June 24, 1940

# STEEL

PRODUCTION • PROCESSING • DISTRIBUTION • USE

ESTABLISHED 1882

P 779/40/1

PRESSES

Built by MESTA

PRESSES

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Steam Hydraulic
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Forming and Piercin
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Ranging from 150 To
20,000 Ton Capacit

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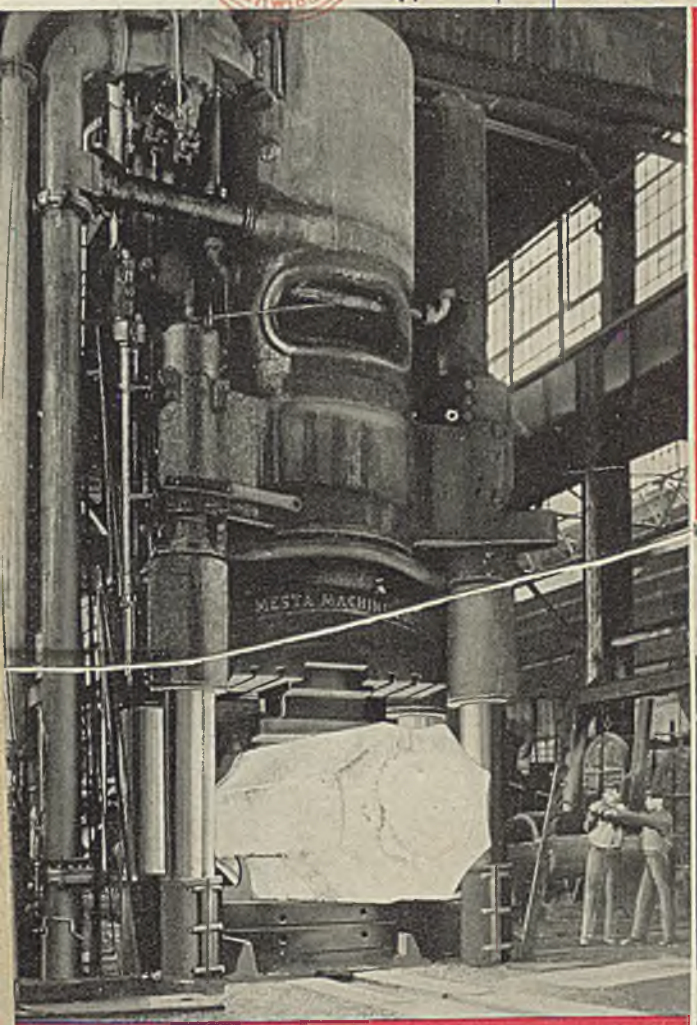
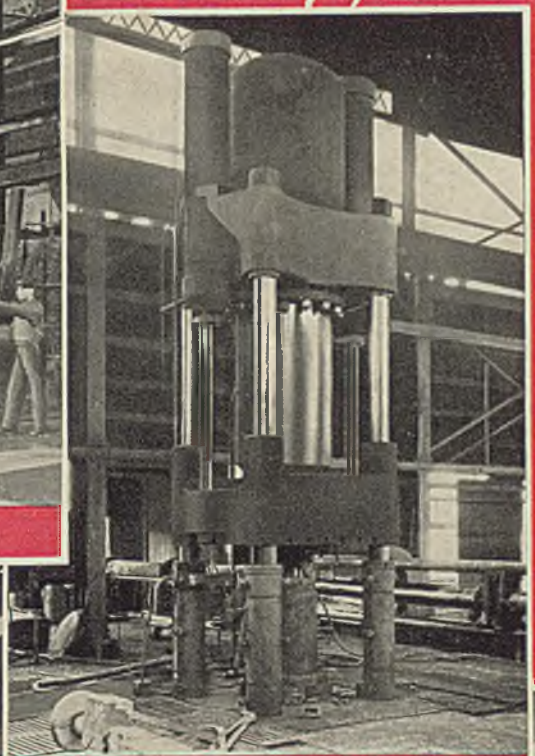
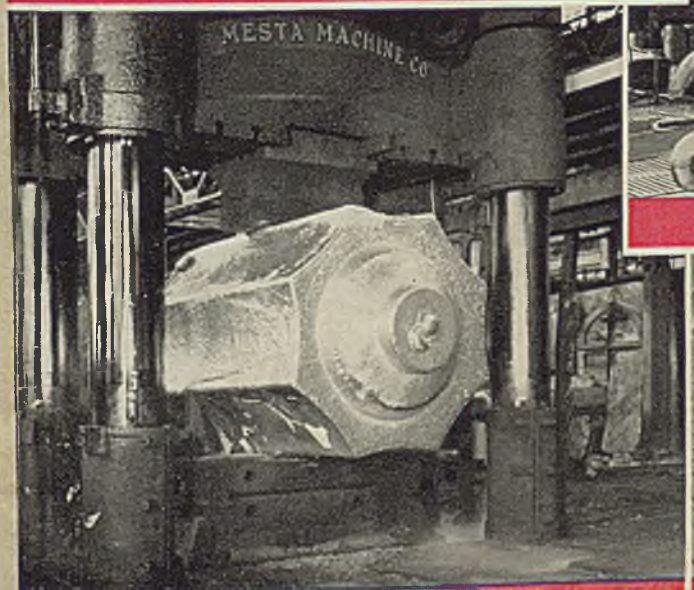
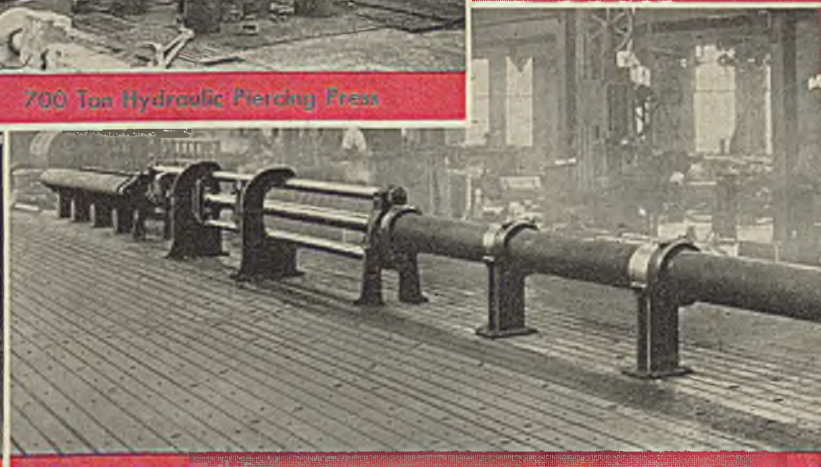


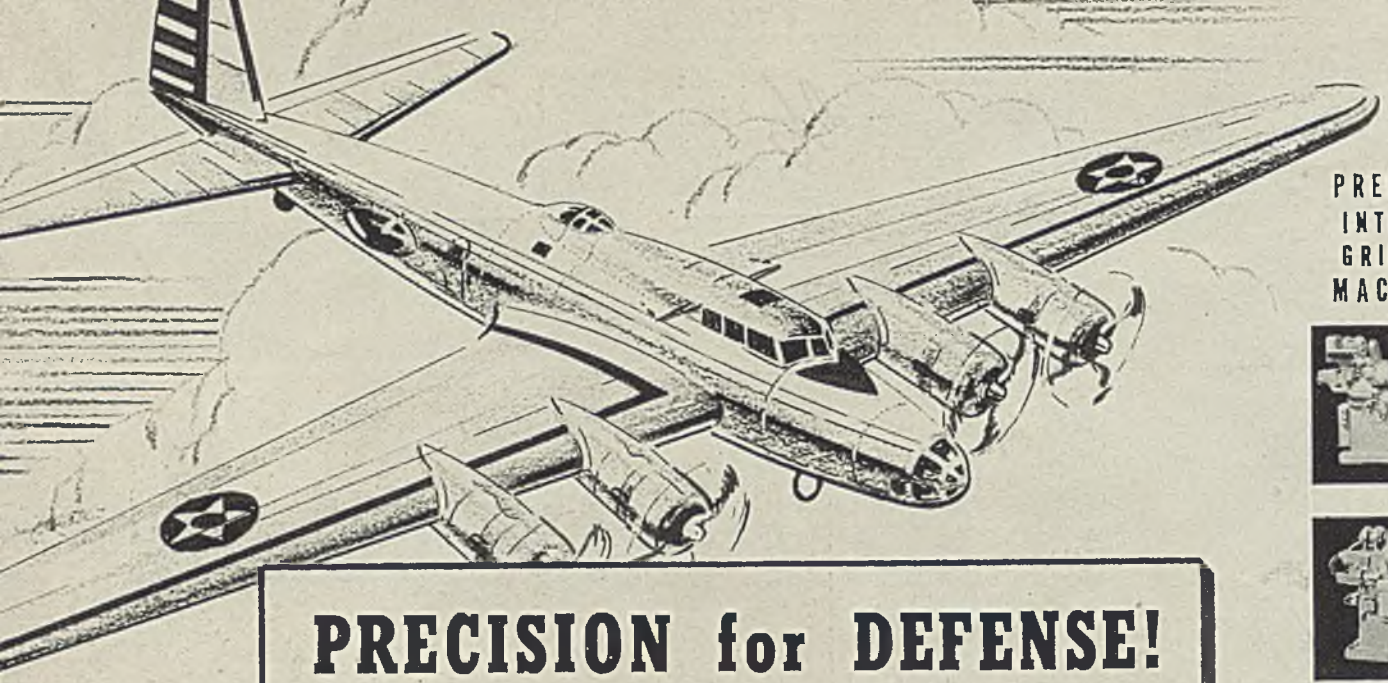

2,000 Ton Steam Hydraulic Forging Press



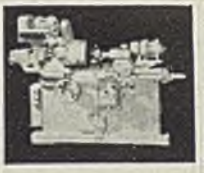
700 Ton Hydraulic Piercing Press





PRECISION INTERNAL GRINDING MACHINES



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# STEEL

ESTABLISHED 1882

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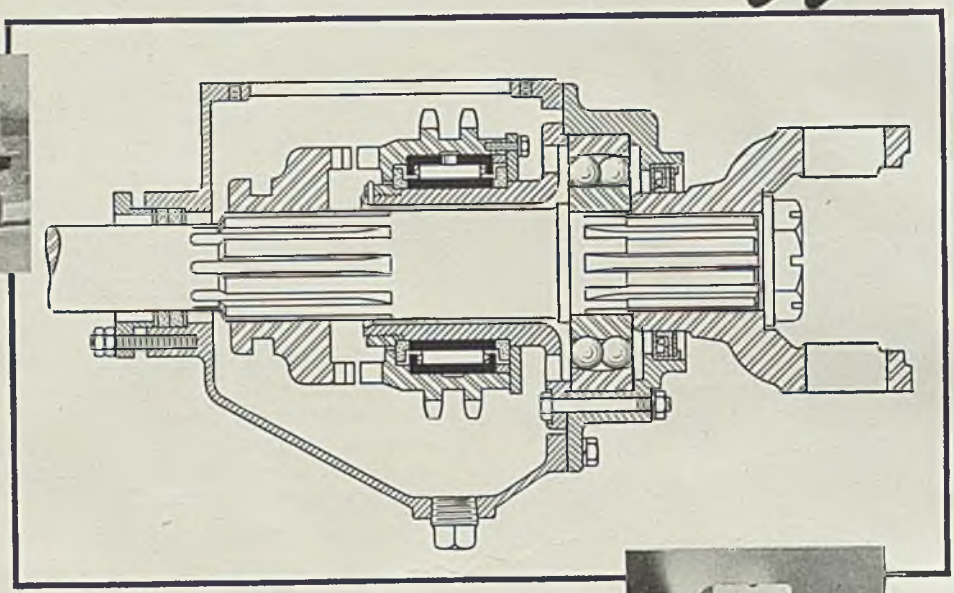
BIBLIOTEKA POLITECHNIKI ŚLĄSKIEJ

Volume 106—No. 14 April 1, 1940



**PRODUCTION • PROCESSING • DISTRIBUTION • USE**

# Compact Power Take-Off



Sterling

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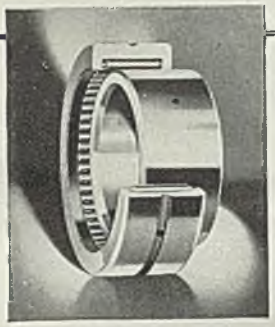
South Bend, Indiana



(*Above*) **CUSTOM-MADE BEARINGS** are engineered by Bantam to meet the most exacting requirements. Typical instance is this 4-row tapered roller bearing—28″ I.D., 36″ O.D., 12½″ long—designed and built by Bantam for service in a 4-high broadside mill.

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# BANTAM BEARINGS

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BIBLIOTEKA POLITECHNIKI

# As the Editor Views The News

■ NEW buying of steel products still is below the level of output so that the rate of production (p. 17) resumed its downward course last week, moving off 1½ points to 61 per cent of ingot capacity. Signs of any substantial increase in the level of steel consumption (p. 103) are lacking, although appearance of more propitious weather last week may cause some expansion in business. Only price change is a further slight weakening in the scrap market. Export demand for iron and steel products continues brisk, especially from Europe and Canada. At the January-February level (pp. 18-19) 1940 exports would be 5,000,000 gross tons, highest level since 1918.

• • •

**Introduces Savings Plan**

The Supreme Court's decision in the Ethyl Gasoline Corp. case last week is held (p. 22) as setting forth an important precedent. Under the decision patent holders can control only the price at which they sell to the direct customers, not the prices at which these customers resell. . . . International Harvester Co.'s employe savings and extra compensation plan (p. 16) will become effective May 1. Under it the company matches 50 per cent of employe's savings up to 5 per cent of salaries, turns over to employes 25 per cent of company's earnings in excess of $3 per share on common stock. . . . Lower prices on aluminum are cited (p. 27) as contributing to lower cost aircraft construction.

• • •

**Taxes vs. Dividends**

Extent to which industry is working to support government is shown strikingly (p. 13) by STEEL's calculation covering the steel industry. This industry in 1939 turned over to tax collectors far more than double the amount of money it paid to its stockholders. . . . Construction of additional plant capacity (pp. 16 and 31) is announced by two leading machine tool builders. . . . Great Western railroad, after five years in receivership, last week (p. 16) started back on the road to private control. . . . One of management's present-day problems (p. 32) is that of educating youth to the fact that there still is no substitute for hard work, as a means of getting ahead in the world.

• • •

**Slings for Handling**

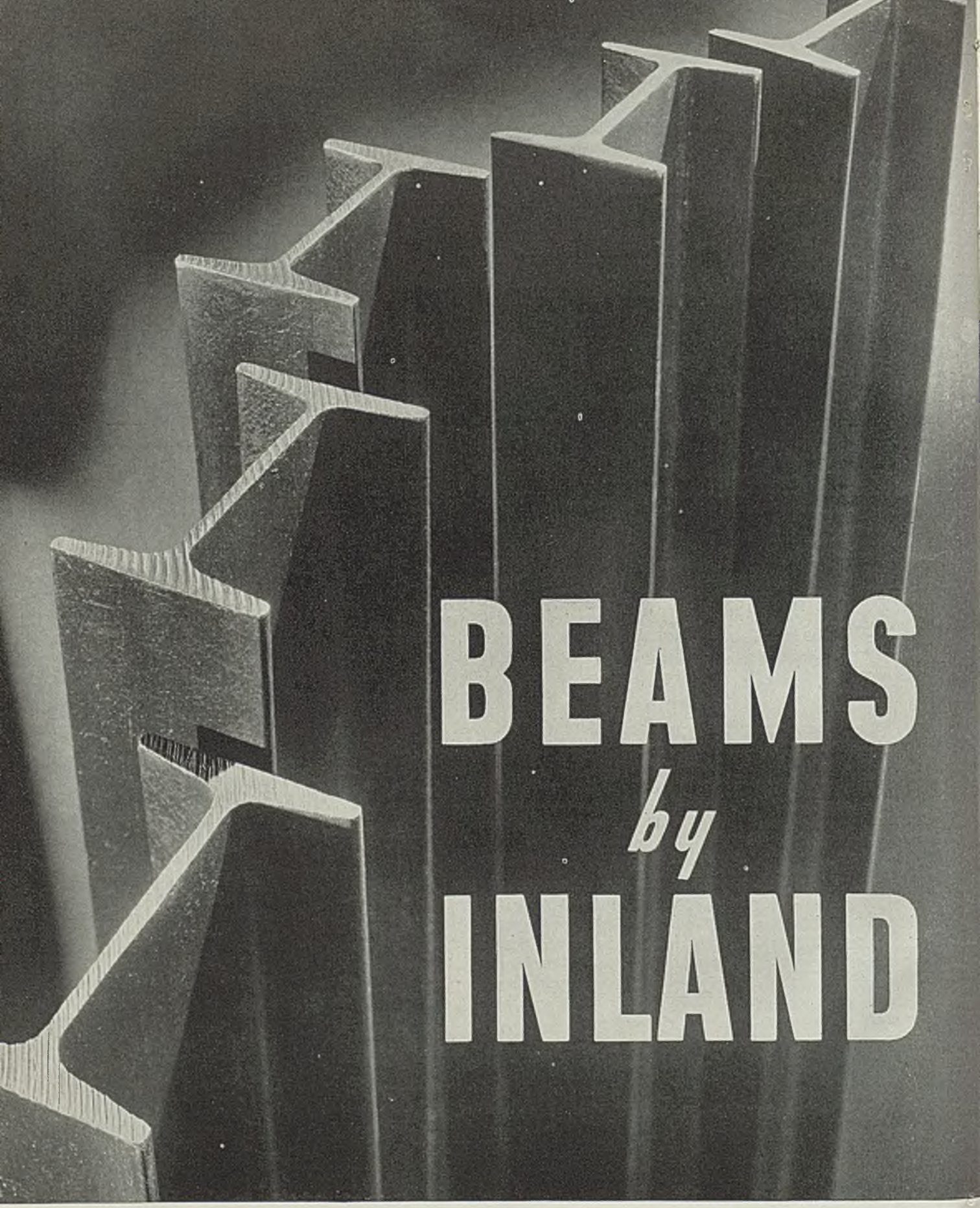
Recent progress in direct radiant heating methods deserves close scrutiny. Chambers may be uniformly heated, for instance (p. 36), by radiants located in a suspended flat roof and at no other places in the furnace structure. . . . More and more the social security system looms as a foremost executive problem. Under it, many smart manufacturers have found (p. 38), they are able to improve their profit position under it. . . . Slings (p. 42) are being used increasingly in handling operations at metal producing and fabricating plants. . . . A well-balanced program is announced (p. 46) for the annual convention of the foundry industry, to be held in Chicago, May 6-10.

