be mailed upon request and our Engineers are available to study your problems.

Left: Upper illustration shows the carriage tools for rough turning the diameters between the ribs on this liquid cooled Airplane Engine Cylinder and the back arm tools for rough facing and forming the ribs and their radii. All these surfaces are finish formed on another Fay Automatic Lathe as shown in the illustration at lower left.



Above: General View of 20" Fay Automatic Lathe

JONES & LAMSON MACHINE COMPANY

SPRINGFIELD, VERMONT, U. S. A.

MANUFACTURERS OF: SADDLE & RAM TYPE UNIVERSAL TURRET LATHES . . . FAY AUTOMATIC LATHES . . . AUTOMATIC DOUBLE-END MILLING & CENTERING MACHINES . . . AUTOMATIC THREAD GRINDING MACHINES . . . COMPARATORS . . . TANGENT AND RADIAL, STATIONARY AND REVOLVING DIES AND CHASERS

Windows of WASHINGTON

By L. M. LAMM
Washington Editor, STEEL

WASHINGTON

■ NATIONAL labor relations board took the initiative in seeking to bar companies facing labor board charges from receiving government contracts, Frank Healy, special assistant to the director of procurement, treasury department, testified last week before the special house investigating committee.

J. Warren Madden, board chairman, previously had testified he was invited to write the procurement division asking such action.

"We did tell them to put their case in writing," said Mr. Healy.

He testified a letter from Chairman Madden suggested that firms involved in alleged unfair labor practices be deprived of federal contracts.

The procurement division did nothing about it, however, Mr. Healy said. Herman Oliphant, then general counsel of the treasury, held the division was without authority to withhold such contracts where the bidders otherwise complied with the law.

Denies Loans Were Withheld

At about the time Mr. Madden wrote the division, Mr. Healy said, a labor delegation called on Admiral Christian J. Peeples, then director of procurement, and asked him to hold up a contract about to be awarded to Remington-Rand because there was a strike at the plant and "the company was fighting the labor board."

Mr. Healy said he was asked to call at the labor board, and talked to Miss Estelle Frankfurter, assistant secretary, about the Remington-Rand and similar cases.

"I said," Mr. Healy recalled, "that it was a fundamental belief at procurement that there could be no specifications or contracts that might restrain competition or increase the cost without express approval of congress."

Emil Schram, chairman, reconstruction finance corporation, denied there was any policy of withholding loans from employers charged with Wagner act violations, but explained the practice was to investigate such cases, and the lending agency reserved the right to use its own judgment.

The witnesses were called as Edmund M. Toland, committee counsel, started an extensive probe of records of the treasury, navy, interior and labor departments—and of two agencies, the RFC and the securities and exchange commission—to determine the extent of an alleged federal "blacklist" of firms facing labor board charges.

Smith Investigation Continues

Mr. Schram said the RFC merely had an arrangement by which it exchanged information with the NLRB.

Under this plan, the RFC gave the labor board a list of approved loans and the board sent the lending agency the names of companies charged with unfair labor practices.

In three instances, Mr. Schram recalled, there were delays in paying out loans at the request of the labor board, but they were only of short duration.

In a fourth case, Mr. Schram said, the RFC refused to follow the recommendations of the board and granted the loan.

In one case, Mr. Schram testified, the RFC found a company named had settled its labor troubles some time before, though the Washington office of the labor board had not been notified.

Mr. Schram said there had been so few cases in which labor troubles had caused delays or investigations by the RFC that the matter was regarded as negligible.

Investigation of the labor board is a kind of 3-ring circus. Independent hearings have been held by the labor committee of the senate, a second by the labor committee of the house, and the third by the special Smith investigating committee of the house.

The regular house and senate labor committees apparently set out to whitewash NLRB but that was far from the attitude of the Smith committee which has made a thorough investigation and from which it is expected some suggestions for amendments beneficial to industry will result.

Regular house and senate labor committees have completed their hearings, but the Smith committee is still going strong. The regular committees are preparing a report during the course of which they will have to weed out a whole flock of bills which have been submitted during the course of the extended hearings. Senate committee took more than 3000 pages of testimony, with the house committee taking about the same. Indications are that some Wagner act amendments will be enacted at this session.

WAGNER TO OFFER BILL FOR NATIONAL MEDIATION BOARD

Senator Wagner, New York, author of the national labor relations act, has announced he will offer a bill creating a national mediation board of three members to handle disputes outside jurisdiction of the national labor relations board. The new agency would take over and expand the work of conciliation service of the labor department.

Senator Wagner said most workers who went out on strike in 1939 were concerned with issues beyond the purview of the national labor relations board, including such matters as wages, hours and working conditions.

The New York senator said that his bill does not amend or modify the national labor relations act, "nor do the functions of the two measures merge or conflict in any way."

"Building upon the work and the

staff of the conciliation service," he said, "the bill places the federal mediation function on a firmer statutory basis, defines its authority, and authorizes more adequate appropriations for its prompt and efficient operations, both in Washington and in the field.

"The establishment of the new three-man board to head up the mediation service will give added prestige to its operations and probably make unnecessary the creation of makeshift mediation boards to handle particular major strike situations as they arise, as in the automobile, textile and steel industries in recent years."

The bill would carry no penalties or coercive measures of any kind, Wagner said, adding that for this reason the board would not be clothed with subpoena powers.

SENATE COMMITTEE OPENS TRADE AGREEMENT HEARINGS

Senator Pat Harrison, chairman, senate finance committee, has announced the committee will open public hearings on the extension of the reciprocal trade agreements act, Feb. 26.

Secretary of State Cordell Hull will be the first witness, followed by Secretary of Agriculture Henry A. Wallace.

Senator Harrison said hearings would be as brief as possible, adding that the house ways and means committee had held exhaustive public hearings and copies of the testimony are available. He said he hopes to eliminate as much duplication of previous testimony as possible. He said a calendar of witnesses will be prepared for the hearings, and persons desiring to be heard should communicate with the committee clerk.

ENACTMENT OF NEW TAX LEGISLATION IMPROBABLE

With both house and senate slashing administration's appropriation bills, there is talk here it will not be necessary to enact additional taxes at present session of congress. However, appropriation bills have not yet been enacted into law and possibility exists this situation will be changed.

Senate and house appropriation committee have sliced nearly $300,000,000 from administration's budget. House recently passed navy appropriation bill providing for about $966,000,000, nearly $112,000,000 less than President's budget estimates. Funds for two new 45,000-ton battleships were cut, but it is expected an attempt will be made to have them restored in the senate.

Long delay in senate's passage of proposed 3-year extension to trade agreement act is not anticipated. If congress is not called upon to enact new tax legislation it may adjourn by June 1 this year. Effort, of course, is going to be made for adjournment before Republican national convention, June 24.

SUGGEST FEDERAL BUSINESS REGULATIONS BE REVISED

Brookings Institution has published report on study of legal and administrative aspects of federal regulation of business and industry. Study, by Dr. Frederick F. Blachly and Dr. Miriam E. Oatman, proposes improvement be sought through revision of existing forms of action and procedure, rather than radical alterations of regulatory system.

Authors take issue with proposals to place nearly all administrative activities under President's control or for a much stricter judicial control of such activities, as offered in pending Logan-Walter bill. They view existing system as organized and controlled in such a way it operates efficiently without invading individual rights.

Study describes rapid development of federal intervention in the economic realm during last fifty years, until at present there are six or seven hundred provisions of federal statutory law, supplemented by thousands of administrative regulations, which govern such intervention.

4983 NEW FREIGHT CARS PUT IN SERVICE DURING JANUARY

Class I railroads in January put 4983 new freight cars into service, largest number installed in any January since 1930 with 8709, Association of American Railroads reports. In January, 1939, 1020 new freight cars were placed in service and in January, 1938, 2148.

Nineteen locomotives were put into service in January, four were steam and 15 electric and diesel. In January, 1939, 17 new locomotives were installed, five steam and 12 electric and diesel. In January, 1939, new locomotives put in service totaled 44, 27 steam and 17 electric and diesel.

New freight cars on order Feb. 1, totaled 34,559, compared with 6637 Feb. 1, 1939, and 6563 Feb. 1, 1938. New freight cars on order included coal, 16,542; box, 16,803; refrigerator, 500; flat, 365; stock, 59 and miscellaneous, 290.

Class I railroads, Feb. 1, had 139 new locomotives ordered, 77 steam and 62 electric and diesel. On same date last year there were 84 on order, 25 steam, 59 electric and diesel; Feb. 1, 1938, 131 on order. These included 110 steam and 21 electric and diesel locomotives.

FRENCH STEELMAKING LAGS BEHIND CURRENT ORDERS

Although the French iron and steel industry is operating at capacity, it is reported unable to keep up with current orders, according to Vice Consul Laurence W. Taylor, Bordeaux, France. Shortage of labor due to mobilization, together with reduced transportation facilities have created problems not yet solved. Distribution, exportation and importation of iron ore are controlled by two committees, one for hematite iron and one for phosphoric iron.

Purchase or sale of scrap iron in France is directed by a government commission whose regulations are strictly enforced. General movement has been started by chambers of commerce and welfare organizations to collect scrap iron for the government. Depots have been established throughout France where old iron is deposited.

TREASURY DEPARTMENT WILL TAKE MANGANESE ORE BIDS

Procurement division, treasury department, will receive bids March 6 for 5000 gross tons of manganese ore, ferro grade A, B or C, under strategic materials act. Ore is to be purchased against contractors' account and is for delivery f.o.b. cars, United States Army Ordnance Depot, Curtis Bay, South Baltimore, Md.

GOVERNMENT IRON, STEEL AWARDS TOTAL $628,681

During week ended Feb. 10 government purchased $628,681.91 worth of iron and steel products under Walsh-Healey act as follows: Air Associates Inc., Garden City, N. Y., $88,806.59; Gillette Safety Razor Co., Boston, $14,280; Camden Forge Co., Camden, N. J., $137,500.

Carpenter Steel Co., Reading, Pa., $23,925.83; Allegheny Ludlum Steel Corp., Brackenridge, Pa., $43,970.49; Jones & Laughlin Steel Corp., West Leechburg, Pa., $43,035.62; York Safe & Lock Co., York, Pa., $59,846.27; Lukens Steel Co., Coatesville, Pa., $22,086.41; Republic Steel Corp., Cleveland, $37,459.97.

Columbia Steel & Shafting Co., Pittsburgh, $24,650 (estimated); Smith & Wesson Inc., Springfield, Mass., $15,502.50; Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., $16,492; Greene-Wolfe Co. Inc., Brooklyn, N. Y., $21,408.51; Hedges-Walsh-Weidner division of Combustion Engineering Co. Inc., Chattanooga, Tenn., $11,150.56.

Harry C. Weiskittel Co. Inc., Baltimore, $44,950 (indefinite); Barnard Aviation Equipment Co. Inc., Newark, N. J., $11,342.16; and Armco International Corp., Middletown, O., $12,257.

ISSUE 24 TIN PLATE SCRAP EXPORT LICENSES IN JANUARY

Twenty-four licenses were issued during January authorizing the exportation of tin plate scrap. The licenses were for 1957 tons, all destined for Japan and valued at $38,063.13.

AVIATION

PLANEMAKERS CRITICIZE MORGENTHAU PROGRAM

■ PLANS by Secretary of Treasury Morgenthau to assist British and French governments in purchasing one billion dollars of aircraft in this country are meeting severe criticism by American planemakers. Although the procurement program calls for 5000 bombers, 3000 pursuit planes and 13,000 engines, purchases would be confined to three types of military craft from Douglas Aircraft Corp., Santa Monica, Calif., Glenn L. Martin Co., Baltimore, and Curtiss-Wright Corp., New York. The three companies then would allocate orders to other manufacturers for specified types of planes.

While one of these companies is reported to favor the program, remainder of the industry is bitterly opposed on grounds the plan would eliminate other types now made, cripple improvements on current models and that industry would be "regimented."

Want Priority

British and French governments not only want priority on their orders over domestic and Latin American business but also want releases of United States army and navy warplanes now classified as secret, including the Bell Airacobra and Curtiss P-40. Army and navy authorities see such sales as endangering American air expansion plans.

Despite the Morgenthau plan's inducements, which include a $250,000,000 aircraft engine plant expansion financed by foreign money, the aircraft industry fears complete and rapid fulfillment of allied demands, which are temporary in nature, would lose for them much of the growing Latin American and domestic airlines business. According to Col. John H. Jouett, president, Aeronautical chamber of commerce, concentration on allied war orders would leave European planemakers free to go after our Latin American business.

Indications are that the Morgenthau plan will be modified to include more planemakers and types of aircraft.

Brewster Expands

Backlog of Brewster Aeronautical Corp., Long Island City, N. Y., is $22,500,000. Negotiations pending promise present backlog will be maintained or increased for the next few years at least. Orders comprise single-seat fighters for Belgium, Finland, one belligerent country, United States navy, and floats and wings for United States navy patrol boats. Expansion program undertaken by company will double capacity. A hangar with 175,000 square feet of floor space was leased from city of Newark, N. J., at Newark airport with option on adjoining ten acres of land for future expansion. Company guarantees city minimum payroll of $2,250,000 and to hire at least 1500 employes.

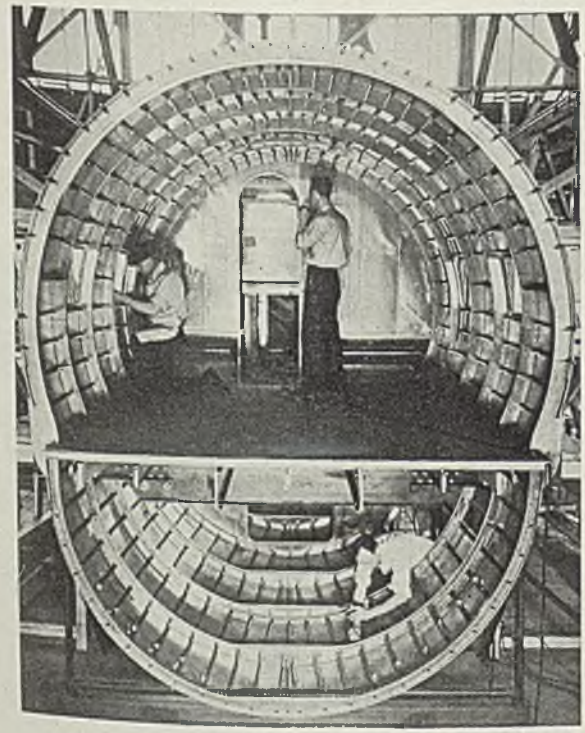
Prospects for larger aviation orders to Canada are seen in statement of Finance Minister Ralston who placed war cost to Canada for fiscal year ending March, 1941, at $500,000,000 of which $100,000,000 would be for aviation. Allotment for aviation to September is only for half this amount.

Interest is being revived in lighter-than-air craft by report from a special board of experts headed by Rear Admiral Ernest J. King and Capt. Garland Fulton to Secretary of Navy Edison, that navy proceed immediately with $10,000,000 program to include a 650-foot dirigible to cost $3,500,000, already authorized by congress, and 15 blimps built at the rate of two to four ships a year.

Board made no recommendations for building giant size dirigibles by the navy, but suggested commercial building with "vigorous" support by the government. The ships would be used as aircraft carriers.

Kinner Motors Inc., Glendale, Calif., has delivered 15 aircraft engines to Canada, first of order for 500. Deliveries are to be over two years.

Report of Bell Aircraft Corp., Buffalo, for 1939 shows a net profit of $9203, comparing with 1938 net profit of $65,488. Backlog is over $7,400,000 with deliveries scheduled well into 1941.



Pressurized Fuselage

■ Cross section of all-metal Curtiss - Wright substratosphere transport fuselage showing structural design and floor level. Fuselage is sealed and retains air under pressure to permit normal flying at 20,000 feet with a "cabin altitude" of 6000 feet

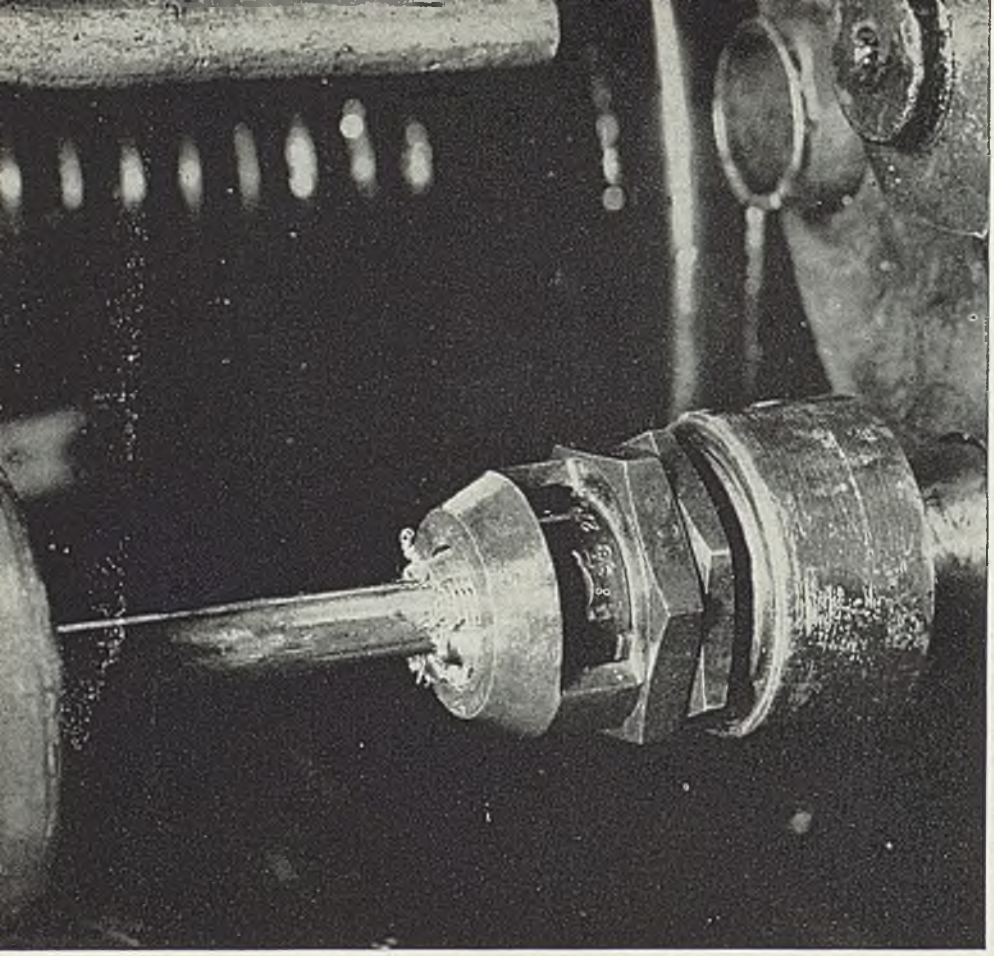
Commercial Production of Gas Reduced Iron Planned

■ Clarkiron Metals Corp., subsidiary of Clarkiron Inc., Los Angeles, has been created to produce iron in Pacific Coast states under Clark patents. Process, developed by Walter Gordon Clark, provides new method for reducing iron ores in natural gas at low temperatures.

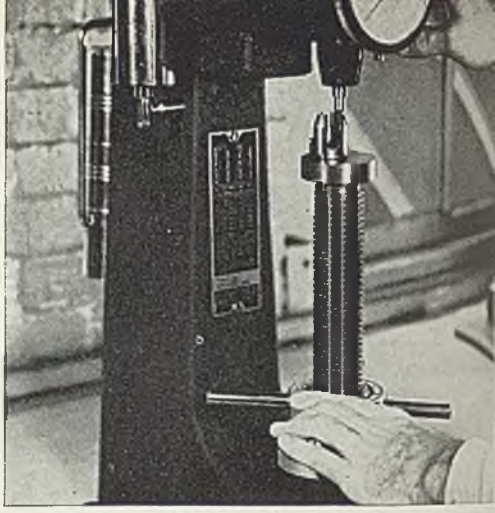
Corporation has acquired iron mine and completed test plant from Clarkiron Inc. Application to California corporation commissioner for permission to issue 125,000 shares of par $10 cumulative convertible preferred stock will be made. Proceeds will be used for construction of plant at Los Angeles for commercial operation.

Sponge iron, carrying either no carbon for production of alloys, or with prescribed carbon content cast into ingots and billets for rolling or other fabricating processes will be produced. Part of output will be converted into powdered iron, from which gangue will be magnetically separated, for use in compression tools.

■ During January a total of 1377 long tons of tin was exported from Thailand (formerly Siam) and 145 long tons (provisional) from the Congo, according to a cable received by the American Iron and Steel institute from the International Tin Research and Development council, The Hague, Holland.



Each "Acorn" Die before final approval threads an actual test plug which is shipped to you with the die.



Too hard is as bad as too soft. Each heat-treated "Acorn" Die must pass this Rockwell Hardness Testing Machine.

Above: Limit snap thread gages check the pitch diameter of every "Acorn" Die test plug — 100% inspection.

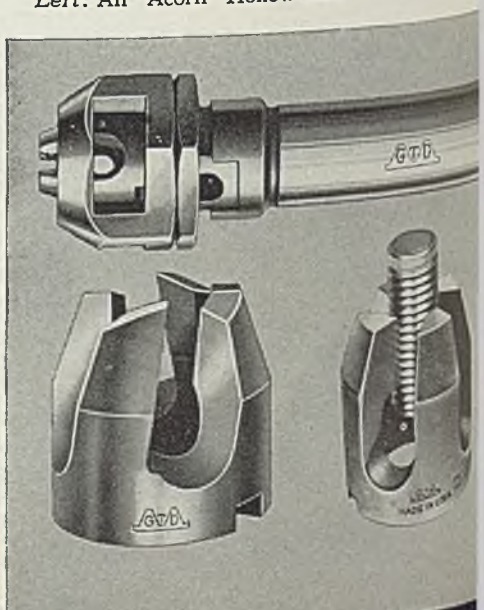
AMAZING PERFORMANCE OF "ACORN" DIES NO "ACCIDENT"

How precision manufacture and repeated tests contribute to long accurate life

Super-accurate tools, such as "Acorn" Dies, call for unusual care in design and manufacture. Variation in cutting angle, in clearance, in chamfer — the least unevenness where the Die seats in the holder, destroys accuracy and cuts production to a fraction of what it should be. G. T. D. Greenfield supplements manufacturing care by thoroughly testing completed die. Some of the methods used to insure top performance are shown here.

It isn't the occasional record of an individual die that matters — it's the steady, consistent high production that "Acorn" Dies produce that makes them so favored by production men.

Below: "Acorn" Die in regular holder.
Right: An "Acorn" Die with test plug inserted.
Left: An "Acorn" Hollow Mill.



Greenfield Tap & Die Corporation · Greenfield, Mass.

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

GTD GREENFIELD

Mirrors of MOTORDOM

By A. H. ALLEN
Detroit Editor, STEEL

DETROIT

■ MOTOR car builders are taking stock of plants and equipment with an eye on the 1941 model season. It is generally believed next year at least will equal if not better the showing made this year, the second successive year in which production has increased from the recession of 1938. Automotive years go in cycles of three usually, and with the presidential campaign out of the way and a conservative again at the country's helm (if you can believe the tipsters) the road will be clear for better business.

As first reported here Jan. 8, Buick already has made a start on new facilities for 1941. Two new buildings, with accompanying docks and receiving and shipping facilities are the initial step in the program which by the way, was originally started over two years ago, but deferred by widespread labor disturbances at that time.

A new plant to house manufacture of axles and axle gears will be 959 feet long and 138 feet wide, providing 156,000 square feet of floor space including covered docks 90 feet deep providing for simultaneous loading and unloading of 14 trucks and three freight cars.

An old building already has been razed (see accompanying illustration) to make way for the new plant. The new axle plant will appear to be virtually a glass building, with over 40,000 square feet of glass on main walls and the monitor sections of the roof. Extensive rearrangement of machinery and equipment, and a number of detailed plant engineering projects will be incident to construction of the axle building, but it is expected to be completed by midyear, without interrupting current production.

Destruction of a 300-foot section of Buick's present sheet metal plant has been started to make way for a 52 x 300-foot addition, two stories high to accommodate a craneway. It will pattern the axle plant in design, with more than 13,300 square feet of glass windows. Both buildings were designed by Albert Kahn Inc., local architect and engineer, plans being rushed through in record fashion.

Awards for structural steel were made last week, involving over 1400 tons. Flint Structural Steel Co. and R. C. Mahon Co., Detroit, were successful bidders.

In addition to the two new buildings, a series of three bridges will be built to facilitate interplant communication and shipping. Another feature will be an unusually long conveyor to carry finished axles from the new plant to final assembly.

The present expansion has been necessitated in the main by increasing demands upon the sheet metal department, axle manufacture being removed from the present sheet metal plant to give additional space. Both front and rear axle assemblies will be manufactured in the new plant, the front axle being an assembly of A-frame and springs rather than an axle as such. It is anticipated that a considerable volume of new machinery such as presses, welding machines, lathes and machine tools will be needed.

Another expansion at Flint, announced last week, is a new plant for

Buick Starts New Axle Plant

■ Down with the old and up with the new, as the ground is cleared at the Buick plant in Flint, Mich., for a new 138 x 959-foot axle plant which will provide 156,000 square feet of floor space for manufacturing rear axles and gears for them. Structural steel for this plant and a new 52 x 300-foot addition to a metal shop, totaling 1400 tons, was placed last week. Buildings are expected to be completed by midyear

AC Spark Plug Co., involving several hundred thousand square feet of floor space to accommodate a proposed enlargement of plug manufacture.

A local manufacturer of conveyors used widely in the auto industry reports customer demand has increased to the point where a tripling of present production schedules has been necessitated. Some of this work is in connection with changes in plants required by new model plants. Nash, for example, has a large conveyor systetm now being figured for installation at Kenosha, Wis., to handle bodies for its new small car line. These bodies are of a different type than conventional units, built up on a structural framework of steel, frame and body being integral. New types of conveyors are required to handle these bodies through assembly and finishing operations.

■ IN THE BACK of many executives' minds, labor continues to be an important problem. Possibility of interruptions to new model programs or to accelerated spring production schedules is always present, though no present indications point to their arising. In fact, the labor front appears unusually calm, so much so that it puzzles some observers. One explanation may be political, what with the break between John L. Lewis and the President and the oncoming political campaigns. Labor leaders may be holing in until they can determine just which way the political wind is blowing, fearing that any outbreak now would only stimulate congress into radical revision of the Wagner act. Already some revision of this act is indicated by reports from Washington, but it probably will be as restricted in character as congressmen feel the public will stand.

In the local tool and die industry, negotiations between plants and the union are proceeding peacefully following termination of agreements at the turn of the year. Plants are operating currently under no agreement, but it is expected new agreements will be concluded within a week or two. Only differences of opinion between the plants and the union appear to be concentrated on seniority provisions. Wage rates seemingly are agreed upon, with the possible exception of minimum rates applying to "leaders," workmen in tool and die shops who supervise a job and the men on this particular job.

Tool and die shops here have been free from major labor disturbances and profess to see no reason why this situation should change. They are currently active on new work for General Motors divisions, Packard, Hudson, Nash and others, and report that these programs are anywhere from a month to two months ahead of last year. Some refrigerator work also is being handled by die shops, as well as a fair amount of business from eastern sources on aircraft and military projects.

A favorable development for local tool and die fabricators has been the fact that a number of eastern interests which heretofore had been active on automotive work now are loaded up on government business, with the result they have had to forego automotive business, resulting in the latter going to shops in Detroit.

Some die suppliers further report the automotive industry appears to be swinging in the direction of entirely new body lines every year, instead of the former practice of effecting complete changes only every two years on an average. This results naturally in a considerably increased demand for dies and tools and tends to level out new business for plants catering to these needs.

■ REVERSAL of the Nov. 10 decision of the Michigan unemployment compensation commission, under terms of which 50,000 employes of Chrysler Corp. were denied unemployment benefits for time lost during the strike, Oct. 6 to Nov. 29, was announced last week by Charles Rubinoff, referee for the commission. He decided that 27,000 employes affected by the strike were entitled to benefits totaling some $3,000,000, by virtue of the claim they were thrown out of work through no fault of their own. The remaining 23,000, principally in the Dodge main, forge and truck plants, were determined ineligible to receive benefits.

Automobile Production

Passenger Cars and Trucks—United States and Canada
By Department of Commerce

	1937	1938	1939
Jan.	399,186	226,952	356,950
Feb.	383,900	202,597	317,517
March	519,022	238,447	389,489
April	553,231	237,929	354,263
May	540,377	210,174	313,214
June	521,153	189,402	324,235
July	456,909	150,450	218,478
Aug.	405,072	96,946	103,343
Sept.	175,630	89,623	192,672
Oct.	337,979	215,286	324,673
Nov.	376,629	390,405	368,538
Dec.	347,349	406,960	469,002
Year	5,016,437	2,655,171	3,732,374

Estimated by *Ward's Reports*

Week ended:	1940	1939†
Jan. 20	108,545	90,205
Jan. 27	106,400	89,200
Feb. 3	101,240	79,410
Feb. 10	95,985	84,500
Feb. 17	95,050	79,860

†Comparable week.

Automobile production figures for the week ended Feb. 24 are published on page 18.

■ EXAMINATION of details of the new body painting equipment installed in Plymouth plants for 1940 models reveals the tremendous advances made in this technique since the early days when a good body shop could turn out two bodies a week and when bodies were made of elm panels boiled four hours and then clamped over frames for 48 hours more. As late as 1909 it took six weeks to apply the 27 coats of paint which went on the bodies. By 1934 the quick-drying lacquers had reduced body finishing to 11 operations requiring only 12 hours.

Now the new synthetic enamels with soy bean base are used by Plymouth, and others, further improving finishes and reducing the hand labor required. Sixteen air-conditioned spray booths at the Plymouth plant here handle bulk of production; six are provided at a new Los Angeles plant and others at the Evansville, Ind., plant.

Purified air is taken in through large "penthouses" on the plant roof and passed through ducts to a false ceiling or "plenum chamber" above the master spray room below, equalizing the flow of air to all booths. As it leaves the plenum chamber the air is forced through 300 dry-type filters and is supplied to the spray booths at a rate of 300,000 cubic feet per minute.

This volume of air maintains air pressure inside the spray room at a slightly higher level than in any other part of the plant, so any leakage through conveyor openings is outward, thus preventing infiltration of dust. Every sheet metal part comes to the spray booths with the enamel base already baked on, then moves through two successive spray booths for two additional finish coats. Work hangs suspended from a concealed conveyor which moves slowly through the booths. As it moves along, each part passes between the booth operators and a curtain of falling water which collects excess paint spray, later to be reclaimed and used as a base coat material.

Workmen now operate spray guns unhampered by hoods or masks, and a department once considered the most undesirable from a working standpoint in an auto plant has been transformed into a place where workmen now bring their lunch boxes at noon hour or between shifts, so they may enjoy their leisure in the purified, heat-controlled and humidified atmosphere.

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STYLE No. 35L

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STYLE No. 39

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No matter what your particular threading requirements may be, you will find precision thread grinding with Ex-Cell-O Machines a practical, profitable method in handling threaded parts.

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Constantly developed over a period of years to give the utmost in output of accurately ground screw threads, Ex-Cell-O Precision Thread Grinding Machines are now being used in many industries for an ever-widening variety of operations...with increased profits on both large and small quantities of precision threaded parts.

Today, Ex-Cell-O builds seven different styles of Precision Thread Grinders. They range from the small production machine to the more elaborate automatic universal machine—machines that handle extremely short or very long pieces, pieces with external or internal threads.

In superior features of construction . . . in greater production of more accurate work . . . in simplicity and ease of operation . . . in the wide variety of threaded work that can be produced economically with them—Ex-Cell-O Precision Thread Grinders are of real interest to every industrial executive.

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EX-CELL-O MACHINES AND TOOLS

Laud Patent System's Benefits In Honoring "Modern Pioneers"

■ NATIONAL interest in the "Modern Pioneer" program of the National Association of Manufacturers heightened last week as approximately 200 inventors and industrial research workers received scrolls at dinners held in six communities.

Commemorating the 150th anniversary of the United States patent system, the program will reach its climax Feb. 27 at the national banquet at the Waldorf-Astoria hotel, New York. Reservations indicate a capacity crowd will attend the dinner at which 19 national "Modern Pioneer" awards will be made. About 100 from the New York district also will receive awards next week.

Scientific Advances Help State as Well as Industry

■ President Roosevelt, asserted Dr. Karl T. Compton, president, Massachusetts Institute of Technology, showed a "profound lack of understanding and appreciation" in his recent message to congress. In his speech at the Rochester, N. Y., dinner honoring 37 modern pioneers Feb. 19, Dr. Compton took issue with the President concerning technological advance and efficiency of industry as unemployment sources.

Scientific advances, he declared, are a boon to industry, and create sources for government taxation. With a few small exceptions, however, the government's policies have discouraged new business enterprises created by invention and new products.

Technological advancements, Dr. Compton admitted, have created some technological unemployment in certain industries, but in the main research and invention have created new employment rather than a surplus of labor. At the same time industrial advancement, brought on by science, has given the public new materials and services otherwise available only to a select few.

Awards at Rochester:

Edward Bausch, Bausch & Lomb Optical Co., Rochester, N. Y.; Dr. Frederick Bedell, Cornell university, Ithaca, N. Y.; Leslie G. S. Brooker, Eastman Kodak Co., Rochester, N. Y.; Charles Albert Campbell, New York Air Brake Co., Watertown, N. Y.; Arthur William Caps, Photostat Corp., Rochester, N. Y.; John G. Capstaff, Eastman Kodak Co., Rochester, N. Y.; Willis Haviland Carrier, Carrier Corp., Syracuse, N. Y.

Dr. William Hale Charch, E. I. du Pont de Nemours & Co., Buffalo; Albert A. Criqui, Buffalo Forge Co., Buffalo; William Chauncey Geer, B. F. Goodrich Co., Akron, O.; Frederick William Gurney, Marlin-Rockwell Corp., Jamestown, N. Y.; Kenneth C. D. Hickman, Distillation Products Inc., Rochester, N. Y.; Roy S. Hopkins, Eastman Kodak Co., Rochester, N. Y.; Lloyd Ancile Jones, Eastman Kodak Co., Rochester, N. Y.; Paul Landrock, Photostat Corp., Rochester, N. Y.

John H. Levis, Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y.; Eli Maynard Long, Shuron Optical Co. Inc., Geneva, N. Y.; Dr. Charles Edward Kenneth Mees, Eastman Kodak Co., Rochester, N. Y.; Joseph Mihalyi, Eastman Kodak Co., Rochester, N. Y.; Benjamin Olney, Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y.; Winfred T. Powell, Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y.; Wilbur B. Rayton, Bausch & Lomb Optical Co., Rochester, N. Y.

Dr. Karl T. Compton

President, Massachusetts Institute of Technology, awards committee chairman in the National Association of Manufacturers' "Modern Pioneer" program

Raymond Ronald Ridgeway, Norton Co., Niagara Falls, N. Y.; Samuel E. Sheppard, Eastman Kodak Co., Rochester, N. Y.; Eugene Cornelius Sullivan, Corning Glass Works, Corning, N. Y.; William C. Taylor, Corning Glass Works, Corning, N. Y.; Henry E. VanDerhoef, Eastman Kodak Co., Rochester, N. Y.; Frederick William von Meister, Ozalid Corp., Johnson City, N. Y.; Sedgwick N. Wight, Gener Railway Signal Co., Rochester, N.

Joint awards—Maurice W. Phelp Solvay Process Corp., Syracus N. Y., with William R. Barber ar Albert G. Natwick, of San Francisc

Hans T. Clarke and Carl Malm, Eastman Kodak Co., Roche ter, N. Y.

James F. Gleason and Ernes Wildhaber, Gleason Works, Roche ter, N. Y.

Alphonse Ferdinand Pieper an Oscar Henry Pieper, Ritter Denta Mfg. Co., Rochester, N. Y.

R. & H. Chemicals department E. I. du Pont de Nemours & Co. Niagara Falls, N. Y.: Arthur An drew Levine with Oliver Wilfred Cass; Earle Atherton Harding with Donald Aubrey Holt; Norman Dunshee Scott with Joseph Frederick Walker; Joseph Seraphin Reichert with Ralph Benjamin Elliott.

Donald James Campbell with Francis Leroy Fennell of Boston area.

Christian John Wernlund with Harry Lloyd Benner of Cleveland area and Robert Richard Bair; Frank Joseph Dobrovolny with John Merlyn Youel of Philadelphia area and Harold Emanuel Klein and Charles Harold Lemke; Burritt Samuel Lacy and Charles Roberts Harris with A. D. Macallum of Philadelphia, and Harlan Avery Bond and Paul Johnson Carlisle.

Frank Edwin Smith with Adrian Naglevoort of San Francisco area, Henry Lloyd Alexander and Herburt du Pont and Willing Bayard Foulke of Philadelphia area.

Honorable mention—Frank Edwin Smith, Floyd Francis Oplinger and Alden Johnson Deyrup, R. & H. Chemicals department, E. I. du Pont de Nemours & Co. Inc., Niagara Falls, N. Y.

Inventions Bring More Goods to More People

■ Reshaping political, economic and social concepts of the past few years that American citizens may better utilize contributions of science to a higher standard of living was urged by Ralph E. Flanders, president, Jones & Lamson Machine Co., Springfield, Vt.

Principal speaker at the Philadelphia banquet, Feb. 16, honoring 135 modern pioneer award recipients, Mr. Flanders paid tribute to scientists and inventors for their part in making possible more comfortable and useful living.

"A higher standard of living," he stated, "does not mean higher wages, higher salaries or higher dividends. It does not mean higher prices for goods or services—least of all does it mean restriction of output. It does mean more and

more goods and services at lower and lower prices relative to incomes.

"We have erred," said Mr. Flanders, in speaking of the past seven years' trends, "in trying to occupy the new frontier of the higher standard of living without following the guidance of these pioneers. In times past our increases in the scale of living have come as a result of new machines, new processes and new resources after they were discovered and developed."

Attempting to further elevate our scale of living, he declared, we have ignored natural laws, have tried to better our lot by raising money wages and shortening working hours in advance of inventions and developments that would make such projects possible. High wages and high prices, he pointed out, when coupled with low production, can only result in high prices and unemployment.

Those now guiding United States' destinies, according to Mr. Flanders, act on the assumption improved machines and processes throw men out of work and impoverish the nation. Hence hours of work have been greatly shortened, wages greatly increased. Attempts to raise real wages in advance of technical improvement, rather than as a result of it are an important factor in persisting unemployment.

Inventors and research workers receiving awards were listed in STEEL, Feb. 19, page 26.

Asserts Patent System Helps Prevent Monopolies

■ Complaints that patents have aided monopolies and encouraged invention of machines to displace labor were declared without foundation by Conway P. Coe, United States commissioner of patents. Addressing a dinner meeting at St. Louis, Feb. 19, honoring 25 inventors and research workers as modern pioneers, Mr. Coe asserted the present system tends to prevent extension and prolongation of economic supremacy in any given field.

"For one thing," he said, "the patent ultimately transfers to public domain the invention it temporarily protects. It also inspires new ideas which render existing monopolies obsolete." As an illustration, Mr. Coe cited the virtual monopoly on land transportation which railroads once held. Today they are engaged in keenest competition with automobiles and airplanes. Many other instances, he said, might be mentioned.

Our patent system, asserted Mr. Coe, has brought this nation not only material progress but also a large degree of both social and political advancement. It has helped keep United States stronger than any other nation, able to resist attacks on democracy.

Refuting claims there is no longer need for patent protection Mr. Coe said nearly 42,000 patents were granted in last fiscal year. Less than 10,000 were issued during first 46 years of the department's existence. More than 2,800,000 were issued in 104 years since.

Department of commerce, declared Mr. Coe, specifically recommended two important changes in our patent laws, in addition to the five enacted by congress last summer. First, a single court of patent appeals; second, so-called 20-year bill, to expedite prosecution of applications and issuance of patents now pending.

Twenty-five awards were made to:

Fred B. Adam, Frank Adam Electric Co., St. Louis; Eric William Bacharach, E. W. Bacharach & Co., Kansas City, Mo.; William P. Bentley, Uvalde Construction Co., Dallas, Tex.; Robert M. Boehm, Masonite Corp., Laurell, Miss.; Wallace L. Caldwell, Aerocrete Western Corp., Birmingham, Ala.; John N. Carothers, Monsanto Chemical Co., Anniston, Ala.

W. C. Coleman, Coleman Lamp Works, Wichita, Kans.; Burns Dick, Wagner Electric Corp., St. Louis; Donald A. Deems, Steem Electric Corp., St. Louis; James P. Dovel, Birmingham, Ala.; Carl Gardner, Smith Center, Kans.; Edwin F. Guth, Edwin F. Guth Co., St. Louis; Lowell Cleland Hewitt, Laclede-Christy Clay Products Co., St. Louis.

Alfred M. Lane, Monarch Metal Weatherstrip Corp., St. Louis; William Horatio Mason, Masonite Corp., Laurel, Miss.; William D. Moore, American Cast Iron Pipe Co., Birmingham, Ala.; Edwin S. Pillsbury, Century Electric Co., St. Louis; Erskine Ramsey, Alabama By-Products Corp., Birmingham, Ala.; Hans Weichsel, automotive division, Wagner Electric Corp., St. Louis; Lloyd Jenkins White, Southern Steel Co., San Antonio, Tex.; Ira Williams, Borgen, Tex.

Joint awards—George M. Bicknell and Irven E. Coffey, Carter Carburetor Corp., St. Louis.

Dr. R. T. Cotton and H. D. Young, Manhattan, Kans., with R. C. Roark, Washington, D. C.

"Recovery Hopes Lie In American Business"

■ Upbuilding American industry to benefit every man, woman and child is the motivating force behind American business, said Harvey C. Fruehauf, president, Fruehauf Trailer Co., Detroit, and member of the board, National Association of Manufacturers.

Engineers, research men, skilled and unskilled workers and employers are all thinking, working, planning, accomplishing to that end, he declared in addressing 900 guests at a dinner honoring, as modern pioneers, nearly 50 outstanding inventors and research scientists of the Detroit area, Feb. 15.

"It is becoming clear to all our citizens," he pointed out, "that in American business lies the hope of national recovery, of spiritual and material well-being for all."

Striking the occasion's keynote, Mr. Fruehauf said: "Patents do more than stimulate invention. They make it possible for industry to develop new discoveries and inventions so that they can be put into practical use to create new jobs. . . .

"The awards are the result of a nation-wide search for the unsung heroes of industry's workshops and laboratories—inventors and research workers whose pioneer accomplishments entitle them to recognition."

Conway P. Coe, United States commissioner of patents, also addressed the meeting. He stressed benefits of the American patent system as constituted.

Detroit awards were announced in STEEL, Feb. 19, page 26.

Horizons Pushed Back Through New Inventions

■ Science and technology have made possible vastly increased variety, quantity and quality of man-made products declared Charles R. Hook, president, American Rolling Mill Co., Middletown, O., at the Baltimore modern pioneers banquet, Feb. 19.

We cannot conceive today, said Mr. Hook, of a limit to possible production. As civilization advances

our horizons broaden, opportunities for progress increase rather than diminish. There is no evidence, he pointed out, that the road of progress has an end.

"Despite all the magnificent achievements of the last century and a half, and the frontiers of science and invention that have been conquered, we are no more than on the threshold of a new age of marvels," asserted Mr. Hook. "Every generation has decried the passing of a frontier . . . but there was always a new frontier ahead."

Mr. Hook cited statistics showing industries with a high rate of invention increased output 60 per cent in the past ten years; those with a low rate of invention gained only 14 per cent

Further proof that technological development does not cause unemployment was offered by Otto S. Schairer, vice president in charge of patent department, Radio Corp. of America, New York. Quoting from a survey made by Machinery and Allied Products institute, he said:

"Jobs increase faster than population; employment is nearest normal in most highly mechanized industries; growing occupations add three new workers to one lost in vanishing occupations; only a very small percentage of workers have lost their jobs through technological development."

Twenty awards were made to the following.

Dr. F. G. Cottrell, Washington, D. C.; George H. Emerson, Baltimore & Ohio railroad, Baltimore: Gustave Fast, Fast Bearing Co., Annapolis, Md.; Alexander Littlejohn Feild, Rustless Iron & Steel Corp., Baltimore; James P. Grey Jr., Grey Hosiery Mills, Hendersonville, N. C.; Thaddeus Stowe Grimes, Lummus Cotton Gin Co., Columbus, Ga.

William B. Hodge, Parks-Cromer Co., Charlotte, N. C.; William E. Hoke, Baltimore; Prof. Elmer V. McCollum, Johns Hopkins university, Baltimore; James Edson Myer, Timber Engineering Co., Washington, D. C.; Walter A. Patrick, Davison Chemical Co., Baltimore.

A. L. Penniman, Consolidated Gas, Electric Light & Power Co., Baltimore; A. Herman Pfund, Johns Hopkins university, Baltimore; F. E. Ricketts, Consolidated Gas, Electric Light & Power Co., Baltimore; J. J. Tatum, Baltimore & Ohio railroad, Baltimore; Frederick H. Untiedt, Washington.

Joint awards: R. C. Roark, bureau of entomology and plant quarantine, United States department of agriculture, Washington, D. C., with R. T. Cotton and Harry D. Young, Manhattan, Kans.

P. L. Betz and S. Karrer, Consolidated Gas, Electric Light & Power Co., Baltimore.

Karl Turk and Richard H. Turk, Porcelain Enamel & Mfg. Co., Baltimore.

Leon A. Graybell, Firestone Tire & Rubber Co., Gastonia, N. C., and Russell B. Newton, Bibb Mfg. Co., Columbus, Ga., with Eugene C. Gwaltney, Saco-Lowell Shops, Biddeford, Me.

Need for New Inventions Will Never End—Coonley

■ Necessity for new inventions and better products will never end, declared Howard Coonley, chairman of the board, National Association of Manufacturers. Paying tribute to 19 modern pioneers presented awards for their work as inventors and in research at Cincinnati, Feb. 21, Mr. Coonley said:

"It is no exaggeration to say the creative spark of invention has been fostered nowhere else so faithfully as here. Result has been the lifting of our American standard of living to ever higher levels, more and more widely shared."

August H. Tuechter, president, Cincinnati Bickford Tool Co., Cincinnati, asserted that only through a private enterprise system in which individual initiative is encouraged can maximum benefits from inventive genius be obtained.

