

STEEL

PRODUCTION • PROCESSING • DISTRIBUTION • USE

For forty-eight years—IRON TRADE REVIEW

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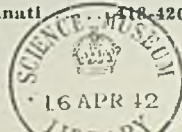
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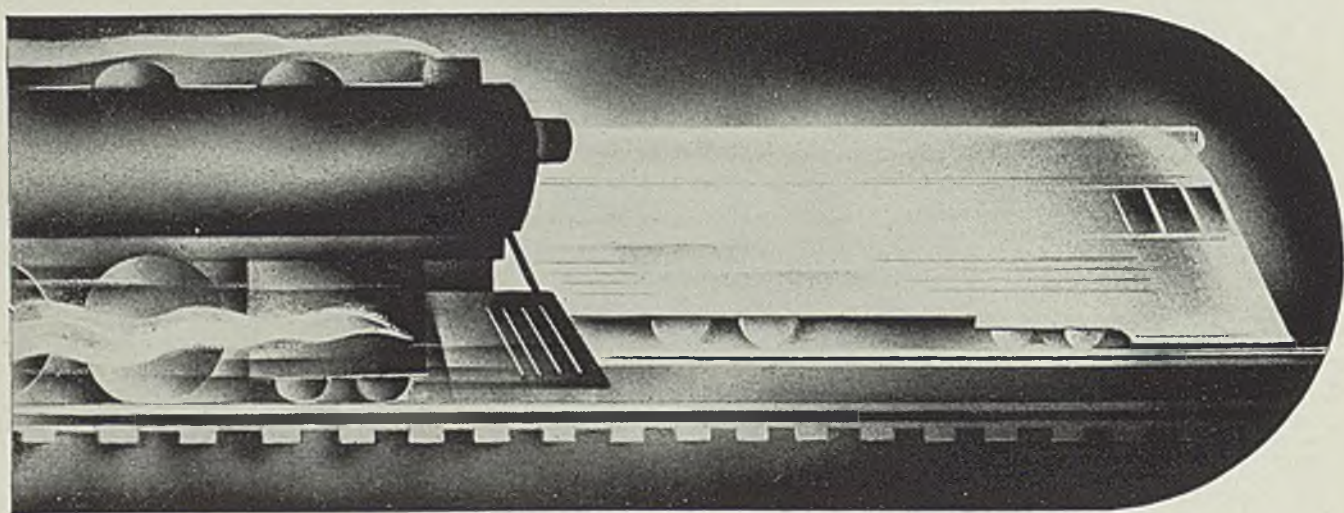
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STEEL

PRODUCTION • PROCESSING • DISTRIBUTION • USE

As the Editor Views the News

DAME NATURE in the guise of floods last week vied with labor discord as a disturber of industrial activity. While plants situated in the lower lakes region still were handicapped somewhat by the deadlocked G.M.C.-CIO situation, manufacturing establishments in the lowlands extending from Pittsburgh to Louisville were facing the threat of high water in the Ohio river and its tributaries. At this writing, the interruption to industrial operations due to the flood (p. 15) does not threaten to be as serious or as widespread as that of St. Patrick's day last year. Sometimes it is easier to gage the effect of unruly nature than that of man-made folly.

• • •

This seems especially true when the latest developments in the General Motors strike are considered. The amazing statement by Mr. Lewis to newspapermen Thursday, when he said his union men expected President Roosevelt's administration to support them in reward for their votes last November, shows the absurd lengths to which the avowed drive for collective bargaining can be stretched when the problem of labor relations is exposed to the influence of politics. In strike-torn communities, the inter-union feud has become more pronounced than the G.M.C.-CIO battle. Pressure by unaffiliated and anti-CIO unionists to return to work is mounting.

Labor Relations and Politics

These developments tend to weaken the position of Mr. Lewis and his camp followers. While it is evident that the CIO campaign against General Motors has wrought havoc in many industrial centers, the effect upon the rate of national industrial activity has not been impressive. If CIO had been able to shut down

No Effect on Steel Output

all G.M.C. plants completely (p. 25), its effect upon the national rate of steelworks operations would have been equivalent to a reduction of only 4½ per cent.

By deduction it can be calculated that General Motors' weekly steel requirements are about 47,000 tons. However, whatever curtailment has developed due to the strike has been more than offset by increased demand from other consumers. As a result the rate of steelworks operations last week (p. 17) mounted from 79 to 80 per cent. A spurt in capital goods activity (p. 32) has helped to take up the slack.

• • •

Low-alloy, high-strength steels rapidly are assuming an important place in the field of engineering materials. The tendency toward a broader application of these steels is focusing attention upon their properties. For this reason it is not surprising that users are beginning to compare notes in an effort to find the alloys best suited to specific requirements. One consumer, in enumerating the specifications for an ideal low-alloy, high-strength steel (p. 34), places particular stress upon the desirability of a steel having low air-hardening properties when welded or gas cut. His subsequent discussion, which pertains to the behavior of nickel-copper low-alloy steels, indicates that producers cannot afford to underestimate the importance of the weldability of their products.

Weldability Is Important

• • •

To build watch-like precision and delicacy of movement into a 500-ton mechanism is the task confronted by the eastern company which has started work (p. 40) on the mounting structure for the 200-inch telescope to be erected on Mount Palomar in southern California. The design and construction involves a number of interesting mechanical problems, one of which—an important pressure bearing—is solved by using oil instead of mercury. . . . Dust control in manufacturing establishments (pp. 42, 45) is receiving more attention than previously. In the new Homestead plate mill, described last week, dust is kept out of the motor room by maintaining the filtered air in this room at a point slightly above atmospheric pressure. Industry is destined to take a deeper interest in air conditioning and dust control.

Waging War Against Dust

E. L. Shaner



Welding Moves **FASTER** With **INLAND** Plate

● Welding of steel plate brought its advantages and its problems, too. There's something temperamental about welds and welders, but with the uniformity of Inland plate and the right combination of welding rod the job moves right along.

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River Steel Plants Again Fighting Floods; Few Suspensions

FLOODS in the Pittsburgh and Ohio river districts last week caused considerable inconvenience and some suspensions at steel and metalworking plants, but the damage was nowhere comparable to that which resulted from the disastrous floods in March last year.

Late bulletins indicated that the interruptions would be short and that steel shipments will not be seriously affected. Plants which shut down—mainly as a precautionary measure—were prepared to get back immediately into production when the danger had passed. Reports summarized the situation as follows:

At Jones & Laughlin Steel Corp.'s Soho plant on the Monongahela river, all five open hearths and both plate mills were down. A coal hoist at its Eliza works was out of commission. The Aliquippa works was still well above water.

Carnegie-Illinois Steel Corp. shut down its sheet bar mill at Mingo, O., and its tin mill at Martins Ferry, O., and banked fires at its Isabella blast furnaces at Etna, Pa. At the McKeesport, Pa., works of Carnegie-Illinois the water had reached a level 20 inches below the sheet mill floor, but barring more rain the lat-

ter plant was scheduled to remain in operation. Water was threatening to curtail production at Crucible Steel company's LaBelle plant at Pittsburgh.

Wheeling Steel Corp. plants at Steubenville and Portsmouth, O., were reported down as a precaution, it being feared that rising water might reach hot brick and cause damage. At the Follansbee Bros. works, Toronto, O., motors were ordered taken out of the pits as it was feared water might reach the power house.

Workers Kept from Plant

Production at the Andrews Steel Co. and Newport Rolling Mill Co. was suspended after streets in Newport, Ky. (across the river from Cincinnati) became flooded and employees faced difficulty in reaching their work. Open hearths were cooled and for a time rolling schedules maintained on a stock of ingots, but wheels were stopped later. Equipment has not been damaged and operations were to be resumed quickly.

Roads surrounding the Ashland, Ky., plant of the American Rolling Mill Co. were blocked by high water but production was maintained. Truck shipments ceased and transportation in some cases shifted to

rail. The Middletown plant of this company was unaffected.

Several foundries bordering the river suspended work with embargoes on pig iron, coke and scrap. Because of blocked streets and roads nearby, affecting employes, a pipe foundry in the district suspended.

Several warehouses tried to maintain deliveries at lower river stages but were forced to suspend shipments. In some cases regular customers were supplied from other sources. Other warehouses, on higher ground, met no difficulties.

Some scrap yards were under water. General conditions such as truck detours and embargoes to several consumers, brought an enforced drop in the scrap market activity.

Early in the week shipments to Cincinnati, by truck, from Portsmouth mills were shut off because of flooded roads.

Temporary suspension of barge shipments will not bring shortage of materials. At least one warehouse received considerable material immediately prior to the flood.

Machine tool shops are out of the affected district but faced inconvenience when flooded streets hampered transportation of employes and materials.

Improve Flood Defense

Along the rivers at Pittsburgh some industrialists have been strengthening their defense against floods during the last ten months. Aluminum Co. of America constructed a flood wall 1787 feet long to help protect its property up the Allegheny river. Several plants undertook to enclose costly machinery in water proof enclosures. In the downtown area the pumping systems in many large buildings were augmented. One department store and one newspaper building installed flood gates and seals for their structures.

Wheeling usually figures that flood stages there will be about 10 feet more than at Pittsburgh, but Wheeling industries generally are not damaged extensively until the water reaches around 43 or 44 feet.

In Pittsburgh and Wheeling the "flu" probably has hampered the efficiency of office forces, plants and stores more than any inconveniences caused by the floods. Absences in a few steel mills and a few steel company offices have materially reduced the ranks of employes at times during the past two weeks.

"Colony" of Steel Houses Nearing Completion in Middletown, O.



MIDDLETOWN, O., home of American Rolling Mill Co. now has 24 steel houses, with porcelain enameled exteriors, ranging in size from four-room cottages to two-story buildings. Workmen are putting finishing touches on six, four of which are shown in illustration. Two local companies, Steel Buildings Inc., and Insulated Steel Construction Co., are producing self-framing steel houses for approximately the cost of conventional construction

Pittsburgh Area Quadruples Continuous Mill Capacity

A REMARKABLE swing-back to Pennsylvania in capacity for products rolled on broad continuous strip and semicontinuous plate mills results from the recent expansion undertaken there.

Prior to the opening of Carnegie-Illinois Steel Corp.'s Homestead mill, Jan. 18, there were only two continuous broad mills in that state. They are the American Rolling Mill Co.'s mill at Butler, and Allegheny Steel Co.'s at Brackenridge. The total annual capacity of these two mills is only 587,500 gross tons. This represented 6.5 per cent of all capacity to such mills in the country.

Add to this the Homestead mill's capacity, 729,000 tons; that of Jones & Laughlin Steel Corp.'s mill in Pittsburgh, now practically completed, 720,000 tons; and Carnegie-Illinois mill authorized for Clairton, estimated at 720,000 tons. Pennsylvania's total thus becomes 2,756,500 tons.

When all the new mills authorized for 1937 are completed total capacity in the United States for the continuous mill products will be 12,598,500 tons. The Pittsburgh district will represent 21.3 per cent of this total.

Building Four More Mills

Twenty-two continuous and semicontinuous mills have been constructed since 1925. Four more will be completed this year. A conservative estimate of the overall cost of these 26 mills is approximately a quarter of a billion dollars.

Republic Steel Corp.'s mill in Cleveland, work on which was started recently, will bring in capacity for 720,000 tons annually; Bethlehem Steel Co.'s mill at Sparrows Point, Md., now under way, 450,000 tons; Tennessee Coal, Iron & Railroad Co.'s mill at Fairfield, Ala., announced last October, 300,000 tons. It is estimated that the Carnegie-Illinois mill at Clairton, announced on the day that the Homestead mill was opened, will have 720,000 tons annual capacity.

Completion of these mills will result in the following distribution of total capacity: Pennsylvania 2,756,500 tons; Ohio 3,145,000 tons; Illinois-Indiana 2,925,000 tons; Michigan, 1,570,000; all other districts 2,202,000 tons.

The Homestead mill is the first of the semicontinuous type ever to be built in Pennsylvania. In addition

to the projected Clairton mill, Carnegie-Illinois will proceed shortly to build a slabbing mill at the Edgar Thomson works, Braddock, Pa., to supply slabs for Clairton. (See STEEL, Jan. 18, page 19.)

"The Homestead mill will not divert business from present comparable facilities in the company's Chicago district, except in event there should be a lack of capacity there at any given time," Carnegie-Illinois stated.

With completion of J & L's mill

in Pittsburgh, scheduled to go into operation within a few weeks, that producer will roll strip steel for the first time.

Prior to completing the Homestead mill, Carnegie-Illinois had only five broad continuous strip and semicontinuous plate mills, all of them located in Illinois, Indiana and Ohio, with total capacity of 2,250,000 tons.

The Homestead, Clairton and Alabama mills will increase this to 3,999,000 tons.

While it is thus increasing its own capacity about 88 per cent, Carnegie-Illinois will still have only 31.7 per cent of the total capacity of all such mills.

MORE INGOT CAPACITY IS CONSIDERED AT CLEVELAND

Facilities for producing steel ingots in the Cleveland district may

Twenty-six Broad Strip Mills in 11 Years

Company	Annual Year	Capacity built	Gr. tons
1—American Rolling Mill Co., Butler, Pa.	1926	312,500	
2—American Rolling Mill Co., Ashland, Ky.	1927	432,000	
3—Republic Steel Corp., Warren, O.	1927	302,000	
4—Weirton Steel Co., Weirton, W. Va.	1927	420,000	
5—Carnegie-Illinois Steel Corp., Gary, Ind.	1927	360,000	
6—American Rolling Mill Co., Middletown, O. . .	1928	372,000	
7—Wheeling Steel Corp., Steubenville, O.	1929	540,000	
8—Great Lakes Steel Corp., Ecorse, Mich. . .	1930	400,000	
9—Carnegie-Illinois Steel Corp., So. Chicago, Ill.	1931	720,000	
10—Otis Steel Co., Cleveland	1932	375,000	
11—Inland Steel Co., Indiana Harbor, Ind. . .	1932	600,000	
12—Allegheny Steel Co., Brackenridge, Pa. . .	1932	275,000	
13—Carnegie-Illinois Steel Corp., Gary, Ind.	1935	270,000	
14—Youngstown Sheet & Tube Co., Campbell, O.	1935	536,000	
15—Carnegie-Illinois Steel Corp., McDonald, O. . .	1935	300,000	
16—Ford Motor Co., Dearborn, Mich.	1935	450,000	
17—Bethlehem Steel Co., Lackawanna, N. Y. . . .	1935	600,000	
18—Great Lakes Steel Corp., Ecorse, Mich. . . .	1936	720,000	
19—Carnegie-Illinois Steel Corp., Gary, Ind.	1936	600,000	
20—Granite City Steel Co., Granite City, Ill.	1936	375,000	
21—Carnegie-Illinois Steel Corp., Homestead, Pa.	1936	729,000	
22—Jones & Laughlin Steel Corp., Pittsburgh . . .	1936	720,000	
23—Tenn. Coal, Iron & R. Co., Fairfield, Ala. . .	1937	300,000	
24—Bethlehem Steel Co., Sparrows Point, Md. . .	1937	450,000	
25—Republic Steel Corp., Cleveland	1937	720,000	
26—Carnegie-Illinois Steel Corp., Clairton, Pa. . .	1937	*720,000	
Total			12,598,500

*Estimate.



CHART shows location of the 21 broad continuous strip and semicontinuous plate mills already built, and the five (in outline) now nearing completion, or authorized. Tonnage figures represent total capacities for the districts when the new mills are completed

be increased shortly. Republic Steel Corp., which now has 12 basic open hearths at its Corrigan, McKinney division, is understood to be obtaining cost estimates on rehabilitating the five open hearths at its Upson works, idle since 1929. These furnaces are of 100-ton daily capacity.

Since Otis Steel Co., Cleveland, declared in an amended registration statement to the SEC that \$3,000,000 of its proposed bond issue is to be used for expansion, reports have been current that it intends to build several open hearths, but this lacks verification. Otis now has eight open hearths at its Riverside works and five small units at its Lakeside works.

In the Buffalo district, Bethlehem Steel Co. is preparing to light more units of its new battery of six open hearths. Construction of these six was suspended early in the depression and just recently completed. Each of these has 150 tons daily capacity.

Four open hearths built late last year by Great Lakes Steel Corp., Ecorse, Mich., were the first to be constructed in this country since 1929-1930, when Great Lakes built eight.

Production

INCREASES at Pittsburgh and Youngstown last week were sufficient to boost the steelmaking rate 1 point to 80 per cent, highest level since February, 1930. Flood conditions in the Pittsburgh and southern Ohio districts has had no great effect on operations as yet.

Cincinnati—Dropped to 68 per cent, with 16 open hearths active. Entire decline from recent levels of 96 per cent because of flooded Ohio river. Rebound assured as soon as waters recede.

Chicago—Continued at 77 per cent, with no letdown in early prospect. Lighting of an additional blast furnace is planned soon. The district currently has 28 of 38 stacks active.

Pittsburgh—Up 1½ points to 82 per cent. United States Steel Corp. subsidiaries started the week at 83 per cent and later were operating at a slightly higher rate. The leading independent held steady at 83 per cent. One of the independents took off two open hearths later in the week, but the average for all for the full week was close to 80 per cent. Blast furnace operations have shown no change over the previous week, 45 active stacks operating.

Wheeling—Off fractionally to 93½ per cent, due to slight recessions caused by the flood.

Central eastern seaboard—Unchanged at 53 per cent, and a sus-

District Steel Rates

Percentage of Open-Hearth Ingot Capacity Engaged in Leading Districts

	Week ended		Same week	
	Jan. 23	Change	1936	1935
Pittsburgh . . .	81½	+ 1½	37½	38
Chicago	77	None	53	59
Eastern Pa. . . .	53	None	36½	28½
Youngstown . . .	70	+ 2	61	64
Wheeling	93½	—½	70	95
Cleveland	78	— 2	67	79
Buffalo	84	None	30	44
Birmingham . . .	76½	+ ½	51	31½
New England . . .	88	None	83	68
Detroit	100	None	88	100
St. Louis	76	— 4	†	†
Cincinnati	68	—24	75	†
Average	80	+ 1	50	53

†Not reported.

tained rate is expected unless the automotive strike is prolonged.

New England—Unchanged at 88 per cent, with production schedules for this week sustaining this rate.

Detroit—Steelmaking continues at full capacity, both producers operating all open hearths. How long this rate will continue is problematical, in view of the tie-up at General Motors plants.

Cleveland-Lorain—Off 2 points to 78 per cent, as Corrigan, McKinney division dropped one open hearth to operate 12, and Otis Steel Co. operated seven furnaces half of the week and eight the remainder. National Tube Co. at Lorain scheduled 11 furnaces, a gain of 1.

Youngstown—Advanced 2 points to 79 per cent, as Republic Steel Corp. at Youngstown, Youngstown Sheet & Tube Co. at Campbell, and Carnegie-Illinois Steel Corp. at Farrell, each put an additional open hearth in production.

Birmingham—Tennessee Coal, Iron & Railroad Co. added another open-hearth furnace to its Ensley group, increasing the steelmaking rate fractionally to 76½ per cent.

Buffalo—Held at 84 per cent. Operations are expected to pass 90 per cent the early part of this week, as Bethlehem Steel Co. continues to add new furnaces to its capacity at Lackawanna.

St. Louis—Off 4 points to 76 per cent, with 22 out of 29 open hearths melting.

Sheet Sales Up

Daily average sheet sales in December, as reported by the National Association of Flat Rolled Steel Manufacturers, Pittsburgh, amounted to 11,225 net tons, compared with 9803 tons in November. Production averaged 7686 tons, against 7468 tons in November, while shipments were 8147 tons in December and

7071 tons in November. Totals for December: Sales, 336,758 tons; production, 230,581 tons; shipments, 244,409 tons.

Metal Trades, La Follette's Target

MEASURES taken by the National Metal Trades association to protect its members from labor organizations last week became the target of the LaFollette civil liberties subcommittee.

Suspending for a few days its inquiries on complaints lodged by the CIO against steel producers, the subcommittee questioned Homer D. Sayre, commissioner for the Metal Trades association; O. R. Abbott, employing manager, and L. A. Stringham, in charge of its labor service.

Sayre testified that the association has 952 members and that it has adopted an open shop policy.

On cross-examination he said that it has "undercover" men who go into various plants to secure labor information for its members. In some instances union officials have been employed for this service. He denied that these agents attempt to bribe employees.

"We believe that the greatest good we can do our members is the prevention of labor difficulties," he said. "I think there is nothing worse than a strike. As a rule a man who goes out on strike loses more than he gets."

Sayre declared that the association is not a lobbying organization, but added that it fights legislation it does not favor "by every legitimate means."

The association, he testified, was formed by 40 employers in Washington in 1899, to formulate a policy of employe relationship. At first this group made agreements with labor unions but this policy was terminated in 1901 and the association has stood for the open shop ever since.

General Motors is not a member of the association, but Fisher Body and Harrison Radiator, subsidiaries, belong, he said. Dues are 20 cents per employe per month. The organization's policies are formed by a council of 12 leaders in the manufacturing industry.

Metal Trades Employment Highest Since June, 1930

Metal trades employment in 22 leading cities increased during De-

ember for the fifth consecutive month, to the highest level since June, 1930, according to the National Metal Trades association, Chicago. Last month's index was 94.4 per cent of the 1925-27 monthly average, compared with 93 in November and 77.8 in December, 1935. This is the highest figure for December since 1929. Practically all centers recorded employment gains. Pick-up in automotive operations accounted for a large share of the improvement.

Machinery Exports Show Heavy Exports in 1936

Exports of industrial machinery from the United States during November were valued at \$12,725,356, a slight increase compared with November, 1935, when exports were valued at \$12,619,169, according to the machinery division of the department of commerce.

Foreign shipments of power-generating machinery increased from \$655,668 in November, 1935, to \$683,012 in November, 1936.

Overseas consignments of construction and conveying machinery decreased slightly, falling from

Steel Index Is Ready

The index to Volume 99 of STEEL, for the last six months of 1936, now is ready for distribution. Copies will be sent to all subscribers requesting them.

\$763,778 in November, 1935, to \$711,689 in November, 1936.

While there was a noticeable decrease in exports of power-driven metal-working machinery, the November, 1936, value totaling \$3,785,013 compared with \$3,923,375 exported in November, 1935, exports of lathes advanced to \$442,898 from \$340,464; sheet and plate metal working machines to \$410,930 from \$193,127; and forging machinery to \$174,388 from \$133,787.

The 11 months' total value for industrial machinery exports was \$143,696,712 compared with \$110,298,231 during the corresponding period of 1935.

1700 Attend Traffic Dinner

Approximately 1700 industrial and civic leaders attended the thirty-sixth annual dinner of the Traffic club, Pittsburgh, Friday, Jan. 22. Preliminary to this affair, several social gatherings were held, including a dinner by Jones & Laughlin Steel Corp., a luncheon by Koppers Co., and a reception by United States Steel Corp. subsidiaries.

Activities of Steel Users and Makers

GENERAL ELECTRIC CO., Schenectady, N. Y., has begun preparation for expansion of the washing machine division at its plant in Bridgeport, Conn. The company recently purchased six buildings which formerly were a part of the Remington Arms Co. plant. The washing machine division will occupy 100,000 square feet of floor space, and both partsmaking and assembly unit will be included. About 90 days will be required for modernization, and installation of machinery.

Foote Bros. Gear & Machine Corp., Chicago, has appointed H. F. Edge & Co., Atlanta, Ga., as a district representative in the southeastern territory, comprising the state of Georgia, South Carolina, eastern North Carolina and northern Florida.

Columbia Tool Steel Co., Chicago, has removed its Milwaukee office from 169 South Second street, to new and larger quarters at 441 North Sixth street. C. F. Scheid is district manager at Milwaukee.

Liquidation into the parent corporation of three subsidiaries of the Dravo Corp., Pittsburgh, has been announced. The three units involved are the Dravo Contracting Co., Keystone Sand & Supply Co.,

and Dravo Realty Co. Business previously done by these subsidiaries will be transacted through established divisions of the corporation.

An improvement program which includes installation of new annealing equipment, sand handling equipment, and new shot blast equipment has been announced by Pittsburgh Steel Foundry Corp. for its plant at Glassport, Pa. The program will involve the expenditure of approximately \$100,000, and when completed, the company will be able to increase its output of railroad material by approximately 50 per cent.

Carboloy Company Inc., Detroit, manufacturer of cemented carbide tools, dies and wheel dressers, announces that its Pittsburgh office has supplemented its service to the southeast territory with an additional district representative, J. E. Weldy, 1107 South Thirtieth street, Birmingham, Ala. Mr. Weldy was formerly located in the Detroit district sales office and before that was a special representative for the company in Minnesota.

Denver Metal & Machinery Co., Denver, has consolidated with the Morse Bros. Machinery & Supply Co., forming the Morse Bros. Machinery Co. Active management of the new firm will be under the direction of Max Grimes, president, and J. T. McShane, vice president. The personnel will remain the same, with the exception of G. G. Morse and R. A. Martin who have resigned to engage in other interests.

Lightweight Steel Enhancing Popularity of Trackless Trolley Coaches



TRACKLESS trolley coaches, a Portland, Oreg., fleet shown above, built with new lightweight steels, are gaining popularity, the number in service increasing from 518 at the end of 1923 to 995 at the end of 1936. Prospective purchases by transit companies in the next five years are estimated by W. J. Clardy, transportation division, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., at \$300,000,000. This includes 5000 street cars, 15,000 gasoline buses and 3500 trolley buses

Steel Men Leaders in Great Lakes Exposition

H. G. Dalton, senior partner of Pickands, Mather & Co., has been elected vice president of the 1937 Great Lakes exposition, Cleveland. Dalton is chairman of the board, Youngstown Sheet & Tube Co.

Included on the executive committee are four others prominent in iron and steel: T. M. Girdler, chairman and president, Republic Steel Corp.; Elton Hoyt II, partner of Pickands, Mather & Co.; G. M. Humphrey, M. A. Hanna Co.; and C. F. Blackmer, president, American Steel & Wire Co.

Interdependence of industry, science and agriculture sets the central theme, "The Making of a Nation", for the 1937 exposition which opens May 29.

Forecast 22.3 Per Cent Rise In Iron, Steel Carloadings

Iron and steel carloadings in the first quarter of 1937 are estimated at 376,599 in the national forecast issued by the regional shippers' advisory boards, covering 29 principal commodities. This represents an increase of 22.3 per cent over the first quarter of 1936, when actual

iron and steel carloadings totaled 307,932. Carloadings of machinery and boilers are estimated at 28,301, compared with 25,133 for the first quarter of 1936, an increase of 12.6 per cent.

Ore and concentrates are estimated at 87,653, against the 1936 first quarter total of 63,864, a rise of 37.2 per cent. For the Great Lakes region an increase of 218 per cent is estimated for the movement of ore. Coal and coke carloadings nationally are estimated to total 2,209,437 in the 1937 first quarter, against 2,043,806 in 1936, an increase of 8.1 per cent.

Bill Asks Receivership For Tax-Owing Ore Mines

Mining companies and other large taxpayers in Minnesota would be thrown into receivership upon failure to pay delinquent taxes under a measure introduced in the state house of representatives by member Richard Kelly, Chisholm.

The bill would empower district courts to appoint county treasurers as receivers ex-officio to collect rents, royalties and other incomes of real property to satisfy all delinquent taxes. Pending disposition of certain valuation cases, some mining companies in the state are

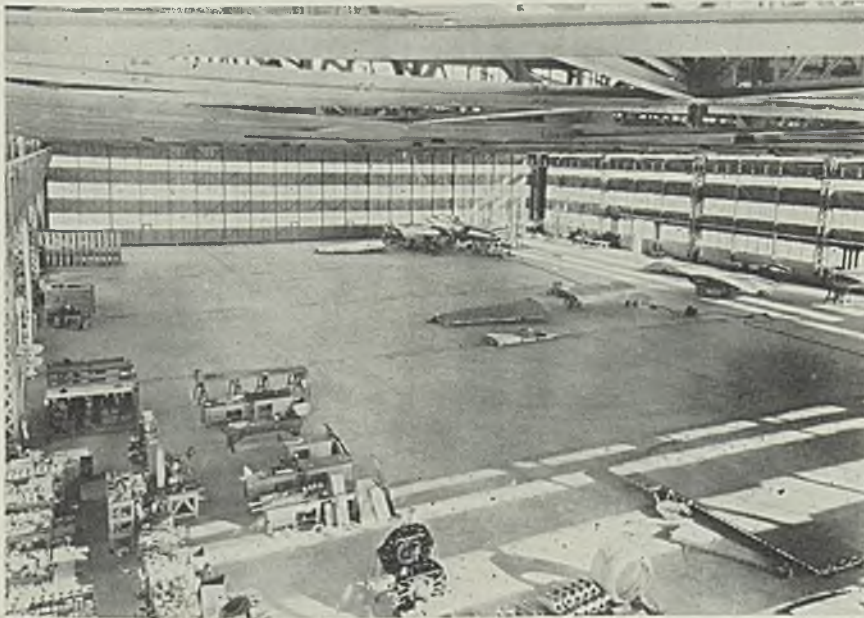
withholding one-half the amount of their taxes.

Hull Asks Extension of Trade Agreement Law

Secretary of State Hull was the first witness heard by the ways and means committee of the house of representatives last week when hearings commenced in connection with the joint resolution of Representative Doughton of North Carolina, calling for the extension of the foreign trade agreement law for a period of three years from next June 12. Opponents to continuance of this act will put in rebuttal testimony before the committee beginning on Monday.

Secretary Hull pointed out this act has been in force for over two and a half years and "the record of what has been done is an open book. It needs no defense from me or from my many associates. We have concluded fifteen trade agreements. In the fifteen foreign countries concerned, duties have been reduced on some of our most important agricultural and industrial products; quotas have been abolished or enlarged; adverse discriminations, where they existed, have been removed and guarantees of equal treatment have been obtained for the future."

Long Steel Girders Used in Modern Airplane Plant



ENCLOSING one of the largest unobstructed areas ever provided for industrial operations, this new Boeing Aircraft Co. assembly plant in Seattle was completed recently by the Austin Co., Cleveland. The building is 204 x 304 feet with a clear height of 35 feet, and is spanned by saw-tooth monitors which admit sunlight to augment light coming through four bands of horizontal sash. Six hundred tons of structural steel was used in the project, including girders 204 feet long. The building has an unbroken area of 2,100,000 cubic feet. Its size can be appreciated by observing the huge bomber near the wall in the background

A. Milne & Co. Mark 50 Years in Steel Business

This year marks the golden anniversary of A. Milne & Co. in the iron and steel business in observance of which the firm has published a booklet, *Fifty Years*, outlining the founding and development of the partnership.

Organized in 1887 by Alexander Milne and Luther Little, both steel salesmen, A. Milne & Co. built a flourishing business in imported steels. Enterprising salesmanship contributed greatly to the firm's success. The first order, for 500 tons of Swedish wire rods, was obtained by Mr. Little by promising delivery within 15 days, unusual in those days. Delivery on the promised date was made possible by Mr. Little's advance knowledge that the rods could be obtained in England and shipped immediately.

With exception of a brief venture into bicycle manufacturing, the firm has concentrated its efforts in merchandising iron and steel and now has offices in New York, Boston, Chicago, Pittsburgh and New Orleans; warehouses in New York, Chicago and New Orleans. Present members of the firm are H. S. Hoyt and J. King Hoyt Jr.

Plow That Spurred Use of Steel on Farm Is 100 Years Old

AN anniversary of considerable significance to the steel industry will be celebrated throughout 1937, when national recognition will be accorded the memory of John Deere, who 100 years ago gave to the world the steel plow, and established the basis for the far-flung enterprises of the John Deere organization today.

While Deere's contribution was mainly agricultural—making possible the development of the vast farm empire of the Middle West—it gave an impetus to the infant steel industry of his day and was the means of providing an important market for steel.

Deere was the first plowmaker to use steel commercially. It is recorded by John Swank in his book *Iron of All Ages* that "the first slab of cast plow steel ever rolled in the United States was rolled by William Woods at the steel works of Jones and Quiggs in 1846 and shipped to John Deere, under whose direction it was made." This was nine years after he had produced his first steel plow. The steel for his earlier plows had come from England.

It was in his pioneer blacksmith shop in the newly-settled village of Grand Detour, Ill., in 1837 that John Deere produced the self-scouring steel plow that was to help revolutionize modern agriculture. Oddly

enough, it was a broken steel sawmill blade that provided him with the metal for his first plow.

Deere's achievement will be honored in thousands of rural and urban communities this year with the holding of "John Deere centennial" days in which community leaders and farmers will participate.

The career of John Deere is a saga of American industry. Born in Vermont in 1804, he was carried by the tide of settlement westward to Illinois in 1837. Back home in New England he had established a considerable reputation as a master mechanic and blacksmith. So in his new home in the village of Grand Detour he set up a blacksmith shop.

Rich Soil; Poor Plows

As he shod the horses and oxen of the settlers in this new country and repaired their plows and tools, he heard on all sides this complaint:

"We've got the richest land in the world. It'll produce 60 bushels of corn to the acre. But after the first crop there's no plow on earth that will scour in this heavy, sticky prairie soil."

Clearly, the prairie settlers had to have a plow with a polished surface that would shed the gluey earth and clean itself.

John Deere pondered this problem and sought the answer. Called

one day to repair a shaft in the neighborhood sawmill, his eye fell on a discarded broken saw blade in a corner. As he looked at the gleaming polished steel an idea struck him. Couldn't he use such metal to fashion a plow that would tame this rich but gummy soil?

Deere obtained the steel saw blade and carried it back to his smithy. Like a thorough craftsman he carved the pattern of the mold-board and share he desired; he heated the steel and fashioned it into shape so that it would clean itself as the plow cut and turned the furrow. He used wrought iron for the landside and standard, and white oak for the handles and beams. Then began a process of trial and error until he had an implement that suited him. He tested the plow on neighborhood fields, noted the defects and corrected them.

Then one spring day in 1837 he announced he was ready for a real demonstration. He took his plow to the farm of a man named Crandall, in whose land no plow had yet been able to scour. While a group of neighboring farmers looked on, John Deere started his test. The plow shed the gummy black soil easily and cut a lean furrow. The plow was a success.

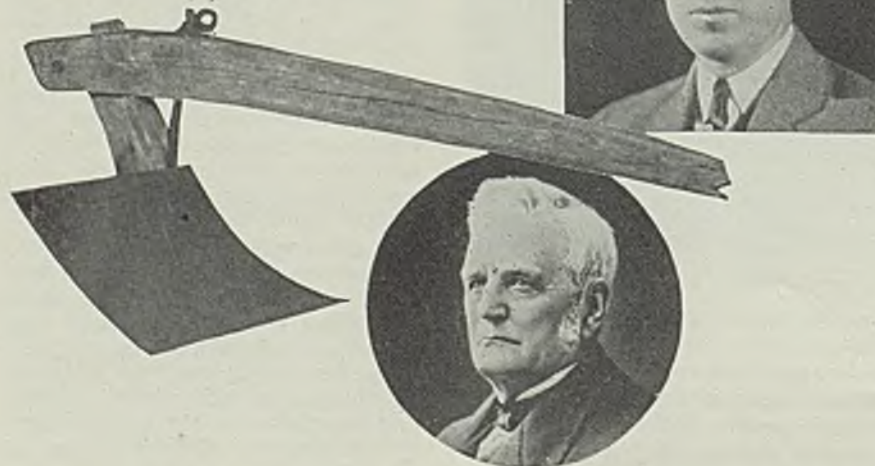
Young Deere made only one plow in 1837. The next year he produced eight. The fame of those implements spread over the countryside and soon he had orders for many.

The demand for these new plows continued to grow, so that it was necessary for Deere to expand his operations—a process which required additional capital. Thus in 1843, six years after he had given the world his first steel plow, John Deere entered into a partnership with Major Leonard Andrus. This partnership continued until 1847, when Deere decided to move his operations to Moline, Ill., because of greater advantages available there—a good supply of coal, cheap river transportation and low cost water power. Therefore, he disposed of his business in Grand Detour a decade after fathering the steel plow.

The steel for Deere's earlier plows had come from England, but the uncertainties of shipping overseas and half across a continent necessitated a supply of materials nearer home. Consequently, to the fast growing industrial city of Pittsburgh he went and induced the Jones & Quiggs Steel Co. to furnish him the kind of steel he needed.

The traditions and policies which John Deere established persist to this day in the management of the company he founded. The activities of the far-flung John Deere organization are directed by his descendants. The present president, Charles Deere Winan is a great-grandson of John Deere.

A POLISHED steel saw blade gave John Deere, blacksmith, (lower portrait) inspiration for the first self-scouring steel plow. The photo shows one of the first three of these plows. Charles Deere Winan, president, Deere & Co. (upper portrait) is the fourth of the family to hold that position since the foundation of the company



Men of Industry

MD. CONROY, assistant to the general manager, Granite City Steel Co., Granite City, Ill., has been appointed assistant to the president. Other appointments announced by the company follow.

P. J. Stremmel, formerly general superintendent, has been made vice president in charge of operations; John H. Vohr, superintendent in charge of strip mills, has been made general superintendent of plants; B. B. Johnston, heretofore assistant to the general superintendent, is now assistant general superintendent; N. B. Randolph, previously assistant general manager of sales, has become general manager of sales, operating under L. F. Miller, vice president in charge of sales.

Chester H. Lehman, vice president, Blaw-Knox Co., Pittsburgh, has been re-elected a director of the Highway Industries bureau.

Harold R. LeBlond, formerly secretary-treasurer, has been elected president, LeBlond-Schacht Truck Co., Cincinnati, succeeding William Schacht, who becomes vice president.

R. L. Regester, 6823 Thomas boulevard, Pittsburgh, has been appointed to handle the sale of all products of the Audubon Wire Cloth Corp., Philadelphia, in the Pittsburgh district.

T. D. Montgomery has been appointed manager of the foreign sales division, Cutler-Hammer Inc., Milwaukee, manufacturer of electric control apparatus.

Clement Thelander, industrial designer, whose studios have been located in Rockford, Ill., for the past five years, has moved to 646 North Michigan avenue, Chicago.

Moxie S. George has been appointed assistant district sales manager of the Milwaukee office, Inland Steel Co., Chicago. He has been active in the steel business in that district for the past 11 years.

A. A. Bilas has been appointed vice president and general manager of sales, Wyckoff Drawn Steel Co., Pittsburgh. E. C. Rock has been named vice president in charge of the western division of the company.

Merlin A. Cudlip, formerly vice president and secretary, Packard Motor Car Co., has been elected vice president, treasurer and a director of McLouth Steel Corp., Detroit, maker of strip steel.

C. G. Frantz, president, Apex Elec-

trical Mfg. Co., Cleveland, has started another term as president, American Washing Machine Manufacturers' association, having been re-elected at the annual meeting in Chicago recently.

John H. Rodger has been elected president, Oxweld Railroad Service Co., Chicago, a unit of Union Carbide & Carbon Corp., New York. This company supplies gases, apparatus, and engineering assistance



John H. Rodger

for use of the oxyacetylene welding and cutting process. Mr. Rodger has been an officer of the company since 1928. He is a director of the Canadian Railroad Service Co., Safety Car Heating & Lighting Co., Vapor Car Heating Co. of the United States, Vapor Car Heating Co. of Canada, Roth Mfg. Co., and Chicago Railway Equipment Co.

Charles F. McBride has been elected president, Monessen & Southwestern railroad and general traffic manager of Pittsburgh Steel Co., Pittsburgh. Mr. McBride was formerly traffic manager of Sharon Steel Corp.

D. B. Milward, formerly in charge of the Chicago office, Electro Refractories & Alloys Corp., Buffalo, has been made sales manager, and transferred to Buffalo. He has been connected with the corporation for 15 years.

Matthew A. Beck, Milwaukee, a life member of the American Society of Mechanical Engineers, was presented with the society's 50-year membership medal at the monthly dinner meeting of the Engineers' society of Milwaukee Jan. 20. He is a life member of the local society as well. Mr. Beck has been prominent

in Milwaukee industrial engineering for more than 60 years, and was president and general manager, Milwaukee Crane & Hoist Co. at the time it was merged with the Harnischfeger Corp., when he retired.

Col. Carmi A. Thompson, Cleveland, affiliated with the coal and iron ore industries, has been elected a director of the Continental Stove Corp., Ironton, O. Carl E. Froelich has been named president, and L. K. Cooper has been elected chairman and treasurer.

George T. Ladd, president, United Engineering & Foundry Co., Pittsburgh, has been appointed by the federal reserve board of governors at Washington as a director of the Pittsburgh branch, Federal Reserve Bank of Cleveland, for a two-year term ending Dec. 31, 1938.

Richard C. Stewart, president and founder, Stewart Iron Works Co., Cincinnati, has been made chairman of the board. Robert S. Stewart has been elected president; Charles L. Costello, vice president; W. S. Rich, secretary; S. M. Stewart, assistant secretary, and C. A. Aplin, treasurer.

William M. Hilb, an active member of Hilb & Bauer, Cincinnati scrap firm, for 40 years, has retired to devote his time to social service activities. He formerly was a vice president, Institute of Scrap Iron and Steel Inc., New York, and served as a director of that organization for many years.

Robert H. Jackson has been appointed head of the antitrust unit, department of justice, Washington, succeeding John Dickinson who resigned Jan. 20, as noted in STEEL, Jan. 4, page 411. Mr. Jackson will have direct supervision of the collosive steel bidding investigation.

Alex B. Hawes has been appointed manager of coke sales, Wheeling Steel Corp., with headquarters in the Carew Tower, Cincinnati. He had been connected with Walter Wallingford & Co. Inc., Cincinnati, broker in pig iron and coke, for the past 18 years. Charles S. Dold has been named assistant manager.

Fred N. Mizer, first vice president, Bishop & Babcock Mfg. Co., Cleveland, has been appointed president and general manager, succeeding the late A. G. Bean. Before becoming affiliated with the Bishop & Babcock company in 1925, Mr. Mizer was foreman of the tool room, General Industries Corp., Elyria, O.

Stanley N. Brown and Robert H. McClintic have been appointed assistants to J. T. Tierney, president, Koppers Co., Pittsburgh. Mr. McClintic will be in charge of all ad-

vertising and sales promotion for Koppers Co., its divisions and subsidiaries, except the advertising of the company's coke plants.

E. S. Bissell, since 1929 technical adviser on industrial application in the instrument division, Bausch & Lomb Optical Co., Rochester, N. Y., has joined the Mixing Equipment Co., Rochester, N. Y., as sales manager. He will also direct advertising and sales promotion.

Frederick W. Lucht has become associated with the engineering staff, Carboly Co. Inc., Detroit, manufacturer of carboly cemented carbide tools, dies and wheel dressers. Mr. Lucht was formerly with the McCrosky Tool Corp., Meadville, Pa.

H. C. Merritt, since 1926 manager of the tractor division, Allis-Chalmers Mfg. Co., Milwaukee, has been elected a vice president. He is a pioneer in the farm and industrial tractor field, starting with the old Hart-Parr Co., now part of Oliver Farm Equipment Co., Chicago, and later with the old Holt Mfg. Co., now part of Caterpillar Tractor Co.

H. I. Dunphy and J. H. Van Moss have been appointed assistant vice presidents, American Car & Foundry Co., New York. W. L. Richeson, previously in charge of sales in the Cleveland district, has been appointed manager of sales, with headquarters in New York, and R. A. Williams has been appointed district sales manager at Cleveland.

Thornton E. Stokes has been promoted to manager of sales, marketing division, Youngstown Pressed Steel Co., Youngstown, O. Frank W. Knecht Jr. has been named Mr. Stokes' assistant. Howard C. Wolf has been advanced to assistant manager of sales of washing machine parts, and A. G. Knowles, to manager of sales, material handling division.

Thomas H. Wilbur has been appointed general manager, Bullard-Dunn process division, Bullard Co., Bridgeport, Conn. This division engineers and licenses the use of the Bullard-Dunn electrochemical process for descaling metals.

Thomas E. Dunn Jr. has also been appointed to the sales department of this division, and will have headquarters at 309 Miller-Storm building, Detroit.

F. A. Kelly, manager of the culvert division, Republic Steel Corp., Cleveland, has been appointed building products co-ordinator, attached to the general sales department. The new position was created because of the wide interest the corporation has in the building field through its subsidiaries, Truscon Steel Co., Berg-



F. A. Kelly

er Mfg. Co., and Steel & Tubes Inc. Mr. Kelly has been associated with Republic since 1931, when he became vice president and general manager of the Canton Culvert Co., then a subsidiary.

C. S. Pitkin has been placed in charge of the east central district, and J. G. Johns has been given supervision over the south eastern district, two new sales districts established by Crane Co., Chicago, to provide closer relations with the trade and between branches, general office and factories. Mr. Pitkin had been manager of the Pittsburgh branch since it was established in 1922 and Mr. Johns was located at Birmingham, Ala., since 1920. Other changes in local branch management follow:

H. M. Moss, sales manager at Pittsburgh, succeeds Mr. Pitkin as branch manager. F. D. Morrison, assistant manager at Birmingham, becomes manager, succeeding Mr. Johns. F. W. Zander, manager at Buffalo, retires from active management because of ill health but has consented to remain as special representative. G. E. Anderson, manager of Lima branch, has been transferred to Buffalo as Mr. Zander's successor. E. R. Henning succeeds Mr. Anderson as manager at Lima. Retirement of H. L. Wood, Sioux City, Iowa, also on account of ill health, moves T. R. Brady, manager of the Rockford, Ill., branch to Sioux City as manager, and R. E. Doherty, sales manager at Portland, Oreg., is made manager at Rockford. S. S. Day, manager at Sacramento, Calif., has asked to be relieved of active duty after many years of service. He will remain as special representative, and be succeeded as manager by E. B. Moor, assistant manager. E. T. Rowe, formerly manager of Syracuse branch, has been appointed manager of Boston branch, succeeding T. H. Dawson Jr., resigned. A. H. Buck, assistant manager at Pittsburgh, succeeds Mr. Rowe as manager at Syracuse.

Died:

JAMES P. ANDERSON, 67, vice president, Wringwood Co., a real estate and iron mine firm, Jersey City, N. J., and at one time affiliated with the steel producing industry, at his home in Paterson, N. J., Jan. 14. He was affiliated with the Paterson Rolling Mills before going to Trenton in 1893. In Trenton, he was employed in engineering work by the New Jersey Steel & Iron Co., the Trenton Iron Co. and the American Steel & Wire Co. In 1905 he went to Paterson, assuming his first affiliation with the Wringwood Co.

John A. Sullivan, Chicago district manager, Lynchburg Foundry Co., Lynchburg, Va., in Chicago, Jan. 11.

Herman G. Honold, 66, foundry superintendent, Payne Elevator Co., Franklin, Mass., in that city recently.

Hugh R. Grable, 46, for the past 19 years president and general manager, United Metal Products Co., Canton, O., in that city, Jan. 16.

Fred Hoehn, 74, former vice president, Forest City Foundries Co., Cleveland, in that city, Jan. 19. He had been associated with the company 57 years.

Earl E. Spencer, 48, president, Stromberg Electric Co., Chicago, in Pasadena, Calif., Jan. 18, as a result of injuries received in an airplane crash near Los Angeles, Jan. 12.

L. F. Boffey, 50, well known authority on industrial purchasing, publisher of *Purchasing*, and former secretary of the National Association of Purchasing Agents, at his home in East Orange, N. J., Jan. 15.

John J. Cain, 76, one-time manager of the Babcock & Wilcox Co.'s plant at Bayonne, N. J., in Bayonne, Jan. 17. In 1900 he selected a site for a plant for the company in Bayonne and upon completion was placed in charge.

J. W. Fenner, 87, former secretary, W. Bingham Co., Cleveland, hardware firm, in that city, Jan. 17. He had been in the employ of the company 46 years, retiring in 1913. Mr. Fenner was active in the organization of the Standard Tool Co., Cleveland.

George B. Jones, 72, manager, Hoosier Iron Works, Kokomo, Ind., until his retirement 5 years ago, in that city, Jan. 12. He was superintendent and assistant manager, Globe Stove & Range Co., Kokomo, for many years before joining the Hoosier organization.

Rail Wage Increase Would Cost \$116,600,000

Representatives of the five railroad train and engine service brotherhoods, at a meeting in Chicago last week, agreed to demand a 20 per cent increase in wages. If granted, the increase will cost the railroads of the country \$116,600,000 annually, it is estimated. Notice will be served on all roads shortly.

It is expected that the remaining 16 standard railroad unions will be urged to take similar action on wages. This proposal has no connection with the shorter work week for railroad employes as embodied in bills now pending in congress. The latter would limit work to 6 hours daily and 30 hours a week.

Radical Labor Bill Is Introduced in Pennsylvania

A bill creating a state labor relations board, consisting of three members to be appointed by the governor, has been introduced in the Pennsylvania state legislature by Senator B. B. McGinnis, Pittsburgh democrat.

Modeled somewhat along lines of the Wagner Labor act, the bill would make it a misdemeanor for any employer to take any part, di-

rectly or indirectly, in the formation of a union of his employes. Unfair labor practices which the measure purposes to curb include a long list of possible offenses by employers, such as discrimination against union employes, spying on employes, circulation of black lists, or refusal to bargain collectively.

It prohibits employers from dealing with any minority group and provides that employe representatives selected "by the majority" shall be the "exclusive" representatives of "all employes" in all negotiations having to do with wages, hours, or other working conditions.

The board is "directed" to prevent unfair labor practices, as defined in the bill. It is forbidden from investigating any differences between groups "within the same labor organization."

The board is given sweeping power to inspect payrolls or other records of employers and full use of the subpoena power. Violations are made punishable by a maximum fine of \$5000 or a year's imprisonment, or both.

Financial

GULF STATES STEEL CO., Birmingham, Ala., reports fourth quarter net income of \$251,324, bringing the net profit for the year, based

on quarterly reports, to \$360,112. This compares with \$141,269 for 1935. The indicated net profit for 1936 is equivalent to \$1.75 a share on 296,069 common shares outstanding, figured after the 7 per cent dividend requirements on the preferred. Its 1935 net amounted to less than 1 cent per common share after preferred dividends.