• • •

**Improving Coal Storage**

A Southern open-hearth furnace (p. 44) is equipped with a simple, efficient, metered combustion control system. . . . Ethyl polychlorobenzene (p. 49) is a new highly stable liquid with industrial potentialities. . . . Halves of metal floats for column gages are joined (p. 49) by gas welding them on a specially built lathe. . . . Dow Chemical Co. (p. 50) has developed an improved coal storage method. . . . Recent developments in radiographic equipment and procedure (p.64) broaden the field for this form of nondestructive examination of metal structures. . . . Flame descaling is used more widely at steel plants, and (p. 54) at fabricating plants in preparation for painting.

E C Kreutzberg

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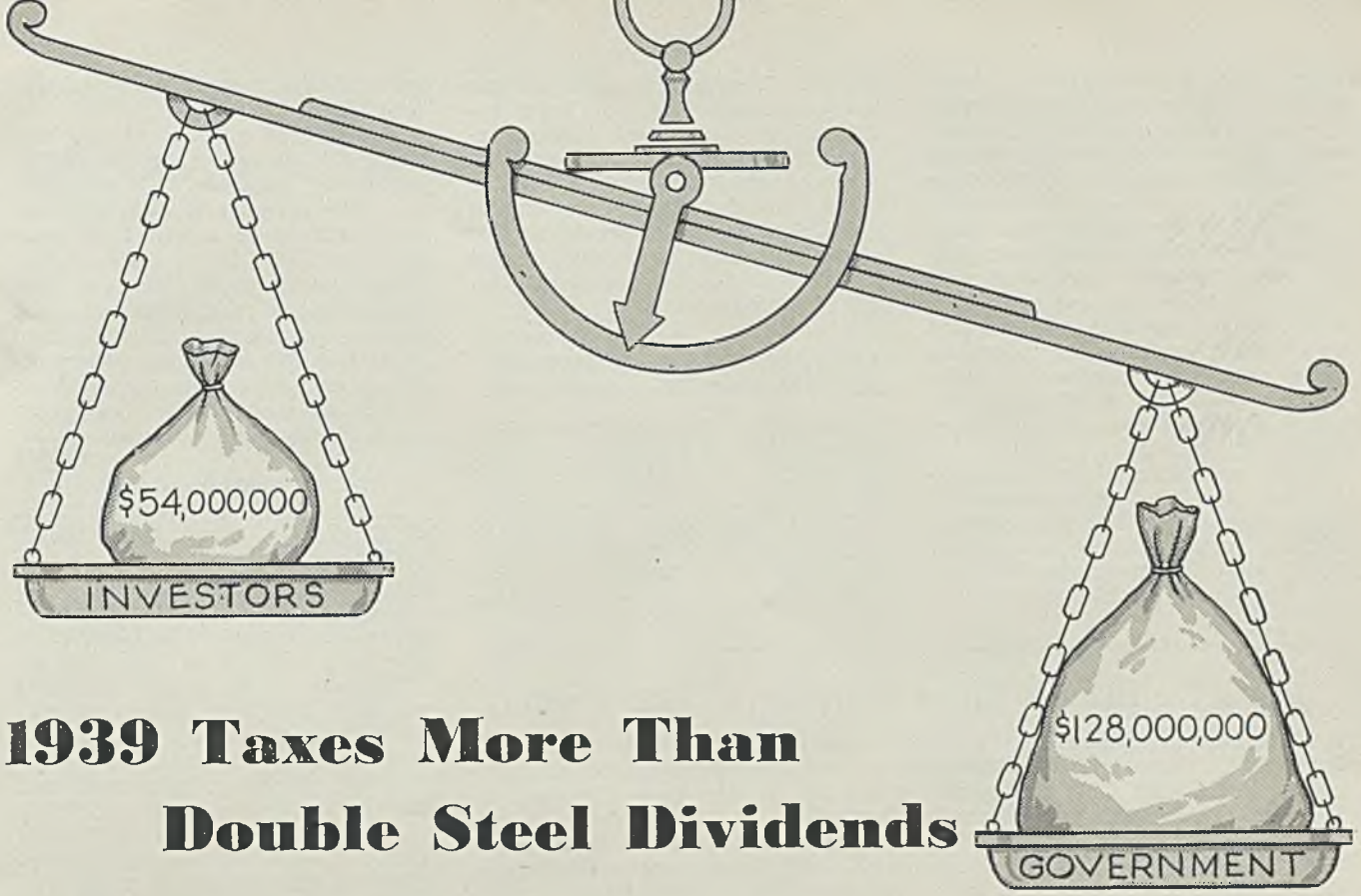



# 1939 Taxes More Than Double Steel Dividends

THE TAX collector is finding the steel industry much more profitable than is the investor.

Taxes levied on 18 leading steel producers in 1939, when operations averaged 64.3 per cent of capacity, aggregated $128,287,398, were 137.5 per cent greater than $54,007,775 dividends paid holders of common and preferred stock in those companies during the year. Net income before preferred stock dividend requirements, earned last year by the same producers, representing about 87 per cent of ingot capacity, was $119,497,120, approximately 93.1 per cent of their taxes accrued and paid in 1939.

This compares with $90,249,920 total taxes paid in 1938, when the same producers, with average 39.6 per cent of capacity operations, incurred a $14,376,005 net deficit. Dividends paid in 1938 totaled $41,614,247, were but 46.1 per cent of the tax bill, and were largely drawn from surplus accounts. Total deficit for the year, after dividend payments, was $55,990,252.

Operations in 1937 were at 72.3 per cent of capacity, highest since 1929's 89 per cent. Net income was $196,876,272, about 28 per cent greater than $153,350,163 levied for taxes. Dividend payments, however, due to previous several years' poor earnings and deficits, were only $128,104,538. Investors received, in 1937, for use of their capital only 83.5 per cent as much as was paid federal, state and local governments, none of which have a direct investment in the industry, for privilege of conducting business.

Dividend payments in 1937 were somewhat larger than they normally would have been, due to the undistributed profits tax.

Accrued taxes paid in the 3-year period, 1937-1939 inclusive, aggregated $371,887,481, far more than either total dividend payments or total net income for the same period. Aggregate dividend payments for the three years were $223,726,540, totaling only 60.1 per cent of the amount paid for taxes. Net income, 81.2 per cent of the 3-year tax total, was $301,997,387.

Comparison of taxes accrued and paid, net income and dividends paid, 1937-1939 inclusive:

| | Taxes | Net Income | Dividends |
|---|---|---|---|
| 1939 | $128,287,398 | $119,497,120 | $54,007,775 |
| 1938 | 90,249,920 | 14,376,005* | 41,614,247 |
| 1937 | 153,350,163 | 196,876,272 | 128,104,538 |
| Total | $371,887,481 | $301,997,387 | $223,726,540 |

*Loss.

Steel companies also have incurred increased clerical and legal expense, due to the extensive records and returns necessary and to the complexity of many tax laws.

For every dollar paid investors in dividends last year, the 18 producers paid to the government $2.38; for every dollar of net profit earned, taxes amounting to $1.07 were paid. Three-year average of taxes paid, per dollar returned to investors in dividends, was $1.66. For every dollar net profit earned, taxes for the period totaled $1.23.

Average taxes levied per gross ton of ingots produced last year by 15 companies, representing 81.1 per cent of the industry's total ingot production capacity, were $3.24. Net income per ton was $2.88, average of dividends paid per ton, $1.05. For the three years, average taxes paid per ton of ingots produced were $3.46 per gross ton compared to dividend payments of $2.08 per gross ton and net income of $3.04 per ton.

Total taxes accrued and paid in 1937 were 77.8 per cent of the net income and 16.4 per cent greater than dividend payments. In 1939, with operations down 12.5 per cent from 1937's average, total taxes exceeded by 7.3 per cent or $8,790,278 the earnings available for dividend payments.

Net profit earned by the 18 companies in 1939 was but 60.7 per cent of the 1937 net earnings. Total taxes in 1939, however, were 83.7 per cent as large as in the former year, due largely to increased social security taxes.

Taxes paid in 1939 would have been sufficient to have afforded employment for more than 71,00 at average annual wage of $1800.

Comparing federal taxes collected from all business in fiscal years 1930 and 1939, report of National Economy League, New York, states total tax accruals and payments in the latter year were $1,704,000,000. This is nearly 35 per cent greater

than 1930's $1,263,000,000 collected as corporate income tax. In 1939 the corporate income tax, together with the excess profits tax, totaled $1,149,000,C00, down $114,000,000 or 9 per cent.

Increase in total federal taxes paid by business in 1939 over 1930 was $441,000,000. This was comprised of taxes on capital stock, $127,000,000; "windfall taxes," levied on "unjust enrichment," resulting from repeal of processing taxes totaled $7,000,000 and employers' share of payroll taxes, enacted since 1930, $421,000,000.

Taxes on individual and corporate income, says the Economy League's report, have been a major federal internal revenue source for past 20 years, although uncertain and fluctuating, according to business conditions. Recent increase in income tax collections has not been entirely due to increased national income, but to amendments such as taxes on dividends in individual returns, heavier taxes on capital gains, less generous provisions for offsetting such gains by capital losses and the graduated tax on undistributed income.

### J & L PROFIT INSUFFICIENT FOR PREFERRED DIVIDENDS

Accelerated demand for steel products in latter half last year enabled Jones & Laughlin Steel Corp., Pittsburgh, to finish the year with $3,188,944 net profit, $2,907,755 of which was earned in fourth quarter, compared to $5,879,958 net deficit incurred in previous year. First nine months' net income last year was $281,189.

Fourth 1938 quarter net loss was $1,129,851, compared to $1,773,591 net deficit incurred in corresponding 1938 period and $2,076,280 net profit earned in fourth 1936 quarter.

Last year's profit, however, was insufficient to meet preferred stock dividend requirements, which total $4,109,973. No dividends were declared or paid on the corporation's 7 per cent cumulative preferred stock during 1939. Dividends in arrears Dec. 31, 1939, aggregated $42 per share, totaled $24,659,838.

In his report to stockholders, H. E. Lewis, chairman of the board, said the corporation's operating rate last year averaged 60 per cent.

Ingot production totaled 2,181,307 gross tons, compared to 1,358,626 in 1938 and 2,472,395 in 1937. Net income per ton of ingots produced was $1.46 last year, in contrast with $4.33 loss in previous year and $1.94 profit earned per ton in 1937.

Rolled steel products sold and shipped last year totaled 1,711,740 net tons, compared with 1,047,088 in 1933. Sales and earnings in 1939 aggregated $113,323,602; in 1938, $75,-410,901.

Total 1939 payroll was $44,491,-746, against $34,162,748 in previous year. Employes last year averaged 27,307, compared to 26,286 in 1938. Paid vacations granted wage earning employes last year cost $439,071, compared to $404,467 in 1938.

Maintenance and replacement expenditures were $14,245,828 last year; in 1938, $10,762,693. Net expenditures for capital additions or improvements during the year, completed or in progress Dec. 31, and excluding prepaid royalties on unmined ore totaled $4,422,886.

Corporation's taxes last year totaled $5,797,715, compared with $4,-379,452 in preceding year. Federal income taxes, included, were $562,-403 in 1939, and $66,342 in 1938; federal social security and railroad retirement taxes totaled $1,750,047, against $1,346,321.

Taxes last year were 13 per cent of the total payroll, compared to 12.8 per cent in 1938. They amounted to $9.87 a share on the corporation's outstanding 7 per cent cumulative preferred stock; were equal to a year's dividend on the 7 per cent cumulative preferred, with additional $2.93 per share for outstanding common.

Balance sheet summary:

| | 1939 | 1938 |
|---|---|---|
| Sales and earnings | $113,323,602 | $75,410,901 |
| Operating profit | 12,002,074 | 1,342,930 |
| Net income | 3,188,944 | *5,879,958 |
| Capital surplus | 30,850,737 | 30,715,094 |
| Current assets | 70,202,084 | 62,464,373 |
| Inventories | 43,794,715 | 42,802,727 |
| Current liabilities | 14,354,897 | 10,804,642 |
| Funded debt | 45,408,235 | 48,281,353 |
| Total surplus | 48,380,391 | 45,289,755 |

*Loss.

## More Consumers Show Increase in 1939 Profits

■ NET 1939 income earned by 320 iron and steel consumers aggregated $316,811,637, compared to $128,859,268 net profit realized by the identical companies in 1938. Only 34 reported a net loss for the year, compared to 103 in 1938. Previous tabulations in STEEL, Feb. 19, p. 29; Feb. 26, p. 16; March 4, p. 38; March 11, p. 18; March 18, p. 22 and March 25, p. 24, listed 269 companies; the following includes 51. All figures are net earnings except where asterisk denotes loss:

| | Fourth Quarter 1939 | Fourth Quarter 1938 | 1939 | 1938 |
|---|---|---|---|---|
| Aetna-Standard Engineering Co., Youngstown, O. | $..... | $..... | $151,859* | $243,667* |
| Aircraft Precision Products Inc., Los Angeles | ..... | ..... | 6,273 | 6,500 |
| Airway Electric Appliance Corp., Toledo, O. | 57,902* | 24,136 | 51,462* | 40,655* |
| Allis-Chalmers Mfg. Co., Milwaukee† | 1,075,673 | 830,273* | 3,719,546 | 2,553,946 |
| American Bosch Corp., Springfield, Mass.† | 81,551 | 1,045,395* | 96,322 | 1,481,562* |
| American Coach & Body Corp., Cleveland† | 34,184 | ..... | 57,528 | 48,686* |
| American Machine & Foundry Co., New York | ..... | ..... | 953,448 | 855,532 |
| Aviation Corp., New York§ | ..... | ..... | 2,238,049* | 187,909 |
| Bendix Aviation Corp., South Bend, Ind.† | 1,398,889 | 562,253 | 4,485,972 | 156,048 |
| Chamberlin Metal Weather Strip Co., Detroit | ..... | ..... | 63,624 | 25,537 |
| Coleman Lamp & Stove Co., Wichita, Kans. | ..... | ..... | 605,174 | 309,152 |
| Colt Patent Fire-Arms Mfg. Co., Hartford, Conn. | ..... | ..... | 1,367,755 | 1,143,620 |
| Combustion Engineering Co. Inc., New York | ..... | ..... | 380,242* | 64,236 |
| Doehler Die Casting Co., Toledo, O.† | 283,343 | 79,359* | 682,043 | 53,607 |
| Douglas Aircraft Co. Inc., Santa Monica, Calif.§ | 502,038 | 325,428 | 2,884,197 | 2,147,392 |
| Driver-Harris Co., Harrison, N. J.† | 214,537 | ..... | 403,946 | 45,972* |
| Electric Boat Co., New York | ..... | ..... | 1,085,516 | 562,829 |
| Emsco Derrick & Equipment Co., Los Angeles | 87,952* | 453,458* | 48,243* | 230,029* |
| Evans Products Co., Detroit† | 188,424 | 12,016 | 242,419 | 524,580* |
| Fostoria Pressed Steel Corp., Fostoria, O. | ..... | ..... | 10,802 | 27,394* |
| General Time Instruments Corp., New York | ..... | ..... | 1,001,786 | 104,190 |
| Gillette Safety Razor Co., Boston | 866,437 | 880,167 | 3,284,797 | 2,941,890 |
| Harvey Hubbell Inc., Bridgeport, Conn. | ..... | ..... | 390,078 | 187,357 |
| Hayes Mfg. Co., Paterson, N. J. | 87,153* | 17,889* | 362,099* | 362,903* |
| Hercules Motors Corp., Canton, O. | 346,191 | 101,223 | 643,553 | 170,312 |
| International Business Machines Corp., N. Y.† | 2,501,997 | 2,608,675 | 9,092,692 | 8,660,034 |
| International Cigar Machinery Co., New York | ..... | ..... | 1,328,155 | 1,366,392 |
| Johns-Manville Corp., New York | 1,488,720 | 597,833 | 4,164,719 | 1,455,302 |
| Kingston Products Corp., Kokomo, Ind.† | 49,618 | 140,529 | 161,373 | 29,047* |
| Marchant Calculating Machine Co., Oakland, Calif.† | 172,806 | 57,299 | 674,958 | 423,399 |
| Martin Co., Glenn L., Baltimore† | 2,596,827 | 208,361 | 4,110,605 | 2,349,355 |
| Master Electric Co., Dayton, O.† | 270,874 | 135,347 | 691,572 | 347,458 |
| Michigan Steel Casting Co., Detroit† | 11,014 | 14,583* | 8,515* | 137,128* |
| National Cash Register Co., Baltimore† | 500,445 | 692,724 | 1,805,086 | 2,392,340 |
| National Rubber Machinery Co., Akron, O.† | 3,636* | 9,590* | 102,331 | 47,062 |
| New Idea Inc., Coldwater, O. | ..... | ..... | 593,328 | 670,534 |
| Otis Elevator Co., New York† | 331,348 | 295,890 | 2,751,026 | 1,912,730 |
| Packard Motor Car Co., Detroit† | 2,595,959 | 1,660,473 | 545,867 | 1,638,317* |
| Pullman Inc., Chicago | 629,257 | 1,051,496 | 4,009,475 | 2,295,829 |
| Rheem Mfg. Co., Richmond, Calif.† | 165,515 | 45,315 | 863,954 | 276,543 |
| Standard Screw Co., Jersey City, N. J. | ..... | ..... | 724,673 | 275,824 |
| Superheater Co., New York† | 143,401 | 61,299 | 602,618 | 465,587 |
| Terre Haute Malleable & Mfg. Corp., Terre Haute, Ind.† | 10,803 | ..... | 31,072 | 40,975* |
| Union Metal Mfg. Co., Canton, O. | ..... | ..... | 204,967 | 101,032 |
| Universal-Cyclops Steel Corp., Bridgeville, Pa. | 416,807 | 89,658 | 864,219 | 99,325 |
| Vichek Tool Co., Cleveland | ..... | ..... | 70,542 | 2,274 |
| Western Steel Products Corp. Ltd., Winnipeg, Man. | ..... | ..... | 141,611 | 132,553 |
| White Motor Co., Cleveland | ..... | ..... | 107,473 | 1,825,275* |
| White Sewing Machine Corp., Cleveland† | 173,642 | 112,480 | 502,967 | 250,245 |
| Yale & Towne Mfg. Co., Stamford, Conn.† | 789,346 | 392,008 | 1,024,150 | 68,958 |
| Young Spring & Wire Corp., L. A., Detroit† | 352,833 | 115,311 | 207,273 | 700,182* |

†Fourth quarter statements based on the nine months' and year's statements; §fiscal year ends Nov. 30.

# United States Steel's Return On Investment "Inadequate"

■ EMPHASIZING vital necessity for mutual employer-employe understanding in industry today, Edward R. Stettinius Jr., chairman of the board, United States Steel Corp., New York, last week introduced the corporation's newly designed annual report to stockholders and employes.

Report discloses accounting form different from those of the past. Corporation's entire operating history in 1939 is presented in gross figures, in percentages, and reduced to a per employe basis. It places at disposal of stockholders, workers and the public a clear picture of all money received by the corporation for sale of its products and services since its organization, in addition to usual financial outline.