W. L. McGrath, vice president and general manager, Williamson Heater Co., Cincinnati, presided.

Awards:

J. C. Carlin, Gaither Chemical Works, Nashville, Tenn.; William R. Chapin, E. C. Atkins & Co., Indianapolis; William A. Chryst, Delco-Products division, General Motors Corp., Dayton, O.; George Clausing, Vulcan Corp., Portsmouth, O.; Charles Hust Fox, Ahrens-Fox Fire Engine Co., Cincinnati; Weston Miller Fulton, W. J. Savage Co., Knoxville, Tenn.; Harvey Dunn Geyer, Inland Mfg. division, General Motors Corp., Dayton, O.

Harold William Greider, Philip Carey Mfg. Co., Lockland, O.; William F. Groene, R. K. LeBlond Tool Co., Cincinnati; Harry B. Hull, Frigidaire division, General Motors Corp., Dayton, O.; Frederick Kohnle, Monarch Marking System Co., Dayton, O.; Jerome Martin, Commercial Solvents Corp., Terre Haute, Ind.

E. A. Muller, King Machine Tool Co., Cincinnati; Thomas Willett Rolph, Holophane Co. Inc., Newark, O.; Games Slayter, Owens-Corning Fiberglas Corp., Newark, O.; Walter Standish Smith, Exact Weight Scale Co., Columbus, O.; L. A. Stengel, Commercial Solvents Corp., Terre Haute, Ind.; John B. Tytus, American Rolling Mill Co., Middletown, O.; Orville Wright, Dayton, O.

Future Promising If Industry Remains Free

■ Recent attacks on our patent laws may contain veiled implications of radical change in America's traditional free enterprise system, warned Raoul E. Desvernine, president, Crucible Steel Co. of America, New York, in addressing guests gathered in honor of 11 modern pioneers at Hartford, Conn., Feb. 16.

Behind these proposals and many other administrative regulations and legislative acts a threat to constitutional democracy and the free enterprise system can be sensed, said Mr. Desvernine. We are drifting toward a totalitarian, paternalistic state.

"There are new frontiers in America," said Mr. Desvernine, "which hold promise of greater wealth, more goods, more jobs and a higher standard of living than was ever produced by territorial conquests and trade domination. These peacetime frontiers stem from the shops and research laboratories of industry. Keep industry ambitious and free to continue discovery of these frontiers and our future will be most promising."

Graham H. Anthony, president, Veeder-Root Inc., Hartford, deplored the general lack of appreciation regarding importance of modern scientists and research experts to our well-being.

"We hear much today," said Mr. Anthony, "about the importance of the 'common' man, but we are here to pay tribute to 'uncommon' men. . . . We must see that we provide for the common man, but we must never forget it is the uncommon man who leads the march of progress."

Clayton R. Burt, president, Pratt & Whitney division, Niles-Bement-Pond, Hartford, was chairman and

toastmaster. Other speakers included Samuel M. Stone, president, Colt Patent Fire Arms Mfg. Co., Hartford; E. Kent Hubbard, Manufacturers' Association of Connecticut Inc.; Fred U. Cunard, vice president and general manager, Underwood Elliott Fisher Co., New York. Connecticut's Governor Baldwin presented the awards; recipients were noted in STEEL, Feb. 19, page 26.

Praise Peaceful Emphasis On Science in America

■ Praise for devotion of a people to development of their country's tremendous natural resources and their own potentialities was expressed at San Francisco and Los Angeles modern pioneer dinners.

Speaking at Los Angeles Feb. 16, C. B. Tibbetts, president, Metal Trades Manufacturers' Association of Southern California stated:

"When in a war-torn, politically befuddled world a gathering of men and women like this audience comes to honor men of science and invention we can be sure America is still on the right road—the road that leads to more jobs, more goods, more services and richer cultural lives which peaceful industrial progress alone can provide."

Mrs. Lucy R. Milligan, chairman, women's division, National Association of Manufacturers, and on the program at both cities lauded the part science and invention have played in making easier the role of today's housewife.

"Drudgery in the modern household," said Mrs. Milligan, "has given way to the most remarkable standard of living in the entire world."

Says Industry's Progress Depends on Patent Laws

■ "Further progress on frontiers of industry is dependent upon perpetuation of basic principles of the patent system," stated Dr. Edward R. Weidlein, director of Mellon Institute, Pittsburgh university. "Granted the perpetuation of basic American institutions, opportunities for progress are unlimited."

Defending industrial efficiency in a democracy at the Boston modern pioneer dinner Feb. 20, Dr. Weidlein said: "No nation anywhere, whatever its form of government, has surpassed our own either in quantity or quality of new materials or products of industrial science."

Furthermore, he pointed out, research and invention make for obsolescence, thus creating new opportunities for workmen.

"Even a new mechanical innovation," said Dr. Weidlein, "which may temporarily displace labor will, in the end, increase demand for labor to supply requirements of the broader market supplied by the machine."

Twenty-nine inventors and research workers were presented awards:

Roger W. Andrews, Riley Stoker Corp., Worcester, Mass.; Howard Maxson Barber, C. B. Cottrell & Sons Co., Westerly, R. I.; James L. Cox, Hygrade Sylvania Corp., Salem, Mass.; Alfred Victor de Forest, Massachusetts Institute of Technology, Boston; Richard M. Dugdale, Farrington Mfg. Co., Jamaica Plain, Mass.; Harold E. Edgerton, Massachusetts Institute of Technology.

Gustavus John Esselen, Gustavus J. Esselen Inc., Boston; Edwin R. Fellows, Fellows Gear Shaper Co., Springfield, Vt.; John Garand, Springfield Armory, Springfield, Mass.; Harold Frederick Hagen, B. F. Sturtevant Co., Boston; Dr. Arthur Cobb Hardy, Massachusetts Institute of Technology, Cambridge, Mass.

Edwin H. Land, Polaroid Corp., Boston; Thure Larsson, Norton Co., Worcester, Mass.; E. M. Lines, Bird & Son Inc., East Walpole, Mass.; Albert J. Loepsinger, Grinnell Co., Providence, R. I.; Clesson E. Mason, Foxboro Co., Boston; William H. Nichols, Waltham, Mass.; Frank Reece, Reece Button Hole Machine Co., Boston.

Dr. Edgar D. Tillyer, American Optical Co., Southbridge, Mass.; Henry E. Warren, Warren Telechron Co., Ashland, Mass.; Edward Goodrich Watkins, Simplex Time Recorder Co., Gardner, Mass.; Arthur Ashley Williams, Safety First Shoe Co., Holliston, Mass.; Edward R. Wolfert, Westinghouse Electric & Mfg. Co., Springfield, Mass.

Joint awards—Eugene C. Gwaltney, Saco-Lowell shops, Biddeford, Me., with Russell B. Newton, Columbus, Ga., and Leon A. Graybell, Gastonia, N. C.

Sterling W. Alderfer and Harold W. Greenup, Firestone Rubber & Latex Products Co., Fall River, Mass.

John F. White and William S. Wilson, Monsanto Chemical Co., Everett, Mass.

Honorable mention—Francis Leroy Fennel, E. I. du Pont de Nemours & Co., Boston.

Says Preservation of Free Enterprise Stimulus Vital

■ Perhaps the greatest of stimuli to free enterprise, our patent system must not suffer the fate that has overtaken so many others in recent years, Robert L. Lund, executive vice president, Lambert Pharmacal Co., St. Louis, warned 1200 guests at a dinner commemorating founding of the patent system, Chicago, Feb. 20.

Chairman, national modern pioneers committee, Mr. Lund in lauding work of 61 research experts and inventors honored at the banquet, asserted inventions create employment, not a lack of it. Only solution of our economic difficultites, he said, lies in greater freedom for enterprise. Unfair and inhibiting restrictions must be removed.

Citations were made by James D. Cunningham, president, Republic Flow Meters Co., Chicago, and sponsoring committee chairman. Awards:

Joseph George Alther, Universal Oil Products Co., Chicago; Harry H. Barber, Barber-Greene Co., Aurora, Ill.; Otto Behimer, Oak Park, Ill.; Leslie William Claybourn, Claybourn division, C. B. Cottrell & Sons Co., Milwaukee; Charles B. Dalzell, Little Falls plant, Cherry-Burell Corp., Chicago; W. A. Darrah, Continental Industrial Engineers Inc., Chicago.

David Pryce Davies, J. I. Case Co., Racine, Wis.; Carbon P. Dubbs, Universal Oil Products Co., Chicago; Joseph S. Duncan, Chicago; Gustav Egloff, Universal Oil Products Co., Chicago; Lewis Martin Ellison, Ellison Draft Gage Co., Chicago; Armin Elmendorf, Elmendorf Corp., Chicago; Alfred L. Eustice, Economy Fuse & Mfg. Co., Chicago; Albert Charles Fischer, Servicised Products Corp., Chicago.

John Mayer Frank, ILG Electric Ventilating Co., Chicago; William Gaertner, Gaertner Scientific Corp., Chicago; Walter Geist, Allis-Chalmers Mfg. Co., Milwaukee; Roscoe Henry George, Purdue University Research Foundation, Lafayette, Ind.; Laurens Hammond, Hammond Clock Co., Chicago; Joseph Harrington, Harrington Heater Co., Riverside, Ill.; Henry B. Hass, Purdue university, Lafayette, Ind.

William Franklin Henderson, Visk-

(*Please turn to Page* 75)

Industry's Boundaries Fade

■ CURRENTLY a series of books by distinguished writers is focusing public attention on the historical importance of famous and romantic American rivers. Granting their historical importance, how many of us today question the force of traditions which still persist in considering some of these rivers definite boundaries between North and South, between East and West, between industry and agriculture?

Why does the western industrialist greet the visiting easterner in some such manner as this? "Congratulations upon your recognition of an industrial civilization west of the Mississippi river!" Probably because he seldom sees this easterner except in the East and because he has strong reason to suspect that when the easterner crossed the Mississippi, he said to himself: "The jumping-off place—the beginning of the great open spaces—farewell to factories!"

Western Area Important Factor in Country's Industrial System

It is surprising that such outworn traditions should persist when so many large and progressive industries flourish west of the Mississippi river, all the way from the Canadian border to the Gulf of Mexico and the Mexican border—as well as south of the Potomac, the Ohio and the Missouri.

Kansas City is typical of many west-of-the-Mississippi centers which have developed so fast and so far that the average easterner has wholly inadequate appreciation of their present industrial importance. We mention Kansas City in particular because one of STEEL's editors recently experienced its hospitality and was greatly impressed. It began with an engineering meeting at which were present many keen-minded production men with more-than-ordinary appreciation of the possibilities of modern industrial equipment. Also present were several professors of engineering who demonstrated above-average practical knowledge of mass production methods.

It included a day in a large, modern steel plant and several other days devoted to visits to well equipped shops manufacturing oil well supplies, diesel engines, agricultural machinery and many other products demanding skill of high order. It included an informal chat with a leading citizen who is a consulting engineer of national repute, and past president of the American Society of Mechanical Engineers.

Nationwide Marketing Opportunities Should Not Be Overlooked

Contrast between East and West as far as industries are concerned rapidly is becoming a matter of concentration rather than of numbers. Compress the metalworking industries of Iowa, for instance, into an area the size of Connecticut, and the result will surprise anyone who thinks of Iowa only in terms of corn and Connecticut in terms of Yankee mechanical enterprise.

Just as the people of the entire country eat the same breakfast foods, follow the same clothing styles, sing the same songs and read the same magazines, so has industry become standardized, whether located in the North, East, West or South. The same modern equipment used at Dayton, O., for example, is employed at Newton, Iowa, Mobile, Ala., and San Diego, Cal.

In view of this it would seem wise for the average manufacturer of industrial equipment and materials to review his sales and distribution system at frequent intervals to make sure that he is making the most of nationwide marketing possibilities.

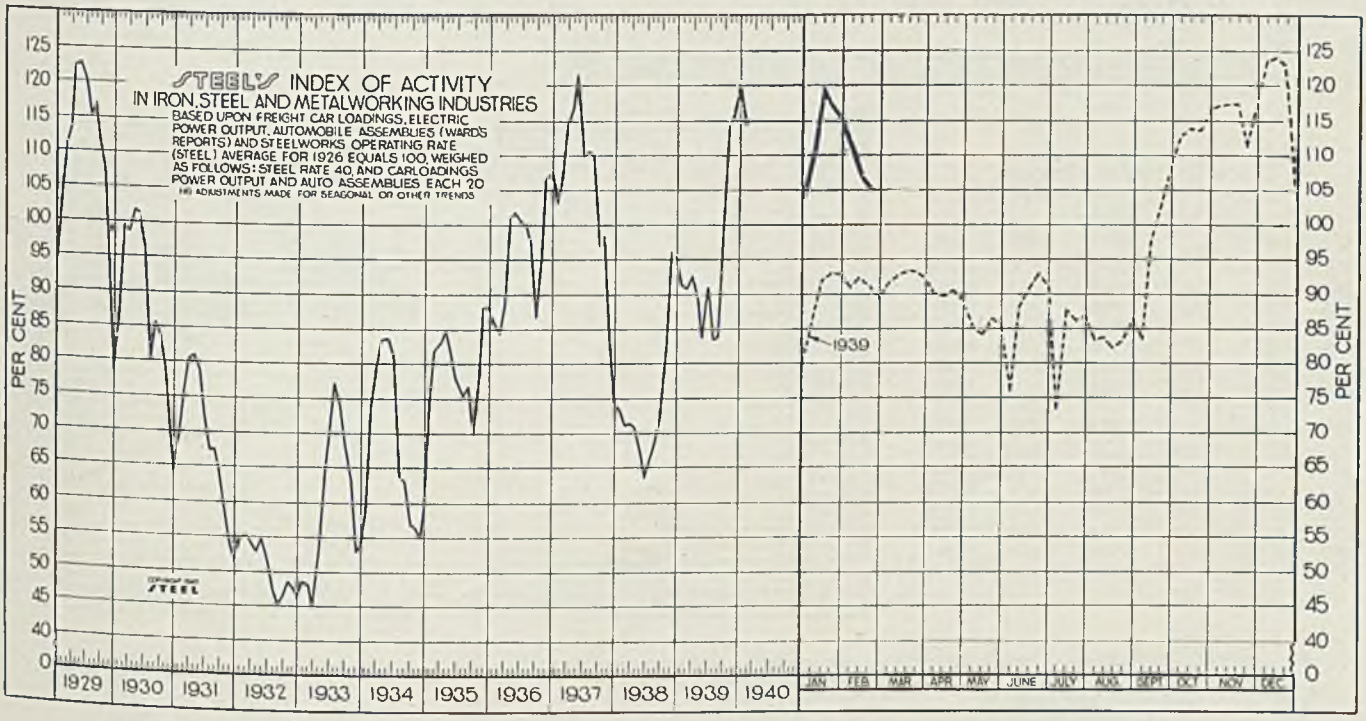
The *BUSINESS TREND*

Domestic Demand Fails to Develop

■ DECLINING activity in the iron, steel and metalworking industries has not yet shown signs of leveling off. With order backlogs rapidly diminishing and the probability that renewed domestic buying will not develop in substantial volume over the next few weeks, it appears that industrial production will be further curtailed to a closer relationship with incoming business. There has been little apparent change in the machine tool, aircraft or shipbuilding industries, the decline apparently being centered in other heavy lines, particularly steel.

It is encouraging to note that consumption is well sustained in most industries. Instead of buying supplies to meet current needs, purchasing agents apparently have decided to let inventories diminish.

STEEL'S index of activity declined 2.1 points to 105.1 during the week ended Feb. 17. This represents the fifth consecutive weekly decline. Since the peak last year of 124.2 recorded during the week ended Dec. 16 the index has receded 19.1 points and is now at approximately the same level registered during the week ended Sept. 23. This indicates that industrial activity has receded to about the same level that existed before the sharp upturn got underway last fall.



STEEL'S index of activity declined 2.1 points to 105.1 in the week ended Feb. 17:

Week Ended	1939	1938
Dec. 16	124.2	99.8
Dec. 23	123.4	94.8
Dec. 30	104.0	79.9
Week Ended	**1940**	**1939**
Jan. 6	110.3	86.5
Jan. 13	119.2	91.9
Jan. 20	117.3	93.0
Jan. 27	115.4	92.9
Feb. 3	111.6	90.7
Feb. 10	107.2	92.1
Feb. 17	105.1†	91.1

†Preliminary.

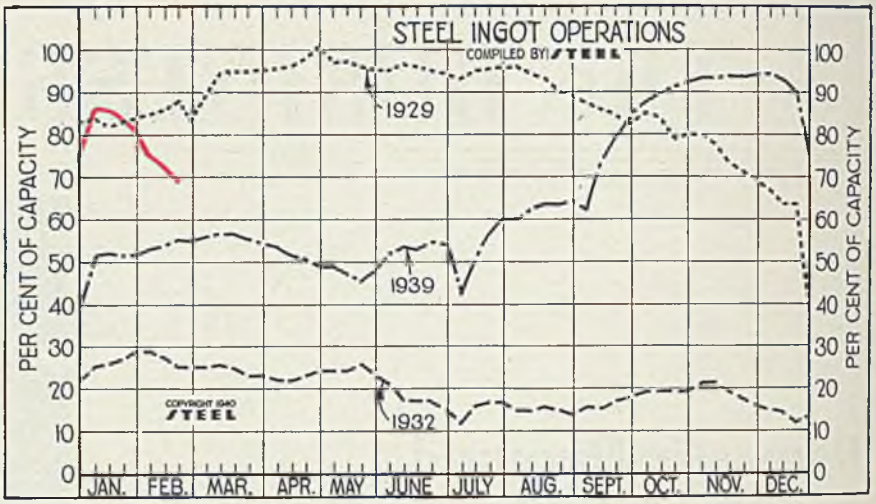
Mo. Data	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Jan.	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6	104.1
Feb.	.....	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2	111.2
March	....	92.6	71.2	114.4	88.7	83.1	78.9	44.5	54.2	80.4	98.6	114.0
April	.....	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0	101.7	122.5
May	.....	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6	101.2	122.9
June	.....	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1	95.8	120.3
July	.....	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3	79.9	115.2
Aug.	.....	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4	85.4	116.9
Sept.	.....	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3	83.7	110.8
Oct.	....	114.0	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2	78.8	107.1
Nov.	.....	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4	71.0	92.2
Dec.	.....	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3	64.3	78.3

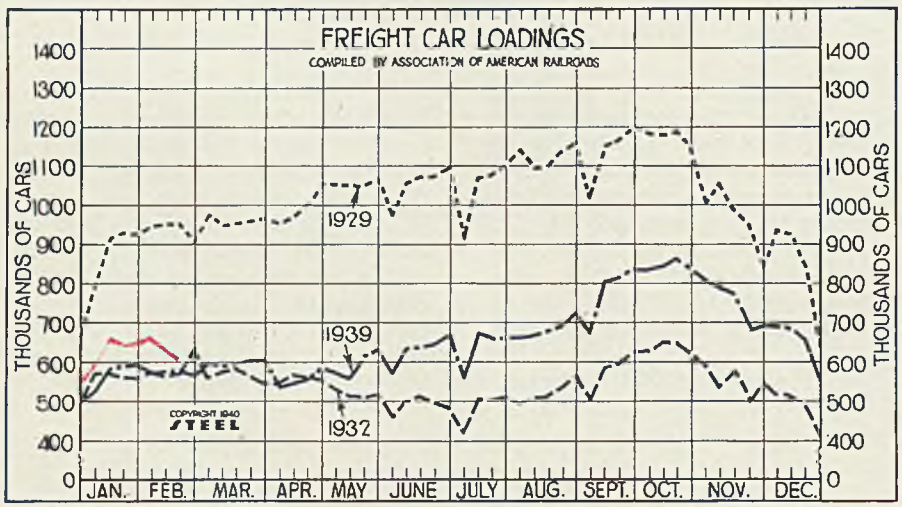
Steel Ingot Operations

(Per Cent)

Week ended	1939	1938	1937
Nov. 18	93.5	63.0	35.0
Nov. 25	93.5	62.0	31.5
Dec. 2	94.0	61.0	30.5
Dec. 9	94.0	61.0	27.0
Dec. 16	92.5	58.0	27.0
Dec. 23	90.5	52.0	23.0
Dec. 30	75.5	40.0	21.0

Week ended	1940	1939	1938	1937
Jan. 6	86.5	51.5	26.0	79.5
Jan. 13	86.0	52.0	29.0	79.0
Jan. 20	84.5	51.5	30.5	80.0
Jan. 27	81.5	51.5	33.0	76.0
Feb. 3	76.5	53.0	31.0	79.5
Feb. 10	71.0	54.0	30.0	81.0
Feb. 17	69.0	55.0	31.0	83.0





Freight Car Loadings

(1000 Cars)

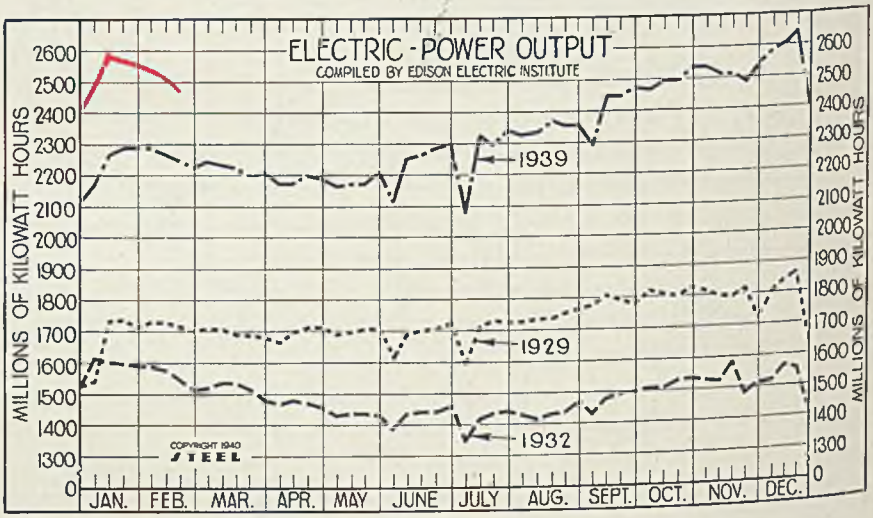
Week ended	1940	1939	1938	1937
Nov. 25		677	562	559
Dec. 2		689	649	623
Dec. 9		687	619	622
Dec. 16		681	606	603
Dec. 23		655	574	460
Dec. 30		550	500	457
Jan. 6	592	531	552	699
Jan. 13	668	587	581	700
Jan. 20	646	590	570	670
Jan. 27	650	594	553	660
Feb. 3	553	577	565	675
Feb. 10	627	580	543	692
Feb. 17	608†	581	536	715

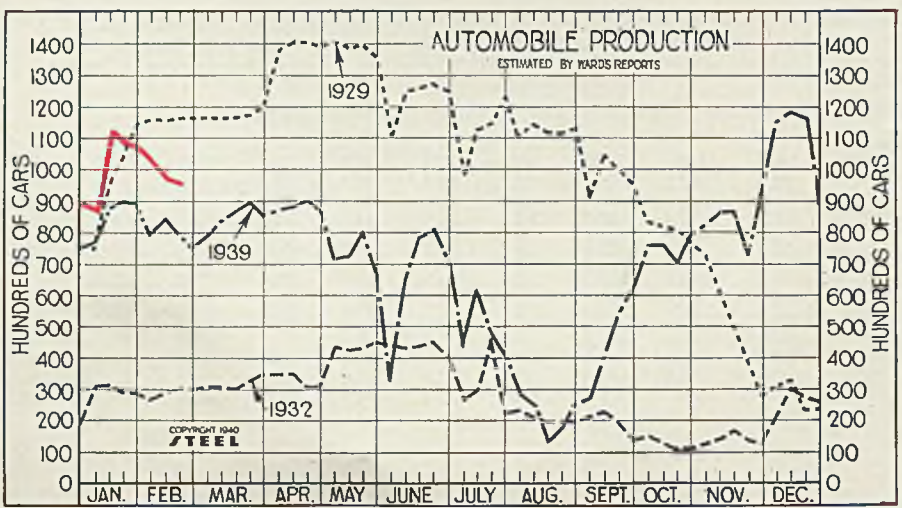
†Preliminary.

Electric Power Output

(Million KWH)

Week ended	1940	1939	1938	1937
Nov. 18		2,514	2,270	2,224
Nov. 25		2,482	2,184	2,065
Dec. 2		2,539	2,286	2,153
Dec. 9		2,586	2,319	2,196
Dec. 16		2,605	2,333	2,202
Dec. 23		2,641	2,363	2,085
Dec. 30		2,404	2,121	1,998
Jan. 6	2,473	2,169	2,140	2,244
Jan. 13	2,593	2,270	2,115	2,264
Jan. 20	2,572	2,290	2,109	2,257
Jan. 13	2,566	2,293	2,099	2,215
Feb. 3	2,541	2,287	2,082	2,201
Feb. 10	2,523	2,268	2,052	2,200
Feb. 17	2,476	2,249	2,059	2,212

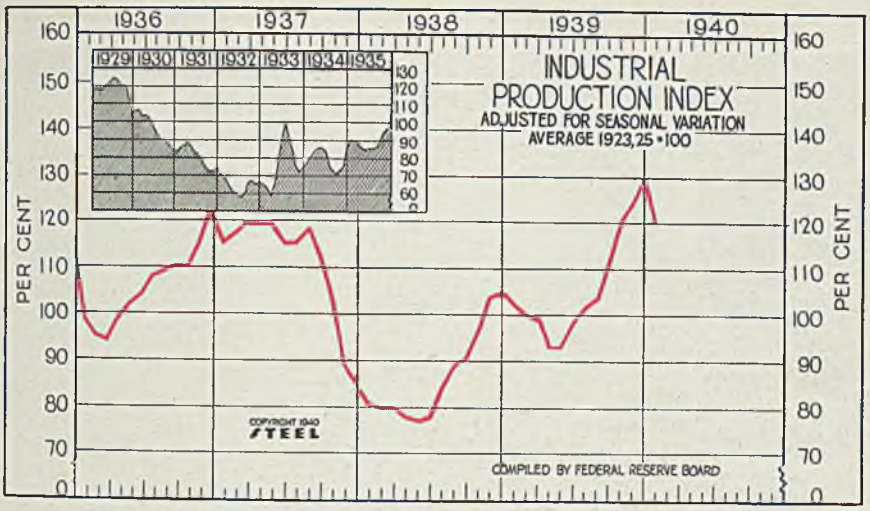




Auto Production

(1000 Units)

Week ended	1940	1939	1938	1937
Nov. 18		86.7	96.7	85.8
Nov. 25		72.5	84.9	59.0
Dec. 2		93.6	97.8	86.2
Dec. 9		115.5	100.7	85.8
Dec. 16		118.4	102.9	82.0
Dec. 23		117.7	92.9	67.2
Dec. 30		89.4	75.2	48.6
Jan. 6	87.5	76.7	54.1	96.8
Jan. 13	111.3	86.9	65.7	91.7
Jan. 20	108.5	90.2	65.4	81.4
Jan. 27	106.4	89.2	59.4	74.1
Feb. 3	101.2	79.4	51.4	72.3
Feb. 10	96.0	84.5	57.8	72.8
Feb. 17	95.1	79.9	70.1	95.7



Industrial Production
Federal Reserve Board's Index

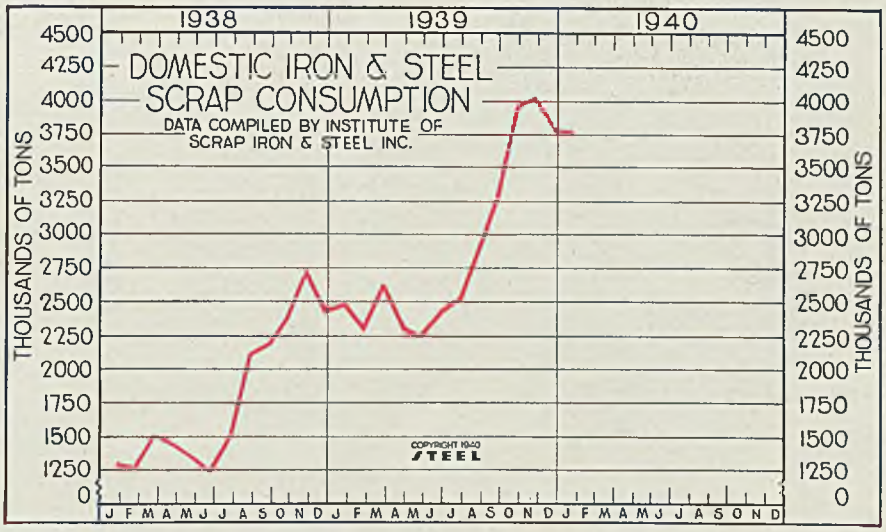
(1923-25 = 100)

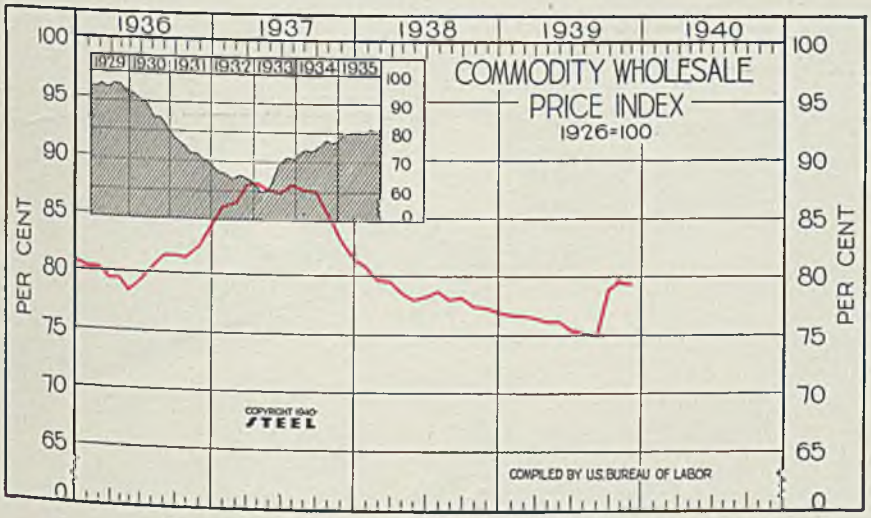
	1940	1939	1938	1937	1936
Jan.	120	101	80	114	98
Feb.	...	99	79	116	94
Mar.	...	98	79	118	93
April	...	92	77	118	98
May	...	92	76	118	101
June	...	98	77	114	103
July	...	101	83	114	107
Aug.	...	103	88	117	108
Sept.	...	111	90	111	109
Oct.	...	120	96	102	109
Nov.	...	124	103	88	114
Dec.	...	128	104	84	121
Ave.	...	106	86	110	105

Iron and Steel
Scrap Consumption

Gross Tons

	1940	1939	1938
Jan.	3,775,000	2,495,000	1,332,000
Feb.	.....	2,313,000	1,306,000
Mar.	.....	2,634,000	1,543,000
Apr.	.....	2,317,000	1,477,000
May	.....	2,263,000	1,387,000
June	.....	2,428,000	1,257,000
July	.....	2,551,000	1,520,000
Aug.	.....	2,919,000	2,133,000
Sept.	.....	3,282,000	2,218,000
Oct.	.....	3,974,000	2,393,000
Nov.	.....	4,025,000	2,740,000
Dec.	.....	3,805,000	2,441,000
Total	.....	35,006,000	21,746,000





All Commodity
Wholesale Price Index
U. S. Bureau of Labor

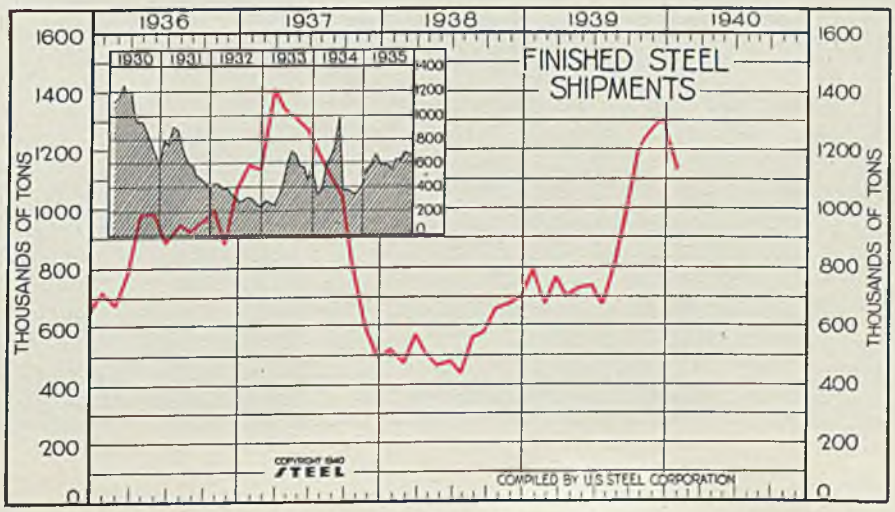
(1926 = 100)

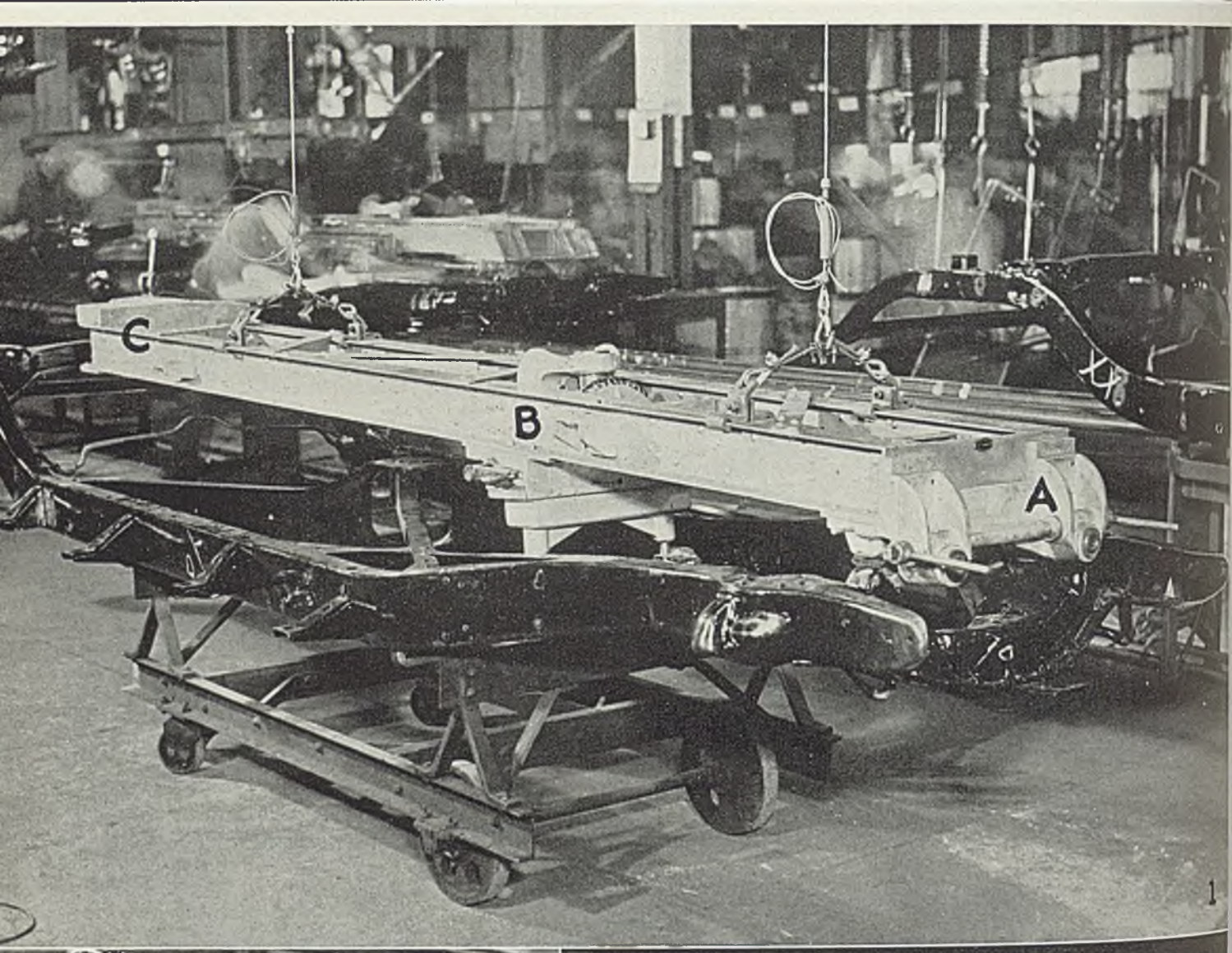
	1939	1938	1937	1936
Jan.	76.9	80.9	85.9	80.6
Feb.	76.9	79.8	86.3	80.6
March	76.7	79.7	87.8	79.6
April	76.2	78.7	88.0	79.7
May	76.2	78.1	87.4	78.6
June	75.6	78.3	87.2	79.2
July	75.4	78.8	87.9	80.5
Aug.	75.0	78.1	87.5	81.6
Sept.	79.1	78.3	87.4	81.6
Oct.	79.4	77.6	85.4	81.5
Nov.	79.2	77.5	83.3	82.4
Dec.	79.1	77.0	81.7	84.2
Average	77.1	78.6	86.3	80.8

Finished Steel Shipments
U. S. Steel Corp.

(Unit: 1000 Gross Tons)

	1940	1939	1938	1937	1936
Jan.	1145.6	789.3	518.3	1150.0	721.4
Feb.	.....	678.0	474.7	1134.0	676.3
Mar.	.....	767.9	572.2	1414.0	783.6
April	.....	701.5	502.0	1344.0	979.9
May	.....	723.2	465.1	1304.0	984.1
June	.....	733.4	478.1	1260.0	886.1
July	.....	676.3	441.6	1187.0	950.9
Aug.	.....	803.8	558.6	1108.0	923.7
Sept.	.....	985.0	577.7	1048.0	961.8
Oct.	.....	1219.0	663.3	792.3	1007.0
Nov.	.....	1270.1	679.7	587.2	882.6
Dec.	.....	1304.3	694.2	489.1	1067.0
Ave.	.....	887.7	552.1	1069.0	902.1

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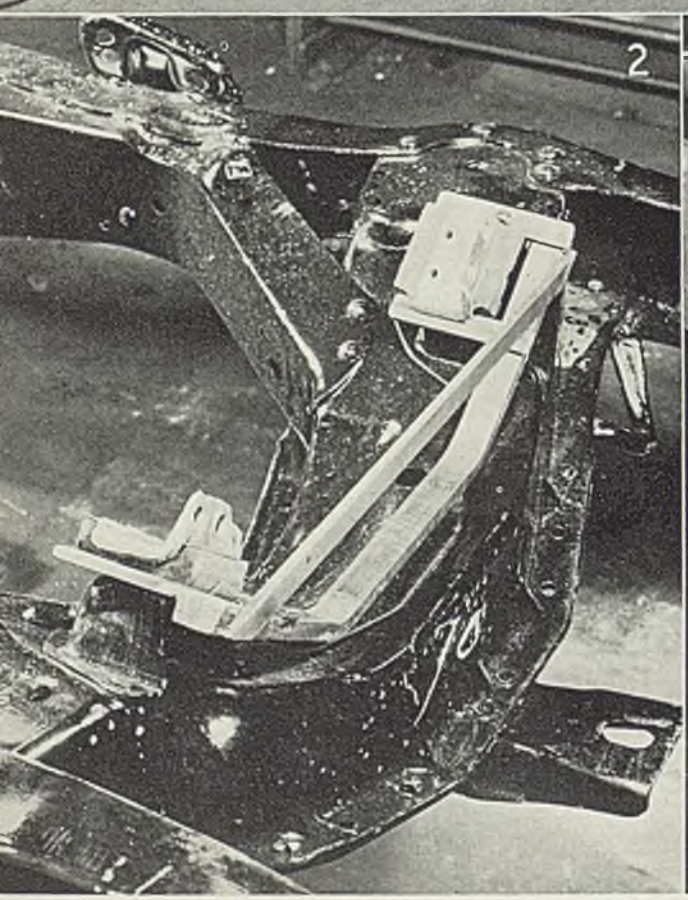
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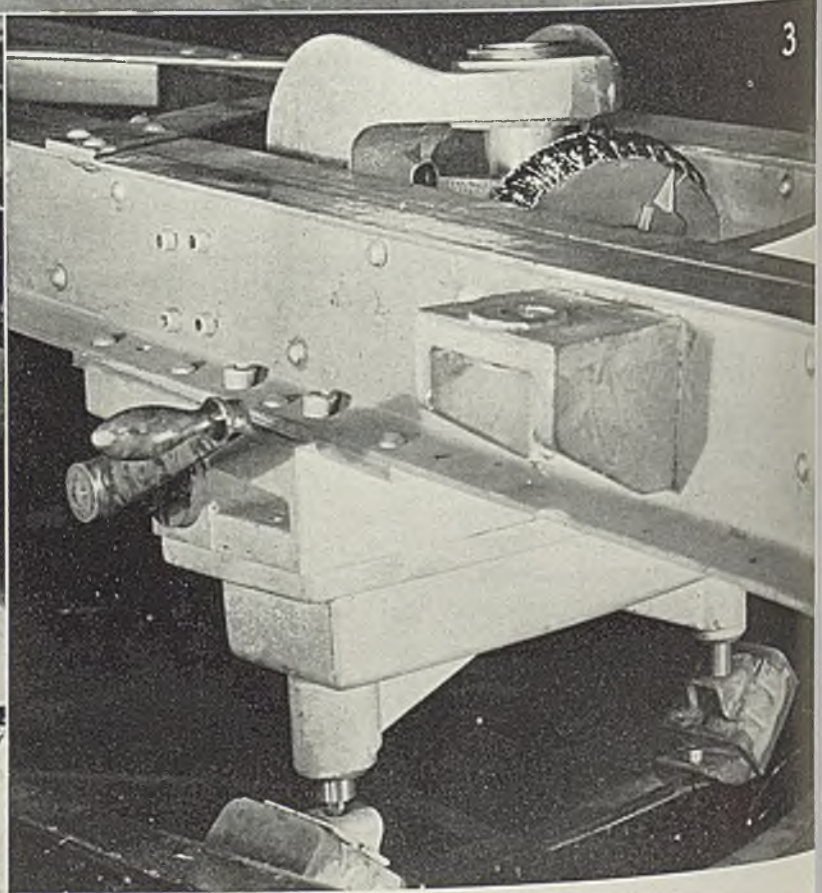

3

Magnesium Alloy Frame Jig

■ FOR PROPERLY and accurately locating the power plant in the frame on new Buick 1940 automobiles, a special fixture of extruded and cast Magalloy (magnesium alloy) has been developed. It helps obtain maximum performance from the new engine mountings incorporated in current design.

The fixture, Fig. 1, is used to align the centerline of the crankshaft with the propeller shaft, thereby assuring that the drive is directly through the lateral centerline of the car. It also permits checking height of both rear engine mountings to be sure they are exactly equal.

Magalloy is used for this fixture because it provides the proper amount of rigidity and at the same time gives extreme lightness. The material weighs only two-thirds as much as aluminum and is approximately one-fifth the weight of steel. Handling the fixture thus is greatly facilitated.

Another quality of the material is that it resists abrasion to a remarkable degree. It is for this reason that the alloy is employed in such exacting uses as foundry core boxes, etc., where abrasive action due to contact with core sand is unusually high.

Front Mountings Positioned by Jig

Buick engines are secured first to the front mountings at each side of the timing gear cover. Consequently if one of the rear mountings is lower than the other, the higher one will support most of the engine weight at the rear. Then if the engine were secured to the lower mounting without use of spacers, undue strain would be placed on the mounting with probable distortion of frame and engine.

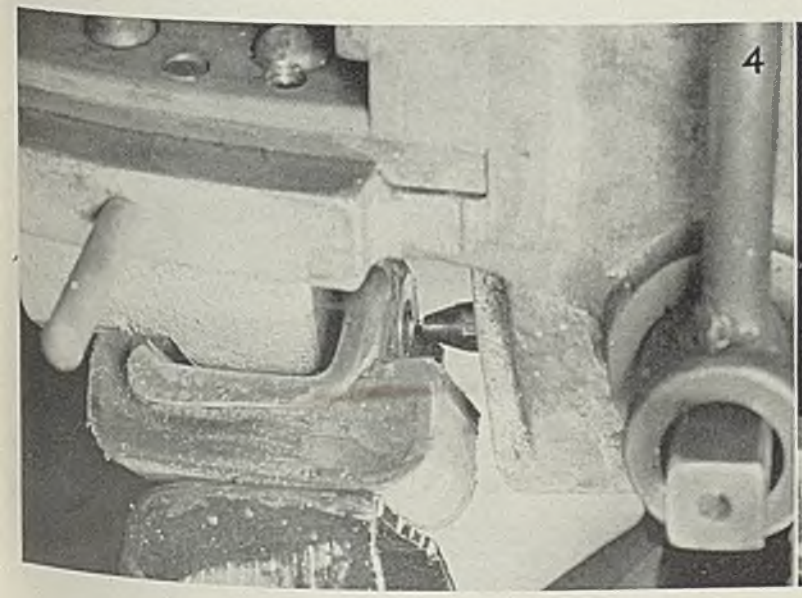
Just prior to use of the gage, a Magalloy jig is used to position accurately the two front rubber mountings near A, Fig. 1. This jig, Fig. 2, holds the mountings with their faces square and in same vertical plane.