Little if any liability is anticipated under the surtax law, in view of the \$21 per share paid out in dividends on preferred during 1936.

ROLLING MILL ACQUIRES CONTROL OF RUSTLESS

The committee on stock list of the New York stock exchange has authorized the listing of 65,700 additional \$25-par common shares of American Rolling Mill Co., issued in exchange for 225,000 shares of Rustless Iron & Steel Corp., Baltimore. This exchange gives American Rolling Mill 403,700 or 55 per cent of the 732,707 shares outstanding. The report issued by the SEC last November disclosed that American Rolling Mill had acquired 103,000 common shares in Rustless and at the same time had purchased warrants for another 50,000 shares.

SCULLIN STEEL PROPOSES REORGANIZATION PLAN

Scullin Steel Co., St. Louis, has proposed in its reorganization plan filed in federal court under the amended bankruptcy act, a 15-year extension of a \$3,062,500 first mortgage bond issue and reduction of fixed interest from 6 to 3 per cent.

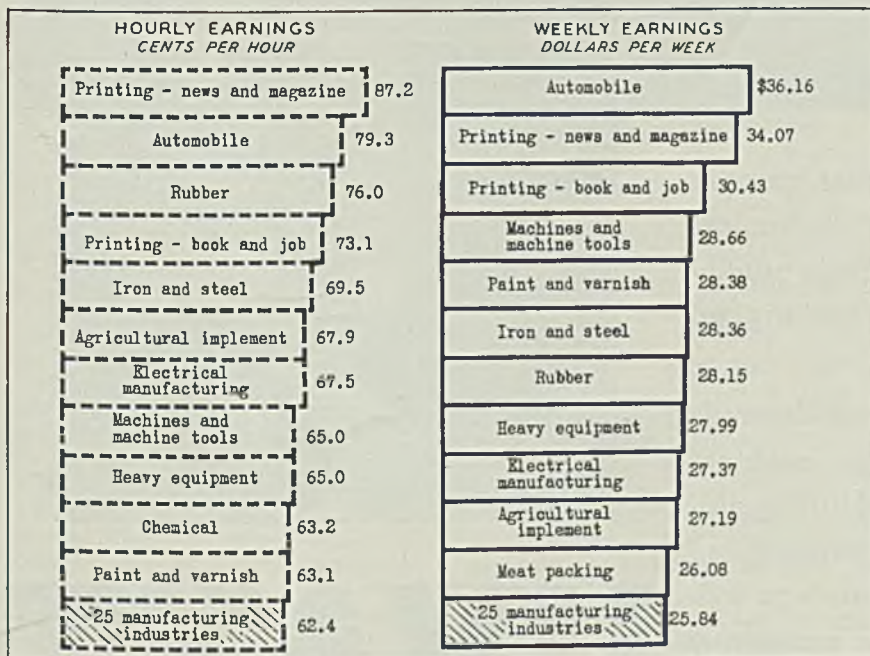
The plan provides for organization of a new company, Scullin Steel Inc., which would issue 14,970 shares of 5 per cent \$100 par non-cumulative preferred stock and 178,880 of no par common. Holders of \$1,497,000 in debenture bonds would receive an equivalent in the new preferred stock. Old preferred would be exchanged for new common, share for share, and old common for the new on a two-for-one basis. A hearing on the plan was ordered for March 15.

EARNINGS

Otis Steel Co., Cleveland, will show earnings for 1936 of approximately \$2,800,000 after all charges except federal income tax and surtax on undistributed income, according to preliminary estimates. Federal income tax and surtax are estimated by the company at approximately \$805,000.

Youngstown Sheet & Tube Co. has declared an accumulated preferred dividend in arrears of \$9.62½ on its preferred shares, payable Feb. 15 to shareholders of record Feb. 6. This will complete payment of all accumulated preferred dividends in arrears.

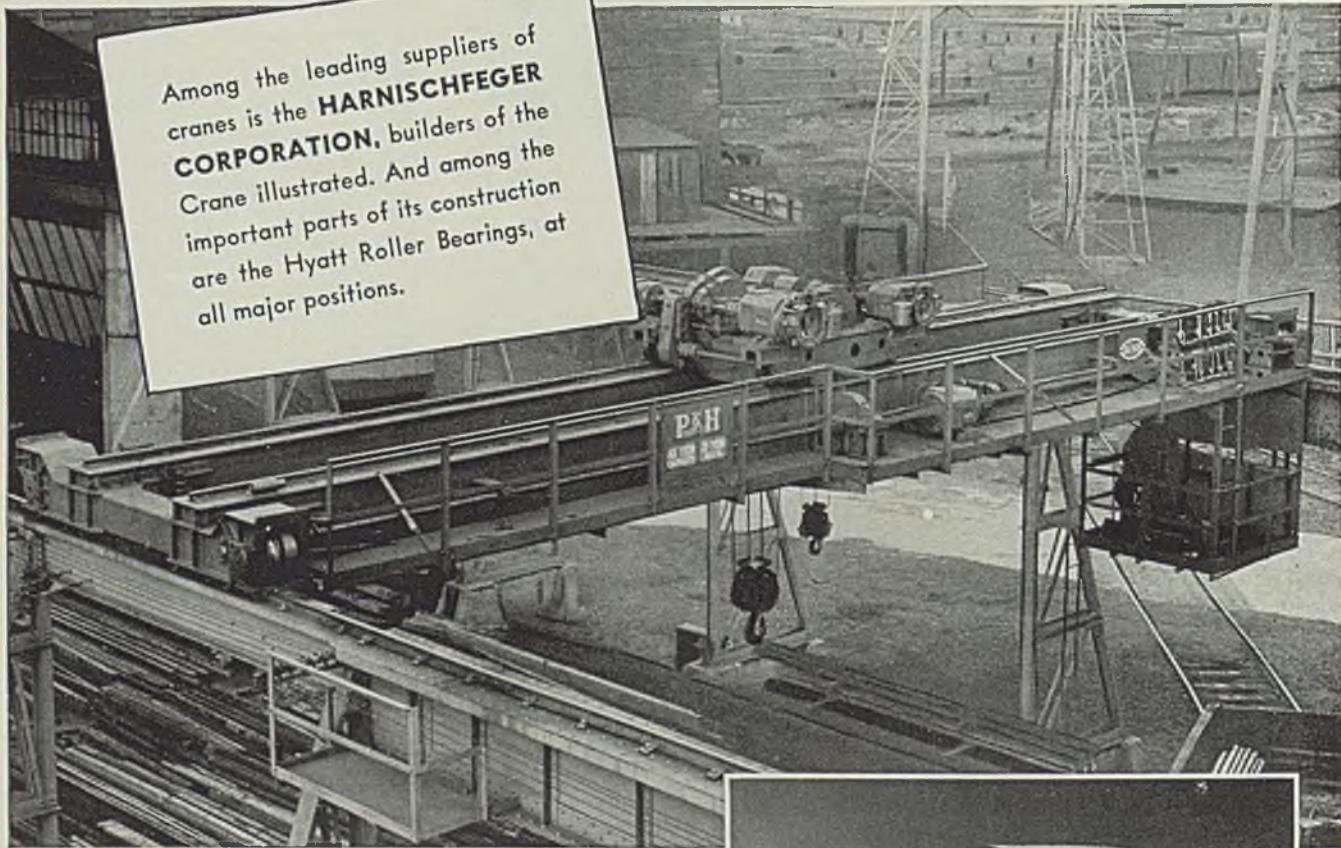
How Leading Industries Rank in Wage Payments



MOST recent compilations by the National Industrial Conference board show that automobile workers in November earned an average of \$36.16, highest in 25 industrial classifications. Machine and machine tools, reflecting the unusual spurt in orders, paid workers \$28.66, fourth from the top in the list, while iron and steel, sixth in order, paid \$28.38. In hourly earnings automobiles were in second place, with 79.3 cents; iron and steel, fifth, with 69.5 cents; and machines and machine tools, eighth with 65 cents

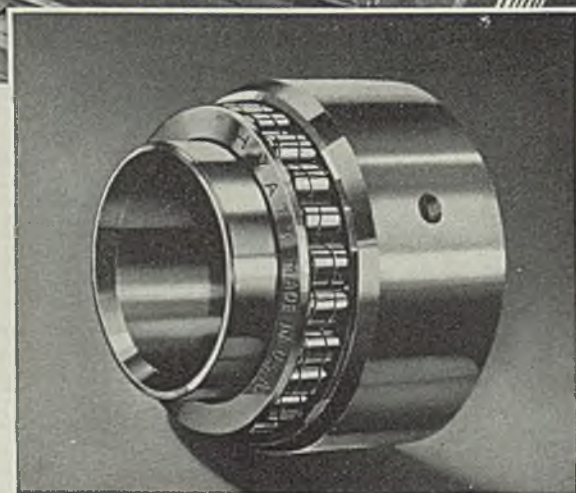
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HYATT

ROLLER BEARINGS

MIRRORS of MOTORDOM

DETROIT

AUTOMOTIVE weather continues unsettled and threatening, with occasional flare-ups such as at the Meldrum avenue plant of Briggs last Tuesday. Dictator Lewis of the U.A.W. appears determined to prolong the disruption, probably with the idea of thus being able to enroll more men and bolster his present weak forces.

After the collapse of negotiations here between General Motors, Gov. Frank Murphy and union leaders, an attempt was made to resume the parley in Washington under direction of Secretary Perkins. This was frustrated, however, by Mr. Lewis when he issued an amazing statement declaring that "workers expect the administration to support them" in view of the fact that labor helped elect Roosevelt, adding that the automotive conflict was but a prelude to a march on steel.

What part labor may have had in electing Roosevelt can be estimated from the fact that his plurality was some 26,000,000 votes, while the most Lewis and his cohorts could have been able to muster, providing they all voted Democratic which is hardly likely, is perhaps 3,000,000 votes.

80 Per Cent Want To Work

General Motors has issued figures showing 110,262 of its 139,312 employes in 43 plants in 36 cities have protested against strikes and petitioned for the right to return to work. In other words, 80 per cent of the men want to resume work.

A new high in absurd charges was reached when the report was circulated that the strike was being supported and financed by a Wall street group said to be short on General Motors common. The name of W. C. Durant, one-time president of General Motors, was linked to this strange story.

The question most frequently asked in Detroit these days is: What is the effect of the General Motors tie-up on other industries? On steel for example? A considerable amount of loose talk is heard on this

score, tendency being to exaggerate the effect on suppliers. One estimate mentioned that the strike had affected either the income or jobs of some 800,000, including employes in plants supplying General Motors as well as workers and stockholders of the latter.

What is the effect on the rate of steel operations? As yet there appears to have been no reflection of suspensions on steelmaking. Here is one way of figuring what the net effect might be:

According to STEEL's analysis of finished steel distribution, the automotive industry consumed about 6,087,000 tons in 1936, or a weekly average of 117,058 tons. General Motors accounts for some 40 per cent of total auto production, which would infer a weekly steel requirement of 46,823 tons. While 47,000 tons is a lot of steel, it is still only about one-quarter of the tonnage used in the San Francisco-Oakland bay bridge, for instance.

Effect on Operating Rate

Continue the analysis a little further. Current steelmaking operations are about 79 per cent of capacity. Annual capacity is figured at 68,455,000 tons, or about 1,316,400 tons weekly. With operations at 79 per cent, this reduces to 1,039,990 tons weekly, out of which General Motors requirements are theoretically 46,800 tons. Thus, if General Motors had suspended production on every single ton of steel required, the total would amount to only 4½ per cent of the present volume of steel which mills are producing, sufficient to lower the national operating rate 3½ points, or to 75½ per cent.

But General Motors has not suspended all steel shipments. For instance, a Cleveland mill is still shipping forging billets into Flint for Buick. No strike is in progress at the Buick plant, although shortage of bodies and other parts forced the plant to close Wednesday, throwing 10,000 more GM employes out of work. Thus it is likely that steel shipments will be cut off here any

day to avoid the necessity of placing them in storage.

Therefore the pinch is not being felt particularly in steel, but it certainly is being felt among a long list of parts suppliers throughout the middle west. As a typical example, a small Cleveland company supplying copper gas line tubing for certain lines of General Motors has managed to keep a department of 15 men busily engaged on this work. All these men had to be laid off when stop-orders on the material came through. Multiply this instance by several hundred and you have a rather bleak industrial picture to usher in a year which gave promise of outdoing its predecessor as far as automobiles were concerned.

Shackling of General Motors costs its 200,000 employes about \$6,000,000 a week in wages; costs its 380,000 stockholders about \$1,500,000 a week in profits available for dividends; will eventually cost its 25,000 dealers untold thousands.

FIRST pronounced effects of the General Motors shut-down were seen in production figures for last week when the total dropped from 91,685 to 81,395. Of this total, Ford accounted for 30,575, Chrysler divisions 23,300, and General Motors a scant 11,975, representing only Chevrolet and truck assemblies, all other divisions being inactive.

Ford is pushing production strongly in an attempt to make up the ground lost to Chevrolet in recent weeks. Glass supplies are apparently unimpaired, with the Rouge glass plants making up for shortages occasioned by interruptions from other sources crippled by strikes. Settlement of strikes at plants of Pittsburgh Plate Glass Co. by awarding employes a wage increase of 8 cents an hour last week indicated supplies of glass would soon be back to normal. No union demands other than the wage increase were granted, it is reported. A similar adjustment of strikers' demands at Libbey-Owens-Ford in

Mirrors of Motordom

Toledo would clear away all obstacles in the path of glass supplies.

Impressive ceremonies attended rolling off the 25,000,000th Ford from the assembly line at Ford last Monday. Newspapermen watched Henry and Edsel Ford clamber into a cream-colored touring sedan as it neared the end of the line. They paused for photographs, then paraded through the highway maze of the Rouge plant and ended up at the new rotunda building where the car was placed on display with other historic Ford models, including the first experimental car begun in 1893, as well as samples of models A, B, C, T, K, N, R and S.

Independents have maintained production fairly well, although all are reported to have their fingers crossed, awaiting difficulties at any moment. Hudson holds close to the 4000 weekly mark. Packard is steady at about 2600, Nash at 2400, Graham 600, Studebaker 2500.

Willys, now rated as one of the unsolved mysteries of the depression, is turning out better than 1600 cars weekly, and boasts 1600 dealers and 105 distributors in domestic fields, with representation in some 60 foreign countries. This sales organization has been thrown together in a matter of some 11 weeks, which certainly must set some kind of a record.

Chrysler divisions are moving along at top speed, combining to turn out 23,300 jobs for the week. About half of these were Plymouths, about one third Dodges, the rest equally divided between Chrysler and DeSoto.

ONE of the interesting angles in the union labor difficulties which beset the automotive industry is the undercover battle between the C.I.O. affiliates and the A. F. of L. unions. It has been the strategy of the C.I.O.'s United Automobile Workers to concentrate solely on General Motors and keep away from other producers. The A. F. of L. unions have in some instances retaliated by attempting to shut off suppliers of some independent producers, which would make the tie-up more industry-wide and might hasten government intervention.

One of the Graham suppliers was closed for a few days by such a strike but it was adjusted speedily and production resumed. It is re-

Automobile Production

Passenger Cars and Trucks—U. S. Only
By Department of Commerce

	1934	1935	1936
Jan.	155,666	289,728	364,004
Feb.	230,256	332,231	287,606
Mar.	338,434	425,913	420,971
Apr.	352,975	452,936	502,775
May	330,455	361,107	460,565
June	306,477	356,340	452,955
July	264,933	332,109	440,999
Aug.	234,811	237,400	271,291
Sept.	170,007	87,540	135,130
Oct.	131,991	272,043	224,628
Nov.	83,482	395,059	394,890
Dec.	153,624	404,528	*460,000
Year	2,753,111	3,946,934	4,415,814

*Estimated.

Estimated by Cram's Reports

Week ended:		
Dec. 26		79,019
Jan. 2		71,800
Jan. 9		96,780
Jan. 16		91,685
Jan. 23		81,395

ported that A. F. of L. unions have been attempting to close AC Spark Plug in Flint, which is now the only GM plant remaining open in this labor hot-bed. The company supplies producers other than General Motors and a tie-up there would have serious repercussions. The U. A.W. of course has strongly resisted efforts to close this plant and so far has been successful. The strategy behind closing the Briggs Meldrum avenue plant as yet has not developed. Fifty-one attempts to organize sit-down strikes in this plant were frustrated before it was finally sealed up by a running picket line last Tuesday. As hundreds of pickets shouldered around the gates and workers unable to gain admittance stood around in confusion, a sound-truck operated by the union approached the latter group and an organizer shouted, "See how easy it is to close a plant? Go to union headquarters and sign up!" The trouble was settled quickly, however, and within a day or so the plant had resumed at capacity. Probably the intervention of Ford representatives had no small part in this speedy readjustment. Briggs makes Lincoln-Zephyr bodies at this plant.

AMONG innovations for new models, in addition to those discussed in this department last week, are rear-engine designs and improved types of shock absorbers.

Engineering departments have been experimenting with rear-engine cars for some time and while many will forecast the day when all cars will go to this drive arrangement, as yet no producers have had the willingness to gamble on tooling up for engines in the rear.

Experimental cars using rear engines are numerous, and interest in the development was heightened by the recent granting of a patent to Henry Ford on a revised type of chassis construction embodying a rear engine. Characterized by Mr. Ford as simply one of the many research developments which his organization has originated and patented merely for protection, the design involves a power plant mounted crosswise directly behind the rear axle, differential and drive gear housing forming a unit with the engine. Radius rods formed integrally with the rear axle extend forward and inward, being mounted in ball joints attached to a frame member. Outer ends of the transmission and engine are supported flexibly on the frame side members by brackets resting on rubber biscuits.

Problems Not Insurmountable

Some engineers are of the opinion that cars could be designed to accommodate rear engines without any appreciable changes necessitated in body dies. Thus, if the public did not react favorably to the rear engine, it could be switched back to the front at no great loss. A major problem in perfecting rear-engine cars appears to be the matter of controls for shifting gears, throttle, clutch, etc., but designers are prepared to overcome any obstacles on this score.

Advantages of the rear engine are that it permits design of the body on sounder structural principles, with consequent reduction in weight; spots the power plant to push rather than pull the car ahead, of special significance in hill climbing; enhances safety from the standpoint of a head-on collision, so the driver will not emerge from a crash with the engine in his lap; eliminates the long propeller shaft which may have tendency to whip or wear in the universals.

Trend in shock absorbers is toward the new larger cylindrical type, which should be good news for strip steel manufacturers. This type of

(Please turn to Page 87)



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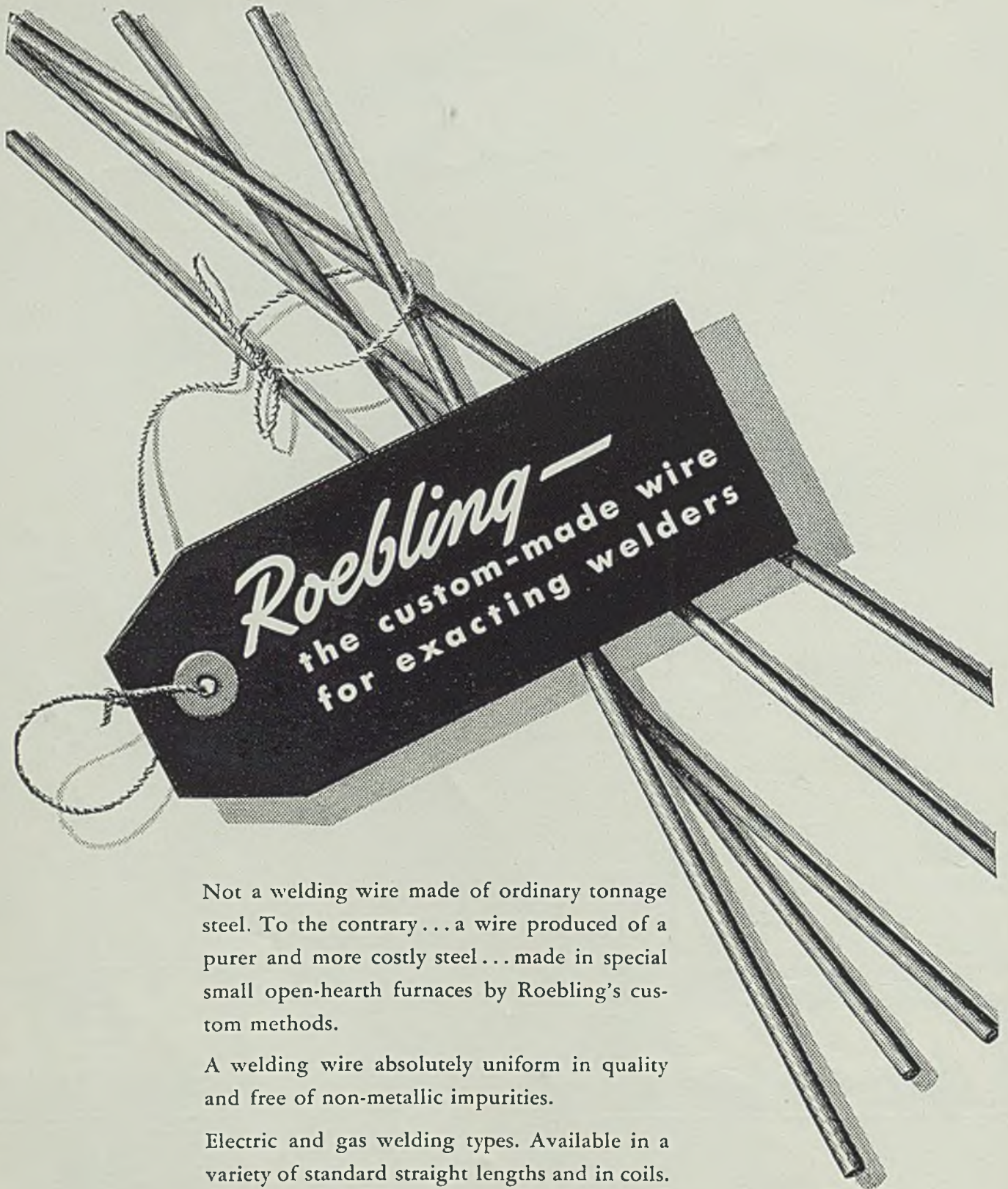
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WASHINGTON

ONE of the most interesting of new bills before congress is one for licensing of corporations by the government, as introduced by Senator O'Mahoney, of Wyoming. It has been referred to the senate committee on the judiciary.

The senator has stated publicly that he does not want to interfere with business but his bill has the imposing title "to regulate interstate and foreign commerce by prescribing the conditions under which corporations may engage or may be formed to engage in such commerce, to provide for and define additional powers and duties of the federal trade commission, to assist the several states in improving labor conditions and enlarging purchasing power for goods sold in such commerce, and for other purposes."

This bill, (S.10), should be watched by industry during this session or it will find itself under a law that will cause it much more trouble than has either the Robinson-Patman act or the Walsh-Healey law, both of which have caused much wailing and gnashing of teeth because industry was not enough awake to their possibilities at the last session.

Other Bills Need Watching

Then there is the house bill (H.R.1955) by Mr. Knutson of Minnesota which would place a tax of 6 cents per pound on the processing of palm oil, used extensively in the manufacture of tin plate. At present this oil is specifically exempted from that tax. Effort was made at the last session to place a tax on this oil but it was taken out in conference as the tax bill was finally agreed.

Senator Lonergan of Connecticut has a couple of bills in the upper house dealing with stream pollution and there are similar bills in the house. There is interest in this subject in the steel industry because during the last session several steel companies appeared in opposition to the various bills which

failed of passage but which are again being agitated.

Representative Connery of Massachusetts, a power in the lower house, has several bills in the hopper, all dealing with labor, and one calling for a 30-hour work week.

A bill to establish a government monopoly of armaments has also been introduced in the house by Representative Johnson of Minnesota and referred to the house committee on military affairs.

Also Senator Borah of Idaho has a bill (S.721) designed to "provide for licensing of corporations engaged in interstate or foreign commerce, and for other purposes." Senator Borah has said in the 14 pages of his bill about all that O'Mahoney said in the 85 pages of his bill and both are pending before the senate committee on the judiciary.

WHAT OF FTC UNDER NEW GOVERNMENT ORGANIZATION?

There is much talk in Washington about government reorganization. The message which the President handed to congress on this subject is just beginning to sink in. Members of congress, even the Democrats, do not like it. Some leaders have announced that they will go along with the President, but only because they have to, as it is going to cost them much patronage if it should go through.

One of the things that will interest the iron and steel industry and business in general is what is to become of the federal trade commission, traditional enemy of the basing point. Under the proposed plan the commission might be put under either the department of commerce or the department of justice. There is much controversy as to which.

Doubtless if this plan ever gets to a point where it seems likely to become law, there will be much pulling and hauling by the various cabinet officers as to which department shall get which commission.

Department of commerce officials, however, are jubilant over the fact that the state department, at least

in this draft of the plan, has not been able to dislodge the foreign service work away from its present place.

There is now and always has been a struggle between the departments of commerce and state as to which shall control foreign commercial work. This has always been under the department of commerce but steady inroads have been made by the state department since the beginning of the present administration.

This situation came about by the hostile attitude toward anything in which Mr. Hoover had previously shown an interest. This included the department of commerce because under him, both as secretary and President, it reached an all time high of efficiency and power.

Without going into detail, the state department now has taken over some of the commercial functions of the commerce department in foreign fields and would like to take over the whole thing. However, that is impossible under the proposed reorganization plan.

ITALY TIGHTENS TRADE RULES TO RECIPROCAL BASIS

It is probably a good thing that the United States at present neither imports nor exports much in the way of steel products from Italy. The government of that country has just taken unto itself the power to drastically change the foreign commerce of its merchants.

Under the new plan future dealings in that country are to be allowed only under two conditions.

One of these provides for reciprocal transactions with countries with which Italy has clearing arrangements. This, it is understood, applies to the United States. In this instance the exchange of goods in compensation shall be conducted only through reciprocal concessions of extra quotas, and payments must be made through clearing arrangements in all cases.

The new plan provides for importation of foreign goods into Italy in direct compensation of Italian

goods only from countries where conditions allow exchange of goods. This does not apply to the United States. In this instance the exchange must be conducted only through private compensation or permit the flow of trade only through private compensation channels.

FOREIGN TRADE OUTLOOK HELD TO BE BRIGHT

Optimism as regards our foreign trade in the near future was expressed last week in a speech by Ernest G. Draper, assistant to Daniel C. Roper, secretary of commerce.

He called attention to the fact that revival of trade cannot come over night. "However," he says "the process is sufficiently under way to allow us to view the future with optimism."

Mr. Draper stated "trade returns for the first nine months of 1936 indicate that we can estimate an increase in world trade for the full year 1936 of approximately three and one quarter billion dollars at current exchange rates. Of this increase the United States share should amount to about \$550,000,000.

"With continuation of negotiations leading to further breakdown in trade barriers, the rise in world prices, and reports of increased industrial activity from all of the more important nations of the world, the movement of world trade revival, already under way, should be accelerated in 1937." There is a "but" in his statement because he calls attention to the fact that:

"Naturally, a calamity such as war, or even a serious threat of war, could result in a reversal of the natural trend now apparent. But again I am optimistic, for the upward movement has already started, and there is nothing so likely to keep the minds of people off war as the absorption of their energies in industry and trade."

IRON, STEEL AWARDS MADE UNDER WALSH-HEALEY LAW

Secretary of Labor Perkins last week made public a statement showing that 550 awards have been made by the government during the three months, ending Dec. 28, all of which come under the scope of the Walsh-Healey government contract law.

In this connection she states that "iron and steel awards amounted to \$1,702,068.56 or 6.2 per cent and consisted principally of structural steel, bars, rails, sheets, pipe, wire and cable, purchased primarily by the navy and war departments, Tennessee valley authority, Panama canal and works progress administration."

Details show that 61 contracts were awarded, with 52 contractors,

42 contractors who are manufacturers and 10 dealers.

DELAY SOUGHT ON TRADE AGREEMENT RENEWAL

Hearings were begun last week before the house committee on ways and means in connection with the request of the administration for a three year extension of the reciprocal trade agreement act. The law expires in June.

There is bound to be opposition to this measure from the Republican side in both houses of congress. It is known, for instance, that Representative Treadway of Massachusetts is opposed to haste in putting this measure through the house. He is anxious to call George N. Peek, former foreign trade adviser to the President, before the house committee and Mr. Peek is now in California. Also Chairman Doughton of the ways and means committee has announced that the bill will be rushed through.

Treadway, ranking Republican member of the ways and means committee, has announced that he will object strenuously to brief hearings by the committee and says that opposition should be granted adequate time to call expert witnesses to Washington.

Of course there is little doubt about the final outcome of this bill. It is a part of the administration's program and the foreign trade agreements are a hobby with Secretary of State Hull, who places great stress on their importance to our foreign trade. There is no question that our foreign trade has increased during the past two or three years, but how much of that increase is due to trade agreements and how much to better business conditions at home and abroad, is anybody's guess.

GERMANY BARS USE OF ORNAMENTAL PLATING

Use of nickel, chromium and cobalt in plating intended for ornamentation is prohibited in Germany in regulations just issued by the board of control, according to the American consulate-general. The new prohibitions become effective within three months.

Among items specified in the regulations are typewriters, household equipment, various items of automobile equipment, tableware, flashlights, building hardware, sanitary ware and hand tools of all kinds.

Goods intended for export may be exempted from the prohibitions.

JAVA PRODUCES CHEAP IRON, STEEL PRODUCTS

An increasing volume of the lighter and cheaper iron and steel items is being produced in Java by so-called "village industries," accord-

ing to the commerce department. A number of these locally-produced articles are being sold in the domestic market at prices appreciably below Japanese quotations.

Production of articles on a commercial scale in the villages for sale outside the district in which they are produced, is a comparatively new development in Java.

The "industry" is still in an experimental stage, but it is pointed out that it has great possibilities, not only in the supplying of cheap iron and steel products to the natives of the Netherlands Indies—at present imported from Japan—but perhaps eventually entering the Asiatic export field.

COLORS ALUMINUM MADE BY NEW PROCESS

Aluminum in various colors is being produced in a plant which has just begun operations in Birmingham, England, according to reports to the metals and minerals division, department of commerce. Although aluminum has been colored previously, the report points out, the process being used in Birmingham is said to be new.

The process is reported to be electrical and gives a protective covering to the aluminum, which becomes an integral part of the metal and is not in the form of a deposit as in chromium plating. Aluminum after being treated by this process, it is claimed, becomes insulated against electrical current up to 500 volts and it will not corrode. Beautiful colored effects can be obtained, it is stated, and the colors being resistant to action of heat and light are said to be permanent.

BRAZILIAN IRON, STEEL INDUSTRY IS EXPANDING

Iron and steel industry of Brazil is steadily expanding according to the department of commerce.

Pig iron production during the third quarter of 1936 was recorded at 20,975 metric tons compared with 20,213 tons in the preceding quarter and 17,426 in the corresponding period of 1935.

Rolling mill production in Brazil totaled 17,833 tons in the third quarter of 1936 against 14,464 tons in the preceding three-month period and 13,316 tons in the corresponding three months of 1935.

Brazilian pig iron production in the first nine months of 1936 totaled 58,109 tons compared with 46,655 tons in the corresponding period of 1935; rolling mill production was recorded at 42,275 tons against 38,701 tons; while the output of "other steel products" was reported at 51,904 tons compared with 46,550 tons.

Editorial

Federal Laws Encourage Monopoly and "Bigness"

MUCH lip service is given in Washington and elsewhere to the plight of small merchants and manufacturers. To listen to the speeches of scores of congressmen who profess to champion the cause of the smaller units, one would think that the interests of business institutions of average size have many friends in court.

But have they? As pointed out in an article on industrial finance, beginning on page 239 of the Jan. 4, 1936, issue of STEEL, many of the federal laws applying to the regulation and taxing of industrial companies are drafted with an eye to their effect upon mammoth corporations and little if any consideration seems to be given as to how they will react upon companies of moderate or small size.

The present federal administration and many members of the present congress have made much ado about decentralizing industry, discouraging "bigness," and curbing monopoly. Nevertheless, the tendency of legislation sponsored by these federal executives and lawmakers is to centralize industry, to encourage "bigness" and to promote monopoly. The reason they are defeating their avowed purpose is that they ignore the effect of their laws upon the business of average size.

To illustrate this point, consider the case of a typical company in an important branch of the capital goods industry. Its profit and loss statement fluctuates between wide limits. Here is its record for the past 18 years:

Year	Profit	Loss
1919 .....	.....	\$ 9,615
1920 .....	.....	20,151
1921	\$ 43,945	.....
1922 .....	.....	15,201
1923 .....	.....	77,461
1924	53,799	.....
1925	38,116	.....
1926	64,289	.....
1927 .....	.....	23,086
1928	154,839	.....
1929	155,468	.....
1930	9,890	.....
1931	39,790	.....
1932 .....	.....	132,486
1933 .....	.....	7,680
1934 .....	.....	97,650
1935	17,159	.....
1936	51,701	.....
Totals	\$628,996	\$383,330

Note that its earnings fluctuate between the extremes of a peak loss of \$132,486 and a maximum profit of \$155,468. To manufacturers catering to con-

sumers' goods markets this wide range seems preposterous. Yet it is common among companies which specialize in heavy construction, fabrication or equipment building. It is an ever present problem in the durable goods industries that cannot be ignored.

Good management in companies subject to such erratic profits has learned an effective technique, the essence of which is to accumulate reserves in the good years to carry the companies through the lean periods. But today, federal laws tend to discourage this practice. In fact, this procedure is penalized so severely that typical durable goods industrial concerns are actually encouraged to merge, to centralize or to tend toward monopoly in order to escape the punishment meted out to unfortunate "average" units.

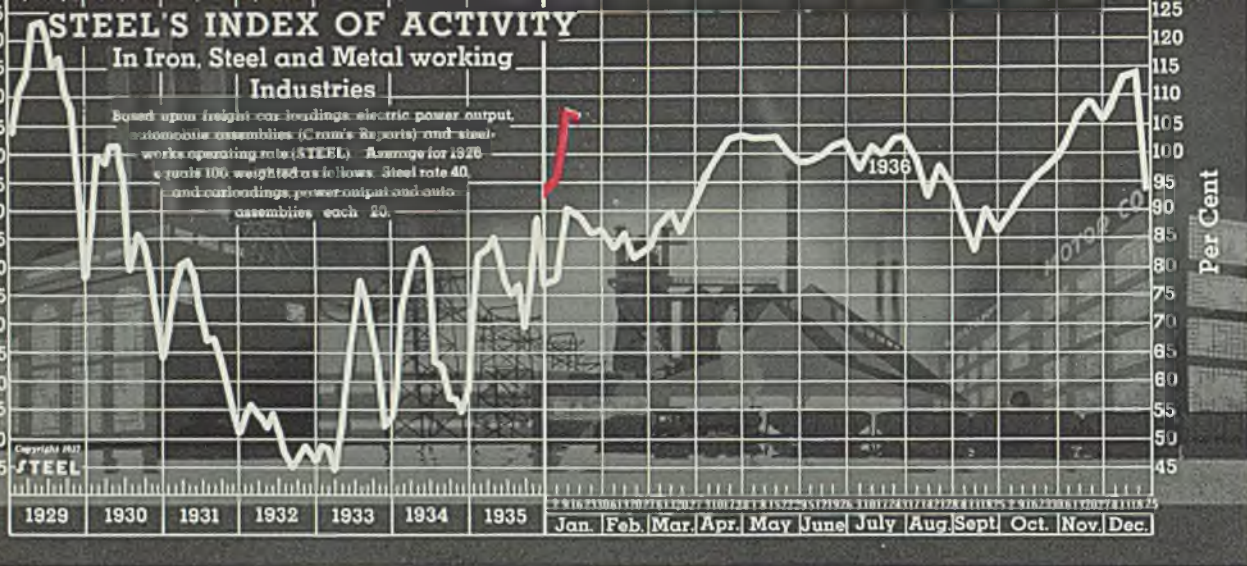
Tax Laws Have Effect of Making Strong Units Stronger and Weak Companies Weaker

Consider the profit and loss record presented in the foregoing paragraphs. The company in question made a profit in 10 and sustained losses in eight of the 18 years. During this period its profit grossed \$628,996 and its losses aggregated \$383,330. Assuming for the sake of simplicity that it paid a normal tax of 15 per cent on profits, its federal tax outlay for the entire period was 15 per cent of \$628,996 or \$94,349.40. Net profit actually was only \$245,666, and on this net sum its taxes amount to 38.4 per cent, which to any fair-minded person must appear to be exorbitant, if not confiscatory.

But this is not the whole story. The present tendency in federal taxation of industrial companies is to exact a still greater tribute, either from the company itself or from its stockholders. A higher yield from the company simply intensifies the urge to merge, or to fold up and go out of business, leaving the field to the industrial giants whose broader base enables them to level the hills and valleys of profit and loss, and thus escape the confiscatory aspects of the tax. A higher yield from the stockholders, which is the avowed purpose of the 1936 tax on undistributed earnings, severely penalizes the company for accumulating funds acquired in good years to carry it through the poor years.

In brief, the actions of the majority of legislators are threatening the very existence of thousands of typical industrial corporations. Will congress realize the import of its mistake in time, or will it continue to force industry into mergers and into the aspects of "bigness" and "monopoly" which it professes to abhor?

Congress talks much about protecting the weak, but many of its acts tend to make the strong stronger and the weak weaker.



STEEL'S index of activity declined 0.7 points to 107.1 in the week ending January 16:

Week ending	1936	1935	1934	1933	1932	1931	1930	1929
Dec. 12	113.9	91.8	60.6	56.0	49.3	53.1	68.2	83.4
Dec. 19	114.8	91.9	64.4	58.0	46.9	52.3	67.3	79.7
Dec. 26	93.3	77.3	60.8	53.7	42.9	46.8	52.3	64.9
Jan. 2	1937	1936	1935	1934	1933	1932	1931	1930
Jan. 9	96.6	78.2	65.4	53.6	45.3	48.8	58.5	74.3
Jan. 16	107.8†	90.2	73.8	58.1	48.6	55.8	69.2	88.1
Jan. 16	107.1*	89.3	78.1	60.9	49.8	56.2	72.1	91.8

†Revised. *Preliminary.

Capital Goods Industries Take Lead in Early 1937

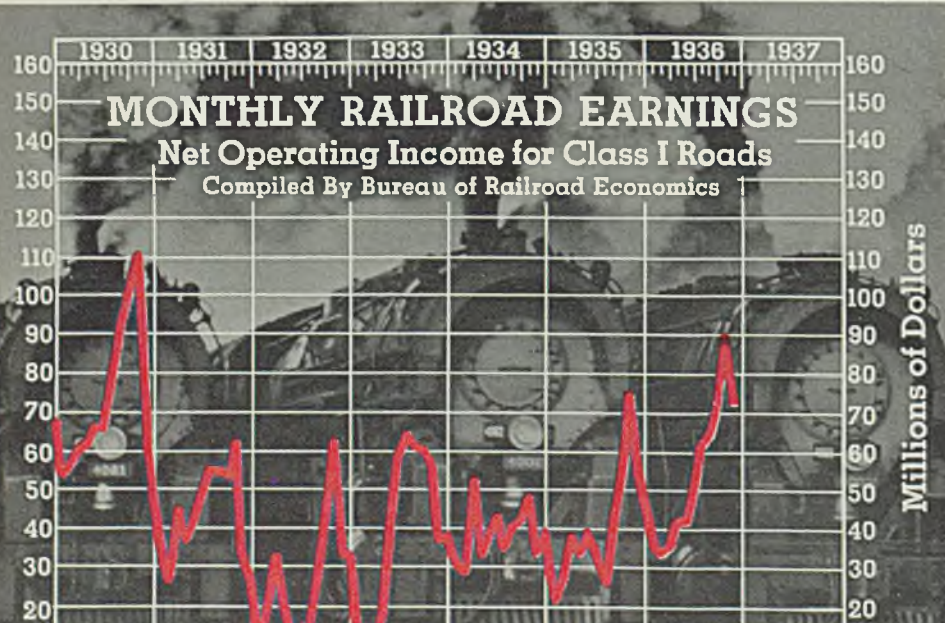
BUSINESS records for only a few weeks of 1937 are available, but already some of the weekly charts are beginning to show a tendency to conform to the shape of the 1936 trend lines.

This is particularly true of the chart of STEEL'S index of activity in the iron, steel and metalworking industries. The gains in the first two weeks of January, 1937, parallel those of the corresponding weeks a year ago. Also the slight recession reported for the week ending Jan. 16 matches a moderate decline in the same week of 1936. It will be interesting to note

whether the uncertain trend which extended into mid-March last year will be duplicated this year.

Should strike trouble continue very long, the 1937 trend line might conceivably reflect a softer situation much as it did a year ago. But the chance of an early settlement of some of the labor difficulties seems brighter, and if work should be resumed in automobile plants soon, the trend of activity undoubtedly would tend upward in February, 1937, instead of downward, as in last year's pattern.

January witnessed the release of statistics for December which forecast a high rate of activity in the equipment industries during the early months of the new year. Most spectacular was the report of the National Machine Tool Builders' association showing that machine tool orders in the final month of 1936

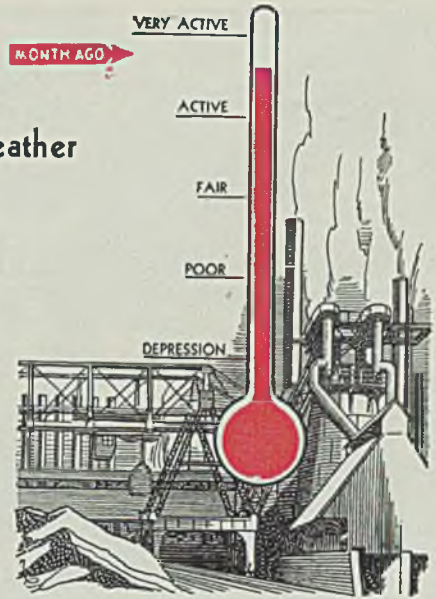


	1936	1935	1934
Jan.	\$35,764,748	\$21,348,557	\$31,058,275
Feb.	33,594,718	25,719,919	29,420,772
March	35,205,513	37,850,965	52,217,083
April	41,547,644	45,625,786	32,433,939
May	41,842,147	39,505,069	39,699,194
June	50,312,580	34,102,703	42,037,757
July	61,773,765	26,919,343	35,441,265
Aug.	64,680,717	42,156,706	40,564,071
Sept.	70,166,026	57,359,339	41,713,425
Oct.	89,851,409	75,425,092	49,336,307
Nov.	72,410,571	54,234,305	32,540,502
Dec.	.....	46,040,165	38,738,295

BUSINESS TREND

Industrial Weather

TREND:
Indefinite



Where Business Stands

Monthly Averages, 1935=100

	Dec., 1936	Nov., 1936	Dec., 1935
Steel Ingot Output	158.5	161.4	114.3
Pig Iron Output	173.0	170.4	118.2
Freight Movement	114.4	124.3	95.7
Building Construction .....	.....	166.7	159.5
Automobile Production .....	.....	116.4	120.1
Wholesale Prices .....	.....	107.9	104.1

exceeded all records since the association began to compile its figures in 1919. The December orders topped the high point of 1929 by 40 per cent.

Meanwhile, orders for foundry equipment were soaring to an 8-year peak. According to the monthly report of the Foundry Equipment Manufacturers' association, the gross orders index for December stood at 283.3, the highest point recorded since May, 1928.

These impressive reports on equipment orders,

coupled with the recent activity in purchasing by the railroads, lend further strength to the belief that the log jam in the capital goods industries really has been broken. The spurt in activity in the heavy lines has lessened materially the extent to which the shock of labor trouble in consumers' goods industries has been reflected in indexes of general business.

Commodity prices still show a strong tendency upward. Bradstreet's index has advanced from a depression low of \$6.53 in February, 1933, to \$10.78 in December, 1936. During the last six months of 1936 the index climbed from \$9.73 to \$10.78, a gain in this short period of 10.8 per cent.

The Barometer of Business

Industrial Indicators

	Dec., 1936	Nov., 1936	Dec., 1935
Pig iron output (daily average, tons)	100,813	98,331	68,275
Machine tool index	180.4	134.0	99.9
Finished steel shipments..	1,067,365	882,643	661,515
Ingot output (daily average, tons)	170,448	173,496	123,272
Dodge building awards in 37 states (sq. ft.) .....	.....	34,947,500	33,441,900
Automobile output	*470,000	405,702	421,579
Coal output, tons	44,487,000	40,615,000	34,829,000
Business failures; number .....	.....	688	940
Business failures; liabilities .....	.....	\$11,532,000	\$17,442,649
Cement production, bbls... ..	.....	10,968,000	5,803,000
Cotton consumption, bales	692,921	626,695	498,000
Car loadings (weekly av.)	693,905	753,619	579,646

*Estimate.

Financial Indicators

	Dec., 1936	Nov., 1936	Dec., 1935
25 Industrial stocks	\$231.61	\$238.46	\$191.96
25 Rail stocks	\$41.92	\$43.26	\$31.98
40 Bonds	\$90.19	\$89.61	\$83.52
Bank clearings (000 omitted) .....	.....	\$24,554,000	\$26,392,778
Commercial paper rate (N. Y., per cent)	%	%	%
*Commercial loans (000 omitted)	\$9,189,000	\$8,812,000	\$8,249,000
Federal Reserve ratio, per cent	80.2	80.3	77.6
Railroad earnings	†\$72,410,571	\$89,851,409	\$54,234,305
Stock sales, New York stock exchange	48,605,047	50,469,732	45,590,420
Bond sales, par value....	\$355,062,700	\$290,875,900	\$315,473,600

*Leading member banks Federal Reserve System.
†November, October and November, respectively.

Commodity Prices

	Dec., 1936	Nov., 1936	Dec., 1935
STEEL's composite average of 25 iron and steel prices	\$35.15	\$34.65	\$33.31
Bradstreet's index .....	.....	\$10.78	\$10.40
Wheat, cash (bushel)....	\$1.49	\$1.34	\$1.15
Corn, cash (bushel).....	\$1.22	\$1.20	79c
Petroleum, crude (bbl.)..	.....	\$1.08	98c

Foreign Trade

	Dec., 1936	Nov., 1936	Dec., 1935
Exports	\$225,766,000	\$223,737,000
Imports	\$196,423,000	\$186,648,000
Gold exports	\$127,000	\$170,000
Gold imports	\$75,962,000	\$190,180,000

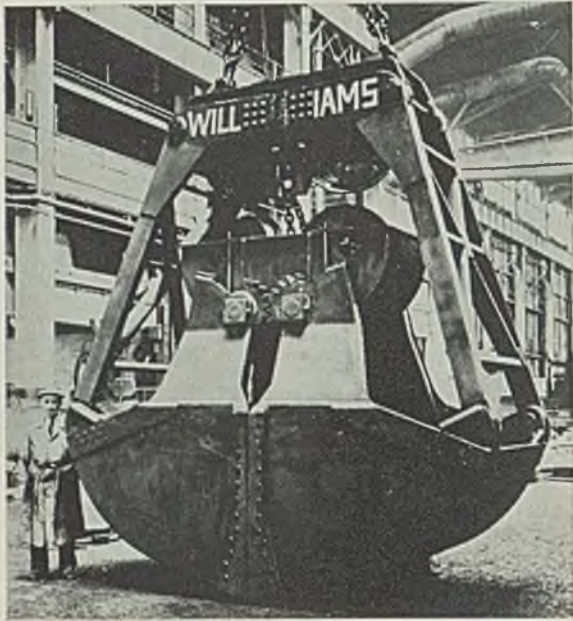


Fig. 1—This 8½ cubic yard nickel-copper steel bucket was designed to handle 7 tons of coal, however, it is actually picking up 8 tons per grab

Nickel-Copper Specifications

THE important place which low-alloy, high-strength steel is taking in fabrication of equipment is evident on every hand, but the decision as to which particular steel is best suited for a certain fabrication often is perplexing. While national advertising of steel producers is based on facts, it frequently is confusing to the engineer or fabricator not familiar with the metallurgy of steel and the predictable reactions of the commonly-used alloys.

A large amount of low-alloy steel finds its way into welded structures and this article will deal with the properties of low-alloy nickel-copper steel for welding. Main requirements of a low-alloy high-strength steel are high yield and ultimate strength, but there are other physical and metallurgical considerations of great importance, often more important than maximum yield and ultimate strength. Advertisements tell us that low-alloy steels possess certain high strengths. The physical properties given are always the results of tests of as-rolled steel.

Welding Changes Properties

This is probably so because the entire experience of the steel industry, at least until the last few years, has been with structural steel fabricated by riveting. In the development of a high-strength steel, the metallurgist has been riveting minded and not welding minded. Too much reliance has been placed on the properties of the steel as-rolled and too little on properties after welding.

Scant consideration has been given to the fact that in riveted construction only slight metallurgical reactions take place, while in weld-

ing drastic metallurgical and metallurgical reactions are encountered, due to the high temperatures used in depositing metal. Many variables affect the resulting weld, the most troublesome physical property encountered being air hardening. The degree of air hardening is greatly affected by certain alloys used to produce high strength. Hence, there are many instances in which it is preferable to sacrifice strength in order to lower the air hardening properties of the steel.

The question, "What is an ideal low-alloy high-strength steel for welding?", could be answered by stating the chemical and physical properties of every commercially-produced low-alloy steel. There is

no one analysis, no one combination of alloys, which fulfills the requirements for an ideal steel under every condition.

Limited to Weldable Steels

If, as is often the case, the essential requirement is resistance to abrasion, many steels ideal under certain conditions would fall far short of this ideal. If resistance to atmospheric corrosion is the chief requirement, some alloys admirable under other conditions would not be suitable. To answer that question, we will limit the requirements to an ideal steel for the welded structures which form a large volume of our mechanical fabrications.