Mr. Stettinius reported rolled and finished steel products shipments totaled 11,707,251 net tons, a 60 per cent increase over 1938's 7,315,506 net tons. Year's peak month was December with shipments totaling 1,443,969 net tons.

Previously reported net 1939 income, $41,119,934, was confirmed, represents a comeback from 1938's $7,717,454 net deficit. Fourth quarter net earnings were $28,835,282, compared to $4,394,454 in corresponding 1938 period and $10,420,445 in third 1939 quarter.

### 1939 Profit Ratio Smaller

Reviewing the year, Mr. Stettinius said:

"The higher level of operations which prevailed throughout the year, compared with 1938, resulted in larger earnings, although not in proportion to those of 1936—a year of comparable tonnage. The lower relative earnings in 1939 were due to a number of factors, an important one being that a considerable part of the total tonnage consisted of products yielding lower prices. The increased tonnage failed to reduce unit costs sufficiently to offset the influence of the lower price yield."

Four regular dividends were declared during the year, each $1.75 per share on preferred stock, totaling $25,219,677, leaving $15,900,257 net income balance. This compares with $32,937,131 net deficit after preferred dividend payments in 1938.

"Earnings available for payment of interest and dividends, although a decided improvement over the previous year's results," said Mr. Stettinius, "do not represent from any viewpoint an adequate return upon investment, nor were the 1939 earnings sufficient to offset the 1938 deficit after payment of preferred dividends."

Last week, however, a dividend of $1 a share on common, payable April 26 to record of April 5 was declared, first since distribution of $1 a share on common Oct. 26, 1937.

Corporation's sales of goods and services last year totaled $857,100,000, equal to $3829 per employe, compared to $611,400,000 in 1938, $1,028,800,000 in 1937 and $791,700,000 in 1937. For goods and services purchased from others, it paid $309,900,000 or 36.2 per cent of the total sales income, equal to $1384 per employe. In 1938, $230,600,000 was expended for goods and services received from others; in 1937, $337,000,000.

### Taxes 7.8 Per Cent of Sales

Depreciation and depletion cost $61,200,000 last year, compared to $49,200,000 in 1938 and $60,900,000 in 1937. This was equal in 1939 to 7.8 per cent of the total sales income and $274 per employe.

Taxes accrued last year were $67,011,086, equal to $299 per employe, 7.41 per cent of total sales, $7.70 per common share and $5.59 per ton of finished steel. This was the highest tax assessment paid by the corporation since 1920, with exception of 1937, when $88,000,000 accrued, and sixth highest since corporation was organized.

Hundreds of governmental authorities, says the report, levied taxes on the corporation in 1939, the "many units of government, which had put no savings into the property and had taken no risk, received $26,000,000 more than the owners (from earnings), who had ventured their savings and thereby created $369,000,000 in wages" for the corporation's employed.

Summary of 1939 tax accruals compared with those of 1938:

| | 1939 | 1938 |
|---|---|---|
| State and local taxes, including state income | $36,827,279 | $32,044,825 |
| Social security taxes, including state and federal | 14,818,056 | 11,309,215 |
| Unemployment compensaton | (10,888,231) | (8,344,870) |
| Old age benefits | (3,929,825) | (2,964,345) |
| Federal taxes, excluding social security | 15,371,751 | 5,488,091 |
| Income and excess profits | (12,975,000) | (2,930,000) |
| Capital stock | (1,985,000) | (2,000,025) |
| Excise and miscellaneous | (411,751) | (558,066) |
| Total of all taxes | $67,017,086 | $48,842,131 |

Interest payments in 1939 totaled $9,300,000, compared to $8,300,000 in previous year, were equal to 1.1 per cent of total 1939 sales and $42 per employe.

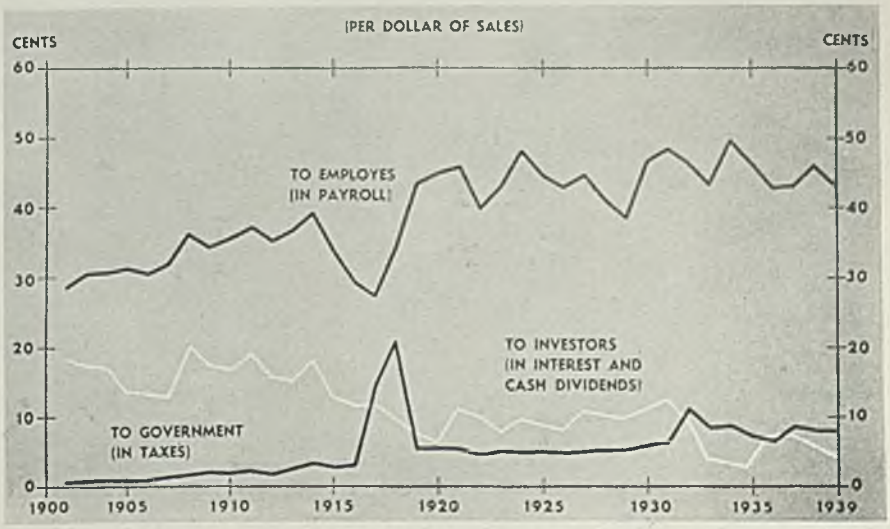
Total cost of these four general items, over which the corporation had relatively little control, says the report, was $447,000,000. This was 52.2 per cent of total sales and $1999 per employe.

Wages and salaries took $369,000,000 or 90 per cent of the $410,000,000 remaining from total sales.

Total gross property expenditures in 1939 were $26,060,987. Amount unexpended on recommended authorizations for additions, extensions and improvements as of Dec. 31, 1939, was $55,000,000.

Employment during 1939 was at a high level, with an average of 223,844 on the payroll, compared to 202,108 average in preceding year. Following composite table presents em-

(*Please turn to Page* 101)




■ What the United States Steel Corp. paid to employes, investors and government since 1902. Note trend toward larger share of sales dollar for workers and the tax collector, and decrease in investors' share

# Current Events in Chicago . . .

By J. F. POWELL, Chicago Editor, STEEL

■ GREAT Western railroad, after more than five years in receivership, last week started back on the road to private ownership. Along with Chicago & Eastern Illinois railroad, it will be the second of the country's railroads which went into receivership in the last ten years to return to private control.

Reorganization plan, approved by 99 per cent of the road's first mortgage holders and preferred stockholders, was approved by Federal Judge Charles E. Woodward in Chicago, March 26. Done away with is the approximately $45,000,000 equity of common stockholders. Court will appoint one man, bondholders another, and stockholders a third, the three forming a temporary committee to select a temporary board of directors. A permanent board of directors will not be elected until former securities have been exchanged for the new. Fixed charges are to be held under $1,000,000 annually, with $863,000 set for the current year. Four per cent first mortgage issue of $16,386,350 will be part of approximately $63,000,000 new capitalization. Working capital from new bonds will be about $2,000,000.

Great Western's main line runs between Chicago and the twin cities and thence to Kansas City. Over 2000 miles of track is operated in five states.

♦

International Harvester Co., Chicago, last week announced its new employe savings and extra compensation plan, effective May 1 and applying to some 50,000 American and Canadian employes in all departments. Managerial employes are not included, however, but will be provided for otherwise.

Employes of one and not more than three years' service are enabled to establish an individual account up to 10 per cent of their salary or wages, and receive interest from the company. Those of three or more years' service receive full benefit of the plan, their accounts deriving money from three sources: Savings of up to 10 per cent of wages or salary; company's matching of savings on a 50 per cent basis up to 5 per cent of salary or wages; distribution to employes of 25 per cent of all company's earnings in excess of $3 per share on common stock. Each employe's share of extra compensation will be proportionate to his salary or wages, and each eligible employe will receive it whether or not he participates in the savings features of the plan. President Sydney G. McAllister estimates the savings features will cost the company more than $1,000,000 annually, whether business is good or not.

♦

Chicago, North Shore & Milwaukee railroad was granted federal authority last week to spend approximately $89,000 to modernize 15 passenger coaches and two diners, as part of road's modernization program. Previously permission was granted to modernize 25 coaches at $150,000 and to buy two high-speed, de luxe, electric streamliners. The streamliners are now being built and will cost approximately $300,000. Road operates high-speed electric service between Chicago, Milwaukee and intermediate towns and suburbs.

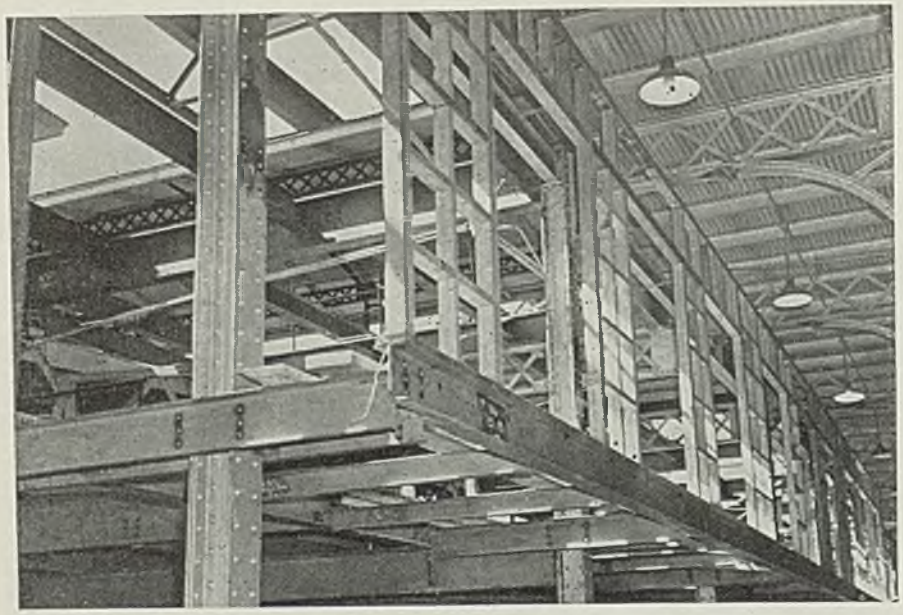
♦

Alfred Kauffmann, president, Link-Belt Co., Chicago, last week told annual stockholders' meeting company's business is being expanded by new products and new applications for old products. Elevating and conveying equipment, and drying machinery business in 1939 was best on record.

Meantime, at annual meeting of another large Chicago company, J. B. Berryman, chairman, Crane Co., told stockholders that to date this year sales and profits have been greater than last year, but stated "we cannot see very far ahead."

Business of Kellogg Switchboard & Supply Co., Chicago, as stated at its annual meeting, is at the same level the first two months of this year as in the latter part of last year. Company's laboratories are working on new and improved communications equipment.

## Legalized Betting Stimulates Steel Demand



■ Legalization of pari-mutuel betting at race tracks in New York and New Jersey is mildly stimulating demand for structural and reinforcing steel. Here workmen at Belmont Park track are completing grandstand additions and stands for pari-mutuel betting machines. Acme photo

## Warner & Swasey Co. To Build Plant Addition

■ A plant addition of about 30,000 square feet, which will add 15 per cent to plant capacity was announced last week by Warner & Swasey Co., 5701 Carnegie avenue, Cleveland.

"This addition is being constructed in order to help meet today's emergency demand for turret lathes," Charles J. Stilwell, company president, said. "On top of a rising domestic demand from normal peacetime industries and heavy buying of machine tools for export to the Allies, there has developed an unprecedented immediate demand for turret lathes for the country's aircraft engine manufacturers, due chiefly to the war requirements of England and France and the defense requirements of the United States.

"While we are fully aware of what experience has shown to be the usual aftermath of expansion for war production, nevertheless we are convinced that the current situation calls for more than normal

measures for the speeding up of our turret lathe output, in order to cooperate in the carrying out of the program of the country's aircraft builders and the government. There is also to be considered the fact that today machine tool capacity has a vital bearing upon the nation's position with respect to national defense.

"Since last September the capacity of our present plant has been increased by one-third, through the installation of new equipment and a three-shift operating schedule. The new addition will represent a 15 per cent increase over today's capacity."

## Bessemer Steel Control Method To Be Explained

■ Some details of the bessemer flame control method of steelmaking will be revealed by H. W. Graham, director of metallurgy and research, Jones & Laughlin Steel Corp., April 2, at a joint meeting of the American Institute of Mining and Metallurgical Engineers, the A.I.M.M.E. Bessemer Steel committee, and the steelworks section of the Engineers Society of Western Pennsylvania. Mr. Graham will explain how his company's invention has operated to scientifically control the bessemer process.

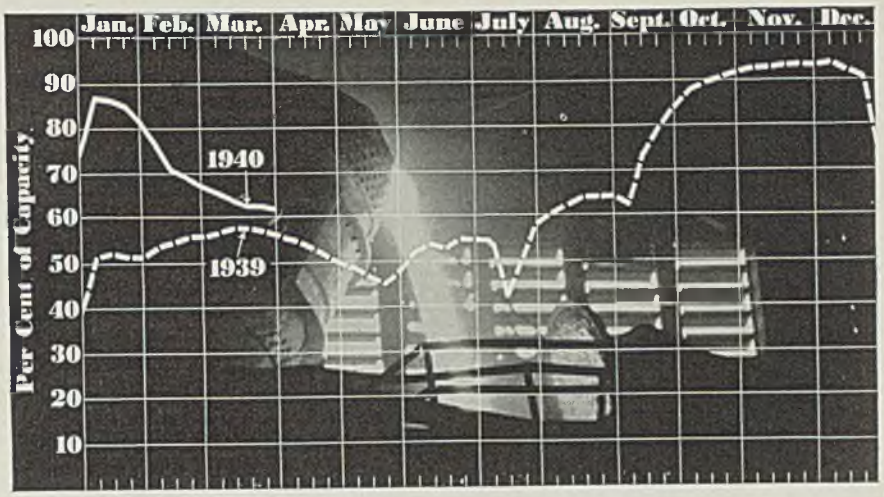
This precision control, on which patent applications have been made, is obtained through use of an arrangement of photoelectric cells and other equipment determining with split-second accuracy the proper "end point" or termination of the blow. It supplements the skill of the operator on which the process has depended entirely since its inception 80 years ago. Talk will be illustrated by direct color motion pictures of the bessemer flame.

## Republic To Build Ore Treatment Plant in South

■ Republic Steel Corp., Cleveland, will construct a small iron ore treatment plant at Spaulding mine, Birmingham, Ala. Unit will be a pilot plant and used for large scale experimentation in improving iron ore quality.

Iron ore in the vicinity of Grace's Gap and northward on Red mountain which is to be treated is too siliceous to be used economically in a blast furnace and Republic is experimenting on a process for concentration.

Much experimental and research work on the ore of this district has been done during the past several years by metallurgists of the section, including the United States bureau of mines and an experimental station at the University of Alabama.




# PRODUCTION... Down

■ STEELWORKS operations last week declined 1½ points to 61 per cent. Seven districts registered declines, mostly small, one showed a slight increase and four were unchanged. A year ago the rate was 54½ per cent; two years ago it was 36 per cent.

**Youngstown, O.** — Steady at 43 per cent with 38 blast furnaces and three bessemers in production. Carnegie-Illinois Steel Corp. took off one open hearth but bessemer production was increased to balance this loss. Schedule for this week is at the same rate.

**Birmingham, Ala.** — Continues at 78 per cent for fourth consecutive week, with upturn to 81 per cent scheduled for this week.

**Detroit** — Up 1 point to 79 per cent, 20 open hearths active.

**St. Louis** — Down 19 points to 39 per cent, only nine open hearths being in production.

**Central eastern seaboard** — Loss of 1 point to 59 per cent. Incoming business, still below production, shows improvement.

**Chicago** — Drop of 3 points to 56.5 per cent, though leading mills showed small gains, more than offset by lower rate by two smaller mills.

**Pittsburgh** — Unchanged at 57.5 per cent although three mills advanced schedules and two reduced.

**Wheeling** — Slipped 2 points to 71 per cent, an increase at one steelworks being more than offset by curtailment by another.

**New England** — Holds at 65 per cent of capacity.

**Buffalo** — Dipped 7 points to 44 per cent as several open hearths were taken off at the end of the preceding week.

**Cincinnati** — Curtailed 5.5 points to 45.5 per cent as open hearths were taken off for repairs. A rate of about 60 per cent is indicated this week.

**Cleveland** — Receded 5 points to 69 per cent as one interest reduced its schedule.

### District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

| | Week ended Mar. 30 | Change | Same week 1939 | Same week 1938 |
|---|---|---|---|---|
| Pittsburgh | 57.5 | None | 49 | 32 |
| Chicago | 56.5 | — 3 | 53.5 | 32.5 |
| Eastern Pa. | 59 | — 1 | 40 | 29 |
| Youngstown | 43 | None | 50 | 30 |
| Wheeling | 71 | — 2 | 66 | 41 |
| Cleveland | 69 | — 5 | 52.5 | 33.5 |
| Buffalo | 44 | — 7 | 42 | 30 |
| Birmingham | 78 | None | 62 | 66 |
| New England | 65 | None | 50 | 20 |
| Cincinnati | 45.5 | — 5.5 | 51 | 18 |
| St. Louis | 39 | —19 | 43 | 46.5 |
| Detroit | 79 | + 1 | 74 | 18 |
| Average | 61 | — 1.5 | 54.5 | 36 |

## Republic Steel Corp. To Close Niles Hand Mills

■ Niles, O., sheet mill division, Republic Steel Corp., Cleveland, soon will be closed permanently, according to company officials. Notices of the shutdown, affecting one of the last oldtime sheet mills in the district, have been mailed to employes.

## Correction

■ Statement in STEEL, March 25, pages 21 and 22, that the Baltimore & Ohio railroad had placed a $1 per day per car demurrage charge on coal at lake ports is incorrect. Lake coal demurrage charges are uniform and published for the account of all carriers in Agent Jones' tariff I.C.C. No. 3374, which provides that for the period March 1 to April 14, inclusive, no demurrage will be assessed. The Baltimore & Ohio is not assessing any demurrage during this period.

# Iron, Steel Export Prospects Considered Best Since 1920

*NEW YORK*

■ AN UNUSUALLY good year in steel exports in 1940, but not a boom year such as experienced during the World war and the years immediately following is the appraisal of leading foreign shippers. As the first quarter ended, the movement abroad continued to expand.

Exporters anticipate a volume that will probably shade the 3,500,000 gross tons (exclusive of scrap) exported in 1937, which was the highest since 1920, when more than 4,700,000 gross tons were exported for a peace-time high. They do not expect a movement comparable with 1920 volume or the higher figures reached in the World war period, when a peak of approximately 6,300,000 tons was established in 1917.

Exports of 3,500,000 gross tons would equal the movement in 1915, the first full year of the World war. Against other World war years, it would compare with approximately 5,900,000 gross tons of iron and steel exported in 1916, about 6,300,000 tons in 1917 and more than 5,300,000 gross tons in 1918. In 1919 there was a sharp drop, but the movement was still impressive at approximately 4,300,000 gross tons.