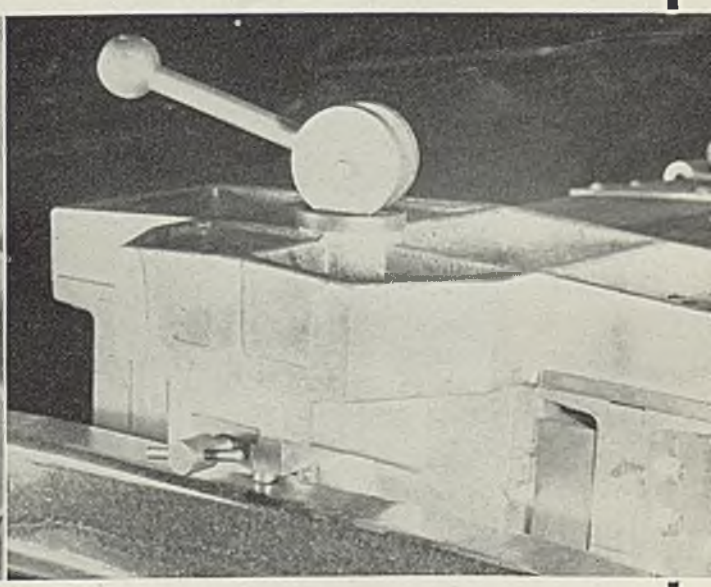
In using the rear-engine-mounting locating fixture, it is placed over the frame and located at the front, A, Fig. 1, by bolt holes in the front engine mountings as shown by details in Fig. 4. Fixture is located at rear by a gage-hole in center of cross member at the kickup, point C, Fig. 1. Detail of piloting fixture at C is shown in Fig. 5.

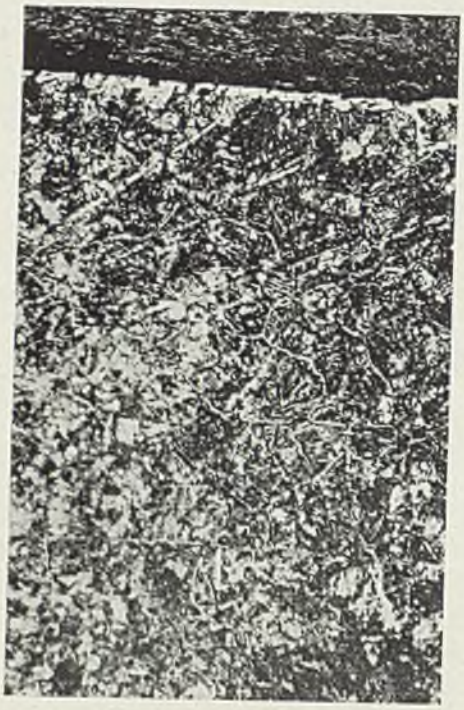
Plug gages then are lowered into tapped holes in top of engine mountings as shown at B, Fig. 1, and in Fig. 3. When plug gages are fully engaged, mountings are correctly placed and then are tightened securely in position. When fully engaged, a shoulder on each of the plug gages rests against top of each mounting, Fig. 3. By means of an appropriate linkage, the amount that one mounting is lower than the other is indicated on a dial on top of the fixture.

If dial pointer, Fig. 3, indicates zero, top faces of mountings are level; if to the right, the righthand mounting is lower and if to the left, the left one is lower. Each gradation on the dial represents 0.060-inch variation in height of the mountings and indicates the number of spacers to be used. These spacers are in two thicknesses—one 0.060-inch and the other 0.120-inch. When placing engine in chassis, the required number are inserted between engine and mounting on the side where needed.

Photos courtesy Magnesium Fabricators Inc., Adrian, Mich., a division of Bohn Aluminum & Brass Corp., 1400 Lafayette building, Detroit.







This article written especially for STEEL discloses important original research in welding of free-machining high-sulphur low-carbon steels and indicates the possible importance of similar work in the field of commercial low-alloy steels

Welding Hig

By J. H. HRUSKA
Metallurgical Engineer
Electro-Motive Corp.
La Grange, Ill.

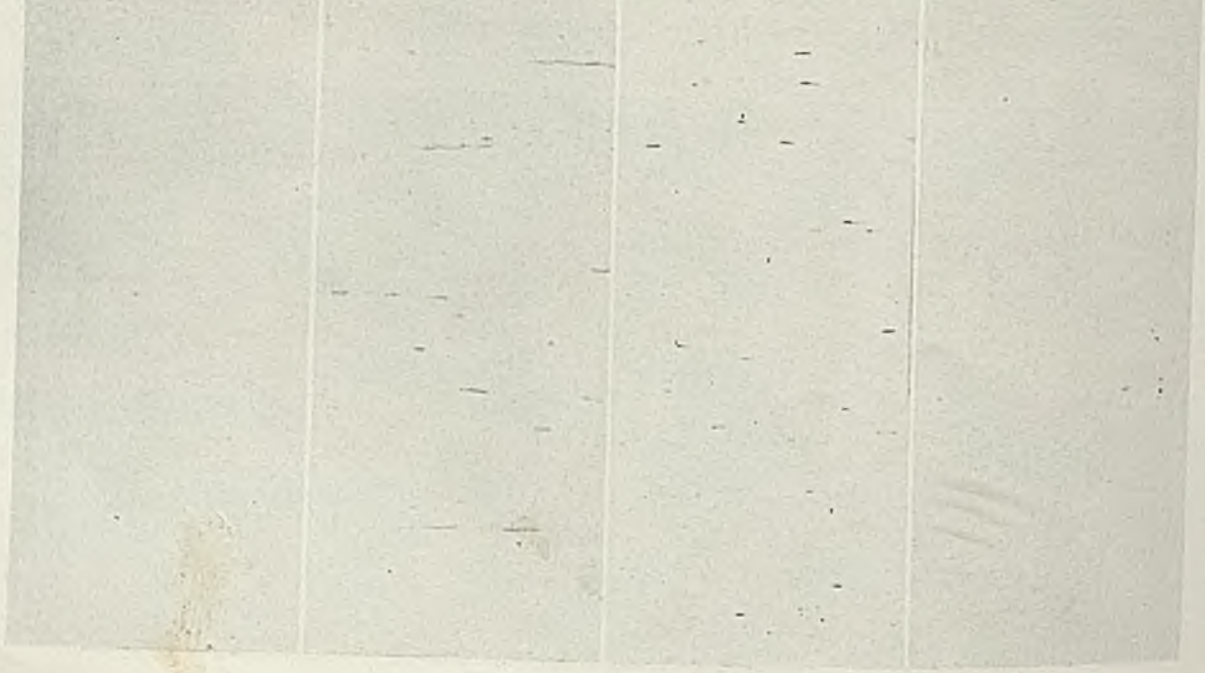
■ ALTHOUGH most steel users and metallurgists fully recognize the role of various concentrations of sulphur in commercially useful ferrous products, a survey of literature discloses only limited information available on actual weldability of high-sulphur steels. It appears further that the prime functions of sulphur in steel have been dealt with only from a viewpoint of machining properties.

Recent efforts of engineers to broaden the admittedly desirable economy of high-sulphur steels also to those fields where welding would fulfill a demand for such combinations are not so clear. This thought has prompted the writer to investigate what seems to be the most promising series of modern high-sulphur steels for welding purposes.

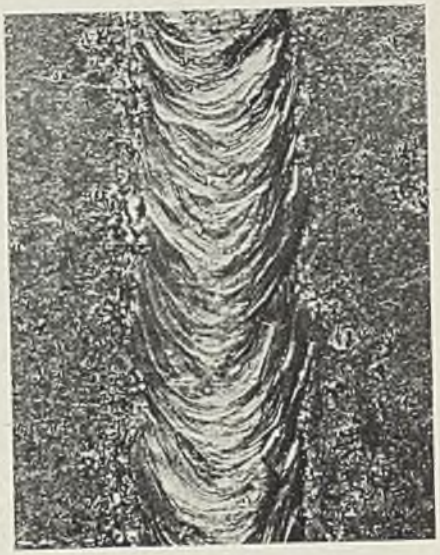
Howe, Sauveur and other well-known metallurgists have carried out basic research work which has brought about a thorough knowledge of metallographic fundament-

Fig. 1. (Above)—Grain size test at 100 diameters with high-sulphur steel containing 0.244 per cent sulphur

Fig. 2. (Below)—Photo micrographs at about 100 diameters showing unetched sections of (left to right) SAE 1020, SAE 1120, SAE X1315 and SAE X1515 steels. Courtesy W. J. Holliday & Co., 545 West McCarty street, Indianapolis



Sulphur Steels



Adding manganese to parent metal and electrodes cuts porosity, gives welds in free-cutting steels as strong as in other low-carbon types. May also aid in welding free-cutting low-alloy compositions

als in the conception of sulphur in steel. This work dealt, of course, with the metallography of ferrous matter rather than the economic possibilities of various grades of steel in regard to tensile properties, impact, machinability and the like.

Impetus of economic importance was given shortly before the World war by the introduction of basic bessemer steels of free-machining types in several European plants. One of the first welding tests made was with stock of about the following analysis:

	Per cent
Carbon	0.04
Manganese	0.46
Phosphorus	0.047
Sulphur	0.214
Silicon	trace

Actual results of these tests were definitely unsuccessful. In later years when the Society of Automo-

Fig. 3. (Below)—Micrograph of automatically welded 2¾-inch steel plate containing 0.244 per cent sulphur and 1.08 per cent manganese. Outline of beveling before welding shown

Fig. 4. (Above)—Weld produced manually by joining high-sulphur plate using 1.48 per cent manganese electrodes, full size view

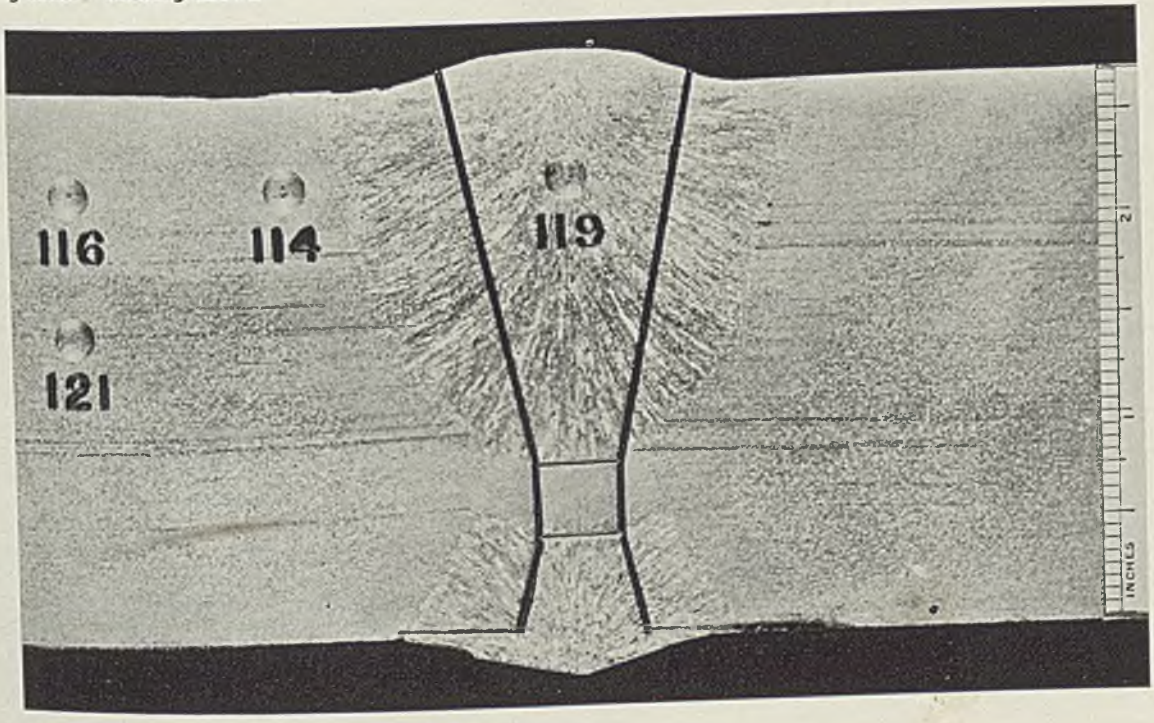


TABLE I

Classification of Free-Cutting Steels

SAE No.	Carbon	Manganese	Phosphorus	Sulphur
	Per Cent			
1112	0.08-0.16	0.60-0.90	0.09-0.13	0.10-0.20
X1112	0.08-0.16	0.60-0.90	0.09-0.13	0.20-0.30
1115	0.10-0.20	0.70-1.00	max. 0.045	0.075-0.15
1120	0.15-0.25	0.60-0.90	max. 0.045	0.075-0.15
X1314	0.10-0.20	1.00-1.30	max. 0.045	0.075-0.15
X1315	0.10-0.20	1.30-1.60	max. 0.045	0.075-0.15

TABLE II

Typical Free Cutting Steels

Nominal SAE No.	Process of Manufacture	Carbon	Manganese	Phosphorus	Sulphur	Mn/S Ratio
		Per Cent				
1112	Acid Bessemer	0.10	0.81	0.102	0.200	4.04
X1112	Acid Bessemer	0.10	0.90	0.097	0.300	3.00
1115	Open Hearth	0.16	0.98	0.012	0.116	8.46
1120	Open Hearth	0.22	0.75	0.011	0.108	6.93
X1314	Open Hearth	0.17	1.25	0.014	0.113	11.08
X1315	Open Hearth	0.20	1.30	0.015	0.130	10.0
"X1515" (see text)	Open Hearth	0.15	1.27	0.014	0.224	5.68

tive Engineers introduced the now universal classification of free-cutting steels those series defined as SAE 1100 and 1300 still were indicative of "poorly weldable" grades of steel.

At the present time, most high-sulphur steels used in various industries may be classified into one of the groups summarized in Table I. This tabulation includes grades with not over 0.25 per cent carbon, the general maximum not exceeding 0.20 per cent carbon. Modern welding technique is, without doubt, in good agreement with these requirements. The metallographic effects of sulphur upon such low-carbon steels then are easily ascertained by means of microscopic studies. Most of the sulphur present appears as a sulphide, predominantly manganese sulphide, which forms gray globular aggregates frequently elongated in the direction of rolling. The photomicrographs in Fig. 2 clearly show this condition and the relative sulphide distribution in the matrix.

Liberation of Gases Important

Fusion welding in its present state is a localized melting process under definite thermal and chemical conditions. Electrically applied heat obviously melts not only the ferrous portion of the metal but also liquefies the inclusions. This means that sulphide slag particles subsequently may be entrapped during solidification. In addition, thermochemical reactions may evolve some sulphur dioxide and other gases such as hydrogen and carbon monoxide. These gases escape only if the fluidity of the liquid melt allows them to do so. If the liberated gases cannot rise to the surface because of high vicosity of the liquid metal, blowholes naturally must result.

In the past, reported attempts to weld high-sulphur steels invariably were associated with blowholes in the finished welds. It is evident from these observations that such gases are less soluble at lower temperatures than at high temperatures. It is equally important to realize a prolonged heating during the welding operation definitely will reduce danger of producing undesirable cavities in the fusion weld metal.

Fig. 5—Micrograph at 100 diameters of specimen shown in Fig. 4. Transition zone between case and core

Corrective measures, therefore, are evident. The welder must "puddle" his metal longer, should prefer higher welding current or a longer arc and should be given further assistance metallurgically by increasing the fluidity of the manganous and other sulphide inclusions.

The last of these requirements brings about the rather interesting conclusion as to the general adoption of electrode and parent metal specifications. Comparison by the writer of weldability of the generally used steels gave some interesting suggestions as to material specifications. Table II presents a summary of typical analyses of commercially available free-cutting steels which may be considered for

TABLE III

Comparison of Welded Plate Materials

Grade of Steel	Armco Ingot Iron	SAE 1015	"X1515"
Chemical Analysis:			
Carbon, %	0.01	0.17	0.17
Manganese, %	0.03	0.46	1.21
Silicon, %	trace	0.01	0.02
Phosphorus, %	0.005	0.012	0.015
Sulphur, %	0.022	0.026	0.258
Physical Properties of Weld Metal:			
Tensile Strength, p.s.i.	43,600	56,930	58,200
Yield Point, p.s.i.	27,700	36,120	45,650
Elongation in 2", %	50.0	31.4	28.2
Reduction of Area, %	80.2	42.5	39.3
Brinell Hardness	87	139	121
Charpy Impact, ft.-lb.	not. det.	27.4	48.6
Bend Test	O.K.	O.K.	O.K.
Carburizing Test:			
Temperature, °F.	1,700	1,700	1,700
Carburizing Time, hrs.	10	10	10
Total Depth of Case, in.	0.071	0.068	0.079
Quenching Temperature, °F.	1,450	1,450	1,450
Quenching Medium	water	water	water
Surface Hardness, Rockwell C.	65.8	64.8	66.4
Core Hardness, Rockwell C.	11.4	17.0	16.5

TABLE IV

Chemistry of High Sulphur Automatic Weld

	Plate Metal	Thermal Zone	Weld Metal
		Per cent	
Carbon	0.14	0.15	0.15
Manganese ..	1.27	1.22	0.96
Silicon	0.03	0.02	0.26
Sulphur	0.224	0.209	0.158
Mn/S Ratio..	5.68	5.83	6.06

welding. The last column in this table presents the ratio of manganese to sulphur.

The seventh of the steels in Table II is not of nominal SAE grade, but differs in an exceptionally high sulphur and correspondingly high manganese concentration. Its manganese-sulphur ratio, however, is somewhere between the two extremes of the SAE 1100 and 1300 series.

Tests made with this particular steel by welding manually or automatically thin as well as heavy sections showed rather surprising results. In both cases the weld must be classified as practically perfect. Photomacrograph in Fig. 3 is a cross section of a plate 2¾ inches thick welded at 2400 amperes at a speed of 6 inches per minute (top), and 1200 amperes and 6 inches per minute (bottom). Hardness of the various principal zones also is shown in the macrograph.

Fig. 4 is a full-size view of a manually produced weld. It is important to realize that the welding was done using an electrode with 1.48 per cent manganese in the hand weld and 1.10 per cent manganese in the automatic weld. Full metallurgical report of comparative welds is presented in Table III. An analysis of various concentrations of elements of a section shown in Fig. 3 is given in Table IV.

Inclusions of oxides, sonims and the like are perhaps most critical to certain metallurgical properties. In order to define these conditions, experiments were made with material containing:

	Per cent
Carbon	0.18
Manganese	1.08
Phosphorus	0.016
Sulphur	0.244
Silicon	0.03

This material first was used for the standard carburizing tests as specified by the McQuaid-Ehn method. Figs. 1 and 5 show the surface and the transition zone, respectively, of these specimens. The core of the same material after annealing at 1475 degrees Fahr. is shown in micrograph Fig. 6.

As a final checkup on the characteristics of the material, magnetizing tests were made. Fig. 7 shows definitely there is little difference between the two types of steel. Table V is the tabulation from which the diagram was constructed.

This admittedly unfinished investigation presents data which should broaden the present scope of usefulness of high-sulphur steels. While certainly the vast majority of such commercial grades are of the simple carbon steel type, perhaps it may be worthwhile to conduct similar experiments in the much wider field of commercially produced low-alloy steels.

Arc welding, either manual or automatic, is definitely adaptable to high-sulphur materials. Static and dynamic tests furthermore have proved the resultant joint to be as strong as joints in any of the other low-carbon steels.

It is imperative, however, that the low quality of ordinary high-sulphur welds be improved by the addition of such elements to the parent metal, as well as to the electrodes, which will offset this deficiency. Manganese is one of the desirable curatives in this respect.

In summary, several operative factors appear to be important in welding high-sulphur steels. However, the simplicity with which this operation may be carried out successfully depends upon the definite assistance which may be rendered by judicious combination of the elements which are commonly present in steels of welding grade.

TABLE V

Effect of Sulphur on Flux Density At Various Magnetizing Forces

Magnetizing Force "H" in Gilberts per cm.	Flux Density "B" in Kilogausses for Steel (0.022% S) with 0.09% C	0.15% C
10	13.3	11.4
20	14.8	13.9
40	16.3	15.6
60	17.2	16.5
80	17.8	17.1
100	18.2	17.5
120	18.6	18.0
140	18.9	18.3
160	19.2	18.6

Magnetizing Force "H" in Gilberts per cm.	Flux Density "B" in Kilogausses for Steel (0.244% S) with 0.09% C	0.15% C
10	12.0	10.8
20	14.7	13.6
40	16.4	15.5
60	17.4	16.3
80	17.9	16.9
100	18.2	17.3
120	18.5	17.7
140	18.8	18.0
160	19.0	18.4

Fig. 6 — Micrograph of core of annealed specimen of high-sulphur steel. Manganese sulphide inclusions are clearly visible

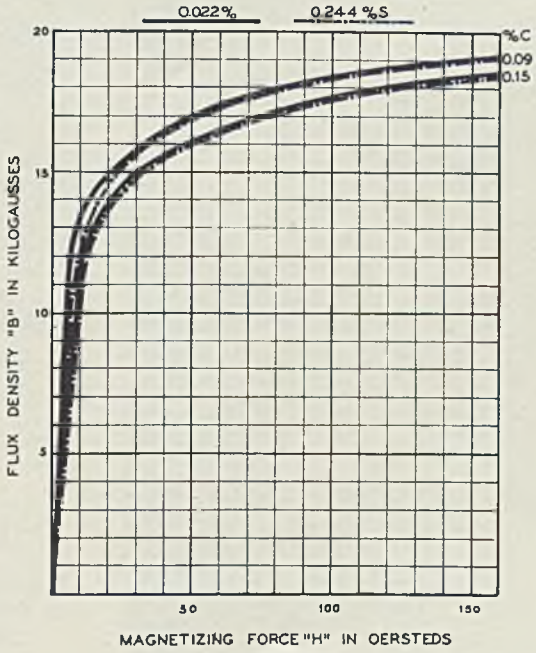


Fig. 7—Diagram showing magnetic properties of high and low-sulphur steels of identical carbon concentration

Cylinder Microstructure Studied

Investigation of wear phenomena shows irons with flake graphit give longest life. Wear in irons with much ferrite increases a amount of ferrite is raised. Coarse graphite gives porous bore

■ OBSERVATIONS on microstructure, composition, hardness and wear of cast iron cylinder bores, together with extensive details of laboratory tests on the relation of engine wear to microstructure and hardness were presented at recent meeting of Detroit chapters of Society of Automotive Engineers and American Foundrymen's association. The first paper was given by E. K. Smith, metallurgist, Electro Metallurgical Co., 30 East Forty-second street, New York; the second by Paul S. Lane, research engineer, American Hammered Piston Ring division, Koppers Co., Bush and Hamburg streets, Baltimore.

The microstructure study prepared by Mr. Smith was undertaken on both new motor blocks and on those which had definite mileage and measured wear, in an effort to throw light on: What is the actual variation in structure of the present-day cylinder bores at the point of maximum wear? How does variation in structure actually affect wear? What is the most desirable structure for cylinder bores considering machinability, cost and wear? How can such structures be obtained practically?

Ten motor-block sections were obtained from eight different cars. Chemical analyses and photomicrographs were made and studied. Samples were taken at a spot about ½-inch from the top of the bore on the side of either No. 2, No 5 or No. 7 cylinder. Then bores with measured mileage and wear were analyzed similarly. Three micrographs were made of each spot. The first, at 100 diameters, unetched, shows graphite formation; the second, at 100 diameters etched with nital, shows the general structural components of the iron; the third, at 1000 diameters etched with nital, shows the detailed structure for study of wear. Mr. Smith presented 42 micrographs in this group of tests, six of which are reproduced here.

Fig. 1. (Top)—Normal alloyed new-block structure, unetched, at magnification of 100 diameters

Fig. 2. (Center)—Same as Fig. 1 but etched with nital

Fig. 3. (Bottom)—Same as Fig. 2 but at 1000 diameters and showing pearlitic structure with little ferrite

Ferrite Increases Wear

Figs. 1, 2 and 3 show a normal alloyed iron with a pearlitic structure and a small amount of ferrite. Hardness is 197 brinell. Analysis shows 2.14 per cent silicon, 0.56 manganese, 3.32 total carbon, 0.113 sulphur, 1.195 phosphorus, 0.61 chromium, 1.45 nickel and 0.01 molybdenum.

Figs. 4, 5 and 6 are micrographs of a block which showed excellent wearing qualities. It is of the low-alloy type containing chromium and nickel. In spite of the presence of appreciable carbides, the blocks were readily machinable and showed low rate of wear. Hardness was 201 brinell. Analysis showed 2.01 per cent silicon, 0.82 manganese, 3.40 total carbon, 0.118 sulphur, 0.176 phosphorus, 0.21 chromium, 0.23 nickel and 0.02 molybdenum. Wear was 0.000467-inch per 10,000 miles.

Certain postulations were made from Mr. Smith's investigation: Irons with flake graphite give the best wear (longest life). Irons with large amounts of ferrite give much wear with the wear increasing directly as the amount of ferrite. Irons with a ferrite fine graphite

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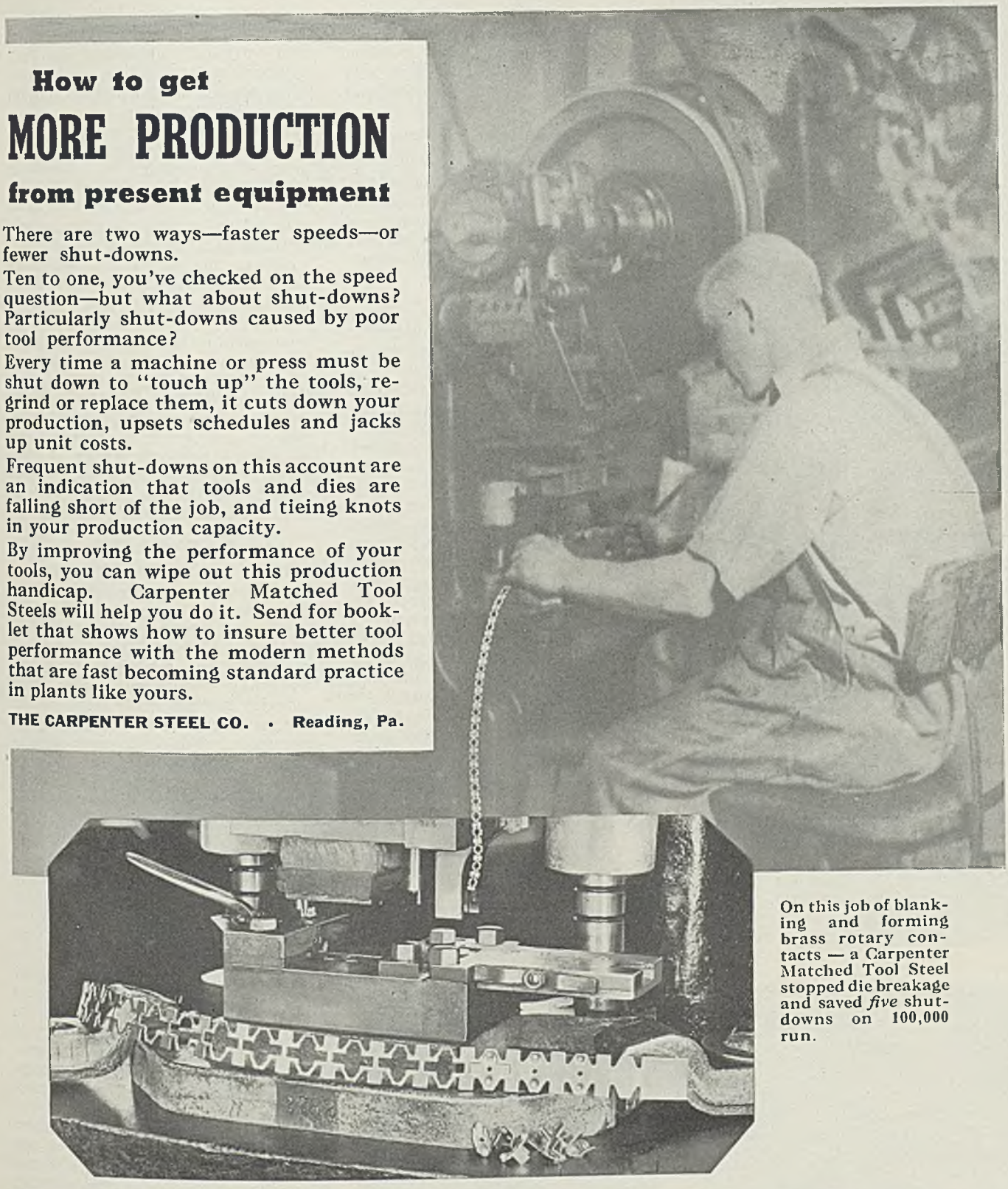

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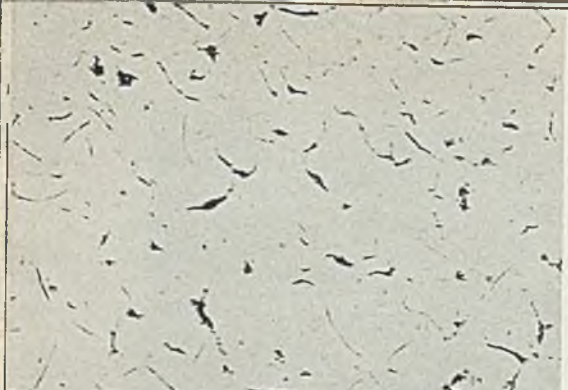

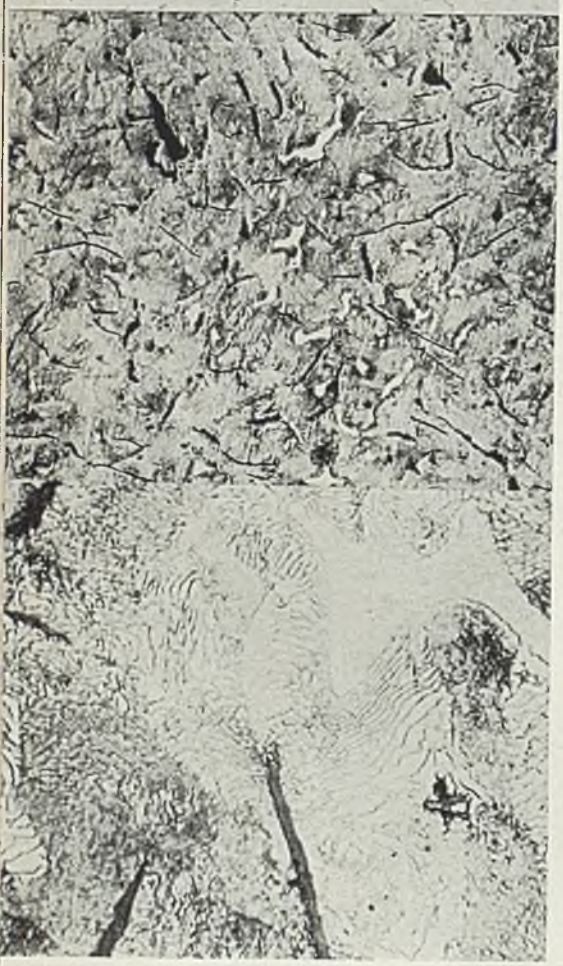

Fig. 4. (Right)—Structure after 40,000 miles of service, showing excellent wear resistance. Low-alloy type with chromium and nickel. Unetched, at magnification of 100 diameters

Fig. 5. (Second from top)—Same as Fig. 4 but etched with nital

Fig. 6. (Third from top)—Same as Fig. 5 but at 1000 diameters. In spite of appreciable carbides, this block was readily machined and showed only 0.000467-inch wear per 10,000 miles

structure give the most wear. Irons with excessively coarse graphite give porous bores. Though no direct relation between wear and structural components is ascertainable, nevertheless it appears the actual structure has an important relation to the wear of the cylinder.

Occasionally a bore is machined which exhibits small defects and the block is scrapped as "porous bore." Frequently this difficulty is caused by excessively coarse graphite resulting from too much silicon or carbon. The machining operation then tears out iron between the coarse graphite flakes, giving a rough appearance to the bore.

Causes of cylinder bore wear, including abrasion, corrosion and poor structure together with suggested cures, were reviewed by Mr. Smith. He pointed out that in many cases the objectionable ferrite fine graphite structure can be eliminated by the addition of ferrosilicon or ferromanganese silicon or other graphitizers in the ladle. Additions of bal-

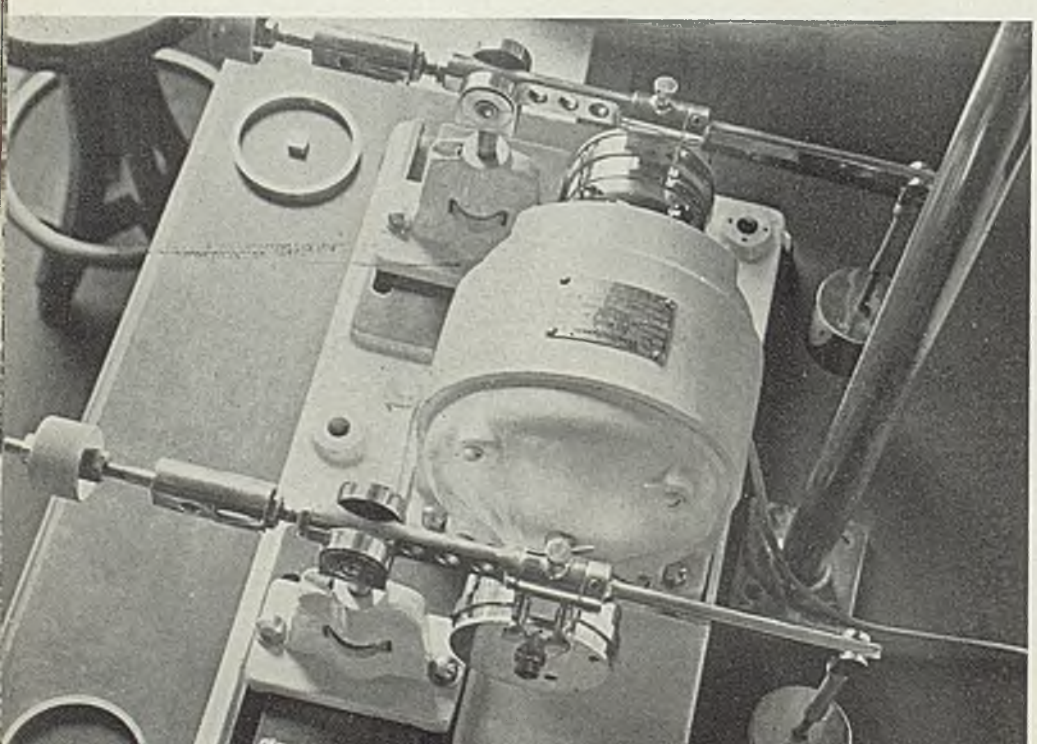

Fig. 7—Laboratory wear-testing machine. Test specimen is loaded and bears against revolving drum. Wear is determined by weight loss of both drum and specimen

anced alloys containing chromium and various graphitizers also are giving promising results as are combinations of molybdenum chromium and nickel chromium.

As preferred microstructure, having in mind machinability, cost and especially resistance to wear, Mr. Smith recommended one which at the position of maximum wear consists of an entirely pearlitic matrix with long thin flakes or normal graphite, no ferrite and sufficient particles of iron-chrome carbide to increase resistance to wear.

To obtain in the laboratory some conception of the mechanics of wear in cylinder bores, Mr. Lane devised a unit shown in Fig. 7. Of the brake shoe type, it has a revolving drum which represents the engine cylinder. A test specimen, representing a piston ring for example, is held against this and the specimen loaded with 5 pounds. A linear speed of 1375 feet per minute is maintained.

Determine Wear by Weight Loss

Wear is determined by weight loss of both the drum and the specimen proper. From many hundreds of determinations on irons of various types it has been possible to establish an arbitrary table of weight-loss values, giving a valuable index of probable wear resistance of the material under conditions of dry operation. Subject to many exceptions, Mr. Lane offered the following values as representing average wear with American automotive engines:

Cylinder wear per 10,000 miles.... 0.001 to 0.003-inch diameter increase.

Piston ring wear per 10,000 miles.. 0.003 to 0.005-inch diameter decrease.

Present practice in automotive engines calls for hardness of 230 to 260 brinell in piston rings, compared with 175 to 230 brinell for bore sections. Rings thus are harder than cylinders, even though it is desired to have the rings "give way" to the cylinders and take the major part of wear. Two explanations are possible. Either the rings, though harder than the bores, have a structure which wears faster or else the cylinder material, though softer, tends to throw more wear on the opposite rubbing surface. These conclusions are demonstrable by the dry-rubbing tests.

Reviewing his data, Mr. Lane acknowledged that recommendations for improvement of wear were limited but only served to illustrate that the subject of wear remains elusive, complex and dependent on almost innumerable variables. Though *practice* in regard to resisting wear is far ahead of *theory*, he was inclined to the viewpoint that an improved understanding of the nature of the materials now being used in engines is a good step toward finding or creating better ones.

Items of Interest about Vanadium

Vanadium Has Wide Application — Ferrovanadium is used for making fine-grained steels having high dynamic strength, fatigue resistance, and wear-resistance. Such steels include high-speed tool steels, nitriding steels, and many engineering and structural steels. Vanadium oxide and ammonium meta-vanadate are used for making other vanadium compounds useful to the chemical industries, one example being substitutes for the more costly platinum catalysts in the manufacture of sulfuric and nitric acids.

Vanadium Improves Steel Castings—A small amount of vanadium, usually not over 0.10 per cent, in steel castings refines grain, materially raises yield strength without sacrificing ductility, and greatly increases resistance to shock and fatigue. For instance, the addition of 0.10 per cent vanadium to a nickel steel raised the yield strength from 53,450 to 69,900 pounds per square inch and increased the Izod impact from 35.5 to 74.3 foot-pounds.

Vanadium Raises Fatigue Strength of Medium-Manganese Steels — The addition of a small amount of vanadium to medium-manganese steels gives them consistently high fatigue strength. Tests on a number of medium-manganese steels containing about 0.18 per cent vanadium showed an average fatigue limit of 70,400 pounds per square inch and an average fatigue ratio of 0.58.

Chromium-Vanadium Steels Help Carry the Loads of Industry — Wherever severe service demands a tough steel . . . a steel that can take punishment . . . chromium-

vanadium steels are the answer. Such highly stressed parts as springs, gears, sprockets, pneumatic and machine tool parts, roller bearing covers, pistons, axles, shafts of all kinds, connecting rods, and crankpins are better and last longer if made of chromium-vanadium steels.

Vanadium Steels for the Railroads — Fine-grained, shock-resistant vanadium steels are used for such engine and railroad car castings as main frames, crossheads, piston heads, wheel centers, driving boxes, rocker arms, equalizers, truck frames,

bolsters, and brake rigging. Wrought vanadium steels are used for helical springs, elliptical springs, and other parts requiring high dynamic strength.

• • •

If you want more information about Vanadium and the many other "Electromet" ferro-alloys and metals and the service that goes with their purchase, write for the booklet, "Electromet Products and Service."

Electromet
Trade-Mark
Ferro-Alloys & Metals

Available through offices of Electro Metallurgical Sales Corporation in Birmingham, Chicago, Cleveland, Detroit, New York, Pittsburgh, and San Francisco. In Canada: Electro Metallurgical Company of Canada, Ltd., Welland, Ont.

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The word "Electromet" is a registered trade-mark of Electro Metallurgical Company

Continuous Weighing

. . . permits accurate blending of ores to blast furnaces Vibratory feeder responds instantly to changes in demand. Con trolled over and under swings provide extremely accurate averag

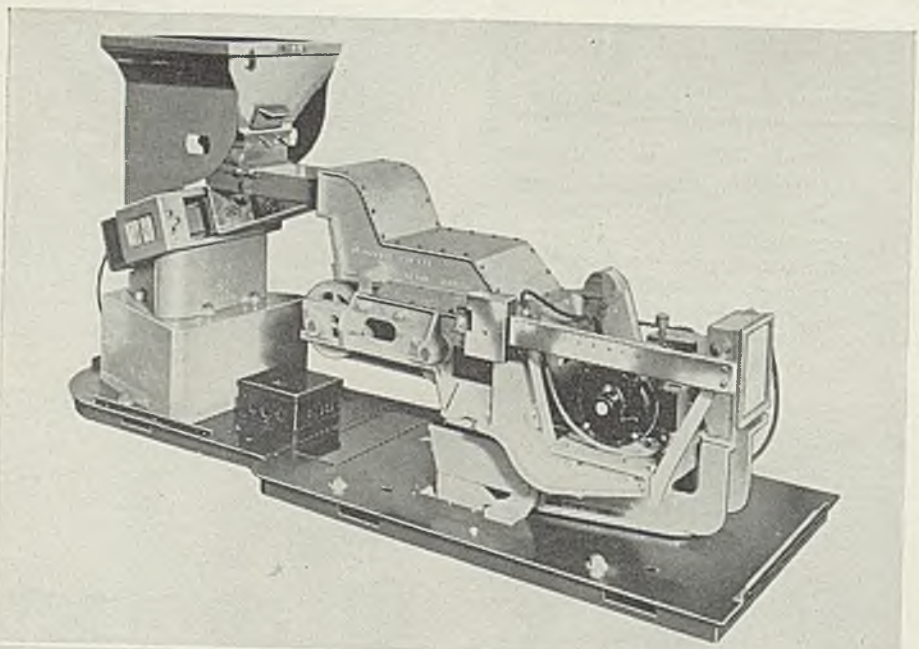
■ TO PRODUCE continuously controlled mixtures at either constant or varied rates, an interesting system of continuous, automatically controlled weighing has been developed recently. Advantages of feeding material continuously and accurately by weight are rather obvious. Applications of such a system are quite numerous. Chief interest to iron and steel producers is use of these machines for continuous blending of ore to produce the desired mixture ahead of the blast furnace. One producer already has purchased eight continuous weighing machines for this purpose.

By JAMES A. FLINT
Manager
Jeffrey-Traylor Division
Jeffrey Mfg. Co.
Columbus, O.

Under this type of feeding, large savings occur not only because the exact amount of material is fed, but probably what is more important, because the amount of material fed is not wrong.

One of the greatest handicaps to accurate and continuous feeding has been the lack of a feeder which could easily and instantly respond to changes asked for by control equipment. A high-frequency electric vibrating feeder has the ability within its designed range to meet changes which may be required almost instantly. Material is conveyed over such feeders by high-frequency vibrations of small amplitude, usually less than 1/32-inch. This vibration is applied to the feeder deck at an angle so the deck rises slightly on the forward stroke in the direction in which the material is being conveyed and falls on the reverse stroke, causing a forward ratcheting motion of the deck with respect to the material on it.

The vibrating deck may be supported in various ways, but is always mounted resiliently. The natural period of vibration of the vibrating deck on its mounting always is arranged to be sufficiently close



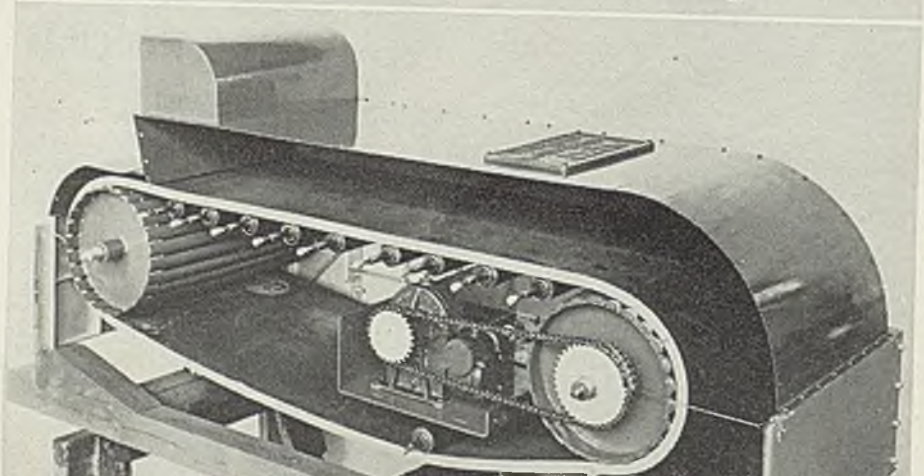
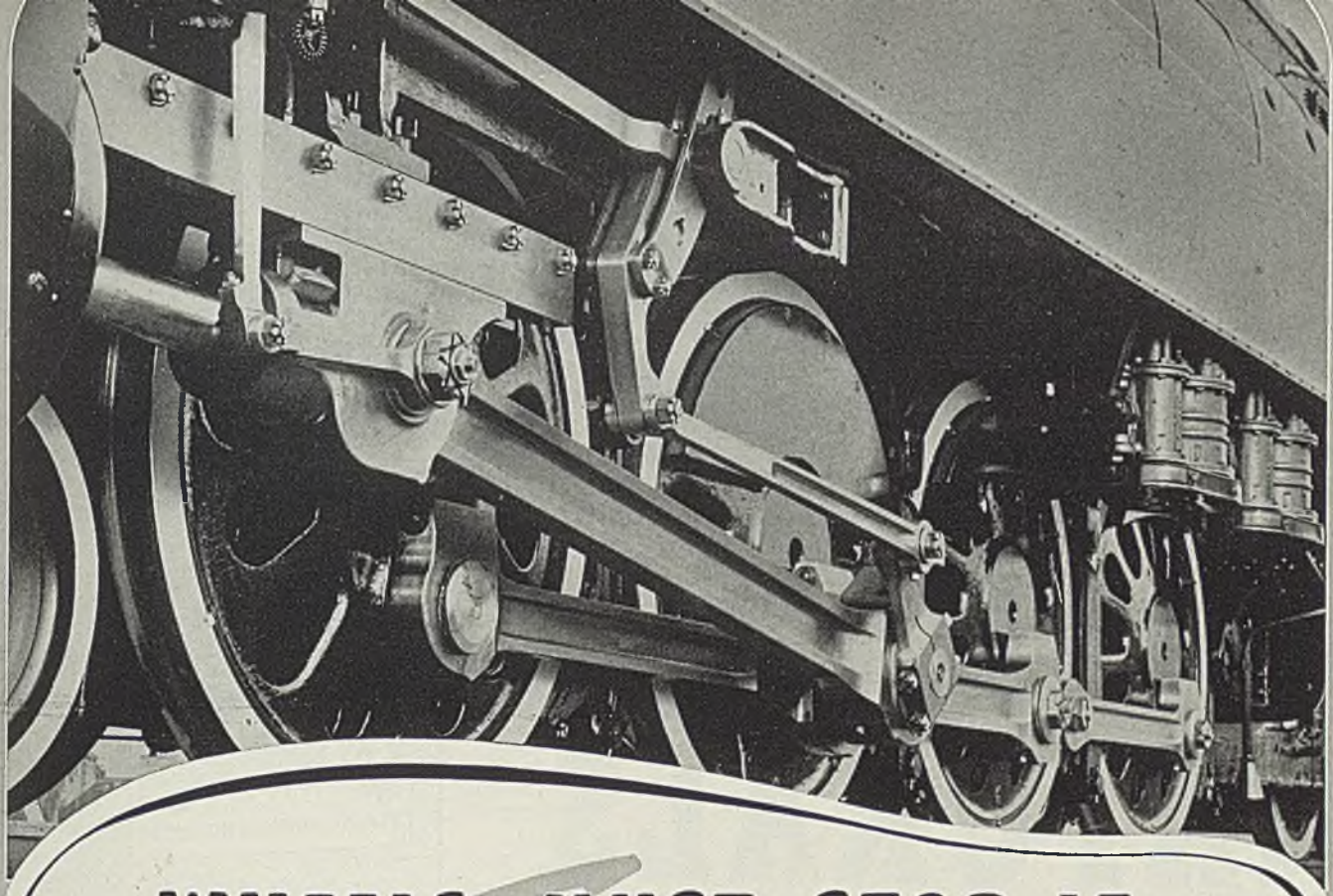


Fig. 1. (Upper)—Complete continuous-weighing system with outer cover removed to show parts. Conical bin feed at extreme left, counterpoise and scale at right

Fig. 2. (Lower)—Closeup of continuous belt conveyor unit with its enclosing cover

From paper presented at Philadelphia meeting of American Society of Mechanical Engineers, Dec. 4-8, 1939.