The author's specification of an



Fig. 2—Analysis of nickel-copper plate and weld using low-carbon electrode with 0.70 per cent molybdenum in the coating:

Region	Carbon, per cent	Nickel, per cent	Copper, per cent	Molybdenum, per cent
A—Weld	....	0.67	0.43	0.21
B—Weld	....	1.01	0.52	0.20
C—Plate	0.24	1.98	1.01	....
A—Weld	....	0.71	0.42	0.29
B—Weld	....	0.89	0.46	0.24
C—Plate	0.08	1.90	1.05	....

High-Strength Steels Meet

of Welded Construction

BY A. E. GIBSON

Vice President, Wellman Engineering Co., Cleveland

ideal steel is one having a high yield and ultimate strength, the former as near the latter as possible, or in more technical terms, possessing a high elastic ratio, without undue loss of ductility; a steel with high resistance to fatigue and impact; one capable of being welded with the same equipment, the same electrodes, the same technique as used with low-carbon steel; a steel having several times the resistance to atmospheric corrosion of low-carbon steel; a steel capable of having its yield and ultimate strength materially increased by simple heat treatment without dangerous loss of impact strength; and a steel having low air-hardening property when welded or gas cut. A difficult specification, but not an impossible one!

Copper Increases Strength

The nickel-copper low-alloy steels meet the above conditions. The importance of copper as an alloy imparting high strength is evident from the fact that an 0.08 per cent carbon, 2.00 per cent nickel staybolt steel has a yield of about 35,000 pounds per square inch and ultimate strength of 50,000 pounds per square inch, but when 1.00 per cent copper is added to the same analysis, the yield point is increased 60 per cent, the ultimate strength 30 per cent.

Nickel-copper steels are commercially produced and nationally advertised by three leading steel manufacturers. Several others are prepared to furnish them on special order. Each of the three mills produces this steel with different percentages of nickel and copper, one with a nickel-copper ratio of 2 to 1, another $\frac{3}{4}$ to 1 and the third 1 to 2.

In each case the copper content is at least 1.00 per cent. This is so because the value of copper as a strengthening alloy is not effective below 0.7 per cent.

One of these steels is produced with one carbon content only, 0.10 per cent, the other two, with carbon ranges approximately 0.10 and 0.20 per cent. Naturally, the higher carbon content produces steel of increased yield and ultimate strength but as carbon is a most active hardening element, it affects the air-hardening quality markedly.

In welded constructions we are in-

terested in the weld strengths procurable. In certain types of welded joints in low-alloy steel, it is possible to increase the section of the weld so that its total strength equals or exceeds that of the parent metal. In many instances it is not possible to have a greater section of weld than plate. Therefore, if welds are to have as great strength as the rolled steel, it is necessary to have the filler metal alloyed. This is made possible by the use of alloy electrodes or of low-carbon electrodes having alloys in the coating. Either method of introducing alloys

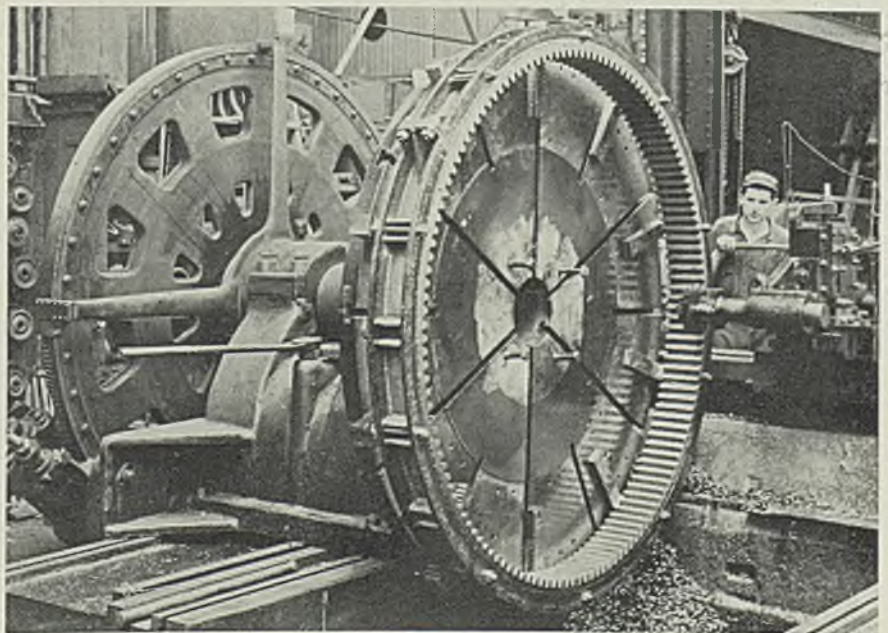


Fig. 3—One of six 80-inch pitch diameter internal gears of nickel-copper steel welded construction, heat treated after welding for stress relief



Fig. 4—Rockwell B hardness values of 0.17 C., 1.95 Ni., 1.00 Cu. steel plate after torch cutting and after reheating with torch to anneal:

Location	Hardness after gas cutting	Hardness after torch drawing
1	102	90
2	109	90
3	100	91
4	92.5	90
Hardness of plate as rolled		90

into the weld gains the desired result.

All of the alloy need not be in the electrode or coating because the filler metal becomes alloyed from intermixture with the molten parent metal. The smaller the weld, the greater the percentage of parent metal alloy found in the weld. This intermixture is shown in Fig. 2; using $\frac{1}{8}$ -inch plate, with a double-V butt weld, the latter contained from one-third to one-half the percentage of alloy found in the rolled plate.

Properties Are Compared

Table I lists several nickel-copper steels, the chemical and physical properties of the plate as rolled, and the values of the welds, as welded, stress relieved, normalized and normalized precipitated. Under the last treatment is shown the greatly increased yield and ultimate strength produced. While little practical application has been made of the property of precipitation treatment to date, it is an intensely interesting phenomenon. The danger of introducing objectionable cooling strains in large welded structures with varied sections by rapidly cooling in air is realized. In simple welded details of fairly uniform section, few ill effects would result.

Metallurgists tell us that a currently accepted metallurgical hypothesis states that only about 0.35 per cent of copper is held in solid solution at room temperature if the steel is slowly cooled, and that copper in excess of this amount may precipitate out of solution. When the copper content is greater than 0.70 per cent and the steel is heated to about 900 to 1000 degrees Fahr. for 1 to 4 hours and cooled, the yield and ultimate strengths of the steel are greatly increased. Copper steels are the only common low-alloy steels which when heated to this temperature range will thus increase in strength.

This increase is frequently accompanied by corresponding loss in impact strength as determined by

the notched bar test. As is true of most steels, normalizing improves the impact strength. If it is desired to use them in the precipitation hardened condition, the normalizing should precede precipitation hardening. This is evident from the results shown in Table III.

The nickel-copper steels have excellent properties of atmospheric corrosion resistance, four to six times that of low-carbon steel. Welds with low-carbon electrodes contain one-third to one-half or more per cent of copper due to intermixture with the molten parent metal and come under the classification of copper steels, used for years as corrosion-resistant steels.

Nickel-copper steel welded with low-carbon heavily-coated electrodes having approximately 0.70 per cent molybdenum in the coating show the following analysis:

Plate $\frac{1}{4}$ Inches Thick, Single-Channel Groove		
Per cent of:	Plate	Weld
Carbon	0.20	0.08
Manganese	0.80	0.50
Sulphur	0.028	0.02
Phosphorus	0.010	0.015
Silicon	0.18	...
Nickel	1.80	0.50
Copper	0.90	0.33
Molybdenum	...	0.70

Tests made by the Champion Riv-

et Co., Cleveland, with nickel-copper coated-electrodes and plate produce strikingly uniform analysis:

Per cent of:	Plate and Electrode	Weld
Carbon	0.06	0.095
Manganese	0.40	0.53
Sulphur	0.008	0.004
Phosphorus	0.053	0.053
Silicon	0.003	0.23
Nickel	2.01	1.86
Copper	1.01	1.00

The increase in carbon, silicon and manganese is from these elements present in the coating.

In corrosive-resistant equipment, welds in nickel-copper steel made with electrodes having the same analysis as the parent metal will without a doubt come into general use, especially as tension and bend properties of the stress relieved welds are almost identical with those of the parent metal. F. J. Eslinger reports in the *Journal of the American Welding Society* for January, 1936, the results shown in Table IV. These are tension and bend tests of butt welded 0.08 per cent and 0.20 per cent carbon, 2.00 per cent nickel, 1.00 per cent copper steel plate and electrode.

These tests prove the high physical values of welds made with the same analysis nickel-copper electrode as the plate and that the duc-

Table I
Composition and Properties of Nickel-Copper Steels

Condition of material	Yield point weld, lbs./sq. in.	Yield point parent metal, lbs./sq. in.	Ultimate strength, lbs./sq. in.	Elongation in 2 in., per cent	Reduction of area, per cent	Location of failure
Nickel-Copper Steel—0.08% C., 1.99% Ni., 1.02% Cu.						
As welded	57,000	...	63,000	29	70	Parent metal
As welded	65,000	...	69,000	26	66	Parent metal
As welded	...	55,800	65,300	33	54	Parent metal
As welded	...	55,800	65,900	34	56	Parent metal
950 deg. F. 1 hr.	80,000	...	83,000	24	57	Parent metal
950 deg. F. 1 hr.	72,000	...	84,000	20	37	Weld metal
950 deg. F. 1 hr.	...	63,500	80,000	31.5	51	Parent metal
950 deg. F. 1 hr.	...	63,400	80,400	31	52	Parent metal
1200 deg. F. 1 hr.	57,000	...	71,000	29	64	Parent metal
1200 deg. F. 1 hr.	70,000	...	73,000	29	64	Parent metal
1200 deg. F. 1 hr.	...	68,100	71,500	31	51	Parent metal
1200 deg. F. 1 hr.	...	63,000	70,900	25.5	54.5	Parent metal
1650 deg. F. 1 hr.	55,000	...	68,000	35	62	Parent metal
1650 deg. F. 1 hr.	53,000	...	68,000	33	60	Parent metal
1650 deg. F. 1 hr.	...	51,400	65,600	42.5	59.5	Parent metal
1650 deg. F. 1 hr.	...	50,600	65,600	40	63	Parent metal
Nickel-Copper Steel—0.22% C., 1.98% Ni., 0.92% Cu.						
As welded	85,600	72,000	95,400	27	42	Parent metal
As welded	85,200	66,300	91,800	27	44	Parent metal
950 deg. F. 1 hr.	82,600	85,000	90,300	9	16.6	Weld, slag inc.
950 deg. F. 1 hr.	78,500	94,000	100,800	18.5	32.6	Weld
1200 deg. F. 1 hr.	69,300	78,800	88,300	16.5	24	Weld
1650 deg. F. 1 hr.	64,400	69,000	81,300	17.5	38	Weld
1650 deg. F. 1 hr.	65,300	70,300	79,750	14	14.5	Weld, slag inc.
Copper-Molybdenum Steel—0.25% C., 0.25 Mo., 1.40% Cu. Average of five test specimens						
As welded	79,870	90,760	93,740	180	28	Weld
950 deg. F. 1 hr.	88,390	95,270	98,740	141	31	Weld
Nickel-Copper-Molybdenum Steel—0.23% C., 0.75% Ni., 1.30% Cu., 0.16% Mo.						
As welded	80,590	90,880	96,460	149	29	Weld
950 deg. F. 1 hr.	93,870	102,920	104,620	147	28.8	Weld

Note—Elongation and reduction are approximate as test specimens were rectangular. Distinct yield points for weld and parent metal were indicated by drop of beam in testing.

tility of the low-carbon welds is far in excess of the code requirements for low-carbon unalloyed plate.

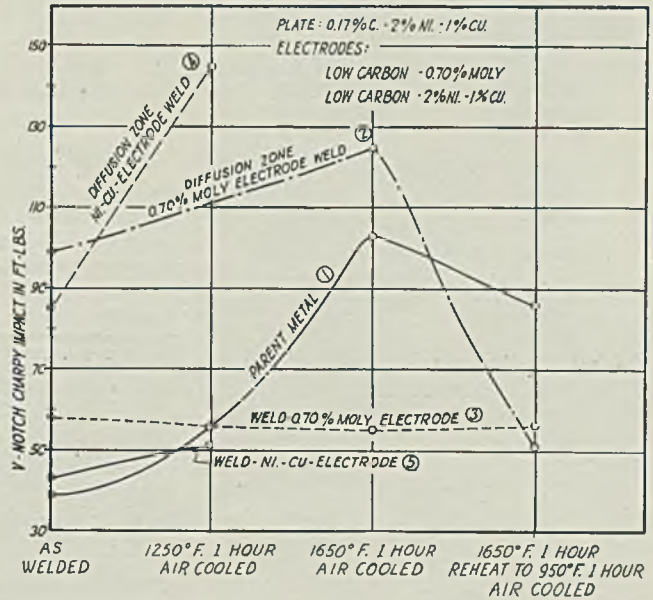
A recent investigation of the comparative loss by corrosion of 0.22 carbon, 2.00 per cent nickel and 1.00 per cent copper alloy steel pipe as against ordinary black pipe, when subjected to an 85 per cent saturated brine solution for a period of 615 hours, showed the latter to corrode from two to four times as fast as the nickel-copper alloy, depending upon whether the pipe was submerged in the brine or in contact with the vapor only. The latter condition is the most severe. (Report of Denver Gardner Laboratory).

Air Hardening Is Slight

One of the chief advantages in the use of the nickel-copper steels is the low degree of air hardening experienced in welding and gas cutting operations. The degree of hardening is not such as to affect the ductility of the material seriously or to present any difficulty in machining operations. In butt welding heavy sections which have been shaped by gas cutting, it is necessary to machine channel grooves for complete penetration. The necessity of annealing after gas cutting and before welding, due to excessive air hardening, is eliminated with the nickel-copper steels.

The high yield and ultimate strength of the nickel-copper steels

FIG. 5 — V-notch Charpy impact curves of welded nickel-copper steel using two types of electrodes



in sheets and light plate has been repeatedly demonstrated. The value of these properties in heavy plate was until recently a matter of conjecture. The Wellman Engineering Co., Cleveland, has lately designed and fabricated a number of 80-inch pitch diameter internal gears with 7-inch face, and also 30-inch diameter by 34-inch face drums of welded construction. Light weight being imperative, welded designs which utilized low-alloy steel were selected

The analysis specified was maximum 0.20 per cent carbon, maximum 0.80 per cent manganese, approximately 2.00 per cent nickel and 1.00 per cent copper. Although the metallurgical department of the mill to which the order was given would not guarantee physical properties above 50,000 pounds per square inch yield strength and 70,000 pounds per square inch ultimate strength, the author was confident that much higher physical values would be obtained.

The actual chemical and physical properties obtained were: 0.17 per cent carbon, 0.74 per cent manganese, 2.00 per cent nickel, 1.00 per cent copper, yield point 66,400 pounds per square inch, ultimate strength 86,600 pounds per square inch and 18.5 per cent elongation in 8 inches. These physical values were obtained with rectangular test pieces in the as-rolled condition. Standard 0505-inch round test specimens cut from the center and outside of the plate produced 69,180-pound yield and 90,700-pound ultimate strength with 25 per cent elongation in 2 inches.

Stress Relieved After Welding

The gears and drums, six of each, were stress relieved at 1200 degrees Fahr. after welding, the former held for 2 hours and the latter for 1 hour. The maximum thickness of plate was 2 1/4 inches in the gear and 3/4-inch in the drums. The weld strengths obtained, while not as high as those of the parent metal, are of a high order. These high weld strengths were derived with welding electrodes having a content of 0.70 per cent molybdenum in the coating.

Butt welded tensile test pieces of 2 1/4-inch plate with double-channel weld grooves were made. The plate was then sawed and the test pieces machined all over approximately 3/4

Table II

Charpy Impact Tests—V-Notch

Copper-Nickel Steel—2.00% Ni., 1.00% Cu., 0.17% C.

Plate thickness, inches	Heat treatment	Location of notch	Impact value, ft.-lbs.	Hardness, Rockwell E
3/8	As received	Parent metal	44.0	
3/8	As received	Parent metal	43.0	
3/8	As received	Parent metal	31.5	
	Ave.		39.5	90.0
3/8	1650 deg. F. 1 hr., air cooled	Parent metal	116.5	
3/8	1650 deg. F. 1 hr., air cooled	Parent metal	93.5	
3/8	1650 deg. F. 1 hr., air cooled	Parent metal	93.5	
3/8	1650 deg. F. 1 hr., air cooled	Parent metal	110.0	
	Ave.		103.4	90.5
3/8	1650 deg. F. 1 hr., air cooled-reheat to 950 deg. 1 hr., air cooled	Parent metal	94.5	
3/8		Parent metal	98.5	
3/8		Parent metal	71.0	
3/8		Parent metal	81.0	
	Ave.		86.3	94.0
2 1/4	Welded with Electrode "A"	Weld	63.5	
2 1/4	Welded with Electrode "A"	Weld	61.5	
	Ave.		62.5	
2 1/4	Welded with Electrode "A"	Diffusion zone	75.0	
2 1/4	Welded with Electrode "A"	Diffusion zone	77.5	
	Ave.		76.3	
3/8	As welded	Weld	46.0	
3/8		Nickel-copper Electrode "B"	Weld	41.0
	Ave.		43.5	91.5
3/8	As welded	Diffusion zone	96.5	
3/8		Nickel-copper Electrode "B"	Diffusion zone	75.0
	Ave.		85.8	95.0
3/8	1250 deg. F. 1 hr., air cooled	Weld	50.0	
3/8		Nickel-copper Electrode "B"	Weld	52.5
	Ave.		51.3	87.0
3/8	1250 deg. F. 1 hr., air cooled	Diffusion zone	146.5	
3/8		Nickel-copper Electrode "B"	Diffusion zone	143.5
	Ave.		145.0	95.3
3/8	1250 deg. F. 1 hr., air cooled	Parent metal	60.0	
3/8		Nickel-copper Electrode "B"	Parent metal	51.5
	Ave.		55.8	90.5

Electrode "A"—Low carbon, 0.70% Mo. in coating.
Electrode "B"—Low carbon, 2.00% Ni., 1.00% Cu.

x 1 7/8-inches. The physical values obtained were as follows:

Yield Strength of Weld, pounds per square inch	Ultimate Strength of Weld, pounds per square inch
As Welded	
67,500	82,100
67,400	78,800
Normalized 1600 Degrees Fahr., Air Cooled	
61,400	75,100
62,200	74,200
65,600	73,500

All fractures occurred in the weld and are therefore weld strengths

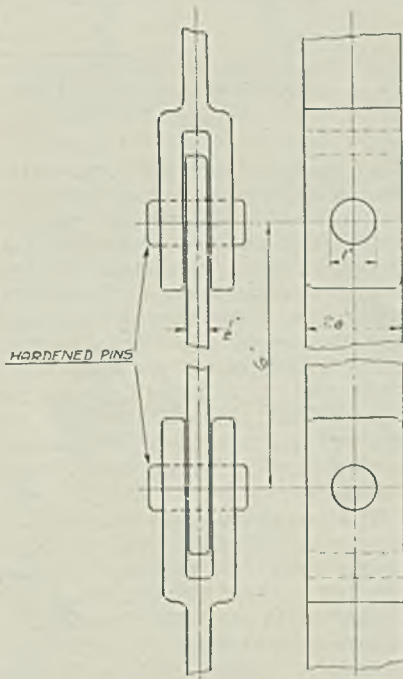


Fig. 6—Tensile and hardness values of nickel-copper steel as rolled and after flame hardening:

	Tensile strength, pounds per square inch
As rolled—Low-carbon steel..	61,900
As rolled—0.20% C., 2.00% Ni, 1.00% Cu. steel	88,300
After flame hardening—0.20% C., 2.00% Ni, 1.00% Cu. steel	114,000

Distance from edge of hole, inches	Flame hardened surface of bar, Rockwell C
1/16	43
1/8	42
3/16	42
1/4	40.5
5/16	38
3/8	34
7/16	28.5
1/2	24
9/16	18.5
Unhardened plate	7.8 (87 Rockwell B).

and not parent metal strengths. It is interesting to note that the Rockwell hardness tests showed strikingly little difference in the hardness

Table III
Effect of Heat Treatment on Nickel-Copper Steel

Treatment	Chemical Analysis						Physical Properties							
	C.	Mn.	S.	P.	Si.	Ni.	Cu.	Yield point, lbs./sq. in.	Ultimate strength, lbs./sq. in.	Elongation in 2 in., per cent	Reduction of area, per cent	*Charpy impact ft.-lbs. well B	Hardness, Rockwell B	Hardness, Brinell
	0.22	0.67	0.020	0.048	0.26	1.97	0.92							
Hot rolled.....								61,000	88,000	27	57	25	89	162
Norm. 1450 deg. F.....								68,000	92,000	28	58	32	89	159
Norm. 1650 deg. F.....								71,000	92,000	28	58	33	89	160
Norm. 1650 deg. F.—Renorm. 1450 deg. F.....								72,000	93,000	28	58	34	87	160
Norm. 1650 deg. F.—Renorm. 1375 deg. F.....								66,000	89,000	28	58	35	89	162
Norm. 1800 deg. F.—Renorm. 1450 deg. F.....								61,000	87,000	28	58	29	88	166
Hot rolled—Heated to 900 deg. F. for 4 1/2 hrs....								82,000	107,000	25	54	16	95	196
Norm. 1450 deg. F.—Heated to 900 deg. F. for 4 1/2 hrs.								82,000	105,000	25	54	23	93	202

*Impact test specimens 0.250 x 0.394-inch, slotted by milling, leaving 0.197 x 0.394-inch metal under the notch which has a radius of 0.02-inch.

of the weld, affected zone and parent metal. Rockwell B values of the weld varied from 87 to 92. After normalizing, these values were 70 to 88 and after being normalized and precipitated, 75 to 91.

Rockwell hardness of the parent metal cut with a gas torch indicates the low air hardening attending this operation, of importance when machining operations for weld grooves are to be performed. Fig. 4 shows Rockwell B readings after torch cutting and when the residual hardness is lowered by subsequent reheating with a torch. It has been our experience that most of the air harden-

ing may be relieved by playing a heating torch on the metal after gas cutting.

Can Be Hardened Easily

The nickel-copper steels can be very satisfactorily hardened by quenching or flame hardening. Steel with 0.20 carbon, 2.00 per cent nickel, and 1.00 per cent copper, rolled into 3/4-inch bars has a Rockwell B hardness of 91-93. When heated and water quenched, it has a surface hardness of 45 Rockwell C which converts to 115 Rockwell B.

The results of tensile tests of low-carbon steel, of 0.20 per cent carbon

Table IV
Tension and Bend Tests of Plate and Electrode Metal

Condition of Material	Full-Size Tension Specimens		0.20% C. Nickel-Copper Steel	
	0.08% C. Nickel-Copper Steel	Ultimate strength, lbs./sq. in.	Yield point, lbs./sq. in.	Ultimate strength, lbs./sq. in.
As welded	58,000	70,000	66,000	91,000
Heat treated 1200 deg. F.....	62,000	73,000	69,000	92,000
Annealed 1580 deg. F.....	63,000	74,000	68,000	90,000

Note—All fractures in rolled plate.

Condition of material	Full-Thickness Cold Bend Specimens		Fracture
	0.08% C. Nickel-Copper Steel	0.20% C. Nickel-Copper Steel	
	Bend, degrees	Bend, degrees	Complete
As welded	180	45	14
Heat treated 1200 deg. F.....	180	180	31
Annealed 1580 deg. F.....	180	180	32

Condition of material	All-Weld Metal Tension Specimens				0.20% Nickel-Copper Steel			
	0.08% Nickel-Copper Steel	Yield point, lbs./sq. in.	Ultimate strength, lbs./sq. in.	Elongation, per cent	Reduction of area, per cent	Yield point, lbs./sq. in.	Ultimate strength, lbs./sq. in.	Elongation, per cent
As welded	58,500	80,000	24	37	69,000	95,000	13	12
Heat treated 1200 deg. F.....	70,000	81,000	27	54	76,000	91,000	18	20
Annealed 1580 deg. F.....	64,000	77,000	26	53	69,000	87,000	17	20

nickel-copper steel as rolled and of the latter steel after flame hardening around the 1-inch holes through which the stress was applied, are shown in Fig. 6. The nickel-copper steel as rolled was 42.6 per cent higher in tensile strength than the low-carbon steel. Flame hardened nickel copper steel was 96.8 per cent higher than the low carbon and 28.8 per cent higher than the as-rolled low alloy. This is of particular interest in riveted structures as the heat of driven rivets affects the structure of the steel in the same manner as flame hardening. See the article "High-Tensile Rivets of Cromsils Steel" published in STEEL,—Ocf. 2, 1933.

Impact Values Are Compared

Table II gives the Charpy V-notch values of the plate and welds of approximately 0.20 per cent carbon nickel-copper steel as welded and under varying heat treatments. Fig. 5 graphically shows the Charpy values with two types of electrodes and under various heat treatments. The impact value of the weld remains fairly constant whether sub-

sequently heat treated or not, while the values of the parent metal and the affected zone increase markedly under thermal stress relief and normalization.

Steel Safe for Welding

From a welding standpoint, the nickel-copper steels are safe. Their air hardening property is low, a great advantage in case of needed welding in service. They have the highest elastic ratio of any of the commercially-produced low-alloy steels. This fact will be decidedly to its advantage when engineers come generally to substitute yield for ultimate strength in figuring sections. The author makes reference to the Mining and Metallurgical Engineers Technical Publication No. 697 and to Hargh, "Fatigue of Structural Steel", *Engineering* (1934) 138, 698-701.

The high impact value of the nickel-copper steels recommend them for service where shock is encountered. They offer no complication in welding with either low-carbon or alloyed electrodes.

The author acknowledges the assistance of Case School of Applied

Science, Cleveland, where a considerable part of the physical and metallographic investigations reported in this article were made.

Forging, Stamping, Heat Treating Plants Listed

Directory of Forging, Stamping and Heat Treating Plants, 1937-38, imitation leather, 261 pages, 5 x 7 1/2 inches; published by Steel Publications Ltd., Pittsburgh; supplied by STEEL, Cleveland, for \$10, plus 15 cents for postage; in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

The scope of this directory is covered by its title. It includes the names of all forging, stamping and heat treating plants in the United States and Canada, with address, names of officers, equipment and products. The plants are arranged alphabetically by name and at the end of each section is a geographical reference index with page numbers referring to the main portion of the section.

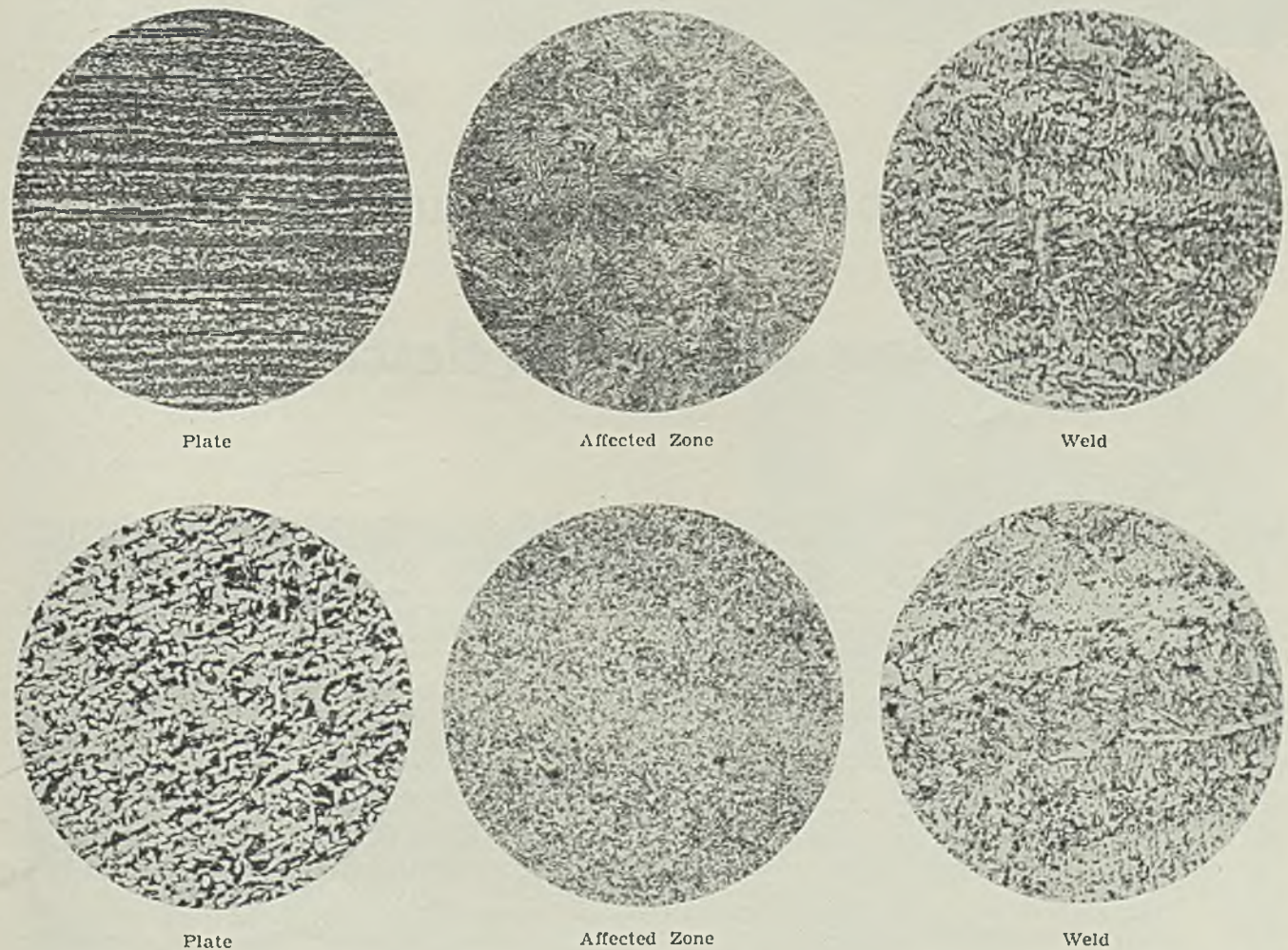
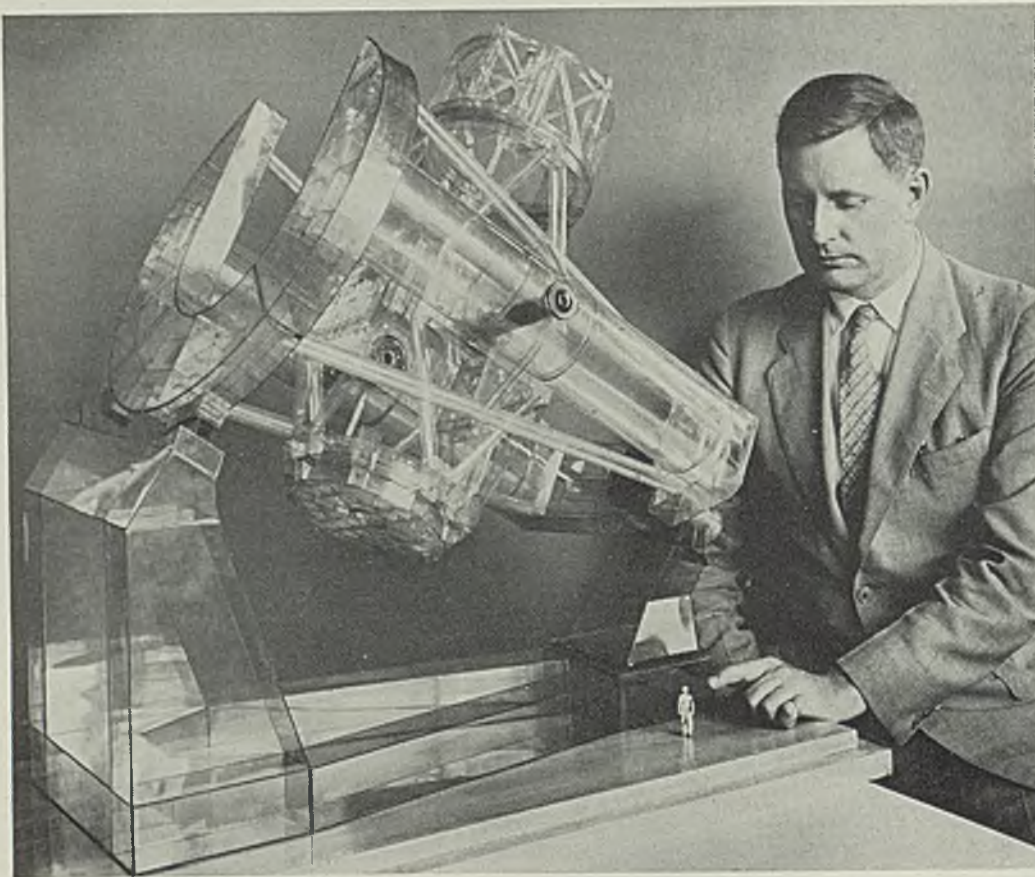


Fig. 7—Photomicrographs of nickel-copper steel and welds. X100. The top row is for steel containing 0.23 C., 0.75 Ni., 1.40 Cu. and 0.08 Mo.; the bottom row for steel containing 0.22 C., 2.00 Ni. and 1.00 Cu.



COMPARATIVE size of human beings with the new 200-inch reflecting telescope being erected on Mt. Palomar is shown by the mannikin to which J. Ormondroyd, Westinghouse engineer, is pointing. Model is of transparent plastic to a $\frac{1}{32}$ scale

Work Started on 500-Ton Mounting Structure for New 200-Inch Telescope

MAJOR project of the world of science, the new 200-inch telescope to be mounted on Mount Palomar in southern California is beginning to take form. While the huge 200-inch mirror is the "eye" of this colossus of precision instruments, the most intricate work is on the body—the million pound mounting structure which is taking shape in the South Philadelphia works of the Westinghouse Electric & Mfg. Co. Structurally, the mounting consists of two units—the tube made of built-up sections, 22 feet in diameter and 60 feet long; and the yoke in which the tube swings, overall length of which is 60 feet. At the bottom of the tube is hung the reflecting mirror, while at the top is a compartment where the observers sit and "ride" the tube.

Yoke to which the tube is attached

floats on oil at a pressure of 250 pounds per square inch, the first time oil has supplanted mercury in this connection. Calculations have been made to show that with this mounting the heavy tube may be moved with a power expenditure of only 1/165,000-horsepower.

Frame Built of Tubes

Hollow steel tubes are used in the construction of the yoke frame. Each tube is of 1-inch steel, 60 feet long and 10½ feet in diameter, constructed of conventional welded design with one seam. One end of the frame ends in a horseshoe which also serves as a bearing. Of hollow box construction, the bearing is 4 feet thick and has an outside diameter of 46 feet, the whole being taller than a four-story building.

In building the huge parts, only

one special piece of apparatus had to be built. In order to heat treat the large parts, a special furnace 26 feet square and 20 feet high was built. All parts are heat treated to relieve stresses resulting from the welded construction which is used throughout. The finished pieces will be transported to Mt. Palomar by water, as tunnel construction and curves make rail carriage impossible. In the Philadelphia shops where the parts are being fabricated, tracks entering the building were lowered 5 feet to permit low slung flat cars to transport the completed parts through the doorways.

An interesting feature of the engineering work was the construction of models of the entire apparatus to 1/32 scale. Built of transparent plastic material, these models are used by the engineers to check their theo-

retical calculations. Micrometers used in checking measurements on the models are tied in an electrical circuit so that meters read when the points touch the surface and thus eliminate squeezing.

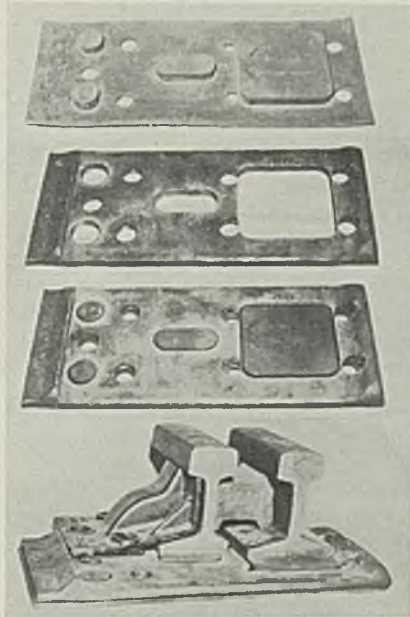
Other units are being established at the site of the telescope, including several smaller domes, a power plant, radio station, water reservoir, homes for the staff and an airplane landing field. Located about 90 miles from Los Angeles and 60 miles from San Diego, Mt. Palomar offers ideal weather conditions and absence of sky glare from surrounding cities. Operations have been under way since 1928, when the Rockefeller foundation granted \$6,000,000 for its construction. Under ideal conditions the telescope will bring the moon to an apparent distance of 24 miles from the earth, and will enable astronomers to see objects a billion light years distant. Mt. Wilson's 100-inch reflector, largest now existing, has a range of approximately 500,000,000 light years.

Rubber Cushioned Tie Plates Reduce Wear and Vibration

A COMBINATION steel and rubber resilient tie plate holds considerable promise for reducing track and rolling stock maintenance, according to the December, 1936, issue of *Oxy-Acetylene Tips*. The plate consists of a carefully formed rubber shoe harnessed to a metallic jacket, the resulting assembly being placed between the rail base and the tie so that the rail at all times is suspended on the rubber seat and has no direct contact with the tie.

In track maintenance these combination tie plates are said to absorb and distribute the wheel loads. Economies are derived from the protection of rails, points and crossings and in maintenance of road beds, bridges, tunnels, subways and

elevated structures. Of particular importance, in subways, tunnels, on bridges and in other applications, is



FROM top to bottom—resilient shoe, flame-converted harness jacket, shoe and jacket assembled and entire assembly for guard rail with brace as used in subway rigid track construction.

the elimination of impact and vibration.

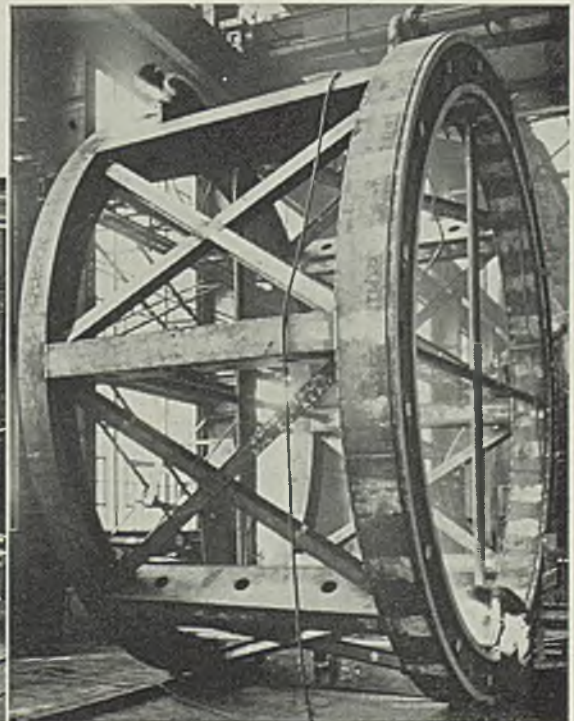
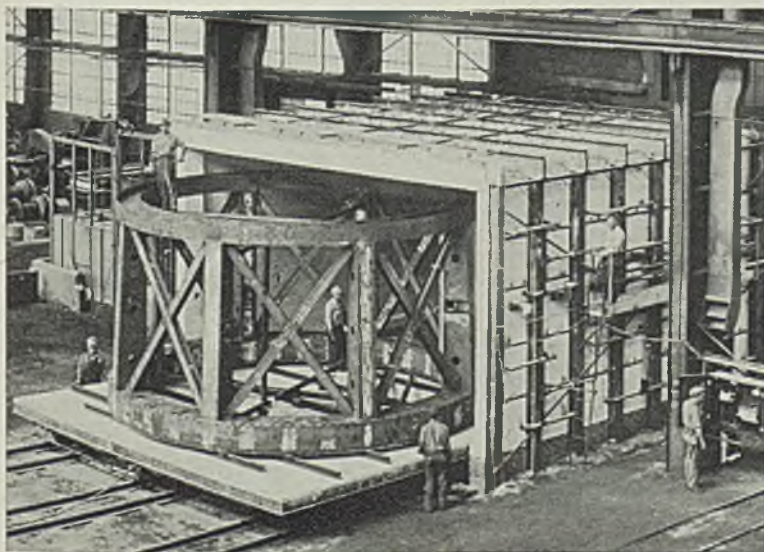
Installation on new track is easy, as plates already formed for the

FURNACE of extra large size was required for stress relieving the welds in the top cage and other units of the new telescope. Below is the top cage entering the new furnace, and at right are welders at work on the construction of this piece

cushion can be had in place of the ordinary tie plates, for existing track the problem was worked out by converting the original tie plates into jackets, using the oxyacetylene cutting method. The first conversion order involved about 2000 plates for a subway curve. The plates were of different styles so that templates were made to suit each one. A portable oxyacetylene shape cutting method was set up and equipped with a special tie plate holder or jig designed specially for this job so as to accommodate any of the tie plates. A weighted average indicated the cost of this work at only a few cents per tie plate, despite the fact that some jackets required as many as four cuts.

Straightline Production Features Die Casting Plant

To take care of the rapidly increasing demand for die castings, Stewart Die Casting Corp., Chicago, is revamping and rebuilding its entire plant. Additional equipment, including an engraving machine, has been installed in the toolroom and a number of new die casting machines have been built and installed in the production department. The entire plant layout has been changed over to a straightline production arrangement which starts with mixing of metal in the alloying department with subsequent operations in the casting, inspection, finishing and shipping departments. The new manufacturing sequence is expected to result in economies to die casting users.



Industrial Engineers Must Supply Answer in Control of Harmful Dust

REPORT of the preventive engineering committee, Air Hygiene Foundation, written by the chairman, Prof. Philip Drinker, Harvard university, Cambridge, Mass., and other technical specialists, advises that engineers in the "dusty trades" can and should cut heavy dust concentrations below the present limits warranted by medical knowledge. This action is important, the report explains, not only to safeguard further the health of workmen but to give employers maximum protection against unjust claims.

Discussing methods of determining dusts, the report states present dust sampling and dust estimating methods undoubtedly will be amended and changed from time to time in the light of new knowledge and further experimentation. Where dust control alone is in question, the use of simplest possible procedure which will give the necessary information is recommended.

Particles Vary in Size

Concerning the size of dust particles, the report observes that much has been made of the fact that particles found in autopsied lungs are of the order of 1 micron (1/25,000 inch)—about like the common bacteria. It is argued, therefore, that the human anatomy and physiology exercises "some phenomenally accurate size grading which excludes larger particles."

The report says "there is no reason whatever to look for any such mysterious explanation. The sizing is done in the air before the dust is breathed and not by the man after it has been breathed." It is pointed out the larger particles tend to fall from the air by their own weight and "only those small enough to act as part of the transporting air stream are likely ever to reach the lungs."

"In diseases such as silicosis and asbestosis, particles must reach the alveoli, minute air sacs of the lungs, or no silicosis or asbestosis results. In maladies like hay fever, the harm is done by particles which may be 15 to 30 microns instead of 1 micron.

"Toxic dusts such as lead and manganese are much more likely to produce ill effects if breathed than if swallowed. The reason for this difference is physiological; it is established and should not be ignored in dust control problems. Again, common sense tells us that the finer par-

ticles of lead are vastly more apt to be breathed than the larger.

"It follows dust control for hygienic reasons should be aimed at the fine rather than the coarse particles. Continuing this argument to its logical conclusion, if one could avoid use of 1 micron dusts or less, or exclude them from the dust which passes a 325-mesh screen, nearly all dust diseases would be eliminated. This is not at all an academic idea, for de-dusting processes are not new and are being applied in many industries. If some of the mechanical ingenuity which is now being applied unthinkingly to creating 1 micron dust were directed to ways for avoiding it, it probably would be discovered that dusts which are too large to be breathed would serve many processes just as well as those which are around 1 micron in size.

"If the breathing of dust causes disability of any sort, such as silicosis, it follows that there must be some degree of air cleanliness from which no disability will result to the average man during the average working period.

Engineer Takes Responsibility

"The super-cautious person may claim that permissible concentrations, commonly called thresholds, are not precise and generally have not been established. This is perfectly true, but emphasizing instead of answering the question, is merely passing the responsibility along to the engineer.

"The absurdity of splitting hairs in order to achieve precisely the degree of cleanliness which fits medical knowledge is accentuated when the engineer begins his design work. He does not base his calculations on dust counts, but on the volumes of air to be handled, together with the best data he can get on the gross dust loading, cubic feet or thousands of cubic feet per hour and pounds of dust per day. If left to his own devices he will do his best to achieve a dust concentration substantially lower than any medical knowledge warrants. Why, then, wait for the mythical thresholds before taking action?"

The report includes a table giving latest available information on the minimum air velocities necessary in certain industries to insure the maintenance of dust concentrations at safe levels. The preventive engineering committee asserts that many firms have neglected heavy

dust concentrations in cases where the dust is of no proven harm, and adds: "There is no satisfactory medical answer at present to this question, but the engineer is making a bad mistake if he lets men breathe heavy dust concentrations of any material. If no other reason for dust control can be found, then one should read transcripts of some of the recent suits at common law in which fantastic damages for alleged silicosis were granted to men who breathed dust containing little or no silica. The courts and compensation boards are not impressed with subtle distinctions between dusts with 10 per cent and 40 per cent quartz, especially when medical experts are reluctant to make definite statements as to the comparative significance of such differences.

"It would be well to realize that men working in dusty trades suffer far more from respiratory troubles of all kinds than do men who work in clean air. The evidence that excessive dustiness of any kind is harmful is beyond argument."

The committee attributes the handicap in this general field to the lack of fundamental data and recommends a number of specific engineering researches for the foundation to undertake in the coming year.

Besides Prof. Drinker, other members of the foundation's preventive-engineering committee are Dr. J. M. DallaValle, public health service; Theodore F. Hatch, New York state department of labor; H. M. Nichols, Hyde Park, Mass.; S. C. Vessy, Cleveland; William P. Yant, Pittsburgh.

New Test Issued on Wire Drawing and Cold Working

Wire Drawing and Cold Working of Steel, by Alastair Thomas Adam; second edition; cloth, 160 pages, 7 x 10 inches; published by H. F. & G. Witherby Ltd., London; supplied by STEEL, Cleveland; in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

The first edition of this work was published ten years ago and in the interval technical development and progress has been so rapid that revision and a new edition has been found necessary.

The main features of the first edition have been retained, with the purpose of presenting the subject so that it may be of interest both to the wire manufacturer and user. A new chapter on typical applications of wire has been added. While some of the old material has been retained, every chapter has been rewritten to keep up with the pace of progress. Illustrations for the most part are new.

a Heavy Duty Resistor

with

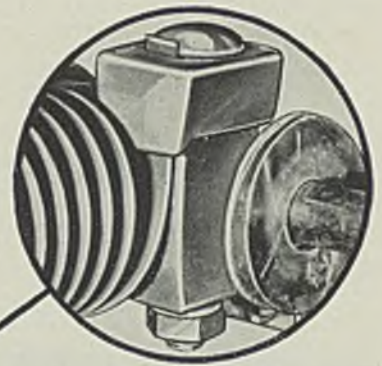
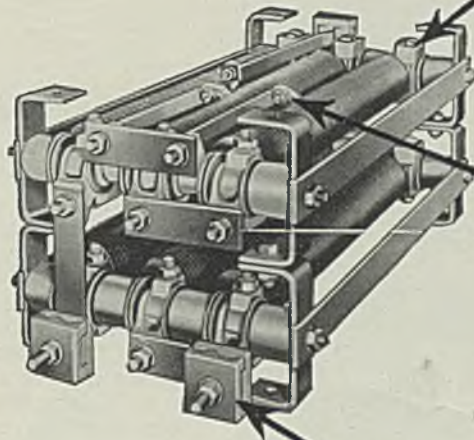
Perfect Contact Terminals

Wedge-type malleable
End terminals . . .

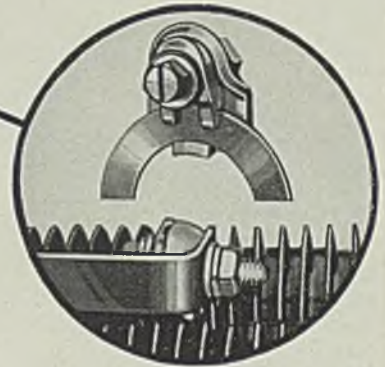
Heavy pressed steel Tap
terminals . . .

Large malleable Cable
terminals . . .

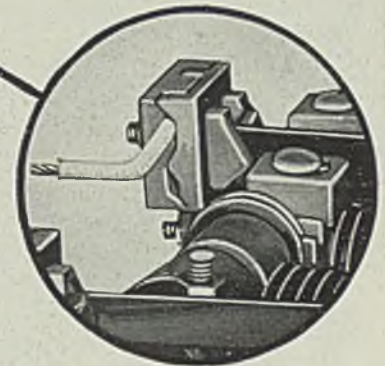
All heavy cadmium plat-
ed to prevent rust . . .



End Terminal



Tap Terminal



Cable Terminal

THE New Monitor Mill Type Resistors are constructed for heavy currents with terminal connectors that can really take it. . . These terminals provide a perfect electrical connection equal to a welded joint but with the advantage of adjustable position. . . . The Tap terminals grip the ribbon in four places with ample contact surface and vise-like pressure. The wedge-type End terminals and Cable connectors are large malleable castings providing the proper dissipation of heat at these vital points and by virtue of their design assure a perfect electrical connection. . . . These resistors will operate at high temperatures without damage, which makes them especially suitable for installations in steel mills, cranes, locomotives, and other equipment subject to severe vibration and shocks, involving heavy currents and general rough usage.