So far, demand from belligerent countries has included little or nothing in the way of shell steel and guns. This was expected by leading steel exporters, who as early as last fall predicted orders of this character likely would not be placed in this country in any volume for many months. Warring nations already had built up heavy reserves.

### Neutral Demand To Continue

Demand from neutral countries, it is believed, will undoubtedly continue above normal, but here again are reservations. The usual sources of steel supply for these countries, it is pointed out, have not been completely cut off in many cases; nor does it appear they will be soon. They are not in a position where, broadly speaking, they have to look to this country as their sole source. Moreover, in certain important instances, unsettled political and economic factors, as well as exchange difficulties will probably limit buying. All in all, there is a disposition in most well-informed quarters to shade predictions with a certain conservatism.

Unusually large movement of steel abroad at present reflects principally purchases made last fall. Not only have mills been unable until recent weeks to produce much of the export tonnage purchased then, but a substantial amount of it was not ordered for shipment until after the turn of the year—and then often for delivery over a period of three or four months.

Actual orders declined sharply last December. January business was sluggish, but a shade better. Demand from the Orient during that month was particularly light due to the observance of extensive holidays. February witnessed a substantial increase and March bookings were a shade better.

This trend in new buying is expected to continue for a while. However, no great bulge is expected until foreign purchasers have an opportunity to digest much of the tonnage on hand. A number unquestionably over-anticipated their needs; and this factor, as well as seasonal influences, must be taken into consideration in any appraisal of the trend of new business over the next few months. Both factors already have had a particular bearing on tin plate, demand for which has slumped noticeably. Some exporters now do not look for material improvement before summer.

Trends are indicated in the accompanying table. Shipments to United Kingdom and Canada were down last year from 1937, but were higher than in 1938 and greatly higher in the case of the United Kingdom than in 1936. An upswing in both instances, probably surpassing 1937, is expected to develop this year.

On the other hand, exports to Japan fell sharply, from 879,652 gross tons in 1937 to 203,034 gross tons in 1939. The abrogation of the United States-Japanese trade treaty on Jan. 25 is not expected to have any great bearing at present, but it is the general trade expectation that Japan will take little more this year than last. Shipments to Rus-

**IRON, STEEL EXPORTS TO LEADING CONSUMING COUNTRIES**

(Gross Tons)

| | 1939 | 1938 | 1937 | 1936 |
|---|---|---|---|---|
| Italy | 19,593 | 9,085 | 21,104 | 7,673 |
| Netherlands | 116,262 | 85,293 | 51,131 | 18,935 |
| Norway | 42,533 | 12,152 | 21,972 | 9,891 |
| Russia | 28,301 | 68,652 | 94,154 | 64,559 |
| Sweden | 146,226 | 31,418 | 100,169 | 36,678 |
| U't'd Kingdom | 163,665 | 132,612 | 378,928 | 15,962 |
| Canada | 390,292 | 276,325 | 456,599 | 292,407 |
| Mexico | 87,202 | 45,319 | 152,060 | 76,496 |
| Cuba | 67,817 | 51,692 | 61,451 | 49,591 |
| Argentina | 66,690 | 28,120 | 46,768 | 35,108 |
| Brazil | 149,553 | 76,402 | 109,079 | 73,996 |
| Chile | 56,910 | 50,223 | 45,520 | 19,958 |
| Colombia | 77,603 | 57,507 | 58,888 | 35,491 |
| Venezuela | 93,206 | 72,247 | 68,646 | 28,441 |
| China | 57,422 | 25,412 | 122,638 | 50,018 |
| Japan | 203,034 | 484,942 | 879,652 | 54,101 |
| Kwantung | 55,933 | 93,115 | 106,355 | 4,207 |
| Philippines | 146,102 | 104,896 | 96,269 | 71,313 |
| Union of South Africa | 47,890 | 42,061 | 56,292 | 31,571 |

## French Barnyards Yield War Steel

■ Steel purchases by belligerents from the United States have not been in large volume to date. Warring nations had built up reserves before hostilities started, and since have been collecting their domestic scrap. Typical is this heap of old horseshoes from the barnyards of France, potential "bad luck" for the enemy. Acme photo

sia declined, with even a still further drop now indicated. Shipments to Mexico also fell.

There was a sharp pick up in buying by the Netherlands, Sweden and Norway. Several South American countries took an increasing volume of steel from the United States, notably Brazil, Venezuela, Colombia and Argentina. Shipments to Argentina in January this year, 37,735 gross tons, were more than half the amount delivered by the United States to that country in all of 1939, and represented about 12 per cent of Argentina's normal annual steel requirements from all sources. Shipments to the Philippines have expanded noticeably.

Exports to South America increased from 229,126 tons in 1936 to 503,818 in 1939. Shipments to Europe last year made a substantial gain, as compared with 1936, but suffered in comparison with 1937, and this was even more true, it will be noted, in the case of Asia and Oceania.

North and Central America, including West Indies, purchased the heaviest amount of iron and steel products from this country in 1939. Great bulk of this tonnage went to Canada.

Canada took 390,292 gross tons out of a total of 658,982 gross tons for the entire classification.

No small share of the influence of foreign buying upon the steel industry is falling indirectly, by virtue of demands from abroad for equipment to be built in this country, such as machine tools, power generating and construction machines, tractors, trucks, airplanes, and so forth. Last year exportation of metalworking machinery totaled $117,473,385, against $111,656,830, in 1938; $9,369,000 in 1933 and $40,804,000 in 1929.

Of the more than $600,000,000 spent by the Allies for goods in the United States since the beginning of the war, airplanes have figured prominently. Further large purchases of aircraft are reported to be imminent.

# January-February Exports Triple Those for Same Period Last Year

■ FEBRUARY exports of steel and iron products, excluding scrap, totaled 436,585 gross tons, valued at $33,361,201, compared with 396,054 tons valued at $31,153,365 in January, as shown by figures of the metals and minerals division, department of commerce. This is an increase of 10 per cent in volume. In February, 1939, exports were 134,777 tons valued at $9,772,707, about one-third in volume and value of the February, 1940, figures.

Much of the sharp gain in trade was due to larger shipments to the United Kingdom, Sweden and Belgium, total shipments to Europe being 146,447 tons against 109,957 tons in January. Shipments to South America also showed an increase, though smaller, February total being 119,639 tons, compared with 110,657 tons in January. Exports to the Far East were relatively unchanged at 83,260 tons against 83,056 tons in January. Trade with North and Central America and the West Indies showed a decline, 72,662 tons against 77,515 tons in January.

Because of large purchases of nonalloy steel ingots and other semifinished steel, the United Kingdom ranked first in February, taking 68,130 tons, a sharp gain over 45,675 tons in January. Argentina was second with 43,281 tons against 37,735 tons in January. Canada was third, 40,586 tons in February, 43,966 tons in January. Brazil was fourth, February shipments being 30,547 tons, January 24,113 tons.

Nonalloy steel ingots and similar products led in tonnage, 60,643 tons. Tin plate exports totaled 50,643 tons, widely distributed. Nonalloy black sheets were exported to a total of 38,142 tons.

Cumulative exports for two months this year were 832,649 tons, valued at $64,514,566, three times those of the comparable period of 1939 when 269,565 tons valued at $19,987,254 were shipped. The two months' figure this year equals or exceeds this class of exports for each of the years 1931, 1932 and 1933.

Scrap exports in February totaled 234,716 tons, valued at $4,137,635, a sharp gain over 187,457 tons valued at $3,567,221 in January and 224,913 tons valued at $3,345,344 in February, 1939.

**UNITED STATES EXPORTS OF IRON AND STEEL PRODUCTS**
**(Gross Tons)**

| Articles | Feb. 1940 | Jan. 1940 | Jan. thru Feb. 1940 |
|---|---|---|---|
| Pig iron | 18,927 | 15,057 | 33,984 |
| Ferromanganese and spiegeleisen | 5,069 | 408 | 5,477 |
| Other ferroalloys | 473 | 747 | 1,220 |
| Ingots, blooms, etc.: | | | |
| Not containing alloy | 65,794 | 58,194 | 123,988 |
| Alloy, incl. stainless | 1,277 | 2,608 | 3,885 |
| Steel bars, cold fin. | 4,937 | 2,761 | 7,698 |
| Bars, iron | 2,176 | 1,449 | 3,625 |
| Bars, concrete | 18,710 | 19,544 | 38,254 |
| Other steel bars: | | | |
| Not containing alloy | 24,293 | 22,577 | 46,870 |
| Stainless steel | 58 | 80 | 138 |
| Alloy, not stainless | 1,325 | 1,600 | 2,925 |
| Wire rods | 14,417 | 9,295 | 23,712 |
| Boiler plate | 911 | 642 | 1,553 |
| Other plates, not fab.: | | | |
| Not containing alloy | 35,001 | 21,316 | 56,317 |
| Stainless steel | 9 | 4 | 13 |
| Alloy, not stainless | 383 | 173 | 556 |
| Skelp iron or steel | 3,388 | 8,535 | 11,923 |
| Sheets, galv. iron | 889 | 984 | 1,873 |
| Sheets, galv. steel | 15,286 | 16,001 | 31,287 |
| Sheets, "black" steel: | | | |
| Not containing alloy | 38,142 | 30,569 | 68,711 |
| Stainless steel | 151 | 241 | 392 |
| Alloy, not stainless | 455 | 562 | 1,017 |
| Sheets, black iron | 2,977 | 2,494 | 5,471 |
| Strip steel, cold-rolled: | | | |
| Not containing alloy | 4,615 | 4,792 | 9,407 |
| Stainless steel | 36 | 97 | 133 |
| Alloy, not stainless | 12 | 40 | 52 |
| Strip steel, hot-rolled: | | | |
| Not containing alloy | 8,892 | 13,304 | 22,196 |
| Stainless steel | ..... | 3 | 3 |
| Alloy, not stainless | 4 | 35 | 39 |
| Tin plate, taggers' tin | 60,643 | 64,301 | 124,944 |
| Terneplate | 399 | 627 | 1,026 |
| Tanks, except lined | 1,535 | 1,957 | 3,492 |
| Shapes, not fabricated | 13,008 | 14,529 | 27,537 |
| Shapes, fabricated | 6,706 | 6,890 | 13,596 |
| Plates, fabricated | 2,868 | 2,107 | 4,975 |
| Metal lath | 101 | 125 | 226 |
| Frames and sashes | 79 | 164 | 243 |
| Sheet piling | 13 | 1,971 | 1,984 |
| Rails, 60 lbs. | 10,104 | 3,952 | 14,056 |
| Rails, under 60 lbs. | 1,450 | 723 | 2,173 |
| Rails, relaying | 344 | 1,154 | 1,498 |
| Rail fastenings | 1,284 | 381 | 1,665 |
| Switches, frogs, crsgs. | 495 | 381 | 876 |
| Railroad spikes | 546 | 491 | 1,037 |
| R. R. bolts, nuts, etc. | 212 | 369 | 581 |
| Boiler tubes, seamless | 2,357 | 1,539 | 3,896 |
| Boiler tubes, welded | 81 | 220 | 301 |
| Pipe: | | | |
| Seamless casing and oil-line | 12,767 | 13,641 | 26,408 |
| Do., welded | 4,536 | 3,657 | 8,193 |
| Seamless black | 3,102 | 1,723 | 4,825 |
| Pipe fittings: | | | |
| Mall. iron screwed | 516 | 498 | 1,014 |
| Cast-iron screwed | 161 | 281 | 442 |
| Pipe and fittings for: | | | |
| Cast-iron pressure | 7,097 | 1,451 | 8,548 |
| Cast-iron soil | 913 | 1,304 | 2,217 |
| Pipe, welded: | | | |
| Black steel | 4,544 | 2,053 | 6,597 |
| Black wrought-iron | 561 | 416 | 977 |
| Galvanized steel | 4,602 | 5,539 | 10,141 |
| Galv. wrought-iron | 565 | 728 | 1,293 |
| All other pipe, ftgs. | 1,210 | 2,279 | 3,489 |
| Wire: | | | |
| Plain iron or steel | 7,692 | 6,621 | 14,313 |
| Galvanized | 2,875 | 3,125 | 6,000 |
| Barbed | 1,736 | 2,418 | 4,154 |
| Woven-wire fencing | 278 | 499 | 777 |
| Woven-wire s'cn cloth: | | | |
| Insect | 33 | 39 | 72 |
| Other | 263 | 143 | 406 |
| Wire rope and cable | 705 | 809 | 1,514 |
| Wire strand | 208 | 41 | 249 |
| Electric welding rods | 277 | 283 | 560 |
| Card clothing | 1 | 1 | 2 |
| Other wire | 1,981 | 1,226 | 3,207 |
| Wire nails | 4,275 | 5,358 | 9,633 |
| Horseshoe nails | 64 | 121 | 185 |
| Tacks | 71 | 73 | 144 |
| Other nails, staples | 239 | 329 | 568 |
| Ordinary bolts, machine screws | 1,185 | 1,081 | 2,266 |
| Castings: | | | |
| Gray-iron (incl. semisteel) | 329 | 442 | 771 |
| Malleable-iron | 151 | 131 | 282 |
| Steel, not alloy | 164 | 305 | 469 |
| Alloy, incl. stainless | 113 | 200 | 313 |
| Car wheels, tires, and axles: | | | |
| Wheels and tires | 807 | 771 | 1,578 |
| Axles, no wheels | 157 | 181 | 338 |
| Axles with wheels | 67 | 7 | 74 |
| Horseshoes and calks | 6 | 4 | 10 |
| Forgings, n.e.s.: | | | |
| Not containing alloy | 1,322 | 2,006 | 3,328 |
| Alloy, incl. stainless | 180 | 287 | 467 |
| Total | 436,585 | 396,064 | 832,649 |
| Scrap, iron and steel | 232,800 | 185,653 | 418,453 |
| Scrap, tin plate | 419 | 449 | 868 |
| Tin plate circles, strips, cobbles, etc. | 454 | 326 | 780 |
| Waste-waste tin plate | 729 | 795 | 1,524 |
| *Terneplate clippings and scrap | 314 | 234 | 548 |
| Total scrap | 234,716 | 187,457 | 422,173 |
| GRAND TOTAL | 671,301 | 583,521 | 1,254,822 |
| Iron ore | 1,027 | 447 | 1,474 |

*New class.

# MEN of INDUSTRY

■ JOHN A. DILLON, former vice president in charge of eastern sales, Pittsburgh Screw & Bolt Corp., Pittsburgh, has organized the Standard International Sales Corp., New York Central building, 230 Park avenue, New York. The company will engage in export and domestic sales of steel and allied products, and in the domestic field will specialize in sales to railroads, car locomotive builders, ship builders and oil companies.

Mr. Dillon is president, and Norman Allderdice, vice president and secretary, and associated with them is a staff of men experienced in export and domestic steel sales.

Mr. Dillon, until the beginning of this year, had been with Pittsburgh Screw & Bolt 20 years.

♦

Jessel S. Whyte, president, Macwhyte Co., Kenosha, Wis., has been elected president, Kenosha Manufacturers' association.

♦

A. R. Niemoeller, 5817 Itaska street, St. Louis, has been appointed sales and service representative for Janette Mfg. Co., Chicago.

♦

Joseph Coudon Jr. has been elected a director, Wheeling Steel Corp., Wheeling, W. Va., replacing his father, deceased. His term expires in 1942.

♦

Lawrence P. Worcester, vice president and chairman of executive committee, Tubular Rivet & Stud Co., Wollaston (Boston), Mass., has been elected a director.

♦

Russell R. Morgan, treasurer, and assistant secretary and assistant sales manager, Cleveland Rock Drill Co., Cleveland, has been named to succeed the late George H. Hall as secretary and sales manager.

♦

Edward J. Schroeter has been elected president, Huber Mfg. Co., Marion, O. He will retain for the present his identification with Teachout Co., Cleveland, of which he is president and general manager.

♦

Joseph M. Franklin, former manager of the Holt, Ala., foundry of Central Foundry Co., has been named southern manager for the company in charge of its operations at Holt, Bessemer and Anniston, Ala.

♦

Frank R. Frost was re-elected president, Superior Steel Corp., Pittsburgh, at a meeting of directors March 26. Other officers re-elected are: Vice president, William P. Ewing; secretary-treasurer, N. K. Schaller; assistant secretary and assistant treasurer, C. D. Claney; assistant secretary, Donald M. Liddell. William A. Streich was elected assistant treasurer.

♦

L. M. Clegg, senior vice president, Thompson Products Co. Inc., Cleveland, has been promoted to executive vice president in charge of all plant and customer operations. He joined the company in 1919 after graduation from Case School of Applied Science; was made a junior salesman in 1922; two years later became sales manager; was elected vice president in 1928 and a director in 1935.

John A. Dillon

♦

Leo Harner has been appointed service engineer in the California territory for Porcelain Enamel & Mfg. Co., Baltimore. The past eight months he has been with the company in technical and service capacities.

♦

David T. Marvel has joined National Tube Co. as assistant manager of sales, Ellwood sales division, Ellwood City, Pa. He was formerly manager of tube sales, Timken Steel & Tube division, Timken Roller Bearing Co., Canton, O.

♦

G. V. Parkins, associated with McKeesport Tin Plate Corp., McKeesport, Pa., 37 years, and since 1936 president, has retired. He has, however, been re-elected a director and will continue in an advisory capacity. J. P. Fife, chairman of the board, has been named acting president, and Lewis M. Stevens, Philadelphia attorney, has been added to the board.

♦

Augustus K. Oliver has been named to succeed Alan M. Scaife as chairman of the board, Pittsburgh Coal Co., Pittsburgh. He has served on the board since 1920 and has been a member of the executive committee since 1924.

♦

Edwin K. Priest has been elected president and works manager, Moore Corp., Joliet, Ill. He was formerly president and general manager, Floyd-Wells Stove Co., Royersford, Pa. He succeeds Milo B. Hopkins, who has become chairman of the board.

♦

Charles G. Pyle, sales manager, Hygrade Lamp division, Hygrade Sylvania Corp., Salem, Mass., has established headquarters at the company's New York offices at 500 Fifth avenue. For several years he had been located at the company's Chicago offices.

♦

S. B. Applebaum, vice president and secretary, Permutit Co., manufacturer of water conditioning equipment, New York, has been elected a director. He has been with Permutit over 25 years, during many of which he was technical manager before becoming vice president.

♦

Lawrence E. Scrannage has been appointed general manager in charge of sales and operations, forging division, Catasauqua, Pa., of the Phoenix Mfg. Co., Joliet, Ill. From 1934 to 1938 Mr. Scrannage was operating superintendent, Cleveland Hardware & Forging Co., Cleveland, and in 1939 entered the field of consulting engineering, specializing in factory management and operation. He attended Tufts and Massachusetts Institute of Technology, after which he joined the forging division of Remington Arms & Ammunition Co., Bridgeport, Conn. He then joined Scovill Wellington Co., and for duration of the World war was shop superintendent at the Philadelphia navy yard. After the war he resumed industrial engineering

at the Sheldon Axle Works, Willys-Overland Co., Toledo Machine & Tool Co., and Trundle Engineering Co.