WHEELS MUST STOP IF Steels — LIKE MEN - GROW TIRED -

Overwork tires steels—causes fatigue—induces failures.

Larger sections to withstand the stresses do not invariably give the answer.

Today, weight and space limitations demand that smaller sections carry higher loads—safely—so the answer must be *alloy steels.*

Research into the behavior of steels subjected to repeated stress has taught steel users and makers that steels of the same tensile or hardness do not mean the same fatigue properties. Rather, the load-carrying ability of a steel depends upon the alloy constituents and the form of the structure at the time it is carrying the load.

This makes these attributes of Republic Alloy Steels worth your while to remember—

1. **They harden uniformly and easily.**
2. **They can be drawn back after quenching at a higher temperature for the same end point hardness.**
3. **The quench structure is more uniform than that of other steels.**
4. **The structure in the normalized and drawn state is more uniform.**

This table illustrates the importance of selecting the correct alloy, showing the fatigue limits on two steels treated to show the same tensile and hardness.

FATIGUE LIMITS—POUNDS PER SQUARE INCH

Steel and Treatment	On Polished Specimen	Specimen with notch ⅛" radius, ⅛" deep	Specimen with notch 1/16" radius, 1/16" deep
S. A. E. 1045 — normalized and tempered to tensile strength of 85,000 to 90,000	38,000	35,000	31,000
.25% carbon, 2.75% nickel steel—normalized and tempered to same tensile strength	52,000	47,000	41,000

From left to right in the table, the stress concentrations become increasingly severe and, under the worst conditions shown, the alloy steel has a fatigue limit higher than the un-notched and polished carbon steel specimens.

★ ★ ★

Since so many factors affect the "fatigue limit" of a part, the selection of the correct alloy steel and the details of its heat treatment is a matter in which the experience of the world's largest producer of alloy steels can help you. Write Republic Steel Corporation, Alloy Steel Div., Massillon, Ohio; General Offices, Cleveland, Ohio.

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

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REPUBLIC STEEL

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WORLD'S LARGEST PRODUCER OF ALLOY STEELS

FIVE NATURALS

Cast-to-Shape

AIR-HARDENING AND OIL-HARDENING TOOL STEELS—PLUS *FLAMALOY*

KROKOLOY—Chrome cobalt alloy castings for super-high production. Air-hardening.

MARTIN STEEL—High carbon, high chrome, alloy castings for medium high production. Air-hardening.

CASTALOY—A low-priced, high carbon, high chrome alloy. Air-hardening.

CARBOMANG—Oil-hardening. A high-grade, electric furnace, laboratory-controlled steel.

OUR complete line of steels, cast-to-shape, covers a wide range of applications, and includes a steel for practically any purpose you may specify.

Flamaloy, the latest addition to our line, is a thoroughly practical, easily-handled, flame-hardening steel. Flamaloy castings are extensively used for punches, pads and inserts in large pressed metal dies—where lesser alloyed steels with good physical properties and wear-resistant qualities are desired.

After machining Flamaloy castings, the areas or surfaces to be hardened may be heated with a torch and water-quenched for an approximate 600 Brinell.

Our alloy, air-hardening and oil-hardening tool steels are cast-to-shape with minimum machining allowance or file finish.

We are also glad to quote on any special alloy castings you may require.

DETROIT ALLOY STEEL COMPANY

Foot of Iron Street — Detroit, Michigan

to the frequency of alternating current which operates the magnet of the vibrator unit so the deck will vibrate at the frequency of the applied current and in synchronization with it.

Amount of material which the feeder discharges is controlled by amplitude of vibration of the deck. This in turn is set by the amount of current applied to the stator. Maximum amplitude and thus maximum capacity of the machine is always less than the setting of the gap between the stator, or magnet face, and its armature so these parts never strike during operation even under maximum vibration, or stroke. This insures long, quiet life and low maintenance.

Thus, the vibrator feeder provides a device which will feed dry chemicals or material at a rate from practically zero to its designed maximum output by simply varying the amplitude of oscillation. Further, this amplitude can be varied instantly by changing the amount of current permitted to flow through the stator of the feeder.

When one of these feeders is installed under a bin, or hopper, it has been found the rate of feed will vary due to voltage fluctuations. Also, variations of bin pressure on the feeder often cause partial bridging or arching of the material or a tendency to flood. Actual changes in physical character of the material as it may stand in or be drawn from the bin likewise cause variation in the feeding rate. While all such variations are usually small, they are easily detected when delivery is check-weighed.

First step in development of an accurate feeding system was to connect this feeder to a scale of a continuous belt type with one end of the belt at or near the balancing knife-edge and the other end counterbalanced with an adjustable poised weight or scale. Weight delivered from a scale of this sort is based on uniform weight of material on each foot of belt length multiplied by the number of feet the belt travels per unit of time.

Rheostats Control Speeds

It is possible to place the vibrating feeder at the most sensitive part of the scale. Placing the vibrating feeder at its most sensitive end means, first, that any change in the feeding rate, either more or less, has a maximum effect in moving the scale up or down; and second, that the effect of an out-of-balance is of a diminishing nature because the load moves toward the balancing knife edges.

In actual operation, it is not attempted to maintain the scale belt exactly in balance, but rather to swing it slowly from slightly overweight to slightly underweight. This gives an extremely precise average.

In one of the conductors connecting the magnet coil of the feeder to the power line, two small adjustable rheostats are inserted in series. One of these is set so when it only is in the circuit, the feeder operates slightly faster than the rate of delivery desired. The other rheostat is set so when it only is in the circuit, the feeder operates slightly below the desired output. These two rheostats are connected to contacts on the weighbelt to operate as follows:

Assume feeder is operating at the high rate resulting in the scale moving to the heavy side. This immediately closes the contacts, causing the other rheostat to be placed in the circuit with the result that the vibrating feeder is instantly shifted to deliver at a slightly lower rate. In a short time this causes the weighbelt to return to balance and go to the minus side, which then makes the contacts shift back as they previously were, the feeder then discharging at the higher rate. As the scale swings freely from plus to minus on each side of exact balance, the average rate of feeding is controlled most precisely.

The weighbelt in all cases is driven at an accurate and constant speed by a synchronous motor, and the poise of the weighscale is adjusted for the required rate of delivery. This then delivers a certain quantity per unit of time since the belt speed is set and loading per foot of belt is constant.

There is a second method in which the poise or scale setting is fixed and speed of belt travel is variable. In this case, the actual volume or weight of material delivered by the system will be the product of weight put on the belt per unit of length times the number of units of length which the recorder shows.

The first type of system is most

(*Please turn to Page* 71)

Fig. 3—End view of counterpoise conveyor showing housing with mercury switches which operate the control to vary discharge rate of feeder unit

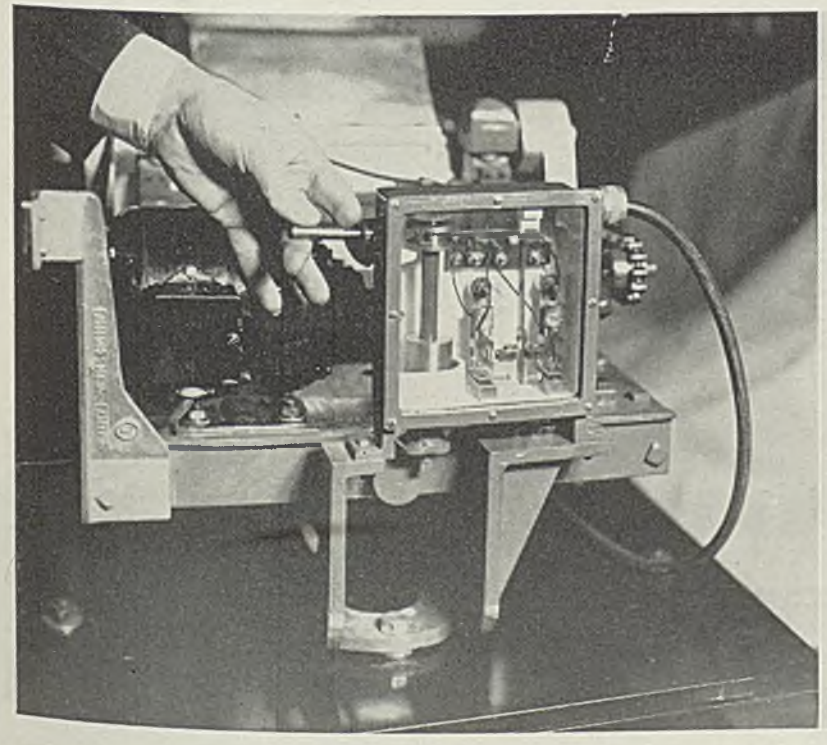
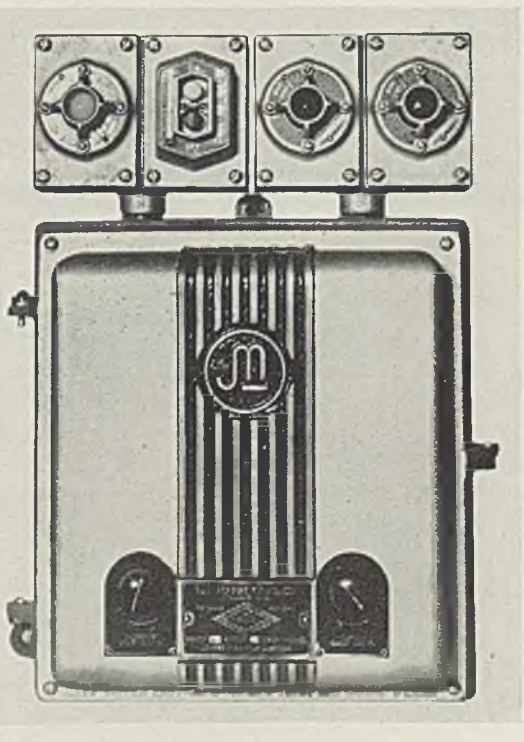


Fig. 4—Closeup of control housing with pilot lights and swing adjustments



Strain-Bearing Panel System

New method of making stressed-skin structures has tension applied by wedge action as parts are tightened during assembly. System is applicable to auto, truck and railroad car bodies as well as others

By ERNEST SCHAEFER
Schaefer Permagrip Enterprises
Cleveland

■ THE Permagrip fastening method already has been utilized for all-wood and for metal-clad wood construction of automobile bodies and other units in which the outer metal covering is practically strain-free. Now the method has been extended by newly designed devices which permit the tensile strength of the outer metal panels to be utilized to carry part of the structural stresses. See STEEL, Feb. 20, 1939, p. 44, for details of the non-strain-bearing types of Permagrip construction.

Purpose of using strain-bearing panel construction is to permit the heavy-gage steel sheets forming the outer surfaces to take part of the structural loads of the body, etc., through tension. Used with welded frame channel and angle iron, such a construction provides an extremely rigid and substantial body which can be adapted easily to many types of special automobiles, trucks and other equipment to form a smooth, flush, streamlined outer surface. Also it is suitable for railroad cars, airplanes, tanks, etc. This construction may even be used to advantage in making boilers and similar equipment because absence of holes in the shell makes full tensile strength of the material available.

In attaching armor plate it is especially advantageous. No holes through the armor are necessary, thus no allowance need be made for drilling or punching the material so the plate can be treated to give any desired degree of hardness, resulting in maximum protection.

Fig. 1 shows how the Permagrip fastening method is adapted to form strain-bearing panels. In this illustration, A is the bolt. With a lock washer, it is placed through the

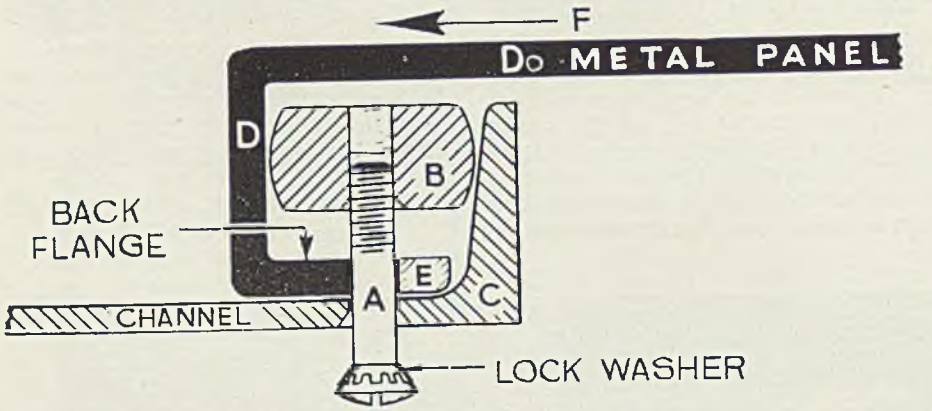


Fig. 1. (Top)—Permagrip tension method is outlined here. Arrows indicate points where tension is developed as bolt A draws fastener B into position during assembly. D is metal panel with C portion of channel, the sloping inner surface of which develops the wedge action

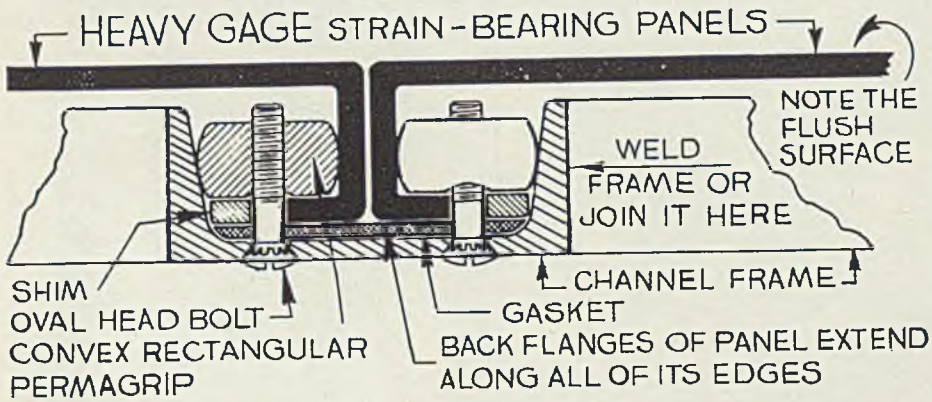


Fig. 2. (Center)—Diagram illustrates how smooth flush outside joints are made with heavy-gage outer panels. Concealed rectangular Permagrips are employed

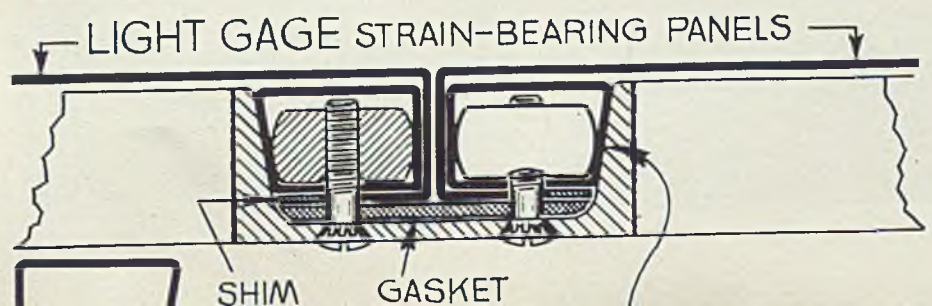


Fig. 3. (Bottom)—For light-gage panels, an extra formed inner channel is used as shown here to equalize tension on outer panels

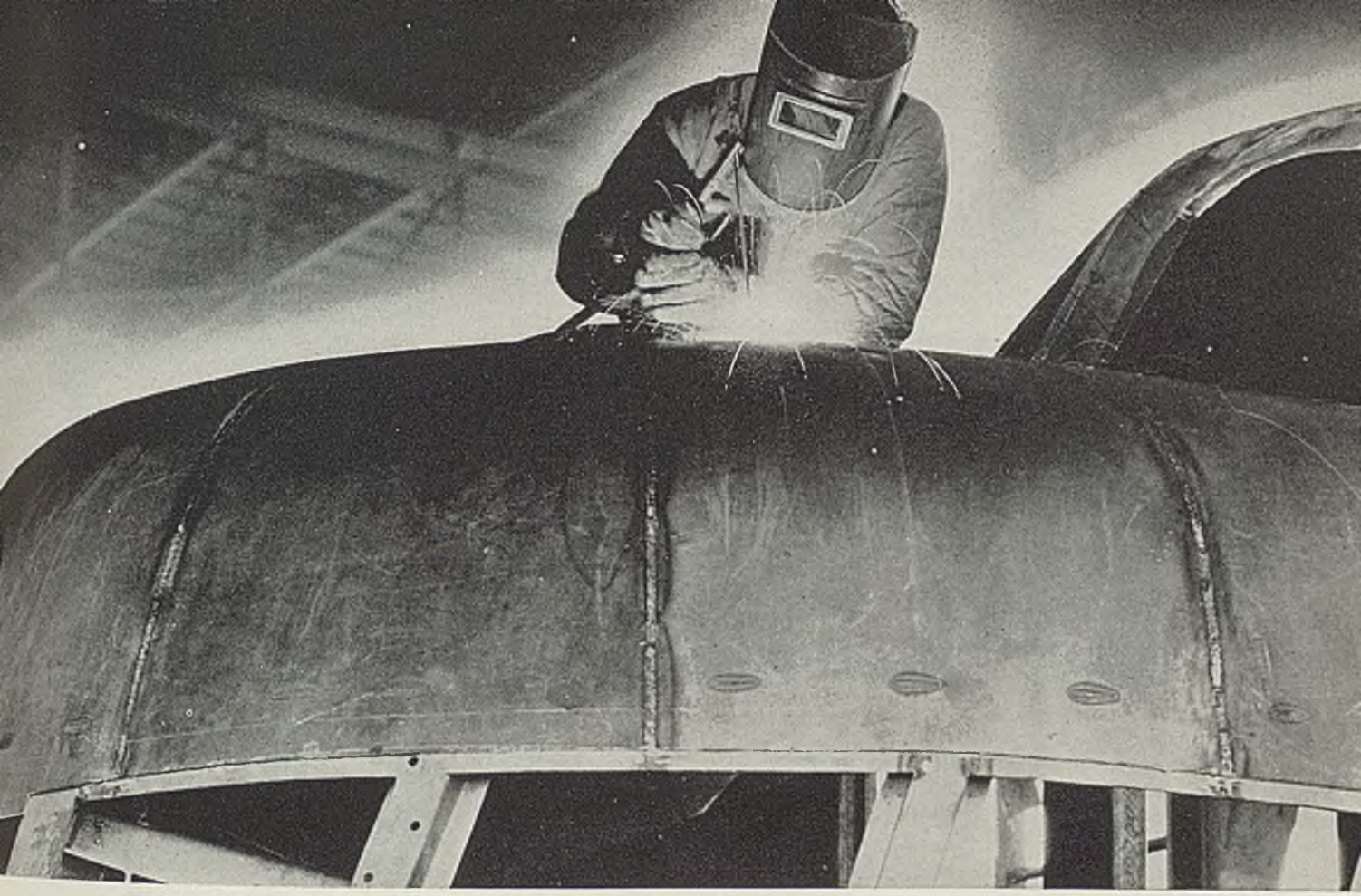


Photo courtesy Electro-Motive Corp.

THE IRON HORSE IS ON A DIET

• Studies show that a conventional steam locomotive in mainline passenger service averages 28 cents per mile for fuel and upkeep costs. That was before the Doctors of Design took things in hand. With welded construction, they've turned this iron horse into a light-weight speedster.

This Diesel-powered streamliner with a three or four car train does the same amount of work and consumes only 7 cents worth of fuel and upkeep per mile—a far cheaper diet. The streamliner has not only cut operating costs but it has sent traffic zooming up, greatly improving the complexion of railroad business.

What welded steel construction has done for the iron horse, it has also done for thousands of other metal products and structures from small appliances to ocean-going vessels. Have you investigated fully its possibilities for *your* products?

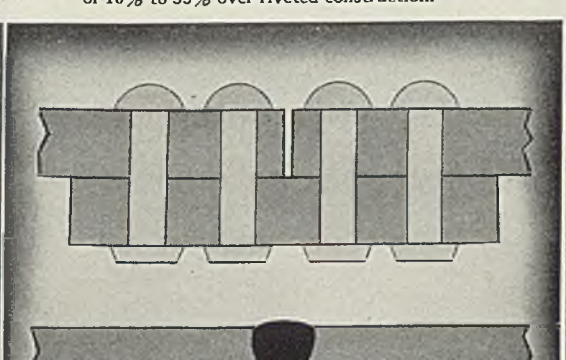
Did you know these facts about welded steel construction? (1) Welding gives you engineering freedom for greater design ingenuity, resulting in better product performance, improved appearance and lower costs. (2) Welding fuses component parts together directly, eliminating connecting members, reducing weight.* (3) The material used is of uniform high quality, affording maximum strength and rigidity. (4) Welding eliminates many production operations, saving time and money.

For counsel on arc welding design and practice, phone the nearest Lincoln office or write THE LINCOLN ELECTRIC COMPANY, Dept. Y1, Cleveland, Ohio. Largest Manufacturers of Arc Welding Equipment in the World.

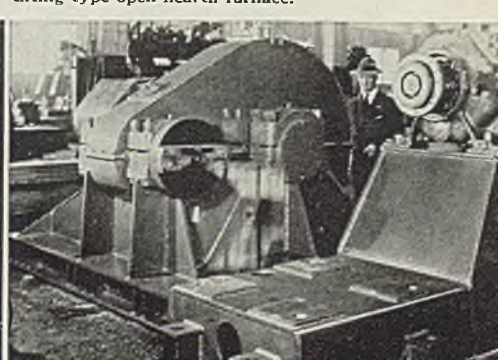
LINCOLN "SHIELD-ARC" WELDING

Unites design ingenuity with superior structural materials for progress

AUTOMATIC. The Lincoln Electronic Tornado produces welds of shielded arc quality for high-speed, low-cost manufacture and construction work. Here, the Tractor Type Tornado fabricates an oil storage tank. Photo courtesy Chicago Bridge & Iron Co.



***FOR EXAMPLE.** Top joint is riveted. Bottom one is "Shield-Arc" welded. It is stronger than the parent metal. Elimination of connecting members and ability to use lighter material in welded structures accounts for savings in weight of 10% to 35% over riveted construction.



HOW TO CUT COSTS. Bending and forming of plate where practical, minimize the number of welded joints for lower production costs. That's the tip of Mr. A. E. Gibson, President, Wellman Eng. Co. who is shown here with a welded steel 150-ton tilting mechanism for a tilting type open hearth furnace.

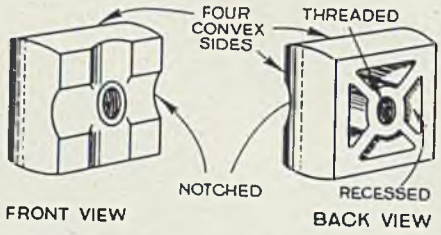


Fig. 4—The four convex outer sides of the Permagrip fasteners are essential features of the strain-bearing assembly diagrammed in Figs. 1, 2 and 3

channel from the inside of the body and draws down the Permagrip fastener B against the sloping inside wall of channel C, thus pulling outer panel D slightly to the left and placing it under tension so that its tensile strength can be utilized effectively to increase the strength of the body. In Fig. 1, E is a metal shim placed under fastener B, opposite the back flanged edge of panel D, to equalize pressure as fastener B is screwed down tight.

Thus the effect of tightening bolt A is twofold. It pulls the concealed fastener B firmly down on the back flange of panel D, holding it securely in place. At the same time, it places panel D under tension in the direction indicated by arrow F, making D a strain-bearing panel. This latter is accomplished by one of the convex sides of fastener B engaging the tapered wedge-like shape of channel C as it is drawn into position. When the operation is completed, bolt A is relieved of side strains and is only under lengthwise tension.

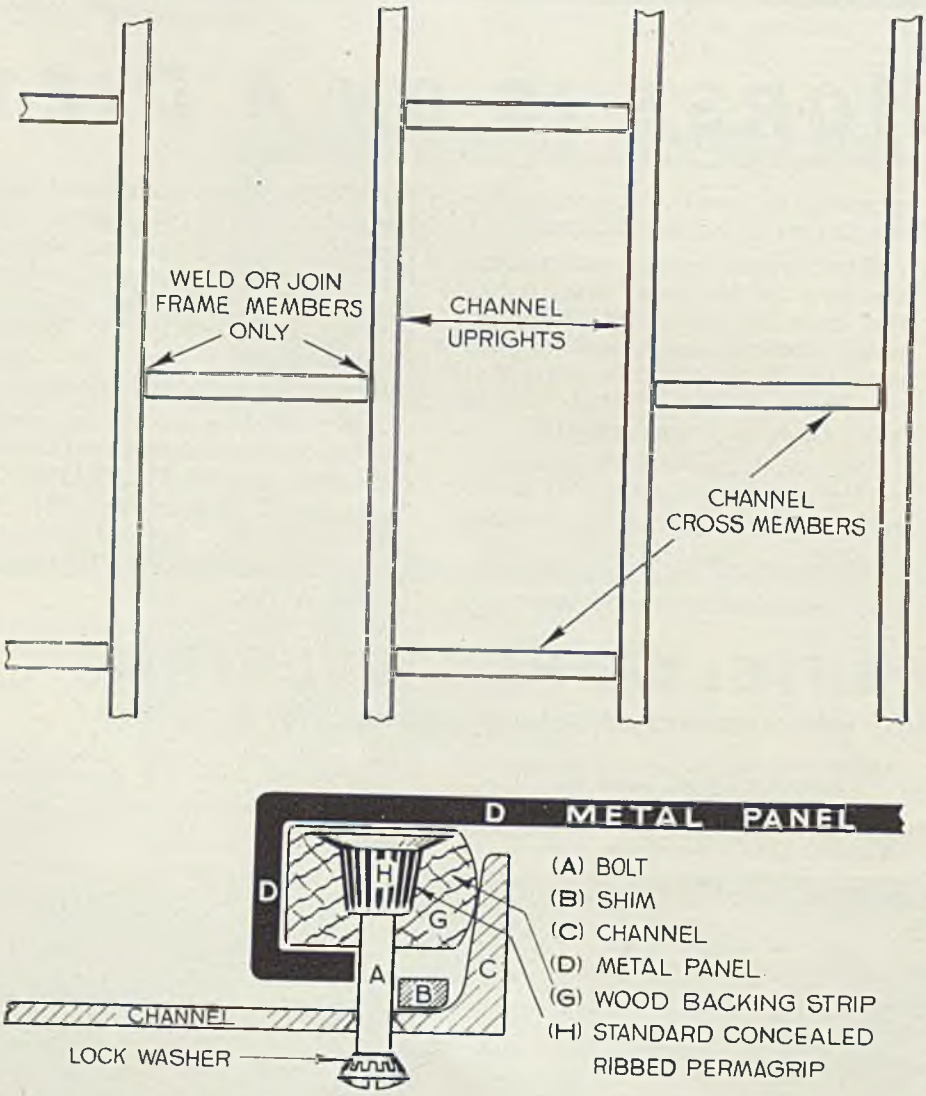
While Fig. 2 shows application of the all-steel strain-bearing construction to heavy-gage panels, Fig. 3 shows how light-gage panels are utilized as strain-bearing sections also. In this latter example, Fig. 3, an extra formed inner channel is employed to equalize the tension on the outer panel and to re-enforce the flanged outer panel. Except for the use of this formed inner channel, the construction and operation of parts are identical with those for the heavy-gage panels shown in Fig. 2. It will be noted that the shim in this case is much thinner as it must, of course, match thickness of the panel to provide equalized bearing of the fastener against the channel and gasket. In both constructions, a gasket is employed immediately adjacent to the channel to make the joint weathertight. Where a weathertight joint is not required, this gasket may be omitted.

The extra formed inner channel used with light-gage panels usually is made of the same material as the panels themselves.

Where extra-heavy service is encountered and maximum strength is to be provided, a method similar to that shown in Fig. 5 may be employed to advantage. Here the main channels of the framework are staggered or alternated, as shown, to provide for strong diagonal bracing through the panels themselves. Of course the panels are staggered so the edges coincide with the channels to provide maximum strength.

Fig. 5. (Upper)—This method of arranging channels in the frame permits staggering of panels thus developing maximum strength from the diagonal bracing afforded by tensioned panels

Fig. 6. (Lower)—Here is an alternate method of making strain-bearing panel assemblies. It is not all-metal as are the others but employs convex wood backing strips and standard concealed ribbed Permagrip fasteners to develop tension in either light or heavy gage panels. Diagrams courtesy Schaefer Permagrip Enterprises, 4176 West 208th street, Cleveland



Design Aids Locking Action

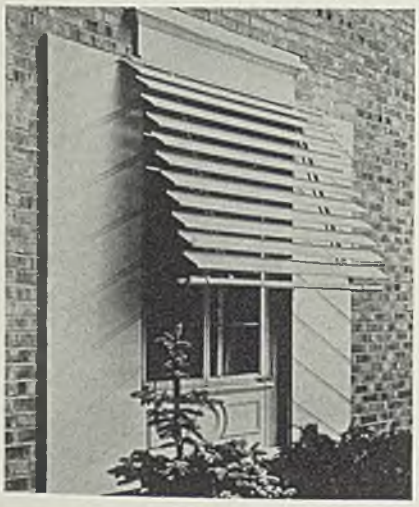
Fig. 4 shows the special Permagrip fastener developed for these applications. It is a convex, rectangular unit entirely of metal and with recesses in one side to reduce weight and with the center hole threaded to take the bolt. All four sides of the fastener are given a convex shape to provide a locking and stretching action no matter which side happens to engage the inner sloping surface of the structural channel.

An alternate method is shown in Fig. 6. Here, full length, hardwood, convex backing strips are used in the place of the inner formed channel section of Fig. 3 as means of holding down the flanged panel edge and as means of tensioning the panels. In this instance, the wood backing strip has a convex side which engages the sloping inside surface of channel C to give the tensioning action as the bolt A is drawn up to pull the backing strip into position, using a standard concealed ribbed Permagrip fastener at H. Of course, when this alternate method is used, the convex metal Permagrip fasteners and inner formed steel channels are omitted. This alternate method is suitable for light as well as heavy-gage metal panels. Note that in either case the shim B is

(Please turn to page 76)

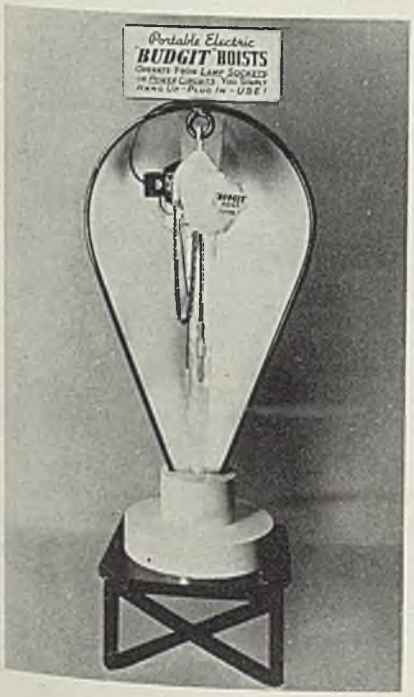
NEW METAL PRODUCTS

■ Rusco Venetian-type awnings made entirely of sheet metal affording year-round sun protection, full visibility, ventilation and light control are offered by American Rolling Mill Co., Middletown, O. These awnings are said to reduce concentration of heat around window openings, improve ventilation and reduce the



cooling load on air-conditioned homes and business buildings. They are made of Armco galvanized Paintgrip sheets bonderized at the steel mill to take and hold paint.

■ Stand developed by Shaw-Box Crane & Hoist division, Manning, Maxwell & Moore Inc., Muskegon, Mich., is used to display portable electric hoists. Stand is built with steel bars and plates and is fabricated with the aid of flame cutting and arc welding. Design is appealing and particularly suited to shape of product.



■ Novel use of stainless steel is in letters on a new towboat, NICHOLAS DUNCAN. Letters, supplied by Jessop Steel Co., Washington, Pa., were fabricated from Hi-Gloss 18-8 stainless steel and attached to sides of vessel near bow.

■ Electromode electric unit heater of Electric Air Heater Co., division American Foundry Equipment Co., Mishawaka, Ind., features downdraft air flow to keep warm air in living zone. Safety switch shuts off heater automatically in case of upset or stoppage of air flow. Separate fan switch permits fan to be run without heat. Element is cast aluminum and is noiseless. Five-blade, 7-inch diameter fan moves 70 cubic feet of air per minute. Shaded pole, 1500 revolutions per minute motor mounted in cool air stream

has large oil reservoirs so lubrication is said usually to be required only once a season. Cabinet is 7 x 11½ x 13 inches, has low center of gravity and is finished in either baked permanent brown or ivory wrinkle finish. Heater costs $26.50.

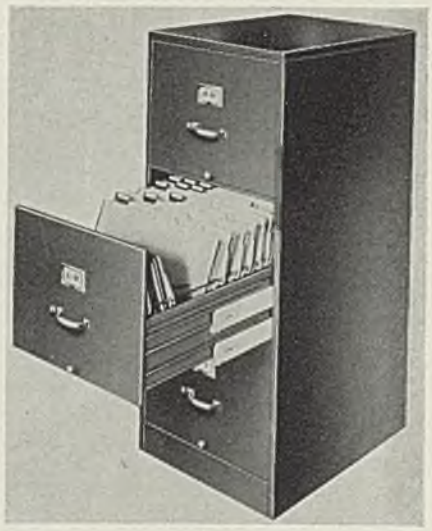
■ Type 750 shovel of Lima Locomotive Works Inc., Shovel & Crane division, Lima, O., has dipper of 1¾-cubic yard capacity with 22-foot boom and 17-foot dipper handle Draglines are equipped with booms ranging from 50 to 80 feet. Size of bucket varies depending upon weight of bucket and class of material to be handled. Cranes are also equipped with booms ranging from 50 to 80 feet. Steering is through hand wheel at operator's right and is possible, with rotating frame, in any position. Power dipper trip is built into and is part of machinery.

■ Subway boxes that serve underneath the ground as housing for cables, wires and switches are being marketed by G & W Electric Specialty Co., 7780 South Dante, Chicago. Such boxes are claimed to be extremely high in corrosion-resistance, nonmagnetic, far stronger and thinner than boxes made from other materials and to offer much longer

service. The two boxes shown are fabricated from Enduro stainless steel, product of Republic Steel Corp., Cleveland.

■ The 25-horsepower Model D3400 diesel marine engine of Caterpillar Tractor Co., Peoria, Ill., has four cylinders with 3¾-inch bore and 5-inch stroke. Maximum horsepower output is at 1500 revolutions per minute, and rating is for continuous sustained service. Auxiliary gasoline engine is standard starting equipment, but electric starting is available. Valves are only operating adjustment. Fuel injection equipment is factory set.

■ A three-drawer steel file for X-ray plates is offered by Globe-Wernicke Co., Carthage avenue, Cincinnati. The Tri-Guard 3-rod filling



principle is used, and guides keep contents upright without compression. Filing and finding are said to be speeded up.

Open Hearth Slag Control

Benefits to be derived justify extended use despite fact no exact rules cover all conditions. Much yet to be learned about slags and their effect on metal. Research may open new fields of activity

■ SLAG control, one of the major variables in steel production, was the subject of the seventeenth Howe Memorial lecture presented at the 152nd meeting of the American Institute of Mining and Metallurgical Engineers in New York, Feb. 12-15. The lecturer was Charles H. Herty Jr., research and development department, Bethlehem Steel Co., Bethlehem, Pa.

Speaking before the institute's Iron and Steel division, Mr. Herty emphasized that the effect of furnace slag on composition and quality is material and its control is increasingly important in the current era of close specifications, uniformity and costs.

Slag control has become an integral part of open-hearth activities from charge to tap and benefits to be derived are sufficient to warrant extended use. Because requirements and raw materials necessarily effect the degree to which control must be exercised, no set rules can be fixed for all conditions, according to the lecturer. Much is yet to be learned about slags and their effects on the metal. Mr. Herty ventured the opinion that fundamental research on slags may open new fields of activity and methods of approach to steel melting problems, but he said any development must fit into the operations of an open hearth.

Bringing Furnaces in Line

Occasionally a certain furnace in a group will become, for some unknown reason, an individualist with respect to FeO content, refusing to go along with other furnaces in the plant, yet all are on the same slag control schedule. Surveys on this situation, according to Mr. Herty, give definite proof that a furnace characteristic is controlling the type of slag produced; also that a proper diet for that specific furnace could make it fall in line with its sister units.

In considering any method of control, it is necessary to view critically costs involved and to balance these against gains; such costs including equipment and personnel. While the basicity of the slag is of great importance in the elimination of phosphorus and sulphur, next to nothing is known about this important factor said Mr. Herty. Use of the lime-silica ratio is frequent, but no one as yet has actually determined how much active lime there is in an open-hearth slag. Until such studies are made the important reactions in the basic open-hearth process must still be considered to be applied by empirical methods.

Summarizes the Variables

Variables effecting the sulphur, phosphorus and oxygen contents of the metal were summarized by Mr. Herty as follows:

Sulphur in the metal is lowered by increased basicity, fluidity and agitation of the slag and by high temperature. High iron oxide and increased sulphur in the charge (including sulphur absorbed from the fuel) make the attainment of a given sulphur more difficult. Phosphorus in the metal is lowered by increased basicity and fluidity of the slag, a high FeO content of the slag and by low temperatures. High phosphorus in the charge is an adverse factor to the production of low-phosphorus steel. Oxygen content before deoxidation is controlled by the carbon in the metal and the FeO content of the slag. Above about 0.10 per cent carbon, the slag is of minor importance, but as the carbon falls below 0.10 per cent it becomes more so.

Choice of raw materials entering the blast furnace, effecting the composition of the iron, has a definite effect on the slags produced in the open hearth and constitutes the first step in control of open-hearth slag, according to Mr. Herty. Uniform quality and analysis of pig iron is a tremendous asset to the open hearth from the standpoint of slags, but the analysis chosen by the blast furnace may not be the one which is the best suited for over-all costs.

Ultimate objectives of slag control should be to produce a slag in the furnace which will eliminate phosphorus and sulphur to the desired extent without excessive use of lime or excessive loss of iron as oxide; to conserve as far as possible both lime and deoxidizers; to prevent wastage of iron in the slag on grades which do not have strict phosphorus requirements and to minimize the melting period through use of as little limestone in the charge as possible. Another objective is to standardize the conditions of oxidation so that the deoxidizing additions will unfailingly produce the desired type of ingot.

Analyses Made Quickly

As the melting of the heat proceeds and lime begins to show in the slag, the true characteristics of the charge begin to be seen. Indications which serve to give a good approximation of the slag composition, according to Mr. Herty, include the trained eye of the melter and rapid methods of chemical analysis now available so that the total iron (usually expressed in FeO) may be returned from the laboratory in about 10 minutes from the time the sample is taken. A somewhat longer period may be required for silicon analysis.

Both of these analyses can be of great aid if taken at the proper

times. There is a considerable deviation from this line in practice, said Mr. Herty, but the definite trend indicates how useful this analysis may be in approximating the silica content of the slag. There are also numerous physical characteristics of the slag which reflect composition with varying degrees of accuracy. Some are immediately apparent to anyone who has carefully watched a heat of basic steel. Two in particular have been widely used since the earliest days of steel melting by furnace operators, namely the consistency of the slag and the slag color remaining on the test spoon after the withdrawal of steel samples from the furnace.

Tests have been developed which will give better approximation of composition and are notably useful when a melter has under his guidance too many furnaces to allow exclusive attention to any one heat, especially during the early periods of the heat.

Measuring Slag Viscosity

Color of slag when cooled in water is also a guide to its approximate composition and color has one definite advantage in that a review of any period of heat may be made if samples have been taken over that period. Appearance of the surface texture of slag cakes poured into standard molds is an interesting, and in many plants, a useful guide. Still another useful characteristic is slag viscosity, long utilized by acid open-hearth melters. For basic slags viscosity usually is determined by the flow of slag in a tube developed in the Metallurgical Advisory Board work, Pittsburgh. In this method the length of flow actually measures a combination of slag fluidity, the reciprocal of viscosity and melting point.

In recent years, said Mr. Herty, much thought has been given to new methods of measuring slag compositions by quick methods, including magnetic characteristics, density, electrical conductivity measurements and the use of the petrographic microscope, but none of these has yet reached a point where it has been put into practice as a control method.

Effects of temperature of pretreatment on creep characteristics of 18-8 stainless steel at 600 to 800 degrees Cent. were discussed by Charles R. Austin and Carl H. Samans, department of metallurgy, Pennsylvania State college, State College, Pa. In tests at 600 degrees Cent. for a common time and set of stress conditions, it is found that the size of precipitate and the distance from the grain boundaries at which cloud-like precipitate occurs is practically the same for each three pretreatments, indicating both precipitation and agglomeration are dependent on test temperatures and independent of the grain size. At this temperature rate, modification of the alloy pretreatment has apparently little effect on creep characteristics.

At 700 degrees Cent. volume of grain-boundary precipitate was about the same for each of the three pretreated specimens, but coarse-grained steel has much more precipitate within the grains, concentrated largely along internal twin bands. Between two fine-grained steels, differences were slight. Strengthening effect of fine precipitate formed by 750-degree pretreatment is apparent. Also the superiority of 18-8 stainless preheated at 1150 degrees Cent. over that treated at 950 degrees is no doubt due to its larger grain-size in the opinion of Messrs. Austin and Samans. Three differently pretreated steels tested at 800 degrees Cent. show no apparent difference either in resistance to deformation or change in microstructure.

At 600 and 700 degrees Cent. precipitation process associated with stainless 18-8 steel is relatively slow and apparently proceeds for several thousand hours; also precipitation appears to occur in grain boundaries, ends of annealing within bands, sides of the same and within the grain. One, probably carbide, and the other, slightly pinkish, are likely ferritic in nature, two types of precipitates occur. Stress nor the plastic deformation accompanying it seem to have little effect on the character of the carbide precipitate.

Heat Treatment for 18-8

Modulus of elasticity of wrought annealed 18-8 stainless steel is approximately 28,000,000 pounds per square inch, proportional limit on the order of 20,000 pounds per square inch and the tensile strength between 80,000 and 90,000 pounds per square inch, according to a report on investigations covering effects of low-temperature heat-treatment on elastic properties of cold-rolled austenitic stainless steels. Results of extended research on this problem were given by Russell Franks and W. O. Binder, Union Carbide & Carbon Research Laboratories Inc., Niagara Falls, N. Y.

Confirming results of other research, they find that while tensile strength of annealed 18-8 steel can be greatly increased by the application of cold-working, the indicated proportional limit of the material remains low and the modulus of elasticity is somewhat lower than that of the annealed stock, notably in the direction of rolling. In the transverse direction of rolling, cold-worked steels have a higher proportional limit and a modulus of elasticity equal to that in the annealed condition.

If cold worked metal is heated to around 200 degrees Cent. and air-cooled the material will act more normally when stressed and also show a considerably higher proportional limit and yield strength, with the previous noted modulus of elasticity at room temperature. Increased fatigue resistance is produced and toughness is improved without rendering the steel subject to intergranular corrosion or reducing resistance to general corrosion. By such treatment tensile strength is not impaired and neither is ductility or the bright cold-rolled surface. Elastic properties of 18-8 steels containing molybdenum or columbium are also enhanced by such heat-treating under identical conditions.

Heating Time Important

Messrs. Franks and Binder emphasized the time factor as most important in striving for physical improvement, stating that unless the heating period is long enough, improvement in elasticity will be neither substantial nor uniform. They suggest the heating period cover at least 8 hours, but no more than 100 hours in the 200 to 250 degrees Cent. range.

Formulas designed for an analysis range relating to expected tensile strength in medium manganese and silicon-bearing steels were offered by C. F. Quest, department of metallurgy, University of Minnesota, Minneapolis, and T. S. Washburn, assistant chief metallurgist, Inland Steel Co., Indiana Harbor, Ind. This is a type of steel being produced by tonnage mills to meet a demand for a tensile strength slightly higher than that of ordinary structural steel, but not high enough to justify more expensive alloys. Data on the subject was accumulated over a number of years by the Inland Steel Co. It is found that significant differences appear for high-manganese steel and when appreciable amounts of silicon are present.

Concentration-penetration curves for the diffusion of carbon in gamma iron were reviewed by Cyril Wells and Robert F. Mehl, metals research laboratory, Carnegie Institute of Technology, Pittsburgh. Results were attained by diffusing carbon from high-carbon into low-carbon alloys and by subsequent chemical analysis of layers which upon calculation yield diffusion coefficients. Under the general subject covering the rate of diffusion of carbon in austenite in plain carbon, nickel and manganese steels, they find manganese and nickel, up to 20 weight per cent, increase the rate

(Please turn to Page 75)

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Institute of Metals Focuses Its Attention on Recrystallization

■ A WIDE variety of subjects were discussed in papers presented at sessions of the Institute of Metals division, American Institute of Mining and Metallurgical Engineers, at the latter's 152nd meeting in New York, Feb. 12-15. Sessions were devoted specifically to recrystallization, copper and silver alloy systems, alloys of cobalt, and general physical metallurgy.