Monitor builds resistors for every class of service—*Smooth-wound* for low-currents, *Hex-wound* for intermediate currents, *Edgewound* for heavy currents and *Edgewound Mill Type* for applications involving heavy currents, severe service and rough usage.

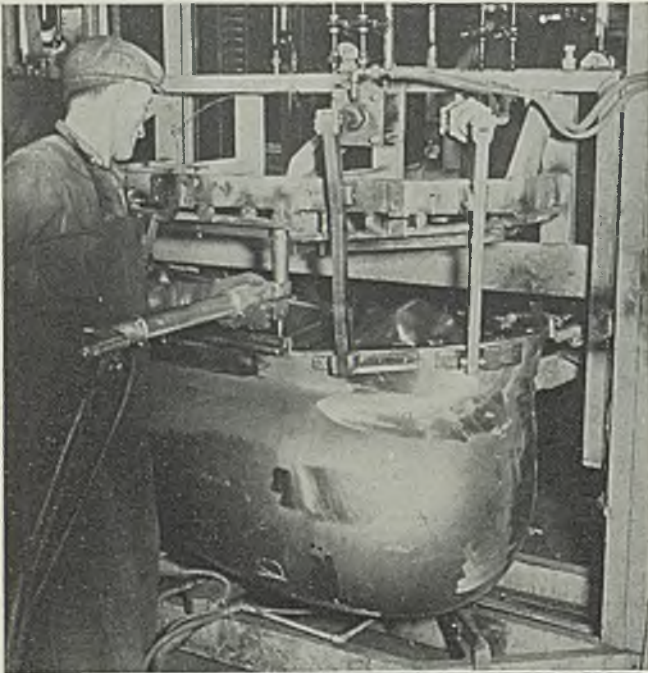
Special mountings are available for applications where standard mountings are not entirely suitable; quotations on same will be furnished on receipt of full information concerning the requirements. Monitor Sales Engineers in principal cities will gladly consult with you. Write us.

Monitor Controller Company

Gay, Lombard & Frederick Sts. BALTIMORE, MARYLAND

Monitor Edgewound Resistors

Buick Fenders Triumph of Die-Maker's Art

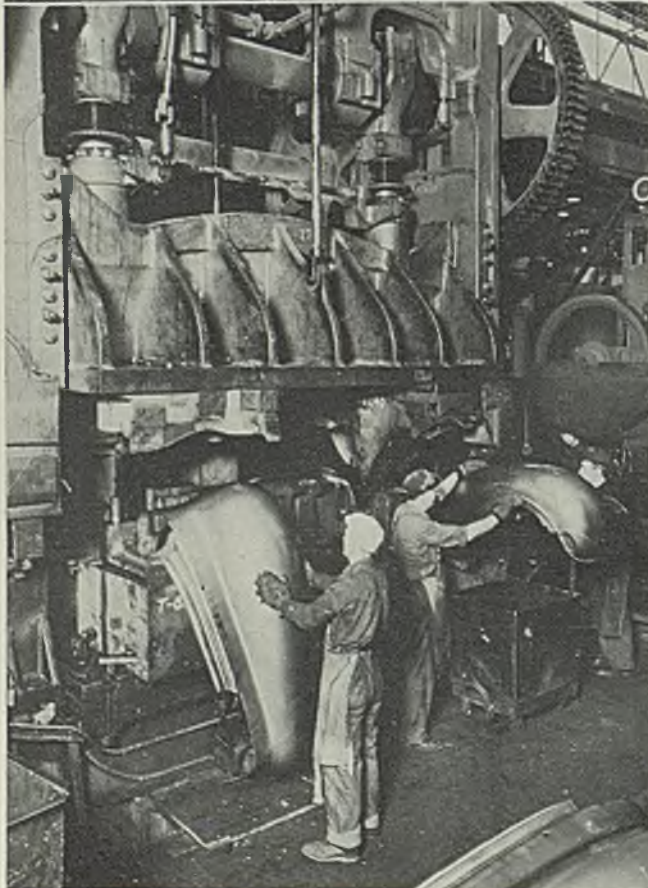


TWENTY-SEVEN separate operations are required to form the one-piece front fender for the 1937 Buick, said to be the deepest one-piece front fender known to the automobile industry. These operations include fifteen on the presses and twelve finishing operations before the fender is ready for the paint shop.

The first four operations involve single die setups but subsequent operations are carried out in multiple setups wherever possible. Operations 5 and 6 are combined in one press using two different dies, as are operations 7 and 8. Operations 9 to 12, inclusive, involve an unusual setup of four dies in one press. The remainder of the stamping operations are carried out in single die setups. Multiple die setups are shown in the illustrations below.

Skirt stampings are welded to the fender by means of a new type welding machine. As shown in the illustration at upper left, the entire assembly is clamped in a fixture and the spots produced by means of an air operated gun welding tool.

The production of this fender involves stretching of the metal far beyond the normal yield point of sheet steel, local elongations amounting to as much as 41 per cent lengthwise and 28 per cent in the width in certain sections. Work hardening, however, is said to increase strength and other physical properties.



Mining and Metallurgical Engineers

Announce Annual Meeting Program

A WIDE range of papers dealing with ferrous and nonferrous metallurgy is scheduled for the 147th annual meeting of the American Institute of Mining and Metallurgical Engineers to be held at the Engineering Societies building, New York, Feb. 15-18.

The annual business meeting will occupy most of Tuesday, Feb. 16. An informal dinner and smoker will be held on Monday evening and the formal dinner on Wednesday evening. Upon the latter occasion, the incoming president will be introduced and medal awards will be made.

Dr. P. D. Merica, vice president, International Nickel Co. Inc., New York, will be the Howe Memorial lecturer before the Iron and Steel division, and will discuss alloy cast iron. This division's blast furnace and raw materials committee will hold a joint meeting with institute's milling methods committee on the afternoon of Feb. 16 to consider flotation as applied to iron ores. The annual lecture of the Institute of Metals division on Feb. 17 will be presented by Dr. R. S. Hutton, Cambridge university, Cambridge, Eng., his subject being refractories.

Technical sessions and papers for the meeting have been announced as follows:

MINERAL ECONOMICS

Monday, Feb. 15

AFTERNOON

- "World Copper: Recent trends in Production, Ore Reserves and Costs," by John J. Croston.
- "Outlook for World Consumption of Metals and Fuels," by A. B. Parsons and Stuart St. Clair.
- "Competitive Position of Fuels in the United States," by H. T. Mann.

IRON AND STEEL DIVISION

Tuesday, Feb. 16

AFTERNOON

Crystallization

- "Preferred Orientation in Iron-Silicon Alloys," by C. S. Barrett, G. Ansel and R. F. Mehl.
- "Primary Crystallization of Metals," by F. R. Hensel.
- "Studies Upon the Widmanstatten Structure, VIII — The Gamma-Alpha Transformation in Iron-Nickel Alloys," by R. F. Mehl and Gerhard Derge.

Wednesday, Feb. 17

MORNING

Ingot Solidification

- "Structure of Rimmed Steel Ingots," by T. S. Washburn and J. H. Nead.
- "Some Factors Influencing Segregation and Solidification in Steel Ingots," by Leon H. Nelson.

- "Rate of Solidification of Rimming Ingots," by John Chipman and C. R. Fon Dersmith.

AFTERNOON

Gases in Steel

- "Fractional Vacuum Fusion Analysis of the Bureau of Standards Steels for Determination of Oxygen," by S. L. Hoyt and M. A. Schell.
- "Effect of Temperature Upon the Interaction of Gases with Liquid Steel," by John Chipman and A. M. Samarin.
- "Oxides in Basic Pig Iron and in Basic Open-Hearth Steel," by T. L. Joseph.
- "Co-operative Study of Methods for Determination of Oxygen in Steel," by J. G. Thompson, H. C. Vacher and H. A. Bright.

Thursday, Feb. 18

MORNING

Iron-Carbon Equilibrium Diagram

- "Constitution of High-Purity Iron-Carbon Alloys," by R. F. Mehl and Cyril Wells.
- "A Suggested Equilibrium Diagram for Cast Iron," by Roy M. Allen.
- "Freezing of Cast Iron," by Alfred Boyle.

AFTERNOON

General Ferrous Metallurgy

- "Fine-Grained Steels for Low-Temperature Service," by A. B. Kinzel, Walter Crafts and John J. Egan.
- "Oxide Films on Iron," by R. F. Mehl and Edward L. McCandless.

Howe Memorial Lecture

- "Alloy Cast Iron," by Paul D. Merica.

INSTITUTE OF METALS DIVISION

Wednesday, Feb. 17

MORNING

Orientation

- "Stereographic Projection in Metallurgy," by C. S. Barrett.
- "Studies Upon Widmanstatten Structure, IX—The Mg-Mg₂Sn and Pb-Sb Systems," by Gerhard Derge, R. F. Mehl and Arthur R. Kommel.
- "Lattice Relationships Developed by the Peritectic Transformation Alpha Plus Liquid to Beta in the Cu-Zn System," by Alden B. Greninger.

AFTERNOON

Properties of Alloys

- "Light-Weight Alloys for Piston Ring Holders Based on Silver," by Claus G. Goetzel.
- "Lead Coating of Steel," by J. L. Bray.
- "Fatigue Properties of Five Cold-Rolled Copper Alloys," by William B. Price and Ralph W. Bailey.
- "Properties of Alloys of Cadmium and Mercury with Small Percentages of Nickel," by Telfer E. Norman and Owen W. Ellis.

Annual Lecture

- "Refractories," by R. S. Hutton.

Thursday, Feb. 18

MORNING

Deformation

- "Influence of Temperature on the Elastic Limit of Single Crystals of Al, Ag and Zn," by Richard F. Miller and W. E. Milligan.

- "Stress—Reduction-in-Area Relations for Cold Working of Metals in Tension," by Charles W. MacGregor.

- "Equipment for Routine Creep Tests and an Example of Its Application," by J. Ruzicka.

AFTERNOON

General Physical Metallurgy

- "Thermodynamic Calculations Concerning Certain Alloys of Tungsten and Molybdenum with Other Elements," by W. P. Sykes and H. A. Schwartz.
- "Thermal and Electrical Conductivities of Aluminum Alloys," by L. W. Kempf, C. S. Smith and C. S. Taylor.
- "Kinetics of Transformation in Solid Solutions of Magnesium-Cadmium Alloys," by I. I. Korniloff.
- "Segregation in Solid Solution Alloy Single Crystals," by Arthur Phillips and R. M. Brick.
- "Diffusion of Copper and Magnesium into Aluminum," by R. M. Brick and Arthur Phillips.

Annual Division Dinner

- "Properties of Photographic Materials," by Dr. Walter Clark, Eastman Kodak Research Laboratories, Rochester, N. Y.

Foundrymen Issue Codes, Aim Toward Dust Control

Recently approved and published by the American Foundrymen's association are two tentative codes of recommended practices developed by the Industrial Hygiene Code committee of that organization. These codes are the first two in a series of approximately 25 being developed to assist in the standardization of dust eliminating methods and improvement of shop operating conditions in the foundry industry.

The two codes which are now available are: 36-27, Tentative Code of Recommended Practices for Testing and Measuring Air Flow Exhaust Systems, and 36-28, Tentative Code of Recommended Practices for Grinding, Polishing and Buffing Equipment Sanitation. The first of these codes is prepared to aid in the standardization of the general type of instruments and technique employed in determining the volume and elasticity of air flow and exhaust system. It covers the application and testing technique for pitot tube, inclined and vertical manometer gages, revolving vane type anemometers and swinging vane type direct reading velocity meters.

The second code published describes recommended practices for the ventilation of all grinding, polishing, buffing, scratch brushing or abrasive cutting-off wheels, and grinding or polishing scraps or belts. A series of definitions is followed by a section on applications for hood and branch type requirements, design of exhaust system, testing exhaust system and hood and enclosure design and minimum air elasticity required.

Copies of these codes may be secured from the American Foundrymen's association.

CONTINUOUS OPERATIONS
need non-failing support



● The closer manufacturing operations dovetail, the more important the material handling equipment becomes. What's in the power-box of the truck has much to do with what goes on the day's production sheet. When there is an Edison Steel-Alkaline Battery in the power-box—profits are protected—the work goes on.



*Made in U.S.A.

But of all batteries* only the Edison is built on the steel-alkaline principle. Edisons do not lose their active materials because they are locked in steel tubes and pockets. The more you investigate the surer you will be that the Edison's greater dependability, longer life and lower maintenance costs constitute the only internal truck power your company can afford. Offices in principal cities.

EDISON storage **BATTERY**

DIVISION OF THOMAS A. EDISON, INC., WEST ORANGE, NEW JERSEY

Materials Handling

Cost of Handling Materials in Chrysler Plants Is Held Under Budget Control

BY GEORGE MILLER
Chrysler Corp.

TO CARRY out an effective method of expense control in the manufacturing division in automotive plants, it is first necessary to translate the manufacturing program as it applies to the various departments into estimates of cost and then effect a positive control.

We have found that by establishing a relationship between our budgets and the factors of time and production activity, we obtain the best results. The relationship of our budgets to the factor of time is represented by a nonvarying amount of money based on one month, and is used as a control on those expenses which are influenced

by time and not by plant activity. These are called nonvariable budgets. Variable rates expressed in terms of dollars of allowance per \$100 of direct labor are used to maintain the correct relationship between our budgets and plant activity as a whole. There are, however, certain departments that do

not function in direct accordance with the direct labor in the plant. In these cases, it is necessary that their budgets be based on their own departmental activities.

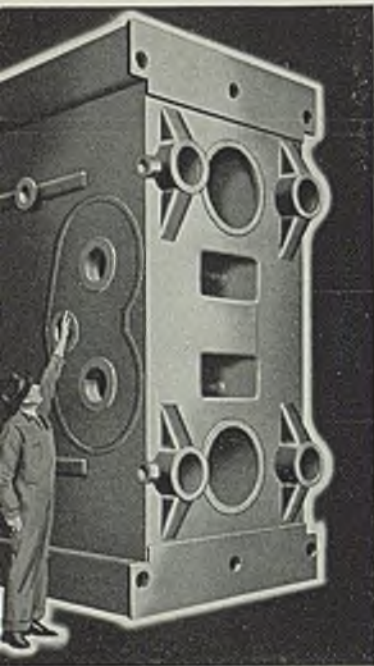
In detailing the budget control of materials handling activities, we do not cover purchasing, planning and planning follow-up factors, but do cover receipt, transportation and actual physical handling of the material in the plant.

The purpose of an efficient materials handling set-up is two-fold.

HANDLING of incoming materials is facilitated by a main receiving dock accommodating eighteen hauling trucks at one time and by six convenient subreceiving stations. Skids, skid boxes and lift trucks play an important part in speeding materials to processing operations

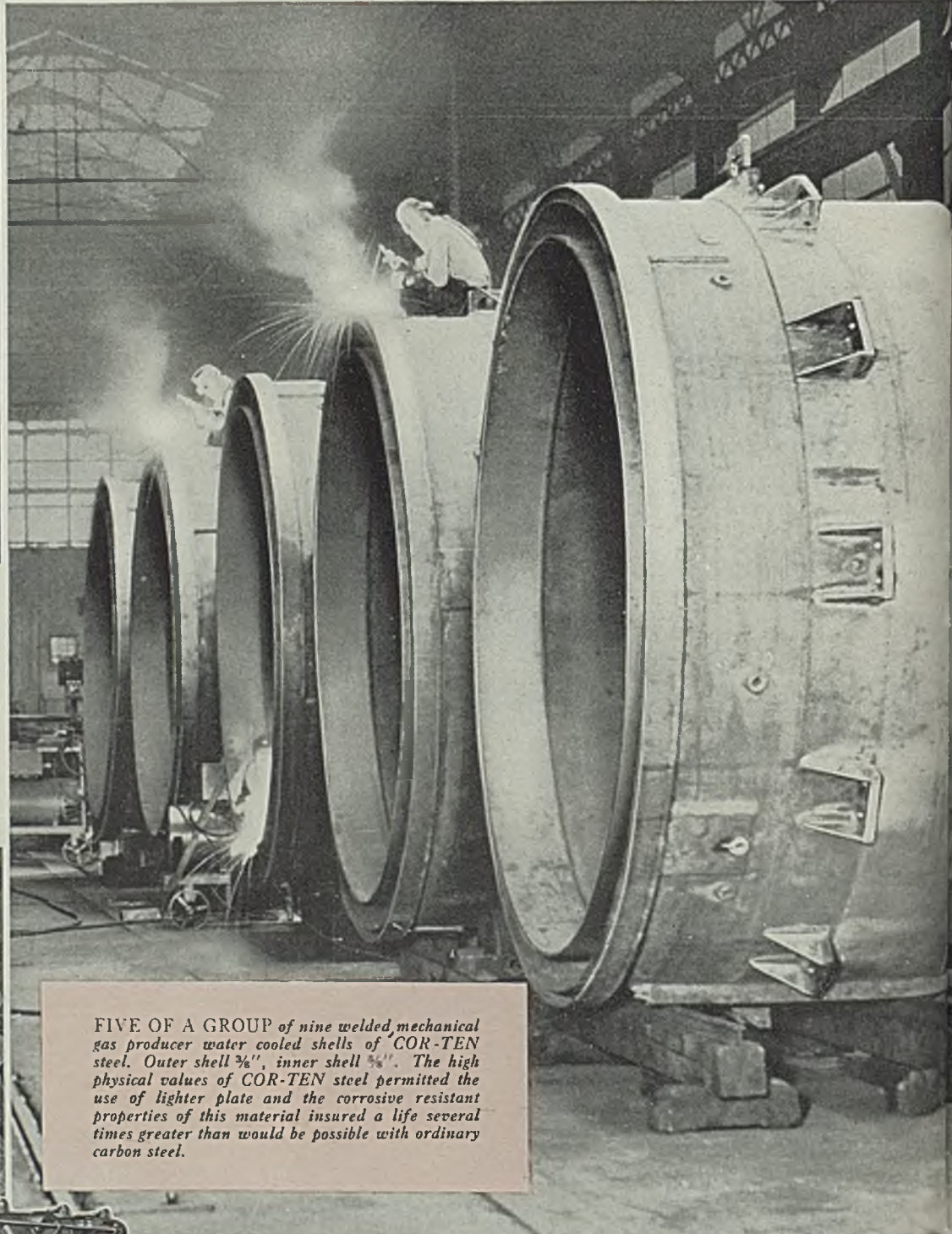
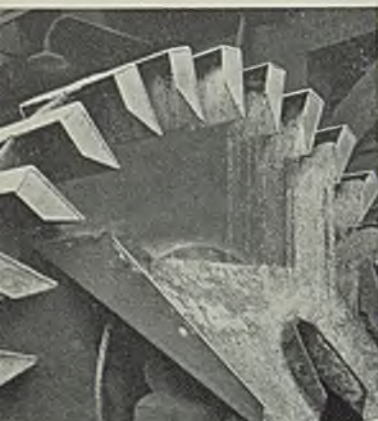


Now... MODERN STEELS

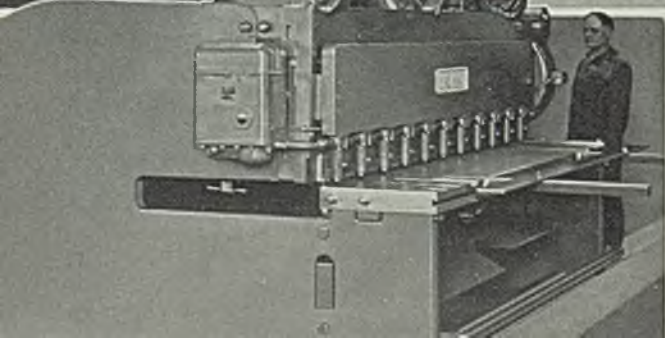


TIME SAVING—one of many cardinal advantages in the use of Rolled Steel for machine construction—was effectively demonstrated in the fabrication of this stamping press crown. Only 12 days (478 labor hours) were required for its complete fabrication! Rolled Steel construction permits immediate execution of design. No delays or waiting for parts or patterns. Weight was reduced exactly 55%.

EASILY BUILT, LONG LASTING welded Rolled Steel sand wheel made of USS Abrasion Resisting Steel, gives long wear in this severe service. A typical application, one of hundreds, in which this low cost steel has stood up better than other and higher priced materials.

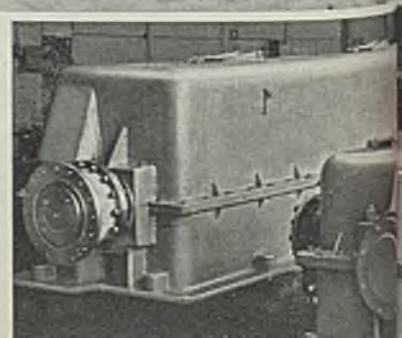


FIVE OF A GROUP of nine welded, mechanical gas producer water cooled shells of COR-TEN steel. Outer shell $\frac{3}{8}$ ", inner shell $\frac{1}{8}$ ". The high physical values of COR-TEN steel permitted the use of lighter plate and the corrosive resistant properties of this material insured a life several times greater than would be possible with ordinary carbon steel.



(Left)
LIGHT-WEIGHT, IMPROVED APPEARANCE, GREATER PRECISION are obtained in this modern $\frac{3}{4}$ " 10' Shear by Rolled Steel used in place of usual construction. Writes the fabricator: "Whereas about $\frac{1}{16}$ " tolerance was acceptable with former shears, these shears cut within a few thousandths of an inch. Reduction in size and weight conserves floor space, minimizes shipping costs."

(Right)
BEAUTY AND SIMPLICITY are combined in these gear cases of Rolled Steel construction throughout except lugs for foundation bolts. Bearings are flange cut from slabs with no machining except of finished surfaces.



FOR MODERN ROLLED STEEL CONSTRUCTION

TODAY, in machine shop and foundry, the welder—truly “a carpenter in metal”—has become the symbol of a new era in the building of machinery and equipment. Rolled steel, flame cut and welded, has simplified fabrication, created new horizons for machine designers.

In countless applications, amazing in variety, this new manufacturing process has demonstrated its ability to produce a higher quality product at lower cost, than any method hitherto employed.

Hand in hand with spectacular advances in the welding art—has been the development of new and improved steels to give that art its fullest scope and ever wider application. Just as the carpenter may secure different kinds of wood to work with, we now place at the disposal of the mechanical engineer a variety of steels that will assure him the utmost efficiency in his application of rolled steel construction.

Here are steels with physical properties vastly superior to ordinary structural

grades. Here are low alloy, high tensile steels, USS COR-TEN and USS MANTEN, which can be welded and make it possible to reduce weight even more drastically than ordinary rolled steel construction permits—USS Abrasion Resisting Steel that at low cost gives long life where abrasive wear is a problem—USS Stainless Steels with improved welding characteristics—and USS CARILLOY Steels, special alloy steels to meet requirements most specific and exacting.

Our engineers are specialists in the application of these various steels—know how they can be best adapted to rolled steel construction. They will be glad to guide you in selecting the steel most economical and practical for your use. They place at your disposal the accumulated experience of many years close association with machinery and equipment builders in all fields. Have you a copy of our booklet “Rolled Steel for Machine Construction”?—you’ll find it a source of helpful information.

AMERICAN STEEL & WIRE COMPANY, *Chicago and New York* · CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago* · COLUMBIA STEEL COMPANY, *San Francisco* · NATIONAL TUBE COMPANY, *Pittsburgh* · TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham*

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



UNITED STATES STEEL

Naturally, the job must be done at a certain cost; it must be efficient to prevent production delays; the material must be handled carefully to avoid damage.

Materials handling is generally a difficult problem to control effectively. This is due to inability of most manufacturing plants to maintain a steady and even flow of material from one day to the next. Material receipts in our chassis plant generally average between 2,500,000 and 3,000,000 pounds per day. This is exclusive of body parts and receipt and handling of bodies in the chassis plant; it covers motors and chassis items only.

Factors in Efficient Setup

The major factors of an efficient and economical materials handling setup consist of: (1) A good plant lay-out; (2) an efficient organization of material supervision and material handlers trained to do a specific job; (3) proper operations and methods line-up; (4) efficient materials handling equipment; (5) and a good cost control method in the materials handling set-up.

Material Receiving. The main receiving department is provided with a dock 240 feet long and 15 feet wide which accommodates 18 hauling trucks at one time. The department office is equipped with tele-

THE accompanying article constitutes excerpts from a paper presented at the annual meeting of the Society of Automotive Engineers in Detroit, Jan. 11-15. The author, George Miller, is budget supervisor, Chrysler and Chrysler-Kercheval plant, Chrysler Corp., Detroit

convenient subreceiving department stations, as follows:

(a) A canopied platform—east side of machine shop.

(b) A canopied area—west side of machine shop.

(c) Canopied platform—east side of chassis building.

(d) Area — west side of chassis building.

(e) Area — south end of chassis building.

(f) Adjacent to elevator serving upper floors and between our two main processing building, a freight car receiving dock is located, consisting of two active and one storage tracks with a dock space for 21 freight cars, all of which can be unloaded at one time. This dock is serviced with material handling conveyors which transport material direct from freight cars to process-

ing departments. Power units also haul direct from these freight cars.

The interdepartmental material handling layout consists of ample aisle space for hauling units to work efficiently. Conveyors are used generally wherever practical. Ample material storage space is provided at each processing operation. Forty-seven departmental material depots are provided. A material shipping department adjacent to the material receiving department is provided to ship interplant and service parts and to return material to vendors.

Principal Handling Operations

The principal material handling operations and methods as set up to handle this volume of material in the chassis plant consist of:

(1) Spot freight cars or hauling trucks in receiving station to entail the least handling and hauling of material in order to place material at or adjacent to the processing operations.

(2) Unloading and checking of materials.

(3) Teletype receiving reports. A receiving unit is set up to serve the planning, accounting and traffic departments. Through this teletype set-up it is possible for these departments to know in a very short



MATERIALS are stored in skid boxes, as shown at the left, at points where they will be used, thus reducing the number of rehandlings. In the illustration below, a stockchaser in the chassis plant inspects a specification reference card



type equipment for the teletyping of receiving reports at the rate of 400 per operator in eight hours. A routing station is provided to accommodate 47 skid platforms for accumulating small and miscellaneous lots of material. One each of these skid platforms is assigned for one of 47 processing department depots. In addition to this main receiving department, we have six

CONVEYORS, lift trucks, skids and skid boxes all combine to make handling on the freight car receiving dock, shown at the right, a smoother flowing operation



RECEIVING reports are teletyped in the Chrysler receiving department office, at the left, at the rate of 400 per operator in eight hours



CAREFUL inspection and routing of materials are characteristic of the handling system. This is handled in the department shown at the right



MISCELLANEOUS lots of materials accumulate on one of 47 skid platforms at the routing station, illustrated at the left, and remain there until a load large enough for moving is obtained

time that material has been received.

Handling and Transporting of Materials. Transportation operations are routed from the receiving department to inspection, to the routing station, where a routing specification card is used for reference by a material dispatcher. Material is then routed to the point of processing or department depot. In many cases inspection is performed at the unloading station, in which case material is routed direct to the processing or departmental depot and not through the receiving inspection department. Small and miscellaneous lots of

stockchasers through an engineering change record set up in the material supervisor's office. These chasers are responsible at all times for maintaining an ample supply of material at the various processing operations, and the storing of material in their depot and at the processing stations in a neat, clean, orderly and safe manner.

Equipment operators are responsible for quick, efficient transportation service and for maintaining the equipment in a safe manner. An individual record of all equipment in the material handling division is maintained so that the upkeep cost of each piece of equipment can be

(k) 30 special designed racks for sheet metal.

(l) 15 special designed skids for hauling 77 transmissions at one time.

(m) Three detachable booms for attaching to high-low lift trucks for hauling motors. This equipment generally is regarded as emergency equipment, in case of conveyor breakdown. One operator with a high-low lift truck with boom attached can handle 40 motors per hour.

It is first necessary that an active budget department be set up to check manpower requirements, by challenging each requisition for help and making physical checks of material handling requirements, and by survey to ascertain more economical methods and other facts. The budget department furnishes the material supervisor with a budget each month covering all expense items in each expense classification. In addition, it furnishes a daily estimate of expense labor so that each department of the material handling division can have sufficient time to study their man hours allowed for the next day's operations.

Every second day the budget department furnishes the material supervisor with a budget efficiency report on all expense items of actual expense as compared to the budget and the corresponding efficiency rating.

Outline of Working Force

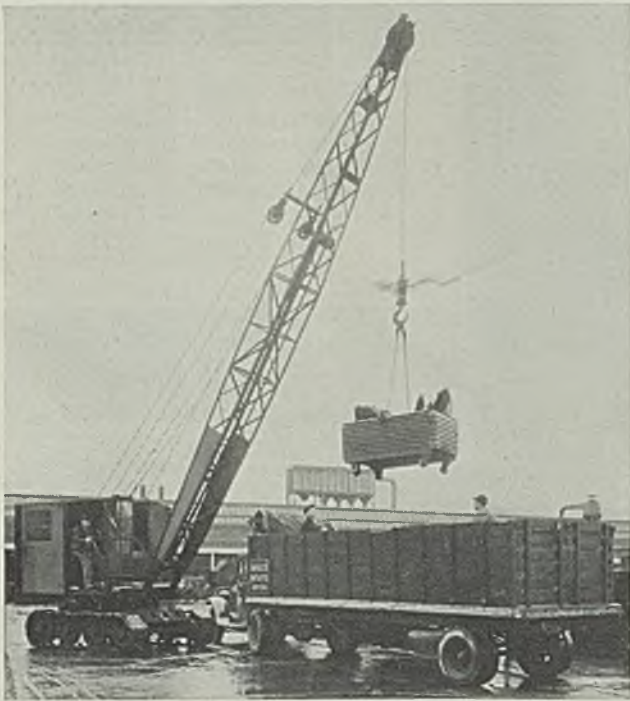
The budget department maintains a co-operative and helpful contact with material handling functions.

The organization and cost involved in the handling of the quantity of material mentioned is as follows:

The working force maintained by the materials handling division of the chassis plant consists of: Salaried supervision, 5; hourly foremen and group leaders, 15; clerical help, 12; equipment operators, 51; dispatchers, 4; schedule men, 1; checkers, 28; stockchasers, 30; stockhandlers, 115; total, 261. This organization is divided into three shifts in many departments with an average cost as follows:

Working Force	Cost per ton	Cost per \$100 direct labor
Supervision and clerical	\$0.154	\$0.897
Stockchasers, checkers, dispatchers, stockhandlers, equipment operators and schedule men	0.902	5.207
Total	\$1.056	\$6.104

In the operation of any budget an efficient interpretation of figures is needed. Judgment that comes from watching past efforts guides management in arranging a budget for the period ahead and providing well-balanced costs.



LIVE skid box loads are handled easily by means of crawler cranes which serve as general utility machines around the plant yard

material accumulate on one of the 47 skid platforms at the routing station until a load large enough is obtained.

Stockchasers are assigned to a given department or section. They supervise the handling and storing of materials in their respective depots, both when it is transported into their depot and when transported from their depot to the processing operations.

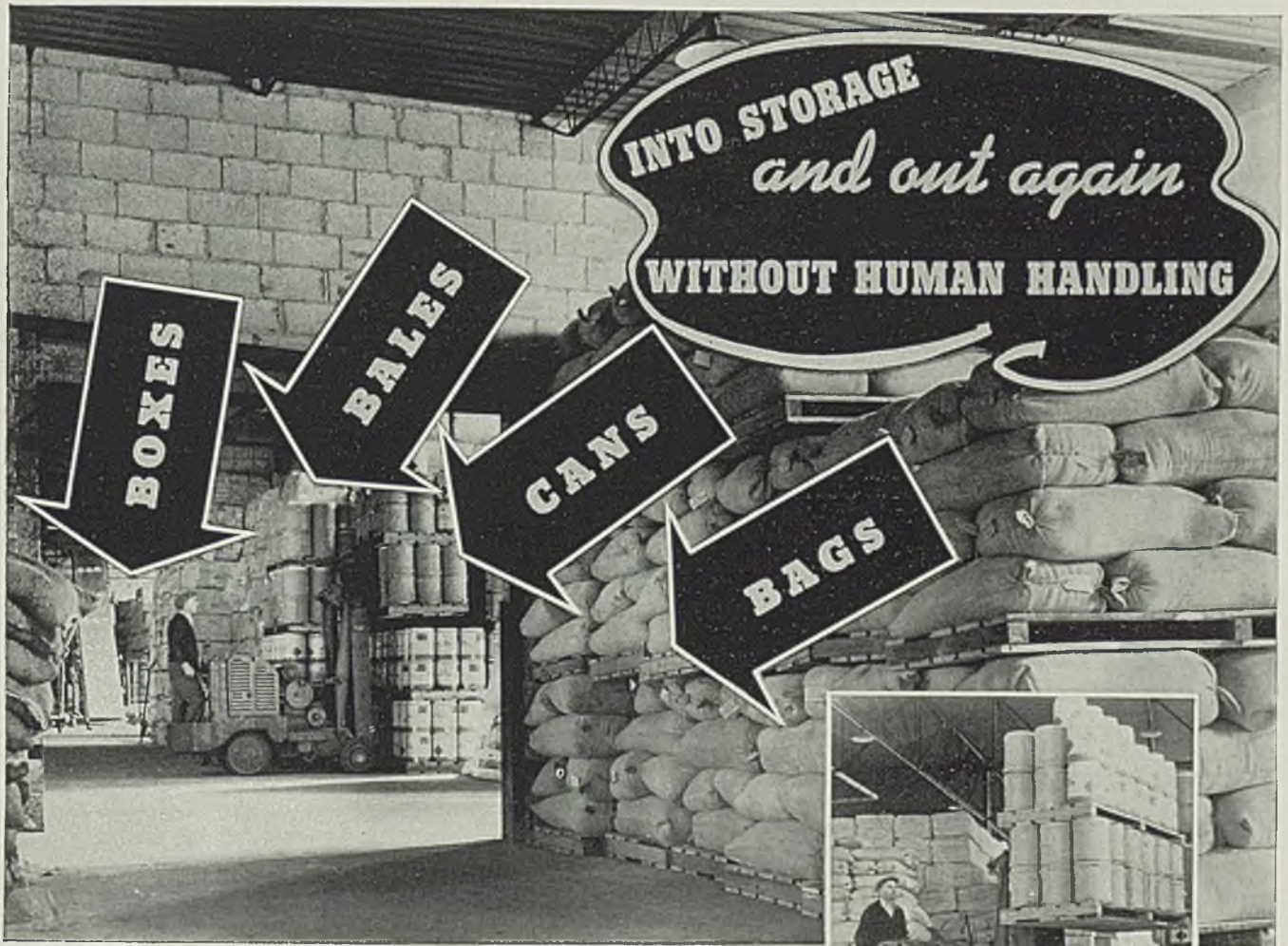
Stockchasers maintain a three-day shortage list, also what is termed a "hot-shot" shortage list. This "hot-shot" shortage list is for items showing possibility of becoming serious. Stockchasers contact with the planning follow-up department through a shortage contact clerk in the material supervisor's office. The set-up permits a central contact for the entire materials handling department.

Engineering changes are checked and effective points accomplished by

checked at any time. Operators of power equipment are responsible for picking up and delivering vendor material containers to the shipping room to be returned to vendors on vendors' own hauling equipment.

Materials handling equipment in the Chrysler chassis plant consists of the following:

- (a) Special designed conveyors wherever practical.
- (b) Five heavy-duty fast elevators.
- (c) 30 power hauling units.
- (d) 16 heavy-duty lift trucks.
- (e) 40 small hand lift trucks.
- (f) 1800 skid platforms 40 x 58 inches.
- (g) 4000 skid boxes — 25 x 40 x 58 inches.
- (h) 2500 skid boxes — 25 x 31 x 48 inches.
- (i) 5000 tote pans — 12 x 18 x 10 inches.
- (j) 60 special storage battery racks, holding 200 per rack.



● FASTER... SAFER... MORE ECONOMICAL... the pallet method of handling packaged goods with a Baker Fork Truck cuts warehouse operating costs to a minimum. From car to storage and from storage back into car or motor-truck the load rides the pallet without re-handling or lost motion. Furthermore this method enables you to use all the storage space up to the roof girders. Baker Fork Trucks can be furnished with lifts up to 20 feet for high stacking.

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The most economical way to handle material is NOT to HANDLE it

SURFACE TREATMENT

AND FINISHING OF METALS

Water Thinned Casein Paint Shown To Have Many Desirable Features

INCREASING use of modern casein paints prompts a study of their development and characteristics, as compared with other types of paint.

The simplest paint is a pigment applied to a wet surface which will hold the color when the surface is dry. Some of the most permanent of all paint jobs are of this type, commonly called fresco work. Waxes, gums, albumens, asphalts, milk and then oil were used in early times more or less in the order named as a means for binding the colored pigment. Paint, therefore, has come to mean a composition of a pigment and a vehicle. If the vehicle is liquid it may require thinning to make it easy to apply to the surface to be decorated. If the vehicle is solid it must be thinned for application by dissolving in a suitable liquid. This thinner, or solvent, forms no part of the finished surface and is useful and necessary only for the practical purposes of application. The practical thinner, therefore, is the one which will do the job in a satisfactory way at the lowest cost.

Maintenance Cost Is Low

The fact that water is the principal thinner in casein paint means substantial savings can be made in thinning these paints for use on interior walls. The use of water generally means a substantial saving in application costs. In the first place casein paint is easy to apply and does not tire the workman applying it, thus allowing larger brushes to be used. Spray guns may be used to apply casein paint to surfaces difficult to reach. Upkeep cost of brushes and clean up and maintenance of all tools is materially less than with other paints. Freedom from fumes of solvents allows a dec-

orator to use a spray gun on interior walls.

Water has always been the most universal solvent and thinner available. It can be considered an adulterant when it does not naturally adapt itself for the use to which it is put and when it does not yield as good a paint film as some more suitable thinner. Water was the only thinner used until asphalts, oils and certain gums came into use. Water is used in paints not as a vehicle itself but because it is the most suitable solvent and thinner for a number of vehicles. However, in casein paint, the thinner does not become a part of the paint film in its permanent and final form, so common sense dictates the use of the least expensive thinner which will produce a satisfactory paint film. It is primarily the cost of this thinner which determines the difference in cost between casein paints and other paints.

High Strength Pigments Used

Casein paints employ nearly all of the highest strength pigments in their manufacture. There is no saving in cost so far as pigment is concerned. Essentially casein paints cannot be considered to have any economical advantage in manufacture and the reason such paints are money savers lies in the inherent qualities of the paint itself. Casein paints need not be considered as competitive with other classes of paint. Admittedly they are inferior in certain respects. However, they combine many of the best qualities of both oil paints and wall paper to give attractive, beautiful, and low cost decoration for interior surfaces.

High light reflection, pleasing optical effects and true colors are

some of these desirable properties. These factors depend on the complete reflection of any illumination from the surfaces which surround the means of illumination. When these surfaces are coated with a paint film composed of a pigment and an adhesive and binding vehicle the reflection of light from these surfaces is dependent upon the light reflective qualities of both the vehicle and the pigment. Since casein paints are using the same pigments other paints use, any difference in the appearance of the paint film must be due to a different behavior of the vehicle itself.

Resists Discoloration

Yellowing of paints behind pictures which have not been moved for a long time and other color changes in paints due to heat, gases and exposure to light are familiar to every painter. It is definitely known that certain oils and gums are the cause of this after yellowing. A casein paint film by itself is substantially colorless and is similar in many ways to the gelatine used in photography. In addition to this a film of casein has great binding and adhesive strength so that it requires a relatively small amount to hold the pigment in a sound firm condition. Also casein by itself, in comparison with other paint vehicles, absorbs little light and does not change the color or character of the light when it is reflected.

Factory owners, owners of large warehouses, managers of large offices and many others concerned with the operating expenses of a business are concerned with this factor of high light reflection because the saving it effects in lighting bills is so substantial. Operators of large garages and other public places who might otherwise not paint at all are interested when they see savings in lighting which far outweigh the cost of painting. The permanence of this whiteness is another factor of interest.

The general impression always has been that a paint with a porous

surface must, of necessity, attract and collect much more dirt than one with a smooth surface. Experiments have shown that a rough surface such as presented by casein paint is continually "breathing" through microscopic pores. This prevents the formation of any dead air film at the surface and not only is it difficult for dust to settle there but any dust which does settle is removed automatically by the breathing of the film. This effect has been confirmed by test panels in smoky, dusty locations.

The advantage of quick drying and the ability to apply two coats from the same staging setup alone affords a considerable saving when using casein paints. The freedom from odor of evaporating solvents or thinners is also an item of considerable importance not only to the painter but to the customer.

The trend of modern decorating effects has been away from high gloss and sheen, and toward flatness and entire lack of gloss. Casein paints have carried this desirable quality still further than was possible with ordinary flat paints. This high degree of flatness which at times approaches almost 100 per cent matte reflection tends to smooth out and obliterate many of the defects in wall surfaces and particularly in rough surfaces.

The decoration of fresh concrete and plaster has always been a problem. Water paints with a casein binder can be applied to damp walls and are probably the safest type of paint to apply to plaster which has hardened but has not thoroughly dried. Formerly casein paints were

always made with the so-called extending pigments which are transparent when wet, but now there are paints of this kind on the market in which the pigments are opaque and which show much greater opacity when wet. Such paints are now obtainable both as powders and as pastes to be mixed with water and sometimes with a mixture of water and a small amount of oil. It must be pointed out in connection with the painting of concrete and plaster that lime, when it reacts with casein, forms an insoluble and permanently stable compound. For this reason casein paint may be applied to these surfaces while they are still "green" with no fear as to the effect on the casein itself. It must be remembered, however, that the pigments used must be lime and alkali proof.

Prevents Bleeding

Another use for casein paints is as a size on insulating and structural boards. It is also effective as a sealer over asphalt coatings to prevent bleeding.

Washing of walls painted with casein paint requires some special precautions. Casein paint surfaces must not be scrubbed. It has been found that this paint can be cleaned effectively by sponging it with water containing a slight amount of soap and approximately 3 per cent of formaldehyde. The formaldehyde serves the double purpose of hardening the paint film and preventing the worker's hands from becoming softened up by the water.

The manufacture of casein paints as well as their use is still a rela-

tively new development. It is probable, therefore, that many paints offered in this class will be poorly formulated and not give the results indicated above. Because of this, precautions must be observed in the purchase of these paints as well as any others.

The national bureau of standards has conducted exhaustive tests on casein paints for use on government projects and maintenance of government buildings. It was found, just as in the case of other types of materials, that careful testing and selection are necessary to be certain the most suitable and stable materials are finally selected. It is interesting to note that some of the paints tested showed bad settling and decomposition in the package only two months after their receipts, while others were in perfect condition after 32 months.

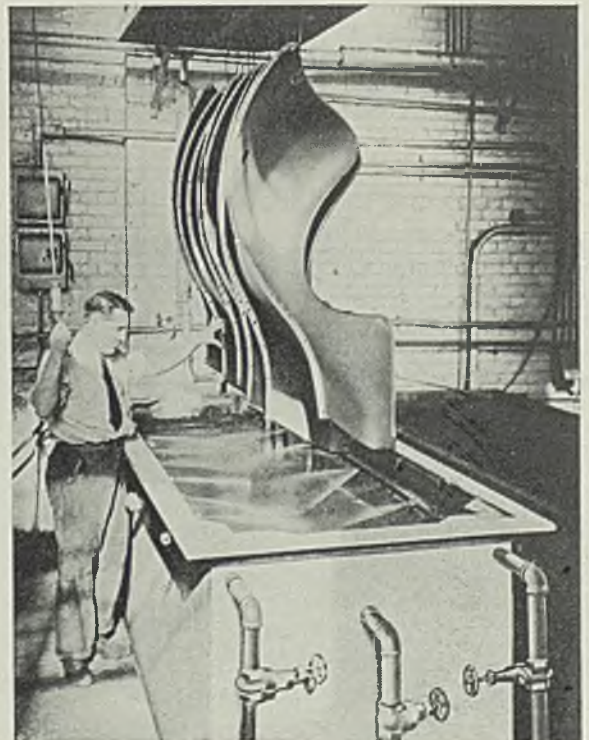
It is safe to predict that the use of casein paints will increase rapidly as painters and builders become more familiar with their application and limitations.

Plating Generators Require Protection from Acid Fumes

It is good practice to place a plating generator in a separate room from the plating tanks to protect it from acid fumes. In one plant the generator is placed on the floor below with bussbars feeding up into the center of the plating room, thus simplifying current distribution.

Rust Proofing Unit Developed for Small Plants

SPRAY application of chemical rust proofing solutions in a compact, low-cost installation has been accomplished in the unit shown here. This unit, developed by Parker Rust-Proofing Co., Detroit, combines the effectiveness of the Spra-Bonderizing process with the lower equipment costs and convenience of the immersion process. The process, known as Dip-Spra-Bonderizing, will produce a corrosion inhibiting coating on galvanized, zinc alloy and cadmium surfaces as well as on iron and steel. Equipment requirements are comparatively simple and easy to install, consisting only of a steam heated processing tank of suitable size, in which a spray pipe is placed above the solution level. Large or deep tanks are fitted with a spray pipe on each side



WELDING, etc.

by Robert E. Kinkead

Problem of Coloring Metal Interests Welding Experts

THOSE who are working on the problems of putting color in metals will find sympathy and help in the welding industry. The fact that a weld is usually different in color from the parent metal is a source of many difficulties in welding. The problem of how to predetermine the color of a metal is fundamental where color is treated as a property wholly separate and distinct from other physical properties. Metal finish on the surface is something entirely different from inherent color of a metal. There is apparently no limit to the controllable variation of color of surface finish of metals. To date, practically nothing of value has been accomplished in the direction of controlling the inherent color of the metal without changing the physical properties of the metal.

Production by the Germans of 9 per cent chromium, 12 per cent manganese steel for cutlery on account of the soft color tone as contrasted with the hard brilliance of conven-

IN THIS column, the author, well-known consulting engineer in welding, is given wide latitude in presenting his views. They do not necessarily coincide with those of the editors of STEEL.

tional cutlery stainless steels illustrates an attempt to solve the problem. Human taste will have to change considerably to permit any considerable percentage of common objects being made with bright metallic surfaces.

Pigmentation of metal to produce color effects is inconceivable to the metallurgist because he cannot imagine any substance which could be used for pigment which would not, in the fused state, combine with the metal to produce a wholly different set of physical properties. Yet, boron and tungsten in certain combinations with other substances are introduced into fused metal without combining with the metal itself. To suppose that these are the only sub-

stances which behave this way would seem unwarranted.

Perhaps it will be necessary to wait until the next depression when metallurgists will have more time to find the solution of the problem of predetermining the inherent color of metals without materially changing their physical properties.

♦ ♦ ♦

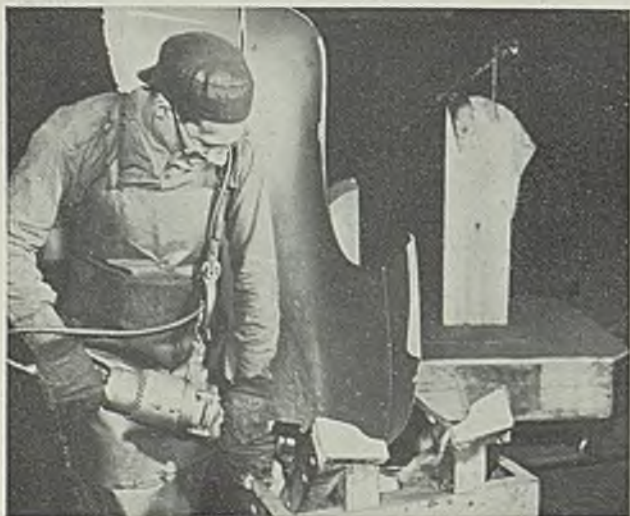
Mr. Roosevelt's Job

AFTER having dealt in a professional capacity with something over seventy companies in connection with their welding problems, we believe the most difficult job in the world is to be the administrative head of a business. The executive executes a plan he has originated and had approved by the administrative head of the business, or a plan handed to him to carry out. He knows the job to be done and the facilities with which he has to work. On the other hand, the administrative head of a business must make decisions of major consequence, the results of which may be good or may wreck the business.

Administration of a business would be simple if the administrator could know all of the facts before reaching a conclusion. The most successful administrators we have seen in action will hear the testimony of several men about what appears to be a fact or set of related facts before trying to establish what are the facts. It seems queer to find that necessary, but the fable of six blind men and the elephant has a basis in experience.

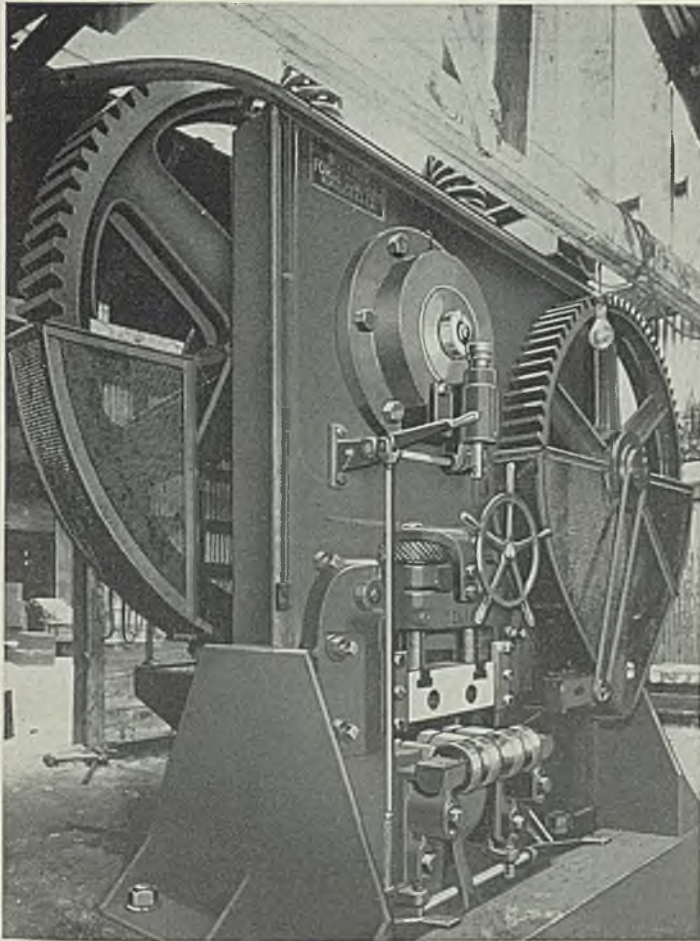
Administrative ability is rare and commands the highest compensation. The economic salvation of the country depends on men of that type working at their jobs. No greater calamity could occur during the next few years than for the administrative talent of the country to be diverted to speculation, partisan politics or industrial strife. That seems to us to be Mr. Roosevelt's job in the next four years.