♦

Yale D. Hills has been named assistant general manager, service-sales division of Timken Roller Bearing Co., Canton, O. Associated with Timken since 1919, Mr. Hills has filled various positions in the general office and in the field. The past nine years he has held managerial positions on the West coast, recently returning to Canton as supervisor of distributors.

J. F. Cornell, branch manager of the Minneapolis branch, service-sales division, has become special representative, with headquarters at Canton. Mr. Cornell will be replaced at Minneapolis by J. P. Roberts, heretofore a salesman with the Pittsburgh office.

♦

Foster N. Perry has been appointed general sales manager, American Bosch Corp., Springfield, Mass. He joined the company in 1924, serving successively at the main plant and as sales manager, New York division, and more recently as sales manager, western division, Chicago. He is a member, Society of Automotive Engineers.

A. C. Altree, with the corporation many years, as sales manager at Springfield, San Francisco and Chicago, has become sales manager, western division.

The company has established new branch offices in Cleveland and San Francisco, with Frank Oberle as sales manager at Cleveland, and Maynard A. Fowler, sales manager, Pacific Coast division.

Fred Behrens, heretofore sales engineer at Chicago, has been made service manager, with headquarters at Springfield, and George H. Cherry, at present sales engineer at Detroit, has been made sales manager, Canadian division.

# Died:

■ GEORGE E. HAMMANN, 73, president, treasurer and general manager, Progressive Mfg. Co., Torrington, Conn., March 18 in that city. He had been associated continuously with the Progressive firm about 36 years. Born in Martinsburg, W. Va., he was secretary of the National Cycle Board of Trade before going to Torrington in 1899 to join the Eagle Bicycle Co., which later became a part of Progressive. At that time he was made secretary and treasurer. Mr. Hammann was an active figure in civic affairs in Torrington, and served several years as a judge in the city court.

**R. E. Clingan**

Chicago district sales manager, Jones & Lamson Machine Co., Springfield, Vt., whose death was noted in STEEL, March 25, page 28

♦

Harry A. Rivers, 47, president, Boston Pipe & Fittings Co., Cambridge, Mass., March 16 in Newtonville, Mass.

♦

Joseph W. King, 49, the past four years traffic manager, Phelps Dodge Corp., New York, March 25 at his home in Paterson, N. J.

♦

Guy S. Warren Sr., 55, vice president, William H. Keller Inc., Grand Haven, Mich., manufacturer of precision tools, March 23 in Ann Arbor, Mich.

♦

George Washington Hughes, 78, for 30 years a pig iron inspector for Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., until his retirement 15 years ago, in that city, March 19.

♦

Fred W. Wagner, 46, chief chemist at the coke plant of Jones & Laughlin Steel Corp., Pittsburgh, March 27. He had been identified with Jones & Laughlin 20 years.

**G. E. Hammann**

♦

Cyrus F. Mackey, 69, former vice president and general manager, Franklin Steel Works, Franklin, Pa., in St. Petersburg, Fla., March 21. He retired about 12 years ago.

♦

Duncan J. Campbell, 73, for several years vice president and general sales manager, Dodge Mfg. Co., Mishawaka, Ind., March 22 in that city.

♦

Oliver Johnson, 71, founder and former president of Wheeling Can Co. and Johnson-Morse Can Co., Wheeling, W. Va., Feb. 26. The companies now are subsidiaries of Continental Can Co., New York.

♦

Alexander Gibson, 41, machine tool salesman in the Cleveland office for Brown & Sharpe Mfg. Co., Providence, R. I., March 20 in Cincinnati. He had been with the Cleveland office since its establishment in 1929.

♦

Howard B. Loxterman, 57, a vice president and director, Blaw-Knox Co., Pittsburgh, in that city, March 28. He had been active with Blaw-Knox since its formation in 1906. Mr. Loxterman formerly served as secretary.

♦

J. E. Hughes, 46, sales engineer, Aetna-Standard Engineering Co., Youngstown, O., March 19. Mr. Hughes joined Aetna-Standard in May, 1931, and before that was employed in a sales and engineering capacity with Woodard Engineering Co. and Youngstown Sheet & Tube Co.

♦

Denton K. Swartwout, 78, chairman of the board, Swartwout Co., maker of industrial ventilating and power plant equipment, Cleveland, at his home in Shaker Heights, O., March 22. He founded the company about 1901 and was its president until four years ago. Mr. Swartwout was a past president, American Supply and Machinery Manufacturers association.

♦

James Criswell, 81, president, James Criswell Co., Pittsburgh, and well known for his work in design and construction of heating and melting furnaces, at Pittsburgh, March 22. For 45 years Mr. Criswell was general superintendent of construction for S. R. Smythe Co., Pittsburgh. In 1927 he formed the James Criswell Co. to engage in engineering and contracting work on open hearth, soaking pits and heating furnaces.

# Windows of WASHINGTON

By L. M. LAMM
Washington Editor, STEEL

*WASHINGTON*

■ NATIONAL labor relations board situation was complicated again last week by publication of a report regarding its administrative machinery by the special house committee which has been investigating the labor act's administration. Report disclosed the investigators felt the board's administration was "ineffective."

J. Warren Madden, board chairman, then stated that only by increasing the staff could work be done more expeditiously. Especial attention was given in the report to work done under direction of Nathan Witt, board secretary. His work was recently severely criticized by William M. Leiserson, board member.

Mr. Madden called the report "excellent."

"There was nothing whatever in the report which reflected anything more than a recommendation that if the board were willing to make a large increase in the staff for handling the case work from the field and supervision of the field, the work could be more expeditiously and satisfactorily done," he said.

### COURT LIMITS PATENT HOLDERS' PRICE CONTROL

United States Supreme Court ruled last week that holders of patents may not extend control over their products beyond sale to jobbers and may not fix resale prices. Department of justice officials state this decision greatly increases its power in its fight on monopoly.

Court held that Ethyl Gasoline Corp. has exercised an unlawful control over gasoline prices through a patent monopoly. Justice department officials assert court's decision extends beyond the oil industry and will strengthen the former's hand in action against other industries.

Decision holds patent owners are forbidden to employ patent pools to control their products after more than one sale. Distinction between a basic patent giving holder a legal monopoly on use of his products and subsidiary patents which would be worthless without the original invention or discovery was set up.

### SEES NO IMMEDIATE HOPE FOR UNEMPLOYMENT DECREASE

Corrington Gill, assistant works progress administration commissioner, said here last week business expansion prospects indicate industry cannot absorb a majority of the country's unemployed within 5 years.

"We are going to have a serious unemployment problem on our hands for a considerable time to come," he said. "It is better, not only for the unemployed but for the country as a whole, that we recognize this fact and make our plans accordingly."

Business, he said, re-employed about 8,500,000 between 1933 and 1939.

Since 1929, however, our labor supply has annually increased by 600,000 for a total of 6,600,000, as a result of normal population growth and shifting age structure.

To these 6,600,000 must be added 1,500,000, representing decrease in total employment from 1929 to 1939 and 2,000,000 estimated unemployed in 1929, he said.

"It is not now a question of recovery," he stated. "We recently recovered to the 1929 level of activity. What we need is expansion far beyond the levels of any earlier period."

### REDUCED ALUMINUM PRICES LOWER COST OF AIRCRAFT

Mass production in American aircraft industry has enabled manufacturers to reduce contract prices, Louis Johnson, assistant secretary of war, said last week.

Aluminum Co. of America, Pittsburgh, Mr. Johnson declared, has lowered its general price schedule. Aluminum ingots for all purposes were reduced 5 per cent, and price of fabricated aluminum for airplanes will be decreased even more as result of mass buying.

Reduction in prices will lower cost of aluminum sheet for army aircraft $340 per plane, and both motor and fuselage costs will be reduced.

Aluminum Co. said reduction was made possible in part by economies resulting from standardization of materials, operating improvements and quantity production orders for aircraft industry.

### RAILROADS' STEEL PURCHASES TOTAL $273,968,000 IN 1939

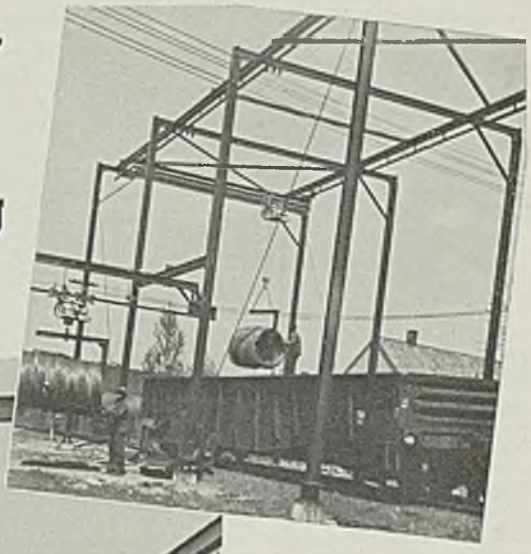
Class I railroads, in 1939, purchased iron and steel products totaling $273,968,000, a $121,792,000 increase over $152,176,000 in 1938, according to Association of American Railroads.

Locomotive and car castings, beams, couplers, frames and car roofs purchased totaled $39,587,000, compared with $22,221,000 in preceding year. Purchases of steel rail, new and second-hand, except scrap, totaled $38,339,000, against $23,742,000 in 1938. For materials used in laying of rails, the railroads expended $34,736,000, an increase of $18,389,000 over preceding year.

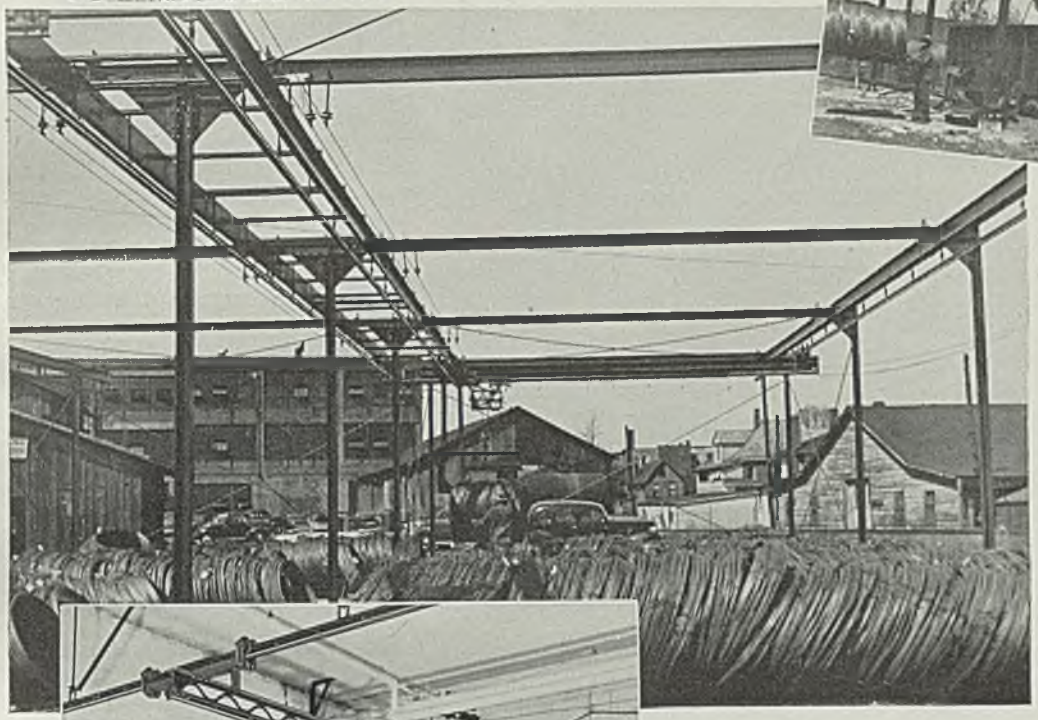
Wheels, axles and tires purchased cost $25,799,000, compared with $16,691,000 in 1938. Bar iron and steel, spring steel, tool steel, unfabricated rolled shapes, wire netting and chain, boiler, firebox, tank and sheet iron and steel expenditures amounted to $21,963,000, compared to $7,910,000 in previous year. Purchases of interlocking and signal material totaled $12,089,000; standard and special mechanical ap-

# "Saves 32c per ton!"

## in handling cost - - -

*Two men unload car of rod in 1½ hours with crane and electric hoist.*



*Cranes provide 6000 sq. ft. of low-cost storage area served by electric hoists.*

*Light duty crane reduces inside storage area. Hoist conveys coils to punches and cold-headers.*

Unloading and storing coiled rod from box cars formerly cost 40c per ton and required 5500 sq. ft. of warehouse space.

Now, raw coils are unloaded from gondolas, stored outside and handled through pickling to punches and cold-headers at 8c per ton.

### A Clear Saving of 32c per Ton Made Possible by Overhead Handling

Innovations, such as a turntable for transferring coils between hoists, develop in conference with American MonoRail engineers.

Their wide experience in nearly every industry often reveals profit producing possibilities where least expected. Consultation is offered without obligation.

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13102 Athens Ave. Cleveland, Ohio

pliances for locomotives, $10,433,000.

Railroads expended $9,015,000 for frogs, switches and crossings, and parts of same in 1939, compared with $4,769,000 in 1938. Iron bridge, turntable and structural steel expenditures totaled $2,523,000, compared with $2,451,000. Purchases of forgings and pressed steel parts for locomotives amounted to $2,953,000, against $2,045,000 in 1938, while purchases of car forgings, iron and steel, and fabricated or shaped steel totaled $13,030,000, compared with $4,221,000. For flues and tubes for locomotives and stationary boilers railroads expended $4,541,000; in previous year, $2,213,000.

Expenditures for bolts, nuts, washers, rivets, lag screws, pins and studs aggregated $9,412,000; in 1938, $3,961,000. Locomotives and car springs purchased in 1939 totaled $2,996,000, compared with $1,612,000 in 1938. Track and roadway tool expenditures totaled $5,925,000, against $3,769,000 in preceding year.

For machinery and repair parts, including all power driven shop machinery, railroads spent $2,803,000 in 1939 and $2,303,000 in 1938. Expenditures for machinery, boilers, repair parts and all other iron and steel products totaled $7,215,000, compared with $4,899,000. Purchases of pipe and fittings totaled $5,387,000; in 1938, $2,559,000. Hand- and small machine tool expenditures totaled $6,181,000, compared with $3,114,000 in 1938.

Capital expenditures for equipment, other improvements to railway property totaled $262,029,000 in 1939, association states. This was an increase of $35,092,000 over such expenditures in 1938, but $247,764,000 less than in 1937.

Of total 1939 capital expenditures, $133,388,000 was for locomotives, freight and passenger cars and other equipment, $128,641,000 for roadway and structures. Capital expenditures in 1939 for equipment were $17,980,000 greater than in 1938, but $189,489,000 below 1937. For roadway and structures, expenditures in 1939 were $17,112,000 greater than 1938's, but $58,275,000 less than in 1937.

Among capital expenditures for roadway and structures made in 1939 was $26,389,000 for heavier rail, compared with $17,247,000 in the preceding year. Railroads spent $21,196,000 for bridges, trestles and culverts in 1939, compared with $18,231,000 in 1938. They also expended $10,459,000 for yards and sidings last year.

## PITTMAN TRADE AGREEMENTS ACT AMENDMENTS DEFEATED

Senate administration leaders late Friday won a decisive victory for trade agreements program continuation when they defeated the Pittman amendment requiring senate ratification of trade pacts.

Administration spokesmen had asserted adoption of the amendment would have killed the entire reciprocal trade program's value. White House officials had indicated bill's passage through senate would have resulted in resolution's veto by President Roosevelt. It is predicted resolution will reach Mr. Roosevelt for signature this week.

Resolution, as it stands, extends trade agreements for a 3-year period from June 12, has already passed house. Western Democrats and Republicans had concentrated efforts on passage of the Pittman amendment.

## BROOKINGS STUDY REPORTS IMPROVING LABOR RELATIONS

Labor relations in the automobile industry appear to be gradually improving, as experience in collective bargaining is gained, according to a study completed at Brookings institution. Study was made by Prof. William H. McPherson, on leave from Oberlin college, Oberlin, O., where he is assistant professor of economics.

Report is based on extensive field work, including many conferences with union officials, officers of employers' associations, and personnel managers. Study covers makers of parts, bodies, and tools and dies, as well as actual manufacturers of motor vehicles. Among subjects discussed are collective agreements, hours, grievance procedure, strikes and boycotts, wage rates, profit sharing, wage differentials, productivity and others of importance in employer-employe relations.

Group of companies which have accorded whole-hearted acceptance to the union, though small, is increasing, report says. While most managers are reluctant to grant new concessions to the union, nearly all are apparently making a very sincere effort to assure successful functioning of agreements they have signed. Union is also growing more responsible, is making a greater effort to observe contracts.

Working hours have been noticeably shortened since advent of unionism, but the author points out this change would have taken place anyway as a result of federal legislation. Wage structure has been considerably altered. Extra pay for overtime and for night shifts has been introduced and use of piece rates sharply curtailed.

Hourly earnings have been greatly increased, but the author finds it impossible to determine how much of this rise has been due to influence of the union, inasmuch as the trend of wages in this industry has been steadily upward, interrupted only by depression. Apparent fact that wage differentials between organized and unorganized plants are now much greater than contrasts between same plants in pre-union times, indicates, however, that the union has probably been responsible for some increase in general level, author says.

## LABOR UNIONS HELD SUBJECT TO ANTITRUST LEGISLATION

Justice Peyton Gordon, district court, District of Columbia, last week rendered a decision sustaining an indictment against American Federation of Labor teamsters union officials. Indictment resulted from dispute with operating engineers over allocation of work and which tied up large government building projects here several months ago. Justice Gordon held labor unions are subject to the Sherman antitrust act.

Giving an important victory to the government in the current antitrust drive against building industry, Justice Gordon overruled a demurrer to the indictment and denied a motion to quash the accusation. It was the first time the Sherman act had been invoked against tieups flowing from interunion wrangles.

## GOVERNMENT WALSH-HEALEY PURCHASES TOTAL $1,422,544

During week ended March 16, government purchased $1,422,544.81 worth of iron and steel products under the Walsh-Healey act, as follows: National Electric Products Corp., Pittsburgh, $105,127; Republic Steel Co., Massillon, O., $19,797.56; United States Steel Export Co., Washington, $48,082.40.

United States Pipe & Foundry Co., Chicago, $12,658.97; Ohio Seamless Tube Co., Shelby, O., $52,040.24; Sharpsville Steel Fabricators Inc., Sharpsville, Pa., $84,700; Lukenweld Inc., Coatesville, Pa., $39,504.