Deformation and recrystallization textures of polycrystalline, high-purity aluminum after compression are of the same type, according to Charles S. Barrett, staff member, metals research laboratory and lecturer, department of metallurgy, Carnegie Institute of Technology, in a paper on the "Recrystallization Texture of Aluminum after Compression." He said also that each recrystallized grain has an orientation different from that predominating in the matrix which it forms, although there are rare exceptions, either with grains or single crystals.

Mr. Barrett also concluded that individual areas alter their orientation without complete loss of texture of the aggregate, owing to the tendency of the recrystallized grains to avoid orientations having (111) or (100) near the axis of compression. Groups of orientations tend to occur among the recrystallized grains but are not always sharply defined, even when the deformation texture is sharp. He also declared that traces of the original grains are visible after recrystallization because within each old grain many of the new grains have like orientations.

Unimportant In Aluminum

Several instances were found, he said, in which the orientation of the recrystallized grains were not accounted for by twinning the deformation texture. This mechanism, he added, appears unimportant in the recrystallization of aluminum.

In experiments with respect to plastic deformation and recrystallization of aluminum single crystals, J. A. Collins, metallurgist, E. I. du Pont de Nemours & Co., Wilmington, Del., and C. H. Mathewson, professor of metallurgy, Yale university, New Haven, Conn., concluded that in addition to the normal glide ellipses, the elongation generated a set of deformation bands, which lay roughly in a plane 90 degrees from the slip plane and in the zone containing the slip-plane pole and the axis of the specimen. These bands were related in some manner to the recrystallization process. It was also brought out that the deformation first fragmented the crystals in many small crystallites with a slight increase in range of orientations, and that the magnitude of the crystallite rotations was not an accurate measure of the capacity of the strained crystals to form new grains by recrystallization.

Recrystallization originated in small nuclei. The linear rate of growth of the new grains into a uniformly strained crystal was constant for a constant temperature. No simple relation, such as a rotation about a single axis, was found that would rationalize the orientation of the new grain to that of the original crystal. The germanitive temperature for recrystallization, the authors stated, was markedly higher for strained single crystals than for similarly strained polycrystalline specimens.

New Crystals Are Formed

Recovery occurred, to some extent, at all temperatures from 200 degrees Cent. up to recrystallization temperature, which ran as high as 645 degrees. Recovery resulted in a removal of material stresses from the small crystal fragments without altering their orientation and reduced the capacity of the strained crystals to form new crystals by recrystallization, it was said.

A study of the effects of cold-work and annealing temperature on the hardness of a sample of pure platinum was described by E. M. Wise and R. F. Vines, research laboratory, International Nickel Co. Inc., Bayonne, N. J. The authors stated it was known qualitatively that the recrystallization behavior of platinum was dependent upon the amount and particularly the nature of impurities present, the amount of prior cold-work, the annealing time and temperature, but that published data were limited. It was in an effort to supply part of this information that the study was undertaken.

The study revealed that the crystallized grain size and the recrystallization temperature are complex functions of the percentage of cold reduction or the cold rolled hardness; also that time is an important factor in determining the recrystallation temperature but has not been extensively investigated. Incr ing annealing temperature or t once recrystallization has been c pleted, had little effect on g size, hardness or tensile strengt the sample of platinum used, cording to the authors.

Experiments with respect changes in damping capacity ing the annealing of alpha br confirm the fact that when met are tested at comparatively frequencies, the principal cause energy dissipation is local or g eral plastic deformation, accordi to John T. Norton, associate p fessor of physics of metals, depa ment of metallurgy, Massachuse Institute of Technology, Cambrid Mass. In cold-worked metals, was further revealed, the intern stress system is an important fa tor in the production of localiz plastic flow. The relief of intern stresses by annealing reduces t damping to a low value and t value is low over a considerab range of applied stress.

At the recrystallization temper ture, the speaker also brought ou the damping capacity shows litt change, provided the applied stres is well within the so-called elasti range of the material. Considere from the point of view of a metal lurgical tool, the damping capacit is a sensitive indicator of interna stresses, but is relatively insensitive to changes of grain size, he said

Clarence Zener and R. H. Randall, instructor and assistant professor in physics, respectively, College of the City of New York, New York, presented a paper, "Variation of Internal Friction with Grain Size." Theoretical consideration by one of the authors had led to the prediction that the dynamic internal friction of annealed metals has a broad maximum at a certain grain size, a prediction verified for alpha brass.

Study Internal Friction

In their paper the authors extended the theory to include the precise manner in which the internal friction varies with graining size on either side of the maximum. New experimental data were presented to test this extended theory which was in complete agreement with the theoretical predictions.

It was found possible to estimate the part of the internal friction that does not arise from thermal currents, stated the authors, who added that this residual internal friction was small in the specimens examined. The relative grain sizes of specimens may be obtained from internal friction measurements with an accuracy comparable to that obtained from grain counts, it was said.

S. E. Maddigan and A. I. Blank, research physicist and research as-

sistant, respectively, Chase Brass & Copper Co., Waterbury, Conn., presented results of an investigation made of the processes of recovery and recrystallization during low temperature annealing of cold-work 70-30 brass. Two annealing temperatures were used, one slightly above and the other slightly below the accepted recrystallization temperature. After various annealing times, up to 2740 hours, microscopic studies were made in addition to tensile strength measurements and very sensitive conductivity measurements.

The process of softening seemed to be divided into two parts, the authors stated: (1) A stage of pure recovery preceding any microscopic evidence of recrystallization and (2) a second stage in which recrystallization could be seen under the microscope with softening probably a combination of recovery and recrystallization.

When Recrystallization Begins

As was expected from results of previous investigators, the authors stated, the time for beginning of recrystallization increased with the increase in grain size, decreasing amounts of cold-work and decreasing temperature.

J. T. Burwell, research laboratory, United States Steel Corp., Kearny, N. J., in a paper on "Crystal Orientation in Silicon-iron Sheet," presented a description of the orientation of the crystals in the material as determined by means of X-rays and expressed graphically in a pole figure. Results indicated that the component crystals were oriented with a (110) plane in the rolling plane and a (001) axis in the rolling direction. This, the author stated, was in agreement with the results of Bozorth and with the magnetic results of Sixtus, but not with those of the optical method used by the latter, nor with Goss' original conclusions.

In a paper, "Some Observations on the Recrystallization of an Iron-Nickel Alloy," George Sachs and J. Spretnak, assistant professor of metallurgical engineering and graduate assistant, respectively, department of metallurgical engineering, Case School of Applied Science, Cleveland, described an investigation of the rolling and annealing structures of a relatively pure iron-nickel (36 per cent) alloy by X-rays to detect possible correlation between the two structures. Pole figures for the rolling structure were found to be similar to those of other face-centered cubic crystallized metals (as, for example, aluminum) and were explained for the major part by superimposition of (111) and (112) structures. Additionally, the hitherto unreported presence of a certain amount of the cubic structure in the roll sheet was detected. It was also revealed that the pole figures of the annealed and the annealed plus 10 per cent reduced samples showed mainly the cubic structure, with some remaining rolling structure in evidence.

Strength Is Increased

Properties of copper-rich alloys containing nickel and phosphorus in ratio of about 5 to 1 show that the most useful hardenability is attained in those having approximately 1.25 to 1.5 per cent of nickel plus phosphorus and that hardness and strength attainable by age-hardening increases only gradually for higher alloy contents. D. K. Crampton, H. L. Burghoff and J. T. Stacey, Chase Brass & Copper Co., Waterbury, Conn., elaborating on properties of copper-rich alloys of the copper-nickel-phosphorus system also conclude such alloys are capable of extensive cold-working after age-hardening, resulting in still further increase in strength. By addition of other alloying elements, cadmium, zinc and tin, yield is slightly modified, strength being added while electrical conductivity is somewhat decreased.

Although all three elements are fairly abundant, study of the cobalt-nickel-silicon alloys has lagged, according to Arthur C. Forsyth and R. L. Dowdell, University of Minnesota, Minneapolis. This group has high melting points which make experimental work difficult. Cobalt and nickel form a continuous series of solid solutions and each dissolves about 7.5 per cent of silicon. In research on alloys containing between zero and 20 per cent silicon, they conclude such alloys above 10 per cent silicon are brittle, but have excellent corrosion resistance and other advantages which are being exploited. Nickel and cobalt appear to replace each other in these alloys, producing only two phases in stable equilibrium. The solid solution alloys are capable of being wrought and may find industrial application and some are ferromagnetic.

Chart Aids in Welding

■ Valuable guide to oxyacetylene welding of commonly used metals and alloys has been prepared in chart form by The Linde Air Products Co., unit of Union Carbide & Carbon Corp., 30 East Forty-second street, New York. Recommended welding method, flame adjustment, welding rod and flux for each of 30 different metals and alloys can be determined at a glance by referring to this outline. Copies of chart may be had free by writing to the company.

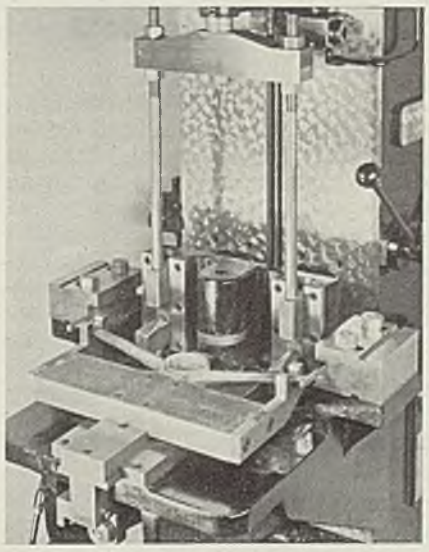
Testing Spoke Castings for Steering Wheels

■ Novel use for an hydraulic broaching machine was found by Colonial Broach Co., 147 Jos. Campau, Detroit, for a prominent motor car manufacturer who desired to test, in production, strength of steel hub core and spoke castings for steering wheels, straightening spokes at the same time.

For the operation, a standard machine was selected. Machine is hydraulic and automatic in operation and is provided with a vertically adjustable fixture table. Steel steering wheel core and spoke casting is laid in fixture, ends of spokes being supported right and left, while hub at center is also supported on hardened steel plates.

Starting of the machine causes fixture slide automatically to shuttle back into fixture. Ram then moves downward. Two notched bars carried from ram cross-head bear against spokes, midway between their ends and hub, thereby bending the spokes. When limit of desired travel has been reached, automatic stops trip an operating valve, whereupon return of ram causes spokes to be bent back into correct position.

Both downward and upward



strokes of ram are adjustable. Adjustment for down stroke is at top of ram crossbar shown in illustration, while that for upstroke is below the table. It is stated that with this set-up about 300 steering gear spoke assemblies can be tested and straightened per hour, this without subjecting the castings to sharp shocks.

Production of Oil Pans Is Geared for Continuous Conveyors

■ PRODUCTION of steel stampings, both large and small, at a speed which will keep up with the pace of modern automobile assembly lines imposes special problems on press equipment and processing technique. Consider such an inconspicuous part as the Ford V-8 engine oil pan, the fabrication of which would appear to be simplicity itself, yet which requires an involved series of steps in its processing, all of which much be geared to a production speed of 12 a minute.

Recently several new hydraulic presses have been installed in the "oil pan line" at the Ford plant, and former units rearranged to make for more efficient production. The new presses in addition to providing positive control of speed and working pressures, eliminate the need for adjustment of die clearances and can be adapted quickly to the production of plastic moldings. In the future, a widespread use of these moldings is indicated in Ford cars so the company is being foresighted in lining up necessary production equipment which can be used for the present on parts going into current models.

Compound Is Applied

The Ford oil pan measures 23⅛ x 10 inches and is drawn out to two depths, the deepest portion being 7 9/16 inches, the shallower portion 4 inches. Blanks are elliptical in shape, cut two at a time from 15-gage, hot rolled, pickled and oiled steel, received in 6800-pound coils, 31⅛ inches wide. The cut blanks pass along a conveyor, through rubber rolls which apply drawing compound to both sides, then to the first drawing operation. Two Lake Erie hydraulic presses of 500-ton capacity—300 tons on the main central ram and 200 tons on the four blankholder rams—have been installed for drawing the pans from the flat. One is shown in an accompanying illustration. In operation the blank is held at 70 tons pressure and the central ram descends at 25 tons pressure.

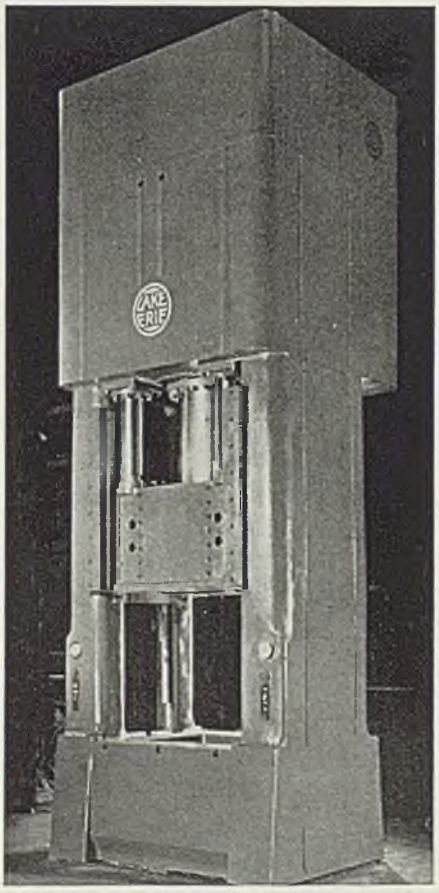
Chromium-nickel-silicon die steel is used. A bead is machined around the edge of the lower die, with a corresponding depression cut in the upper die so the blank is actually pulled through a reverse curve as it is drawn. Additional beads are cut in the die along the front and back to slow the drawing operation further. Length and height of these beads is calculated carefully to give just the proper amount of resistance to the steel as it is forced into the die impression.

Presses have inside punch slides and outside or blankholder slides. They are of the side-housing type with solid housings keyed into place and with tension columns shrunk in, prestressing the columns beyond the natural loads. Pumping units are entirely enclosed at the top. Following specifications apply:

	Inches
Maximum stroke	30
Shut height	18
Right to left on bed	55
Front to back on bed	54
Right to left, blankholder slide	46
Front to back, blankholder slide	46
Right to left, punch slide	24
Front to back, punch slide	12
Right to left, hole in bed	30
Front to back, hole in bed	24

Speeds are set so it is possible to draw eight pans per minute when running at full automatic speed.

Double-action 500-ton hydraulic press built by Lake Erie Engineering Corp., Riverview and Woodward avenues, Buffalo, for high-speed forming operations on automobile oil pans. Note totally enclosed construction and push-button controls



Power is supplied by a 75-horsepower motor. Controls are all of the pushbutton type, allowing the operator to "inch" the press down for setting the dies, or to use a semi-automatic operation; that is, one complete cycle and return. Also press can be full automatic, running through a continuous cycle until stopped.

One big advantage of the hydraulic press is the rapid approach speed to the work followed by a slower pressing speed, thus giving the steel a chance to flow into the die.

The severe draw given the steel in this first operation dictates an annealing before further processing. The pans are conveyed in double rows through a gas-fired annealing furnace where they are subjected to a temperature of 1750 degrees Fahr. for about 10 minutes. This is a continuous type furnace. As pans emerge from discharge end, they are hung on an overhead conveyor and moved to a pickling room where they are dipped in a 15 per cent solution of sulphuric acid, washed and then returned to the press department.

Pan Sides "Expanded"

Next operation is known as "expanding the sides," a press operation which bulges the sides of the pan about 2 inches. This is done on two 1000-ton French Oil Mill hydraulics provided with split punch and die. The punch is split diagonally so it will expand to the desired degree after positioning inside the pan in the die. As the punch expands, a cam action comes into play to close the bottom die securely.

The final operation on hydraulic presses is known as restriking. It is done on two 500-ton Southwark single-acting hydraulics at a speed of about 6 seconds per piece. These presses are capable of making 22 short working strokes per minute, ranking them among the fastest hydraulics of their type ever built. They have an adjustable stripper in the moving down platen and a full stroke of 20 inches. Platen area is 48 x 41 inches. As is the case with the other hydraulics, these presses can be operated manually, semiautomatically or automatically.

At this point, there follows a lengthy series of smaller press operations, machining, welding and inspecting. A brief summary will indicate the detailed care given this oil pan assembly before it is ready for installation on the motor line.

Flange is trimmed on two No. 8 Bliss presses, at a speed of 12 pieces per minute.

Rear end of the pan is restruck and the oil pump recess finish

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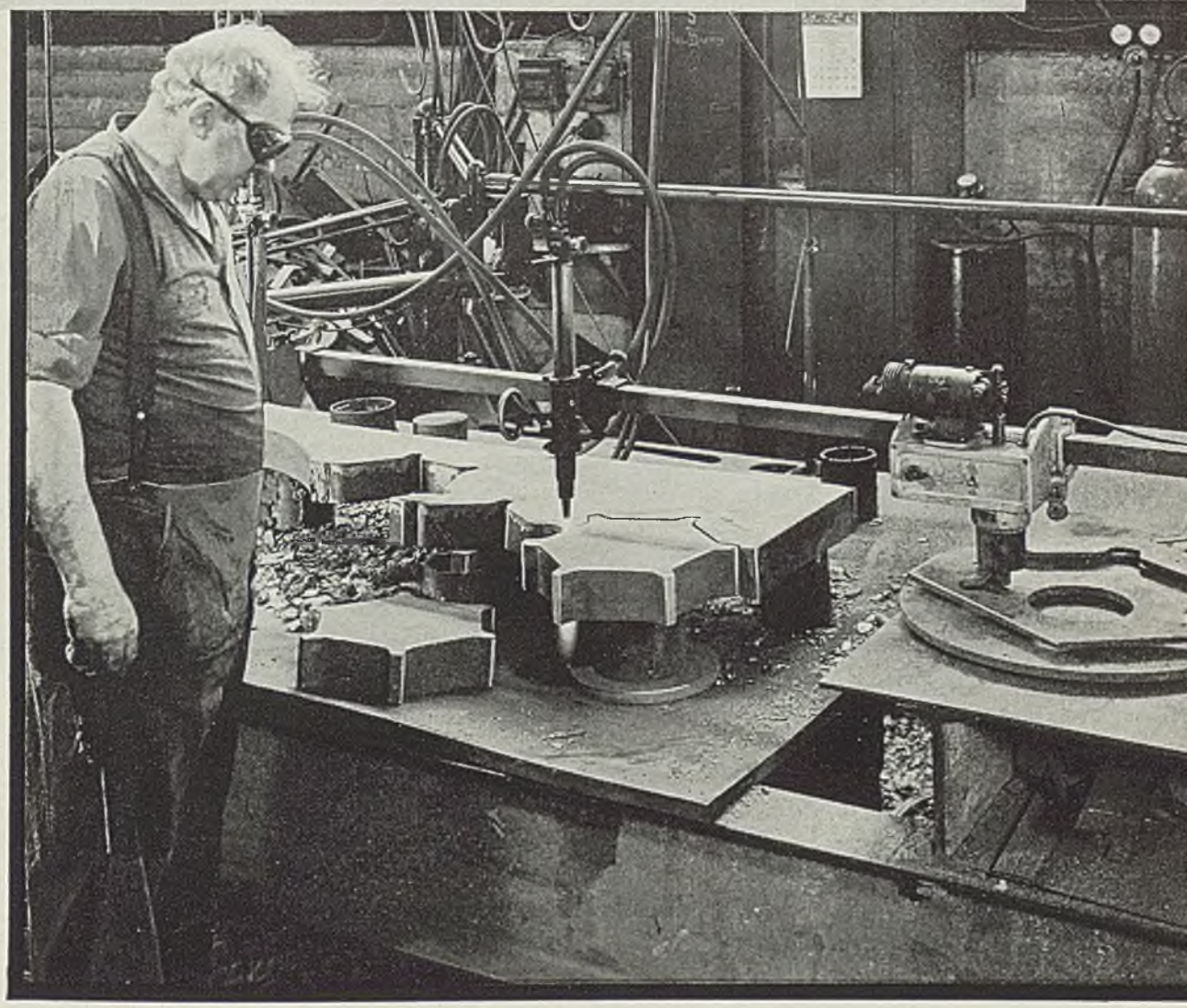

In many instances steel cut-to-shape, by this J & L Warehouse process, saves you money on parts usually made by forging or casting.

In the application pictured here you see one of the J & L flame-cutters producing heavy steel sprockets. These are for a manufacturer who has found this J & L method the most economical in supplying this part for his regular production requirements. The cut is so smooth that little finishing is necessary — only grinding the teeth to a slight bevel. Manufacturers also use this service to save valuable time in replacing heavy broken parts of manufacturing equipment.

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formed and trimmed on a battery of Toledo PA5 presses.

Flange is finish formed and the breather hole is preformed on a 650-ton Cleveland hydraulic press.

Drain plug is spot welded in position on a hydraulically controlled welder, the plug having six spot projections through which the current flows automatically to make the welds. Drain plug hole then is pierced on a small press.

A baffle plate is assembled and spot welded into place inside the pan, with two spot welds on each side.

Stamped steel flywheel housing is welded on the rear end of the pan. The housing is located accurately in a fixture and three spot welds made, after which a single-point welder is used to make 21 more welds across the bottom and up each side.

Side flange of the pan is turned over and the entire pan and flywheel housing given a final restrike on a 500-ton Southwark hydraulic operating at 75-ton pressure.

Breather cup is welded into position.

Further reinforcement strips are spot welded in a hydraulically controlled welder.

Fourteen 11/32-inch holes are pierced in the flange.

Stamped steel felt retainer is welded on the front with four spot welds.

Steel starter plate is arc welded to the pan.

Four holes for the oil gage bracket are pierced in a press.

Oil gage bracket and gasket is riveted into place.

Entire face of the pan is disk ground on horizontal 54-inch wheels operating at 800 revolutions per minute.

Drain plug hole is reamed.

Rear radius of the pan is finished trimmed and the drain plug hole spot faced.

Drain plug hole is tapped, the plug assembled and the pan water tested for leaks around the hole at a pressure of 10 pounds.

Given Pre-inspection Scouring

Four holes are drilled and tapped in the transmission face, and the starter hole is spot faced.

Starter cup which houses the bendix spring then is assembled in a PA4 press, and the pan transferred to a washing oven where it is scoured with soda ash and water to clean thoroughly before inspection.

Inspection benches are provided to give a complete check on every detail of the pan assembly, including sizing of holes, squareness of spot facing, soundness of welds, detection of cracks, flatness of flange, runout on face (held to plus 0 and minus 0.010-inch). Having passed these inspections, the pan is placed on another overhead conveyor which transfers it to a paint spray booth where the outside is painted black, after which the unit is placed on the intraplant conveyor and moved to motor assembly.

Who's in the Dog House Now?

■ Novel method of reducing scrap losses has been placed in operation by General Foundry & Mfg. Co., Flint, Mich. A blackboard contains names of molders listed according to their number, and is so ruled that a week's record may be kept. Left of board are two dog houses; one for each day, and one for a weekly record.

Therefore, all molders whose scrap returns exceed a predetermined percentage are placed in the dog house, much to their chagrin and to the amusement of their fellow employes. Those whose scrap losses remain in lower brackets compete for a monthly prize of $30, divided among six molders with lowest percentage.

Colored red, white and blue squares are used after each man's number to indicate percentage classification into which he has fallen. Board takes advantage of human desire to excel and to avoid ridicule for inefficient workmanship. Photo courtsey Meehanite Research Institute of America, 311 Ross street, Pittsburgh.

Book Describes Stainless Steel Fabrication

■ Detailed recommendations for fabrication of stainless steels made by United States Steel Corp. are incorporated in a booklet recently issued by Carnegie-Illinois Steel Corp., Carnegie building, Pittsburgh. The booklet, entitled "The fabrication of USS Stainless Steels" is divided into three parts and embodies some 91 pages of material considered a guide to successful workmanship.

For convenience, stainless steels are divided as determined by composition and metallurgical characteristics. The groups include martensitic, austenitic and ferritic steels. Fabricating recommendations are given for each particular group as a whole and, where necessary, more detailed recommendations are given for individual steels in the group.

Subjects such as welding, riveting, soldering, joint design, machining, cutting, forming, annealing, pickling operations, surface finishing and protection are discussed.

Synthetic Wax

■ A new high-melting synthetic wax, Acrawax C, made from domestic raw materials has been developed by Glyco Products Co. Inc., 148 Lafayette street, New York. Wax has a melting point of 133 to 134 degrees Cent. It is not hard or brittle. It is insoluble in water and soluble hot in mineral spirits, turpentine, toluol, naphtha and similar hydrocarbon solvents. Solutions in turpentine, naphtha and toluol produce a stable gel on cooling. Acrawax C blends with paraffin, carnauba wax, candelilla wax, resin, etc.

Pipe Nipple Practice

■ A recommended commercial standard for brass, steel and wrought iron pipe nipples, (revision and consolidation of CS5-29, CS6-31 and CS10-29) is being circulated to the industry for written acceptance by national bureau of standards, Washington.

Recommendations cover black and zinc-coated steel and wrought iron pipe nipples in iron pipe sizes from ⅛ to 12 inches inclusive, of standard lengths, and brass nipples in iron pipe sizes from ⅛ to 6 inches inclusive, of standard lengths.

PENNSALT CLEANER
SAVES 37.5% ON CLEANING MATERIALS FOR AMERICAN FIXTURE AND MFG. CO.

Beauty of finish has always distinguished fine furniture. And modern furniture, such as the Chromcraft dinette set illustrated, imposes even more exacting standards than is the case with traditional materials. With this fact uppermost in mind the American Fixture and Mfg. Co., of St. Louis, Mo., recently conducted tests with metal cleaners, adopting one of the Pennsalt Cleaners after it had demonstrated a clear superiority in actual service.

The results showed a 37.5% saving in cleaning materials over the cleaner formerly used, eliminated a sawdust cleaning operation, and a costly hand scrubbing operation as well. In producing these substantial savings, the Pennsalt Cleaner prepares the surface of the metal properly for the exacting chrome finishing operations.

Orthosil was the original Pennsalt Cleaner—a product that brought outstanding new economies and improved results to heavy-duty metal cleaning operations in virtually every industry. Companion cleaners, meeting each need with laboratory precision, have been developed for varied and extreme requirements. Together they form the group known today as the Pennsalt Cleaners.

Their exceptional dissolving and emulsifying action, tremendous lasting power, and quick efficient cleaning ability fit one or more of them for a money-saving place in your processes. Why not give them a test? Write to Dept. E and we will gladly furnish full details. Pennsalt Cleaner Division, Pennsylvania Salt Manufacturing Company, Philadelphia, Pa.

Other Pennsylvania Salt Chemical Products used in large quantity by industry

Anhydrous Ferric Chloride • Sal Ammoniac • Carbon Tetrachloride • Soda Ash • Mineral Acids • Caustic Soda • Kryolith • Acid-Proof Cements

PENNSALT
CLEANERS FOR INDUSTRY

PENNSYLVANIA SALT MANUFACTURING COMPANY

Chemicals

New Air-Hardening Die Steel Is Developed

■ A NEW air-hardening tool steel, designed to replace steels requiring liquid quenching for developing the characteristics desired in dies, punches, and similar tools is announced by Bethlehem Steel Co., Bethlehem, Pa. After extensive laboratory tests and service trials, the following approximate analysis was adopted: Carbon, 1.00 per cent; manganese, 2.00; chromium, 2.00; molybdenum, 1.00 per cent.

Essential advantages are: Good hardenability when air quenched, comparable to many liquid-quenched die steels; and low quenching temperature, 1550 to 1625 degrees Fahr., some 100 to 200 degrees Fahr. below that for ordinary air-hardening die steels with equal hardness. This simplifies furnace operation, lessens chance of overheating corners of a machined die, minimizes distortion and danger of cracking. Other advantages include satisfactory machinability in annealed condition, high abrasion and wear resistance, ease of heat treatment, good hardness penetration.

Forging

Slow and uniform heating is important in forging, preferably done at 1950 to 2000 degrees Fahr. If a preheater is available it is advantageous to hold the parts at 1200 degrees Fahr. until thoroughly heated before being brought to full temperature. Forging temperature must not drop below 1500 degrees Fahr.; reheating if necessary. Due to air hardening, forged parts should be cooled in lime, ashes, silocel or some other heat-resisting medium.

Annealing

Annealing is done to produce a steel with good machinability and to develop a structure which will insure effective response in air hardening. A hardness under 229 brinell on small and medium-sized parts is developed by heating slowly and uniformly to 1600 degrees Fahr., holding at that temperature for at least 1 hour per inch of average thickness, and cooling down to about 400 degrees Fahr. at the rate of 20 degrees Fahr. per hour. After reheating to 1325 degrees Fahr., parts are held at this temperature for about 4 hours per inch of thickness, then removed and cooled to room temperature.

An alternate annealing cycle provides slightly higher hardness. It consists of heating slowly to 1400 degrees Fahr., holding for 1 hour per inch of thickness, cooling at a rate of 20 degrees Fahr. per hour to 900 degrees, followed by furnace cooling to room temperature.

TABLE I

Fracture Ratings Hardness

Treatment Deg. F. Still Air	Fracture Ratings	Rockwell Hardness
1450	9¼	57
1500	9¾	62
1550	9¾	63
1600	9½	63
1650	9	63
1700	8¾	63
1750	5	46
1800	4½	44

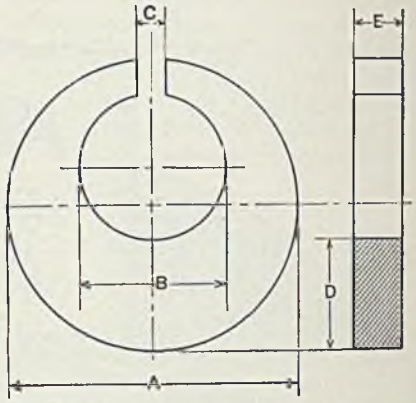


Fig. 2—Dimensions checked in distortion tests and shape of sample employed

Hardening

Care must be exercised in heating and quenching to keep distortion to a minimum and to prevent decarburization. The steel should always be heated slowly to the hardening temperature. Pack hardening is advocated for large parts to insure maximum surface hardness.

If possible it is well to preheat to about 1200 degrees Fahr., and soak thoroughly at that temperature. Recommended hardening temperature is 1550 to 1625 degrees Fahr., depending on size of piece, held for 1 hour per inch of thickness and air cooled. For large dies, an air blast should be directed against the face during hardening.

TABLE II

Rockwell Hardness in Tempering Tests

Temperature Deg. Fahr.	Hardening Temperature, Deg. F., Still Air 1500	1550	1600	1650	1700
None	62	63	63	63	63
300	59	61	61	60½	61
400	58	60½	60	60	60
500	57	59	59	58½	59
600	56	57½	57	57	57
700	55	57	57	57	57
800	54	56	56	56	56
900	51	54	54	53½	54
1000	49	52½	53	53	53
1100	46	48	49	49	48
1200	37	39	39	40	39
1300	27	28	28	28	28

Fig. 1—Fractures of hardened specimens. Hardening temperatures in degrees Fahr., left to right, top row: 1450, 1500, 1550, 1600; bottom row: 1650, 1700, 1750, 1800. Actual size

Tempering

Parts are charged into tempering furnace after cooling to about 200 degrees Fahr. Depending upon size and degree of hardness desired, temperature is raised slowly to between 325 and 375 degrees Fahr., maintained for at least 1½ hours per inch of thickness and slowly cooled to room temperature.

Physical Properties

Physical tests were carried out on steel analyzing: Carbon, 0.95 cent;

TABLE III

Distortion in Heat Treatment

Location	Dimension in Inches Annealed	Change, in Inches per Inch — Air Hardened At 1550° F.	Air Hardened at 1550° F. Tempered 300° F.
A	4.99825	0.00067	0.00040
B	2.89875	0.00095	0.00077
C	0.50075	0.00210	0.00190
D	1.89625	0.00102	0.00102
E	1.00150	0.00013	0.00038

manganese, 2.04; phosphorus, 0.016; sulphur, 0.017; silicon, 0.23; chromium, 1.93; molybdenum, 1.04 per cent. Except in the distortion and hardenability tests, specimens were taken from 1-inch square annealed bar stock.

Critical Points: Dilatometric tests on 1-inch round specimens, heated and cooled at a rate of 400 degrees Fahr. per hour, gave the following ranges:

Heating, Ac range, 1370 to 1440 degrees Fahr.

Cooling, Ar range, 1300 to 580 degrees Fahr.

Hardness: Specimens 1-inch square and 4-inch long hardened in still air at temperatures ranging from 1450 to 1800 degrees Fahr. at 50-degree intervals were fractured and fracture ratings and hardness determined. Results are in Table I, while Fig. 1 shows appearance of the fractures.

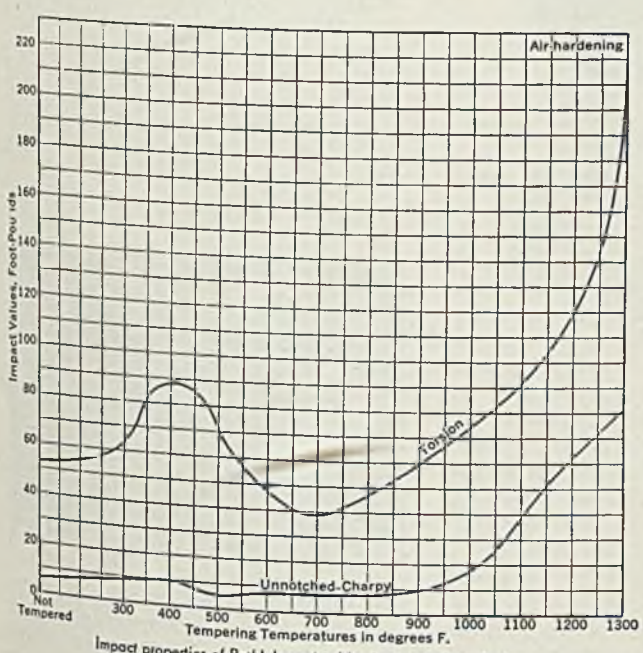
Tempering: Specimens 1-inch square and 2-inch long were hardened in still air from 1500, 1550, 1600, 1650 and 1700 degrees Fahr. and then tempered at temperatures from 300 to 1300 degrees Fahr. Results are in Table II.

Impact Strength: Tests for Charpy and torsional impact values were made on specimens hardened in still air from 1550 degrees Fahr. and tempered at 100-degree intervals from 300 to 1300 degrees Fahr. Charpy specimens were unnotched, 0.250 x 0.375 x 2 inches long. Torsion impact specimens were 0.250-inch diameter, striking speed was 600 revolutions per minute. As impact values may vary with the speed used, results do not necessarily represent maximum or minimum obtainable. To compare with other impact values, test conditions must be identical. All specimens were rough machined oversize, heat treated and ground to size. Results are exhibited in Fig. 3.

Distortion: Specimens were 1¼-inch samples cut from annealed forgings of 5½-inch diameter, upset from 4½-inch square billet stock. Table III shows changes in dimensions of test piece. Fig. 2 shows sample locations.

Hardenability: Specimens 4 inches long were cut from an annealed 4½-inch square billet; hardened in still air from 1550, 1600 and 1650 degrees Fahr.; halved and hardness readings taken at ⅛-inch increments along the longitudinal central axis of the billet. Results show hardness penetration in the center, measured from transverse faces of the 4-inch length. Fig. 4 shows hardness developed.

Fig. 3—Results of impact tests



Impact properties of Bethlehem Air-Hardening tool steel after air cooling from 1550 degrees F. in still air and tempering

Study of Government Relation to Business

■ *Government and Economic Life, Vol.* 1; by Leverett S. Lyon, Myron W. Watkins and Victor Abramson; cloth, 519 pages, 6 x 9 inches; published by the Brookings Institution, Washington; supplied by STEEL, Cleveland, for $3.

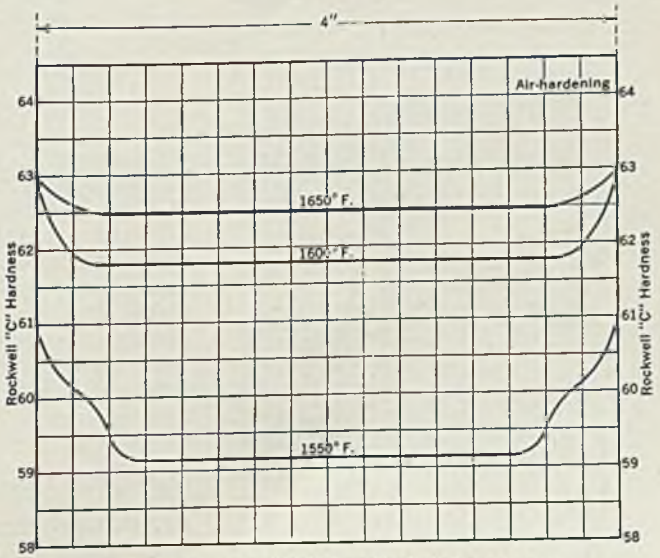
This is publication No. 79 by the institute of economics of the Brookings Institution and deals with the development and current issues of the American public policy.

In the initial volume the authors have gone further than discussion of government control or interference in business and have considered the wider subject of the government's relations to economic life. The second volume will go beyond the area usually referred to as government in relation to business and deal with those segments of economic life and those occasions in which governmental action has taken special forms or gone over into direct governmental production.

The first volume analyzes governmental activities which have been applied to a large part of American industrial life.

A great deal of effort has been made to interpret the development of each major phase of public policy in terms of the significant economic and social forces which have conditioned it and to present current trends and frontier issues. The final chapter presents an analysis of present tendencies in broader terms. In it is pointed out the change in emphasis in the purposes for which government is being used, the new governmental methods which are employed and, more significant, the changes in social criteria which these shifts imply.

Fig. 4—Hardness test results



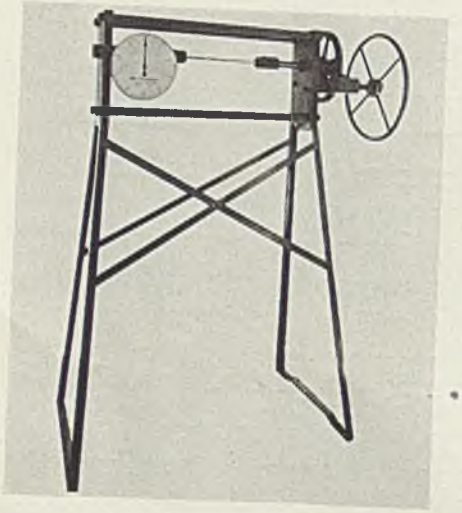
Hardenability curve of Bethlehem Air-Hardening tool steel

Fluorescent Light

■ Hygrade Sylvania Corp., Salem, Mass., offers Miralume HF-200 fluorescent lighting unit for general commercial lighting complete with four 40-watt (48-inch) daylight or white fluorescent lamps and all wiring and fittings. Units are available for 100 to 125 volts and 220 to 250 volts. They can be installed in any standard 60-cycle alternating-current circuit. Its dimensions are 7¾ x 10½ x 48½ inches.

Tests Tensile Strength

■ W. C. Dillon & Co. Inc., 3551 Sheffield avenue, Chicago, has developed a tensile strength testing machine for testing rods, tubing, wire, flat metals, castings, weldings, chain, porcelain insulators, fiber, rope, rubber and composition materials of all kinds. Dynamometer has demountable 10-inch easy-to-read dial and can be used separately for hoists, draw bars and weighing. Machine is claimed to test tensile strength of practically any material up to 25,000 pounds. It requires small floor space and weighs less than 350 pounds.



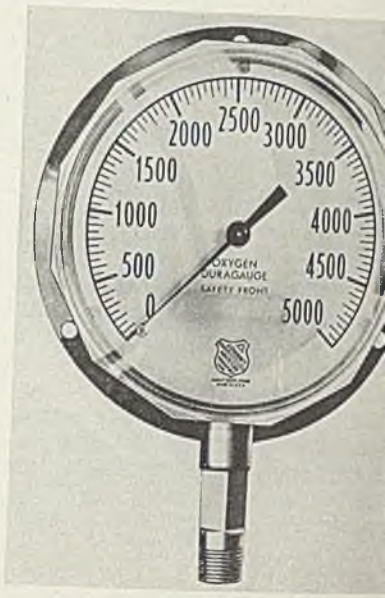
Radial Saw and Woodworking Machine

■ American Saw Mill Machinery Co., Hackettstown, N. J., has developed Uni-Point radial saw and universal woodworking machine which allows saw to pivot both horizontally and vertically around one point in center of table on every cross cut. Overarm telescopes so when saw is pushed back there are no projecting parts or overhanging mechanism and entire work table is clear for laying out work.

Control handles are at front of machine. Universal knee permits motor to be turned in any position. Machine is said to be suitable for left or right hand ripping, bevel ripping at any angle, dadoing, rabbetting, routing, tenoning, jointing, sanding, shaping, etc. It is made in two standard sizes: Junior carries motors up to 2 horsepower and saws up to 14 inches and cuts off lumber up to 3 x 15 inches and rips 28 inches wide or through center of a 56-inch panel; Senior with motors up to and including 7½ horsepower and 18-inch saws, cuts off 5 x 20 inches and rips 40 inches wide or through center of an 80-inch piece. Carrying base with handles is available for Junior model in place of regular legs.

Oxygen Gage

■ Ashcroft American Gauge division, Manning, Maxwell & Moore Inc., Bridgeport, Conn., has developed a special oxygen Dura for high-pressure service. I a heavy cast brass case, safet

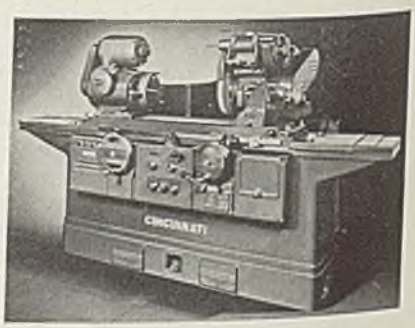


id front and full open back. Ba is sealed with moisture-proof pap protected by thin brass dis Mounting lugs on case hold it awa from wall. Bourdon tube is bery lium copper, and socket is forge bronze. Gage cover of transparen plastic opens up dial for easier rea ing. Accuracy is guaranteed t within ½ of 1 per cent.

Grinding Machine

■ Cincinnati Grinders Inc., Oakley station, Cincinnati, announces a new hydraulic universal grinding machine. It has swing of 12 inches and can be obtained in between-center lengths of 24, 36, 48 and 72 inches. Wheel head incorporates recently announced Filmatic spindle bearings. Grinding wheel and driving sheave are mounted close to front and rear bearings, respectively, reducing bending from load applied at these two points. Three-horsepower motor mounted on top of wheel head unit drives grinding wheel spindle.

Table feed is actuated hydrauli-



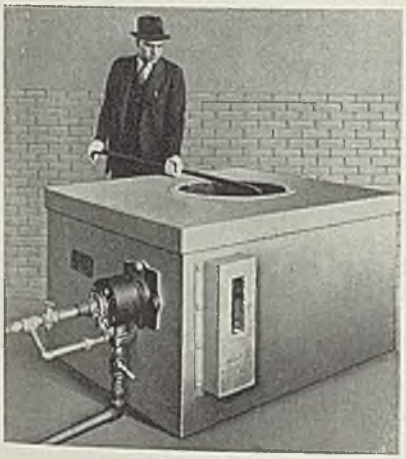
cally and feed rates are infinitely variable from 3 to 240 inches a minute. With new mechanical speed change device built into headstock,

an infinite number of work speeds may be obtained, varying from 55 to 500 revolutions per minute.

Headstock may be swiveled at right angles to grinding wheel for face grinding operations. Table has two hand-controlled traverse rates for setting up long adjustments and for fine adjustments and shoulder grinding. Hand infeed traverse of wheel head also has two speeds. Table ways are pressure lubricated with filtered oil.

Pot Furnace

■ A. F. Holden Co., New Haven, Conn., has developed a pot furnace said to have 30 per cent fuel recuperation. Built in either oil or gas fired types, equipment features



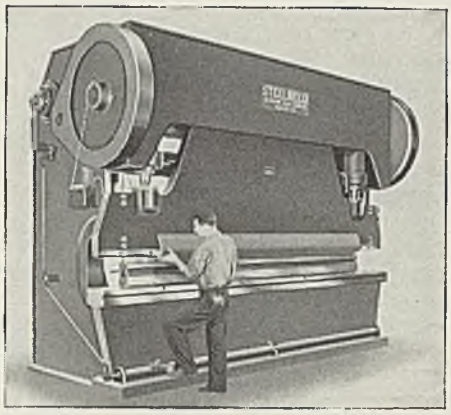
specially constructed wall allowing exhaust gases to pass at right angles to incoming fuel. Thus gas or oil is preheated before entering chamber and terminal velocity of gases passing out of exhaust is only sufficient to support combustion. Cases are said to be slowed down 50 per cent in their travel from exhaust, resulting in fuel economy.

Additional feature is that pot becomes part of top framework of furnace. Pot furnace can be made in any size and have more than one burner and exhaust. For conventional size equipment running up to 24 inches in diameter, one burner and exhaust deliver maximum efficiency.

Bending Press

■ Steelweld Machinery division, Cleveland Crane & Engineering Co., Wickliffe, O., has introduced Model J-12 Steelweld bending press. It handles plate up to 12 feet x ½-inch between housings and up to 14 feet over total length of bed and ram. Longer plate can be handled by extending bed and ram at one or both ends. Press illustrated has a double end extension.

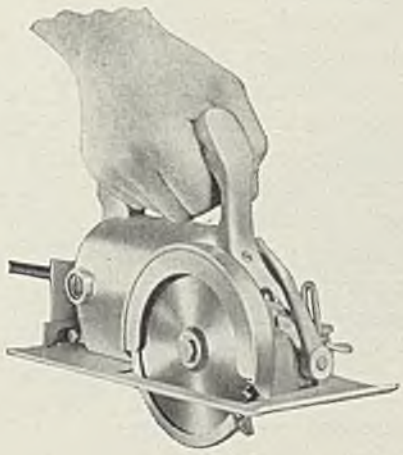
Ram is operated by two eccentrics, one on each side of machine, and each provided with three extra-large main bearings and an eccen-



tric bearing. Bearings are lubricated automatically. Gears are protected with metal covers, and shafts are located at rear of machine away from possible damage of crane hooks and bent-up plates. Press may be used for bending, forming, blanking, drawing, rubber-forming and multiple-punching operations. Several operations may be handled by passing work successively through various dies set in position along length of machine. Press is 7 feet 4 inches x 11 x 15 feet 6 inches and has 18-inch deep throat.