Hand Tools Used in Production Grinding



DEPTH of the fendens on 1937 model Pontiac cars makes it impossible for a set of dies to do the entire job, and a small rear section is welded into place. Hand grinders are used to smooth the seam

"Buffalo" Billet Shears STAND UP!



● What do you demand of your cutting shears? Speed? Clean Cuts? Freedom from breakdowns? Adaptability to the job at hand? Rigidity?

If these are things you look for, you'll find them all and more in Buffalo Billet Shears. Their electrically welded frames of "Armor Plate" steel are guaranteed unbreakable forever.

We offer 4 standard types that will cut a wide variety of shapes and sizes. Capacities up to 8" squares.

Your metal-cutting problems can be handled economically on Buffalo machines. Why not let us make recommendations.

● Buffalo No. 15 Billet Shear. Cuts 7-inch square or 7 1/4" round bars. This type is used extensively in automobile and drop forge plants.



● Send for this bulletin on Buffalo Billet Shears. Contains much helpful information on shears and bar cutters.

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Good Housekeeping Is an Asset to Industrial Maintenance Departments

THE plant maintenance force occupies a position similar to the housekeeper in the home. There are housekeepers and also those who just stay in the house. With some the homes are always in order. Regular "tidying up" and periodic "going over" keep them that way. Others give a "lick and a promise," mostly promises, occasionally.

Plant housekeeping falls in one or the other of these classifications, too. The obvious amount of dust, dirt and leaking oil is often a fair indicator of the trouble, or freedom from trouble, under which the plant operates. Of course, the amount of dust generated in the manufacturing operations must be considered, but even a woodworking department shows whether the equipment is looked after or not.

Oil Leaks Cause Trouble

Since the combination of dust or dirt and excess oil is a common cause of much electrical and mechanical trouble with drives and machines, the prevention of the combination, or its frequent removal, are aids in preventing trouble. Leaking oil to a very large extent is unnecessary and is also a fire hazard. Too much oil, the wrong viscosity or improper application are commonly responsible for this condition.

With low-priced portable blows and vacuum cleaners built for industrial use there is little excuse for permitting dust and dirt to accumulate in motors and auxiliary electrical equipment. Many plants schedule periodic cleanings, varying from every week to monthly, depending upon conditions, with every two weeks as the most common period.

Good housekeeping for the equipment also has a good effect upon the

personnel of the maintenance force. With well appearing, clean equipment the tendency is for the men to endeavor to keep it that way and perform thorough, first-class workmanship on repairs. Working with dirty, greasy equipment imparts less regard for it and a desire to get the job over as quickly and easily as possible. Pride in workmanship is impossible under such conditions. For that matter the men can hardly be blamed for not taking more interest in the equipment than does the management.

♦ ♦ ♦

Lubricating Chains

ORIGINALLY silent chains were operated in the open and either ran dry or were lubricated by brushing a heavy oil or light grease on the back of the chain in operation. The lubricant worked into the chain bearings and also became an excellent dust catcher, which carried the dust into the chain bearings with it.

The use of chain casings, which are now practically universal, serves three purposes: (1) To exclude dust; (2) to retain lubricant; (3) for safety to drive and workers.

To exclude dust and retain lubricant, the chain casing should be tight with oil and dust retainers at the shaft openings. Safety requires a case substantial enough to resist any ordinary external force. Casings supplied by chain manufacturers, either in standard dimensions or built to order, fulfill these requirements by welded construction and efficient design to facilitate lubrication.

When chains are enclosed lubrication is usually accomplished automatically, either by the splash system or by oil slingers. In the

splash system, which is often used where the lower chains is approximately horizontal, the bottom of the case is filled with oil so that the chain touches the oil and splashes it over the chain.

Where one end of the chain is low, usually at the motor or sprocket, oil pockets in the low end of the case. In such cases a disc or slinger is mounted on the shaft alongside the sprocket and inside the casing. In operation the disc dips into the oil and throws it to the top of the casing which dips in the form of an inverted cone; the oil drips from the point of this cone onto the chain and works into the pin bearings.

The oil reservoir should be emptied periodically on frequencies varying according to the amount of dust in the atmosphere and the severity of the service. Seldom is it advisable to flush out the case with gasoline as any light oil remaining in the case will dilute the fresh oil. In any case gasoline should not be permitted to contact the chain unless it is removed and carefully relubricated before again putting in operation.

♦ ♦ ♦

Best operating speeds for leather belt drives are between 3000 and 3500 feet per minute. Exceeding these speeds necessitate excessive belt tensions with resultant shorter life and greater maintenance and should be avoided wherever possible.

♦ ♦ ♦

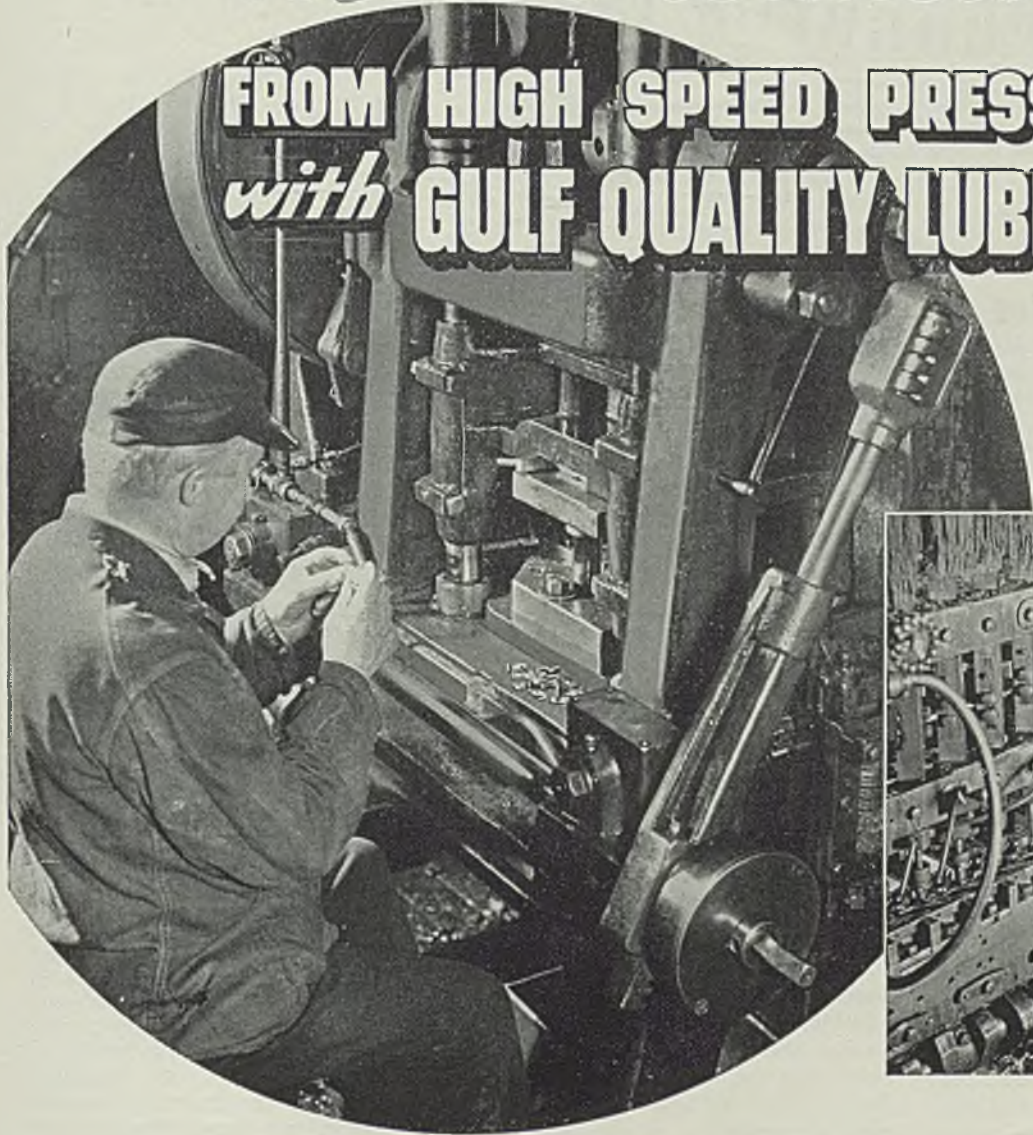
Inaccuracy of division of teeth and of tooth profile and improper lubrication are three possible causes of gear noise. Imperfect matching of spiral and herringbone gear teeth also tends toward noisy operation.

♦ ♦ ♦

Do not expect long life with four multiple v-belts when five had been recommended.

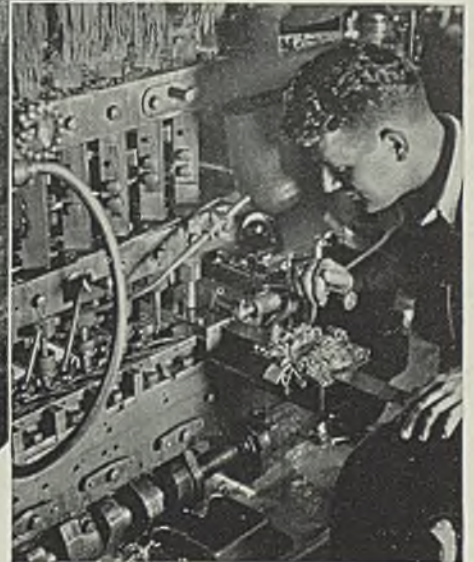
More Production

FROM HIGH SPEED PRESSES
with **GULF QUALITY LUBRICANTS**



(Left) This high speed press produces steel stampings, completing several operations at each stroke. Gulf lubricants help keep production at a high rate.

(Below) This press produces a large variety of steel and brass parts with extreme accuracy. Because of the close fitting dies and the long, deep draws, proper lubrication is vital.



Efficient Lubrication saves time-out-of-service for Adjustments and Repairs

● A high production rate is vital to profitable operation for such machines as are shown above. Time out for adjustments and repairs means lost production, higher operating costs and as a result, lower profits.

Metal working plant operators who are striving for a high rate of production these days are rec-

ognizing the need for proper lubrication. They are calling in a Gulf engineer to assist them in placing the lubrication of all their equipment on the most efficient basis possible. This service is extended to all users of Gulf lubricants from Maine to Texas without charge. A Gulf engineer is always at your service.



GULF OIL CORPORATION ★ GULF REFINING COMPANY

GENERAL OFFICES: GULF BUILDING, PITTSBURGH, PA.

PROGRESS IN

STEELMAKING

Develops Plastic Packing

An all-service packing with a new antifrictional lubrication has been made available for steel plant use. Exhaustive tests have shown that this new product provides a permanent antifrictional seal. It is resilient, flows readily under gland pressure and has no tendency to harden or dry out. The packing is composed basically of extremely fine particles of new alloy. A special high-temperature binder containing flaked graphite completely covers and saturates each particle of alloy and each strand of long fiber asbestos. The material is processed for even distribution and resistance to high temperatures. It is available in spiral form—something never before attempted in a plastic packing.

Simplifies Marking Steel

Stamping steel with numerals or letters ranging in size from 1/16 to 3/4-inch is facilitated by a multiple-wheel die. The numerals and letters are engraved in tool steel wheels which later are hardened. The wheels are assembled so that each can be revolved independently of the others; all can be locked into the position desired. The frame is made with an indentation on each side to permit aligning the stamp for a desired position in case it is not possible to line to the front edge of the frame. Striking the shank of the stamp with a hammer makes an impression. The stamp is available with four or more wheels.

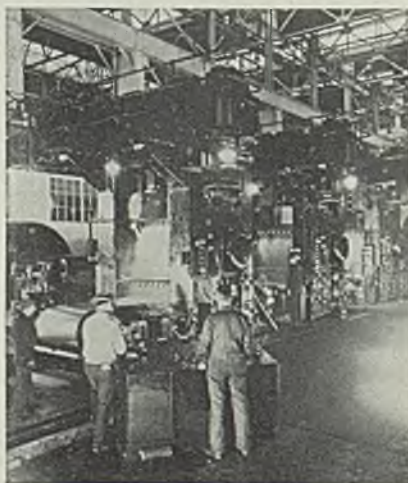
Insulation Effects Savings

Insulation of open-hearth furnaces from the ground up at a large steelworks not only has effected a savings in fuel and refractories but has permitted melters to make a better grade of steel in a shorter time. For the same amount of gas, a larger quantity of air is required at the intake. The reason for this is that the downtakes, regenerators and furnace proper is made airtight. Under former working conditions the air was drawn in through

numerous cracks. Air added at the intake passes through the checkers and is preheated. This affords better control in burning the gas to give up its heat to the bath of metal, thus effecting a fuel saving. Producer gas requirements on a fully insulated furnace is estimated as the equivalent of 150 pounds of coal per ton of steel made. Because of the close control of the atmosphere over the bath, operators find it easier to

Regulates Tension of Strip

INCLUDED among the many features of the 3-stand tandem cold strip mill at the plant of the Ford Motor Co., Dearborn, Mich., are the latest developments in electric control. Adjustable-voltage control of threading and running speeds are provided, and accurate indication and automatic control of tension between stands obtained. Applied for the first time is a new General Electric tension regulator which measures and controls the strip tension, thus helping to maintain accurate and uniform thickness of the finished strip. By means of an electric gage, the tension is measured on the strip itself instead of depending on the power input to the driving motors. A view of the 3-stand cold mill train is shown below



control the slag and quality of the steel. Since less gas and air are used the volume of fuel burned is less; its velocity is less. Consequently, there is less impingement and wear on the refractories and less slag in the slag pockets. The life of the silica brick in the roof is increased about 15 per cent because of the uniform heating of the brick improving the resistance to spalling. Since insulating the furnaces at this plant melters have found that cooling is slower and the melting temperature is reached more rapidly after charging. Following the shutdown at the end of the week approximately two to three hours is saved in the heating up time.

Records Slab Temperature

At a broad stripsheet mill in the Great Lakes district the heat of the slab as it enters the train of rolls is recorded by a device installed at the discharge end of the heating furnaces facing the roller tables which conveys the heated slab to the mill. The instrument is connected with the optical pyrometer in front of the finishing mills. By watching this indicator the furnace operator can determine whether the slabs are leaving the furnaces at temperatures too high or too low, and can make whatever adjustments that are necessary.

Prolongs Life of Parts

Heat resisting parts made of either metal or refractory materials can be protected from chemical and heat reactions by a newly developed coating which withstands temperatures up to 3600 degrees Fahr. The product is shipped dry and requires water for mixing. Economies claimed by the use of the material are longer life of equipment, less loss of time because of shutdowns, less labor required for maintenance, prevention of "iron pickup" by molten metals, and lower manufacturing costs. The new coating is recommended for crucibles, iron melting pots, ladles and spouts, furnace walls, lining and muffles, plungers and skimmers.

Improved Magnetic Pulley Ventilated By Action of Conveyor Belt

OPERATING action of the conveyor belt is used by this magnetic separator pulley for an unusual type of radiating ventilation which serves to reduce the heat around the coils, thereby producing a more powerful pull and sustained efficiency in prolonged action. Through a system of ducts, air is forced into the radiating areas of the pulley by the upper belt and in turn is sucked out by the action of the return belt. This provides a continuous circulation of fresh air through the pulley.

By this design the pulley exerts more magnetic pull in pounds per square inch, an increase in power which is appreciated particularly during rush and overload periods. Pulley castings are one piece and are annealed to insure maximum permeability. The pole or flanges of the coil sections are sloped toward the core, giving increased area and consequent greater flux density or magnetic strength at the face of the pulley.

Manufacturing Methods

After machining, the casting is heated slowly to a temperature of 300 degrees Fahr., after which three coats of special enamel are each baked on. After the casting has cooled, several layers of mica provide further insulation before the magnet wire is laid. After connections are applied the coil windings are covered with mica plate and all voids filled with impregnating compound, including the space between the coil windings and the steel covering bands. It has been found that this precaution allows rapid dissipation of the heat produced by the windings through the forced ventilating system.

Steel coil covers are used because their co-efficient of expansion keeps

them intact and because they spread the magnetic lines of force over the entire face of the pulley. Tests show steel covers increase magnetic pull appreciably. Another important reason for the use of steel plates is the fact they are attracted to the pulley magnetically, thus preventing possibility of their becoming loose and causing trouble.

The equipment is supplied by Stearns Magnetic Mfg. Co., Milwaukee.

Annealing Steel by Resistance Heating

WHILE resistance welding is primarily a method of joining metals on a production scale at high speed and low cost, there are times when the process can be adapted by a few simple changes to operations

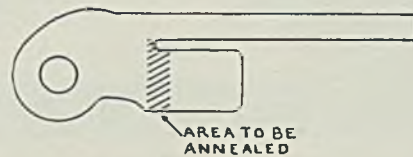


Fig. 1—Without an anneal, this steel stamping broke at the point indicated when formed to shape

quite different from welding. The butt welder used to heat and bend forgings is one example; the machine built like a seam welder and used for continuous heating of tubing and machine adapted to heating and pulling wire apart are others.

Still another of these by-products of resistance welding that has great

possibilities is the use of resistance heating for annealing metal parts, particularly when the area to be annealed is limited to a section of the whole piece.

The product in this case is a stamping which is formed into a piece of automotive hardware. Just before the annealing operation it appears as shown in Fig. 1. The shaded area represents the section that is annealed to prevent breakage

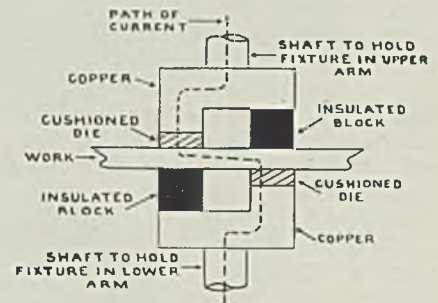


Fig. 2—With this simple fixture applied to an electric resistance butt welder, the stamping was annealed quickly and effectively

when the stamping is formed to shape. The operation is performed on a foot-operated, 10-kilovolt-ampere capacity spot welder fitted with a simple fixture shown in cross section in Fig. 2.

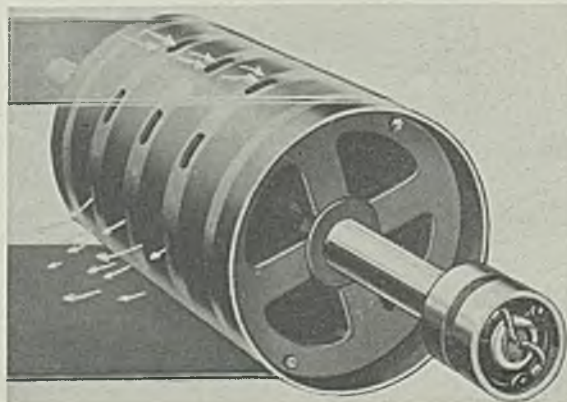
Current flows through the shanks which are attached to the upper and lower arms of the spot welder. The direction of flow is controlled by the arrangement of contacts and insulated blocks which prevent the current from passing directly through the stock and force it to flow through the area to be annealed. The cushioned faces on the dies take care of any slight irregularities in the steel and insure uniform heat through the area between the copper and insulated dies.

Mechanical Year Book in Step with New Methods

Mechanical World Year Book, 1937; cloth, 560 pages, 4 x 6 inches; published by Emmott & Co. Ltd., Manchester, Eng.; supplied by STEEL, Cleveland; in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

Uniform with preceding editions this yearbook covers mechanical engineering topics, with a section on toothed gearing. This was added to reflect improvements in toothed gearing design and manufacture to keep pace with increased speeds in machinery. This section is entirely new and contains most recent data on this subject.

Other sections have been revised to parallel developments in the several departments of mechanics.



ARROWS show course of air as belt passes over magnetic pulley. Ventilation is claimed to increase efficiency of separator, especially with overloads

Prefabricated Stack Welded in One Piece Raised by Unique Crane

THE statement often heard about someone "going at things backwards" is seldom received as complimentary. Ordinarily it is not consistent for the tail to wag the dog. A recent outstanding and peculiar development in cranes, however, plainly demonstrates that it can be done in some cases with remarkable effectiveness. The crane to which reference is made is the latest addition to the line of tractor cranes manufactured by R. G. Le Tourneau Inc., Peoria, Ill.

The crane shown in the accompanying illustration, works both backward and forward. That is to say, what ordinarily is the tongue of the crane and usually is attached to the drawbar of the tractor is used in this case as a boom. This tongue, here used as a boom, is 80 feet in length, so it may be used to pick up a stack 100 feet long at a point well past the center, and to swing

it up into position in the manner shown. The boom sheave housings of this crane carry 10 sheaves each. There being one sheave in each boom sheave housing utilized in carrying the load line, there are nine sheave wheels in each housing which can be used for booming, thus making a total of 18 strands of cable passing between the two housings.

Six Tires Support Load

Ample width is provided in the wheel base, the load being supported on 6 huge tires. The crane boom or tongue, as used in this case for lifting exceedingly heavy and very bulky loads, is provided with a heavy steel loop that attaches to the tractor drawbar. The number of sheaves in the housing at the end of the 80-foot tongue may vary, depending upon the maximum load to be lifted to great heights. With

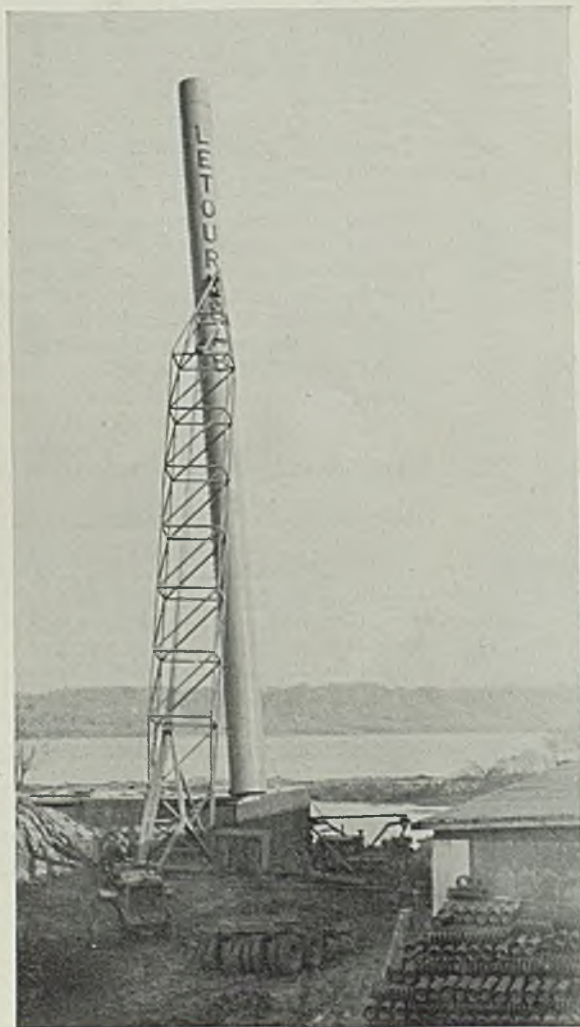
the tongue boomed high into the air, very heavy loads can be handled to advantage.

The crane is expected to become a welcome chore-boy about the Le Tourneau plant, as well as being used in the handling of heavy production work. Both tongue and crane proper being framed together of box beams, and the former effectively bridge braced to withstand thrust and strain from every direction, it has already demonstrated complete effectiveness on heavy and difficult installation jobs, having placed the heavy new boilers in the same plant where the stack is shown in process of erection. The company expects also to use it in heavy maintenance work and in the shifting of heavy machine equipment as necessary. Its high degree of mobility to spots difficult of access to other forms of equipment, and the extreme range of its scope as to power, height and distance, are expected to win for it a large place.

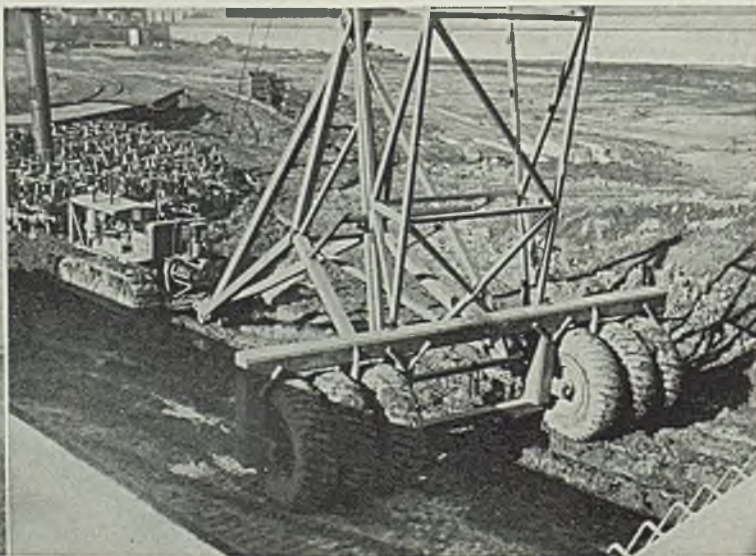
The stack shown was fabricated by welding together the sections of steel plate which make up the structure. It is 53 inches plus in diameter, and was made up lying at full length on the shop floor, the ladder steps also being welded into position.

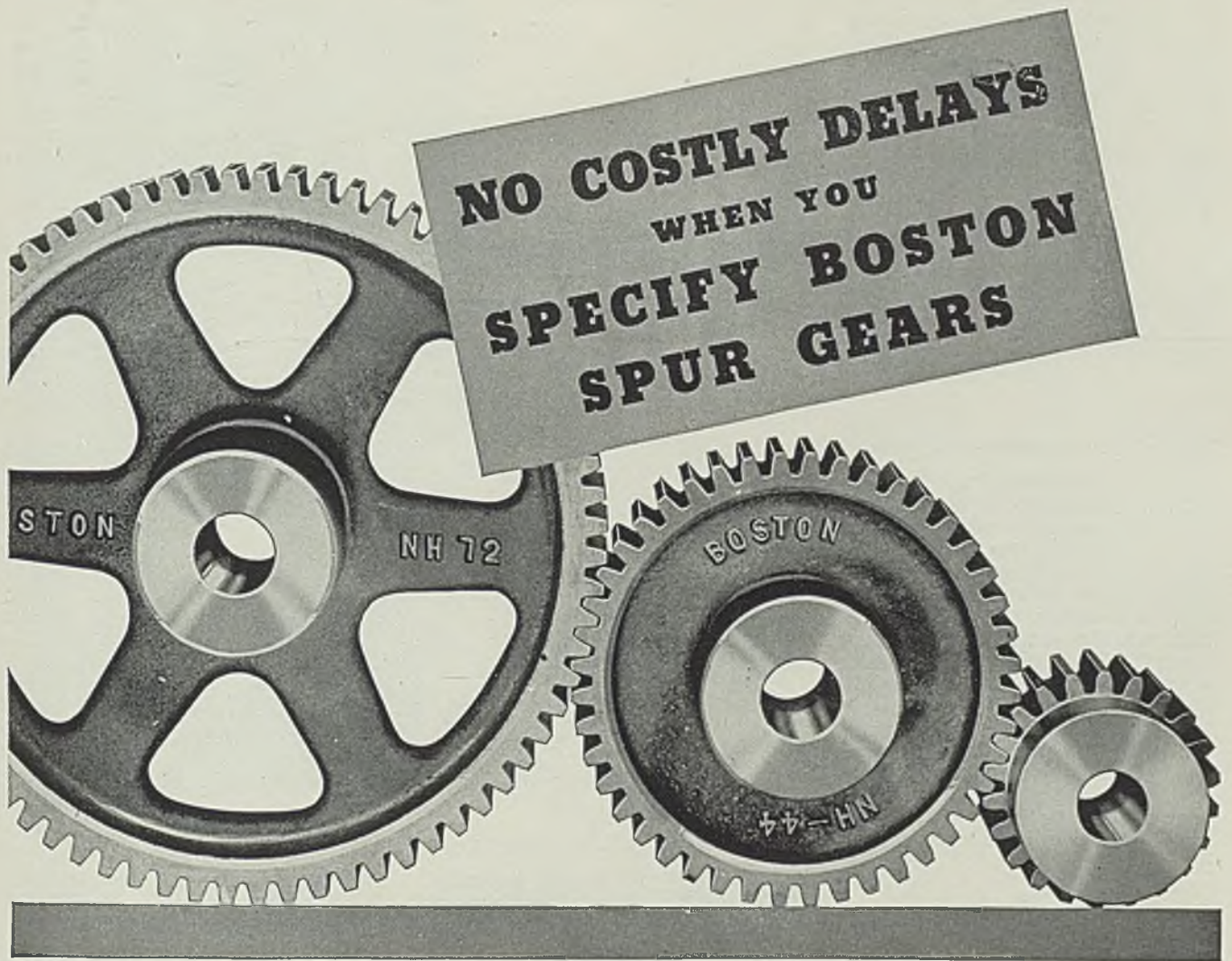
Metal Forming Operations Combined in One Machine

A line of special machines which form flat metal strips not only into sectional shapes but also in side bends to any desired outline has been developed by the Bailey Co., Amesbury, Mass. Former methods separated the two functions. The company produces sectional formed shapes for moldings; these are rolled from strip metal combined in many cases with fabrics such as cotton cloth, felt or plush.



PREFABRICATED in one piece by welding, the stack, is shown at left raised in a vertical position by the tractor crane. Closer view of the tractor crane base supported by six oversize pneumatic tires is shown below





Forty-three pages in our new General Catalog 51 are devoted to stock spur gears manufactured by us. These are made from Steel, Cast Iron, Brass, Textolite, and Fabroil. Every one of these spurs is a stock item. Simplify your spur gear problem—select your gears from our General Catalog 51—then order from stock. To best serve you Boston Spur Gears are carried in stock in forty-five distribution centers throughout the country. Boston Stock Gears are better than special gears.

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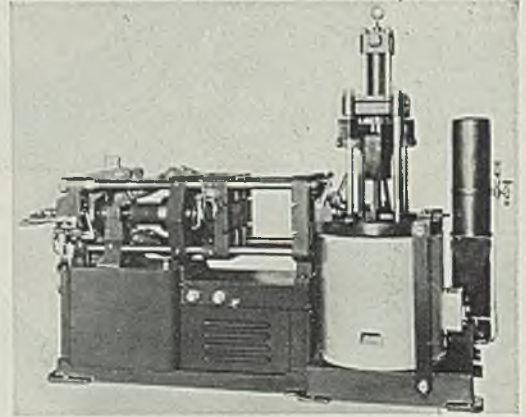
Underfeed Clinchor—

Tomkins-Johnson Co., Jackson, Mich., announces a new 24-inch throat underfeed clinchor which makes possible the handling of large, awkward pieces. Throat depths have previously been limited to 8 inches. Clinch nuts are automatically fed to the ram. The work is located over the nut which is set by a single stroke of the ram, and ram stroke is actuated by a slight pressure on the foot treadle. At the end of the up stroke of the ram, another clinch nut is supplied to the anvil. This cycle is automatic. However, each operation in the cycle may also be accomplished manually.

Die Casting Machine—

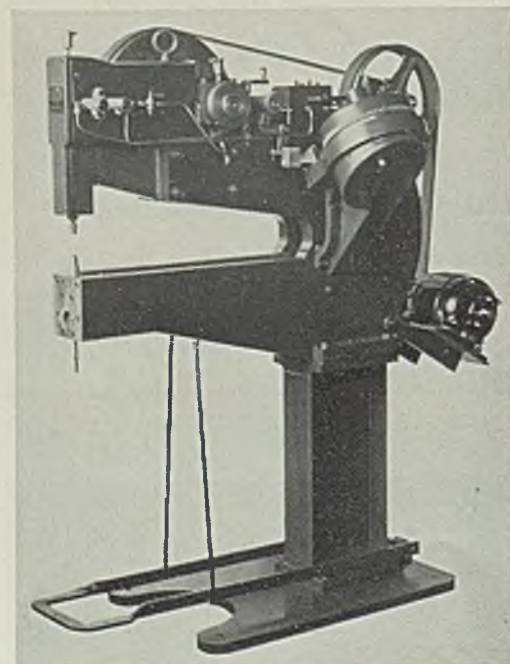
Phoenix Ice Machine Co., 2703 Church avenue, Cleveland, have recently placed on the market the new Lester H-HP2 die casting machine. Moving parts of this unit

Lester H-HP2 die casting machine designed for casting zinc or white metal has recently been announced by the Phoenix Ice Machinery Co.



are operated by a self contained hydraulic mechanism. The die movement is a combination of hydraulic cylinder and linkages and insures positive die lock. All links and toggles are made of solid bar steel. All parts of the cycle of operation are automatically controlled and are adjusted by means of finger tip con-

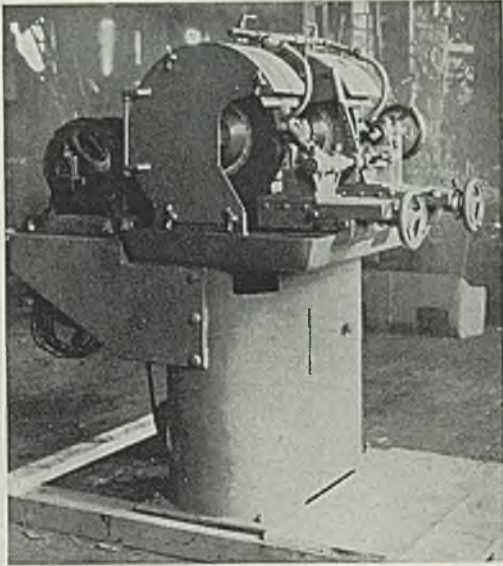
trol. Methods of adjustment make it possible to fit new dies accurately without misalignment of the die plates. Metal plunger is operated directly by a hydraulic cylinder, so designed as to give self-adjustable and rapid injection stroke. The nozzle is built of heat resisting material and a simple ball-joint is machined on both ends. A solid type plunger operates in a goose neck bushing, the goose neck being cast together with the melting pot. The furnace is round, insulated and lined with fire brick. A range of 400 to 600 cycles per hour can be completed on this machine providing the die will allow the casting to be made efficiently at this speed. This unit is built for zinc or white metal castings, although quotations are available on machines for other metals such as aluminum, brass and magnesium.



Tomkins-Johnson underfeed clinchor equipped with a 24-inch throat for handling large or awkward pieces

Rock Bit Grinder—

Mine & Smelter Supply Co., Denver, has recently placed on the market a heavy-duty rock bit grinder. The machine is a self-contained wet grinder, equipped with standard V-belt motor drive, water tank within the base and a centrifugal pump. Models are also available for flat-belt drive or as a bench model with or without drainage pan and with or without pump. Babbitted or anti-friction bearings are available



Heavy duty wet grinder for grinding rock drill bits, built by the Mine & Smelter Supply Co.

on all models. The two wheels are the V-face wheel for grinding cutting edges and a bevel-face wheel for grinding faces. The wheels are 22 inches apart, allowing two operators to work side-by-side. Features of this machine include water piping with individual valves for each wheel; gaging dial for checking bit diameter; hand feed for regulating position of bit holder and wheel dresser holder, and water-storage tank with three settling compartments incorporated in the base. Spindles and bushings are obtainable for all types and makes of bits.

eration is controlled by a foot switch which acts through a solenoid clutch. The machine may be operated continuously or worked one cycle at a time. Terminals are water-cooled, and if desired electrodes may be water-cooled also. Capacity of the machine is two pieces of 1/16-inch clean iron or steel. It has a pressure range of 25 to 100 pounds and a throat depth of 4 3/4 inches.

Straight Side Press—

Zeh & Hahnemann Co., Newark, N. J., has recently added a new

straight side press to its line. Capacity of the new machine is 200 tons; frame and pitman are of solid steel castings; bearings are bronze bushed and the press is executed with wedge adjustment for rigid conception. Press has a normal stroke of 4 inches and a maximum stroke of 12 inches. Twin spiral gears are used and the back gear shaft runs on heavy-duty roller bearings. A twin-disk clutch acts as engaging means. Distance between pillars is 25 inches, bed area 22 x 22 inches, speed of the back gear shaft 360 revolutions per minute and a 10 horsepower motor is required to run the press.

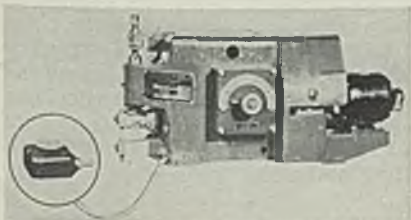
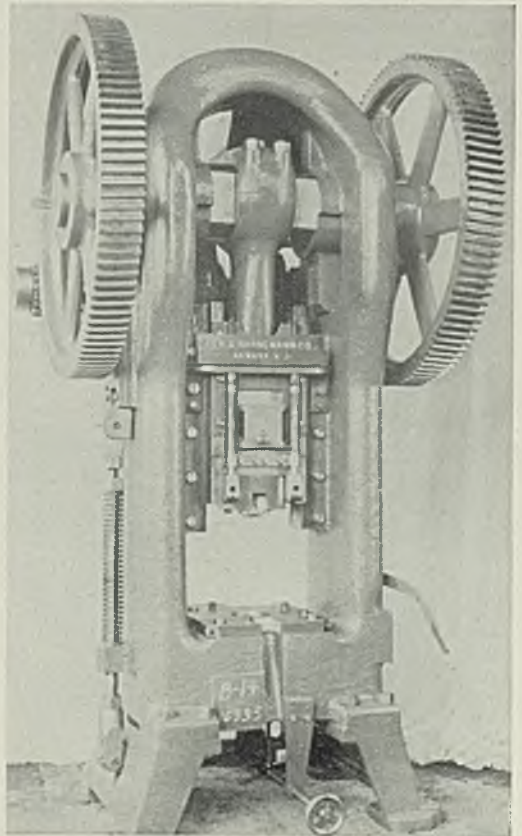
Voltage Regulator—

American Transformer Co., Newark, N. J., has recently announced an improved voltage regulator for alternating current circuits which is known as the type TH Transtat and is available in various standard sizes for controlling voltage to load up to 2.5 kilovolt-amperes on either 115 or 230 volt lines. Control throughout the entire range is at a uniform rate, increments being 0.5-volt each. Equipment has no effect upon power factor and does not cause wave-form depression, line surges or interference to radio receivers. The unit consists of a transformer coil surrounding an annular steel core and a carbon brush which is arranged so that it may be rotated in continuous contact with a com-

Bench Type Spot Welder—

Thomson-Gibb Electric Welding Co., Lynn, Mass., announces a new bench type spot welder designed for mass production welding of small parts. The machine is compact in size, accurate in timing and precise in the application of pressure. Power is supplied by a 10-kilovolt-ampere transformer and motor driven by a 1/6-horsepower motor working through a reduction unit. A cam at the back actuates a rubber arm which moves the welding spindle up and down with a straight line motion. The machine is equipped with an adjustable pressure spring to further uniformity in the application of pressure. Op-

Zeh & Hahnemann 200-ton straight side press which has a normal stroke of 4 inches and a maximum stroke of 12 inches



Thomson-Gibb bench model spot welder for mass production welding of small parts



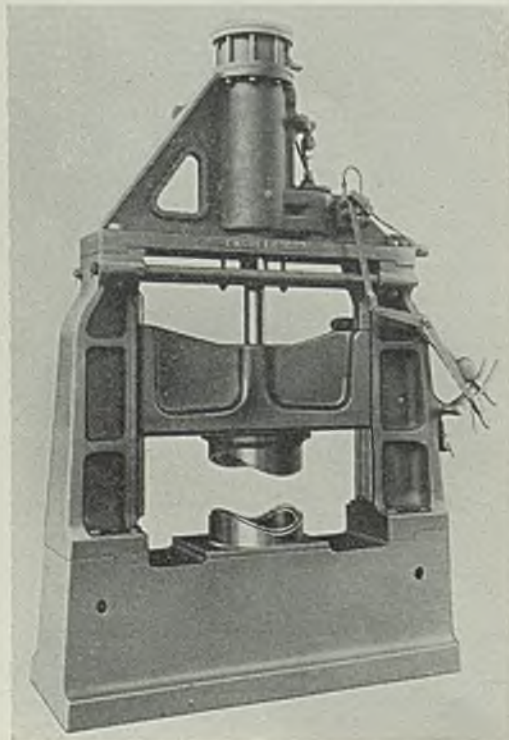
Type TH Transtat voltage regulator for alternating current circuits

mutator formed on the winding by removing insulation from the wire in a narrow track around the circumference. Standard regulators are designed for service in single-phase circuits of relatively low voltage and limited capacity. Special methods have been developed which permit the use of these units for regulating higher voltages over an extended range and for controlling polyphase circuits.

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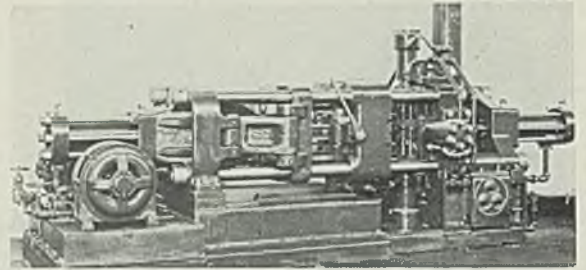
Pneumatic Hammer—

Chambersburg Engineering Co., Chambersburg, Pa., has recently placed on the market a pneumatic



Chambersburg pneumatic hammer designed for use in making airplane wing and fuselage sheathing

Brass die casting machine, semiautomatic in operation, newly announced by Reed-Prentice Corp.



hammer designed for use in making airplane wings and fuselage sheathing. The hammer is operated from the normal shop supply of compressed air ranging from 75 to 100 pounds per square inch. The cylinder is smaller than that usually fitted in a steam or air operated hammer and the ram is of light weight ribbed design. Ram weight may be adjusted for the general design modified to accommodate any particular shape to meet special requirements. The tool may be operated by the hand levers, or a special type of treadle may be supplied if this type control is preferred. The blow may be delivered and if desired, the pressure maintained for any length of time with the ram or the upper die in contact with the work. Hammer may be supplied to perform work of any size or type.

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Brass Die Casting Machine—

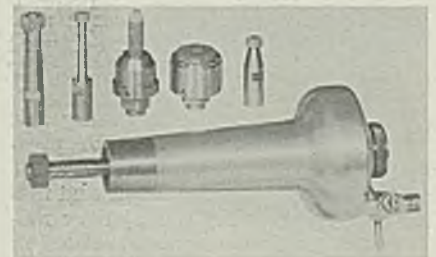
Reed-Prentice Corp., Worcester, Mass., is introducing a new brass die casting machine. The machine is semiautomatic in its operation, the operator throwing a lever to

close the dies and cores. The second operation is to ladle the material into the metal cylinder from where it is forced into the dies by the operation of the plunger. From that point the cycle is automatic. The first timing period determines the time to pull the cores, the second allows time for cooling before opening the dies, the third allowing the plunger to follow the moving die and force the metal slug out of the cylinder before it returns. Machine is mounted on a heavy steel fabricated base. Toggle mechanism and auxiliary die plates are of steel and the large die plates are of semisteel. Stationary die plate is water cooled. A nitrogen bottle is furnished which acts as an accumulator and increases plunger speed.

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Grinder—

Onsrud Machine Works, 3900 Palmer street, Chicago, has recently developed a new air turbine grinder which develops ½ horsepower and 33,000 revolutions per minute. The most unique feature



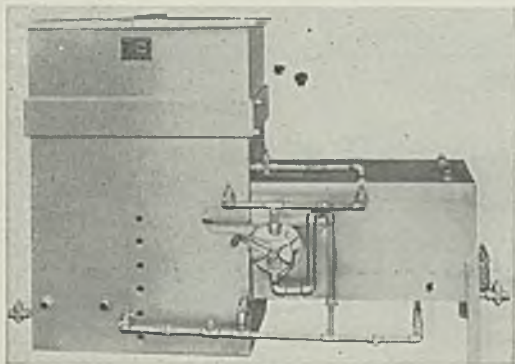
Onsrud air turbine grinder employs a unique system of lubrication

of the new machine is the system of lubrication employed. The spindle is hollow and filled with oil. Centrifugal action feeds the oil through resistant elements or plugs to the bearings in the form of a mist or film. There are no oil cups or grease cups and the bearings are assured of correct amount of lubrication when the tool is running and none when idle.

♦ ♦ ♦

Degreaser—

G. N. Blakeslee & Co., Nineteenth street and Fifty-second avenue, Chicago, has recently introduced a



Small degreaser recently announced by the Blakeslee company arranged for steam, gas or electric heat

small degreaser arranged for steam, gas or electric heat. The unit is supplied with or without hand pump and storage tank. The machine cleans metal parts with the liquid or vapor method, having closed cycle solvent handling, and is self-contained and self-distilling. An auxiliary storage tank is provided for storing the clean distilled solvent which flows from the degreaser by gravity. The storage tank is equipped with cleanout door, drain and vent. Parts are cleaned by immersing in the boiling liquid wash, then rinsing in the pure solvent distillate and finally suspended in the chemically pure solvent vapor.

Disk Sander—

Stanley Electric Tool Division, Stanley Works, New Britain, Conn., has recently designed a new electric disk sander built for production and repair work. It is ball bearing equipped throughout, sturdily constructed, light in weight and compact for use in close places. The



Stanley disk sander has been designed for production and repair work

tool is furnished with a high speed universal motor enclosed in an aluminum alloy housing. Unit is furnished complete with a 7-inch flexible pad, 12 sanding disks, wrenches and a heavy rubber covered 3-conductor cable. The sander may be used on wood or metal for heavy or light work.

Tool Kit—

Carboloy Co., Detroit, announces a new tool kit for general machining operations. The kit contains

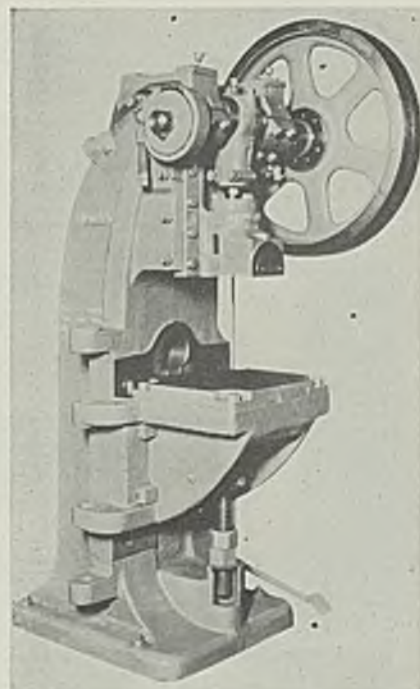
nine tools milled and brazed, and is particularly well adapted for smaller shops whose limited production of any one kind of parts does not warrant the purchase of single purpose carbide tools. The tools in the kit are designed for general turning, facing and boring operations on engine lathes, turret lathes, boring mills and boring bars. All operations on these tools have been completed except the grinding.

Clutch Mechanism—

Niagara Machine & Tool Works, Buffalo, N. Y., announces the addition of a 14-point sleeve clutch with built in single stroke mechanism through the standard equipment on the complete line of Niagara horn presses. Features of the Niagara sleeve clutch included instant engagement, built-in single stroke mechanism with throwout running on antifriction bearings, positive lock for use when setting dies, large striking and driving purposes and long life.

Metal Handling Truck—

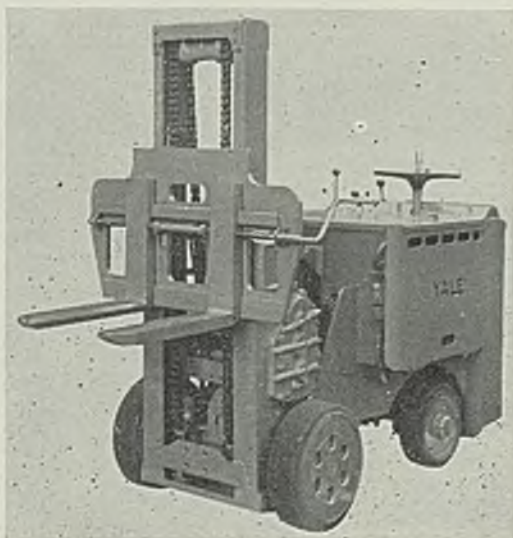
Yale & Towne Mfg. Co., 4530 Tacony street, Philadelphia, Pa., has recently announced a fork-type industrial lift truck adapted for



Niagara horn press equipped with the new 14-point sleeve clutch with built-in single stroke mechanism

use in pig handling in the metal refining industry, which may also be used for general work in the pallet system of handling. The forks are designed to grip the pigs firmly and can be laterally adjusted by a hand crank to handle any length pigs. Truck has a maximum capacity of 4000 pounds and is built to turn around in an aisle 6 inches longer than the total length of the truck and load. Battery compartment permits both top and side removal of the battery, and the battery connector plug can be disconnected from the outside of the battery compartment. Important feature of this truck is two sprocket-hoist chains, each capable of supporting the load.

Yale & Towne has recently announced this fork type truck designed for handling metal pigs of all sizes



RECENT PUBLICATIONS OF MANUFACTURERS

Copies of any of the literature listed below may be obtained by writing directly to the companies involved, or by addressing STEEL, in care of Readers' Service Department, 1213 West Third Street, Cleveland.