Stupp Bros. Bridge & Iron Co., St. Louis, $110,990; Bethlehem Steel Co., New York, $55,200 (estimated); Service Tool & Engineering Co., Dayton, O., $18,968.80; Bunell Machine & Tool Co., Cleveland, $14,634.30; Steel Products Engineering Co., Springfield, O., $11,944.80.

Service Machine Co. Inc., Elizabeth, N. J., $39,648; Chas. Fischer Spring Co., Brooklyn, N. Y., $103,119.20; Bethlehem Steel Co., Bethlehem, Pa., $378,425.80; Babcock & Wilcox Tube Co., Beaver Falls, Pa., $11,701.34.

M. K. Epstein Co., Springfield, Mass., $14,300; Gary Steel Products Corp., Norfolk, Va., $20,839.40; Baldt Anchor Chain & Forge Corp., Chester, Pa., $172,500; Lakeside Bridge & Steel Co., Milwaukee $84,423, and Pfaudler Co., Rochester, N. Y., $23,940.

# AVIATION

### METALS CONTRIBUTE TO AIRLINE SAFETY RECORD

■ COMPLETION last week of one year of flying by United States commercial airlines without a fatal accident marked a historic achievement which will do much to increase public confidence in air transportation and further encourage air travel.

In the year ended March 26, planes traveled 87,325,145 miles, carried 2,028,817 passengers. Many factors contributed to the safety record. They include more cautious and conservative operating policies by airlines, increased experience, improved radio and navigation instruments, improved airway facilities and weather reporting and greater co-operation between air carriers through the Air Transport association.

A less publicized but fundamental factor is the constant improvement in metals, heat treatment and construction methods which has done much to permit operation at higher speeds with a greater margin of safety.

Higher speeds and larger planes have placed great stresses on structural members. For normal flight a plane may be designed to have a safety factor of five to keep normal stresses well below fatigue limits. (Safety factor is ratio of maximum load a member will carry to normal expected load.) Due to stresses from storms, air disturbances, landing impacts this margin is seldom held, average safety factor probably running from two to four.

The fatigue limit of a metal is that value of stress above which repeated stressing will induce fatigue failure. In some light nonferrous alloys now commonly used, this point is one-third the yield strength.

Contribution of stainless steel to safety in aircraft can be grasped best by considering that its fatigue limit is two-thirds of the yield strength. Under same stress, stainless steel has a safety factor double that of light alloys. In other words, stainless steel has twice the fatigue limit of lighter alloys if yield point is the same in both materials.

Owing to its retention of strength at elevated temperatures, stainless steel also has come into favor as a fire wall between engine and plane, thus greatly reducing fire hazard to plane in case of a fire in the engine. Seamless steel tubing is used for all liquids passing through fire wall.

Greatest fire hazard in an engine is the possibility of an oil pipe bursting and spraying oil over the hot exhaust manifold. Because of its strength and resistance to vibration, stainless steel is used in flexible oil hose.

#### Structure Sizes Reduced

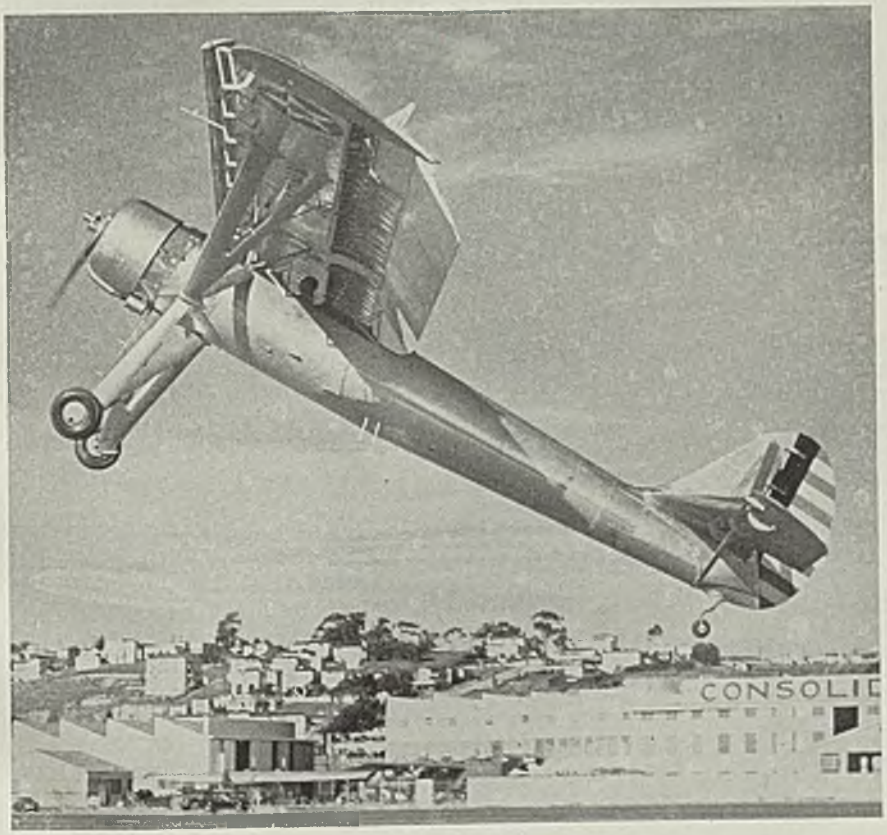
Stainless steel also has permitted planemakers to design "closed" structural members with no fear of corrosion occurring inside of member. Thus structures have been reduced in size and increased in strength.

Before advent of modern sodium-cooled stainless steel exhaust valves, 300 hours was considered life of a valve, and there were many motor failures in flight. Today valves have operated more than 5000 hours without failure. Dependability of engines has greatly increased with dependability of valves.

With larger planes and higher landing speeds, landing gear had to be made stronger in proportion to its weight. Heat treatment has progressed to where a tensile strength of 225,000 pounds per square inch can be imparted to steels such as SAE X4130, SAE X4340 now used to make hydraulic landing struts.

Increasing use of "stressed skin" fuselage construction has directed attention to riveting speed and its effect on fatigue failure. Although determination of riveting speeds depends on individual analysis, life of rivets has been lengthened in many instances by reducing blows per minute from 5000 to below 2500 and down to riveting with one blow. Large number of fast blows tends to stress rivet beyond elastic limit and decrease its fatigue resistance.

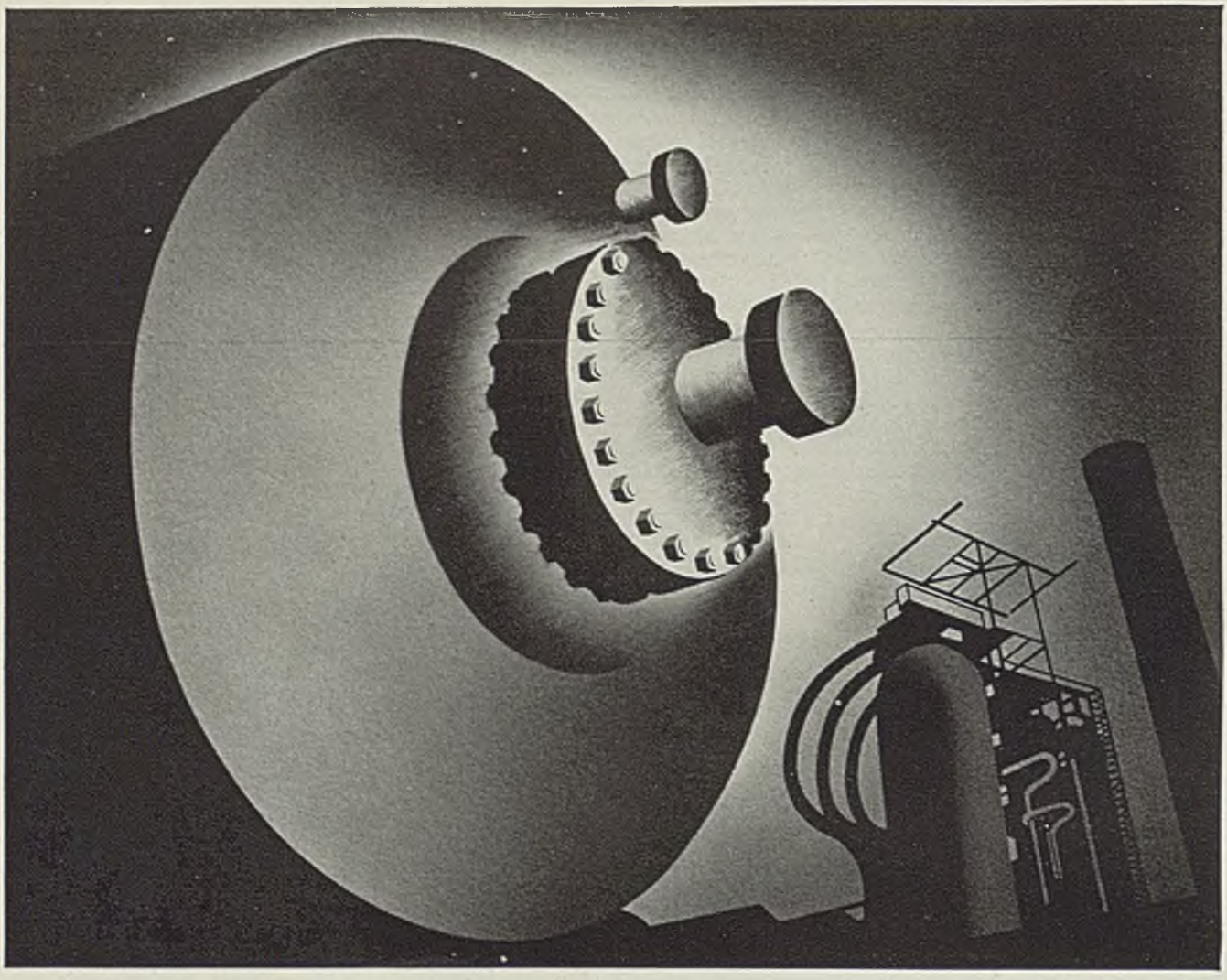
## Flying "Motorcycle" for Army



■ Capable of an unprecedented range in speed from an almost complete hover in mid-air to fast straight flying, this Ryan YO-51 "Dragonfly" will be used as a short range observation plane by the United States army air corps. Plane is said to take off and land at 60 degree angles and to stop within 10 feet after touching ground. Wing is slotted type with flaps which can be retracted into wing or extended to greatly increase wing area in take-off or act as landing air brake. Wing span is 50 feet, length of plane is 35 feet. Photo, courtesy Ryan Aeronautical Co., San Diego, Calif.

## Bar Mill Wage Steady

■ Monthly settlement of bar mill wage base by Western Bar Iron association and Amalgamated Association of Iron, Steel and Tin Workers last week developed a card rate for April on boiling, bar and 12-inch mills at 2.15c; on guide and 10-inch mills, 2.25c. Rates have been unchanged since June, 1939.



# HOLDING WHERE IT'S HOT

What with temperatures ranging up to 1000° F. and high stresses, the bolts used in much oil refinery equipment have no sinecure — and the failure of a single bolt may cause plenty of trouble.

That is why Chromium—Molybdenum (SAE 4140) steel is being more and more widely used for high temperature bolting on reaction chambers, pumps, etc.

This steel meets ASTM Specifications A 193-37 T. At the elevated temperatures encountered it has all the requisite physical properties, including good creep strength.

Chrome-Moly (SAE 4140) and other Molybdenum steels are meeting many of the special problems of refinery service with dependability and economy. These steels and their applications are described in our technical book, "Molybdenum in Steel". A copy will be sent free on request to any interested production executive or engineer.

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MOLY



STEEL

# Mirrors of MOTORDOM

By **A. H. ALLEN**
Detroit Editor, STEEL

*DETROIT*

■ FIRST quarter of the 1940 business pie has been sliced away and devoured. Automobile manufacturers found it a highly delectable morsel, what with factory sales of 449,314 units in January, 403,627 in February and an estimated 438,500 in March bringing the three-month total to 1,291,441 cars, trucks, road tractors and commercial vehicles in the United States and Canada. This is about double the first-quarter total for 1938 and well ahead of the 1,063,977 units produced in the period last year. It is nearly on a par with the three opening months of 1937 when March output zoomed to 519,022 to bring the quarter's total to 1,302,108. No other comparable record has been made except for the banner year of 1929, when the first three months poured out 1,546,319 units for a new high.

### February Sales at Peak

While the roseate statistics of auto output are encouraging there is nonetheless a sourish taste to the general business dish at the moment. In steel circles not much prospect is seen of any substantial buying to fill out 1940 programs. Scrap markets have been depressed for weeks, and dealers are inclined to the belief the only thing to snap the market out of the doldrums would be a good shot of war alarms from Europe which might stimulate renewed steel buying as it did last September.

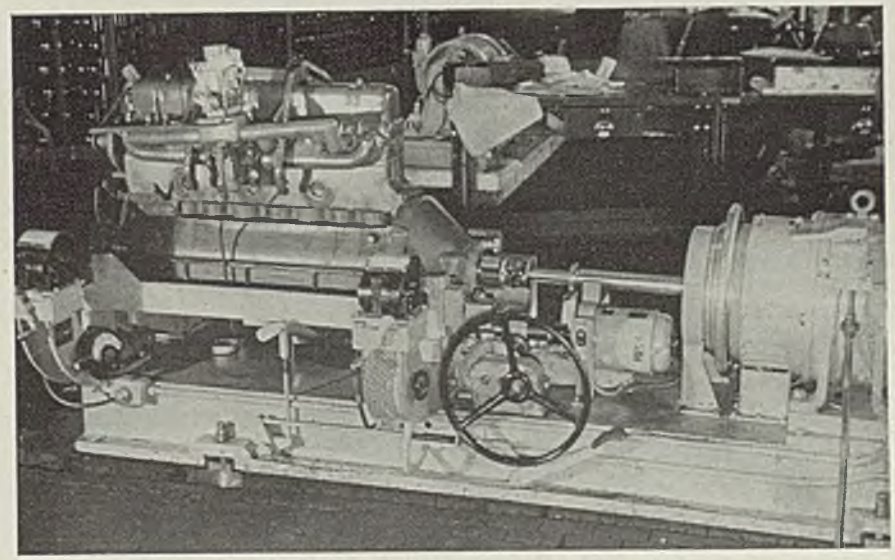
Automobile Manufacturers association points out that retail sales (not to be confused with factory sales to dealers) of passenger cars in February were higher than in any other February in history, and truck sales were higher than any save February, 1937. Here are figures on combined car and truck retail sales over the past year, with percentage increase for each month over the previous year:

| | | Percentage gain |
|---|---|---|
| 1939 | | |
| 2 mos. | 419,524 | 35.9 |
| Feb. | 201,646 | 34.6 |
| March | 330,880 | 45.1 |
| April | 311,480 | 36.0 |
| May | 323,193 | 45.0 |
| June | 301,911 | 58.9 |
| July | 280,832 | 47.6 |
| Aug. | 210,304 | 33.4 |
| Sept. | 169,456 | 45.2 |
| Oct. | 277,864 | 82.4 |
| Nov. | 303,204 | 11.6 |
| Dec. | 315,630 | 13.6 |
| Year | 3,244,278 | 38.4 |
| 1940 | | |
| Jan. | 285,273 | 30.9 |
| Feb. | 283,973 | 40.8 |
| 2 mos. | 569,246 | 35.7 |

Note that sales for January and February totaled 569,246, against actual output of 852,941, leaving a difference of 283,695 to apply against unfilled orders and dealers' stocks. There are some grounds for belief that current dealers' stocks are building up to a fairly high level, in anticipation of normally improved buying in April, May and June.

■ PACKARD'S contribution to the navy department's experiment with a "poor man's navy" is in the form of 1200-horsepower V-12 engines, three of which will be used to power each of the 23 torpedo boats now

## Measures and Locates Unbalance in Engine



■ Unbalance in Buick engines is quickly measured and located by this machine using a mechanical oscillograph to register amplitude of vibration and flywheel angle. In testing, engine is rotated over a wide range of speed by a 15-horsepower direct-current motor equipped with a variable speed drive. Corrections for balance are made by drilling into heavy side of rotating member with drill mounted on stand. Photo courtesy Reliance Electric & Engineering Co., Cleveland

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POLITECHNIKI

under construction by Electric Boat Co., Groton, Conn. Contract calls for 80 to 100 of these high-power engines, a few of which already have been built, with more scheduled for completion within six weeks.

The engines are an adaptation of the V-12 Packards used by Gar Wood in his boats in the Harmsworth Trophy races and are described as the "typical Packard marine and aircraft engine," with individual steel cylinders and welded-on stainless steel water jackets, bolted to a heat treated cast aluminum alloy crankcase. Bore is 6½ inches, stroke 6⅜ inches. Pistons are of forged aluminum alloy, connecting rods and crankshaft of forged alloy steel.

Displacement of this engine is 2500 cubic inches and, without supercharger it is rated at about 800 horsepower at 2500 r.p.m. With supercharger this is stepped up to 1200 and a maximum of 1350 for emergency. Overhead valves are carried in a valve housing and are operated through forged steel camshaft driven through gearing from the crankshaft. Connecting rod bearings are of the copper-lead type.

Complete with reverse gear and accessories, the engines will cost around $18,000 each. Packard will produce practically all integral parts in its own plants except for carburetors, ignition, certain gearing and other parts. Recent government contract for around $2,000,000 included funds for experimental work with seven other types of engines, one of which is believed to be the Skinner sleeve-valve liquid-cooled plant for aircraft.

### "Suicide Fleet" Being Built

Torpedo boats or the "suicide fleet" are frankly a navy experiment, according to Walter Davenport, writing in a recent issue of *Collier's*. The type being built in this country was designed by an Englishman, Hubert Scott-Paine, who sold American rights to Electric Boat. The latter built a $750,000 plant at Bayonne, N. J., for building the new boats which cost about $218,000 each. Built along speedboat lines, the craft range in length from 59 to 81 feet, will make 40 knots in high seas and will carry four torpedo tubes, two machine guns, a crew of six or eight and, except for the engines, that is about all. They are part of a $15,000,000 trial program urged on the navy department by President Roosevelt and the Secretary of the Navy.

Army orders for 3365 Dodge trucks have been received by Chrysler Corp., bringing the total of army purchases from Dodge in the last few months to 10,786. The newest order covers two types—½-ton units on 116-inch wheelbase, and 1½-ton units on 133-inch wheelbase. Body styles include reconnaissance design, tarpaulin covered type for general transport, tarpaulin covered with special winch in front of the engine and dump body with closed-in cab. All have four-wheel drives with transmissions so designed that when desired the front wheel drive can be cut out. Both types must be able to maintain top speed of 45 m.p.h. and the light trucks must be able to negotiate a 60 per cent grade in low gear with 1000-pound load, heavier trucks the same grade with 3000-pound load.