Portable Cutter

■ Syracuse GuildTool Co., Syracuse, N. Y., announces portable GuildCutter, to cut material up to 1¼-inch thick, especially wood, plywood, celotex and other building



materials. Cutter has saw blade 4½ inches in diameter. Saw arbor also provides for use of a dado head ¼-inch wide for ploughing, grooving, and dadoing.

As base of machine raises and lowers, any depth cut from a scratch to the full 1¼-inch capacity may be made. Base also tilts to 45 degrees for beveling. Telescope-type guard protects blade at any angle. Frame is cast aluminum alloy highly polished. Tool is 4½ inches wide, 8 inches high and 11¼ inches long. It weighs 7 pounds.

Sheet Lifter

■ Cullen-Friestedt Co., 1300 South Kilbourn avenue, Chicago, has developed a swivel leg sheet lifter for handling narrow sheet steel two packs at a time side by side. Lifter can also handle single bundles coming within its opening range. Of 7-ton capacity, lifter illustrated has opening range handling single packs from 15 to 30 inches wide or two side by side packs not over 30 inches wide.

Legs are 22 inches deep and 48

inches apart to correspond to rollers of runout table. Dimensions can be varied and lifter made with as many legs on each side as desired. Opening and closing mechanism is actuated by hand wheel or chain and chain wheel through spiral gear reductions. Swivel movement of legs is made through spiral gears on each of carrying legs and controlled by two levers, one for each side of lifter. All legs on each side of lifter are swiveled simultaneously and lock in either parallel or right angle position in relation to length of sheets.

Bin Wall Caps

■ American Manganese Steel division, American Brake Shoe & Foundry Co., Chicago Heights, Ill., offers nonmagnetic bin wall caps cast of 13 per cent manganese steel. Caps are applied to wall tops of bins used to store ferrous melting

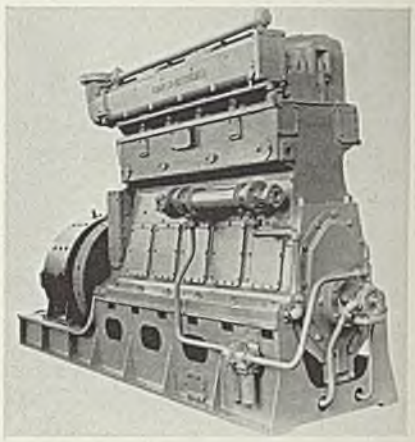
stocks such as steel scrap customarily handled in and out of bins with lifting magnets. Nonmag-

netic austenitic manganese steel prevents fouling by magnet and pulling caps loose. Individual castings such as Ts, Ls and long straight pieces made with inner reinforcing members are welded together into units before application. Studs are cast in concrete walls during erection and caps are fastened to these. Slots in countersunk bolt-holes permit grout to be funneled into hollows between wall-tops and caps for solid seating.

Diesel Engine

■ Cooper-Bessemer Corp., Mt. Vernon, O., offers type JS diesel engine in 5, 6, 7 and 8-cylinder units rated at 430, 525, 600 and 675 horsepower, respectively, at 400 revolutions per minute. Cylinder bore is 13 inches, and stroke 16 inches. Crankshaft is a one-piece steel forging 9 inches in diameter. Main bearings are babbitt-lined steel shells with shim adjustment.

Die-forged steel connecting rods are used, having 2-piece crankpin boxes. Piston pin ends of connecting rods are bolted solidly to piston pins. Undersides of piston crowns are jacketed and oil cooling provided. Eight piston rings are incorporated, five of compression type and three of oil control, with one of the latter below piston pin. Quadruple chain driven by camshaft



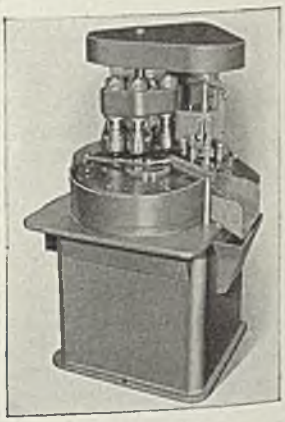
drives fuel pump and auxiliary drive shaft.

Cooling water header is cast integral with cylinder block underneath air intake header on exhaust side of engine. Fuel injectors are arranged en bloc on camshaft housing cover and are gear driven from camshaft. Air inlet and exhaust outlet connections may be placed at either end of engine. Gage board is located in center of engine on operating side.

Semiautomatic Threader

■ L. J. Kaufman Mfg. Co., Manitowoc, Wis., has placed on the market a semiautomatic threading machine performing a threading and reaming operation at the rate of 1600 to 2100 steel pieces per hour. Hand loading is in front of machine with parts ejected automatically at side.

Machine embodies 30-station revolving dial having suitable work-



holding inserts or chucks to hold part being processed. It has three 1-inch rotating self-opening die heads and three reamers mounted in six individual spindles. Individual vertical adjustment is provided for each cutting tool. Three pieces are completed at every index movement of dial. Operating mechanisms are air controlled and interlocked for fool-proof continuous operation.

Continuous Weighing

(*Concluded from page* 51)

suitable where a constant rate of delivery is desired. The second system is suitable for those difficult applications where the machine must follow a demand curve which may be changing constantly. Such a system as this latter enables the rate of delivery to follow the demand indicated by a flow meter, by boiler pressure, by power demand or a motor, or the system may be interlocked with similar machines to blend or proportion a number of different materials continuously.

Fig. 1 shows a complete continuous-weighing system embodying above equipment and without the protective cover which is placed over it when in actual use. At the left can be seen conical bin feed. Just below it is the magnetic vibrator unit of the feeder, which discharges the material to the conveyor section in the center of Fig. 1. To the right of this is seen the counterpoise with scale where various rates of discharge are set.

Lights Indicate Balance

In Fig. 2 may be seen a closeup of the continuous belt conveyor with one side open to show its construction. Fig. 3 is an end view of the counterpoise conveyor showing the housing containing mercury switches which operate the control.

Fig. 4 is a closeup view of a control housing. At extreme left above the main housing is a white pilot light which burns continuously when the machine is operating. At its immediate right is an on-and-off switch for the system. Next to right is a red light and at extreme right a green light. These flash on when the scale is heavy or light respectively, both red and green lights being off when the scale is in exact balance. The slow swing of the scale on each side of center thus is indicated visually to the operator at all times. Near the lower side of the housing are two adjustments. The one at the left increases or decreases the amount of underswing, and the one at the right increases or decreases the overswing.

In addition to these controls, there are a multitude of mechanical and electrical devices which can be built into the system including continuous recording meters, interlocks, remote control apparatus and other accessories. Thus the system can easily be adapted for almost any type of application suitable for continuous feeding.

Equipment is available which efficiently handles extremely fine, dry or aerated material which ordinarily will run almost like water to cause what is commonly known as "flooding." Another difficult type of material is that which continuously bridges or arches over the discharge opening. Devices are available which permit feeding such material by the system described above with no difficulty.

Simplified Practice of Steel Scrap Reaffirmed

■ Division of simplified practice, national bureau of standards, Washington, announces simplified practice recommendation R58-36, classification of iron and steel scrap, has been reaffirmed without change by the standing committee of the industry.

This recommendation became effective originally in 1926. It was revised for the first time in 1928, reaffirmed in 1935, and again revised in 1936. It classifies scrap for use in blast, basic open-hearth and electric furnaces and for use in gray iron foundry practice and bessemer converters; it includes, also, specifications for classes of miscellaneous scrap and a contract form for the purchase of scrap. Copies of the recommendation may be obtained from superintendent of documents, government printing office, Washington, at 5 cents.

Eye Protection Data

■ American Optical Co., Southbridge, Mass., has prepared a table summarizing test data on the density, percentage of transmission of visible light and the absorption of the dangerous ultra-violet and infrared rays of glass which it has developed specifically for industrial use. This data is intended to aid in solving complex problems in eye protection.

Machinability Chart

■ Recommendations for turning, forming, threading, drilling, tapping and reaming different grades of stainless steels are incorporated in a machinability chart distributed by Rustless Iron & Steel Corp., 3400 East Chase street, Baltimore. Only stainless steels with hardness of 180 to 240 brinell are covered by the chart, which works on the principle of a slide rule.

Adhesive Material Has High Bonding Strength

■ Rubber, wood, glass, metal, felt, leather or combinations of these materials can be glued together by means of Strangle-Hold adhesive developed by Chemical division, Colonial Alloys Co., East Somerset, Trenton avenue and Martha streets, Philadelphia.

Material is said to have a high bonding strength, is waterproof, elastic and can stand temperatures as high as 283 degrees Fahr. It is unaffected by many corrosives and makes an excellent base coat for paint.

Composed of two ingredients, a powder and liquid, mixture is troweled over parts to be joined or protected. Thickness of one coat is 0.010-inch and it dries to a black color.

Releases Tentative Tier Building Requirements

■ "Recommended Fundamental Principles, Tentative Minimum Requirements, and Tentative Standard Welded Connections for Tier Buildings" is title of a booklet released by American Institute of Steel Construction, 101 Park avenue, New York. Subject matter was developed by a special committee appointed by board of directors of the institute in 1938.

Topics embodied include recommended tentative standard details on fillet weld sizes, typical details of column bases, simple beam-to-beam connections, typical beam details, code for fusion welding and gas cutting in building construction and fusion welding symbols. F. H. Frankland, chief engineer, American Institute of Steel Construction is chairman of committee.

Welds at Low Heat

■ Chief advantages of welding alloy rods and fluxes called Castolin are that welding can be performed at low temperatures. Placed on the market by Park Sales Co., 3 Park place, New York, they are available for oxyacetylene welding. Stresses and overheating with subsequent warping of welded parts are said to be avoided by use of these materials. Alloys may be obtained for welding of aluminum and its alloys; for building up on steel, cast iron, copper, brass and bronze; for cast iron, steel, copper, brass, extruded bronze, cast aluminum and die-castings.

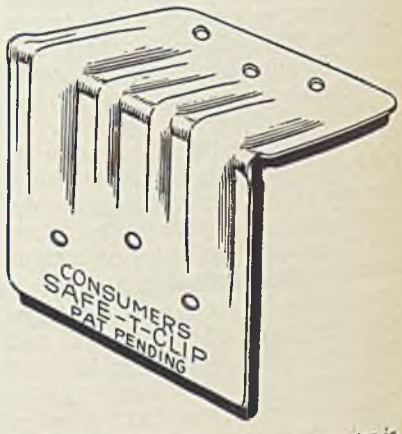
Steel Blackened in Five To Fifteen Minutes

■ Houghto-Black, a salt for blackening steel parts in water solution at temperatures below tempering range—between 270 and 290 degrees Fahr.—is a recent development of E. F. Houghton Co., 240 Somerset street, Philadelphia.

Parts to be blackened are suspended in solution, either on wires or in a basket. After immersion for about 5 to 15 minutes, depending on metal analysis and condition of original surface, work is colored a uniform jet black. Parts when removed are rinsed in clear hot water, dried and dipped in a rust preventive or soluble oil solution to prevent corrosion.

Corrugated Clips Protect Corners of Packaged Steel

■ To protect corners of packaged steel, Consumers Steel Products Corp., 6450 East McNichols road, Detroit, has designed Safe-T-Clip of 20-gage steel with holes for nailing it in place. Clip, which is corrugated so steel bands or wires used in wrapping cannot shift their position and loosen bundle, is made in two sizes—the small for wire or steel bands up to ¾-inch in width, the large for wire or steel bands up to 1¼ inches in width.



Above 20-gage steel corner protector is ready to install. Holes are already drilled for nails

Have You Seen This HELPFUL LITERATURE?

Here are the latest industrial publications reviewed for your benefit. They are yours for the asking. There is no charge or obligation. Simply fill in the convenient coupon and return.

(1)—Self-Locking Nuts

Elastic Stop Nut Corp. — 58-page illustrated wire bound catalog which explains in detail the Elastic Stop nut principle and its operation. Applications and uses in various industries are discussed. Dimensions, list prices, and other useful data are included.

(2)—Piston Pumps

John S. Barnes Corp. — 4-page illustrated bulletin covering piston pumps, PA-14, 16, 17 and 18 Series. Features include positive, vibration-free feed for all types of cutting tools, interchangeable pump sizes, non-pulsating fluid delivery, etc. Performance data and specifications are given.

(3)—Vibrating Packer

Ajax Flexible Coupling Co.—4-page illustrated bulletin No. 30 describing the vibrating packer. Designed for settling and compacting materials in containers as they are filled, this packer is mounted on coil springs preventing transmission of vibration to floor and affording quiet operation.

(4)—Roller Bearings

Bower Roller Bearing Co. — 4-page illustrated bulletin which describes "Micro-Honing," a method of improving surface finish of bearings. While clearing off the dead metal film, "Micro-Honing" provides a highly finished, hard surface that is mechanically accurate, thereby providing permanent adjustment when bearing is installed.

(5)—Grinding Machine

Cincinnati Grinders Inc. — 12-page illustrated bulletin No. G-448, describing the new Model ER 12-inch hydraulic universal grinding machine and its features, including "filmatic" spindle bearings, variable work speeds over a wide range, table traverse speeds infinitely variable, independent right and left-hand tarry adjustment, etc. Specifications are given.

(6)—Grinding Wheels

Fort Pitt Grinding Wheel Co. — 148-page booklet giving list prices and specifications of grinding wheels of all types, including vitrified and silicate bonded, shellac bonded, rubber bonded and resinoid bonded. Special shapes and segments are described.

(7)—Press Safety Guard

Junkin Safety Appliance Co. Inc.—8-page illustrated folder describing the triple interlock safety guard, designed to protect operators of stamping presses. Features include better protection, automatic operation and increased production. A booklet entitled, "Stamping Presses, Their Safety, Uses and Abuses," is also available.

(8)—Presses

E. W. Bliss Co. — 36-page illustrated catalog in which eighty-odd years of press development are covered. Illustrations and discussions are given of two foreign and six domestic Bliss plants. The plastic flow of metals as a manufacturing process is discussed.

(9)—Valves

Jenkins Bros.—30-page data book, "Jenkins Recommends," describing accepted practice for installing valves. Valve positions are indicated and pipe lines are diagrammed. Directions for specifying valves for various uses are also included.

(10)—Screw Machines

George Scherr Co. Inc. — 8-page illustrated bulletin covering "Tornos" high speed automatic screw machines, which are made in eight sizes from 5/32-inch to 1-3/16 inches capacity. Features include extreme accuracy and high spindle speeds up to 12,000 R. P. M. Specifications are given.

(11)—Metals and Alloys

Cambridge Wire Cloth Co.—32-page illustrated bulletin No. 76, giving general information on aluminum, copper and copper alloys, brass, bronze, nickel and stainless steel, etc., that are available in fabricated screen and cloth forms. Applications, resistance to chemical attack and strength of materials are covered by engineering tables.

(12)—Spot Welders

Pier Equipment Mfg. Co. — 12-page illustrated catalog No. 40, describing the complete line of Ace spot welders. Detailed information is given on various types of welders, the newly designed contactor, and operating mechanism used on the 1940 manually-operated welders. Manual and automatic types are discussed.

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HELPFUL LITERATURE

(13)—Fire Brick

Armstrong Cork Co., 8-page illustrated bulletin No. I-114 describing various types of fire brick for all types of heated equipment. Features include low thermal conductivity, high physical strength, uniformity in size and composition, low shrinkage and ample refractoriness. Cements and asphalt products are also discussed.

(14)—Storage Equipment

All - Steel - Equip Co. Inc. — Illustrated folder No. NA-14, describing steel equipment for handling and storage. Stacking boxes, stack-units, taper pans, tool boxes, shop boxes, steel lockers, drill and reamer cabinets, files and filing equipment, and storage and wardrobe cabinets are included.

(15)—Accessories

George Gorton Machine Co. — 24-page illustrated bulletin No. 1317-B, covering many types of cutters, tooth burrs, chucks, collets, jig boring tools, machine vises, graduating machines, and grinding wheels. Dimensions, general specifications and prices are included.

(16)—Automatic Lathe

Jones & Lamson Machine Co.—16-page illustrated bulletin No. 39-175, describing the 8-inch Fay automatic lathe, its operation and adjustments, some of its tools and attachments, and specifications. Typical set-ups shown.

(17)—Valves

Edward Valve & Mfg. Co. Inc. — 8-page illustrated bulletin, "Today's News of Tomorrow's Valves," showing many types of valves in typical installations. Features include resistance to heat and corrosion.

(18)—Cable Terminators

Delta-Star Electric Co. — 32-page price list No. 65-2. A complete line of cable terminators and potheads is covered and list prices are included.

(19)—Sheet Metal Machinery

Fred J. Swaine Mfg. Co. — 44-page illustrated loose-leaf catalog covering various types of sheet metal machinery. Open back inclinable presses, power punching presses, and sheet metal tools and dies are described. Weights, specifications and dimensions are given.

(20)—Shears

Niagara Machine & Tool Works—Illustrated bulletin No. 72-A presents new series of power squaring shears, built in sizes ranging from 10 gage to ½-inch. Features include more working strokes per hour, quick and accurate adjustment, rugged construction.

(21)—Thread Grinders

Ex-Cell-O Corp. — 4-page illustrated bulletin No. 14291, describing the new high production internal precision thread grinder. Eight work speeds are provided. Features include automatic sizing, rapid feeding and retracting, and ball bearing grinding spindle.

(22)—Band Saws

Wells Mfg. Co. — 2-page illustrated bulletin covering metal cutting band saws. Four cutting speeds are provided—60, 90, 250 and 500. Applications are given for the foundry, pattern shop, die shop and sheet metal shop. Specifications are also included.

(23)—Die Sections

Ajax Steel & Forge Co. — 4-page illustrated bulletin on composite die steel sections. Figures are given for the various gages of sheet steel in determining the size of tool steel and also the size of steel for the base. Price list is included.

(24)—Portable Conveyors

Aluminum Ladder Co. — 8-page illustrated folder No. 243, covering wheel type and roll type aluminum portable gravity conveyors. Features include safety, appearance and light weight.

(25)—Riveting Hammers

Cleveland Pneumatic Tool Co. — Loose leaf illustrated bulletin No. "N." Various types of "Cleco" slow hitting and one-shot riveting hammers, designed especially for service in aircraft industry, are described. They strike blows at the proper speed and power to cause rivet metal to flow uniformly without crystallization. Specifications are given.

(26)—Alloys

Monsanto Chemical Co.—62-page bulletin No. 2 on phosphorus-iron alloys. Contains a report of experimental research investigation upon corrosion and mechanical influences of alloying elements in low alloy steels. Data on each type of steel is given in individual tables and graphs. Brief analyses are given.

(27)—Steel Pipe

Jones & Laughlin Steel Corp. — 12-page illustrated bulletin No. AD-121. J & L Permalined steel pipe and its advantages, including easy installation and handling, economy, long service-life, corrosion resistance, and increased "flow-efficiency," are discussed. Sizes, weights and dimensions are included.

(28)—Electric Tools

Black & Decker Mfg. Co. — 61-page illustrated catalog "1940 Portable Electric Tools" covering drills, drill stands, hole saws, tool chests, screw drivers, lectro-shears, grinders, sanders, surfacers, buffers, valve refacers, attachments and accessories.

(29)—Slings

Macwhyte Co. — 56-page illustrated sling handbook. Contains latest information on design, capacity and weight comparison of slings, wire rope and chain; tables for safe working loads; typical assemblies; crane signals; breaking strength and weight comparisons.

(30)—Plate Fabrication

Downingtown Iron Works — 42-page illustrated catalog No. 102. Numerous typical examples of steel plate fabrication are shown. Facts about A. S. M. E. code, analyses of S. A. E. steels, miscellaneous tables and other information are included.

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Open Hearth Slag Control

(*Concluded from Page* 58)

of diffusion, but this increase is inappreciable for the amounts of these elements ordinarily present in heat treating or carburizing steels. Rate of diffusion does not vary with impurities ordinarily present in commercial steels or with grain size in the range of A.S.T.M. No. 3 to No. 8. Under certain conditions diffusion rate increases with greater carbon concentration by about 80 per cent between 0.1 and 1.0 weight per cent carbon and this increase is practically independent of temperature.

Importance of Minerals Proved

Discussing the international aspects of strategic mineral supplies, J. W. Furness, chief, economics and statistics branch, bureau of mines, Washington, said the present conflict abroad has brought out with crystal clarity the fact future historians must emphasize the basic part that mineral wealth plays in world affairs. He said "When you consider how few countries have adequate domestic resources of the essential raw materials to support a modern steel industry, it is at once apparent that the nations of the world fall into two categories; namely, those that have "have" and those that "have not" such resources. For example, the iron and steel industry of Japan is forced to depend on such areas as Burma and Australia for its high-grade iron ores, supplemented by the import of scrap iron and steel, largely from the United States, as well as by the ores of Manchukuo and other nearby sources. It is therefore dependent for its raw materials on sources not under the political control of Japan.

"The Tata Steel Co. of India, depending as it does on Burma coal for its metallurgical coke, is based upon the large occurrence of high-grade iron ore of the Central Provinces. The low buying power of India as well as competition from foreign sources of the manufactured products has prevented the rapid expansion of this industry.

"The Ruhr area of Central Europe has been the source of friction between Germany and France for years. Germany controls the metallurgical coal while France controls by far the larger part of the Minette ores. To utilize these ores it is necessary for both France and Germany to import relatively large tonnages of high grade iron ore."

Modern Pioneers

(*Concluded from Page* 33)

ing Corp., Chicago; Walter Frederick Herold, Bassick division, Stewart-Warner Corp., Chicago; George Alexander Hughes, Edison General Electric Appliance Co. Inc., Chicago; Prof. N. Vladimir Ipatieff, Universal Oil Products Co., Chicago; Prof. Morris Selig Kharash, University of Chicago; Dr. Paul E. Klopsteg, Central Scientific Co., Chicago; Howard L. Krum, Teletype Corp., Chicago.

Harry E. La Bour, La Bour Co. Inc., Elkhart, Ind.; Maj. Adolph Langsner, Eugene Dietzgen Co., Chicago; Clarence E. Lomax, Associated Electric Laboratories Inc., Chicago; Sern Madsen, Curtis Companies Inc., Clinton, Iowa; Dr. Earl T. McBee, Purdue Research Foundation, Lafayette, Ind.; Ira E. McCabe, Mercoid Co., Chicago; George Rudolph Meyercord, Haskelite Mfg. Corp., Chicago; Carl Shelley Miner, Miner Laboratories, Chicago; Jacque Cyrus Morrell, Universal Oil Products Co., Chicago; A. L. Murray, Auburn Rubber Corp., Auburn, Ind.

Martin L. Nelson, Associated Electric Laboratories Inc., Chicago; Ray C. Newhouse, Allis-Chalmers Mfg. Co., Milwaukee; William B. Newkirk, Corn Products Refining Co., Argo, Ill.; Herbert F. Obergfell, Associated Electric Laboratories Inc., Chicago; Carl G. Olson, research department, Illinois Tool Works, Chicago; Carl Pfanstiehl, Pfanstiehl Chemical Co.,

Waukegan, Ill.; Thomas Hunton Rogers, Standard Oil Co. of Indiana, Whiting research laboratory, Chicago; Carlisle K. Ross, United States Gypsum Co., Chicago.

L. R. Smith, A. O. Smith Corp., Milwaukee; Harry Steenbock, University of Wisconsin, Madison, Wis.; William Halvor Taylor, Vilter Mfg. Co., Milwaukee; Ernest H. Volwiler, Abbott Laboratories, North Chicago, Ill.; Vandeveer Voorhees, Standard Oil Co. of Indiana, Chicago; Cary Richard Wagner, Pure Oil Co., Chicago; Julius Benjamin Wantz, General Electric X-Ray Corp., Chicago; Hugo Herbert Wermine, Belden Mfg. Co., Chicago; Dr. William M. White, Allis-Chalmers Mfg. Co., Milwaukee; John Wicks, Associated Electric Laboratories Inc., Chicago; Frederick Duwaine Wilson, Western-Austin Co., Aurora, Ill.; Elmer Elsworth Woodward, Woodward Governor Co., Rockford, Ill.

Joint awards—William D. James, George T. Markey and John B. Olson, James Mfg. Co., Fort Atkinson, Wis.

Simplified Roof Gutter

■ Belding eaves trough, developed by Wheeling Metal & Mfg. Co., Wheeling, W. Va., may be installed without use of solder or special tools. This trough is based on th principle that outside diameter of curved line is slightly greater tha the inside diameter. Because th sections are interchangeable they ar easily fitted together. Bolts an nuts are utilized to tighten section Corner sections are mitered and fu nished ready for installing. Troug is built to fit standard malleabl circles, but special hangers ar available. These are so formed the can be snapped into place by hand.

Gutter is available in three sizes 4, 5 and 6-inch, in standard 10-foo lengths. Mitered corners and en sections provided with downspou tubes are supplied in same sizes.

Health Program for Small Plants Outlined

■ Answer to "how can small size plants carry on a health program?" is found in a publication available from the committee on healthful working conditions, National Association of Manufacturers, 14 West Forty-ninth street, New York.

Under the title of "Who's Too Small for a Health Program?" the committee outlines in the booklet a method whereby many small plants can extend medical services to their employes. It also points out how they can decrease compensation insurance premiums, accidents, number of absences, labor turnover and increase quantity and quality of production.

Strain-Bearing Panels

(*Concluded from Page 54*)

employed underneath the wood backing strip to balance and equalize pressure exerted against the flange of the panel when the wood backing strip is pulled down in place.

Application of this new method thus is seen to make available a system of producing light and heavy-gage strain-bearing panels with all-metal construction throughout. In any case, the outer surfaces are all flush with no rivet or bolt heads. In addition, the joints themselves can be sealed by running solder or other material into them and finishing off smooth with the outside surface.

Then when the outer surface is painted, it is impossible to detect where the joint was made. Such a system permits making special bodies for all types of automotive equipment. It also lends itself readily to the construction of other types of movable and stationary units. It produces high strength with modern streamlined appearance at a reasonable cost and employs only simple fabrication methods. Patent applications have been made.

Steel Demand Steadier; Output Still Receding

Prospects more favorable for leveling off in operations next month. Buyers cautious, covering only early needs

MARKET IN TABLOID

Demand
Steadier, partly for fill-in requirements.

Prices
Generally maintained; scrap still declining.

Production
Off 2 points to 67 per cent.

■ SIGNS are appearing of a check to the recent sharp recession in steel market activity. Ingot production has declined further and no general upturn has appeared in buying, but demand is steadier and prospects for a leveling off in steelmaking during March are brighter.

The national ingot rate slipped 2 points to 67 per cent last week. This compares with 55 per cent a year ago and is the lowest since just prior to the start of last September's abrupt rise in operations.

Consumers still are ordering conservatively, in the absence of most of the incentives which prompted heavy forward buying last fall. Inventories are ample, deliveries are satisfactory and prices show no upward tendency. Possibility that quotations might weaken as a result of quieter demand has not been realized, and although price steadiness gives buyers little stimulus to cover beyond early needs, the occasion to withhold purchases for lower levels has been alleviated in some instances.

Inventories of steel users are moderating, but it is thought unlikely stocks will be permitted to decline to the level prevailing the middle of 1939. This means that replacement buying on the part of some consumers is not far off. The weather has had more than its usual adverse effect on business so far this year, with compensating betterment expected in demand for certain products with the approach of spring.

The relatively high rate of automobile production has yet to be reflected in steel purchases by that industry. Most buying lately has been of a fill-in nature, but larger tonnages still are in prospect. Assemblies last week increased 7520 units to 102,570, a trend contrary to the usual one for this period. Output a year ago was 75,660. General Motors, with an increase of 6500 units, accounted for most of the gain.

Export business in iron and steel products continues active. Keener competition for foreign tonnage is seen in disappearance of most or all of the premium over domestic prices that such orders previously commanded.

Production of steel products for railroad use still is supported by old orders. A fairly large number of freight cars remain to be built against previous contracts, and meanwhile most carriers are marking time in carrying out additional contemplated purchases. Unfilled rail tonnage also is heavy and for the present is unlikely to be added to materially by supplementary buying.

Outstanding railroad equipment inquiry comprises 1000 box cars and 25 locomotives on which the New York Central will open bids March 13. The Nickel Plate has ordered 60 cars, ten of which are container cars, and 110 containers and the Northern Pacific has placed four small diesel-electric locomotives.

Tin plate specifications continue light, and production is down 2 points to 58 per cent. Approach of the packing season normally stimulates tin mill operations, but the outlook is complicated by consumers' inventory additions in recent months.

Steel inquiries for building construction still are short of the volume looked for by spring but are marked by a relatively large number of private projects. Fabricated shape awards were smaller last week, principal ones being 1200 tons for a Buick Motor plant and 1260 tons for a California bridge. Concrete reinforcing bar prices, recently weak in many districts, have tended to strengthen. Cast iron pipe inquiries are more numerous in some sections in anticipation of spring work.

Shipbuilding continues a supporting factor in plate demand in the East. Some tonnage remains to be placed, with large lots still on order. Sustained activity in this field is in prospect for many months.

Scrap prices have yet to reverse their recent trend, changes in most districts still being downward. The composite is off 12 cents to $16.67, compared with $14.96 a year ago and $15.50 at the opening of last September.

Variations in steelmaking last week were mixed, six districts showing reductions while two were advancing and four were unchanged. Pittsburgh and Chicago both sagged, the former being down 3 points to 63 per cent and the latter 5 points to 63½. Buffalo was off 3 points to 67, Cincinnati declined 2 points to 59 and St. Louis dropped 4½ points to 63½. Wheeling rose 8 points to 94 and Cleveland was up 1½ to 68. Unchanged areas were eastern Pennsylvania at 68, Birmingham at 90, Detroit at 92 and New England at 63. Youngstown declined 3 points to 40.

COMPOSITE MARKET AVERAGES

	Feb. 24	Feb. 17	Feb. 10	One Month Ago Jan., 1940	Three Months Ago Nov., 1939	One Year Ago Feb., 1939	Five Years Ago Feb., 1935
Iron and Steel	$36.83	$37.00	$37.01	$37.09	$37.50	$36.37	$32.54
Finished Steel	56.10	56.10	56.10	56.10	55.90	56.50	54.00
Steelworks Scrap..	16.67	16.79	17.08	17.48	20.06	14.87	11.66

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

	Feb. 24, 1940	Jan. 1940	Nov. 1939	Feb. 1939
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.25c
Steel bars, Chicago	2.15	2.15	2.15	2.25
Steel bars, Philadelphia	2.47	2.47	2.47	2.57
Iron bars, Chicago	2.30	2.30	2.15	2.15
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.275	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.00	2.15
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.20
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.00	2.15
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.20
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.60
Tin plate, per base box, Pitts.	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.45

Semifinished Material

Sheet bars, Pittsburgh, Chicago.	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods, No. 5 to ⅜-inch, Pitts.	2.00	2.00	1.92	1.92

Pig Iron

	Feb. 24, 1940	Jan. 1940	Nov. 1939	Feb. 1939
Bessemer, del. Pittsburgh	$24.34	$24.34	$24.34	$22.34
Basic, Valley	22.50	22.50	22.50	20.50
Basic, eastern, del. Philadelphia	24.34	24.34	24.34	22.34
No. 2 foundry, Pittsburgh	24.21	24.21	24.21	22.21
No. 2 foundry, Chicago	23.00	23.00	23.00	21.00
Southern No. 2, Birmingham	19.38	19.38	19.38	17.38
Southern No. 2, del. Cincinnati	22.89	22.89	22.89	20.89
No. 2X, del. Phila. (differ. av.)	25.215	25.215	25.215	23.215
Malleable, Valley	23.00	23.00	23.00	21.00
Malleable, Chicago	23.00	23.00	23.00	21.00
Lake Sup., charcoal, del. Chicago	30.34	30.34	30.34	28.34
Gray forge, del. Pittsburgh	23.17	23.17	23.17	21.17
Ferromanganese, del. Pittsburgh	105.33	105.33	105.33	85.27

Scrap

Heavy melting steel, Pittsburgh	$17.25	$18.15	$21.90	$15.65
Heavy melt. steel, No. 2, E. Pa.	16.00	16.80	19.25	13.25
Heavy melting steel, Chicago	15.75	16.45	17.45	14.00
Rails for rolling, Chicago	18.25	19.05	20.50	17.25
Railroad steel specialties, Chicago	18.50	18.50	20.50	16.00

Coke

Connellsville, furnace, ovens	$4.75	$4.75	$5.00	$3.75
Connellsville, foundry, ovens	5.75	5.75	6.00	5.00
Chicago, by-product fdry., del.	11.25	11.25	11.25	10.50

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Except when otherwise designated, prices are base, f.o.b. cars.

Sheet Steel

Hot Rolled

Pittsburgh	2.10c
Chicago, Gary	2.10c
Cleveland	2.10c
Detroit, del.	2.20c
Buffalo	2.10c
Sparrows Point, Md.	2.10c
New York, del.	2.34c
Philadelphia, del.	2.27c
Granite City, Ill.	2.20c
Middletown, O.	2.10c
Youngstown, O.	2.10c
Birmingham	2.10c
Pacific Coast points	2.60c

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 points	3.65c

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 points	4.00c

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	4.50c

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	3.35c	3.95c

Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.

Chrome-Nickel

	No. 302	No. 304
Bars	24.00	25.00
Plates	27.00	29.00
Sheets	34.00	36.00
Hot strip	21.50	23.50
Cold strip	28.00	30.00

Straight Chromes

	No. 410	No. 430	No. 442	No. 446
Bars	18.50	19.00	22.50	27.50
Plates	21.50	22.00	25.50	30.50
Sheets	26.50	29.00	32.50	36.50
Hot strip	17.00	17.50	24.00	35.00
Cold stp.	22.00	22.50	32.00	52.00

Steel Plate

Pittsburgh	2.10c
New York, del.	2.29c
Philadelphia, del.	2.15c
Boston, delivered	2.46c
Buffalo, delivered	2.33c
Chicago or Gary	2.10c
Cleveland	2.10c
Birmingham	2.10c
Coatesville, Pa.	2.10c
Sparrows Point, Md.	2.10c
Claymont, Del.	2.10c
Youngstown	2.10c
Gulf ports	2.45c
Pacific Coast points	2.60c

Steel Floor Plates

Pittsburgh	3.35c
Chicago	3.35c
Gulf ports	3.70c
Pacific Coast ports	3.95c

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 points	2.70c

Tin and Terne Plate

Tin Plate, Coke (base box)

Pittsburgh, Gary, Chicago	$5.00
Granite City, Ill.	5.10

Mfg. Terne Plate (base box)

Pittsburgh, Gary, Chicago	$4.30
Granite City, Ill.	4.40

Bars

Soft Steel

(Base, 20 tons or over)

Pittsburgh	2.15c
Chicago or Gary	2.15c
Duluth	2.25c
Birmingham	2.15c
Cleveland	2.15c
Buffalo	2.15c
Detroit, delivered	2.25c
Philadelphia, del.	2.47c
Boston, delivered	2.52c
New York, del.	2.49c
Gulf ports	2.50c
Pacific Coast points	2.75c

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 points	2.75c

Iron

Chicago,	2.15c
Philadelphia	2.37c
Pittsburgh, refined	3.50-8.00c

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

**Subject to a deduction of 25 cents per 100 lbs. in lots of 20 tons or over of one size, in lengths of 30 feet or over, for shipment at one time to one destination.*

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	3.30c
Woven wire fencing (base C. L. column)	67
Single loop bale tie (base C.L. column)	56
Galv. barbed wire, 80-rod spools, base column	70
Twisted barbless wire, column	70

To Manufacturing Trade

Base, Pitts.-Cleve.-Chicago-Birmingham (except spring wire)

Bright bess., basic wire	2.60c
Galvanized wire	2.65c
Spring wire	3.20c

Worcester, Mass., $2 higher on bright basic and spring wire.

Cut Nails

Carload, Pittsburgh $3.85

Cold-Finished Bars

	Carbon	Alloy
Pittsburgh	2.65c	3.35c
Chicago	2.65c	3.35c
Gary, Ind.	2.65c	3.35c
Detroit	2.70c	*3.45c
Cleveland	2.65c	3.35c
Buffalo	2.65c	3.35c

* Delivered.

Alloy Bars (Hot)

(Base, 20 tons or over)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem	2.70c
Detroit, delivered	2.80c

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.35	3100	0.70
2100	0.75	3200	1.35
2300	1.55	3300	3.80
2500	2.25	3400	3.20
4100	0.15 to 0.25 Mo.		0.55
4600	0.20 to 0.30 Mo. 1.50-2.00 Ni.		1.10
5100	0.80-1.10 Cr.		0.45
3100	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
9000	spring rounds, squares		0.40

Electric furnace up 50 cents.

Strip and Hoops

(Base, hot strip, 1 ton or over; cold, 3 tons or over)

Hot Strip, 12-inch and less

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, Birmingham	2.10c
Detroit, del.	2.20c
Philadelphia, del.	2.42c
New York, del.	2.46c
Pacific Coast points	2.70c
Cooperage hoop, Youngs., Pitts.; Chicago, Birm.	2.20c
Cold strip, 0.25 carbon and under, Pittsburgh, Cleveland, Youngstown	2.80c
Chicago	2.90c
Detroit, del.	2.90c
Worcester, Mass.	3.00c

Carbon	Cleve.,	Pitts.
0.26—0.50		2.80c
0.51—0.75		4.30c
0.76—1.00		6.15c
Over 1.00		8.35c

Worcester, Mass. $4 higher.

Commodity Cold-Rolled Strip

Pitts.-Cleve.-Youngstown	2.95c
Chicago	3.05c
Detroit, del.	3.05c
Worcester, Mass.	3.35c

Lamp stock up 10 cents.

Rails, Fastenings

(Gross Tons)

Standard rails, mill	$40.00
Relay rails, Pittsburgh 20—100 lbs.	32.50-35.50
Light rails, billet qual., Pitts., Chicago, B'ham.	$40.00
Do., rerolling quality	39.00

Cents per pound

Angle bars, billet, mills	2.70c
Do., axle steel	2.35c
Spikes, R. R. base	3.00c
Track bolts, base	4.15c
Car axles forged, Pitts., Chicago, Birmingham	3.15c
Tie plates, base	2.15c

Base, light rails 25 to 60 lbs., 20 lbs., up $2; 16 lbs. up $4; 12 lbs. up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base plates 20 tons.

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller	68.5 off
Do. larger, to 1-in.	66 off
Do. 1⅛ and larger	64 off
Tire bolts	52.5 off

Stove Bolts

In packages with nuts separate 72.5 off; with nuts attached add 15%; bulk 83.5 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts	60 off
Plow bolts	68.5 off

Nuts

Semifinished hex	U.S.S.	S.A.E.
½-inch and less	67	70
⅝-1-inch	64	65
1⅛-1½-inch	62	62
1⅝ and larger	60	..

Hexagon Cap Screws

Upset, 1-in., smaller	70.0 off

Square Head Set Screws

Upset, 1-in., smaller	75.0 off
Headless set screws	64.0 off

Piling

Pitts., Chgo., Buffalo	2.40c
Gulf ports	2.85c
Pacific coast ports	2.90c

Rivets, Washers

F.o.b. Pitts., Cleve., Chgo., Bham.

Structural	3.40c
⅛-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
9 and 10	64½	55
11 and 12	63½	54

Iron

2	30½	15
2½—3½	31½	17½
4	33½	21
4½—8	32½	20
9—12	28½	15

Line Pipe

Steel

1 to 3, butt weld	67½
2, lap weld	60
2½ to 3, lap weld	63
3½ to 6, lap weld	65
7 and 8, lap weld	64
10-inch lap weld	63½
12-inch, lap weld	62½

Iron

	Blk.	Galv.
¾ butt weld	25	7
1 and 1¼ butt weld	29	13
1½ butt weld	33	15½
2 butt weld	32½	15
1½ lap weld	23½	7
2 lap weld	25½	9
2½ to 3½ lap weld	26½	11½
4 lap weld	28½	15
4½ to 8 lap weld	27½	14
9 to 12 lap weld	23½	9

Boiler Tubes

Carloads minimum wall seamless steel boiler tubes, cut lengths 4 to 24 feet; f.o.b. Pittsburgh, base price per 100 feet subject to usual extras.

Lap Welded

Sizes	Gage	Steel	Charcoal Iron
1½" O.D.	13	$ 9.72	$23.71
1¾" O.D.	13	11.06	22.93
2" O.D.	13	12.38	19.35
2¼" O.D.	13	13.79	21.68
2¼" O.D.	12	15.16	.....
2½" O.D.	12	16.58	26.57
2¾" O.D.	12	17.54	29.00
3" O.D.	12	18.35	31.36
3½" O.D.	11	23.15	39.81
4" O.D.	10	28.66	49.90
5" O.D.	9	44.25	73.93
6" O.D.	7	68.14	.....

Seamless

Sizes	Gage	Hot Rolled	Cold Drawn
1 "O.D.	13	$ 7.82	$ 9.01
1¼"O.D.	13	9.26	10.67
1½"O.D.	13	10.23	11.79
1¾"O.D.	13	11.64	13.42
2" O.D.	13	13.04	15.03
2¼"O.D.	13	14.54	16.76
2¼"O.D.	12	16.01	18.45
2½"O.D.	12	17.54	20.21
2¾"O.D.	12	18.59	21.42
3" O.D.	12	19.50	22.48
3½"O.D.	11	24.62	28.37
4" O.D.	10	30.54	35.20
4½"O.D.	10	37.35	43.04
5" O.D.	9	46.87	54.01
6" O.D.	7	71.96	82.93

Cast Iron Pipe

Class B Pipe—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, Young., Birm., Sparrows Point	$34.00
Duluth (billets)	36.00
Detroit, delivered	36.00

Forging Quality Billets

Pitts., Chi., Gary, Cleve., Young., Buffalo, Birm.	40.00
Duluth	42.00

Sheet Bars

Pitts., Cleveland, Young., Sparrows Point, Buffalo, Canton, Chicago	34.00
Detroit, delivered	36.00

Wire Rods

Pitts., Cleveland, Chicago, Birmingham No. 5 to 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 $0.45.

Skelp

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

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur.	$4.35- 4.60
Connellsville, fdry.	5.00- 5.75
Connell. prem. fdry.	5.75- 6.25
New River fdry.	6.25- 6.50
Wise county fdry.	5.50- 6.50
Wise county fur.	5.00- 5.25

By-Product Foundry

Newark, N. J., del.	11.38-11.85
Chicago, outside del.	10.50
Chicago, delivered	11.25
Terre Haute, del.	10.75
Milwaukee, ovens	11.25
New England, del.	12.50
St. Louis, del.	11.75
Birmingham, ovens	7.50
Indianapolis, del.	10.75
Cincinnati, del.	10.50
Cleveland, del.	11.05
Buffalo, del.	11.25
Detroit, del.	11.00
Philadelphia, del.	11.15

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	16.00c
Toluol, two degree	25.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c

Per lb. f.o.b. Frankford and St. Louis

Phenol (less than 1000 lbs.)	14.75c
Do. (1000 lbs. or over)	13.75c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers	6.75c

Per ton, bulk, f.o.b. port

Sulphate of ammonia	$28.00

Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25 sil.; 50c diff. below 1.75 sil. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$24.00	$24.50	$23.50	$25.00
Birdsboro, Pa.	24.00	24.50	23.50	25.00
Birmingham, Ala.‡	19.38	.....	18.38	24.00
Buffalo	23.00	23.50	22.00	24.00
Chicago	23.00	23.00	22.50	23.50
Cleveland	23.00	23.00	22.50	23.50
Detroit	23.00	23.00	22.50	23.50
Duluth	23.50	23.50	.....	24.00
Erie, Pa.	23.00	23.50	22.50	24.00
Everett, Mass.	24.00	24.50	23.50	25.00
Granite City, Ill.	23.00	23.00	22.50	23.50
Hamilton, O.	23.00	23.00	22.50	.....
Neville Island, Pa.	23.00	23.00	22.50	23.50
Provo, Utah	21.00	.....	.....	.....
Sharpsville, Pa.	23.00	23.00	22.50	23.50
Sparrow's Point, Md.	24.00	.....	23.50	.....
Swedeland, Pa.	24.00	24.50	23.50	25.00
Toledo, O.	23.00	23.00	22.50	23.50
Youngstown, O.	23.00	23.00	22.50	23.50

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

Delivered from Basing Points:				
Akron, O., from Cleveland	24.39	24.39	23.89	24.89
Baltimore from Birmingham	24.78	.....	23.66	.....
Boston from Birmingham	24.12	.....	.....	.....
Boston from Everett, Mass.	24.50	25.00	24.00	25.50
Boston from Buffalo	24.50	25.00	24.00	25.50
Brooklyn, N. Y., from Bethlehem	26.50	27.00	.....	.....
Canton, O., from Cleveland	24.39	24.39	23.89	24.89
Chicago from Birmingham	†23.22	.....	.....	.....
Cincinnati from Hamilton, O.	23.24	24.11	23.61	.....
Cincinnati from Birmingham	23.06	.....	22.06	.....
Cleveland from Birmingham	23.32	.....	22.82	.....
Mansfield, O., from Toledo, O.	24.94	24.94	24.44	24.44
Milwaukee from Chicago	24.10	24.10	23.60	24.60
Muskegon, Mich., from Chicago, Toledo or Detroit	26.19	26.19	25.69	26.69
Newark, N. J., from Birmingham	25.15	.....	.....	.....
Newark, N. J., from Bethlehem	25.53	26.03	.....	.....
Philadelphia from Birmingham	24.46	.....	23.96	.....
Philadelphia from Swedeland, Pa.	24.84	25.34	24.34	.....
Pittsburgh district from Neville Island	Neville base, plus 69c, 84c, and $1.24 freight.			
Saginaw, Mich., from Detroit	25.31	25.31	24.81	25.81
St. Louis, northern	23.50	23.50	23.00	.....
St. Louis from Birmingham	†23.12	.....	22.62	.....
St. Paul from Duluth	25.63	25.63	.....	26.13

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $28.50, base; $29.74 delivered Philadelphia.