Socket Screws—Holo-Kromo Screw Corp., Hartford, Conn. Catalog on its fibro forged socket screws.

Steel Service—E. I. Du Pont de Nemours & Co., Wilmington, Del. Bulletin giving testing methods and pickling control charts.

Adjustable Die Head—Geometric Tool Co., New Haven, Conn. Bulletin No. EJ4-1, descriptive of a small solid adjustable die head.

Annealing Furnaces—Surface Combustion Co., Toledo, O. Bulletin No. 78, illustrating controlled atmosphere annealing furnaces for nonferrous metals.

Threading Equipment—Oster Mfg. Co., Cleveland. Catalog covering its entire line of pipe and bolt threading equipment and welding equipment.

Pulverizer—Whiting Corp., 15600 Lathrop avenue, Harvey, Ill. Catalog No. 15, covering the company's complete line of pulverizing and pulverized coal firing equipment.

Forgings—Champion Machine & Forging Co., Cleveland. Booklet No. 200-5M, illustrating and describing its facilities for producing forgings of various types up to 600 pounds each.

Chronometer Valve—Union Water Meter Co., Worcester, Mass. Catalog No. 67, illustrating chronometer valves including price list and weights. Catalog No. 56, illustrating brass goods and listing prices.

Blast Generators—Ruemelin Mfg. Co., 3860 North Palmer street, Milwaukee. Bulletin No. 36, illustrating its line of direct pressure blast generators used in a variety of cleaning operations.

Agitators and Mixers—Patterson Foundry & Machine Co., East Liverpool, O. Catalog No. 375, just published, illustrates many of the company's products, giving detailed specifications of each.

Roller Chain—Chain Belt Co., Milwaukee, Wis. Bulletin No. 291, describing Rex roller chain. Bulletin No. 292, describing Rex Grip-

lock chain. Bulletin No. 293, describing Rex Z-Metal chain.

Metallographic Equipment—Bausch & Lomb Optical Co., Rochester, N. Y. Bulletin No. E-240, illustrating its new research metallographic equipment, a complete, co-ordinated outfit for visual and photographic work.

Engine Jacket Water Coolers—Young Radiator Co., Racine, Wis. Bulletin No. 1136 on its new line of engine jacket water coolers, for use in engines using gasoline, gas or oil, and for cooling air compressors.

Forgings—Champion Machine & Forging Co., 3725 East Seventy-eighth street, Cleveland. Folder No. 200-5M, briefly illustrating the service this company offers in research engineering, forging and heat treating.

Welding Pipe Lines—Linde Air Products Co., 205 East Forty-second street, New York. Booklet No. 2367, illustrating an improved welding method used in the construction of over 8000 miles of cross-country pipe lines.

Gas Engine—Cooper-Bessemer Corp., Mt. Vernon, O. Bulletin No. 309, describing a gas engine, type GN, in 3, 4, 6, and 8 cylinders, rated at 50 to 80 horsepower per cylinder, convertible to a strictly modern diesel.

Temperature Control—Automatic Temperature Control Co. Inc., 34 East Logan street, Philadelphia. Bulletin No. G-11, describing and showing some results of the new ATC balancer for control of temperature, pressure and other variables.

Roller Chain—Whitney Chain & Mfg. Co., Hartford, Conn. Bulletin V-110 A, describing the Whitney roller chain flexible couplings, including detailed tables giving service factors, standard bore tolerances, standard keyways, coupling cover dimensions and list prices.

Protecting Field Coils—Reliance Electric & Engineering Co., 1088 Ivanhoe road, Cleveland. Folder

No. 1202, describing methods used in protecting field coils of direct current motors and generators from damp, dirt, corrosive fumes and deterioration under severe operating conditions.

Handling Electric Industrial Truck Batteries—Electric Storage Battery Co., Allegheny avenue at Nineteenth street, Philadelphia. Bulletin No. 205, describing and illustrating battery handling systems and equipment for changing batteries quickly and easily.

Electric Air Heaters—Electric Air Heater Co. division of American Foundry Equipment Co., Mishawaka, Ind. Booklet No. 337, describing its line of electric heaters, construction of which involves casting of aluminum fins around a General Electric calrod heating element.

Chronicle of Automotive Industry—Eaton Mfg. Co., Cleveland. A chronicle of memorable events in the brief but prodigious history of the automotive industry, including many photographs of the first cars and of those pioneers who did so much to keep the industry alive in its early days.

Power Pumps—Fairbanks, Morse & Co., 900 South Wabash avenue, Chicago. Bulletin No. 6160, describing characteristics and applications of duplex power pumps. Booklet illustrating its complete line of diesel engines. An introduction traces briefly the development and explains the operation and uses of diesels.

Broach Sharpening Machines—Colonial Broach Co., Detroit, Mich. Bulletin No. 104-9A, describing its broach sharpening machines. Bulletin No. 104-9J, showing a layout of the various basic types of standard broaching machines. Bulletin No. 104-9H, covering its high speed pull up line broaching machines. Bulletin No. 104-9D, describing light duty presses. Bulletin No. 104-9B, describing its single ram surface broaching machines. Bulletin No. 104-9K, illustrating the high speed "Pusher," for continuous automatic broaching of small parts.

Week's Output Up Despite Strike and Flood

Ships, Cars, Promise

Tonnage; Export

Demand New Factor

ALTHOUGH implications of the strike in plants of General Motors Corp. may carry a threat to the steel industry actual effects at the moment cause little disturbance. With heavy backlogs of orders for all forms of steel producers find delay in shipments to this consumer allows better delivery to other users. It has been estimated that General Motors Corp. usually consumes about 4½ per cent of all finished steel produced in this country. Current loss of tonnage by the strike is somewhat less than this proportion as some partsmakers are continuing production for stock.

Proof of the small effect of this stoppage is found in the scale of operations by steelmakers, which shows an increase of one point over the preceding week, to 80 per cent of capacity. Chicago, Eastern Pennsylvania, Buffalo and New England were unchanged; Pittsburgh gained one and one-half points, Youngstown district gained two; Detroit was off five points, St. Louis off four points, Cleveland off two points and Cincinnati down 24 points.

Automotive production for the week ending Jan. 23 was 81,395 units, a decline of 10,290 from the preceding week.

Flood conditions in the Ohio valley have not yet caused serious curtailment of steel production, though the threat is still hanging over many plants. Repetition of interruptions met in March, 1936, does not seem imminent.

Mill capacity for flat-rolled steel in the Pittsburgh district is being raised from about 6.6 per cent of total capacity of the country to about 20 per cent as the result of completion of two broad strip continuous mills and a third about to be built.

Total of structural steel contracts placed last week is 13,751 tons. This compares with 29,346 tons for the preceding week, the decline probably being due to the fact that recent closing on protected projects has reduced the number pending. Notable tonnages of the past week include 2150 tons for a Mississippi river dam, 2100 tons for a toll bridge in Florida and 1105 tons for bridges for the Chicago, Milwaukee, St. Paul & Pacific.

Decision by the Pittsburgh Steamship Co., Great Lakes subsidiary of the United States Steel Corp. to build two freighters this year marks the first addition to bulk cargo in this service since 1930. Steel requirements will total close to 12,000 tons, mostly bars



MARKET IN TABLOID

DEMAND *Strong in all lines.*

PRICES *Scrap index moves 13 cents higher.*

PRODUCTION . . *Operations up one point to 80 per cent.*

SHIPMENTS . . . *Steady, delivery improving.*

and plates. Barge inquiries for river service involve about 3000 tons in addition to the large number of such craft recently placed with builders.

Although railroads have been considered relatively out of the picture as substantial buyers of rails and equipment after the heavy commitments late last year a continuous stream of car and locomotive inquiry and sales is evident. Current active inquiries for cars total more than 7000 and for locomotives 32. In the past week 2200 cars were placed.

Reversal of the usual trend in pig iron shipments is envisaged as a result of the present foreign trade situation. Inquiries from European sources for pig iron made in the United States has caused speculation as to the possibility of this material becoming an export commodity instead of an import. Apparently some European makers have committed themselves beyond ability to serve and are seeking tonnage here to eke out their own production. High ocean freights, which have increased strongly recently, may interpose something of a barrier to heavy buying.

A somewhat mixed situation exists in steel and iron scrap, with slight weakness evident in steel grades in the Pittsburgh district at the same time strength is shown in the East and West. Export demand appears to be at the bottom of a sudden rise in Eastern Pennsylvania, topped by a purchase for a domestic consumer at a higher price than had been paid previously. Uncertainty of the situation makes buying to cover contracts a puzzling matter. At the same time brokers find offerings light and the supply apparently scarce.

With prices down at Pittsburgh and up at Philadelphia and Chicago the net result is an advance of 13 cents in STEEL's scrap composite, to a new high of \$18.29. This also raised the iron and steel composite two cents to \$36.57. The finished steel composite is unchanged at \$55.80.

COMPOSITE MARKET AVERAGES

	Jan. 23	Jan. 16	Jan. 9	One Month Ago Dec., 1936	Three Months Ago Oct., 1936	One Year Ago Jan., 1936	Five Years Ago Jan., 1932
Iron and Steel	\$36.57	\$36.55	\$36.52	\$35.15	\$34.67	\$33.34	\$29.65
Finished Steel	55.80	55.80	55.80	53.90	53.90	53.70	47.28
Steelworks Scrap..	18.29	18.16	17.87	16.92	16.44	13.15	8.03

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.

A COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

	Jan. 23, 1937	Dec. 1936	Oct. 1936	Jan. 1936		Jan. 23, 1937	Dec. 1936	Oct. 1936	Jan. 1936
Finished Material					Pig Iron				
Steel bars, Pittsburgh	2.20c	2.05c	2.05c	1.85c	Bessemer, del. Pittsburgh.....	\$22.31	21.8132	20.8132	20.81
Steel bars, Chicago	2.25	2.10	2.10	1.90	Basic, Valley	20.50	20.00	19.00	19.00
Steel bars, Philadelphia	2.49c	2.36	2.36	2.16	Basic, eastern del. East Pa.....	22.26	21.8132	20.8132	20.81
Iron bars, Terre Haute, Ind.	1.95	1.95	1.95	1.75	No. 2 fdy., del. Pittsburgh.....	22.21	21.3132	20.3132	20.31
Shapes, Pittsburgh	2.05	1.90	1.90	1.80	No. 2 fdy., Chicago	21.00	20.50	19.50	19.50
Shapes, Philadelphia	2.25½	2.11½	2.11½	2.01½	Southern No. 2, Birmingham....	17.38	16.88	15.50	15.50
Shapes, Chicago	2.10	1.95	1.95	1.85	Southern No. 2, del. Cincinnati..	20.94	20.44	19.44	20.20
Tank plates, Pittsburgh	2.05	1.90	1.90	1.80	No. 2X eastern, del. Phila.	23.135	22.6882	21.6882	21.68
Tank plates, Philadelphia	2.23½	2.09	2.09	1.99	Malleable, Valley	21.00	20.50	19.50	19.50
Tank plates, Chicago	2.10	1.95	1.95	1.85	Malleable, Chicago	21.00	20.50	19.50	19.50
Sheets, No. 10, hot rolled, Pitts....	2.15	2.10	1.95	1.85	Lake Sup., charcoal, del. Chicago	26.54	26.2528	25.7528	25.25
Sheets, No. 24, hot ann., Pitts....	2.80	2.75	2.60	2.40	Gray forge, del. Pittsburgh	21.17	20.6741	19.6741	19.67
Sheets, No. 24, galv., Pitts.....	3.40	3.35	3.20	3.10	Ferromanganese, del. Pittsburgh.	84.79	82.65	80.13	90.13
Sheets, No. 10, hot rolled, Gary...	2.25	2.25	2.05	1.95	Scrap				
Sheets, No. 24, hot anneal., Gary..	2.90	2.90	2.70	2.50	Heavy melting steel, Pittsburgh..	\$19.50	\$18.55	\$18.15	\$14.50
Sheets, No. 24, galvan., Gary....	3.50	3.50	3.30	3.20	Heavy melt. steel, No. 2, east. Pa.	17.50	14.12½	13.95	11.37½
Plain wire, Pittsburgh	2.60	2.60	2.50	2.30	Heavy melting steel, Chicago....	18.25	17.00	16.25	13.40
Tin plate, per base box, Pitts....	\$4.85	5.25	5.25	5.25	Rail for rolling, Chicago	19.75	17.50	16.95	14.25
Wire nails, Pittsburgh	2.25	2.20	2.05	2.40	Railroad steel specialties, Chicago	19.75	19.00	17.75	14.45
Semifinished Material					Coke				
Sheet bars, open-hearth, Youngs..	\$34.00	\$32.00	\$32.00	\$30.00	Connellsville furnace, ovens.....	\$4.00	\$4.00	\$4.00	\$3.50
Sheet bars, open-hearth, Pitts....	34.00	32.00	32.00	30.00	Connellsville, foundry, ovens.....	4.25	4.40	4.25	4.00
Billets, open-hearth, Pittsburgh..	34.00	32.00	32.00	29.00	Chicago, by-product foundry, del...	10.25	9.75	9.75	9.75
Wire rods, No. 5 to 1½-inch, Pitts.	43.00	40.00	40.00	40.00					

Steel, Iron, Raw Material, Fuel and Metals Prices

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

Sheet Steel		Tin Mill Black No. 28		Corrosion and Heat-Resistant Alloys		Structural Shapes	
Prices Subject to Quantity Extras and Deductions (Except Galvanized)		Pittsburgh	2.95c	Pittsburgh base, cents per lb. Chrome-Nickel		Pittsburgh	2.05c
Hot Rolled No. 10, 24-48 in.		Gary	3.05c	No. 302 No. 304		Philadelphia, del.	2.25½ c
Pittsburgh	2.15c	St. Louis, delivered	3.285c	Bars	23.00 24.00	New York, del.	2.30 ¼ c
Gary	2.25c	Cold Rolled No. 10		Plates	26.00 28.00	Boston, delivered	2.43 ½ c
Chicago, delivered	2.28c	Pittsburgh	2.80c	Sheets	33.00 35.00	Bethlehem	2.15c
Detroit, del.	2.35c	Gary	2.90c	Hot strip	20.75 22.75	Chicago	2.10c
New York, del.	2.48c	Detroit, delivered	3.00c	Cold strip	27.00 29.00	Cleveland, del.	2.25c
Philadelphia, del.	2.44c	Philadelphia, del.	3.09c	Straight Chromes		Buffalo	2.15c
Birmingham	2.30c	New York, del.	3.13c	No. No. No. No.		Gulf Ports	2.45c
St. Louis, del.	2.485c	Pacific ports, f.o.b. cars, dock	3.40c	410 430 442 446		Birmingham	2.20c
Pacific ports, f.o.b. cars, dock	2.70c	St. Louis	3.135c	Bars	17.00 18.50 21.00 26.00	Pacific ports, f.o.b. cars, dock	2.60c
Hot Rolled Annealed No. 24		Cold Rolled No. 20		Plates	20.00 21.50 24.00 29.00	Bars	
Pittsburgh	2.80c	Pittsburgh	3.25c	Sheets	25.00 28.00 31.00 35.00	Soft Steel	
Gary	2.90c	Gary	3.35c	Hot strip	15.75 16.75 21.75 26.75	(Base, 3 to 25 tons)	
Chicago, delivered	2.93c	Detroit, delivered	3.45c	Cold stp.	20.50 22.00 27.00 35.00	Pittsburgh	2.20c
Detroit, delivered	3.00c	Philadelphia, del.	3.54c	Steel Plate		Chicago or Gary	2.25c
New York, del.	3.13c	New York, del.	3.58c	Pittsburgh	2.05c	Duluth	2.35c
Philadelphia, del.	3.09c	Pacific ports, f.o.b. cars, dock	3.40c	New York, del.	2.33c	Birmingham	2.35c
Birmingham	2.95c	St. Louis	3.135c	Philadelphia, del.	2.23 ¼ c	Cleveland	2.25c
St. Louis, del.	3.135c	Enameling Sheets		Boston, delivered	2.45c	Buffalo	2.30c
Pacific ports, f.o.b. cars, dock	3.45c	Pittsburgh, No. 10	2.60c	Buffalo, delivered	2.30c	Detroit, delivered	2.35c
Galvanized No. 24		Pittsburgh, No. 20	3.20c	Chicago or Gary	2.10c	Pacific ports, f.o.b. cars, dock	2.75c
Pittsburgh	3.40c	Gary, No. 10	2.70c	Cleveland, del.	2.24 ¼ c	Philadelphia, del.	2.49c
Gary	3.50c	Gary, No. 20	3.30c	Birmingham	2.20c	Boston, delivered	2.60c
Chicago, delivered	3.53c	St. Louis, No. 10	2.935c	Coatesville, base	2.15c	New York, del.	2.53c
Philadelphia, del.	3.69c	St. Louis, No. 20	3.535c	Sparrows Pt., base	2.15c	Pitts., forg. qual.	2.55c
New York, delivered	3.73c	Tin and Terne Plate		Pacific ports, f.o.b. cars, dock	2.60c	Rail Steel	
Birmingham	3.55c	Gary base, 10 cents higher.		St. Louis, delivered	2.33c	To Manufacturing Trade	
St. Louis, del.	3.735c	Tin plate, coke base (box) Pittsburgh	\$4.85			Pittsburgh	2.05c
Pacific ports, f.o.b. cars, dock	4.00c	Do., waste-waste	2.75c			Chicago or Gary	2.10c
		Do., strips	2.50c			Moline, Ill.	2.10c
		Long ternes, No. 24 unassorted, Pitts.	3.70c			Cleveland	2.10c
		Do., Gary	3.80c			Buffalo	2.15c

Iron

Terre Haute, Ind.	2.10c
Chicago	2.15c
Philadelphia	2.39c
Pittsburgh, refined ..	2.75-7.50c

Reinforcing

New billet, straight lengths, quoted by distributors

Pittsburgh	2.25c
Chicago, Gary, Buffalo	
Cleve., Birm., Young...	2.30c
Gulf ports	2.65c
Pacific coast ports f.o.b.	
car docks	2.70c
Philadelphia, del.	2.54c
Rail steel, straight lengths, quoted by distributors	
Pittsburgh	2.10c
Chicago, Buffalo, Cleve-	
land, Birm., Young....	2.15c
Gulf ports	2.50c

Wire Products

Prices apply to straight or mixed carloads; less carloads \$4 higher; less carloads fencing \$5 over base column.

Base Pitts.-Cleve. 100 lb. keg.

Standard wire nails	\$2.25
Cement coated nails	\$2.25
Galv. nails, 15 gage and coarser	\$4.25
do. finer than 15 ga.	\$4.75
(Per pound)	
Polished staples	2.95c
Galv. fence staples	3.20c
Barbed wire, galv.	2.75c
Annealed fence wire	2.90c
Galv. fence wire	3.30c
Woven wire fencing (base column, c. 1.) ..	\$63.00
To Manufacturing Trade	
Plain wire, 6-9 ga	2.60c
Anderson, Ind. (merchant products only) and Chicago up \$1; Duluth up \$2; Birmingham up \$3.	
Spring wire, Pitts. or Cleveland	3.20c
Do., Chicago up \$1, Worc. \$2.	

Cold-Finished Carbon Bars and Shafting

Base, Pitts., one size, shape, grade, shipment at one time to one destination

10,000 to 19,000 lbs.	2.55c
20,000 to 59,999 lbs.	2.50c
60,000 to 99,999 lbs.	2.45c
100,000 to 299,999 lbs.	2.42 1/2 c
300,000 lbs. and over	2.40c
Gary, Ind., Cleve., Chi., up 5c; Buffalo, up 10c; Detroit, up 15c; eastern Michigan, up 20c.	

Alloy Steel Bars (Hot)

(Base, 3 to 25 tons)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem	2.75c		
Alloy			
S.A.E.	Diff.	S.A.E.	Diff.
2000	0.25	3100	0.55
2100	0.55	3200	1.35
2300	1.50	3300	3.80
2500	2.25	3400	3.20
4100 0.15 to 0.25 Mo.			0.50
4600 0.20 to 0.30 Mo.			1.25-
1.75 Ni.			1.05
5100 0.80-1.10 Cr.			0.45
5100 Cr. spring			base
6100 bars			1.10
6100 spring			0.70
Cr., Ni., Van.			1.40
Carbon Van.			0.85
9200 spring flats			base
9200 spring rounds, squares			0.25

Piling

Pittsburgh	2.40c
Chicago, Buffalo	2.50c

Strip and Hoops

(Base, hot rolled, 25-1 ton)
(Base, cold-rolled, 25-3 tons)

Hot strip to 23 1/4-in.

Pittsburgh	2.15c
Chicago or Gary	2.25c
Birmingham base	2.30c
Detroit, del.	2.35c
Philadelphia, del.	2.44c
New York, del.	2.48c
Cooperage hoop,	
Pittsburgh	2.15c
Chicago	2.25c
Cold strip, 0.25 carbon and under, Pittsburgh, Cleveland	2.85c
Detroit, del.	3.05c
Worcester, Mass.	3.05c
Cleve. Worces-	
Carbon Pitts. ter, Mass.	
0.26-0.50	2.85c 3.05c
0.51-0.75	3.95c 4.15c
0.76-1.00	5.70c 5.90c
Over 1.00	7.75c 7.95c

Rails, Track Material

(Gross Tons)

Standard rails, mill	39.00
Relay rails, Pittsburgh, 20-100 lbs.	25.50-28.00
Light rails, billet qual., Pittsburgh, Chicago ..	\$38.00
Do., rerolling quality ..	37.00
Angle bars, billet, Gary, Pittsburgh, So. Chicago	2.70c
Do., axle steel	2.10c
Spikes, R. R. base	2.90c
Track bolts, base	4.00c
Tie plates, base	2.10c
Base, light rails 25 to 40 lbs.; 50 to 60 lbs., inclusive up \$2; 16 and 20 lbs. up \$1; 12 lbs. up \$2; 8 and 10 lbs., up \$5. Base railroad spikes 200 kegs or more; base tie plates 20 tons.	

Bolts and Nuts

Pittsburgh, Cleveland, Birmingham, Chicago. Discounts to legitimate trade as per Dec. 1, 1932, lists:

Carriage and Machine

1/2 x 6 and smaller	70 off
Do. larger	65-10 off
Tire bolts	50-5 off
Plow Bolts	
All sizes	65-10-10 off
Stove Bolts	
In packages with nuts attached 72 1/2 off; in packages with nuts separate 72 1/2-5 off; in bulk 81 1/2 off on 15,000 of 3-inch and shorter, or 5000 over 3-inch.	
Step bolts	60 off
Elevator bolts	60 off

Nuts

S. A. E. semifinished hex.:

1/2 to 1 1/8-inch	60-20-5 off
Do., 1/2 to 1-inch	60-20-5 off
Do., over 1-inch	60-20-5 off
Hexagon Cap Screws	
Milled	50-10 off
Upset, 1-in., smaller	60 off
Square Head Set Screws	
Upset, 1-in., smaller	75 off
Headless set screws	75 off

Rivets, Wrought Washers

Structural, Pittsburgh, Cleveland	3.25c
Structural, Chicago	3.35c
1/8-inch and smaller, Pitts., Chi., Cleve.	70-5 off
Wrought washers, Pitts., Chi., Phila. to jobbers and large nut, bolt mfrs.	\$6 off

Cut Nails

Cut nails, Pitts. (10% discount of size extras) ..	\$3.10
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Do., less carloads, 5 kegs or more, no discount on size extras... \$3.40
Do., under 5 kegs, no disc on size extras... \$3.55

Pipe and Tubing

Base \$200 net ton, except on less boiler tubes under 2 inches and cold drawn seamless.

Welded Iron, Steel Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less. Chicago, del. 2 1/2 less. Wrought pipe, Pittsburgh.

Butt Weld Steel

In.	Blk.	Galv.	
1/2 and 3/4	60	44 1/2	
3/4	64 1/2	55	
1	67 1/2	59	
1-3	69 1/2	61 1/2	
Iron			
1/2	27	10 1/2	
3/4	32	16	
1-1 1/4	35	21	
2	38 1/2	23	
Lap Weld Steel			
2	62	53 1/2	
2 1/2-3	65	56 1/2	
3 1/2-6	67	58 1/2	
7 and 8	66	56 1/2	
9 and 10	65 1/2	56	
Iron			
2	32 1/2	18	
2 1/2-3 1/2	33 1/2	20 1/2	
4-8	35 1/2	24	
Line Pipe Steel			
1/2, butt weld	56		
1/2 and 3/4, butt weld ..	59		
1/2, butt weld	63 1/2		
3/4, butt weld	66 1/2		
1 to 3, butt weld	68 1/2		
2, lap weld	61		
2 1/2 to 3, lap weld	64		
3 1/2 to 6, lap weld	66		
7 and 8, lap weld	65		
Iron			
1/2-1 1/2 inch, black and galv. take 4 pts. over; 2 1/2-6-inch 2 pts. over discounts for same sizes, standard pipe lists, 8-12-inch, no extra.			
Boiler Tubes			
C. L. Discounts, f.o.b. Pitts.			
Lap Weld Charcoal Steel			
2-2 1/4	33	1 1/4	8
2 1/2-2 3/4	40	2-2 1/4	13
3	47	2 1/2-2 3/4	16
3 1/2-3 3/4	50	3	17
4	52	3 1/2-3 3/4	18
4 1/2	42	4	20
		4 1/2	21

In lots of a carload or more, above discounts subject to preferential of two 5% and one 7 1/2% discount on steel and 10% on charcoal iron.

Lapwelded steel: 200 to 9999 pounds, ten points under base, one 5% and one 7 1/2%. Under 2000 pounds 15 points under base, one 5% and one 7 1/2%. Charcoal iron: 10,000 pounds to carloads, base less 5%; under 10,000 lbs., 2 pts. under base.

Seamless Boiler Tubes

Under date of May 15 in lots of 40,000 pounds or more for cold-drawn boiler tubes and in lots of 40,000 pounds or feet or more for hot-finished boiler tubes, revised prices are quoted for 55 cold-drawn boiler tube sizes ranging from 1/2 to 6-inch outside diameter in 30 wall thicknesses, decimal equivalent from 0.035 to 1.000, on a dollars and cents basis per 100 feet and

per pound. Less-carloads revised as of July, 1, 1935, card. Hot-finished carbon steel boiler tube prices also under date of May 15 range from 1 through 7 inches outside diameter, inclusive, and embrace 47 size classifications in 22 decimal wall thicknesses ranging from 0.109 to 1.000, prices being on lb. and 100 ft. basis.

Seamless Tubing

Cold drawn; f.o.b. mill disc. 100 ft. or 150 lbs. 32%
15,000 ft. or 22,500 lbs. 70%

Cast Iron Water Pipe

Class B Pipe—Per Net Ton

6-in. & over, Birm.	\$41.00-42.00
4-in., Birmingham	44.00-45.00
4-in., Chicago	52.00-53.00
6 to 24-in., Chicago	49.00-50.00
6-in & over, east. fdy.	45.00
Do., 4-in.	46.00
Class A pipe \$3 over Class B	
Std. ftgs., Birm. base ..	\$100.00

Semifinished Steel

Billets and Blooms

4 x 4-inch base; gross ton	
Pitts., Chi., Cleve., Buffalo and Young	\$34.00
Philadelphia	39.30
Duluth	36.00
Forging Billets	
6 x 6 to 9 x 9-in., base	
Pitts., Chicago, Buffalo ..	40.00
Forging, Duluth	42.00
Sheet Bars	
Pitts., Cleve., Young., Sparrows Point	34.00
Slabs	
Pitts., Chicago, Cleveland, Youngstown	\$34.00
Wire Rods	
Pitts., Cleve., No. 5 to 1 1/2-inch incl	43.00
Do., over 1 1/2 to 1 1/4-inch incl.	45.00
Chicago up \$1; Worcester up \$2.	
Skelp	
Pitts., Chi., Young., Buff., Coatesville, Sparrows Pt. 1.80c	

Coke

Price Per Net Ton Beehive Ovens

Connellsville, fur.	\$3.90- 4.10
Connellsville, fdry.	4.50- 4.75
Connell. prem. fdry.	5.50
New River fdry.	6.00
Wise county fdry.	4.45- 5.00
Wise county fur.	4.00- 4.50
By-Product Foundry	
Newark, N. J., del.	10.17-10.60
Chi., ov., outside del.	9.50
Chicago, del.	10.25
New England, del.	12.00
St. Louis, del.	10.00-10.50
Birmingham, ovens	6.50
Indianapolis, del.	9.65
Cincinnati, del.	9.75
Cleveland, del.	10.30
Buffalo, del.	10.50
Detroit, del.	10.70
Philadelphia, del.	9.85

Coke By-Products

Spot, gal. Producers' Plants

Pure and 90% benzol.	16.00c
Toluol	30.00c
Solvent naphtha	30.00c
Industrial xylo.	30.00c
Per lb. f.o.b. Frankford	
Phenol (200 lb. drums) ..	15.50c
Do., (450 lbs.)	14.50c
Eastern Plants, per lb.	
Naphthalene flakes and balls, in bbls., to jobbers	7.25c
Per 100-lb. Atlantic seaboard Sulphate of ammonia.	\$1.30
†Western prices, 1/4-cent up.	

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; 50c diff. for each 0.25 below 1.75. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	\$22.00	\$22.50	\$21.50	\$23.00
Birdsboro, Pa.	22.00	22.50	21.50	23.00
Birmingham, Ala.† ..	17.38	.....	16.38	21.50
Buffalo	21.00	21.50	20.00	22.00
Chicago	21.00	21.00	20.50	21.50
Cleveland	21.00	21.00	20.50	21.50
Detroit	21.00	21.00	20.50	21.50
Duluth	21.50	21.50	.....	22.00
Erie, Pa.	21.00	21.50	20.50	22.00
Everett, Mass.	22.75	23.25	22.25	23.75
Hamilton, O.	21.00	21.00	20.50	.....
Jackson, O.	20.25	20.25	19.75	.....
Neville Island, Pa.	21.00	21.00	20.50	21.50
Provo, Utah	18.50	.....	18.00	.....
Sharpsville, Pa.	21.00	21.00	20.50	21.50
Sparrows Point, Md.	22.00	.....	21.50	.....
Swedeland, Pa.	22.00	22.50	21.50	23.00
Toledo, O.	21.00	21.00	20.50	21.50
Youngstown, O.	21.00	21.00	20.50	21.50

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

Delivered from Basing Points:

Akron, O., from Cleveland	21.76	21.76	21.26	22.26
Baltimore from Birmingham	22.58	.....	21.46	.....
Boston from Birmingham	23.37	.....	22.87	.....
Boston from Everett, Mass.	23.25	23.75	22.75	24.25
Boston from Buffalo	23.25	23.75	22.75	24.25
Brooklyn, N. Y., from Bethlehem ..	24.27	24.77	.....	.....
Brooklyn, N. Y., from Bmghm.	24.05	.....	.....	.....
Canton, O., from Cleveland	21.76	21.76	21.26	22.26
Chicago from Birmingham	21.22	.....	21.10	.....
Cincinnati from Hamilton, O.	20.82	21.58	21.08	.....
Cincinnati from Birmingham	20.69	.....	19.69	.....
Cleveland from Birmingham	21.12	.....	20.62	.....
Cincinnati from Hamilton, O.	21.07	21.79	20.07	.....
Mansfield, O., from Toledo, O.	22.76	22.76	22.26	22.26
Milwaukee from Chicago	22.00	22.00	21.50	22.00
Muskegon, Mich., from Chicago, Toledo or Detroit	23.90	23.90	23.40	24.40
Newark, N. J., from Birmingham ..	23.01	.....	.....	.....
Newark, N. J., from Bethlehem ..	23.39	23.89	.....	.....
Philadelphia from Birmingham	22.38	.....	22.26	.....
Philadelphia from Swedeland, Pa. ..	22.76	23.26	22.26	.....
Pittsburgh district from Neville Island	Neville base plus 67c, 81c and \$1.21 switching charges			
Saginaw, Mich., from Detroit	23.25	23.25	22.75	22.75
St. Louis, northern	21.50	21.50	21.00	.....

Delivered from Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
St. Louis from Birmingham	†21.12	.....	20.82	.....
St. Paul from Duluth	22.94	22.94	.....	23.44

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Standish, N. Y., \$25.50, Phila. base, standard and copper bearing, \$26.63.

Gray Forge

Valley furnace	\$20.50	Lake Superior fur.	\$23.50
Pitts. dist. fur.	20.50	do., del. Chicago	26.04
		Lyles, Tenn.	24.00

Silvery†

Jackson county, O., base: 6-6.50 per cent \$24.50; 6.51-7—\$25.00; 7-7.50—\$25.50; 7.51-8—\$26.00; 8-8.50—\$26.50; 8.51-9—\$27.00; 9-9.50—\$27.50; 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

Fire Clay Brick		Chester, Pa., and Baltimore bases (bags) ..	\$45.00
<i>Super Quality</i>		Domestic dead-burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases (bags) ..	42.00
Pa., Mo., Ky.	\$58.90	Domestic dead-burned gr. net ton f.o.b. Chewelah, Wash. (bulk) ..	24.00
<i>First Quality</i>		Base Brick	
Pa., Ill., Md., Mo., Ky.	\$45.60	Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.	
Alabama, Georgia.	\$38.00-45.00	Chrome brick	\$47.00
<i>Second Quality</i>		Chem. bonded chrome. .	47.00
Pa., Ill., Ky., Md., Mo.	40.85	Magnesite brick	67.00
Georgia, Alabama	36.10	Chem. bonded magnesite	57.00
<i>Ohio</i>			
First quality	\$40.85		
Intermediary	38.00		
Second quality	29.45		
Malleable Bung Brick			
All bases	54.15		
Silica Brick			
Pennsylvania	\$45.60		
Joliet, E. Chicago	54.15		
Birmingham, Ala.	45.60		
Ladle Brick			
(Pa., O., W. Va., Mo.)			
Dry press	\$25.00		
Wire cut	23.00		
Magnesite			
Imported dead-burned grains, net ton f.o.b.			

Fluorspar, 85-5

Washed gravel, duty paid, tide, net ton.	\$23.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	\$18.00
Do., for barge	\$19.00

Ferroalloys

Dollars, except Ferrochromes

Ferromanganese, 78-82% tidewater, duty paid. .	80.00
Do., Baltimore, base. .	80.00
Do., del. Pittsburgh. .	84.79
Spiegeleisen, 19-20% dom. Palmerston, Pa., spot. .	†26.00
Do., New Orleans	26.00
Ferrosilicon, 50% freight allowed, c. l.	69.50
Do., less carload	77.00
Do., 75 per cent.	126-130.00
Spot, \$5 a ton higher.	
Silicomani., 2½ carbon. .	89.00
2% carbon, 94.00; 1%, 104.00	
Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb. del.	10.00
Ferrotungsten, stand., lb. con. del.	1.30-1.40
Ferrovandium, 35 to 40% lb., cont.	2.70-2.90
Ferrotitanium, c. l., prod. plant, frt. all, net ton	137.50
Spot, 1 ton, frt. allow., lb.	7.00
Do., under 1 ton, lb. .	7.75-8.25
Ferrophosphorus, per ton, c. l., 17-19% Rockdale, Tenn., basis, 18%, \$3 unitage	58.50
Ferrophosphorus, electrolytic, per ton c. l., 23-26% f.o.b. Anniston, Ala., 24% \$3 unitage. .	75.00
Ferromolybdenum, stand. 55-65%, lb.	0.95
Molybdate, lb. cont.	0.80
†Carloads. Quan. diff. apply.	

Nonferrous

METAL PRICES OF THE WEEK

Spot unless otherwise specified. Cents per pound

Copper			Straits Tin		Lead	Lead	Alumi-	Antimony	Nickel
Electro, del. Conn.	Lake, del. Midwest	Casting, refinery	New York Spot	Futures	N. Y.	East St. L.	num 99%	Chinese Spot, N. Y.	Cath-odes.
Jan. 16 13.00	13.12½	12.65	51.60	51.50	6.00	5.85	6.00	*19.00	14.25 35.00
Jan. 18 13.00	13.12½	12.70	51.25	51.05	6.00	5.85	6.00	*19.00	14.25 35.00
Jan. 19 13.00	13.12½	12.70	50.95	50.70	6.00	5.85	6.00	*19.00	14.25 35.00
Jan. 20 13.00	13.12½	12.70	51.12½	50.85	6.00	5.85	6.00	*19.00	14.25 35.00
Jan. 21 13.00	13.12½	12.70	51.10	50.90	6.00	5.85	6.00	*19.00	14.25 35.00
Jan. 22 13.00	13.12½	12.70	50.95	50.70	6.00	5.85	6.00	*19.00	14.25 35.00

*Nominal range 19.00 to 21.00c.

MILL PRODUCTS

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 13.00.

Conn. copper	
Sheets	
Yellow brass (high)	18.12½
Copper, hot rolled	20.37½
Lead, cut to jobbers.	9.50
Zinc, 100-lb. base	10.50
Tubes	
High yellow brass	20.87½
Seamless copper	21.37½
Rods	
High yellow brass	16.12½
Copper, hot rolled	17.12½
Anodes	
Copper, untrimmed	17.87½
Wire	
Yellow brass (high)	18.37½

OLD METALS

Deal. buying prices, cents lb.

No. 1 Composition Red Brass	
New York	9.50-9.62½
Cleveland	10.00-10.25
*Chicago	9.25- 9.50
St. Louis	9.00- 9.50

Heavy Copper and Wire

New York, No. 1	11.12½-11.37½
*Chicago, No. 1	10.75-11.00
Cleveland, No. 1	11.00-11.25
St. Louis, No. 1	10.62½-11.00

Composition Brass Borings

New York	9.00- 9.25
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Light Copper

New York	9.50-9.62½
*Chicago	9.25- 9.50
Cleveland	9.25- 9.50
St. Louis	9.00- 9.25

Light Brass

*Chicago	6.00- 6.25
Cleveland	5.50- 5.75
St. Louis	5.75-6.12½

Lead

New York	5.25-5.37½
Cleveland	5.00- 5.15
Chicago	5.00- 5.25
*St. Louis	5.00- 5.25

Zinc

New York	3.00-3.12½
*St. Louis	3.50- 4.00
Cleveland	3.25- 3.50

Aluminum

Borings, Cleveland. .	10.25-10.50
Mixed, cast, Cleve. .	13.50-13.75
*Mixed, cast St. L. .	13.25-13.50
Clips, soft, Cleve. .	15.25-15.50

SECONDARY METALS

Brass, ingot 85-5-5-5, lcl. .	14.00
Stand. No. 12 alum. .	17.50-17.75

Warehouse Iron and Steel Prices

Cents per pound for delivery within metropolitan districts of cities specified

STEEL BARS

Baltimore	3.50c
Boston††	3.55c
Buffalo	3.10c
Chattanooga	3.71c
Chicago (j)	3.35c
Cincinnati	3.55c
Cleveland	3.25c
Detroit	3.43 1/2 c
Houston	3.10c
Los Angeles	4.00c
Milwaukee	3.46c-3.61c
New Orleans	3.70c
New York† (d)	3.62c
Pitts. (h)	3.30c-3.45c
Philadelphia*	3.45c
Portland	3.85c
San Francisco	3.85c
Seattle	4.10c
St. Louis	3.59c
St. Paul	3.60c-3.75c
Tulsa	3.35c

IRON BARS

Portland	3.50c
Chattanooga	3.71c
Baltimore*	3.10c
Cincinnati	3.55c
New York† (d)	3.15c
Philadelphia*	3.45c
St. Louis	3.59c
Tulsa	3.35c

REINFORCING BARS

Buffalo	2.60c
Chattanooga	3.71c
Cleveland (c)	2.25c
Cincinnati	3.40c
Houston	3.25c
Los Angeles, c.l.	2.45c
New Orleans*	2.67c
Pitts., plain (h)	3.25c
Pitts., twlsted squares (h)	3.40c
San Francisco	2.72 1/2 c
Seattle	3.75c
St. Louis	3.49c
Tulsa	3.25c
Young	2.30c-2.60c

SHAPES

Baltimore	3.50c
Boston††	3.57c
Buffalo	3.35c
Chattanooga	3.81c
Chicago	3.45c
Cincinnati	3.65c
Cleveland	3.56c
Detroit	3.65c
Houston	3.10c
Los Angeles	4.00c
Milwaukee	3.56c
New Orleans	3.80c
New York† (d)	3.62c
Philadelphia*	3.30c
Pittsburgh (h)	3.40c
Portland (i)	3.85c
San Francisco	3.75c
Seattle (i)	2.85c
St. Louis	3.69c
St. Paul	3.70c
Tulsa	3.60c

PLATES

Baltimore	3.60c
Boston††	3.58c
Buffalo	3.47c
Chattanooga	3.81c
Chicago	3.45c
Cincinnati	3.65c
Cleveland, 1/2-in. and over	3.56c
Detroit	3.65c
Detroit, 3/8-in.	3.85c
Houston	3.10c
Los Angeles	4.00c
Milwaukee	3.41c
New Orleans	3.80c
New York† (d)	3.65c
Philadelphia*	3.30c

Phila. floor	4.95c
Pittsburgh (h)	3.40c
Portland	3.85c
San Francisco	3.75c
Seattle	3.85c
St. Louis	3.69c
St. Paul	3.70c
Tulsa	3.60c

NO. 10 BLUE

Baltimore	3.45c
Boston (g)	3.70c
Buffalo	3.72c
Chattanooga	3.66c
Chicago	3.35c
Cincinnati	3.50c
Cleveland	3.41c
Det. 8-10 ga.	3.43 1/2 c
Houston	3.45c
Los Angeles	4.15c
Milwaukee	3.46c
New Orleans	3.85c
New York† (d)	3.57c
Portland	3.95c
Philadelphia*	3.45c
Pittsburgh (h)	3.25c
San Francisco	3.95c
Seattle	4.10c
St. Louis	3.59c
St. Paul	3.60c
Tulsa	3.80c

NO. 24 BLACK

Baltimore*†	4.10c
Boston (g)	4.30c
Buffalo	3.35c
Chattanooga*	3.56c
Chicago	3.90c-4.55c
Cincinnati	4.05c
Cleveland	4.31c
Detroit	4.33 1/2 c
Los Angeles	4.35c
Milwaukee	4.16c
New Orleans*	3.52c
New York† (d)	4.22c
Philadelphia*†	4.15c
Pitts.** (h)	3.65c-4.95c
Portland	4.65c
Seattle	4.85c
San Francisco	4.65c
St. Louis	4.29c
St. Paul	4.30c
Tulsa	4.85c

NO. 24 GALV. SHEETS

Baltimore*†	4.20c
Buffalo	4.10c
Boston (g)	4.35c
Chattanooga*	4.16c
Chicago (h)	4.35c-5.35c
Cincinnati	4.65c
Cleveland	4.91c
Detroit	5.00c
Houston	4.50c
Los Angeles	4.60c
Milwaukee	4.76c
New Orleans*	4.32c
New York† (d)	4.50c
Philadelphia*†	4.80c
Pitts.** (h)	4.50c-4.75c
Portland	5.35c
San Francisco	5.25c
Seattle	5.35c
St. Louis	4.89c
St. Paul	5.10c
Tulsa	5.20c

BANDS

Baltimore	3.50c
Boston††	3.70c
Buffalo	3.52c
Chattanooga	3.91c
Cincinnati	3.75c
Cleveland	3.66c
Chicago	3.60c
Detroit, 3/8-in. and lighter	3.68 1/2 c
Houston	3.35c
Los Angeles	4.30c
Milwaukee	3.71c
New Orleans	4.25c

New York† (d)	3.82c
Philadelphia*	3.55c
Pittsburgh (h)	3.50c
Portland	4.60c
San Francisco	4.45c
Seattle	4.60c
St. Louis	3.84c
St. Paul	3.85c
Tulsa	3.55c

HOOPS

Baltimore	3.75c
Boston††	4.70c
Buffalo	3.52c
Chicago	3.60c
Cincinnati	3.75c
Detroit, No. 14 and lighter	3.68 1/2 c
Los Angeles	6.25c
Milwaukee	3.71c
New York† (d)	3.66c
Philadelphia*	3.80c
Pittsburgh (h)	4.00c
Portland	5.95c
San Francisco	6.50c
Seattle	5.95c
St. Louis	3.84c
St. Paul	3.85c

COLD FIN. STEEL

Baltimore (c)	4.15c
Boston*	4.30c
Buffalo (h)	3.70c
Chattanooga*	4.51c
Chicago (h)	3.95c
Cincinnati	4.15c
Cleveland (h)	3.95c
Detroit	4.03 1/2 c
Los Ang. (f) (d)	6.35c
Milwaukee	4.06c

New Orleans	4.55c
New York† (d)	4.22c
Philadelphia*	4.18c
Pittsburgh	3.80c
Portland (f) (d)	5.35c
San Fran. (f) (d)	6.30c
Seattle (f) (d)	5.35c
St. Louis	4.19c
St. Paul	4.20c
Tulsa	4.80c

COLD ROLLED STRIP

Boston	3.495c
Buffalo	3.39c
Chicago	3.52c
Cleveland (b)	3.00c
Cleveland (b)	3.20c
Detroit	3.43c
New York† (d)	3.57c
St. Louis	3.61c

TOOL STEELS

(Applying on or east of Mississippi river; west of Mississippi 1c up.)

Base	
High speed	.59 1/2 c
High carbon, high chrome	.39c
Oil hardening	.23c
Special tool	.21c
Extra tool	.17 1/2 c
Regular tool	.14 1/2 c
Uniform extras apply.	

BOLTS AND NUTS

(100 pounds or over)	
Discount	
Chicago (a)	65
Cleveland	70
Detroit	70-10

Milwaukee	65
Pittsburgh	65-5

(a) Under 100 lbs., 60 off.
 (b) Plus straightening, cutting and quantity differentials; (c) Plus mill, size and quantity extras; (d) Quantity base; (e) New mill classif. (f) Rounds only; (g) 50 bundles or over; (h) Outside delivery, 10c less; (i) Under 3 in.; (j) Shapes other than rounds, flats, fillet angles, 3.50c.

On plates, shapes, bars, hot strip and blue annealed quantity extras and discounts as follows: Under 100 lbs., add \$1.50; 100 to 399 lbs., add 50c; 400 to 999 lbs., base; 4000 to 9999 lbs., deduct 10c; over 10,000 lbs., deduct 15c. At Cleveland, under 400 lbs., add 50c, with \$1 minimum invoice.

†Domestic steel; ††Plus quantity extras; **Under 25 bundles; ††50 or more bundles; †New extras apply; ††Base 8000 lbs., extras on less.

Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, Jan. 21

Export Prices f. o. b. Ship at Port of Dispatch—(By Cable or Radio)

	British gross tons U. K. ports		Channel or North Sea ports, metric tons		Continental**Quoted in gold pounds sterling	
	£	s d	Quoted in dollars at current value	£	s d	
PIG IRON						
Foundry, 2.50-3.00 Silicon	\$22.10	4 10 0*	\$15.25		1 17 6	
Basic bessemer	22.10	4 10 0*	13.43		1 13 0	
Hematite, Phos. .03-.05	21.48	4 7 6				

SEMIFINISHED STEEL

Billets	\$30.69	6 5 0	\$24.40		3 0 0
Wire rods, No. 5 gage	48.49	9 17 6	41.68		5 2 6

FINISHED STEEL

Standard rails	\$40.51	8 5 0	\$44.74		5 10 0
Merchant bars	1.98c	9 0 0	1.39c to 1.57c		3 15 0 to 4 5 0
Structural shapes	1.87c	8 10 0	1.29c to 1.48c		3 10 0 to 4 0 0
Plates, 1 1/2-in. or 5 mm.	2.10c	9 11 3	1.94c to 1.97c		5 5 0 to 5 7 6
Sheets, black, 24 gage or 0.5 mm.	2.64c	12 0 0	2.67c		7 5 0††
Sheets, gal., 24 gage, corr.	3.23c	14 15 0	3.22c		8 15 0
Bands and strips	2.20c	10 0 0	1.75c		4 15 0
Plain wire, base	2.31c	10 10 0	1.94c		5 5 0
Galvanized wire, base	2.75c	12 10 0	2.15c		5 17 6
Wire nails, base	2.64c	12 0 0	1.75c		4 15 0
Tin plate, box 108 lbs.	\$ 4.85	0 19 9			

British ferromanganese \$80 delivered Atlantic seaboard, duty-paid. Germ. n ferromanganese £9 0s 0d (\$43.74) f.o.b.

Domestic Prices at Works or Furnace—Last Reported

	As d	French France	Belgian France	Reich Marks
Fdy, pig iron, Si. 2.5	\$19.89	4 1 0(a)	\$17.51	375
Basic bessemer pig iron	20.25	4 2 6(a)	12.84	275
Furnace coke	5.28	1 1 6	5.93	127
Billets	30.89	6 5 0	27.53	590
Standard rails	1.82c	8 5 0	1.64c	780
Merchant bars	2.19c	9 10 0	1.68c	800
Structural shapes	2.01c	9 3 0	1.64c	780
Plates, 1 1/2-in. or 3 mm.	2.16c	9 16 9	2.12c	1,010
Sheets, black	2.64c	12 0 0‡	2.62c	1,250‡
Sheets, galv., corr., 24 ga. or 0.5 mm.	3.08c	14 0 0	4.10c	1,950
Plain wire	2.42c	11 0 0	2.77c	1,320
Bands and strips	2.26c	10 5 0	1.92c	915
			1.43c	950
			2.85c	1,900
			1.90c	1,300
			6.66c	370
			3.11c	173
			2.29c	127

*Basic. †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, b hematite. ††Close annealed. **Gold pound sterling carries a premium of 68.85 per cent over paper sterling.