Sharply contrasted with the spectacularly large Packard engines just referred to is a new diminutive power plant shown for the first time at the Toy Fair in New York last week by Syncro Devices Inc., Detroit. The engine has been designed to power toy racing cars and develops 1/7-1/6 horsepower, weighing just under 5 ounces. Bore is 13/16-inch, stroke 9/16-inch, displacement 0.29-cubic inch. With only five major parts in the entire assembly, the unit is ingeniously designed, entire cylinder, bypass and manifold assembly being a single permanent mold aluminum alloy casting, held by two bolts to the aluminum die cast crankcase. Gas tank is of transparent plastic. Stainless steel and fiber commutator ring replaces the usual cam-controlled contact points for supplying spark.

## Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

| | 1938 | 1939 | 1940 |
|---|---|---|---|
| Jan. | 226,952 | 356,962 | 449,314 |
| Feb. | 202,597 | 317,520 | 421,820 |
| March | 238,447 | 389,495 | ..... |
| April | 237,929 | 354,266 | ..... |
| May | 210,174 | 313,248 | ..... |
| June | 189,402 | 324,253 | ..... |
| July | 150,450 | 218,494 | ..... |
| Aug. | 96,946 | 103,343 | ..... |
| Sept. | 89,623 | 192,678 | ..... |
| Oct. | 215,286 | 324,688 | ..... |
| Nov. | 390,405 | 368,541 | ..... |
| Dec. | 406,960 | 469,120 | ..... |
| Year | 2,655,171 | 3,732,608 | ..... |

Estimated by Ward's Reports

| Week ended: | 1940 | 1939† |
|---|---|---|
| Mar. 2 | 100,855 | 78,705 |
| Mar. 9 | 103,560 | 84,095 |
| Mar. 16 | 105,720 | 86,725 |
| Mar. 23 | 103,395 | 89,400 |
| Mar. 30 | 103,370 | 85,980 |

†Comparable week.

| | Week ended Mar. 30 | Mar. 23 |
|---|---|---|
| General Motors | 45,790 | 45,990 |
| Chrysler | 25,330 | 20,510 |
| Ford | 20,750 | 23,100 |
| All others | 11,500 | 13,795 |

Interest in gasoline-powered racers is of comparatively recent origin, but already clubs are being formed in leading cities to promote building and running of the tiny speedsters. Complete kits for building the cars sell for as little as $10 or $15, without engine, the latter usually costing about the same amount. Syncro Devices is developing a new racing car kit to sell for $12.50, requiring only four bolts for assembly and made up chiefly of aluminum castings.

The small power plants have been built for several years to install in model airplanes and motor boats, but their use in racing cars is counted on to open a broader market for their sale. A dozen or more companies are engaged in their manufacture.

■ WORK of Count Alexis de Sakhnoffsky in the field of motor car design is well known through his sketches in *Esquire*, his designs for White Motor Co. and elsewhere. Shortly to appear is a new sports roadster of his design and bearing his name. He is working in co-operation with Nash in the project. The company supplies him with its Ambassador 8 convertible model more or less "in the white" and he tears it down and rebuilds the body according to his own concepts. Top and doors are cut off and lowered. Moldings are removed and body lines reworked to give a lower and more rakish effect, suggestive of Lincoln Zephyr's continental cabriolet, recently introduced.

### Sport Model on Market Soon

Sakhnoffsky's creation will sell for about $2600, it is understood around Detroit, and initial plans call for building 20 of them, in a Chicago plant. One has been finished, it is reported, and Nash dealers soon will receive specially prepared literature describing the new custom product.

Reshuffling of forging and stamping requirements for Buick, Olds and Pontiac models in 1941 is now in process. Already mentioned here has been the new forge shop which Olds is planning to build at Lansing. Now, reports are to the effect rear fender stampings for Olds and Pontiac, currently supplied by Buick, will be produced for 1941 models at Lansing and Pontiac, respectively, and Olds cylinder blocks will be supplied by the Pontiac foundry, instead of by Buick. Both Olds and Pontiac produce their own front fenders and in the past have made rear fenders, but for three years they have been produced at Buick, probably because of savings on die costs possible.

# ENDURANCE

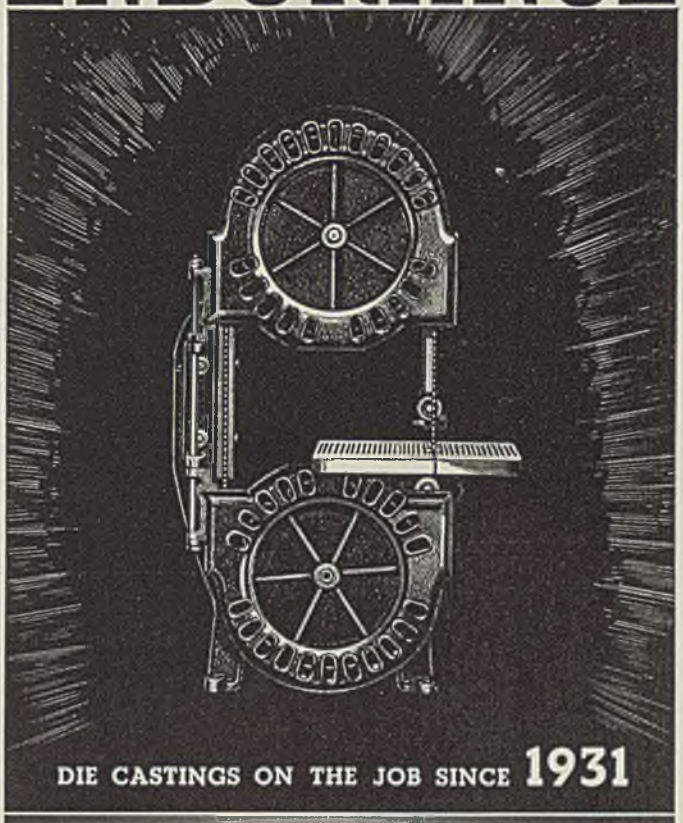
## DIE CASTINGS ARE TOUGH

● Machine tools have a tough existence. The battering and constant use to which they are subjected are a real test for the materials used in their construction. The designers of this 1931 model band-saw knew this when the unit was being planned—knew it when they specified ZINC Alloy Die Castings for many of the parts.

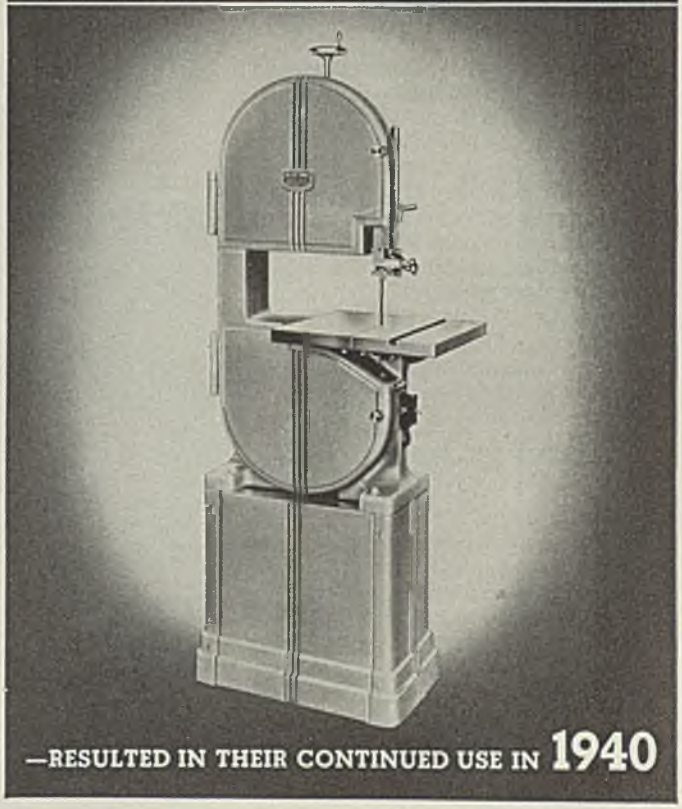
Although this early model represented the company's first use of die cast parts, the judgment of the engineers has been upheld by unusual service records over a period of nine years. The fact that the latest model band-saw continues to employ nine ZINC Alloy Die Castings is a strong endorsement for this modern metal and production method.

This is the fourth advertisement in a series* designed to illustrate the widespread acceptance and increased use of ZINC Alloy Die Castings in most of today's major industries. If you are not thoroughly informed on the physical and economic advantages offered with ZINC Alloy Die Cast parts, we suggest that you consult a commercial die caster—or write to The New Jersey Zinc Company, 160 Front Street, New York City.

*Copies of earlier advertisements in this series gladly mailed on request.



DIE CASTINGS ON THE JOB SINCE **1931**



—RESULTED IN THEIR CONTINUED USE IN **1940**

**ZINC**
**ALLOY DIE CASTINGS**

The Research was done, the Alloys were developed, and most Die Castings are made with

**HORSE HEAD SPECIAL** (99.99 + % Uniform Quality) **ZINC**

# MEETINGS

### PROGRAM IS ARRANGED FOR ELECTROCHEMISTS' MEETING

■ TECHNICAL sessions on electric steel and progress in electrodeposition, group breakfasts and luncheons, the annual dinner, and plant visitations are listed as highlights on the program for the seventy-seventh general meeting of the Electrochemical society at Galen Hall, Wernersville, Pa., April 24-27.

Among papers scheduled for presentation are: "The Electric Furnace in the Steel Foundry," by F. A. Melmoth, vice president, Detroit Steel Casting Co., Detroit; "Recent History of Certain Cobalt-Nickel Alloy Plating Solutions," by Louis Weisberg, consulting chemist and president, Louis Weisberg Inc., New York; "Improvement in Quality of Metal Deposits Due to Rotation of Cathode Applies Likewise to Metal Deposits by Displacement," by Roberto Piontelli, professor of electrochemistry, University of Milan, Italy; and "Structure of Heavy Electrodeposits of Copper and Nickel," by J. W. Cuthbertson, lecturer in electrometallurgy, Victoria university, Manchester, England.

### COAL GROUPS TO JOIN IN CONFERENCE IN ANN ARBOR

Twenty-fifth fuel engineering conference of Appalachian Coals Inc., Cincinnati, will be held jointly with the fourth annual coal utilization institute of the University of Michigan at Ann Arbor, Mich., April 22. The program is designed to cover a broad scope in coal utilization, and to appeal to industrial executives, power engineers, purchasing agents, coal distributors, and equipment manufacturers, as well as research men, educators, fuel engineers and engineering students.

### MANAGEMENT GROUP HOLDING ITS ANNUAL CONFERENCE

"Men at Work" has been made the theme for the fourth annual industrial conference of the Industrial Management society at the Chicago Towers (Medinah) club, Chicago, April 5-6. Under this subject, speakers will deal with the relationships between employes and their supervisors.

Among addresses scheduled are the following: "How Business and Economic Trends Affect Employment," by B. K. Elliott, vice president, Studebaker Corp., South Bend, Ind.; "Selecting the Right Man for Work," by Dr. H. A. Vonachen, Caterpillar Tractor Co., Peoria, Ill.; "The Doctor's Influence on Management's Labor Policies," by Dr. Otto P. Geier, Cincinnati Milling Machine Co., Cincinnati; "Governmental Control of Employe Relations," by Noel Sargent, secretary, National Association of Manufacturers, New York; and "How Multiple Management Works," by W. L. McGrath, president, Williamson Heater Co., Cincinnati.

### MANAGEMENT PROBLEMS TO BE AIRED AT CONFERENCE

Cleveland chapter, Society for the Advancement of Management, will conduct a spring conference at the Statler hotel, Cleveland, April 11-12. Speakers of national importance will speak upon getting the production job done, production costs, relations of government and business, the budget as an effective management tool, pricing the product to reach the market, keeping abreast of the worker's thinking, and public relations.

### INDUSTRIAL ADVERTISERS' CONFERENCE IN DETROIT

National Industrial Advertisers association has picked Detroit for its eighteenth annual conference, Sept. 18-20. Headquarters will be at Hotel Statler. The conference will be sponsored by the Industrial Marketers of Detroit, local chapter of the association, with the Toledo Industrial Advertisers club, Toledo chapter, as co-host. Major economic changes at home and abroad affecting industry make this year's meeting particularly important.

With the addition of Canadian chapters recently, the association has become international in character. Several domestic chapters also have been added in the past year, bringing the total to 20, and membership to over 1450.

### LARGE EXHIBIT FOR ANNUAL COAL MINING CONVENTION

Modernization of mining methods and equipment will be the theme of the seventeenth annual coal convention and exposition of the American Mining Congress in Music Hall, Cincinnati, April 29-May 3. Problems of lowering costs will share major attention with the industry's economic problems at convention sessions. Exhibits of 140 companies will tax facilities of the four exhibit areas.

### LISTS SPEAKERS FOR TOOL ELECTRIFICATION FORUM

Principal feature of the 1940 machine tool electrification forum to be held in East Pittsburgh, Pa., May 6-8, under sponsorship of Westinghouse Electric & Mfg. Co., will be the discussion of new electrical features and applications available to solve problems of the machine tool builder.

Roger S. Pyne, chief engineer, Van Norman Machine Tool Co., Springfield, Mass., will outline the application of electric drive and control for special-purpose grinding machinery. Problems of control, wiring and installation will be discussed by D. K. Frost, electrical engineer, Mattison Machine Works, Rockford, Ill.

Synchro-tie apparatus, the "electrical lineshaft" for keeping machine functions in step with each other, will be described in theory and application. Don Lee Hadley, Westinghouse consulting engineer, will demonstrate the principles of industrial design, applied to utilitarian motors and control apparatus.

### DATE ANNOUNCED FOR 1940 POWER SHOW IN NEW YORK

Dec. 2-7 has been established as the date for the fourteenth National Exposition of Power and Mechanical Engineering at Grand Central Palace, New York. Better known as the Power show, this biennial exposition brings together the product displays of over 300 leading manufacturers serving the power field, and is widely attended by power engineers, operating men and executives. Exhibit space already has been engaged by 90 per cent of the exhibitors in the last exposition in 1938. Indications are that the 1940 show will be the largest since 1930.

### MANAGEMENT GROUP TO DISCUSS MARKET METHODS

Annual marketing conference of the American Management association is to be held at Hotel Roosevelt, New York, April 24-25. The program will center on problems in dealing with sales personnel, methods of market research, and use of sales presentations. Under the heading of sales personnel, the conference will discuss selection, training and compensation of salesmen.

## Bethlehem Steel Rebuilds Lackawanna Bar Mill

■ To better co-ordinate its bar mill facilities, Bethlehem Steel Co. is moving the 12-inch bar mill at the Lackawanna plant, Buffalo, from its present location to a site south of the continuous sheet-strip mill in Hamburg turnpike.

Five new buildings, each 800 feet long and with total floor area of 400,000 square feet, will be erected at the new location. Rebuilding of the bar mill will not affect capacity or employment. Moving the 12-inch mill will provide finishing space for the bars produced on the 8 and 10-inch mills which will remain in their present location.

# Canadian First Quarter Auto Production at All-Time Peak

*TORONTO, ONT.*

■ CANADIAN automobile and truck production in Canada during the first quarter established an all-time record. High output to some extent was due to producers' desire to build up stocks for later delivery and to clear lines for production of trucks, lorries, tanks and other vehicles for war needs.

Canada's shipbuilding industry is assured of capacity operations for the next two years at least with orders already booked and other large contracts for merchant ships as well as for war craft are to be placed soon. During the week contracts were placed with Halifax Shipyards Ltd., Halifax, N. S., to convert the Canadian National steamship PRINCE DAVID into an armed merchant cruiser for the Canadian government at cost of $535,000; Burrard Shipyards Ltd., Vancouver, B. C., will convert the PRINCE ROBERT, into an armed cruiser at cost of $600,000.

Contracts totaling $37,500,000 have been placed with 12 shipbuilders in Canada for antisubmarine ships of the "whale catcher" type, while contracts for minesweepers to a value of $9,385,000 have been placed with three British Columbia yards.

In the province of Quebec five shipyards received orders for patrol vessels including: Canadian Vickers Ltd., Montreal, with contract amounting to $4,561,920; Marine Industries Ltd., Sorel, $3,991,680; Davie Shipbuilding & Repair Co., Montreal, $5,702,400; Morton Engineering Co., Quebec, $2,289,600; George T. Davie & Sons, Levis, $1,723,680.

### Shipbuilding Contracts Placed

Other companies receiving contracts were St. John Dry Dock & Shipbuilding Co., St. John, N. B., $1,749,600; Port Arthur Shipbuilding Co., Port Arthur, Ont., $4,665,000; Kingston Shipbuilding Co., Kingston, Ont., $1,723,680; Collingwood Shipyards Ltd., Collingwood, Ont., $4,561,920; Burrard Dry Dock Co., Vancouver, B. C., $2,604,960; Yarrows Ltd., Esquimalt, B. C., $1,956,960; Victoria Machinery Depot, Victoria, B. C., $1,956,960.

The minesweepers are being built by the North Vancouver Ship Repairs Ltd., North Vancouver, B. C., $4,017,600; Burrard Dry Dock Co., $4,017,600; Prince Rupert Dry Docks, Prince Rupert, B. C., $1,350,000.

Other contracts placed by the war supply board during the week had value of $2,148,320, the largest orders being for aircraft supplies totaling approximately $1,000,000. Contracts were placed as follows:

Naval stores—St. John, N. B., Iron Works Ltd., $10,710.

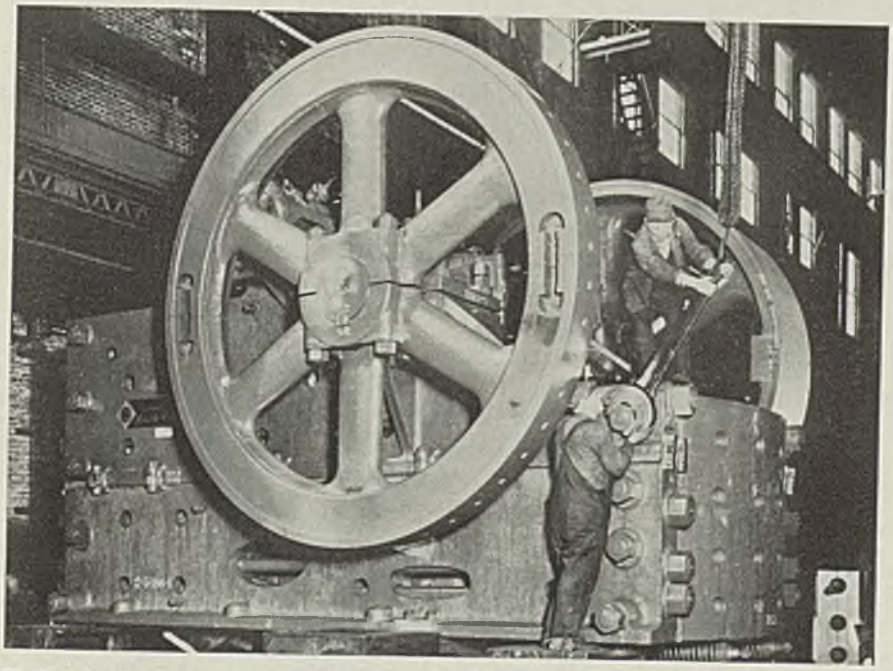
Mechanical transport — Metallic Roofing Co. of Canada Ltd., Toronto, $201,670; La France Fire Engine & Formite Co. Ltd., Toronto, $7189.