Gray Forge		Charcoal	
Valley furnace	$22.50	Lake Superior fur.	$27.00
Pitts. dist. fur.	22.50	do., del. Chicago	30.34
		Lyles, Tenn.	26.50

†Silvery

Jackson county, O., base: 6-6.50 per cent $28.50; 6.51-7—$29.00; 7-7.50—$29.50; 7.51-8—$30.00; 8-8.50—$30.50; 8.51-9—$31.00; 9-9.50—$31.50; Buffalo, $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base; Prices are the same as for silveries, plus $1 a ton.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Manganese differentials in silvery iron and ferrosilicon, 2 to 3%, $1 per ton add. Each unit over 3%, add $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$60.80

First Quality

Pa., Ill., Md., Mo., Ky.	47.50
Alabama, Georgia	47.50
New Jersey	52.50

Second Quality

Pa., Ill., Ky., Md., Mo.	42.75
Georgia, Alabama	34.20
New Jersey	49.00

Ohio

First quality	39.90
Intermediate	36.10
Second quality	31.35

Malleable Bung Brick

All bases	$56.05

Silica Brick

Pennsylvania	$47.50
Joliet, E. Chicago	55.10
Birmingham, Ala.	47.50

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$28.00
Wire cut	$26.00

Magnesite

Domestic dead - burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$50.00
Chem. bonded chrome	50.00
Magnesite brick	72.00
Chem. bonded magnesite	61.00

Fluorspar

Washed gravel, duty pd., tide, net ton	$25.00-$26.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail.	22.00
Do. barge	22.00
No. 2 lump	22.00

Ferroalloy Prices

Ferromanganese, 78-82%, lump and bulk, carlots tide., duty pd. $100.00
Ton lots 110.00
Less ton lots 113.50
Less 200 lb. lots 118.00
Do., carlots del. Pitts. 105.33

Spiegeleisen, 19-21% dom. Palmerton, Pa., spot 32.00
Do., 26-28% 39.50

Ferrosilicon, 50% freight allowed, c.l. 69.50
Do., ton lot 82.00
Do., 75 per cent 126.00
Do. ton lots 142.00
Spot, $5 a ton higher.

Silicomanganese, c.l., 2½ per cent carbon, 103.00
2% carbon, 108.00; 1%, 118.00
Contract ton price $12.50 higher; spot $5 over contract.

Ferrotungsten, stand., lb. con. del. cars 2.00-2.10

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; electrolytic, per ton, c. l., 23-26% f.o.b. Monsanto, Tenn., 24% $3 unitage 75.00

Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb., contained cr., del. carlots 11.00c
Do., ton lots 11.75c
Do., less-ton lots 12.00c

67-72% low carbon:

	Carloads	Ton lots	Less ton
2% carb.	17.50c	18.25c	18.75c
1% carb.	18.50c	19.25c	19.75c
0.10% carb.	20.50c	21.25c	21.75c
0.20% carb.	19.50c	20.25c	20.75c

Spot ¼c higher

Ferromolybdenum, 55-65% molyb. cont., f.o.b. mill, lb. 0.95

Calcium molybdate, lb. molyb. cont., f.o.b. mill 0.80

Ferrotitanium, 40-45%, lb., con. ti., f.o.b. Niagara Falls, ton lots 1.23
Do., less-ton lots 1.25
20-25% carbon, 0.10 max., ton lots, lb. 1.35
Do, less-ton lots 1.40
Spot 5c higher

Ferrocolumbium, 50-60%, contract, lb. con. col., f.o.b. Niagara Falls 2.25
Do., less-ton lots 2.30
Spot is 10c higher

Technical molybdenum trioxide, 53 to 60% molybdenum, lb. molyb. cont., f.o.b. mill 0.80

Ferro-carbon-titanium, 15-18%, ti., 6-8% carb., carlots, contr., net ton 142.50
Do, spot 145.00
Do, contract, ton lots 145.00
Do, spot, ton lots 150.00

15-18% ti., 3-5% carbon, carlots, contr., net ton 157.50
Do, spot 160.00
Do, contract, ton lots 160.00
Do, spot, ton lots 165.00

Alsifer, contract carlots, f.o.b. Niagara Falls, lb. 7.50c
Do, ton lots 8.00c
Do, less-ton lots 8.50c
Spot ½c lb. higher

Chromium Briquets, contract, freight allowed, lb. spot carlots, bulk 7.00c
Do., ton lots 7.50c
Do., less-ton lots 7.75c
Do., less 200 lbs. 8.00c
Spot, ¼c higher.

Tungsten Metal Powder, according to grade, spot shipment, 200-lb. drum lots, lb. $2.50
Do., smaller lots 2.60

Vanadium Pentoxide, contract, lb. contained $1.10
Do, spot 1.15

Chromium Metal, 98% cr., 0.50 carbon max., contract, lb. con. chrome 84.00c
Do., spot 89.00c
88% chrome, contract 83.00c
Do., spot 88.00c

Silicon Metal, 1% iron, contract, carlots, 2 x ¼-in., lb. 14.00c
Do., 2% 12.50c
Spot ¼c higher

Silicon Briquets, contract carloads, bulk, freight allowed, ton $69.50
Ton lots 79.50
Less-ton lots, lb. 3.75c
Less 200 lb. lots, lb. 4.00c
Spot ½-cent higher.

Manganese Briquets, contract carloads, bulk freight allowed, lb. 5.00c
Ton lots 5.50c
Less-ton lots 5.75c
Spot ¼c higher

Zirconium Alloy, 12-15%, contract, carloads, bulk, gross ton $97.50
Do, spot 102.50

34-40%, contract, carloads, lb., alloy 14.00c
Do, ton lots 15.00c
Do, less-ton lots 16.00c
Spot ¼c higher

Molybdenum Powder, 99%, f.o.b. York, Pa. $2.60
200-lb. kegs, lb. 2.75
Do, 100-200 lb. lots 3.00
Do, under 100-lb. lots

Molybdenum Oxide Briquets, 48-52% molybdenum, per pound contained, f.o.b. producers' plant 80.00c

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials

	Soft Bars	Bands	Hoops	Plates ¼-in. & Over	Structural Shapes	Floor Plates	Sheets: Hot Rolled	Sheets: Cold Rolled	Sheets: Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars: Carbon	Cold Drawn Bars: SAE 2300	Cold Drawn Bars: SAE 3100
Boston	3.98	4.16	5.16	3.85	3.85	5.66	3.81	4.78	4.86	3.46	4.13	8.63	7.23
New York (Met.)	3.84	3.96	3.96	3.76	3.75	5.56	3.58	4.60	4.50	3.51	4.09	8.59	7.19
Philadelphia	3.85	3.85	4.35	3.55	3.55	5.25	3.55	4.55	4.75	3.51	4.06	8.56	7.16
Baltimore	3.95	4.05	4.45	3.70	3.70	5.25	3.55	....	5.05	....	4.05	....	....
Norfolk, Va.	4.15	4.25	....	3.90	3.90	5.45	3.75	....	5.40	....	4.15	....	....
Buffalo	3.35	3.82	3.82	3.62	3.40	6.40	4.20	4.40	4.50	3.42	3.75	8.15	6.75
Pittsburgh	3.35	3.60	3.60	3.40	3.40	5.00	3.35	....	4.75	3.35	3.65	8.35	6.95
Cleveland	3.25	3.50	3.50	3.40	3.58	5.18	3.35	4.05	4.72	3.20	3.75	8.15	6.75
Detroit	3.43	3.43	3.68	3.60	3.65	5.27	3.43	4.50	4.84	3.40	3.80	8.45	7.05
Cincinnati	3.60	3.67	3.67	3.65	3.68	5.28	3.42	4.37	4.67	3.45	4.00	8.50	7.10
Chicago	3.50	3.60	3.60	3.55	3.55	5.15	3.35	4.30	4.85	3.50	3.75	8.15	6.75
Twin Cities	3.75	3.85	3.85	3.80	3.80	5.40	3.60	4.95	5.00	3.83	4.34	8.84	7.44
Milwaukee	3.63	3.73	3.73	3.68	3.68	5.28	3.48	4.43	4.98	3.54	3.88	8.38	6.98
St. Louis	3.62	3.72	3.72	3.47	3.47	5.07	3.38	4.32	4.95	3.61	4.02	8.52	7.12
Kansas City	4.05	4.15	4.15	4.00	4.00	5.60	3.90	....	5.00	....	4.30	....	....
Memphis	3.90	4.10	4.10	3.95	3.95	5.71	3.85	....	5.25	....	4.31	....	....
Chattanooga	3.80	4.00	4.00	3.85	3.85	5.68	3.75	....	4.40	....	4.39	....	....
Tulsa, Okla.	4.44	4.54	4.54	4.33	4.33	5.93	4.24	....	5.71	....	4.69	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.88	3.45	....	4.75	....	4.43	....	....
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	4.80	5.00	4.60	....	....
Houston, Tex.	4.05	6.20	6.20	4.05	4.05	5.75	4.20	....	5.25	....	....	....	....
Seattle	4.00	4.00	5.35	3.40	3.50	5.75	3.70	6.50	4.75	....	5.75	....	....
Portland, Oreg.	4.25	4.50	6.10	4.00	4.00	5.75	3.95	6.50	4.75	....	5.75	....	....
Los Angeles	4.15	4.65	6.45	4.00	4.00	6.40	4.30	6.50	5.25	....	6.60	10.65	9.80
San Francisco	3.50	4.00	6.00	3.35	3.35	5.60	3.40	6.40	5.15	....	6.80	10.65	9.80

	SAE Hot-rolled Bars (Unannealed): 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.18	7.50	6.05	5.80	7.90
New York (Met.)	4.04	7.35	5.90	5.65	....
Philadelphia	4.10	7.31	5.86	5.61	8.56
Baltimore	4.10	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.10	5.65	5.40	7.50
Pittsburgh	3.40	7.35	5.95	5.50	7.60
Cleveland	3.30	7.30	5.85	5.85	7.70
Detroit	3.48	7.42	5.97	5.72	7.19
Cincinnati	3.65	7.44	5.99	5.74	7.84
Chicago	3.70	7.10	5.65	5.40	7.50
Twin Cities	3.95	7.45	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.82	7.47	6.02	5.77	7.87
Seattle	5.85	....	8.00	7.85	8.65
Portland, Oreg.	5.70	8.85	8.00	7.85	8.65
Los Angeles	4.80	9.40	8.55	8.40	9.05
San Francisco	5.00	9.65	8.80	8.65	9.30

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds, except 0-1999 pounds (hot rolled sheets only) in New York; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300-4999 pounds in Portland, Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in Birmingham.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Kansas City and St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 300-4999 in San Francisco, Portland; any quantity in Twin Cities; 300-1999 in Los Angeles.

Galvanized Sheets: Base, any quantity in New York, 150-1499 pounds in Cleveland, Milwaukee, Pittsburgh, Baltimore, Norfolk; 150-1049 in Los Angeles; 300-4999 in Portland, Seattle, San Francisco; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, St. Louis, Tulsa; 1500 and over in Chattanooga, Philadelphia; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco, 1000 and over in Portland, Seattle; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

CURRENT IRON AND STEEL PRICES OF EUROPE

Dollars at Rates of Exchange, Feb. 21

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	British gross tons U. K. ports: £ s d	Continental Channel or North Sea ports, gross tons: Quoted in dollars at current value	**Quoted in gold pounds sterling: £ s d
Foundry, 2.50-3.00 Si.	$23.70 6 0 0	$31.95	3 15 0
Basic bessemer	....	19.59	2 6 0N
Hematite, Phos. .03-.05	24.69 6 5 0	.....	.....
Billets	....	$31.95	3 15 0
Wire rods, No. 5 gage	....	61.34	7 4 0
Standard rails	$41.48 10 10 0	$48.99	5 15 0
Merchant bars	2.41c 13 9 0	2.74c	7 4 0
Structural shapes	2.17c 12 2 6	2.81c	7 8 0
Plates, 1¼ in. or 5 mm.	2.30c 12 17 6	3.21c	8 9 0
Sheets, black, 24 gage or 0.5 mm.	3.04c 17 0 0	2.97c	7 16 6°
Sheets, gal., 24 ga., corr.	3.49c 19 10 0	4.38c	12 1 0
Bands and strips	2.19c 12 5 0N	2.76c	7 5 0
Plain wire, base	3.49c 19 10 0N	3.04c	8 0 0
Galvanized wire, base	4.16c 23 5 0N	3.63c	9 11 3
Wire nails, base	....	3.52c	9 5 0
Tin plate, box 108 lbs.	$ 6.22 1 11 6	.....	.....

British ferromanganese $100.00 delivered Atlantic seaboard duty-paid.

Domestic Prices at Works or Furnace—

Last Reported

	£ s d	French Francs	Belgian Francs	Reich §§Mark
Fdy. pig iron, Si. 2.5	$21.92 5 11 0(a)	$17.65 788	$29.49 875	$25.33 63
Basic bess. pig iron	20.64 5 4 6(a)	....	26.96 800	27.94 (b)69.50
Furnace coke	5.78 1 9 2	5.04 225	10.45 310	7.64 19
Billets	37.03 9 7 6	26.05 1,163	42.97 1,275	38.79 96.50
Standard rails	2.00c 11 3 0	1.59c 1,588	2.06c 1,375	2.38c 132
Merchant bars	2.51c 14 0 0††	1.45c 1,454	2.06c 1,375	1.98c 110
Structural shapes	2.23c 12 8 0††	1.41c 1,414	2.06c 1,375	1.93c 107
Plates, †¼-in. or 5 mm.	2.24c 12 10 6††	1.85c 1,848	2.42c 1,610	2.29c 127
Sheets, black	3.13c 17 10 0§	2.19c 2,193‡	2.85c 1,900‡	2.59c 144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.	3.58c 20 0 0	2.85c 2,850	4.80c 3,200	6.66c 370
Plain wire	3.49c 19 10 0	2.34c 2,340	3.00c 2,000	3.11c 173
Bands and strips	2.64c 14 15 0††	1.63c 1,632	2.18c 1,450	2.29c 127

†British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continent usually for basic-bessemer steel. (a) del. Middlesbrough. 5s rebate to approved customers. (b) hematite. °Close annealed. ††Rebate of 15s on certain conditions. N—Nominal.

**Gold pound sterling not quoted. §§Last prices, no current quotations.

IRON AND STEEL SCRAP PRICES

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated; †indicates brokers prices

HEAVY MELTING STEEL

Birmingham, No. 1.	16.00-16.50
Bos. dock No. 1 exp.	15.00-15.50
New Eng. del. No. 1	15.00
Buffalo, No. 1	16.50-17.00
Buffalo, No. 2	14.50-15.00
Chicago, No. 1	15.50-16.00
Chicago, auto, no alloy	14.50-15.00
Chicago, No. 2 auto	12.50-13.00
Cincinnati dealers	13.00-13.50
Cleveland, No. 1	16.00-16.50
Cleveland, No. 2	15.00-15.50
Detroit, No. 1	†12.50-13.00
Detroit, No. 2	†11.50-12.00
Eastern Pa., No. 1	17.00-17.50
Eastern Pa., No. 2	16.00
Federal, Ill.	13.25-13.75
Granite City, R. R.	14.25-14.75
Granite City, No. 2	13.25-13.75
Los Angeles, No. 1	13.50-14.00
Los Angeles, No. 2	12.50-13.00
L. A., No. 1 f.a.s.	16.00-17.00
L. A., No. 2 f.a.s.	15.00-16.00
N. Y. dock No. 1 exp.	14.50
Pitts., No. 1 (R. R.)	18.00-18.50
Pittsburgh, No. 1	17.00-17.50
Pittsburgh, No. 2	16.00-16.50
St. Louis, R. R.	†14.50-14.75
St. Louis, No. 2	†13.25-13.75
San Francisco, No. 1	13.50-14.00
San Francisco, No. 2	12.50-13.00
Seattle, No. 1	14.50-15.50
Toronto, dlrs., No. 1	11.00
Valleys, No. 1	16.50-17.00

COMPRESSED SHEETS

Buffalo, new	15.00-15.50
Chicago, factory	15.00-15.50
Chicago, dealers	13.50-14.00
Cincinnati, dealers	12.50-13.00
Cleveland	15.50-16.00
Detroit	†13.00-13.50
E. Pa., new mat.	17.00-17.50
E. Pa., old mat.	14.00-14.50
Los Angeles	12.00-13.00
Pittsburgh	17.00-17.50
St. Louis	†10.50-11.00
San Francisco	12.00-13.00
Valleys	16.00-16.50

BUNDLED SHEETS

Buffalo, No. 1	14.50-15.00
Buffalo, No. 2	13.00-13.50
Cleveland	11.50-12.00
Pittsburgh	16.00-16.50
St. Louis	†8.50- 9.00
Toronto, dealers	9.75

SHEET CLIPPINGS, LOOSE

Chicago	9.75-10.25
Cincinnati, dealers	8.50- 9.00
Detroit	†9.00- 9.50
St. Louis	†8.00- 8.50
Toronto, dealers	9.00

BUSHELING

Birmingham, No. 1.	13.00
Buffalo, No. 1	14.50-15.00
Chicago, No. 1	14.50-15.00
Cincin., No. 1, deal.	9.50-10.00
Cincin., No. 2 deal.	3.25- 3.75
Cleveland, No. 2	9.50-10.00
Detroit, No. 1, new	†12.00-12.50
Valleys, new, No. 1	15.50-16.00
Toronto, dealers	5.00- 5.50

MACHINE TURNINGS (Long)

Birmingham	5.00
Buffalo	10.00-10.50
Chicago	9.25- 9.75
Cincinnati, dealers	5.00- 5.50
Cleveland, no alloy	8.50- 9.00
Detroit	†7.00- 7.50
Eastern Pa.	11.00-11.50
Los Angeles	4.00- 5.00
New York	†6.50- 7.00
Pittsburgh	10.50-11.00
St. Louis	†7.00- 7.50
San Francisco	5.00
Toronto, dealers	6.50
Valleys	10.50-11.00

SHOVELING TURNINGS

Buffalo	12.50-13.00
Cleveland	9.50-10.00
Chicago	10.00-10.50
Chicago, spcl, anal.	12.50-13.00
Detroit	†8.50- 9.00
Pitts., alloy-free	12.00-12.50

BORINGS AND TURNINGS
For Blast Furnace Use

Boston district	†4.50- 4.75
Buffalo	10.50-11.00
Cincinnati, dealers	4.00- 4.50
Cleveland	9.50-10.00
Eastern Pa.	10.00-10.50
Detroit	†7.50- 8.00
New York	†5.75- 6.00
Pittsburgh	8.00- 8.50
Toronto, dealers	6.00

AXLE TURNINGS

Buffalo	16.50-17.00
Boston district	†9.50-10.00
Chicago, elec. fur.	16.50-17.00
East. Pa. elec. fur.	16.50-17.00
St. Louis	†10.00-10.50
Toronto	6.00- 6.50

CAST IRON BORINGS

Birmingham	7.50
Boston dist. chem.	†8.00- 8.50
Buffalo	10.50-11.00
Chicago	9.25- 9.75
Cincinnati, dealers	4.00- 4.50
Cleveland	9.50-10.00
Detroit	†7.50- 8.00
E. Pa., chemical	14.50-15.00
New York	†7.00
St. Louis	†5.50- 6.00
Toronto, dealers	6.00

RAILROAD SPECIALTIES

Chicago	18.25-18.75

ANGLE BARS—STEEL

Chicago	17.50-18.00
St. Louis	†15.25-15.50

SPRINGS

Buffalo	19.50-20.00
Chicago, coil	18.50-19.00
Chicago, leaf	17.50-18.00
Eastern Pa.	21.00-21.50
Pittsburgh	20.50-21.00
St. Louis	†16.50-17.00

STEEL RAILS, SHORT

Birmingham	16.00-16.50
Buffalo	21.50-22.00
Chicago (3 ft.)	18.00-18.50
Chicago (2 ft.)	18.50-19.00
Cincinnati, dealers	20.00-20.50
Detroit	†19.50-20.00
Pitts., 3 ft. and less	20.50-21.00
St. Louis, 2 ft.& less	†18.00-18.50

STEEL RAILS, SCRAP

Birmingham	15.50
Boston district	†14.00-14.50
Buffalo	17.00-17.50
Chicago	16.00-16.50
Cleveland	18.50-19.00
Pittsburgh	18.50-19.00
St. Louis	†15.00-15.50
Seattle	18.00-18.50

FROGS, SWITCHES

Chicago	15.50-16.00
St. Louis, cut	15.50-16.00

PIPE AND FLUES

Chicago, net	10.00-10.50
Cincinnati, dealers	9.75-10.25

RAILROAD GRATE BARS

Buffalo	11.50-12.00
Chicago, net	10.00-10.50
Cincinnati, dealers	8.75- 9.25
Eastern Pa.	15.00
New York	†10.50-11.00
St. Louis	†10.00-10.50

RAILROAD WROUGHT

Birmingham	14.00
Boston district	†9.50-10.00
Eastern Pa., No. 1	18.00-18.50
St. Louis, No. 1	†10.25-10.75
St. Louis, No. 2	†13.25-13.75

FORGE FLASHINGS

Boston district	†10.75-11.00
Buffalo	14.50-15.00
Cleveland	15.00-15.50
Detroit	†11.50-12.00
Pittsburgh	15.50-16.00

FORGE SCRAP

Boston district	†7.00
Chicago, heavy	18.00-18.50

LOW PHOSPHORUS

Cleveland, crops	21.50-22.00
Eastern Pa. crops	21.00-21.50
Pitts., billet, bloom, slab crops	21.50-22.00

LOW PHOS. PUNCHINGS

Buffalo	19.50-20.00
Chicago	17.50-18.00
Cleveland	17.50-18.00
Eastern Pa.	21.50-22.00
Pittsburgh	19.50-20.00
Seattle	15.00
Detroit	†13.25-13.75

RAILS FOR ROLLING
5 feet and over

Birmingham	16.50
Boston	†15.75-16.00
Chicago	18.00-18.50
New York	†17.00-17.50
Eastern Pa.	20.00-21.00
St. Louis	†17.50-18.00

STEEL CAR AXLES

Birmingham	19.00-20.00
Boston district	†16.00-16.50
Chicago, net	20.50-21.00
Eastern Pa.	22.00
St. Louis	†18.00-18.50

LOCOMOTIVE TIRES

Chicago (cut)	18.00-18.50
St. Louis, No. 1	†15.50-16.00

SHAFTING

Boston district	†17.00-17.25
New York	†18.00-18.50
Eastern Pa.	23.00-23.50
St. Louis, 1¼-3¾"	†16.50-17.00

CAR WHEELS

Birmingham, iron	16.00
Boston dist., iron	†13.00-13.25
Buffalo, steel	21.00-21.50
Chicago, iron	17.00-17.50
Chicago, rolled steel	17.50-18.00
Cincin., iron, deal.	16.50-17.00
Eastern Pa., iron	20.00-20.50
Eastern Pa., steel	21.00-21.50
Pittsburgh, iron	18.50-19.00
Pittsburgh, steel	20.50-21.00
St. Louis, iron	†16.00-16.50
St. Louis, steel	16.50-17.00

NO. 1 CAST SCRAP

Birmingham	15.00
Boston, No. 1 mach.	†15.00-15.25
N. Eng. del. No. 2	14.00-14.50
N. Eng. del. textile	18.25-18.75
Buffalo, cupola	16.50-17.00
Buffalo, mach.	17.50-18.00
Chicago, agri. net	12.50-13.00
Chicago, auto net	14.50-15.00
Chicago, railroad net	13.50-14.00
Chicago, mach. net	14.00-14.50
Cincin., mach. deal.	16.00-16.50
Cleveland, mach.	20.00-21.00
Detroit, cupola, net	†14.50-15.00
Eastern Pa., cupola	19.50-20.00
E. Pa., No. 2 yard	15.50-16.00
E. Pa., yard fdry.	16.50-17.00
Los Angeles	16.50-17.00
Pittsburgh, cupola	17.50-18.00
San Francisco	14.50-15.00
Seattle	[illegible]
St. Louis, breakable	†13.75-14.25
St. Louis agri. mach.	†16.50-17.00
St. L., No. 1 mach.	†17.50-18.00
Toronto, No. 1 mach., net dealers	15.50

HEAVY CAST

Boston dist. break.	†12.25-12.50
New England, del.	15.00-15.50
Buffalo, break	14.50-15.00
Cleveland, break, net	15.25-15.75
Detroit, auto net	†15.50-16.00
Detroit, break	†11.00-11.50
Eastern Pa.	17.50-18.00
Los Ang., auto, net	13.00-14.00
New York break	†13.50-14.00
Pittsburgh, break	15.00-15.50

STOVE PLATE

Birmingham	10.00
Boston district	†10.50-11.00
Buffalo	13.00-13.50
Chicago, net	9.00- 9.50
Cincinnati, dealers	8.00- 8.50
Detroit, net	†9.00- 9.50
Eastern Pa.	15.00
New York, fdry.	11.00
St. Louis	†11.25-11.75
Toronto dealers, net	11.50

MALLEABLE

New England, del.	20.00-21.00
Buffalo	16.50-17.00
Chicago, R. R.	18.50-19.00
Cincin., agri., deal.	13.25-13.75
Cleveland, rail	21.50-22.00
Eastern Pa., R. R.	21.50-22.00
Los Angeles	12.50
Pittsburgh, rail	21.00-21.50
St. Louis, R. R.	†16.25-16.75

Ores

Lake Superior Iron Ore

Gross ton, 51½ %
Lower Lake Ports

Old range bessemer	$5.25
Mesabi nonbessemer	4.95
High phosphorus	4.85
Mesabi bessemer	5.10
Old range nonbessemer	5.10

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract.	9.00-10.00

Foreign Ore (Prices nominal)

Cents per unit, c.i.f. Atlantic

Manganiferous ore, 45-55% Fe., 6-10% Mn.	14.00-15.00
Swedish low phos.	14.00
North African low phos.	14.00
Spanish, No. African basic, 50 to 60%	14.00
Chinese wolframite, short ton unit, duty paid	$23.00-23.50
Scheelite, imp.	$23.50-24.50
Chrome ore, 48% gross ton, c.i.f.	$26.00-28.00

Manganese Ore

Including war risk but not duty, cents per unit cargo lots.

Caucasian, 50-52%	48.00-50.00
So. African, 50-52%	48.00-50.00
Indian, 49-50%	nom
Brazilian, 48-52%	46.00-48.00
Cuban, 50-51%, duty free	61.20

Molybdenum

Sulphide conc., per lb., Mo. cont., mines	$0.75

Sheets, Strip

Sheet & Strip Prices, Pages 78, 79

Pittsburgh—Small lots of sheets have been placed by several automobile companies, but the heavy buying indicated for spring needs has not appeared. Miscellaneous orders are more numerous, indicating reductions in consumer inventories. Mill backlogs continue to recede, however, and production is tapering, although at a less rapid pace. Sheet mills are running slightly better than 65 per cent, with a leveling off or slightly higher pace seen for the near future. Prices have held firmly in the face of some buying which apparently has been done to a certain extent to test the market. Increased competition for export business has brought down the premium prices formerly quoted but has not dropped them below domestic levels. Galvanized sheet demand continues moderate. Jobbers are buying slightly heavier but still are cautious. Galvanizing operations last week were slightly better than 55 per cent.

Cleveland — Buying shows occasional gains but generally holds at the slower rate of recent weeks, with shipments and backlogs still tending downward. Some auto partsmakers are less active on lighter releases from assembly plants, although this trend is expected to be reversed next month.

Chicago — With only a few exceptions, producers find sheet and strip bookings unchanged or lighter. Deliveries are improving, although production has receded. Prospects are good for substantial demand from farm equipment interests.

New York — Sheet buying is only steady, improvement in some directions, such as among household appliance manufacturers, being offset by declines elsewhere. The trade looks for seasonal betterment in general volume soon, aided by the upturn due shortly in building construction. Most sellers still are unable to give better delivery than slightly under three weeks on hot and cold rolled sheets. Galvanized not available out of stock requires about four weeks.

Philadelphia—Prices are reported to have been firm on 1000 tons of cold rolled, hot rolled and enameling sheets for Philco refrigerators last week. According to trade reports, hand-mill sheets were offered at the usual $2 differential, but the consumer required a continuous mill product. Specifications for Chevrolet replacement fenders have been stepped up. At least one stove manufacturer also is more active.

Buffalo — A diversified flow of releases against old orders, which are still termed substantial, is holding sheet and strip production at a favorable rate despite a reduction from recent peaks. Automotive material accounts for a large share of output, but requirements of miscellaneous users are fairly heavy. The latters' inventories are indicated as being comparatively light.

Cincinnati — Production is supported partly by backlogs, but the latter continue to shrink. Automotive demand is lagging, this being attributed in a measure to ample inventories. Miscellaneous buying, except in galvanized, remains active in point of number of orders but is moderate in total tonnage. Prices on carload lots are firm.

St. Louis — Strip buying continues on a hand-to-mouth basis. Little change is in early prospect, in view of the improbability of higher prices and likelihood of continued prompt deliveries.

Birmingham, Ala.—Little pickup is evident in sheets which several weeks ago registered some decline both in spot orders and in produc-

tion. Continued rainy weather has followed the prolonged cold of January, with the result placements for spring needs have not materialized. Some strip is being turned out in anticipation of the new cotton season.

Toronto, Ont.—Sheets are in better demand, especially from the automotive industry and electric stove and furnace makers. Spot demand is being filled by warehouses, mills reporting bookings into July. Dealers seeking quick delivery are turning to American sources of supply. Prices are firm.

Plates

Plate Prices, Page 78

Cleveland — Orders continue to trail shipments. Specifications from some users are fair, but in some directions, particularly railroads and car builders, little additional buying to replace currently declining backlogs is in early prospect. Deliveries vary among different producers, some offering relatively prompt shipment.

New York — Orders include approximately 700 tons of steel, principally plates, for an all-welded tanker placed by Tide Water Associated Oil Co. with Charleston Shipbuilding & Dry Dock Co., Charleston, S. C. The 141 vessels now under contract at various yards for the maritime commission involve the expenditure of $34,267,500 for plates and shapes required, according to an analysis by the National Council of American Shipbuilders.

Miscellaneous buying is light with reduction in oil company inquiry. Consumers of plates are manifesting livelier curiosity on second quarter prices. Undoubtedly some buying is being held back until the situation clears. While shipments are heavy consumers are taking tonnage freely, indicating consumption is heavy.

Philadelphia—A nearby shipyard will require approximately 7000 tons of plates for two light cruisers. Another yard is expected to release about 4400 tons for C-1 boats shortly. Railroad work is light. Pennsylvania railroad has taken in a large part of the material required for its present program and an additional program is not indicated so far. Miscellaneous buying is none too active. Some export inquiry is noted, including 1500 tons for Italy and 800 tons for Brazil. The latter represents tonnage which German mills were unable to deliver on an order booked before the war.

Birmingham, Ala. — While sustained production of plates is largely at the expense of backlogs, sufficient tonnage is being boked to maintain output at a satisfactory level. A large proportion of the district's tonnage is going to tank manufacturers and into shipbuilding.

Seattle—No large tonnages are in the market, shops reporting a normal volume of repair and small construction jobs for tanks, boilers and smokestacks. Seasonal ship repair work is calling for the usual quantity of plates.

San Francisco—Demand for plates continues weak and only one award of size was reported placed. Several new inquiries are expected within a short time and will require close to 1500 tons. To date 15,122 tons have been booked, compared with 11,448 tons for the same period last year.

Toronto, Ont.—Increasing demand is reported from many sections, with requirements heavy for shipbuilding. Boiler and tank builders also show interest in the market, and better demand is developing for rolling stock construction. Plate producers are booked many months ahead; in fact, it is stated Canada's output will be fully absorbed for more than a year. Some delay in

starting shipbuilding is reported, due to difficulty in obtaining plate deliveries.

Plate Contracts Placed

580 tons, tunnel outlet No. 1, Fort Peck dam, Wiota, Mont., to Chicago Bridge & Iron Co., Chicago.

Plate Contracts Pending

500 tons, water tank, city of Toledo, O.; bids March 6.

Bars

Bar Prices, Page 78

Pittsburgh — February specifications may run ahead of January. Most new business is from miscellaneous sources, although some fill-in tonnage from large buyers is included. Fairly active business is in prospect from the automotive industry. Cold-finished bar specifications from farm equipment builders have been relatively heavy, and auto partsmakers have been specifying fairly actively. Prices are firm in all grades.

Chicago—Demand is unimproved, but several sources report alloy bar inquiries, chiefly from automotive sources. Agricultural equipment makers' demand for bars is outstanding and expected to continue. Renewed automotive purchasing is looked for.

New York — Bar specifications show little improvement. Some consumers still are very active, but there has been no pickup in most miscellaneous lines and releases from railroads, railroad equipment builders and bolt and nut makers are tapering. Stocks of some consumers and warehouses are a factor in the belief there will be no marked improvement in demand much before the end of March.

Philadelphia — A district interest has booked approximately 600 tons of light gun forgings for a European nation. Forging shops generally are fairly active. Makers of machine tool and other types of equipment continue busy but ordering from railroads and warehouses is not up to expectations.

Birmingham, Ala.—Although most orders are small, bar tonnage is satisfactory, especially reinforcing bars, due in the main to demand for private construction and fairly steady operations by producers of agricultural implements.

Buffalo — Bar mill schedules are steady at levels prevailing earlier this month, indicating some resistance to a further slackening. Larger consumers in some instances still have fairly large inventories.

Pipe

Pipe Prices, Page 79

Chicago — Cast pipe inquiries are more numerous, pending business increasing in anticipation of spring work. Milwaukee has taken bids on 1000 tons, with an additional 212 tons up this week. Flint, Mich., also takes bids this week on 512 tons. Purchases for WPA work are steady, mostly in one or two carloads.

Pittsburgh — Demand is steady, a slight decline in specifications for oil country goods being offset by a pickup in merchant pipe. Business in the latter this month probably will exceed February sales. Better weather partly is responsible for a larger movement of standard pipe from stock. Both mechanical and pressure tubing are slow in new buying.

Birmingham, Ala.—In the face of noticeable letdown in cast iron pipe bookings, first quarter will show a satisfactory volume. Some tonnage

continues to come from private utilities, mostly on the west coast, and some from government projects.

Seattle — Inquiry is more active as cities plan seasonal improvements. Largest contract pending is at Spokane where bids will be opened Feb. 29 for 986 tons of 8 to 12-inch cast iron pipe and an unstated tonnage of 18 and 24-inch steel water mains.

San Francisco—The only important cast iron pipe letting involved 440 tons of 12-inch for Los Angeles. So far this year 3813 tons have been booked, compared with 5210 tons for the corresponding period in 1939. Fisher Contracting Co., 516 South Seventh street, Phoenix, Ariz., has been awarded the contract by the Inspiration-Consolidated Copper Co., Miami, Ariz., for the construction of an 11-mile 12-inch steel pipe line from the Pringle ranch to the Kiser pump station.

Cast Pipe Placed

440 tons, 16-in. Class 200 and 250, Los Angeles; allocated as follows; 240 tons to American Cast Iron Pipe Co., Birmingham, Ala., and 200 tons to United States Pipe & Foundry Co., Burlingto N. J.

Cast Pipe Pending

1000 tons, water works, Milwaukee; Un ed States Pipe & Foundry Co., Burlin ton, N. J., low.

986 tons, 6 and 12-inch, Spokane, Wash bids Feb. 29.

400 tons, 6 and 12-inch, Everett, Wash H. G. Purcell, Seattle, low, for Unite States Pipe & Foundry Co., Burlingto N. J.

512 tons, water works, Flint, Mich.; bi Feb. 27.

230 tons, water works, Beech, Mich Lynchburg Pipe & Foundry Co., Lynch burg, Va., low.

212 tons, water works, Milwaukee; re bids Feb. 26.

203 tons, department of public works Chicago; United States Pipe & Foundr Co., Chicago, low.

140 tons, 16-inch, East Forty-fifth stree extension, Seattle; Valley Constructio Co., Seattle, low.

132 tons, water works, Detroit; bids in.

Rails, Cars

Track Material Prices, Page 79

In addition to three 660-horsepower diesel-electric locomotives recently noted as purchased from American Locomotive Co. the Northern Pacific has ordered three 1000-horsepower diesel-electric engines from the Electro-Motive Corp., La Grange, Ill., and one 660-horsepower from Baldwin Locomotive Works, Eddystone, Pa.

Atlantic Coast Line is rebuilding 1000 box cars in its shops at Waycross, Ga., the company now applying steel sides and U-section truck sides to the cars which were originally built with steel frames.

New York Central will open bids March 13 under Clayton act on 1000 fifty-ton allsteel box cars for the Pittsburgh & Lake Erie and 25 locomotives, the largest equipment inquiry in the East this year. Toronto transportation commission has awarded 50 street cars to the Canadian Car & Foundry Co.

Bids have been taken on 150 gross tons of 128-pound Tribly girder rails and accessories for the Los Angeles harbor commission, San Pedro, Calif., and on 162 gross tons of 128-pound girder rails and accessories for the Long Beach, Calif., board of harbor commissioners.

Locomotives Placed

Northern Pacific, three 1000-horsepower diesel-electric locomotives, to Electro-Motive Corp., La Grange, Ill., and one 660-horsepower diesel-electric locomotive to Baldwin Locomotive Works, Eddystone, Pa.; these are in addition to three 660-horsepower diesel-electrics noted in a recent issue as going to

American Locomotive Co., New York.

Locomotives Pending

New York Central, 25 locomotives; bids March 13.

Car Orders Placed

Nickel Plate, fifty 70-ton covered hopper cars to American Car & Foundry Co., Berwick, Pa., ten 100-ton gondola-type container cars with 110 steel containers, to Pullman-Standard Car Mfg. Co., Michigan City, Ind.

Car Orders Pending

Denver & Rio Grande Western, 10 caboose cars; bids asked.

New York Central, 1000 fifty-ton allsteel box cars for Pittsburgh & Lake Erie; bids under Clayton act March 13.

Buses Booked

American Car & Foundry Motors Co., New York: Ten 42-passenger for Houston Electric Co., Houston, Tex.; seven 29-passenger for St. Joseph Railway, Light & Power Co., St. Joseph, Mo.; seven 26-passenger for Indiana Service Corp., Fort Wayne, Ind.; six 36-passenger for United Electric Railways Co., Providence, R. I.; six 36-passenger for Saugus Transit Co., Saugus, Mass.; five 35-passenger for Cincinnati, Newport & Covington Railway Co., Covington, Ky.; five 31-passenger for Safety Motor Transit Corp., Roanoke, Va.; four 36-passenger for Springfield Street Railway Co., Springfield, Mass.; three 37-passenger for Denver, Colorado Springs & Pueblo Motorway, Denver; three 28-passenger for Conestoga Transportation Co., Lancaster, Pa.; two 40-passenger for Boston, Worcester & New York Street Railway Co., Framingham, Mass.

Wire

Wire Prices, Page 79

Pittsburgh — Lower production has accompanied lighter specifications for manufacturers' wire. The merchant market also is slow. Export demand is fair but is insufficient to offset the lag in domestic buying. Automotive purchases lately have been small, largely for fill-in purposes, although heavy requirements are indicated for spring. Mill prices are holding, but some shading is reported in secondary markets.

Cleveland—Barber wire and twisted barbless wire now are being quoted under a new arrangement similar to that employed for woven wire fence. Barbed wire in 80-rod spools and barbless wire in 80-rod, 100-rod and 100-pound spools now are quoted column 70. Business in merchant products is improving slowly, although the seasonal upturn has been delayed in many sections by recent unfavorable weather. Buying of manufacturers' wire continues slow.

Chicago — Farm equipment manufacturers are outstanding in wire demand. Business in general, however, has shown no significant upward trend. Heavier needs of the automotive industry are expected to support an early upturn in total business.

Philadelphia — Nails are reported firm currently with carload business done at full published price.

Birmingham, Ala.—Wire products continue to move in good volume, including nails and wire fencing. Current orders are not abreast of shipments, with the result backlogs are gradually diminishing.

Ferroalloys

Ferroalloy Prices, Page 80

New York — Movement of ferromanganese in particular and ferroalloys in general continues to sag, a result of further recession in steelmaking. Most sellers look for an upturn by at least late March, although shipments would be influenced by a second quarter price change. It is too early to speculate as to possible revisions next period, quotations meanwhile being unchanged.

Shapes

Structural Shape Prices, Page 78

Pittsburgh — Industrial inquiries continue to improve the spring outlook for fabricated shapes. Currently the market is slow, awards and pending tonnage still being relatively light. Rumors of price concession on several recent orders are denied in most cases, and indications are the full market has been paid for the plain material.

Chicago — Shapes continue quiet, both awards and inquiries the past week being small. Indiana takes bids Feb. 27 on four bridges involving 665 tons.

Boston — Outstanding in heavier inquiries is 3500 tons for a bureau of yards and docks building here on which bids close this week. Orders are more numerous, but bridge requirements lag.

Philadelphia—Additional pending tonnage for the Philadelphia navy yard's expansion program constitutes chief interest currently. Local contractors also are bidding on a 9000-ton job for the Long Island railroad.

New York — Inquiry is heavier, topped by 13,500 tons for an elevated highway section in Queens, bids Feb. 28. Awards also are up slightly, including two apartment buildings taking close to 2000 tons. More small private construction is coming out.

Buffalo—The structural steel market is marking time pending announcements of bidding dates on several contemplated projects. Pending jobs total about 14,000 tons.

Seattle — Business pending exceeds 2000 tons, all for public works, including 600 tons for stoplogs and trash racks for the Bonneville dam, 529 tons for steel for Bonneville substations and an unstated tonnage for 131 steel towers, 50 to 70 feet, for the latter agency's transmission system. Bids are in for all three jobs, the White City Electric Co., Chicago, low for the 30-mile power line between Kelso and Chehalis, Wash., at $114,122.

San Francisco — Structural tonnage placed last week did not exceed 4000 tons. To date awards total 39,975 tons, compared with 24,769 tons for the same period a year ago. The largest letting went to Minneapolis-Moline Power Implement Co. and called for 1260 tons for a bridge over the Eel river in Humboldt county, California, for the state. Bids have just been taken on 975 tons for another bridge over the Eel river, Humboldt county, California, for the state.

Birmingham, Ala.—Shapes, which gave some indication of improvement recently, are about holding level. Prospects are considered good with a considerable volume of highway and private construction in sight. Output is estimated unofficially at around 75 per cent.

Toronto, Ont. — Business is gaining, with upwards of 8000 tons pending. War construction awards, as well as additions to industrial plants, are bolstering demand. Some 3000 tons of steel will be required for an office building here for the hydro-electric power commission, and about 500 tons for a new Orange Crush building. At Verdun, Que.,

Shape Awards Compared

	Tons
Week ended Feb. 24	14,121
Week ended Feb. 17	49,490
Week ended Feb. 10	18,917
This week, 1939	27,602
Weekly average, year, 1940	18,212
Weekly average, 1939	22,411
Weekly average, January	13,938
Total, to date, 1939	199,042
Total to date, 1940	145,695

Includes awards of 100 tons or more.

500 tons is pending for Verdun Protestant hospital.

Shape Contracts Placed

1300 tons, Austin, Tex., 720 metal screens for water outlets at Marshall Ford Dam on Colorado River, to Stupp Brothers Bridge & Iron Co., St. Louis.

1260 tons, Eel river bridge, Humboldt county, California, for state, to Minneapolis-Moline Power Implement Co., Minneapolis, Minn.

1200 tons, rear axle plant, for Buick Motor division, General Motors Corp., Flint, Mich., to R. C. Mahon Co., Detroit.

880 tons, steam plant, Georgia Power Co., Macon Ga., to Virginia Bridge Co., Roanoke, Va.

800 tons, storehouses, naval air station, Jacksonville, Fla., to Bethlehem Steel Co., Bethlehem, Pa., through Hillyer & Lovan, Jacksonvile, general contractors.

785 tons, housing project, Pittsburgh; 540 tons to Truscon Steel Co., Youngstown, O., 245 tons to Pittsburgh-Des Moines Steel Co., Pittsburgh. Reported last week all to Pittsburgh-Des Moines.

750 tons, steam plant, Alabama Power Co., Chickasaw, Ala., to Virginia Bridge Co., Roanoke, Va.

675 tons, bridge, Little Elk river, Elkton, Md., to American Bridge Co., Pittsburgh.

595 tons, undercrossing of Santa Fe and Union Pacific tracks, Los Angeles, Calif., for state, to Columbia Steel Co., San Francisco.

500 tons, bridge, FAP-54 (2), York county, South Carolina, to Nashville Bridge Co., Nashville, Tenn.

475 tons, bridge, FA-754-E1, Wythe county, Virginia, to Virginia Bridge Co., Roanoke, Va.

420 tons, industrial building, Calco Chemical Co., Bound Brook, N. J., to Harris Structural Steel Co., New York; Edward R. Stearns Inc. contractor.

415 tons, state highway bridges, Dallas, Tex., to Mosher Steel Co., Houston, Tex.

395 tons, office building, Charleston, W. Va., to American Bridge Co., Pittsburgh.

350 tons, alterations, turbine and boiler rooms, Narragansett Electric Co., Providence, R. I., to James H. Tower Iron Works, Providence, R. I.

310 tons, underpass, Polhemus street, San Jose, Calif., for state, to Judson-Pacific Co., San Francisco.

310 tons, case supports, for Sun Oil Co., Marcus Hook, Pa., to Belmont Iron Works, Philadelphia.

300 tons, crane runway extension, for Buick Motor division, General Motors Corp., Flint, Mich., to Flint Structural Steel Co., Flint, Mich.

275 tons, addition to warehouse, for Wamkill Realty Corp., Bronx, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.

265 tons, warehouse, National Gypsum Co., Mobile, Ala., to Mobile Steel Co., Mobile, Ala.

255 tons, addition, 330 Whitlock avenue, Bronx, New York, to Bethlehem Steel Co., Bethlehem, Pa.

250 tons, addition to postoffice and federal building, Milwaukee, to Worden-Allen Co., Milwaukee.

250 tons or more, hangar and terminal for United Air Lines, Portland, Oreg., to Bethlehem Steel Co.; George Buckler Co., Portland, general contractor.

240 tons, mill building extension, Cleveland Pneumatic Tool Co., Cleveland, to Burger Iron Co., Akron, O.

185 tons, steel sheet piling, United States engineer, Milwaukee, to Bethlehem Steel Co., Bethlehem, Pa.; bids Feb. 6.

180 tons, power house and coal bunker, for Gair Cartons Inc., Piermont, N. Y., to American Bridge Co., Pittsburgh.