Iron and Steel Scrap Prices

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated; † indicates brokers prices

<p>HEAVY MELTING STEEL Birmingham† 12.50-13.50 Bos. dock, No. 1, exp. †14.25-14.75 N. Eng. del. No. 1 14.00-14.25 Chicago, No. 1 17.50-18.00 Buffalo, No. 1 18.00-18.50 Buffalo, No. 2 16.25-16.75 Chicago 18.00-18.50 Cleveland, No. 1 17.50-18.00 Cleveland, No. 2 16.50-17.00 Detroit, No. 1 15.00-15.50 Eastern Pa., No. 1 18.00-18.50 Eastern Pa., No. 2 17.25-17.75 Federal, Ill. 14.50-15.00 Granite City, R. R. 15.50-16.00 Granite City, No. 2 14.00-14.50 New York, No. 1 †13.50-14.00 N. Y. dock, No. 1 exp. †13.50 Pitts., No. 1 (R. R.) 20.00-20.50 Pitts., No. 1 (dir.) 19.25-19.75 Pittsburgh, No. 2 17.50-18.00 St. Louis, R. R. 16.00-16.50 St. Louis, No. 2 14.50-15.00 Toronto, dirs. No. 1 9.75-10.50 Toronto, No. 2 8.75- 9.50 Valleys, No. 1 18.00-18.50</p> <p>COMPRESSED SHEETS Buffalo, dealers 16.25-16.75 Chicago, factory 17.25-17.75 Chicago, dealer 16.00-16.50 Cleveland 17.00-17.50 Detroit 15.50-16.00 E. Pa., new mat. 16.50-17.00 E. Pa., old mat. 15.00-15.50 Pittsburgh 19.25-19.75 St. Louis 12.00-12.50 Valleys 17.75-18.00</p> <p>BUNDLED SHEETS Buffalo 13.50-14.00 Cincinnati, del. 12.00-12.50 Cleveland 13.50-14.50 Pittsburgh 17.50-18.00 St. Louis 10.00-10.50 Toronto, dealers 6.00</p> <p>SHEET CLIPPINGS, LOOSE Chicago 13.00-13.50 Cincinnati 11.00-11.50 Detroit 12.00-12.50 St. Louis 9.50-10.00</p> <p>STEEL RAILS, SHORT Birmingham 15.00-16.00 Buffalo 20.00-21.00 Chicago (3 ft.) 21.00-21.50 Chicago (2 ft.) 22.00-22.50 Cincinnati, del. 19.00-19.50 Detroit 17.50-18.00 Pitts., open-hearth, 3 ft. and less 23.50-24.00 St. Louis, 2 ft. & less 17.00-17.50</p> <p>STEEL RAILS, SCRAP Boston district †12.75-13.25 Buffalo 18.00-18.50 Chicago 18.75-19.25 Pittsburgh 20.50-21.00 St. Louis 16.50-17.00 Toronto, dealers 9.00</p> <p>STOVE PLATE Birmingham 8.50- 9.00 Boston district †9.75-10.00 Buffalo 13.50-14.00 Chicago 10.00-10.50 Cincinnati, dealers 10.75-11.25 Detroit, net 10.00-10.50 Eastern Pa. 15.00 New York, fdry. 10.50-11.00 St. Louis 11.25-11.75 Toronto, deal'rs, net 7.50- 8.00</p>	<p>SPRINGS Buffalo 18.50-19.00 Chicago, leaf 19.75-20.25 Chicago, coll 22.50-23.00 Eastern Pa. 22.00-22.50 Pittsburgh 23.50-24.00 St. Louis 18.00-18.50</p> <p>ANGLE BARS—STEEL Chicago 19.50-20.00 St. Louis 17.00-17.50 Buffalo 14.50-15.00</p> <p>RAILROAD SPECIALTIES Chicago 19.50-20.00</p> <p>LOW PHOSPHORUS Buffalo, billet and bloom crops 20.00-20.50 Cleveland, billet, bloom crops 21.00-21.50 Eastern Pa., crops 23.00 Pittsburgh, billet, bloom crops 24.50-25.00 Pittsburgh, sheet bar crops 23.50-24.00</p> <p>FROGS, SWITCHES Chicago 17.50-18.00 St. Louis, cut 16.00-16.50</p> <p>SHOVELING STEEL Chicago 18.00-18.50 Federal, Ill. 14.50-15.00 Granite City, Ill. 14.50-15.00 Toronto, dealers 7.50</p> <p>RAILROAD WROUGHT Birmingham 9.00-10.00 Boston, district 8.00- 8.25 Buffalo, No. 1 16.25-16.75 Buffalo, No. 2 18.00-18.50 Chicago, No. 1, net 15.00-15.50 Chicago, No. 2 18.00-18.50 Cincinnati, No. 2 16.00-16.50 Eastern Pa. 18.00 St. Louis, No. 1 14.00-14.50 St. Louis, No. 2 16.00-16.50 Toronto, No. 1 dir. 8.00</p> <p>SPECIFICATION PIPE Eastern Pa. 15.00 New York 11.00-11.50</p> <p>BUSHELING Buffalo, No. 1 16.25-16.75 Chicago, No. 1 16.50-17.00 Cincin., No. 1, deal. 12.25-12.75 Cincinnati, No. 2 7.50- 8.00 Cleveland, No. 2 12.00-12.50 Detroit, No. 1, new 14.50-15.00 Valleys, new, No. 1 17.25-17.75 Toronto, dealers 7.00</p> <p>MACHINE TURNINGS Birmingham 6.00- 6.50 Buffalo 11.50-12.00 Chicago 10.00-10.50 Cincinnati, dealers 9.50-10.00 Cleveland 11.00-11.50 Detroit 9.50-10.00 Eastern Pa. 11.50-12.00 New York 8.25- 8.75 Pittsburgh 14.25-14.75 St. Louis 7.25- 7.75 Toronto, dealers 6.25- 7.00 Valleys 11.00-11.50</p> <p>BORINGS AND TURNINGS For Blast Furnace Use Boston district 7.25- 8.25</p>	<p>Buffalo 12.00-12.50 Cincinnati, dealers 9.50-10.00 Cleveland 12.00-12.50 Detroit 10.50-11.00 Eastern Pa. 11.00-11.50 New York 7.00- 7.50 Pittsburgh 14.00-14.50 Toronto, dealers 6.25</p> <p>CAST IRON BORINGS Birmingham 6.00- 6.50 Boston dist. chem. 8.50- 9.00 Boston dist. for mills 8.00- 8.25 Buffalo 10.75-11.25 Chicago, dealers 9.50-10.00 Cincinnati, dealers 9.50-10.00 Cleveland 12.00-12.50 Detroit 10.50-11.00 E. Pa., chemical 11.50-13.00 New York 8.00- 8.50 St. Louis 8.00- 8.50 Toronto, dealers 6.75</p> <p>PIPE AND FLUES Cincinnati, dealers 9.75-10.25 Chicago, net 12.50-13.00</p> <p>RAILROAD GRATE BARS Buffalo 14.00-14.50 Chicago, net 11.50-12.00 Cincinnati 10.25-10.75 Eastern Pa. 14.50-15.00 New York 10.50-11.00 St. Louis 12.00-12.50</p> <p>FORGE FLASHINGS Boston district †11.50-11.75 Buffalo 16.00-16.50 Cleveland 16.50-17.00 Detroit 14.00-14.50 Pittsburgh 17.50-18.00</p> <p>FORGE SCRAP Boston district 6.50- 7.00 Chicago, heavy 21.00-21.50 Eastern Pa. 16.00-16.50</p> <p>ARCH BARS, TRANSOMS St. Louis 16.50-17.00</p> <p>AXLE TURNINGS Boston district 9.00- 9.50 Buffalo 13.50-14.00 Chicago, elec. fur. 17.50-18.00 Eastern Pa. 15.50-16.00 St. Louis 11.50-12.00 Toronto 6.25</p> <p>STEEL CAR AXLES Birmingham 15.50-16.00 Boston district †18.50-19.00 Chicago, net 21.00-21.50 Eastern Pa. 22.00-22.50 St. Louis 20.00-20.50</p> <p>SHAFTING Boston district †17.25-17.75 Eastern Pa. 22.50 New York †17.00-17.50 St. Louis 15.00-15.50</p> <p>CAR WHEELS Birmingham 15.00-15.50 Boston dist. iron. †13.00-13.50 Buffalo, iron 17.00-17.50 Buffalo, steel 19.00-20.00 Chicago, iron 18.50-19.00 Chicago, rolled steel 20.00-20.50</p>	<p>Cincinnati, iron 17.50-18.00 Eastern Pa., iron 19.00 Eastern Pa., steel 22.00-22.50 Pittsburgh, iron 19.00-19.50 Pittsburgh, steel 24.00-24.50 St. Louis, iron 16.50-17.00 St. Louis, steel 18.00-18.50</p> <p>NO. 1 CAST SCRAP Birmingham 13.75-14.50 Bos. dis. No. 1 mach. †13.25-13.75 N. Eng., del. No. 2 13.00 N. Eng., del. textile 15.00 Buffalo, cupola 15.75-16.25 Buffalo, mach. 16.75-17.25 Chicago, agri. net. 12.50-13.00 Chicago, auto 14.25-14.75 Chicago, mach. net 15.00-15.50 Chicago, rail'd net 14.00-14.50 Cincin., mach. cup. 15.75-16.25 Cleveland, mach. 17.50-18.00 Eastern Pa., cupola 18.50-19.50 E. Pa., mixed yard 16.00-16.50 Pittsburgh, cupola 17.50-18.00 San Francisco, del. 13.50-14.00 Seattle 10.00-11.00 St. Louis, No. 1 13.25-13.75 St. L., No. 1, mach. 13.50-14.00 Toronto, No. 1, mach., net 10.50-11.00</p> <p>HEAVY CAST Boston dist. break. †12.50-12.75 New England, del. 14.00 Buffalo, break. 13.75-14.25 Cleveland, break 13.50-14.00 Detroit, No. 1 mach. net 13.50-14.00 Detroit, break. 12.50-13.00 Detroit, auto net 13.50-14.00 Eastern Pa. 18.00 New York, break. †13.50-14.00 Pittsburgh 15.50-16.00</p> <p>MALLEABLE Birmingham, R. R. 14.00-15.00 New England, del. †16.25-17.50 Buffalo 18.00-18.50 Chicago, R. R. 20.00-20.50 Cincin., agri. del. 14.75-15.25 Cleveland, rail. 18.00-18.50 Detroit, auto, net. 14.50-15.00 Eastern Pa., R. R. 17.50-18.00 Pittsburgh, rail 19.00-19.50 St. Louis, R. R. 16.50-17.00</p> <p>RAILS FOR ROLLING 5 feet and over Birmingham 15.00-16.00 Boston 13.25-13.50 Buffalo 19.00-19.50 Chicago 19.50-20.00 Eastern Pa. 18.50-19.00 New York 15.50 16.00 St. Louis 17.50-18.00</p> <p>LOCOMOTIVE TIRES Chicago (cut) 20.50-21.00 St. Louis, No. 1 14.50-15.00</p> <p>LOW PHOS. PUNCHINGS Buffalo 19.00-20.00 Chicago 21.75-22.25 Eastern Pa. 22.00-22.50 Pittsburgh (heavy) 22.00-22.50 Pittsburgh (light) 21.50-22.00</p>
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Iron Ore

Lake Superior Ore	
Gross ton, 51 1/2%	
Lower Lake Ports	
Old range bessemer	\$4.80
Mesabi nonbess.	4.50
High phosphorus	4.40
Mesabi bessemer	4.65
Old range nonbess.	4.65

Eastern Local Ore	
<i>Cents, unit. del. E. Pa.</i>	
Foundry and basic	
56.63% con. (nom.)	8.50- 9.00
Cop.-free low phos.	
58-60% (nom.)	10.00-10.50

Foreign Ore	
<i>Cents per unit, f.a.s. Atlantic ports (nominal)</i>	
Foreign manganifer-	

ous ore, 45.55%	
iron, 6-10% man.	16.00
No. Afr. low phos.	16.00
Swedish low phos.	11.50
Spanish No. Africa	
basic, 50 to 60%	15.50
Tungsten, spot sh.	
ton unit, duty pd.	\$15.85-16.00
N. F., fdy., 55%	7.00
Chrome ore, 48%	
gross ton, c.i.f.	20.00-21.00

Manganese Ore

<i>(Nominal)</i>	
Prices not including duty, cents per unit cargo lots.	
Caucasian, 50-52%	34.00
So. African, 50-52%	34.00
Indian, 50-52%	34.00

Bars

Bar Prices, Page 70

Pittsburgh—Activity of bar mills is holding up slightly better than producers had expected in view of the automotive situation and the effect of higher prices. In a few instances repeat orders have already been received from consumers who appeared to have been well protected before Jan. 1. Deliveries are still extended. Machinery makers have been taking more material than in the comparable period one year ago.

Cleveland—Producers are still operating at a relatively high rate, due to extensive backlogs and the encouraging amount of new business placed at the advanced prices. Among those making recent purchases, nut and bolt and farm equipment manufacturers require most tonnage. Alloy bar market has felt the effects of hold-up orders from partsmakers more than commercial steel bar producers.

Chicago — Active specifications permit heavy shipments of bars and the movement still is not affected by the curtailment in needs of some automotive plants. Some farm implement manufacturers are running at capacity and indications point to a steady rise in implement and tractor building during the balance of the quarter. While bar sales still are restricted by forward coverage last quarter, new business is in fair volume. Deliveries average four to six weeks.

New York—Commercial steel bar tonnage is moving strongly although principally against orders placed before the \$3 advance, Jan. 1. New buying is slower but not as dull as the trade had expected.

Philadelphia—Bar tonnage is moving well, although new orders are showing a more perceptible falling off. Prices are firm at 2.20c, Pittsburgh, or 2.49c, Philadelphia.

Youngstown, O.—Steel bar makers here are enjoying continued good business and operating rates are pronounced satisfactory. The automobile makers' troubles have not been noticed in local mills' activities. Orders for bars are flowing in steadily from miscellaneous consumers and this situation is expected to continue through the winter by Youngstown district interests.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 71

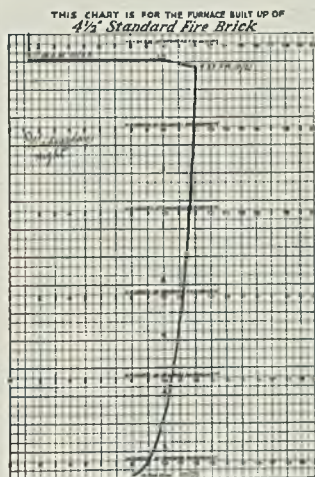
Bolt and nut jobbers report sales almost on a par with December,

AT THE CLEVELAND STEEL SHOW

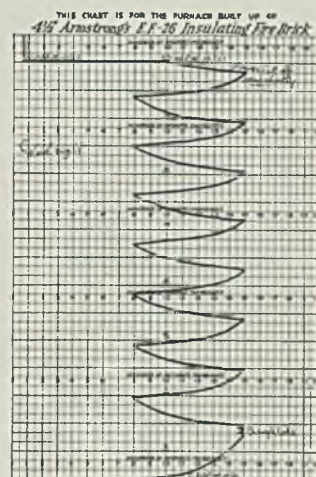
COMPARATIVE TESTS IN DEMONSTRATION

FURNACES PROVE EFFICIENCY OF

Armstrong's EF-26 Insulating Fire Brick



Charts at the left and right were simultaneously recorded on Brown Instrument Company's potentiometers. Burners were Surface Combustion atmospheric type, of exactly the same size and type, and similarly adjusted by their engineer.



FURNACES BUILT WITH Armstrong's BRICK

... give Quicker Heating, Lower Fuel Consumption, Lower Heat Storage, Increased Production, Lower Outside Furnace Temperatures, Greater Operating Flexibility

AT Cleveland, two furnaces were set up. One was constructed of 4 1/2" standard fire brick; the other, of 4 1/2" Armstrong's EF-26 Insulating Fire Brick. The purpose of the test was to give an accurate comparison—not to establish any records. Therefore, no coatings were used on the outside or the inside of either furnace.

Now follow the charts, and you'll see that with the gas supply the same, the fire brick furnace required from 2:30 P.M. until 9:55 P.M. to rise from 750° to 1210°. During the same length of time, the furnace insulated with Armstrong's EF-26 Insulating Fire Brick was brought up to 1500°, and

allowed to cool off to 800°, a total of EIGHT TIMES.

Convincing tests—even under unfavorable show conditions. Far more convincing, however, is the performance record of Armstrong's EF-26 Insulating Fire Brick under actual working conditions. These efficient brick can be made up in any special sizes—machined to size with a tolerance of 4/1,000 of an inch, or cast to size with a tolerance of 1/16 of an inch. Write for complete information and samples... also your copy of our new illustrated folder. Armstrong Cork Products Company, Building Materials Division, 985 Concord Street, Lancaster, Pennsylvania.



Armstrong's

HIGH TEMPERATURE INSULATION

one of the best months last year. This fact offers much encouragement in view of suspension orders from the auto trade. At present backlogs are sufficient to hold operations at a high peak well into February and are expected to be still further extended upon settlement of labor difficulties. Prices are firm.

Shipments continue heavy, with railroad shops, freight car builders and farm implement and tractor manufacturers taking largest lots. Operations of structural fabricators are increasing, and heavier rivet demand is in prospect.

Rivet prices are steady.

Plates

Plate Prices, Page 70

Pittsburgh—Award of 20 to 25 barges, involving approximately 3000 tons, is expected to be made within a few days. American Bridge Co. has been awarded a contract for the construction of two standard coal barges, approximating 300 tons of material, of the combination riveted and welded type, by the National Barge Co. Dravo Corp. is constructing five all-welded steel barges for the Pennsylvania railroad for

service in New York harbor. This contract involves about 500 tons of material. The open winter has been expediting operations in fabricating yards.

Cleveland—Most plate requirements over the last 30 days were for small structural projects and specialty jobs, such as boilers and presses. However, Bethlehem Steel Corp., Bethlehem, Pa., received the award of 2½ miles of 48-inch pipe for water main at Toledo, O. This project involves 2600 tons and is one of the largest of this type placed for some time. Shipments continue heavy against contracts with new business offering considerable encouragement to producers.

Pittsburgh Steamship Co., subsidiary of U. S. Steel Corp., Cleveland, will take bids shortly on two bulk freighters, requiring approximately 12,000 tons of plates and shapes. This is the first major ship building project on the Great Lakes since 1930.

Chicago—Plate mills have substantial backlogs, some producers requiring four to six weeks for delivery of new tonnages. Operations of freight car builders are the best since pre-depression days and plate releases for railroad equipment building are in similar volume. Structural fabricators are increasing their schedules, and with fabricators of equipment for the oil industry, expect to have better operations during the next several months.

New York—Considerable plate tonnage is being booked for identified work, with heavy demand from abroad, particularly from Scandinavia. Prices for export are advancing accordingly, with most producers apparently quoting at least the domestic equivalent and in some cases higher. Miscellaneous domestic demand is tapering. Panama Railroad Steamship Co. will issue specifications within two weeks for either two or three 468-foot combination cargo and passenger boats. Expectation of other ship work developing soon is based on probability the maritime commission will be brought to its full complement of five members this week.

Philadelphia—While orders against identified projects continue in good volume, miscellaneous demands for plates have slowed perceptibly within the past week. Production has been well sustained, however, at all eastern plants, with deliveries two or three weeks delayed on an average. The base price is firm at 2.15c, Coatesville, Pa., or 2.235c, Philadelphia.

Birmingham, Ala.—Plate demand is active and business in hand and in sight will keep mills here active for three to four months with prospects bright well into the summer.



THIS correct, convenient Blue Book—pocket size—knows the answers . . . Standard Drill Rod Lists, Decimal Equivalents, Areas, Weight Tables, Hardness Conversion . . . Tensiles, Wire Gage Comparison, SAE Chemical Compositions, Temperature Conversion Factors, Recommended Practices on the Heat Treatment of Tool Steels, Definitions of Steel Terms . . . also life-size portraits of interesting Special Shapes.

If you use Drill Rods or Cold Drawn Steels—particularly Cold Drawn Tool or Alloy Steels, or Special Shapes—a copy is yours for the asking . . . on your Company letterhead.

P. S.—It also suggests a completely satisfactory source—unless you are already using “Pittsburgh’s” product.

PITTSBURGH TOOL STEEL WIRE CO.
MONACA, PENNSYLVANIA

San Francisco—Awards confined to unimportant lots. Considerable interest is being displayed in the floating drydock for Pearl Harbor, T. H., up for bids Feb. 3 and involving 4000 tons of plates.

Seattle—Current plate buying of importance is absent but as soon as materials are available by water shipment, numerous projects are expected to materialize. Meanwhile there is a fair turnover of light gages.

Contracts Placed

650 tons, miscellaneous tanks and piping, Kleckhefer Contalner Co., Plymouth, N. C., to Ingalls Iron Works, Birmingham, Ala.

350 tons, 500,000-gallon elevated water tank, Green Bay, Wis., to Pittsburgh-Des Moines Steel Co., Pittsburgh.

345 tons, 24-inch pipe line, Barberton, O., to Youngstown Sheet & Tube Co., Youngstown.

130 tons, 20-inch riveted steel pipe, U. S. Engineer, Galveston, Tex., to Wyatt Metal & Boiler Works, Houston, Tex.

Contracts Pending

600 tons, tanks, Shell Oil Co., Seattle.
180 tons, 500,000-gallon tank, Fresno, Calif.; Chicago Bridge & Iron Works, Chicago, Iowa.

Sheets

Sheet Prices, Page 70

Pittsburgh — Judging from present demand from diversified sources, if the automotive suspensions are lifted on sheets in the near future, complications in deliveries are likely to increase. Such sources as railroad equipment and household appliances manufacturers have been specifying at a good rate, while mills at the same time have been striving to reduce the unusually large backlogs they piled up before the advance in prices.

Cleveland—Mills continue to operate close to capacity on heavy backlogs which are extended into April in some cases. Heavy demand from miscellaneous consumers such as stoves, refrigerators and barrel manufacturers has offered encouragement to producers and enabled them to keep close to capacity operations.

Chicago — Sheet mill operations continue full, and unless further restrictions on automotive shipments develop, mills are assured of capacity schedules during the balance of this quarter. New business has been in better volume than was anticipated and backlogs already indicate that delivery of some tonnages will be extended into April. Suspension of some automotive tonnages has permitted quickening of

shipments to other consumers, but delivery still is a major problem. Prices are steady on new business.

New York—Sheet buying by domestic consumers is fairly well sustained at the rate of the past fortnight, with export inquiry more active than ever, particularly from Europe. Premiums over the domestic market are now being reported.

Philadelphia—Slowing up in sheet inquiry is increasingly perceptible, although jobbers of galvanized sheets are buying more actively in anticipation of spring business, which should start by the middle of March. Deliveries have improved in some grades, particularly in cold reduced sheets; however, some sellers are still booked rather solidly for the entire quarter, and on some grades are unable to do anything much before May, having become considerably oversold.

The Philco Radio & Television Corp., this city, with substantial orders for automobile radio sets, has received suspensions due to the automobile strike, and in turn is holding up some steel shipments. Edward G. Budd Mfg. Co., this city, has received a suspension of Chevrolet passenger car frames, but, for the time being at least, is continuing production and storing the frames.

It is reliably understood that it has not as yet received suspensions on Chevrolet truck frames. Heintz Mfg. Co. is still holding up steel shipments on Chevrolet fenders.

Buffalo—Automotive strikes have had little effect on production of hot and cold-rolled sheets here. Tonnage at rates close to capacity for other lines of consumption is taking up any slackness in shipment to automobile manufacturers. It is said the past ten weeks have seen a far greater tonnage of sheets produced here than in any other period of equal length in the history of this district.

Youngstown, O.—Continuing unchanged on satisfactory operating rates, independent sheet makers here are booking a fair amount of business despite the automotive industry's troubles. This business is coming from a wide variety of consumers and includes all kinds of sheets. Sufficient back logs have been accumulated meanwhile in Youngstown district mills to insure continuation of current operating rates for two weeks or more.

Cincinnati—A strong, broad demand, represented in new orders, is augmenting backlogs of sheet mills to hold production at capacity de-

HEAVY MACHINERY
and
HEAVY MATERIALS
require
STURDY FLOORS

if accidents are to be avoided and material handling costs kept to a minimum. RUTS and HOLES must be eliminated—the best way is with



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Ready for use in from 18 to 36 hours, STONHARD RESURFACER provides a safe, even floor designed for heavy traffic. A custom built floor to suit your needs. Ask about our Trial Offer.

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COMPANY

INDUSTRIAL BUILDING MAINTENANCE MATERIALS
813 Terminal Commerce Bldg., Philadelphia, Pa.

spite suspensions for some automobile material. Most recent ordering has been in moderate tonnages but the aggregate is unexpectedly large, considering the purchasing done at third quarter prices. Output in some river mills is temporarily curtailed or suspended because of high water conditions.

Birmingham, Ala.—Backlogs for three months or longer active operation are held by sheet mills. New business is coming in and additional tonnage bids fair to continue the heavy operations indefinitely.

Pipe

Pipe Prices, Page 71

Pittsburgh—The unusually mild weather in many sections of the country has enabled construction to go forward at a much better rate than last year. This, in turn, has been reflected in demand for pipe. Sales are well ahead of a year ago. Jobbers and manufacturers, now that inventories have been taken, are ordering at a better rate than

a few weeks ago. Oil country goods are moving well.

Cleveland—Pipe requirements usually confined to small tonnages for industrial and domestic use, sprung to life last week with two outstanding awards. Bethlehem Steel Co., Bethlehem, Pa., was awarded 2½ miles of 48-inch pipe for water main at Toledo, O., and Youngstown Sheet & Tube Co., Youngstown, O., 8500 feet of 24-inch, for a water main at Barberton, O. The Toledo, O., award is estimated at 2600 tons, while at Barberton, O., 335 tons.

Chicago—Cast pipe continues slow, with most orders and inquiries involving lots of less than 100 tons. Outstanding in projects pending locally is 360 tons for sanitary district work. While shipments are being made against old contracts, producers' backlogs have been reduced and no immediate pick-up in buying is in prospect.

New York—Cast pipe buying is light with the exception of a purchase of approximately 1000 tons by a New Jersey utility. New inquiry is small, including 225 tons for Syracuse, N. Y. Eastern foundries are operating 65-70 per cent but with reduced backlogs. Prices are firm.

Youngstown, O.—Wrought pipe mills are gathering headway due to growing demand for the medium and smaller diameter forms of tubing. This seems to indicate continued expansion in the building industry. Demand for oil country goods also continues in satisfactory volume.

Tulsa, Okla.—Gulf Refining Co. has let contract for seven miles of 10-inch oil line near Eunice, N. Mex. to Kelly, Dempsey & Co., to be Lindeweld oxyacetylene welded.

San Francisco—The largest cast pipe award placed so far this year went to Pacific States Cast Iron Pipe Co. and involved 1336 tons of 4 to 12-inch, class 150, for Salt Lake City, Utah. Other lettings were lots of less than 100 tons.

Seattle—Small out of stock sales feature the market. New projects are being postponed pending shipping facilities by water. Parker & Hill, Seattle engineers, will open bids Jan. 30 for 20,000 feet of 1½ to 6-inch pipe for Des Moines, Wash. B. H. Sheldon, Gresham, Oreg., is low at \$20,740 for construction of a water system at Maplewood, Oreg., involving an unstated tonnage of 6 and 8-inch, cast or steel.

Steel Pipe Placed

2600 tons, 2½ miles, 48-inch, for water main, Toledo, O., to Bethlehem Steel Co., Bethlehem, Pa.
335 tons, 8500 feet, 24-inch, for water main, Barberton, O., to Youngstown Sheet & Tube Co., Youngstown, O.

Behind the Scenes with STEEL

Steel Goes Clubby

SOCIETY note: Benny Aronoff's Buckeye Social club in Toledo recently called in a couple of welders to erect two 7 by 15-foot steel tables, after police became careless and smashed up two wooden tables, presumably being used to serve tea to the customers.

Benny also has installed two steel doors, with vault-type locks, to keep out a strong breeze which seemed to seep through the old wooden doors. A wise-cracking police lieutenant suggested the tables could be covered with felt-covered beaverboard and used for dice throwing. Police are funny that way.

Six in One

RECENT new two-year subscription to STEEL was made out in the name of one man in the engineering department of a Birmingham, Ala., plant, but the check in payment was signed by a different gentleman. An explanatory note indicated the check-writer was one of six men who will read STEEL for the next two years, while the addressee was another of the sextet.

Didn't say who the other four were. If he'll send us their names, we will forward a supply of printed routing slips he can attach to the copies as they are received, thereby facilitating the routing to all six readers.

Office boys tell us they wouldn't be without these handy routing slips, as it obviates all necessity for deciphering the boss' handwriting.

Slight Accident

EXCERPT from a paper by Stanley Knauss of Gar Wood Industries at the recent S.A.E. meeting in Detroit: "Here is how one of our coaches looked after a collision in which the coach, going at a speed of better than 60 miles per hour, struck a sedan without lights that appeared suddenly from a side road. The driver stated he did not have time to use the brake, and the terrific impact knocked the motor car 75 feet down the road, rolled it over

three times, and killed the three occupants; while the coach did not leave the highway.

"In an impact of this nature, the welded tubular structure seems to absorb and localize the shock which accounts for the fact that with the exception of the

INQUISITIVE CAMERA DEPT.—XX



TWO junior members of STEEL'S editorial staff, Miss LaVerne Nock (left) and Joe C. Sullivan (right), pause before their respective typewriters for our nosy cameraman. Miss Nock is a graduate from the stenographic ranks who for several years has handled much routine editorial copy. Mr. Sullivan recently joined the market and news division of the staff.

windshield and one side windshield glass, not one other window in the coach was even cracked. The impact was so great as to emboss the spare tire on the tire cover door. The axle was bent almost into a knot, the tube structure at the front end was bent, and a few were broken, but there the damage was localized; in fact, the main entrance door immediately behind the windshield was in perfect alignment and could be opened and closed with a finger tip.

"Officers of the company operating the coach made the statement that had the engine been in the front it would have been either in the driver's lap or in a corn field."

What did you say that bus driver's name was?

—SHIRDLU

Gallagher & O'Hara, Youngstown, O., general contractors.

Cast Pipe Placed

1336 tons, 4 to 12-inch, Salt Lake City, Utah, to Pacific States Cast Iron Pipe Co., Provo, Utah.

300 tons, 6-inch, Conway, N. H., to Warren Foundry & Pipe Corp., Phillipsburg, N. J.

215 tons, small sizes, WPA requirements, Boston, Worcester and Haverhill, Mass., to Warren Foundry & Pipe Corp., Phillipsburg, N. J.

110 tons, Augusta, Me., to United States Pipe & Foundry Co., Burlington, N. J.

Cast Pipe Pending

136 tons, 6 and 8-inch, treasury department, Los Angeles, invitation 20220; bids opened.

100 tons, 4 and 6-inch, treasury department, San Francisco, for Berkeley, Calif.; bids opened.

Transportation

Track Material Prices, Page 71

In spite of heavy orders for freight cars placed late in December and just after the opening of the year railroads continue to inquire for additional rolling stock. Board of transportation, New York, is expected to award its purchase of subway cars about Jan. 25 and indications point to the original inquiry for 250 cars being doubled. Baltimore & Ohio, in addition to 2000 cars awarded to its own shops is reported to have given 2000 seventy-ton gondolas to Bethlehem Steel Co., Bethlehem, Pa. This is 500 more than its original inquiry.

Central of Vermont has appropriated \$250,000 for repairs, including 15 locomotives and 100 freight cars. The city of Philadelphia and Delaware river bridge commission are understood to plan for buying 60 subway cars for operation between Philadelphia and Camden, N. J.

The Pennsylvania has completed construction of 10,000 freight cars in its own shops, which were started early in 1936. It is now scrapping 32,000 old cars thus displaced. Of the new cars 2000 are special mill-type for handling structural shapes and pipe, 3000 are automobile cars and the remaining 4700 are ordinary types.

Locomotives Placed

Guayaquil & Quito, two type 2-8-0 locomotives, to Baldwin Locomotive Works, Eddystone, Pa.

Locomotives Pending

Aluminum Corp. of Canada, one locomotive.

Missouri Pacific, four 600-horsepower and

two 900-horsepower diesel switch engines.

Union Pacific, 25 freight locomotives, in addition to 20 freight and passenger locomotives recently noted as placed.

Car Orders Placed

Baltimore & Ohio, 2000 covered wagon top box cars of 50-ton capacity, to own shops.

Chicago Great Western, 200 hopper cars, to Pullman-Standard Car Mfg. Co., Chicago.

Car Orders Pending

Baltimore & Ohio, 2000 gondola cars of 70-ton capacity.

Chicago Rapid Transit Co., 600 passenger trailer cars.

Chicago, Milwaukee, St. Paul & Pacific, 2000 freight cars.

Illinois Terminal, St. Louis, 50 flat cars, 100 gondolas.

Missouri Pacific, 1000 box cars, 700 gondolas, 500 hoppers, 25 cabooses.

North American Car Corp., 200 refrigerator cars.

Buses Booked

American Car & Foundry Motors Co., New York: Fifteen 30-passenger to Transit Co. of Harrisburg, Harrisburg, Pa.; five 35-passenger to Worcester Street Railway, Worcester, Mass.; four 35-passenger to Eastern Massachusetts Street Railway Co., Boston; two 32-passenger and two 24-passenger to Santa Fe Transportation Co., Oakland, Calif.

Strip

Strip Prices, Page 71

Pittsburgh—Since the first week in January demand for strip has shown slight gains each succeeding week. In several instances, consumers who had apparently covered a good share of their requirements before the Jan. 1 price advance have already returned for more tonnage, at the higher prices. The automotive strike situation has lessened shipments to Michigan, but mills are estimated to be operating at approximately 75 per cent, practically even with mid-December.

Cleveland—Present miscellaneous demand from small farm tools and electrical equipment manufacturers has offered encouragement to producers, holding operations near capacity. Prices remain firm and unchanged at 2.85c, base Cleveland.

Chicago—Strip mills continue to experience good demand from customers other than automotive plants and operations are well sustained. New business from miscellaneous users has continued in good volume, considering the amount of forward buying done last quarter. Mill backlogs, while showing no further gains,

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are slow to decline. Prices are steady.

New York—Sellers of cold-rolled strip report increasing suspensions from automotive accessory manufacturers engaged on work for General Motors but have been able so far to divert much of their production into other channels. Operating schedules are somewhat easier. Many consumers are still buying actively, prompted by the thought of heavier automotive demand when the labor situation is settled.

Philadelphia—Strip buying is perhaps the slowest in several weeks. Consumers covered rather substantially before the recent price advance and therefore are showing little interest other than in following up on deliveries.

Youngstown, O.—Makers of medium and narrow strip continue to book a satisfactory aggregate of new business from widely diverse sections. The wider strip mills, which cater to the automotive trade, have completed their shifts and are now operating at somewhat more satisfactory rates. Hot strip is in better demand than cold-rolled, and narrower widths, particularly those going into hoops, are much sought after.

Tin Plate

Tin Plate Prices, Page 70

Pittsburgh — Tin plate specifications recently have been featured by heavy demand for beer and oil cans. Mills are operating at close to 95 per cent of capacity, although

fluctuations have been reported. Manufacturers of all kinds of cans have been specifying freely, partly due to a desire to be protected as nearly as possible in the event of unforeseen disruptions which might occur.

Wire

Wire Prices, Page 71

Pittsburgh — From an overall viewpoint, activity of wire mills is at a high level, practically undisturbed in this district by automotive suspensions. Demand for manufacturers' wire is well maintained. One of the features recently has been the demand from manufacturers of railroad equipment.

Cleveland—Bolt and nut demand for wire shows considerable activity, with some concerns reporting more tonnage than they can handle, in spite of suspension orders from the auto trade. Due to moderate weather throughout the East, fencing requirements are heavier than usual, many dealers thus taking advantage of the spring discount rates. Backlogs range from six to ten weeks, with production near capacity.

Chicago — Manufacturers' wire shipments continue heavy and producers still are faced with the problem, in some instances, of giving desired deliveries. The latter situation has been aided by the suspension of some automotive material, but present capacity is being taxed. Merchant products' demand

is fair and a pick-up in shipments of barbed wire fencing, etc., is looked for next month as distributors plan to increase their stocks in view of the more favorable outlook for farm buying this year. Prices of wire and wire products are steady.

Youngstown, O.—Manufacturers' wire and wire rods continue in best demand at local mills but with a fair sprinkling of business for the lighter wire products. The latter is expected to pick up ahead of the usual spring demand from agricultural centers.

Metallurgical Coke

Coke Prices, Page 71

The warm weather has had an adverse effect upon demand for coke in the Connellsville region, but the automotive situation has not been reflected to any great extent, except possibly in foundry coke. Coal mine operators have been pondering over the outlook for renewal of labor contracts. Republic Steel Corp., which recently acquired the Mount Hope mine from the Brownsville Coal & Coke Co., planned to have operations on at least a 50 per cent basis by last Thursday. Coke prices are steady.

Foundry coke shipments in the Chicago district are about 10 per cent heavier than a month ago and domestic heating fuel is more active as a consequence of colder weather. Foundries are stocking little coke and shipments still are taking by-product oven capacity. The market continues \$9.50, ovens, for outside delivery and \$10.25, delivered Chicago.



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Cold Finished

Cold Finished Prices, Page 71

Pittsburgh — With capital goods industries specifying steadily for cold-finished material and orders from other sources being received in good volume, the effect of the automotive suspensions has been less apparent than expected when the labor controversy began. Machinery makers' requirements are well above the comparable period a year ago.

Ferroalloys

Ferroalloy Prices, Page 72

New York—Shipments of ferromanganese continue heavy. Prices are firm at \$80, duty paid, eastern seaboard. Domestic spiegeleisen, 19 to 21 per cent, also is moving well, with prices unchanged at \$26, Palmerton, Pa., per ton, regardless of quantities.

Shapes

Structural Shape Prices, Page 70

New York—Structural awards are light, although inquiry is heavier. Close to 20,000 tons of new work has come out for bids since Jan. 1. Public works, including bridges for New York state and the Manhattan Midtown tunnel project account for the bulk of this tonnage.

Philadelphia—Distribution is expected to be announced this week on approximately 28,000 tons for electrification work on the Paoli-Harrisburg division of the Pennsylvania railroad. Five fabricators are expected to participate in this business. Demand, otherwise, is relatively light. Shapes are firm at 2.15c, Bethlehem, Pa., or 2.255c, delivered, Philadelphia.

Buffalo—Fabricators report the outlook for the first half as very promising. They are figuring numerous public projects and an increasing number of factory and business house expansion projects about to reach contract stage.

Pittsburgh—Operations of structural fabricators, while around 50 per cent, are better than in several years, largely due to comparatively mild weather in many sections of the country. Awards last week included 2150 tons for Mississippi river dam No. 3, Red Wing, Minn., to the Lakeside Bridge & Steel Co., Milwaukee, and 2100 tons for the Overseas Road & Toll Bridge district, Miami, Fla., to American Bridge Co., Pittsburgh.

Cleveland—Shape mills report good backlogs and some feel they will be further extended as those projects on which bids have been taken, will soon be placed, taking advantage of the lower prices. Among the pending list is a plant extension for Reeves Mfg. Co., Dover, O., approximately 500 tons, and state crossing elimination, this city, requiring close to 500 tons.

Chicago—Structural fabricators continue to receive a large number of small inquiries, and with the price protection period drawing to a close, an increase in awards of such proj-

ects as well as larger jobs is anticipated. More than 35,000 tons of shapes will be required for about 450 small projects now pending.

San Francisco—Important structural lettings include 800 tons for the Insurance Co. of North America building, San Francisco, taken by Columbia Steel Co., and 500 tons for an addition to Owens-Illinois Glass Co. plant, Los Angeles, placed with Ingalls Iron Works. Awards so far this year total 11,209 tons, compared with 5227 tons last year.

Seattle—The year has opened slowly but business is hampered by the inability to obtain materials by water shipment. Bids are in for 600 tons, required for the Alaska Railroad's Knik river bridge, the largest tonnage pending.

Shape Contracts Placed

2150 tons, Mississippi river dam No. 3, Red Wing, Minn., for United States government, to Lakeside Bridge & Steel Co., Milwaukee.

2100 tons, beams, etc., for Overseas Road & Toll Bridge district, Miami, Fla., to American Bridge Co., Pittsburgh.

1105 tons, bridges, Chicago, Milwaukee, St. Paul & Pacific railroad; 400 tons to Worden-Allen Co., Milwaukee, 270 tons to American Bridge Co., Pittsburgh, 225 tons to Milwaukee Bridge Co., 210 tons to Wisconsin Bridge Co., Milwaukee.

800 tons, Insurance Co. of North America building, San Francisco, to Columbia Steel Co., San Francisco.

780 tons, mill buildings, Clarksburg, W. Va., for National Carbon Co., to Bethlehem Steel Corp., Bethlehem, Pa.

680 tons, Columbia power station-unit No. 3, for Cincinnati Gas & Electric Co., Columbia Park, O., to Mt. Vernon Bridge Co., Mt. Vernon, O.

500 tons, addition to Owens-Illinois Glass Co., Los Angeles, to Ingalls Iron Works, Birmingham, Ala.

455 tons, highway bridge, Almond, N. C., to Virginia Bridge & Iron Co., Roanoke, Va.

350 tons, West Thirty-eighth avenue underpass, Denver, for state of Colorado, to Bethlehem Steel Corp., Bethlehem, Pa.

340 tons, highway structure, Tuckahoe, N. Y., to Bethlehem Steel Corp., Bethlehem, Pa.

335 tons, grade crossing, Atlantic county, New Jersey, to Bethlehem Steel Corp., Bethlehem, Pa.

300 tons, railroad viaduct underpinning, Detroit, to American Bridge Co., Pittsburgh.

270 tons, highway bridge, North river, North Carolina, to Bethlehem Fabricators Inc., Bethlehem, Pa.

250 tons, warehouse, Pacific Coast Borax Co., Los Angeles, to Consolidated Steel Corp., Los Angeles.

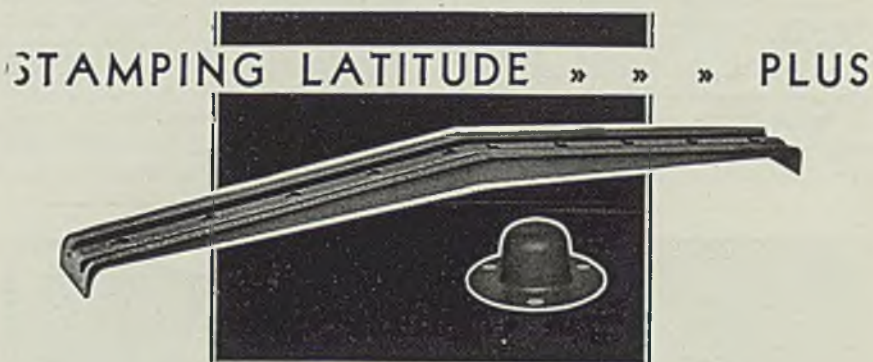
235 tons, warehouse, Western Electric Co., Cincinnati to Oregon Bridge Co., Lebanon, O.

225 tons, bridge, 224.18, Erie railroad, Union, N. Y., to American Bridge Co.

220 tons, state highway viaduct, WPGM-

Shape Awards Compared

	Tons
Week ended Jan. 28	13,715
Week ended Jan. 16	29,346
Week ended Jan. 9	16,544
This week, 1936	26,155
Weekly average, 1936	21,764
Weekly average, 1937	23,335
Weekly average, December	21,351
Total to date, 1936	93,862
Total to date, 1937	93,341



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81-C, Milnot, N. D., to Bethlehem Steel Corp., Bethlehem, Pa.
 215 tons, Padre canyon arch bridge, Flagstaff, Coconino county, Arizona, to Bethlehem Steel Corp., Bethlehem, Pa.
 210 tons, warehouse and machine shop, Lanett Bleachery & Dye Works, Lanett, Ga., to Bethlehem Steel Corp., Bethlehem, Pa.
 210 tons, paint shop addition for Du Pont interests, San Francisco, to Bethlehem Steel Corp., Bethlehem, Pa.
 200 tons, state bridge FAP-649, Sioux Rapids, Iowa, to Pittsburgh-Des Moines Steel Co., Pittsburgh.
 200 tons, hospital building, Ft. Defiance, Ariz., for United States Indian agency, to Capitol Steel & Iron Co.
 180 tons, airplane factory building, British-American Mfg. Export Corp., Dover, Del., to Bethlehem Steel Corp., Bethlehem, Pa.
 175 tons, plate girder spans, Buena Vista county, Iowa, to American Bridge Co., Pittsburgh.
 170 tons, curb angles, procurement division, treasury department, to Egleson Bros. & Co., Long Island City, N. Y.
 150 tons, addition, Swift & Co., Vernon, Calif., to Bethlehem Steel Co., Los Angeles.
 150 tons, dredger ladders, radio beacon tower and miscellaneous, to Standard Steel Fabricating Co. & Boiler Works, Seattle.
 150 tons, shop extension, Line Material Co., South Milwaukee, Wis., to Milwaukee Bridge Co., Milwaukee.
 145 tons, project 1334, E. I. du Pont de Nemours & Co., Kearny's Point, N. J., to Belmont Iron Works, Philadelphia.
 125 tons, state highway bridge, New Haven railroad separation, Eastern State Parkway, Dutchess county, New York, to Phoenix Bridge Co., Philadelphia, through Turnbull Construction Co., Cold Springs, N. Y.
 125 tons, bridge, Windham, Conn., to American Bridge Co., Pittsburgh.
 115 tons, bridge for United States forest service, Kern county, California, to Minneapolis-Moline Power Implement Co., Minneapolis.
 100 tons, Castro Canyon bridge, Mon-

terey county, California, to Moore Dry-dock Co., Oakland, Calif.

Shape Contracts Pending

7000 tons, toll bridge across Mississippi river at East St. Louis, Ill.; plans expected to be ready for bids in March.
 5100 tons, including 2100 tons of piling, Mississippi river dam, New Boston, Ill.; Maxon Construction Co., Dayton, O., low for general contract, R. C. Mahon Co., Detroit, low for fabricated steel.
 4400 tons, tunnel rock section 4, Midtown-Hudson tunnel, for Port of New York authority.
 2000 tons, American Gas & Electric Co., Wellsburg, W. Va.
 700 tons, bridge, Norfolk, Ark.
 650 tons, Erie county jail, Buffalo.
 600 tons, tainter gates, Beverly, Tex.
 550 tons, state highway bridges, Delaware and Tompkins counties, New York; bids in.
 500 tons, plant extension, Reeves Mfg. Co., Dover, O.; bids in.
 475 tons, alterations to building, for Spear & Co., New York.
 450 tons, building for Stanford university, Palo Alto, Calif.; bids opened.
 425 tons, state normal school addition, Genesco, N. Y.; T. C. Brown Co., Schenectady, N. Y., general contractor.
 400 tons, state bridge, Wolf road, Hillside, Ill.
 365 tons, Highway structure, RC-2445, Otsego county, New York; Lane Construction Corp., general contractor.
 350 tons, state bridge, California avenue, Chicago.
 300 tons, state highway bridge, WPGH-RC-3858, Delaware county, New York.
 250 tons, mill building additions, for Steel & Tubes Inc., Cleveland.
 225 tons, state highway bridges, Attleboro and Leominster, Mass.; bids in.
 225 tons, Kennewick-Pasco state bridge, Wash.; Parker & Schram, Portland, general contractor.
 200 tons, plant addition for Du Pont interests, Carneys Point, Pa.; bids opened Jan. 20.
 135 tons, Sierra street bridge, Reno, Nev.; J. F. Knapp low on general contract.
 125 tons, radial gates, Bonneville proj-

ect; Star Iron & Steel Co., Tacoma, Wash.; low.
 Unstated, Black Canyon railroad bridge, Emmet, Ida.; bids in at bureau of reclamation, Denver.
 Unstated, four radial gates and holsts, Upper Snake river project, Idaho; bids to bureau of reclamation, Denver, Jan. 29.

Reinforcing

Reinforcing Bar Prices, Page 71

Pittsburgh—Inquiries for concrete reinforcing material, particularly for private projects, are heavy. Reinforcing rail steel bars at 2.10c, base, Pittsburgh, are in fair demand. On both rail and new billet materials, bending prices since Dec. 15 have been up \$2 a ton. Heavy bending is now \$8 a ton, and light bending \$18 a ton.

Cleveland—Awards for reinforcing steel bars were scarce last week, and average well under 100 tons. The particularly discouraging feature of the present trend is the absence of any good sized projects likely to come out over the next few weeks. Prices are firm although no real test has been offered.

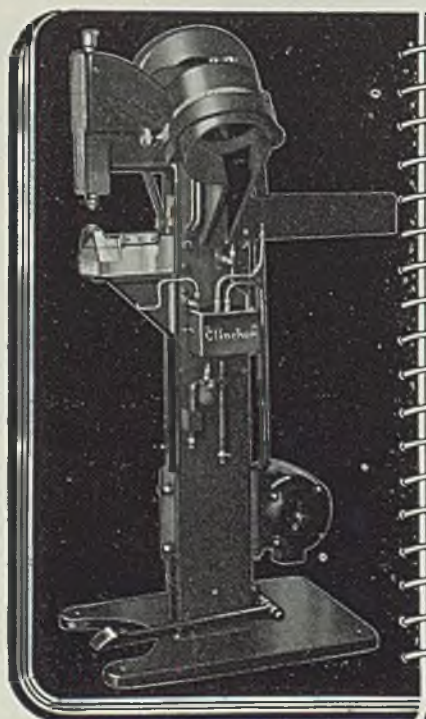
Chicago—Shipments continue active, while new business is fair. Several large lots are pending and expected to be placed shortly. Chicago sanitary district work includes 1375 tons for a sewage treatment works, while 600 tons for a Mississippi river dam is to be placed soon. Small orders constitute an important part of current business.

New York—Recently increased prices for reinforcing bars are subject to slight test on new business, bulk of awards being made on previously specified projects. Approximately 950 tons for world's fair construction is being rebid. Awards include about 450 tons for New York state highway work.

Philadelphia—Apart from 800 tons for two schools, on which McCloskey Contracting Co., Philadelphia, has the general contract, little reinforcing bar tonnage is pending. To date the new prices have not received an adequate test, but on such

Concrete Awards Compared

	Tons
Week ended Jan. 23	1,424
Week ended Jan. 16	4,316
Week ended Jan. 9	6,215
This week, 1936	12,888
Weekly average, 1936	6,005
Weekly average, 1937	3,105
Weekly average, December	3,560
Total to date, 1936	36,223
Total to date, 1937	12,420



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small work as is being noted, stronger prices are applying. The official delivered price on new billet bars continues 2.54c, Philadelphia.

San Francisco — Majority of awards were in lots less than 100 tons. The aggregate placed during the week was 1795 tons, bringing the total for the year to 2297 tons, compared with 13,172 tons in 1936. New inquiries include 520 tons for the Lyon street approach of the Golden Gate bridge, San Francisco, bids on which have been taken by the treasury department.

Seattle—Important tonnages have not developed and business pending is not of large proportions. The market is firm at the new price level of 2.65c. Small orders predominate but local plants have sizable backlogs and are operating at capacity.

Reinforcing Steel Awards

- 300 tons, state highway mesh, project RC-3854, Geneva-Canandaigua, Ontario county, New York, to American Steel & Wire Co., Chicago, through John Bellardino Inc., Seneca Falls, N. Y.
- 280 tons, city structure No. 5, Westside elevated highway project, New York, to Jones & Laughlin Steel Service Corp., Long Island City, N. Y., through Poirier & McLane Corp.
- 250 tons, dormitory, University of Arizona, Tucson, Ariz., to unnamed interest.
- 200 tons, Insurance Co. of North America building, San Francisco, to Gunn-Carle & Co., San Francisco.
- 150 tons, city hall, San Bernardino, Calif., to unnamed interest.
- 139 tons, approaches to Sierra and Lake street bridges, Reno, Nev., to unnamed interest.
- 105 tons, post office, St. Albans, Vt., to Bethlehem Steel Co., Bethlehem, Pa.

Reinforcing Steel Pending

- 1375 tons, southwest sewage treatment works, Chicago sanitary district; E. J. Albrecht Co., Chicago, general contractor.
- 600 tons, Mississippi river dam, New Boston, Ill.; Maxon Construction Co., Dayton, O., low for general contract.
- 600 tons, Gunpowder Falls-Montebello tunnel, Baltimore; J. F. Shay, Los Angeles, low bidder.
- 520 tons, treasury department, San Francisco, invitation 3152; bids opened.
- 500 tons, store for J. C. Penney Co., St. Louis.
- 480 tons, bridge over Potomac river, Sheperdstown, W. Va.
- 400 tons, Springfield, Mo., postoffice; Henke Construction Co., Chicago, low bidder.
- 282 tons, building for Western Illinois Teachers' college, Macomb, Ill.
- 280 tons, Macomb, Ill., training school building; Jacobson Brothers, Chicago, low bidder.
- 240 tons, Ward building, Lincoln, Nebr.
- 230 tons, schedule C, Broadway low level tunnel, Oakland, Calif.; bids Jan. 27.
- 230 tons, Peoria, Ill., postoffice; Lundoff-Bicknell Co., Chicago, low bidder.
- 200 tons, state highway projects, Chenango, Otsego and Orange counties, New York; Lane Construction Corp., and West Shore Concrete Co. Inc., gen-

- eral contractors.
- 205 tons, building for Standard Brand Co., San Francisco; bids opened.
- 175 tons, city bridge, Aberdeen, Wash.; J. B. Lamb, Aberdeen, general contractor.
- 155 tons, state projects in Walla Walla county, Washington; Parker & Schram, Portland, Oreg., and Henry Hagman, Cashmere, Wash., general contractors.
- 149 tons, courthouse and jail, Santa Cruz, Calif.; bids opened.
- 130 tons, Mattoon, Ill., sewage treatment plant; Dan Pray, Monett, Mo., low bidder.
- 100 tons, mesh highway project, RC-3855, Westchester county, New York; Malloy & Murray Construction Co. Inc., Yonkers, N. Y., general contractor.
- 100 tons, store building for Montgomery, Ward & Co., Walla Walla, Wash.; Drake, Wyman & Voss, Portland, Oreg., general contractor.
- 100 tons, high school, Maywood, Ill.

Pig Iron

Pig Iron Prices, Page 72

Pittsburgh—While demand for pig iron at the higher price at present is not exceptionally strong, shipments are heavy, and some observers believe January's deliveries will exceed December. Prices are steady.

Cleveland—Producers report little new business since the first of the month, as most consumers specified for enough pig iron to last them throughout first quarter. Farm equipment, railroad castings and heating household appliance foundries are most active consumers at present in view of the lag in shipments to auto foundries and related partsmakers.

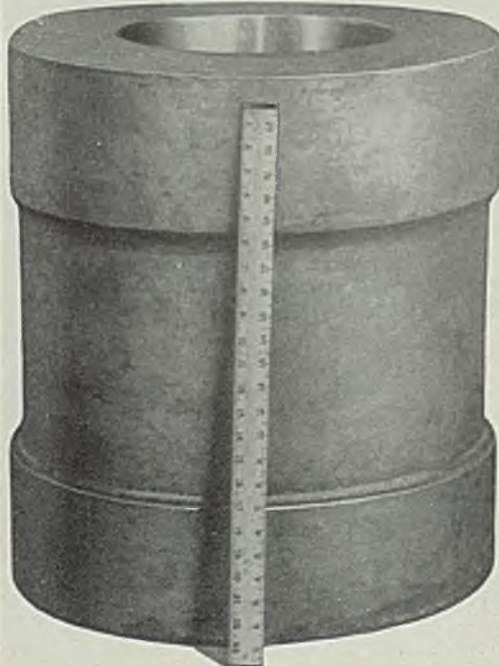
Chicago—Pig iron shipments are

steady and the January movement is expected to equal or better that of December. Foundry schedules have been interrupted only by automotive labor troubles, and good operations elsewhere are in prospect for the remainder of the quarter. Best demand for castings is coming from railroad shops and car builders, machinery manufacturers and farm implement and tractor builders. New business continues quiet.

New York—Indicative that the time is not far when Europe may become a substantial buyer of American pig iron, instead of a seller of iron to this country, Holland has cabled an inquiry for 1200 tons, of which half is No. 1 and No. 2 foundry and the remainder hematite. Another interesting development is the purchase of approximately 8000 tons of iron in this country by China. Domestic buying is dull, but with the melt well sustained, shipments are going forward briskly.

Buffalo—Producers of merchant iron are concerned over the possible effect of the Michigan labor troubles on foundry melt. Melt of iron is probably greater than at any time in the history of this district, and merchants do not plan to let the labor difficulties change production schedules, even if the strikes should be prolonged.

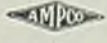
Youngstown, O.—Shipments of pig iron from valley blast furnaces continue in good volume. The number of merchant furnaces will again be reduced since the Youngstown Sheet & Tube Co. is dismantling one of its Hubbard, O., stacks, but is resuming blowing of the other. The



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net current result of this narrowing of the once generous merchant furnace capacity is a very comfortable backlog of miscellaneous pig iron orders on the books of Struthers Iron & Steel Co.

Philadelphia—Pig iron shipments continue heavy, although new orders are spotty. Most consumers have contracted for current quarter requirements, and sellers look for little real improvement in demand until March. Prices are steady.

Cincinnati—The pig iron market remains unchanged excepting in effects of an Ohio river flood which has caused embargoes on shipments to a few foundries. Otherwise shipments are heavy to supply a foundry melt holding at about 80 per cent. New buying is insignificant because of earlier covering.

St. Louis—Pig iron trade is quiet, as far as buying is concerned. Shipments are heavy and specifications continue to pour in against contracts, indicating that melters are operating fully.

Birmingham, Ala.—Shipments exceed new buying of pig iron. Production holds at the high level of December, with 15 blast furnaces in operation.

Toronto, Ont.—Pig iron prices have been advanced \$1 per ton on both the Toronto and Montreal markets, bringing the base price, 2.25 silicon and under, to \$21.50, Toronto, and \$23, Montreal. Each 0.25 per cent increase in silicon is 25 cents per ton higher. Demand is improving with awards over 1200 tons per week.

Scrap

Scrap Prices, Page 74

Philadelphia—Domestic and export buying have combined over the past week to push domestic steel prices on steel scrap up sharply, with No. 1 steel now holding at \$18 to \$18.50, delivered eastern consuming point, and No. 2, \$17.25 to \$17.75. Eastern Pennsylvania consumers, with one notable exception, have lagged in their melting steel purchases until recently, with export purchases setting the pace; then the Pencoyd, Pa., consumer came into the market with a sharp boost in prices, paying \$18.50, delivered, for No. 1 steel and \$17.75 for automobile scrap, a slightly better quality than ordinary No. 2, with indications that still higher would have to be paid on any large tonnages. These prices, which topped the going export prices by 75 cents to \$1, has left the foreign market in a state of confusion from which it is not yet fully recovered. Meanwhile, prices on some leading cast grades have advanced, with \$18 done on heavy breakable. Axle turnings are up \$1 to \$15.50 to \$16, delivered, and steel axles to \$22 to \$22.50.

Pittsburgh—The scrap market in this district has been inactive this week, but nevertheless, a strong undertone prevails. A natural reaction following the large tonnage taken by a leading steel producer was a slightly easier tone, noticeable in the early part of the week. On a

small lot of scrap sold for consumption, No. 1 steel did not command the \$20 a ton delivered price which featured the scale to the leading producer.

Some dealers have reported noticing indications of hesitancy on the part of some mill buyers. Settlement of the automotive labor situation would clear the outlook in the opinion of many observers. One other factor having some effect on this market has been the price of export scrap in the East.

Demand for railroad specialties is good and they are reported hard to pick up at \$24-\$24.50. The quotable range on No. 1 heavy melting steel for consumption is \$19.25-\$19.75.

Cleveland—Steel and iron scrap here and in the Valleys is dull. Most consumers are sufficiently covered to meet their needs. Some buying is being done in small lots. Shipments are steady on contracts. Prices show no change.

Chicago—Scrap remains strong under the influence of heavy consumption and a lack of surplus supplies. Prices of a number of grades are up 50 cents to \$1. Heavy melting steel is unchanged at \$18 to \$18.50, following sales at \$18.25 and \$18.50. Local yards continue to benefit from open weather, which has permitted almost uninterrupted operations this winter.

New York—Iron and steel scrap prices are firm, brokers paying \$14 per ton for domestic shipment on most active business. Prices for export are unchanged, but firm at \$13.50, dock, for No. 1 heavy melting steel. Rails for rolling are up \$1 per ton, dealers paying \$15.50 to \$16 f.o.b. for domestic shipment. Specification pipe has advanced 50 cents and No. 1 machinery cast and No. 2 cast for delivery to district foundries is 50 cents higher.

Buffalo—Local dealers now ask \$18.50 for No. 1 heavy melting steel, with other grades which can be shipped on such orders also tending to slightly higher levels although there are no definite reports of sales at this figure. It is known that local mills bought some tonnage at \$18 from a selected list of dealers but the quantity bought is uncertain. Dealers are covering requirements as rapidly as possible and are giving strength to the entire list. Mills are pressing for deliveries in some instances.


Cincinnati—A slightly softer iron and steel scrap market developed immediately before a high river stage which caused a lull in activity at some points. Mill shunned new tonnage commitments but, where unaffected by the flood, took material freely on contract. Bids on a recent Louisville & Nashville

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list were in line with published quotations, many items selling for application to district contracts.

St. Louis—The market for steel and iron scrap is quiet and prices are unchanged, principally because there has been no buying. Dealers see considerable business ahead, largely as a result of the heavy orders placed for railroad cars with makers here and nearby.

Birmingham, Ala.—Higher scrap prices of the past several weeks are maintained and there is fairly good movement. Heavy melting steel is unchanged at \$12.50 to \$13.50 and No. 1 cast has sold as high as \$14.

Seattle—Tone of the market is firm. Dealers are buying all offerings to replenish stocks in anticipation of a heavy export movement when transportation is resumed. Tidewater terminals are storing heavy tonnages booked for shipment. Local mills are still buying liberally.

Toronto, Ont. — Trading in iron and steel scrap continues to expand and dealers find a ready market for all available materials. Heavy melting and other steel grades have been moving in good volume to the Hamilton and Montreal districts against contract and spot orders are increasing in number.

Warehouse

Warehouse Prices, Page 73

Pittsburgh—Warehouse operators are adhering to the new prices and sales of material are steady, with structural and plate tonnage showing improvement. While activity in certain materials possibly could be stronger, demand for sheets has been well maintained. Deliveries from mills still are extended and some difficulty is encountered in replenishing stocks in a few lines.

Cleveland—Warehouse distributors report daily average sales slightly lower than in the corresponding period last month, due principally to seasonal influences and some extent to the labor trouble in auto plants. The new price differential plan has generally been accepted.

Chicago—Sales continue at a rate comparing favorably with that of December. January is expected to average close to last month's volume. Demand is well diversified. Prices are steady.

Cincinnati — Several warehouses suspended deliveries when the Ohio river rose to a point where trucks were blocked off. Some of these interests accepted business, making shipments from other sources of supply. Demand has been holding

close to fourth quarter levels. New prices are strong.

St. Louis — Warehouses are reported to be doing a heavy volume of business in sheets, since most mills are well sold up well into next quarter on this item. Business in other items is also good.

San Francisco—Demand is holding up well but stocks in distributors' warehouses have become badly broken due to inability to secure shipments via water. Sheet mills and the wire mill cannot begin to take care of demand, and replenishment of these products must come by rail from eastern centers. It is thought that distributors will apply a surcharge to take care of the excessive rail freight costs, and thus pass the burden on to the consumer.

Seattle—Present turnover consists of small tonnages, mostly emergency orders. Heavy shipments by water are in prospect when transportation is reopened. Prices are firm. While Portland is underselling on some items, dealers in that territory have noticeably firmed their prices.

Semifinished

Semifinished Prices, Page 71

Demand for semifinished material continues strong, while shipments are heavy. With steelworks operations in the Pittsburgh district at the highest rate in six years, semifinished material cannot be obtained as easily as at times during the last year. In general, a tight situation

exists. Standard steel billets and forging quality bars continue to be sought among an increasing number of American mills by British, French, Italian and Japanese consumers. However, mills continue so busy that they have no excess.

Iron Ore

Iron Ore Prices, Page 74

Cleveland—Stocks of iron ore at Lower Lake ports and furnaces Jan. 1 were about 100,000 tons larger than on the comparable date last year, according to Lake Superior Iron Ore association.

The association's report follows:

	Tons
Consumed in November.....	4,269,049
Consumed in December.....	4,551,379
Increase in December.....	282,330
Consumed in December, 1935..	3,100,530
On hand at furnaces, Jan. 1..	27,022,495
On Lake Erie docks, Jan. 1....	4,379,653
Total on hand at furnaces and Lake Erie docks, Jan. 1.....	31,402,148
Reserves total, Jan. 1, 1936...	31,341,660

New York — Sharp advances in foreign ores, reflect further increases in ocean rates, which have practically doubled within the past four months, and a further tightening of supplies. Foreign manganese ore has jumped to 16 cents, f.a.s. Atlantic ports; North African low phosphorus to 16 cents, and Spanish North African basic to 15.50c, with practically all of the latter ore going to Germany, which has obtained operating rights from General Franco, of the Spanish insurgents. With no offerings of

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Swedish low phosphorus available, prices on this grade are purely nominal.

Caucasian manganese ore has been advanced to 34.00c, not including duty, with South African and Indian holding nominally at this level.

Refractories

Refractories Prices, Page 72

Pittsburgh — The first price advance in three years has been well received generally. Buyers were well covered before the higher quotations went into effect. Manufacturers are cleaning up these December specifications as rapidly as possible.

Steel in Europe

Foreign Steel Prices, Page 73

London—(By Cable)—Great Britain's foreign trade increased in tonnage in December over November. Exports of steel rose from 193,311 gross tons in November to 204,829 tons in December, a gain of 11,518 tons. Imports increased 4133 tons, from 90,660 tons in November to 94,793 tons in December.

Production of steel and iron remains at a record level and large tonnages have been sold ahead. The markets are quieter owing to the limited tonnage available. Only a portion of export demand can be satisfied. Some pig iron has been sold into September. Enlargement of steel plant capacity is being continued in the effort to meet demand.

The Continent reports steelworks are unable to satisfy export demand for bars and plates. The base price for export sheets has been further increased. German steel firms have been awarded contracts totaling \$12,000,000 by the railway ministry of the Chinese government for repairs to the Peking-Hankow railroad and a new line from Chuchow to Kweiyang.

Nonferrous Metals

Nonferrous Metal Prices, Page 72

New York—Price tone of the domestic nonferrous metal markets firmed around mid-week following a weakening in sentiment on Monday and Tuesday due to the sharp drop in prices on the London Metal Exchange. Heavy liquidation of speculative holdings abroad appears to have been completed at least for the present. The outlook here now fa-

vors steady prices in quiet markets.

Copper—Electrolytic copper held at 13.00c, Connecticut, even when export dropped to 12.27½c on Tuesday. The foreign market advanced to a high of 12.70c later in the week.

Lead—Prices held steady on the basis of 5.85c, East St. Louis, despite lighter consumer demand and a decline in prices abroad. The market is established on a firm basis price-wise in view of the well booked position of consumers and the improved statistical position of the industry.

Zinc—Only routine business was booked in zinc as consumers are well covered on first quarter requirements. Foreign prices are not threatening the domestic prime western market which is firm at 6.00c, East St. Louis.

Tin—The tin market was practically devoid of consumer demand as indicated by the fact that warehouse stocks in this country have increased to 915 tons from 255 tons at the end of the previous week. Straits spot eased to around the 51-cent level.

Antimony—Less-than-carlot business continued to rule in antimony with both American and Chinese spot unchanged at 14.25c, New York.

790 U. S. Steel Employes Will Bowl in Tournament

One of the largest bowling tournaments ever sponsored by an individual industrial organization will be held in Gary, Ind., in February when 790 employes of the United States Steel Corp. subsidiaries in the Chicago district compete in their first annual meet.

Represented in the tournament will be the plants and offices of the American Steel & Wire Co., American Bridge Co., Scully Steel Products Co., Carnegie-Illinois Steel Corp., Elgin, Joliet & Eastern railway, and Universal Atlas Cement Co., all corporation subsidiaries.

Ladd Tells of Industrial Boom in Japan

Japan, enjoying an industrial boom, is steadily increasing its pig iron capacity, said George T. Ladd, president, United Engineering & Foundry Co., Pittsburgh, on his return last week after a two month's absence in the Far East.

"Japan's plants are working at full capacity," he said. "While I found that there is a shortage of scrap and pig iron, they are steadily increasing the pig iron capacity.

"Tin plate and sheet mills are

running full blast. All manufacturing is extremely active. I visited one company employing about 40,000 men and found operations in high gear.

Obsolete machinery is one factor hampering the Japanese.

"Not unionized, the Japanese worker of the skilled class is paid approximately \$12 to \$15 a week. Of course, the difference in living conditions must be recognized in any such comparison, as well as the backgrounds of the workers. Strikes, however, are rare in any plant in Japan.

Returning from the Orient, Mr. Ladd traveled aboard the CHINA CLIPPER. "I felt as safe as riding in a train," he asserted.

Steel Company Choruses Featured in Radio Series

Music, as sponsored by industry, will be heard in a series of weekly radio programs inaugurated last Saturday by station KDKA, Pittsburgh. Male choruses of several steel companies and other industrial plants will continue the series through March 20.

Chorus of Jones and Laughlin, southside works, gave the opening concert last Saturday night. Choruses from Weirton Steel Co., Brad-dock, Homestead, Clairton and New Castle plants of Carnegie-Illinois Steel Corp., Wheeling Steel Co., American Rolling Mill Co., Westinghouse Electric & Mfg. Co., and others will be heard.

Officers Elected by Manufacturers Association

William B. Warner, president, McCall Co., publishers, New York, was elected president of the National Association of Manufacturers by the board of directors last week. C. M. Chester, president of the association in 1936, was elected chairman of the board.

Thomas E. Wilson, board chairman, Wilson & Co., Chicago, packers, was elected first vice president; S. Clay Williams, former NIRA administrator and chairman, R. J. Reynolds Tobacco Co., Winston Salem, N. C., second vice president; and Walter J. Kohler, former governor of Wisconsin and president of Kohler Co., Kohler, Wis., third vice president.

The new board of directors for 1937 was elected by members at their annual convention last month.

Twelve regional vice presidents were elected last week, including: C. S. Davis, president, Borg-Warner Corp., Chicago; Lamot duPont,

president, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.; T. M. Girdler, chairman, Republic Steel Corp., Cleveland; S. Wells Utley, president, Detroit Steel Casting Co., Detroit; F. B. Davis, president, United States Rubber Co., New York.

12,400 Employees Carry \$21,000,000 Insurance

More than \$21,000,000 of group life insurance is carried by employees of the American Rolling Mill Co., "the first in the steel industry to provide group insurance," says the Equitable Life Assurance Society.

Average policies of \$1700 are held by 12,400 workers, approximately 99 per cent of those eligible. In 20 years, \$1,535,485 has been paid to 920 beneficiaries.

Ore, Pig Iron Imported

Philadelphia—Substantial ore and pig iron importations arrived here during the week ended Jan. 16. Included were 4034 tons of chrome ore from Portuguese Africa and 492 tons from South Africa; 2826 tons of iron ore from Persia; and 1800 tons of pig iron from British India and 1392 tons from the Netherlands.

Other arrivals were 80 tons of structural shapes and 42 tons of steel bars, from Belgium; 53 tons of cold-drawn steel wire from Sweden and two tons of ferrotitanium from England.

Mirrors of Motordom

(Concluded from Page 26)

"ride softener" has been adapted from the airplane oleo, using an oil cushion to absorb wheel jolts. More oil is required than in some present hydraulic types, which brings up the matter of oil viscosity and its relation to outside temperature. Oil must have sufficient viscosity to provide the necessary damping qualities, yet must not become too stiff in cold weather to be effective.

INCREASE in tire prices last week has prompted some speculation on what Ford will do when his new tire plant is completed six months or so hence. It is reported Ford now places half his tire business with Firestone and spreads the balance among other producers. The new plant will supply about half of Ford's tire requirements; this will mean either a sharp reduction in the present Firestone share, elimination

of other suppliers, or an extensive reduction in purchases from all suppliers. . . . Detroit should be a great tip for boat sellers. It seems to be the ambition of every man here, especially the younger men, to own a power boat for week-end cruises during open-weather. . . . "It is very probable that the car of the future will have no running boards, no gearshift lever, no exposed headlamps, horns, door handles or other objects to break the smooth flow of the streamline," states David E. Anderson, chief engineer of Bohn Aluminum & Brass. . . . Recent study by an eastern investment management group shows the average price of a car since 1925 has decreased from \$887 to \$603; the average price per horsepower has dropped from \$27.70 to \$7. . . . Burroughs Adding Machine has let contracts for a large new plant at Plymouth, Mich., supplementing present quarters on Second boulevard. . . . Trailer interests are contemplating a sit-down strike in Palm Beach, Fla., because that city recently turned thumbs down on a proposed trailer camp as a "public nuisance". . . . Public opinion in Detroit is strongly behind the recent movement in Washington to require incorporation of unions and an accounting of their funds and activities.

Equipment

Pittsburgh—As a result of price increases and the delivery situation,

machine tool builders have been unusually busy. Inquiries are still holding up from diversified sources and the automotive labor controversy has not yet had any noticeable effect in this district. Makers of generators and turbines report heavy demand from the utility field, particularly for heavy-duty equipment.

Chicago—January business in machine tools is making a creditable showing in the face of the record December volume. While some price increases already have become effective, others become applicable later this month and this situation still is stimulating the closing on inquiries. By Feb. 1 higher quotations will have become effective on practically all of the larger tools. The Santa Fe is closing on its recent list, while a fairly large list has appeared from the Milwaukee road.

Boston—Machine tool shops in New England are booked at capacity operation for more than two months in numerous instances. Delivery on standard tools averages from six to eight weeks. Prices are generally 10 per cent higher on most standard tools, the increase being announced by several builders last week. Buying is active and apparently influenced but slightly by the price trend. Textile mill equipment builders are operating full time with large backlogs.

Seattle—Weather and strike conditions have slowed demand although inquiry for electrical goods, pumping equipment and miscellaneous items is active.



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Construction and Enterprise

Ohio

BARBERTON, O. — City is completing plans for construction of a 1-story, 20 x 45-foot pumping station at sewage disposal plant. Cost is estimated at \$50,000, and Barstow & LeFebre Inc., American building, Cincinnati, is engineer.

BELLE CENTER, O.—Village plans construction of waterworks system and water softening plant, to cost \$86,700. Application has been filed for a PWA loan and grant, and a bond issue of \$18,000 will be submitted to voters at a special election soon. John E. Osborn is mayor, and Edison Ellis, 922 State street, Lima, O., is engineer.

BELLAIRE, O.—Matz Brewing Co. plans installation of additional storage tanks.

CINCINNATI — Bruckmann Brewing Co., Ludlow street, plans an expansion program during 1937, to include installation of new machinery and storage tanks.

CLEVELAND—City division of light and power, room 105, City Hall, plans purchase of new boiler drums on boilers 7, 8 and 9 at East Fifty-third street light plant. Bids will be taken until noon Jan. 29.

CLEVELAND—Plant of Edgar T. Ward Sons Co., steel finishers at 1210 East Fifty-fifth street, was damaged by fire last week. George E. Parker is manager.

CLEVELAND — Martin Bros. Electric Co., W. L. Martin, president, 1858 East Fortieth street, plans construction of a 1- and 2-story, 120 x 150-foot, factory at East Thirty-sixth street and Perkins avenue. Architect is L. L. Broida, 1643 Lee road.

HAMILTON, O. — City is taking bids Feb. 15 for construction of a municipal light plant addition to cost \$50,000. Russell P. Price is city manager, and consulting engineer is Froelich & Emery Engineering Co., Second National Bank building, Toledo.

IRONTON, O.—Ohio Calcium Co. plans an expansion program which will increase capacity five times. Two new calcining kilns will be built. Carter N. Abel is president and treasurer.

LIMA, O. — Lima Cord Sole & Heel Co. plans to construct a plant and install considerable new machinery which will double its present operations. J. E. Grosjean is president of the board. Present address is 815 North Jackson street.

LONDON, O.—Village is considering purchase of water softener to cost about \$18,000, and an application for funds has been submitted to PWA. Evelyn Fitzgibbons is village clerk.

NELSONVILLE, O. — City has taken no action on bids received Nov. 9, 1936, for improvements to light plant and waterworks. Three stoker-fed 300-horsepower boilers, a water softener unit, an additional engine and generator unit and four deep well electric turbine pumps will be installed. Cost will be around \$80,000. Voters will pass on \$60,000 mortgage revenue bonds at next November election.

NEWCOMERSTOWN, O.—Heller Bros. Co., file manufacturers, is starting construction of a 2000-kilowatt power plant as part of an expansion program. Two steam turbines will be installed.

PAINESVILLE, O.—Light Alloys Co.

plant was destroyed last week by fire. Otto Harer is president.

RICHWOOD, O. — Village plans construction of a sewage disposal plant costing \$53,000. Burgess & Niple, 568 East Broad street, Columbus, is engineer. Approval from PWA is pending.

ST. CLAIRSVILLE, O. — City plans construction of sewage disposal plant to cost \$100,000, with PWA aid. Jennings-Lawrence Engineering Co., 12 North Third street, Columbus, is engineer.

SUGAR GROVE, O. — Village plans construction of a waterworks and sewage disposal plant to cost over \$100,000. WPA aid will be sought. W. Graff, Lancaster, O., is engineer.

WOOSTER, O.—City plans construction of sewage treatment plant at Killbuck Valley pumping station, at a cost of \$165,000, of which city will pay \$40,000. William Long is mayor, and engineer is H. P. Jones, Second National Bank building, Toledo.

Michigan

BATTLE CREEK, MICH.—W. K. Kellogg Co. plans expansion of its plants during 1937 at Battle Creek and London, Ont.

GRAND BLANC, MICH.—City plans construction of waterworks system to cost \$50,000, and O. F. Gould, engineer, Flint, is completing plans.

MARINE CITY, MICH.—Reid Products Co., makers of car window channels, is doubling its plant capacity.

MUSKEGON, MICH.—Vento Steel Products Co. plans \$150,000 expansion program. H. R. Jesson is president.

MUSKEGON HEIGHTS, MICH.—Norge Corp. plans construction of addition to plant at a cost of \$100,000.

PLYMOUTH, MICH. — Burroughs Adding Machine Co., Second boulevard, Detroit, will start construction in two weeks of a factory unit and power plant on Plymouth road, 135 x 600 feet, approximately half being five stories high, the remainder one story. The addition will manufacture mainly auxiliary products of the Burroughs Co. Albert Kahn Inc. is architect, third floor, New Center building, Detroit.

STEPHENSON, MICH. — Council has retained Shoecraft, Drury & McNamee, engineers, Grand Rapids, to make a survey of feasibility and cost of municipal sewage disposal plant.

THREE RIVERS, MICH.—Eddy Paper Co. has awarded the general contract for construction of additions to its factory to the Miller-Davis Co., Kalamazoo. Estimated cost is \$90,000.

TRENTON, MICH.—White Star Refining division of Socony Vacuum Oil Co. plans to build an addition to its plant at Trenton.

Illinois

CHICAGO—Peoria Foundry Co. was recently incorporated. Correspondent is Waugh, LaRue and McClellan, 208 South La Salle street.

CHICAGO—Modern Die Casting Corp., 430 South Green street, has been organized. Correspondent is Julian H. Levi, 1507 First National Bank building.

CHICAGO—Planert Mfg. Corp. has been organized at 2256 Walnut street

to repair and maintain tools and dies. Correspondent is Nelson & Nelson, 748 North Damen avenue.

CHICAGO—Perfection Battery Works Inc. has been organized to manufacture electrical batteries and storage batteries. Correspondent is Irving Abrams, 134 North LaSalle street.

CHICAGO — Coca-Cola Bottling Co. of Chicago Inc., 1101 West Congress street, plans construction of a two-story bottling plant at Montrose and Ravenswood avenues, at a cost of over \$40,000. New equipment will be installed.

JOLIET, ILL.—Illinois Gray Iron Mfg. Co., care of Joliet Mfg. Co., 14 Youngs avenue, has been incorporated to manufacture iron, brass, aluminum and other metal products. Correspondent is Silvio E. Pacenti, Chicago Heights.

Indiana

FORT WAYNE, IND. — Board of public works, R. G. Beams, chairman, City Hall, plans construction of a sewage disposal plant to cost \$5,000,000. Cole, Moore & Geupel Inc., 211 Union Trust building, South Bend, Ind., is engineer.

VALPARAISO, IND. — Board of public works, E. J. Cotterman, clerk, is preparing preliminary plans for waterworks improvements, to include installation of two new diesel engines, electrification of six pumps of 500,000-gallon capacity, and erection of an elevated steel storage tank. Cost will be around \$160,000, and a bond issue has been approved. C. Brossman, 1009 Chamber of Commerce building, Indianapolis, is engineer.

Pennsylvania

AMBRIDGE, PA. — Spang Chalfant & Co. plans construction of a plant addition to cost \$150,000.

NEW CASTLE, PA. — City plans to modernize its water filtration plant and install a new auxiliary pumping unit.

NEW CASTLE, PA. — Pennsylvania Power Co., L. B. Round, vice president and general manager, 19 East Washington street, subsidiary of Commonwealth & Southern Corp., 20 Pine street, New York, plans construction of substations and steam power plant distribution lines in Lawrence county, at a cost of \$2,800,000.

OIL CITY, PA. — Oil Well Supply Co., Colbert avenue, subsidiary of United States Steel Corp., will take bids in February for construction of a 1-story, 65 x 150-foot factory. H. W. White is the company engineer, and A. R. Zelt is general manager.

PITTSBURGH—United States Engineer office, 914 Federal building is taking bids until 11 a.m. Feb. 1 for a diesel engine-driven crawler type convertible crane.

SPRING CITY, PA.—Council of borough is taking bids until 8 p.m. Jan. 28 for construction of sewage treatment plant.

New York

BUFFALO, N. Y.—Erie Electric Motor Repair Co., dealer, 124 Church street, is in the market for the following machinery: A transformer, 50 or 75 kilovolt-amperes, 22,000 volts primary, 110 or 220 volts secondary, 60 cycles; a 250-horsepower motor, 230 volts, 400 to 1200 revolutions per minute, with control, direct current; a 1000-kilowatt rotary converter, 60 cycles, 3-phase, 2300 volts primary, 250 volts secondary, direct current; a 750-kilowatt, 440-volt steam turbine generator, 25-cycle, 3-phase; and a squirrel cage motor, 150-horsepower, 25-cycle, 3-phase, 440-volt, 750 revolutions per minute.

DRESDEN, N. Y. — New York Central
(Please turn to Page 90)

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(Continued from Page 88)

Electrical Corp., Penn Yan, N. Y., will install two water tube boilers, of 220,000 pounds pressure per hour in generating plant at Lake Seneca. Cost is estimated at \$40,000. C. F. Brunt is district manager.

NEW YORK—William J. Needham Machinery Corp. was organized recently, to manufacture tools and machinery. Correspondent is Sol Klein, 230 West Forty-first street.

ROCHESTER, N. Y.—Pfaudler Co., 89 East avenue, plans to build a 1-story, 260 x 500-foot factory on West avenue at a cost of between \$500,000 and \$600,000. Engineer is Gordon & Kaelber, 311 Alexander street.

ROSE, N. Y. — Village plans construction of a waterworks system, including a filtration plant and elevated steel tank, to cost \$100,000. A public referendum will be held, and WPA aid is being asked. W. Lozier, 10 Gibbs street, Rochester, is engineer.

New Jersey

IRVINGTON, N. J. — Art Tube Co., 8 Reeve place, plans construction of a 1-story, 145 x 155-foot plant at Lyons avenue and Cordier street. Estimated cost is \$50,000, and architect is J. T. Simpson, 744 Broad street, Newark.

NEWARK, N. J. — A. Fink & Sons Inc., 810 Frelinghuysen avenue, plans construction of a 3-story, 65 x 80-foot factory addition. Stadler Engineering Co., 114 Liberty street, New York, is engineer.

Massachusetts

RANDOLPH, MASS. — C. E. Young Co. plans construction of a plant for manufacturing portable garages. Estimated cost is \$40,000.

Maine

FAIRFIELD, ME. — Central Maine Power station plans building a new electric power station to replace one recently burned. Cost is estimated at \$60,000.

Alabama

FAIRFIELD, ALA. — American Steel & Wire Co., will construct addition to wire plant, to increase capacity approximately 23,000 tons annually. Cost is estimated at \$200,000. The wire mill is adjacent to the \$29,000,000 tin mill now being built by the Tennessee Coal, Iron & Railroad Co., Birmingham.

SELMA, ALA.—Hanna Mfg. Co., Athens, Ga., has acquired the plant of the Alpine Tannery Co., and will install wood-working machinery.

Maryland

BALTIMORE—C. M. Kemp Mfg. Co., 405 East Oliver street, is building a 1-story plant addition for welding and heavy machine assembly. The company manufactures immersion heaters and similar products.

BALTIMORE — Schluderberg Kurdle Co., Baltimore and Eaton streets, will let contract soon for construction of a 4-story 60 x 60-foot oil refinery to cost \$50,000. Architect is H. Peter Henschel, 59 East Van Buren street, Chicago.

CURTIS BAY, MD. — Standard Wholesale Phosphate Co., Mercantile Trust Co. building, is taking bids for construction of a plant addition to cost \$100,000.

District of Columbia

WASHINGTON—Navy department, bureau of supplies and accounts, is taking bids until Jan. 29 for miscellaneous steel forgings, schedules 9780 and 9794, for delivery Brooklyn, N. Y., Puget Sound, Wash., and Newport, R. I.

Florida

JACKSONVILLE, FLA. — Syndicate is considering construction of a paper mill. R. R. Livingston, engineer, 70 Pine street, is in charge.

Georgia

ATLANTA, GA.—John Wyeth & Bros., manufacturing chemists, plan construction of building at 825 Spring street, Northwest.

ATLANTA, GA. — Walker Electric Co., 546 Means street Northwest, plans construction of a new plant to cost \$40,000. Engineer is Robert & Co., Bona Allen building.

Missouri

MAYSVILLE, MO. — City plans construction of a new sewage disposal plant and distribution system costing \$70,000. J. Smith is mayor, and J. W. Shikles & Co., New York Life building, Kansas City, is engineer.

SPRINGFIELD, MO. — Springfield Gas & Electric Co., Howard Person, chief engineer, 324 East Walnut street, New York, plans to spend \$600,000 for constructing addition to power plant which will double capacity. A new turbine of 12,500-kilowatt capacity will be installed, as well as steam and electric auxiliaries.

ST. LOUIS — Mississippi Valley Equipment Co., Chamber of Commerce building, dealer, is looking for a synchronous motor generator set, 600-kilowatt, 3-phase, 60-cycle, 2300-volt, 250 to 275-volt direct current.

ST. LOUIS — Burroughs Glass Co., 305 Arsenal street, has acquired the plant of the Swift Packing Co., at 814 Vandeventer avenue, and will remodel it.

ST. LOUIS — St. Louis Terminal Railroad association, Union Station, is considering elimination of the Cahokia Creek viaduct and construction of a terminal in East St. Louis. Total cost is estimated at \$1,000,000.

ST. LOUIS—S. G. Adams Metalware Co., 2940 Franklin street, is receiving bids for construction of a plant at Delmar and Garrison streets, to be 1-story, 58 x 62 feet. Charles H. Dietering is architect, 308 Title Guaranty building, and Koerner Engineering Co., 1601 Syndicate building, is engineer.

Arkansas

LITTLE ROCK, ARK.—Board of public affairs plans construction of addition to water filtration plant, at a cost of \$136,000. Burns & McDonnell Engineering Co., 107 West Linwood avenue, Kansas City, Mo., is engineer.

Oklahoma

ADA, OKLA.—Thomas P. Holt, Box 357, is looking for diesel engines and dynamos, and estimates for constructing a complete light and power plant for a city of 20,000 population, covering both cost of equipment and transmission lines.

Texas

SAN ANTONIO, TEX.—San Antonio

Public Service Co., Chester N. Chubb, president, 201 North St. Marys street, plans to spend \$1,400,000 for new construction and extensions during 1937.

Wisconsin

CUDAHY, WIS. — Solar Corp., 940 West Bruce street, Milwaukee, maker of paints, varnishes and electric storage batteries, plans construction of a branch plant at 3362 East Layton avenue, to cost about \$100,000. Robert H. Smith is engineer, 5920 West North avenue.

GREEN BAY, WIS.—Wisconsin Public Service Corp. plans to spend \$1,570,000 during 1937 on an expansion program, the largest item to be a hydroelectric generating station at Tomahawk, Wis., to cost \$480,000. J. P. Pulliam is president.

LA CROSSE, WIS. — Badger Stamping & Tool Co. has been incorporated by Harry Brown and Raymond F. and S. J. Uhler.

MADISON, WIS. — Wisconsin Power & Light Co. plans to spend \$1,500,000 for construction during 1937. Grover C. Neff is president.

MANITOWOC, WIS.—Curt G. Joa Co. Inc., maker of special machinery and tools, has doubled its outstanding capital stock and will probably enlarge its shops. Curt G. Joa is president.

MENASHA, WIS. — Marathon Paper Mills Co., D. C. Everest, general manager, plans construction of an addition to its converting plant, to cost about \$300,000.

MILWAUKEE—Hell Co., 3000 West Montana street, maker of motor truck tanks, dump bodies, hydraulic hoists and other equipment, plans a \$500,000 plant enlargement program. Julius P. Hell is president and treasurer.

MILWAUKEE — City plans to install a 30,000,000-gallon per day centrifugal pump with motor in the Monomonee valley booster station at a total cost of about \$40,000, \$16,200 to be supplied by PWA. Henry P. Bohmann is superintendent of the city water department, City Hall.

REEDSVILLE, WIS.—Village plans construction of \$80,000 municipal waterworks and sewage disposal plant, and Jerry Donohue Engineering Co., Sheboygan, Wis., has been engaged to make survey of costs.

TWO RIVERS, WIS.—Enterprise Tin Plating Works Inc. is starting erection of new plant at 1209 Monroe street. Sylvester Schmitt, Two Rivers, is engineer.

Minnesota

CASS LAKE, MINN. — Rathborne, Hair & Ridgway Co., manufacturers of wooden boxes, plans construction of a factory addition and improvements to present plant. New machinery and equipment will be installed to double present capacity.

GLENCOE, MINN. — City has rejected bids received Nov. 16 for installation of a deep-well turbine pump and will ask bids again soon. F. X. Eickmain is city clerk.

LAKE CRYSTAL, MINN. — City will vote on bond issue at special election soon for financing construction of a municipal light and power plant and distribution system. George W. Champion is city clerk, City Hall. G. M. Orr & Co., Baker Arcade, Minneapolis, are engineers.

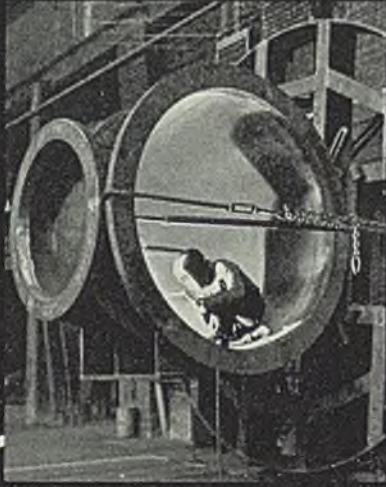
LE SUEUR, MINN. — City will take

(Please turn to Page 92)

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(Concluded from Page 90)

bids until Feb. 8 for improvements to municipal light and power plant, including new equipment consisting of a diesel engine generating unit and auxiliary equipment. G. A. Kampen is city clerk.

LONG PRAIRIE, MINN. — City is considering construction of a sewage disposal plant to cost \$45,000, and PWA aid is being sought. Druar & Millnowski, 830 Globe building, St. Paul, is engineer.

MINNEAPOLIS—Scott-Atwater Foundry Co. has been incorporated by C. E. Scott, H. B. Atwater and F. D. Abbott.

MINNEAPOLIS — Flour City Welding Co. has been incorporated by G. V. Watson, Robert Watson and C. O. Nordgren.

MINNEAPOLIS — Minneapolis-Moline Power Implement Co., steel and machinery division, structural steel fabricator and manufacturer of tractors and other machinery, has started construction of a 1-story foundry addition, 59 x 109 feet, at Twenty-ninth and Minnehaha streets.

ROSEAU, MINN. — Village plans installation of additional equipment in municipal light and power plant. R. J. Hagen is village clerk.

ST. CLOUD, MINN. — W. P. Hilger Co., manufacturers of frost shields, electric sleet shields, engine heaters, etc., has purchased the factory formerly occupied by the Pan Motor Co. and the Aluminum Industries Co. The buildings will be rebuilt and new machinery and equipment installed.

ST. PAUL — Superior Packing Co., 2125 Wabash avenue, will construct a 1-story plant addition, 58 x 85 feet.

THOMSON, MINN. — City has made a preliminary survey of construction of a waterworks plant to cost around \$50,000. J. Wilson, 610 Torrey building, Duluth, is engineer.

WASECA, MINN. — Steele-Waseca Co-operative Electric association is completing plans for erection of 290 miles of rural transmission lines. Pillsbury Engineering Co., 1200 Second avenue South, Minneapolis, is engineer.

WINONA, MINN. — Winona Machine & Foundry Co., producer of railway and brass castings, plans rebuilding present foundry and construction of an addition, where new equipment will be installed.

WORTHINGTON, MINN. — Worthington Gas Co. will build an addition to its gas plant and install new gas manufacturing equipment.

North Dakota

ASHLEY, N. D. — Village plans construction of a waterworks system costing \$79,000. J. D. Stabler is village auditor.

Iowa

CHEROKEE, IOWA — State board of control, Ames, Iowa, plans improvements at the state hospital power plant, to include rebuilding and equipping at a cost of \$125,000; building a sewage disposal plant, cost \$60,000; installation of a deep-well pump and accessory equipment, cost \$10,000; and construction of a new building, \$200,000.

DUMONT, IOWA — Butler county, J. S. Van Wert, Dumont, county agent, has been allotted \$105,000 for erection of 234 miles of rural transmission lines.

FOREST CITY, IOWA — City will take bids Feb. 3 for construction of a municipal light and power plant to cost \$165,000, including powerhouse, cooling tower, three diesel engines complete with electric generators and accessory equip-

ment. Young & Stanley Inc., Muscatine, Iowa, are engineers.

STORM LAKE, IOWA — City plans construction of municipal light and power plant, and Young & Stanley Inc., engineers, Muscatine, Iowa, have been engaged to make a survey of feasibility and costs.

WATERLOO, IOWA — Iowa Public Service Co., Howard M. Smith, manager, will erect a new powerhouse addition, to include a turbine room and a boiler room. Cost of building and equipment is estimated at \$1,000,000.

WEBSTER CITY, IOWA — Charles Cloz Co., manufacturer of tools, machines and agricultural implements, has been incorporated. Henry S. Lord is president.

Nebraska

BAYARD, NEBR. — Chimney Rock Public Power district has been allotted \$150,250 REA funds for erection of 218 miles of rural transmission lines in Morrill, Banner and Scotts Bluff counties.

IMPERIAL, NEBR. — Village plans construction of sewage disposal plant. Black & Veatch, 4706 Broadway, Kansas City, Mo., are engineers.

OMAHA — Nebraska Power Co., F. A. Davidson, president, Seventeenth and Harney streets, plans construction of a power plant in South Omaha, to cost \$1,500,000. Clarence Minard is chief engineer.

OMAHA — City council has instructed Harry Trustin, city engineer, to make a survey of the cost of construction of a sewage disposal plant in Benson, a suburb. Cost is estimated at close to \$2,000,000. Emmett Hannon is city clerk, City Hall.

Montana

HELENA, MONT. — Yellowstone Valley Electrification association has been allotted \$155,000 REA funds for erection of 135 miles of rural transmission lines.

Pacific Coast

INGLEWOOD, CALIF. — North American Aviation Co., Imperial highway, plans construction of a factory at Mines field, at a cost of over \$40,000.

OLEUM, CALIF. — Union Oil Co., 220 Montgomery street, San Francisco, plans to construct additional units to its cracking plant at a cost of \$1,500,000 or

more. Engineering department of the company is in charge.

PASADENA, CALIF.—City plans applying to PWA for 45 per cent grant to assist financing addition to waterworks, at total estimated cost of \$91,000.

SAN FRANCISCO — Turner Machinery Co., 734 Bryant street, plans to build a 1-story machine shop at Thirteenth and Folsom streets at a cost of \$40,000. W. H. Ellison, 821 Market street, is engineer.

DAVENPORT, WASH. — Davenport Power & Light Co. has been incorporated by Walter Zellner and associates. Correspondent is Pettyjohn & McCallum, McMillan building.

SEATTLE — General Tire Co., 2033 Fourth avenue, is building an addition to its local plant. O. E. Hancock, Walker building, is architect.

TACOMA, WASH. — City has received allotment of \$704,700 from PWA for financing part of cost of waterworks system improvements, which are expected to cost \$1,566,000.

Canada

HAMILTON, ONT. — Canadian Industries Ltd., 1135 Beaver Hall Hill, Montreal, Que., plans construction of a factory to produce titanium pigments for use in paint and dye industries. Cost is estimated at \$150,000. L. D. McCrady, 1050 Beaver Hall Hill, Montreal, is engineer.

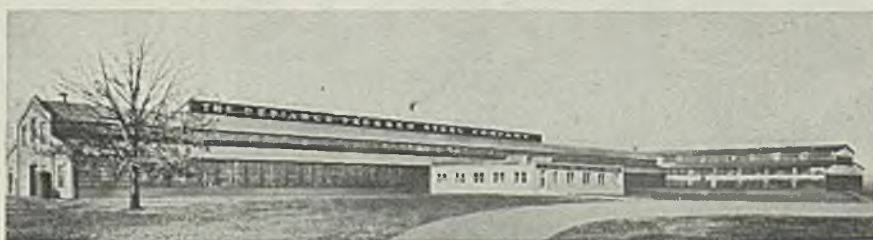
RAGGED RAPIDS, ONT. — Hydro-Electric Power commission of Ontario will ask bids soon for construction of a hydroelectric plant of 10,000 to 12,000-horsepower on the Muskoka river. Cost will be about \$1,000,000.

ST. CATHERINES, ONT. — W. S. Tyler Co. of Canada Ltd., R. A. Donner, manager, plans construction of a 1-story, 100 x 350-foot plant on Ontario street. Cost will be about \$80,000. Company architect in charge.

SAULT STE. MARIE, ONT. — Chromium Mining & Smelting Corp. will take bids soon for construction of a building to house a furnace for producing low carbon chromes. Cost will be about \$90,000. R. A. Bayard, care of the company, is engineer.

MONTREAL, QUE. — Adhesive Lime Ltd., care of J. Hamilton, 5119 Mountain Sights avenue, plans construction of a factory for manufacturing natural and adhesive lime, artificial stone, etc. Cost is estimated at \$50,000.

Defiance Pressed Steel Opens Operations in New Plant



DEFIANCE PRESSED STEEL CO., Marion, O., after an interruption of seven months has resumed operations in its new plant, shown above. The former plant at Defiance, O., was destroyed by fire last June. The new factory occupies buildings formerly housing the Power Mfg. Co., includes 100,000 square feet of floor space, and will employ approximately 600 men. Defiance Pressed Steel specializes in light and medium heavy metal stampings of all kinds and welded assemblies