180 tons, repairs, bridges 3893 and 3915, Fairfield, Conn., to American Bridge Co., Pittsburgh.

175 tons, Charles river shaft, Weston, Mass., to Atlas Steel Construction Co.

165 tons, curbing, etc., New York, for New oYrk city parkway authority, to Bethlehem Steel Co., Bethlehem, Pa.

150 tons, bowling academy, Bethlehem, Pa., to Bethlehem Steel Co. on direct bids.

141 tons, state highway bridge, Lombard, Ill., to American Bridge Co., Chicago.

140 tons, Dry Creek bridge at Roseville, Calif., and building Oakland, Calif., for Air Reduction Sales Co., to Moore Drydock Co., Oakland, Calif.

130 tons, store building, Dormont, Pa., to South Hills Ornamental Iron Co.

105 tons, transit commission bridges, East 163rd street and Third avenue, New York, to Bethlehem Steel Co., Bethlehem, Pa., through Cayuga Construction Corp., New York.

100 tons, Coca Cola plant, Evansville,

Ind., to International Steel Co., Evansville, Ind.

Shape Contracts Pending

3000 tons, railroad swing bridge over Clarenton drainage and navigation canal, near Baldwin, La.; bids March 19.

1500 tons, railroad bridge over Wax Lake outlet, near Calumet, La.; bids March 19.

975 tons, Eel river bridge, Humboldt county, Calif., for state; A. Soda & Son, 5231 Grove street, Oakland, Calif., low on general contract at $329,981.

875 tons, H-piling, shipway No. 2, Philadelphia navy yard; Ralph S. Herzog Co., Philadelphia, low.

713 tons, Beaumont, Tex., bridge across Neches river for Kansas City Southern railroad.

700 tons, dry dock 4, Mare Island, Calif., for United States navy.

655 tons, state highway bridges, various Indiana locations, bids Feb. 27; bridges involve 273, 267, 92 and 33 tons each.

480 tons, structural laboratory superstructure, Philadelphia navy yard; Hughes-Foulkrod Co., Philadelphia, low.

400 tons, building 3-B, for Aluminum Co. of America, Edgewater, N. J.

400 tons, factory building, for Collins & Aikman Corp., Bristol, R. I.

400 tons, power house, Genoa, Wis.; bids Feb. 29.

310 tons, bearing piles, improvement Los Angeles river, Los Angeles, between Mariposa and Fletcher streets; Wm. T. Loesche, Los Angeles, low on general contract at $170,741.

270 tons, alterations to high school, Malverne, N. Y.

226 tons, state of Missouri, highway bridge; bids Feb. 23.

200 tons, alterations to subway, Bronx, New York, for city.

200 tons, mezzanine stations, Chicago, for city.

180 tons, store building, for W. T. Grant Co., Cleveland.

170 tons, submarine mine depot building, Ft. Monroe, Va., for army engineers.

170 tons, office and plant building, for Pepsi Cola Bottling Co., Cleveland.

140 tons, factory building, for Edwin L. Wiegand Co., Pittsburgh.

120 tons, state bridge, Wilbur cross parkway, Milford, Conn.

110 tons, addition, high school, Columbia, Pa.

100 tons, addition, pier No. 2, Philadelphia navy yard; Kolyn Construction Co., Trenton, N. J., low.

Unstated, two 90-inch tube valves for outlet works, Wickiup dam, Oreg.; Joshua Hendry Iron Works, San Francisco, low.

Reinforcing

Reinforcing Bar Prices, Page 79

Pittsburgh — Recent price weakness is less pronounced. Stronger quotations are reported in some sections, although recovery to full prices has yet to become general. In eastern markets some orders and inquiries have brought full prices. Inquiries are lighter, but a large tonnage still is pending.

Chicago — Changes in concrete bar activity are slight, although inquiries for small tonnages are more numerous. Prospective work is fairly large, including the new $6,500,000 technical school building for Northwestern university. Concessions of $5 and $6 a ton are reported on certain recent jobs, but producers look for a firmer market with improvement in demand.

New York—Buying is confined mostly to small lots, but pending tonnage is heavier. State highway programs in the East are lagging,

Concrete Bars Compared

	Tons
Week ended Feb. 24	2,155
Week ended Feb. 17	5,671
Week ended Feb. 10	7,320
This week, 1939	6,940
Weekly average, year, 1940	7,652
Weekly average, 1939	9,197
Weekly average, January	7,410
Total to date, 1939	91,543
Total to date, 1940	61,217

Includes awards of 100 tons or more.

however, indicating spring requirements will be less than expected. Prices are shaded frequently on more attractive tonnages.

Philadelphia — Outlook for reinforcing bars is none too bright, with pending work mostly for small lots. Prices on plain bars are fairly well maintained but weaker on fabricated material.

Seattle — Rolling mill operations have been reduced as backlogs are practically cleaned up. Lack of industrial construction is affecting demand. Business pending is small. Reclamation bureau opened bids at Denver Feb. 19 for 250 tons billet bars and Feb. 20 for 1050 tons of reinforcing bars, both for the Coulee project.

San Francisco—Activity in reinforcing bars was almost at a standstill and awards were limited to lots of less than 100 tons. Less than 300 tons were reported placed and awards so far this year aggregate 14,762 tons, compared with 30,731 tons for the corresponding period of 1939. Pending business, however, calls for more than 20,000 tons.

Toronto, Ont. — Reinforcing steel sales are heavier. Baines & David, Ltd. closed 100 tons for a new Canada Wire & Cable building at Leaside; 150 tons is pending for a building at Montreal for International Business Machine; and 500 tons will be required for a university building at Vancouver, B. C. A number of smaller contracts are pending.

Reinforcing Steel Awards

1200 tons, storehouses, naval air station, Jacksonville, Fla., to Bethlehem Steel Co., Bethlehem, Pa., through Hillyer & Lovan, Jacksonville, general contractors.

365 tons, bridge over Raritan river, contract 6, Sayreville, N. J., to Bethlehem Steel Co., Bethlehem, Pa.; J. G. English Inc. and Joseph Nesto & Co., contractors.

150 tons, bridge, Woodward, Okla., to Sheffield Steel Corp., Kansas City, Mo.

140 tons, bridge, Santa Fe railroad, Powers, Colo., to Colorado Fuel & Iron Corp., Denver.

100 tons, warehouse addition, Bunte Brothers Candy Co., Chicago, to Joseph T. Ryerson & Son Inc., Chicago.

100 tons, building, Columbus Coated Fabric Co., Columbus, O., to Joseph T. Ryerson & Son Inc., Chicago.

100 tons, Charles river water shaft, metropolitan district commission project, Weston, Mass., to Concrete Steel Co., New York.

Reinforcing Steel Pending

1500 tons, institute of technology building, Northwestern university, Evanston, Ill.

1250 tons, grade elimination, contract 2, Long Island railroad, Rockaway, N. J.; bids Feb. 28.

700 tons, subway, section D-2-A, Chicago; bids Feb. 29.

645 tons, improvement Los Angeles river between Mariposa and Fletcher streets, Los Angeles; Wm. T. Loesche, Los Angeles, low on general contract at $170,741.

600 tons, low pressure pumping station, Toledo, O.; bids Feb. 28.

545 tons, Eel river bridge, Humboldt county, California, for state; A. Soda & Sons, 5231 Grove street, Oakland, Calif., low on general contract at $329,981.

500 tons, flood wall, Huntington, W. Va.

430 tons, Fern Ridge dam, Lane county, Oreg., for United States engineer office, Portland, Oreg.; bids Mar. 5.

410 tons, shipway No. 2, Philadelphia navy yard; Ralph S. Herzog Co., Philadelphia, low.

400 tons, bottling plant, Seagram & Co., Louisville, Ky.; J. A. Utley, contractor.

300 tons, chemical building, contract AA, Toledo, O.; bids March 6.

250 tons, subway station section, Chicago, Robert R. Anderson Co., Chicago, low.

245 tons, state overpass, Tigard, Oreg.; Jacobsen-Jensen Co., Portland, low.

200 tons, Logan-Fontanelle housing, Omaha, Nebr.

120 tons, bridge, Housatonic Junction,

Behind the Scenes with STEEL

Success Story

■ We probably don't need to repeat our conviction that STEEL is the most effective advertising medium in the whole industry, but we are seriously wondering if the International Correspondence Schools can expect any such remarkable results from their current campaign as this testimonial letter they received a few years ago from the Atlanta Penitentiary.

Deer I. C. S.

3 yars ago when i war livin with pappy nar Murfreezburro i sined up fer wun ov yur corzes.

Jest befur i cum here to the jale hows, the jidge bak hom ast me to tell the joory about my stil. they had brot ut into cort. Whin i got throo xplanin ut an how ut work the jidge he sed ut war the gol blamed best stil he evur seen. So did the joory. i jest wunted to tell yuh i oh ut all to yur sheet metul corz. thank yuh.

Yurs trewly,
Hiram blake.

If You Believe The Papers

■ Four Finns were playing bridge in a front line dugout (so the story goes) when a sentry called out that an entire Russian division was attacking. "Excuse me," said one, "I'll take care of them. I'm dummy."

Well Done

■ The most interesting and best edited plant magazine we've seen in a long time is the New Departure *News* published monthly for all employes. It's our idea of a very practical step in improved employe relations we hear so much about and if you are interested Carleton B. Beckwith will no doubt be glad to send along a sample copy.

First Research

■ Another swell little booklet, just received, is by Revere Copper & Brass in which it is explained that the first industrial research by an American manufacturer was done by Paul Revere's son, Joseph Warren Revere, in 1804, the year Aaron Burr killed Alexander Hamilton in a duel on the Hudson Palisades.

Coming Next Week

■ Another article you certainly won't want to miss will appear in next week's STEEL. It is written by J. J. Kanter, research metallurgist, Crane Co., Chicago and describes a normalizing treatment for reducing creep in alloy steel bolting materials. Creep resistance is improved 3 to 4 times.

Heads Of The Week

■ Wheels Must Stop If Steels —Like Men—Grow Tired—*Republic, page* 49.

The Iron Horse Is On A Diet —*Lincoln Electric, page* 53.

We Flunk Again

■ Our attempt to find out if we were Reith or wrong last week brought us a neat little stack of adding machine tapes all totaling up to 121,390, which is the number of cannon balls in Mr. Woodall's pile. Everyone was nice in suggesting a typographical error in our answer but t'ain't the case. Reith is wrong and so are we.

Should Be Easy

■ H. G. Taylor wants to see how good some of you are with your compasses. Find by construction the middle point of a given straight line using nothing but arcs of circles. No straight edges or straight lines allowed. After five minutes, and 28 pieces of copy paper, we swear we must have cheated to ever get that "A" back in Miss Williamson's 10B geometry class.

Best Of The Bunch

■ Confucius' Brother Say: *Confucious talk too much!*

SHRDLU

Milford, Conn.
102 tons, store building John Smythe & Co., Evanston, Ill.; B. W. Handler Construction Co., Chicago, low.

Pig Iron

Pig Iron Prices, Page 80

Pittsburgh — Sales are light and production is declining. Shipments of merchant iron are off, while steelworks' needs also have moderated. Prices are firm, but there is little to test them, and buyers indicate they will refrain from purchasing for the present. Weakness in blast furnace scrap has yet to influence pig iron prices. Coke supplies are ample, with beehive oven activity still declining. By-product ovens continue at capacity.

Chicago—Shipments are well behind January. Maintenance of foundry melt has increased coke shipments to about 10 per cent over same period last month, but most foundries are believed taking iron heavily from their own stocks. Mill consumption of pig iron is low, following ingot production curtailments.

New York — The fairly well sustained foundry melt is being accommodated principally by stocks of iron under contract, and buying remains light. Most sellers expect little improvement before April.

Philadelphia—Export inquiry is more active, including lots of several thousand tons for Belgium and Sweden. Domestic buying is light and few furnaces now are behind on shipments. Most foundries are averaging four to five days per week but melt is down slightly.

Buffalo—Demand from foundries is improving slowly, with releases in most instances calling for prompt shipment. Producers have no trouble filling such demands. Some foundries which had large stocks are indicated as having worked down reserves, having re-entered the market for additional iron. Pig iron production holds near 70 per cent of capacity.

Cincinnati—Pig iron buying continues desultory. Consumers are placing only small tonnages for early needs, with most users being supplied against contracts. Buying in any large volume is not expected before the middle of March.

St. Louis — Sales and shipments continue to decline, and the January-February movement is expected to show a 15 to 20 per cent reduction compared with a year ago. This is partly a reflection of heavy deliveries last quarter.

Toronto, Ont.—Merchant pig iron sales are steady in small lots for spot needs. Forward booking is dull,

but most large melters have supplies or placed contracts for requirements through March. Current sales total about 1800 tons for the week. Producers are stocking little iron. War contracts are expected to stimulate sales next quarter.

Scrap

Scrap Prices, Page 82

Pittsburgh—Weaker tone remains in the market. Offerings are a little larger aided by better weather. Dealer prices are leading the market downward, since consumer buying is light and scattered. Small sales have been made in many grades at lower prices, and the entire list is off somewhat. Declines have been heaviest in blast furnace grades, where some tonnage amounting to distress material has been offered. Railroad specialties likewise are being offered generally at lower prices. Open hearth grades are still weak, buying light.

Cleveland—Prices have yielded somewhat, though quiet. Most movement is plant scrap as yards are largely under snow. Some tonnages have been released but buying is of small lots.

Chicago—No. 1 steel is still $15.50 to $16 but toward week's end dealers were being offered $15.75 by brokers. Trading was light and many prices highly nominal, with mills still absent from the market.

New York—Prices continue to ease off, No. 1 machine and heavy breakable cast being down another 50 cents. Rails for rolling also are off a like amount. Buying by domestic consumers is light, and shipments are slower. Japan has made some small purchases, with most of the material to be shipped from the west coast.

Philadelphia—While an upward swing in prices is anticipated within the next three to four weeks this is not reflected so far in the small amount of additional business reported. In fact, No. 2 steel has flattened out to $16. No. 1 steel remains at $17 to $17.50, steelworks cast at $18 and steel specialties at $21 to $21.50. E. G. Budd Mfg. Co. has sold about 1500 tons of new compressed sheets at close to $16, f.o.b. Export movement is light, with coverage against contracts on the basis of $15.50 for No. 2 steel and $17 for No. 1, Port Richmond.

Buffalo—Heavy melting steel has reversed its recent price trend, advancing 50 cents on a sale of approximately 5000 tons of No. 2 material on the basis of $14.50 to $15. Customary price differentials would make No. 1 steel $16.50 to $17. This is the first upturn in five months. While the weather has been a strengthening factor, there is no scarcity of scrap in filling old orders.

Detroit — While prices are largely nominal, average reductions of 50 cents have been made on a number of grades, including heavy melting steel. Cast grades are holding better, in view of nearness of foundry activity on 1941 model die programs. Tone of the market is bearish, despite the high rate of steelmaking.

Cincinnati — Dealers' buying prices have been reduced, reflecting the weakening influence of market inactivity. There is no tonnage buying, and while material is moving against old contracts, shipments are much lighter than 60 days ago.

Toronto, Ont.—Scrap is more active, with mills placing larger contracts but continuing to hold down bid prices. Electric furnace interests also are buying more freely.

St. Louis — Prices are softer, the result of heavier receipts from country dealers and lack of mill buying. Many grades are down an additional

25 to 50 cents. Steelworks' inventories and recent purchases are ample for current needs, particularly in view of declining consumption. Better weather has stimulated movement of scrap to market.

San Francisco — Movement of scrap continues restricted, steelworks buying only for stock replacement. Further weakness in quotations is noted. No. 1 heavy melting, metropolitan district, Los Angeles and San Francisco is now $13.50 to $14, f.o.b. cars, with No. 2 at $12.50 to $13. Borings and turnings hold at $5.50 to $6, with No. 1 cast scrap $14.50 to $15.50 for cupola size and $13.50 to $14 for charging box size. Several ships are being loaded in Pacific ports with material for Japan on old orders, but as far as can be ascertained no new business has been placed of late.

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
17	11.25	11.25	11.00	45.12½	45.00	5.00	4.85	5.50	20.00	14.00	35.00
19	11.25	11.25	11.00	45.37½	45.25	5.00	4.85	5.50	20.00	14.00	35.00
20	11.50	11.50	11.25	46.00	45.75	5.00	4.85	5.50	20.00	14.00	35.00
21	11.50	11.50	11.25	46.35	46.12½	5.00	4.85	5.50	20.00	14.00	35.00
22—Holiday.											
23	11.50	11.50	11.25	46.12½	45.87½	5.00	4.85	5.50	20.00	14.00	35.00

*Nominal.

MILL PRODUCTS

F.o.b. mill base, cents per lb., except as specified. Copper brass products based on 11.50c Conn. copper

Sheets

Yellow brass (high) 18.31
Copper, hot rolled 20.12
Lead, cut to jobbers 8.25
Zinc, 100 lb. base 11.00

Tubes

High yellow brass 21.06
Seamless copper 20.62

Rods

High yellow brass 14.26
Copper, hot rolled 16.62

Anodes

Copper, untrimmed 17.37

Wire

Yellow brass (high) 18.56

OLD METALS

Nom. Dealers' Buying Prices

No. 1 Composition Red Brass

New York 7.25-7.50
Cleveland 7.75-8.00
Chicago 7.75- 8.00
St. Louis 7.75-8.00

Heavy Copper and Wire

New York, No. 1 ..... 9.00-9.25
Cleveland, No. 1 ..... 9.00-9.25
Chicago, No. 1 ..... 9.00-9.25
St. Louis 8.75-9.25

Composition Brass Turnings

New York 7.00-7.25

Light Copper

New York 7.00-7.25
Cleveland 7.00-7.25
Chicago 7.00-7.25
St. Louis 6.75-7.00

Light Brass

Cleveland 3.75-4.00
Chicago 4.50-4.75
St. Louis 4.50-4.75

Lead

New York 4.25-4.50
Cleveland 4.37½-4.50
Chicago 4.25-4.50
St. Louis 4.00-4.25

Zinc

New York 3.00-3.25
Cleveland 3.00-3.25
St. Louis 3.25-3.50

Aluminum

Mixed, cast, Cleveland 8.50-9.00
Borings, Cleveland 7.00-7.25
Clips, soft, Cleveland 15.75-16.00
Misc. cast, St. Louis 8.75-9.00

SECONDARY METALS

Brass ingot, 85-5-5-5, less carloads .. 12.00
Standard No. 12 aluminum ... 14.50-15.00

Warehouse

Warehouse Prices, Page 81

Chicago — Demand has tapered, and February bookings appear likely to fall below last month's. Business holds well above the level a year ago, although this quarter's sales will not match those of the last period.

Philadelphia — Warehouse business continues restricted compared with late last year, reflecting greatly improved mill deliveries. Prices are fairly well maintained.

Buffalo — Sales have declined less than seasonal the past few weeks and remain well above the volume a year ago. Demand is diversified, with prices steady.

Detroit — Sales hold at about the January rate, and although the peak season is approaching by virtue of the early release of some 1941 model die program, warehouse demand has not been stepped up appreciably.

Cincinnati—Sales are fairly steady. Volume is considered seasonally satisfactory on all items except sheets and building materials. Requirements of machine tool manufacturers are active.

Seattle—Wholesale houses report improved inquiry with weather conditions more favorable. Sheets, light plates and bars are in good demand, other out of stock items moving also in normal volume. Prices are unchanged.

Iron Ore

Iron Ore Prices, Page 82

Cleveland — January consumption of Lake Superior iron ore was the largest for that month since 1919. The total was 5,289,308 gross tons, against 5,538,374 tons in December and 2,926,706 tons a year ago, according to the Lake Superior Iron Ore association. Stocks at furnaces and on Lake Erie docks were reduced 5,750,526 tons during the month and on Feb. 1 were only about 1,500,000 tons larger than a year ago. Comparison of stocks follows:

	At Furnaces	On Docks	Total
Feb. 1	25,901,496	4,287,751	30,189,247
Month Ago	30,804,898	4,634,875	35,439,773
Year Ago	26,646,130	5,042,775	31,688,905

Nonferrous Metals

New York—Copper sales soared last week, lifting the producers' market ¼-cent to the basis of 11.50c, Connecticut. Lead demand continued active while inquiry for zinc improved. Tin prices moved higher, following the trend abroad.

Copper — Electrolytic rose to 11.50c, Connecticut, on Tuesday when sales jumped to 76,264 tons, the third largest daily total on record. With copper selling above the domestic level in the export market, large tonnages of custom smelter metal were withdrawn from competition for domestic business. Rolled and drawn product and brass ingot prices advanced proportionately.

Lead—Undertone of the market remained firm to strong but unchanged at 4.85c, East St. Louis. The current price level was supported by active demand which forced one seller to dispose of three times his intake on Friday. Waiting lists were general.

Zinc — Galvanizers showed increased buying interest as general metal market sentiment improved. Prices were strong at the close with some observers expecting an advance from the 5.50-cent East St. Louis level for prime western.

Tin — Price leadership has been taken by London and Eastern markets since Great Britain has resumed issuance of export licenses. A rising trend in those markets carried Straits spot here to 46.35c before easing to 46.12½c on Friday. Moderate tonnages were sold here.

Antimony — Only routine business is being booked at 14.00c, New York, for American spot. Chinese spot held nominally unchanged at 16.50c, duty paid New York.

Semifinished

Semifinished Prices, Page 79

Pittsburgh — Semifinished steel specifications from nonintegrated mills increased the past week, reflecting inventory depletion. Buying is well below last fall's volume but is definitely improved over January. Best demand is in sheet bars. Wire rod sellers report fair business and an active export market which is a factor in supporting production.

Tin Plate

Tin Plate Prices, Page 78

Tin plate specifications continue light at about the same rate as a month ago. Most buying activity has been in export markets. Prices on the latter business now are at domestic levels, reflecting increased competition among sellers. Production still is declining, last week's rate being estimated at 58 per cent, off 2 points. Several factors point to a leveling off in the trend soon, although canmakers' inventories may result in a lag between the start of the canning season and the placing of heavier specifications for tin plate.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 79

Bolt and nut production shows a further decline, now holding around 45 per cent. Automotive needs have shown some improvement, and as soon as more open weather appears and construction becomes more active, a turn for the better is expected. Specifications from shipyards are steady but are light from railroads and jobbers.

Steel in Europe

Foreign Steel Prices, Page 81

London—(*By Cable*)—Despite expanding steel output in Great Britain deliveries to commercial users are further extended. Deliveries of foreign ore are improving and shipments of semifinished steel from Belgium, the Dominions and America are also in better volume. In the face of considerable domestic demand for light sections and sheets official control authorities endeavor to satisfy home consumers partly and at the same time meet export requirements. Exports of tin plate continues substantial.

Belgium and Luxemburg report more active demand from the European market. Strong competition in plates and merchant steel by American makers continues to be met.

Industrial Development In Pacific Northwest

(*Concluded from Page* 15)

velopment, possibly, will be the manufacture of aluminum, such a plant now being definitely assured in the Columbia river area."

Manufacturers Association of Washington has made an exhaustive study of the field. While agreeing that the production of alloys is a logical result of cheap power, Clancey M. Lewis, manager of this group, believes that in fibers and textiles, the Pacific Northwest will find its best industrial expansion.

"This is the logical place in which to establish fiber and textile plants," he stated. "We have abundant raw materials and plenty of cheap power. We have abandoned the idea of processing raw silk here and turned our attention to the development of the fiber industry which naturally fits into our heavy production of pulp.

Low Power Rates Attractive

"The same conditions apply to the manufacture of finished goods from wool and flax, grown here in large quantity. At present we are shipping the raw materials to eastern industrial centers paying the freight on excess moisture and dirt and again paying the freight on the finished product. With power available at attractive rates, there is every inducement for factories to locate in this area where manufacturing conditions are favorable. The economies thus effected should stimulate manufacturing here and shipping finished goods to the large consuming markets."

Census figures show that in 1937 the Pacific Northwest, in comparison with the national average, was 75 per cent deficient in manufacturing.

If from this is subtracted this area's excess in the production of forest products—646 per cent of the national average for lumber and 236 per cent for paper and allied products — the Northwest's industrial average is only 36 per cent of the national level. These figures emphasize the region's dependence on a natural resource that is rapidly being depleted and the urgent need for the development of other industrial lines if permanent prosperity is to be assured.

Addressing the mining institute at the University of Washington, Seattle, Jan. 16, Dr. Ivan Bloch, in charge market development section, the Bonneville project, said in part:

"When we talk of light materials, we do not only refer to aluminum but to magnesium and the light and strong alloys of both . . . There are distinct possibilities in the Northwest manufacture of magnesium metals, particularly since large quantities of low-cost power have become available and that electrolysis of magnesium requires about 20,000 kilowatt hours per ton of magnesium metal. Inasmuch as the metal is one of the keys in the development of light metal processes and manufacturing in the Northwest, the utilization of Northwest magnesite in conjunction with Columbia river power should be encouraged.

"Mining will benefit from the availability of cheap electric power, some branches immediately, others later when the beneficiation of ores in areas economically reached with the extensions from the network of power lines to eventually link the hydroelectric plants of the Pacific Northwest.

"The indirect benefit of low power cost will be the establishment of new industries which can use the latent resources of the Northwest mining regions, also the new application of electric power to the reductive and manufacturing processes and the general stimulus to prosperity and development when it is known that many minerals now unsalable are marketable.

"It does not seem yet that clay can be considered a proper raw material for aluminum production in the Northwest, as it does not evidence commercial feasibility but warrants the study of the utilization of aluminous raw material which is plentiful within the nation. Cheap power will help to develop low grade resources.

"There is also a border line field in which electricity can be utilized wherein the delivery of heat is accomplished by radiation by heated nonmetallic or metallic elements installed within a furnace or kiln. In this type of work, an increase in the use of electric power can be expected."

Dr. Bloch suggests the possibility of electrolytic zinc production, the electric smelting of copper, the manufacture of calcium carbide and other products including plastics, all of which require a large amount of electric power.

University of Iowa Offers Cost Reduction Training

■ Practical training in cost reduction methods is offered in a special three-week summer management course at Iowa State university, Iowa City. Motion and time study, waste elimination, cost reduction and related subjects are included. Offered for the first time last year, course was attended by executives and engineers from 25 different industries in United States and Canada.

Course opens June 10.

Construction and Enterprise

Ohio

ATTICA, O.—American Gas Service Co., will build $50,000 plant soon.

CHAUNCEY, O.—Village, N. D. Hines, mayor, plans sanitary sewer, sewage treatment plant and waterworks to cost $170,000. J. J. Morgan, 255 East Broad street, Columbus, O., is engineer.

DAYTON, O.—Wright Field, contracting officer will take bids to March 4 for 36 milling machines (circular 40-1092); to March 1 for 30 sheet metal press brakes, 17 formers, 8 sheet metal combination machines, 2 punch presses, 42 shears (circular 40-1089).

NEW BREMEN, O. — Village, R. H. Dickman, mayor, plans waterworks improvements to cost $45,000. Champe, Finkbeiner & Associates, Toledo, are engineers.

NORTH BALTIMORE, O. — Central Ohio Light & Power Co., A. W. Conoger, manager, plans substation and lines to cost $10,000.

NORTH BALTIMORE, O. — Village, Fred Halboth, mayor, plans light and power system to include brick building 111 x 38 feet and three diesel engines to cost $194,671. C. J. Simon, Evans Central building, Van Wert, O., is engineer.

REPUBLIC, O. — Village, C. E. Womer, mayor, plans waterworks system to cost $78,000. Champe, Finkbeiner & Associates, Toledo, O., are engineers.

New York

LONG ISLAND CITY, N. Y.—Laminated Shim Co. Inc. is building a new plant at Stamford, Conn., with 30,000 square feet of floor space.

Michigan

ADRIAN, MICH. — Stubnitz-Greene Spring Corp., plans a new heating plant adjacent to its shops.

DETROIT—U. S. Industrial Developments, Inc., 4859 Fourth avenue, was incorporated with $100,000 capital to deal in patents.

DETROIT—Lafayette Machinery Corp., Stanley Immerman, 6420 East Lafayette, was incorporated to deal in industrial machinery, capital $1000.

KALAMAZOO, MICH.—John Rysenga has contract for factory building of Michigan Research Laboratory, division of Kelly Ink Co. Leroy and Newlander, Kalamazoo, are architects.

Mississippi

CARTHAGE, MISS.—Federal Compress & Warehouse Co., Memphis, Tenn., plans installing sprinkler system and enlarging cotton warehouse by addition doubling present capacity.

KOSCIUSKO, MISS.—City votes March 11 on $70,000 bonds for improvements to power plant.

MERIDIAN, MISS.—City votes March 5 on $100,000 bonds for addition to water works system to be leased to Flintkote Co., New York, for period of 25 years.

South Carolina

WALTERBORO, S. C.—Coastal Electric Co-operative Inc., D. T. Strickland, president, plans power line.

Tennessee

CARTHAGE, TENN.—Upper Cumberland Electric Membership Corp. applied to United States engineer office to build 2300-volt transmission line across Caney Fork river.

CLARKSVILLE, TENN.—Central Mfg. Co., R. F. Hayes, manager, plans warehouse 150 x 40 feet.

MEMPHIS, TENN.—Miller Electric Co. Inc., 111 West Ashley street, Jacksonville, Fla., has $69,000 contract for overhead city distribution electric system.

MEMPHIS, TENN.—Shelby Paper Box Co., 61 West Colorado street, will erect new plant for corrugated shipping cases and folding paper cartons.

MEMPHIS, TENN.—City commission let contract at $14,800 to Redlinger & Hansen Co., 1467 Lamar avenue, for remodeling two airport hangars. Hughes Heating Co., 672 Madison will install heating system in hangars.

NASHVILLE, TENN.—Nashville Coal Co., E. E. Wilson, will apply for $600,000 loan from RFC for coal carbonizing plant.

Louisiana

ALEXANDRIA, LA.—City commission receives bids March 11 for deep well pump and motor and complete mechanical cooling tower for new substation of municipal light department.

West Virginia

CLARKSBURG, W. VA.—B. W. Jackson, 1009 West Graham road, Richmond, Va., has contract for 127 miles of electric power lines for Harrison rural electric association, Henry W. Austin, superintendent.

FOLLANSBEE, W. VA.—United Engineering & Foundry Co., First National building, Pittsburgh, has orders from Follansbee Steel Corp. for two reversing cold mills, one temper pass mill and a tin plate flying shear for delivery in July.

Virginia

ALEXANDRIA, VA.—Virginia Public Service Co. and its subsidiaries have 1940 budget of $3,500,000 including $2,000,000 appropriation for a 15,000-kilowatt steam generating plant to be built adjacent to present power plant, work started. New construction work in Alexandria and counties of Arlington, Fairfax, Loudoun and Fauquier is expected to cost $146,000. Work on proposed increase in capacity of Clarendon substation is to begin about March 1 and to cost $42,000.

RICHMOND, VA.—Virginia Electric & Power Co., Jack G. Holzclaw, president, Richmond, will probably expend $3,676,460 in 1940 in improvements. New buses in Richmond and Norfolk-Portsmouth areas will cost $230,000. Other items include $300,000 for consumers electric service extension, $480,000 for transformers and meter equipment, $450,000 for transmission line improvements, $90,000 for rural electrification, $35,000 for underground construction and $125,260 for gas line extension at Norfolk.

WINCHESTER, VA. — Northern Virginia Power Co., W. M. Krise, manager, plans $200,000 construction program including $50,000 office building and 11.9 miles of 33,000-volt power line from Strasburg to Front Royal. Another major project is changing of primary sys-

tem of distribution in Winchester from 2300 to 4000 volts.

Missouri

KANSAS CITY, MO.—Ralph E. Cameron, director of public works, plans $60,000 hangar 600 x 200 feet at municipal airport.

ST. LOUIS—Fire damage to building of John Ramming Machine Co., 306-08 South First street was $31,000.

ST. LOUIS—Union Electric Co. of Missouri, will make alterations to its electric power and steam heating plant to cost $179,000 as part of a $1,600,000 program.

ST. LOUIS — Railway Supplies- Handlan Inc., 611 South First street, let $25,000 contract to Murch-Jarvis Co., Railway Exchange building, for factory. H. S. Van Hoefen, Railway Exchange building, is architect.

TIPTON, MO.—Co-Mo Electric Co-operative Inc., Thomas C. Driscoe, president, receives bids Feb. 26 for power lines. A. Y. Taylor & Co., Central building, Clayton, Mo., is engineer.

Arkansas

LITTLE ROCK, ARK.—First Electric Co-operative Corp. was granted permission by state utilities commission to build $327,000 power lines in seven counties.

PINE BLUFF, ARK.—Fire damage to plant of Pine Bluff Coffin Co. was $25,000.

RUSH, ARK.—Fire damage to Morning Star Milling Co. mill was $125,000.

SALEM, ARK.—North Arkansas Electric Co-operative Corp. was authorized by state utilities commission to construct 205 miles of power lines to serve 660 consumers in Fulton, Baxter, Izard and Sharp counties.

Wisconsin

MILWAUKEE, WIS.—Allen-Bradley Co. has amendment to city zoning ordinance to permit enlarging plant. Expansion probably will be 3-story addition.

MILWAUKEE — Perfex Corp., 415 West Oklahoma avenue, will build $43,000 3-story addition 43 x 101 feet. Herbert Tullgren is architect.

TWO RIVERS, WIS.—Schwartz Mfg. Co. plans new plant double present capacity about May 1 on new site. City will purchase present plant at $28,000 next fall when vacated and will sell or rent to some new industry being sought.

Texas

ABILENE, TEX. — Cage Bros. & J. Floyd Malcolm, Bishop, Tex., has contract for pump station building at Fort Phantom Hill reservoir. Freese & Nichols, Capps building, Fort Worth, Tex., are engineers.

BROWNSVILLE, TEX.—Maurice Angley Lumber Co. will erect warehouse 70 x 90 feet to cost $42,000.

HOUSTON, TEX.—Cameron Iron Works reclassified and increased capital stock from $25,000 to $600,000.

McALLEN, TEX. — Rio Grande By-Products Corp., E. W. Linnard, secretary, will build $500,000 citrus processing plant.

ORANGE, TEX.—Orange Car & Steel Co. was sold to Consolidated Steel Corp. of Texas, a subsidiary of Consolidated Steel Corp. Ltd. of Los Angeles. Initial expenditure was $100,000. Plans for immediate and extensive improvements to Orange plant have been drawn.

QUINLAN, TEX.—City, Dr. E. C. Bills, mayor, voted $20,000 revenue bonds and $15,000 municipal bonds for waterworks. City has federal grant of $15,000.

SAN ANTONIO, TEX.—Hollingsworth Construction Co. has contract for $15,000 hangar at Stinson Field for Eastern Air Lines.

TEXARKANA, TEX.—Public buildings administration opens bids Feb. 29 for water storage tank at Federal Correctional Institute.

South Dakota

CORONA, S. DAK. — Electrification project is planned in Grant and Roberts counties. A co-operative will be formed and application made to REA for funds. G. A. Dyke, county agent, Corona, is interested.

FLANDREAU, S. DAK.—REA approved awarding of contract by Sioux valley empire electric association, Louis Lorentson, to Megarry Bros., St. Cloud, Minn., for 841 miles of power lines to serve 2000 consumers in Minnehaha, Moody, Brookings, Kingsbury and Lake counties. Buell & Winter Engineering Co., 508 Insurance Exchange building, Sioux City, Iowa, is engineer.

Nebraska

OMAHA, NEBR.—Nebraska Power Co., J. E. Davidson, president, applied to state railway commission to build 10½ miles of power lines near Louisville and Murdock.

Iowa

CEDAR FALLS, IOWA—City, H. B. Philpot, city clerk, plans hydro-electric plant with two generators. Clark N. Streeter is city engineer.

CHARITON, IOWA — Voters indorsed granting 25-year franchise to Central States Electric Co. for gas service. Company promised if vote was favorable it would spend $20,000 in next three months on purifying system.

DYERSVILLE, IOWA — City, Helen Hall, city clerk, plans sewage disposal plant to cost $35,000. E. E. Schenk, 400 Waterloo building, Waterloo, Iowa, is engineer.

MONTEZUMA, IOWA—Iowa Power & Light Co. has appealed to state supreme court the decision of district court in refusing to grant an injunction against a $136,000 municipal light and power plant.

SCRANTON, IOWA—City is planning sewers and sewage treatment plant to cost $62,757. Howard R. Green, 417 First avenue southeast, Cedar Rapids, Iowa, is engineer.

Wyoming

EVANSTON, WYO.—A $75,000 bond issue to finance a sewage disposal plant will be submitted to voters in May.

Montana

WHITEFISH, MONT.—City, Dan Auken, city clerk, rejected proposal of Mountain States Power Co. A municipally owned power plant is favored.

Idaho

COEUR D'ALENE, IDAHO — Kootenai county electrical association recommended to Washington bid of W. A. Patterson, St. Paul, low at $50,705 for 70 miles of power lines.

Arizona

PHOENIX, ARIZ.—A housing project of 135 family units of six rooms each for colored families is planned by Phoenix housing authority, to cost $420,000.

Pacific Coast

LOS ANGELES — The Primetal Specialties Co. was organized in Los Angeles county with a capital stock of $25,000. Directors are: Victor M. Carter, Ralph W. Kibbee and Morton Bridge, Los Angeles. Company is represented by B. Drachlis, Central boulevard, Los Angeles.

WILMINGTON, CALIF.—Great Lakes Carbon Co. plans a ship-loading plant to cost $10,000.

BEND, OREG. — Alexander Yawkey

sawmill, J. Daggett, manager, was destroyed by fire.

PORTLAND, OREG.—George Isaackson is low at $29,150 to Bonneville project for substation at Raymond, Wash.

SPRINGFIELD, OREG.—Weyerhaeuser Timber Co. is planning sawmill here. Negotiations for a 40-acre site are under way.

WASCO, OREG.—Pacific Power & Light Co. approved plans for 14-mile power line between Celilo and Rufus.

ANACORTES, WASH.—Anacortes Veneer Co. has RFC approval for $150,000 loan for additional machinery.

AUBURN, WASH.—Graham & Painter, Seattle architects, are receiving bids for $20,000 North Coast Lines bus terminal.

CENTRALIA, WASH.—City has five-year lease with Bonneville project for 300 kilowatts of prime power. This is said to be the first agreement of its kind in the state.

CLE ELUM, WASH.—City is awaiting WPA approval of $56,000 loan toward $159,775 water system improvement. Parker & Hill, Seattle, are engineers.

COLVILLE, WASH.—Stevens county electric co-operative will receive bids March 1 for 292 miles of power lines under an allotment of $326,000.

LONGVIEW, WASH.—City will have election soon for bonds to finance $100,000 water filter plant.

POMEROY, WASH.—Centennial Flour Mills plans a 125,000-bushel grain elevator and feed plant.

PUGET SOUND NAVY YARD, WASH.—Commander R. E. Thomas called bids March 27 for four buildings at Tongue Point, Oreg., base. Spec. 9483.

SEATTLE—Pacific Food Products Co. has purchased plant at 815 Adams street and plans to add equipment.

SEATTLE — Northwest Light Service Corp., of Washington, 318 Douglas building, capital $85,000 was formed by P. A. Heney and associates to manufacture electrical products.

VANCOUVER, WASH. — Northwestern Electric Co. has begun $25,000 expansion involving 17 miles of 11,000-volt power lines and nine milese of lateral lines.

SEATTLE—Navy budget calls for $446,539 next fiscal year for improvements at Sand Point, Seattle, air base, including $40,000 addition to hangar, $3000 for power plant, $15,000 building additions and $19,000 for tools and equipment.

SPOKANE—Associated Union Laundry, Peter Boegem, manager, plans purchase of additional equipment financed by A. F. of L.

WINTHROP, WASH.—Okanogan county electric co-operative will receive bids March 5 for 54 miles of power lines, $60,000 available. R. M. Towne, Tacoma, Wash., is engineer.

Canada

ESQUIMALT, B. C.—Dominion department of public works, Ottawa, has awarded $220,000 contract to Carter-Halls-Aldinger Co., Ltd., 700 Taylor street, Vancouver, B. C., for fuel tanks here.

NEW WESTMINSTER, B. C.—Ward & Sons Ltd., 131 Eleventh avenue, has general contract for $25,000 plant addition here for Pacific Veneer Co. Ltd., Braid street.

VANCOUVER, B. C.—Dominion Construction Co. Ltd., 509 Richards street, has general contract for $20,000 addition to plant of Canadian Boxes Ltd., 281 Industrial avenue.

VICTORIA, B. C.—Contracts for six Royal Canadian navy subchasers were awarded, three subchasers to Yarrows Ltd., three to Victoria Machinery depot. Ships cost $500,000 each. Other shipyards expect early commitment from British sources to build freighters.

MONCTON, N. B.—Dominion department of national defence, Ottawa, plans $100,000 airplane building here on speedway property. Hon. N. M. Rogers, Ottawa, is minister.

SAINT JOHN, N. B.—New Brunswick power commission plans 7500-horsepower plant and 23 miles of power lines to cost $400,000, at Grand Lake in central New Brunswick.

KITCHENER, ONT. — Kitchener Lumber Co., 19 Kent avenue, Otto Hauch, manager, plans machine shop to cost $12,000 and is interested in equipment for it.

LARDER LAKE, ONT. — Chesterville Larder Lake Gold Mines Ltd. is having plans prepared by W. F. James, engineer, for milling plant of 150 tons daily capacity to cost $170,000. Milling equipment, concentrator equipment, etc., will be purchased.

NIAGARA FALLS, ONT. — Canadian Carborundum Co. Ltd. has awarded general contract to R. Timm Construction Co., Welland, Ont., for two-story plant addition 48 x 55 feet.

PETERBOROUGH, ONT. — Canadian General Electric Co. Ltd. has awarded $75,000 general contract to A. W. Robertson, Ltd., Toronto, Ont., for plant addition.

SUDBURY, ONT.—Bell Telephone Co. of Canada Ltd., 76 Adelaide street west, Toronto, Ont., will call for tenders soon for exchange building here to cost $300,000. F. J. McNab, care of company, is architect.

TORONTO, ONT.—Consumers Gas Co. Ltd. has awarded contract to Walter Davidson, 188 Duke street, for 38 x 100-foot machine shop addition.

TORONTO, ONT.—Industrial Electric Products, Ltd. plans plant addition. Benjamin Swartz, 139 Queen street, west, is architect.

TORONTO, ONT.—Trane Co. of Canada is expanding facilities for assembly of unit heaters. Present plant will be converted into a sheet metal shop.

TORONTO, ONT.—R. G. Kirby & Sons Ltd., 539 Yonge street, has contract for $35,000 factory for Dominion Corrugated Paper Co. Ltd., 142 Weston road. Mackenzie Waters, 96 Bloor street west, is architect.

BRISTOL, P.E.I.—Bristol Mills plans $30,000 mill to replace one destroyed by fire, on old site.

AMOS, QUE.—Municipal council, Felix Allard, plans aqueduct and power plant to cost $50,000.

JOLIETTE, QUE.—Barrett Co. Ltd., 5551 St. Hubert street, Montreal, is building addition to mill here on Arthemis street. Paper machinery, boilers and transmission equipment will be installed. G. E. Bradle, is local manager.

MONTREAL, QUE. — International Business Machines Co. Ltd., has awarded contract to Louis Donolo, 630 Dorcester street, for wrecking existing building and erecting four-story building to cost $50,000.

MONTREAL, QUE. — Leo Letourneau, agent for company in which Mayor Archambault Desy, 5089 Gouin boulevard east, is interested, plans $50,000 airplane factory on Back river.

MOUNT ROYAL, QUE.—Tenders received for $25,000 plant addition here for Canadian Marconi Co. Ltd., 211 St. Sacrement street, Montreal. J. C. Meadowcroft, 1154 Beaver Hall square, Montreal, is architect.

ST. LAURENT, QUE.—Beaver Products Ltd. has awarded contract to J. L. Quay & Frere for $20,000 plant addition.

HUMBOLDT, SASK. — Underwood & McLellan, 502 Grain building, Saskatoon, Sask., are engineers for $40,000 waterworks system and will call for tenders soon.

MEADOW LAKE, SASK.—Underwood & McLellan, Saskatoon, Sask., are engineers for $60,000 sewage and waterworks plant.

ROSETOWN, SASK.—Underwood & McLellan, Saskatoon, Sask., are engineers for $65,000 waterworks here.

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Help Wanted

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Federal Works Agency, Public Buildings Administration, Washington, D. C., Feb. 7, 1940.—Sealed proposals in duplicate will be publicly opened in this office at 1 P.M., Standard Time, Mar. 8, 1940, for construction of the U. S. P. O. at Wake Forest, N. C. Upon application, one set of drawings and specifications will be supplied free to each general contractor interested in submitting a proposal. The above drawings and specifications MUST be returned to this office. Contractors requiring additional sets may obtain them by purchase from this office at a cost of $5 per set, which will not be returned. Checks offered as payment for drawings and specifications must be made payable to the order of the Treasurer, U. S. Drawings and specifications will not be furnished to contractors who have consistently failed to submit proposals. One set upon request, and when considered in the interests of the Government, will be furnished, in the discretion of the Commissioner, to builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any sub-contractor or material firm interested, and to quantity surveyors, but this privilege will be withdrawn if the sets are not returned after they have accomplished their purpose. W. E. Reynolds, Commissioner of Public Buildings, Federal Works Agency.

Federal Works Agency, Public Buildings Administration, Washington, D. C., Jan. 31, 1940.—Sealed proposals in duplicate will be publicly opened in this office at 1 P.M., Standard Time, Mar. 6, 1940, for construction of the U.S.P.O. at Bronson, Mich. Upon application, one set of drawings and specifications will be supplied free to each general contractor interested in submitting a proposal. The above drawings and specifications MUST be returned to this office. Contractors requiring additional sets may obtain them by purchase from this office at a cost of $5 per set, which will not be returned. Checks offered as payment for drawings and specifications must be made payable to the order of the Treasurer, U. S. Drawings and specifications will not be furnished to contractors who have consistently failed to submit proposals. One set upon request, and when considered in the interests of the Government, will be furnished, in the discretion of the Commissioner, to builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any sub-contractor or material firm interested, and to quantity surveyors, but this privilege will be withdrawn if the sets are not returned after they have accomplished their purpose. W. E. Reynolds, Commissioner of Public Buildings, Federal Works Agency.

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