Aircraft supplies—Lockheed Aircraft Corp., Burbank, Calif., $428,313; Canadian Wright Ltd., Montreal, $316,678; British air ministry, $130,036; Canadian Vickers Ltd., Montreal, $15,356.

Machinery and tools—Grey Bonney Tool Co. Ltd., Ottawa, Ont., $18,792; Engineering Tool & Forgings Ltd., St. Catharines, Ont., $11,880; Vivian Engine Works Ltd., Vancouver, $8600; Silver Agencies Ltd., Halifax, $6560; Singer Sewing Machine Co., Toronto, $6238; The Canadian Fairbanks-Morse Co. Ltd., Ottawa, $3264.

Munitions — Dominion Engineering Co. Ltd., Montreal, $128,150; Hudson Bay Mining & Smelting Co. Ltd., Winnipeg, Man., $13,095.

## Will Crush Iron Ore in Far East



■ Three all-steel jaw crushers with 60 x 84-inch openings are being built by Allis-Chalmers Mfg. Co., Milwaukee, to be used on iron ore in the Far East. Each crusher weighs 225 tons. Flywheel in foreground is over 12 feet in diameter and weighs 14 tons. V-belt drive sheave on other side has 23 grooves, a pitch diameter of 147 inches, weighs 18 tons

## Builds New Foundry at Milling Machine Plant

■ Cincinnati Milling Machine Co., Cincinnati, has awarded contracts for construction of a new brick and steel foundry building, 400 feet wide and 660 feet long, on South street, west of the company's No. 2 plant. Plans call for the building to be completed by Oct. 1 and for equipment to be installed by Nov. 1, according to Frederick V. Geier, president.

Building will cover approximately six acres of floor space, will consist of high bay monitors with concrete roof-tile construction and cork insulated roof. Positive air circulation will provide effective heating and ventilation.

An enclosed roofed-over yard will be used to store pig iron, coke, sand and other raw materials.

Modern foundry equipment will provide for a continuous cycle of molding, pouring, shake out, cleaning and painting of castings. Equipment includes many developments in processing and operation applied for the first time to the kind of castings used in company's products.

Space for locker and shower rooms, a cafeteria, medical department and parking lot for employes will be provided. Adjoining the foundry proper will be pattern shop and pattern storage, structural steel welding and sheet fabrication departments.

# How To Handle the Young Man

■ RECENTLY a high school graduate "learner" at a large machine tool plant in the East complained to the general manager that his compensation, 45 cents an hour, was not sufficient to enable him to get along comfortably. He thought his rate ought to be increased.

"You think so," replied the general manager, "because you don't realize that as far as we are concerned you are a highly speculative investment. We are gambling with a large amount of money on the possibility that we may be able to convert some of you learners into competent machinists for the future—our future, we hope. As a matter of fact, you are not yet worth what we are now paying you."

Just how convincing this argument was to the "learner" this general manager is not at all sure, but it was made in all sincerity. In his own boyhood he could not afford to go beyond grammar school. Then for several years, in order to live while serving his own machinist apprenticeship, which to him represented a golden opportunity, he worked at a grocery store after shop hours which, incidentally, were ten hours a day, and also including all day Saturdays.

### "Learners" Must Realize Hard Work Is Only Avenue to Advancement

In his recent address before the American Society of Tool Engineers (STEEL of March 25, p. 22) Clifford S. Stilwell pointed out that the average young man of today is of softer stuff than his predecessor of a quarter-century ago. "I am definitely impressed that as young men seek positions in industry, either as graduates of universities or from technical high schools, they present themselves in an attitude of mind which is a definite handicap to their progress," said Mr. Stilwell.

The average employer knows that this generalization of a widely prevailing youth psychology is no exaggeration. What bothers him is that it prevails at a time when many manufacturers actually suffer from an acute shortage of skilled and semiskilled men and when many others, in the event of a sudden upsurge, for example, in the demand for certain direct and indirect implements of war, immediately would be faced with a similar condition.

This "the-world-owes-me-a-living" attitude, it should seem, best can be prevented from becoming an even more serious problem than it is through intelligent management policies. Absolutely essential is recognition of merit, coupled with a policy of quickly and adequately rewarding it by promotion, higher compensation or both.

### Intelligent Management Can Overcome Wrong Mental Attitude of Beginners

After all, what the young man of today really wants is just what the young man of a quarter-century ago likewise wanted—a job with good compensation and a chance for promotion. The only change is that too many boys of today expect such a happy situation to materialize without any special effort on their part, whereas the boys of twenty-five years ago realized they had to earn it the hard way. The smart employer recognizes that among his important problems is that of making his younger employes realize that there still is no substitute for hard work as a means for getting ahead and the surest way that he can drive this fact home to those who believe otherwise is by seeing to it that those who do work hard do get ahead.

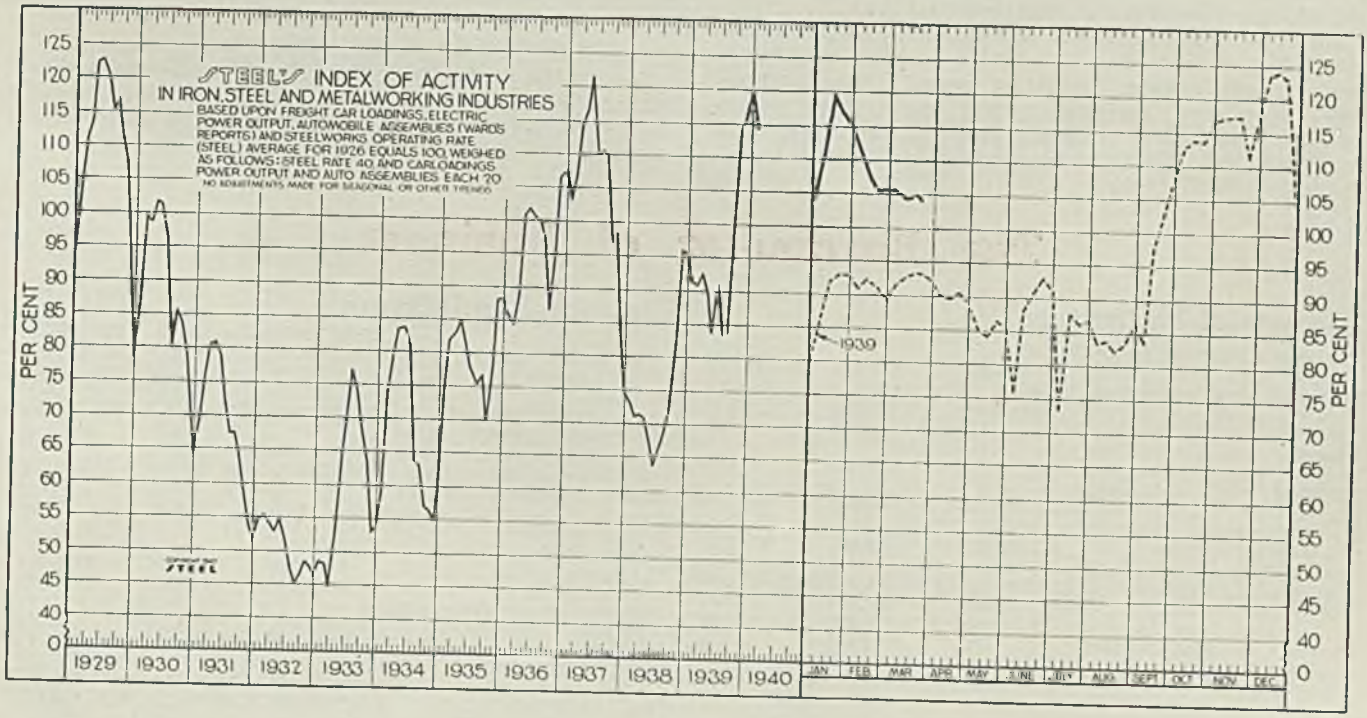
# The BUSINESS TREND

## Industrial Activity Lags Pending Seasonal Impetus

■ THUS FAR seasonal factors which usually exert a favorable influence upon industrial activity at this time of the year have not been able to do more than retard the sharp downward movement of most industrial indicators recorded during January and February. On the whole the business outlook appears to be one of a steadier trend, but of no immediate prospect of a change for the better.

Of primary importance in the weeks immediately ahead will be the buying policy on inventories to be followed by industry. The current tendency appears to let inventories shrink, in view of the fact that there is no immediate prospect of sharp price advances in commodities, while in most instances there is no shortage of raw materials and rather prompt deliveries now are available.

Despite the sharp decline in most industrial lines since the turn of the year, new orders still are estimated below current production in most instances. However, it is encouraging to note that while new demand is moderately below current production levels, consumption has been fairly well sustained. This is par-




*STEEL'S index of activity declined* 1.2 *points to* 103.7 *in the week ended March* 23:

| Week Ended | 1940 | 1939 |
|---|---|---|
| Jan. 20 | 117.3 | 93.0 |
| Jan. 27 | 115.4 | 92.9 |
| Feb. 3 | 111.6 | 90.7 |
| Feb. 10 | 107.2 | 92.1 |
| Feb. 17 | 105.1 | 91.1 |
| Feb. 24 | 105.4 | 89.3 |
| Mar. 2 | 105.6 | 91.5 |
| Mar. 9 | 104.7 | 92.7 |
| Mar. 16 | 104.9 | 93.3 |
| Mar. 23 | 103.7 | 93.2 |

| Mo. Data | 1940 | 1939 | 1938 | 1937 | 1936 | 1935 | 1934 | 1933 | 1932 | 1931 | 1930 | 1929 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan. | 114.7 | 91.1 | 73.3 | 102.9 | 85.9 | 74.2 | 58.8 | 48.6 | 54.6 | 69.1 | 87.6 | 104.1 |
| Feb. | 105.8 | 90.8 | 71.1 | 106.8 | 84.3 | 82.0 | 73.9 | 48.2 | 55.3 | 75.5 | 99.2 | 111.2 |
| March | ..... | 92.6 | 71.2 | 114.4 | 88.7 | 83.1 | 78.9 | 44.5 | 54.2 | 80.4 | 98.6 | 114.0 |
| April | ..... | 89.8 | 70.8 | 116.6 | 100.8 | 85.0 | 83.6 | 52.4 | 52.8 | 81.0 | 101.7 | 122.5 |
| May | ..... | 83.4 | 67.4 | 121.7 | 101.8 | 81.8 | 83.7 | 63.5 | 54.8 | 78.6 | 101.2 | 122.9 |
| June | ..... | 90.9 | 63.4 | 109.9 | 100.3 | 77.4 | 80.6 | 70.3 | 51.4 | 72.1 | 95.8 | 120.3 |
| July | ..... | 83.5 | 66.2 | 110.4 | 100.1 | 75.3 | 63.7 | 77.1 | 47.1 | 67.3 | 79.9 | 115.2 |
| Aug. | ..... | 83.9 | 68.7 | 110.0 | 97.1 | 76.7 | 63.0 | 74.1 | 45.0 | 67.4 | 85.4 | 116.9 |
| Sept. | ..... | 98.0 | 72.5 | 96.8 | 86.7 | 69.7 | 56.9 | 68.0 | 46.5 | 64.3 | 83.7 | 110.8 |
| Oct. | ..... | 114.0 | 83.6 | 98.1 | 94.8 | 77.0 | 56.4 | 63.1 | 48.4 | 59.2 | 78.8 | 107.1 |
| Nov. | ..... | 116.2 | 95.9 | 84.1 | 106.4 | 88.1 | 54.9 | 52.8 | 47.5 | 54.4 | 71.0 | 92.2 |
| Dec. | .... | 118.9 | 95.1 | 74.7 | 107.6 | 88.2 | 58.9 | 54.0 | 46.2 | 51.3 | 64.3 | 78.3 |

ticularly true in the automotive, aircraft, shipbuilding, machine tools, heavy electrical equipment and household appliance industries.

Of important significance at this time is the improvement, although still relatively small, in export business. February foreign shipments were off only slightly from the high December and January levels and indications are that March will show an increase over February. In some quarters it is estimated that exports are accounting for 15 per cent of production, compared with about 6 per cent through most of 1939.

During the week ended March 23 STEEL's index of activity in the iron, steel and metalworking industries declined 1.2 points, following a period of five weeks in which the index remained close to the 105 level. For the latest period the index stands at 103.7, compared with 104.9 in the previous week but compares favorably with the 93.2 level recorded at this time last year.

Declines in electric power consumption and automobile production forced STEEL's index to ease to moderately lower levels during the latest period. The national steel rate and revenue freight carloadings resisted the downward tendency during the week ended March 23. Steelmaking operations in that week held unchanged at 62.5 per cent. However, current estimates place new demand at approximately 50 per cent of capacity. Unless new orders record further gains during the coming weeks it appears probable that steel output will decline further.

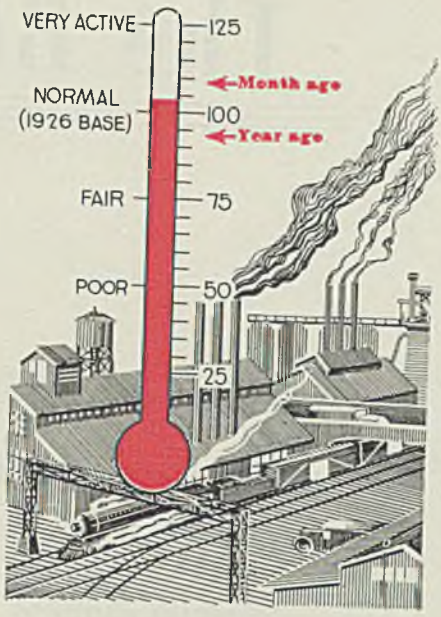
Electric power consumption recorded the third consecutive weekly decline during the period ended March 23, following the seasonal trend, but maintained its margin of increase over the corresponding period last year. An upturn in power output is not seasonally expected to develop for at least six weeks.

Despite the moderate decline in automobile assemblies during the week of March 23, output remained above the 100,000 units-per-week level for the fifth consecutive week.

## Industrial Weather

**TREND:**

*Downward*




## Where Business Stands

**Monthly Averages, 1939 = 100**

| | Feb., 1940 | Jan., 1940 | Feb., 1939 |
|---|---|---|---|
| Steel Ingot Output | 107.5 | 120.0 | 85.1 |
| Pig Iron Output | 117.7 | 134.3 | 85.2 |
| Freight Movement | 94.1 | 98.1 | 87.7 |
| Automobile Production | 135.6 | 144.5 | 102.1 |
| Building Construction | 67.8 | 35.0 | 74.4 |
| Wholesale Prices | *76.5 | 103.0 | 75.0 |

*Preliminary.

# The Barometer of Business

## Industrial Indicators

| | | | |
|---|---|---|---|
| Pig iron output (daily average, tons) | 101,648 | 115,915 | 73,578 |
| Iron and steel scrap consumption (tons) | 3,054,000 | 3,775,000 | 2,313,000 |
| Gear Sales Index | 116 | 123 | 86 |
| Foundry equipment new order index | 179.4 | 197.9 | 135.3 |
| Finished steel shipments (Net tons) | 1,009,256 | 1,145,592 | 747,427 |
| Ingot output (average weekly; net tons) | 1,056,673 | 1,268,555 | 836,822 |
| Dodge bldg. awards in 37 states ($ Valuation) | $200,574,000 | $196,191,000 | $220,197,000 |
| Automobile output | 421,820 | 449,314 | 317,520 |
| Coal output, tons | 39,270,000 | 44,940,000 | 34,134,000 |
| Business failures; number | 1042 | 1237 | 1202 |
| Business failures; liabilities | $13,472,000 | $15,279,000 | $13,582,000 |
| Nat'l Ind. Conf. board (25 industries, factory): | | | |
| †Av. wkly. hrs. per worker | 38.7 | 39.1 | 36.1 |
| †Av. weekly earnings | $28.09 | $28.49 | $29.95 |
| Cement production,† bbls. | 6,205,000 | 9,488,000 | 5,301,000 |
| Cotton consumption bales | 662,659 | 730,143 | 562,580 |
| Car loadings (weekly av.) | 616,067 | 642,464 | 574,347 |

†January, 1940, December and January 1939 respectively.

## Foreign Trade

| | Feb., 1940 | Jan., 1940 | Feb., 1939 |
|---|---|---|---|
| Exports | $346,779,000 | $368,583,000 | $218,682,000 |
| Imports | $199,775,000 | $241,897,000 | $158,072,000 |
| Gold exports† | $22,000 | $11,000 | $81,000 |
| Gold imports† | $236,413,000 | $451,183,000 | $156,427,000 |

January, 1940, December and January 1939 respectively.

## Financial Indicators

| | Feb., 1940 | Jan., 1940 | Feb., 1939 |
|---|---|---|---|
| 25 Industrial stocks | $192.67 | $191.78 | $181.21 |
| 25 Rail stocks | $22.98 | $23.03 | $23.24 |
| 40 Bonds | $72.89 | $73.01 | $72.56 |
| B'k clear'gs† (000 omitted) | $23,922,000 | $26,596,000 | $23,187,000 |
| Commercial paper rate (N. Y., per cent) | ½–⅝ | ½–⅝ | ½–⅝ |
| *Com'l. loans (000 omitted) | $8,528,000 | $8,499,000 | $8,186,000 |
| Federal Reserve ratio (per cent) | 87.5 | 87.5 | 84.2 |
| Capital flotations (000 omitted) | | | |
| New Capital | $103,959 | $90,901 | $377,452 |
| Refunding | $346,842 | $188,559 | $163,173 |
| Federal Gross debt. (mil. of dol.) | $42,365 | $42,110 | $39,864 |
| Railroad earnings† | $45,566,633 | $60,953,114 | $32,947,172 |
| Stock sales, New York stock exchange | 13,465,355 | 15,991,105 | 13,876,813 |
| Bond sales, par value | $120,647,000 | $145,078,150 | $119,402,725 |

*Leading member banks Federal Reserve System.
†January, 1940, December and January, 1939 respectively.

## Commodity Prices

| | Feb., 1940 | Jan., 1940 | Feb., 1939 |
|---|---|---|---|
| STEEL'S composite average of 25 iron & steel prices | $36.97 | $37.09 | $36.37 |
| U. S. Bureau of Labor's index | *78.5 | 79.4 | 76.9 |
| Wheat, cash (bushel) | $1.22 | $1.19 | $0.87 |
| Corn, cash (bushel) | $0.74 | $0.73 | $0.64 |

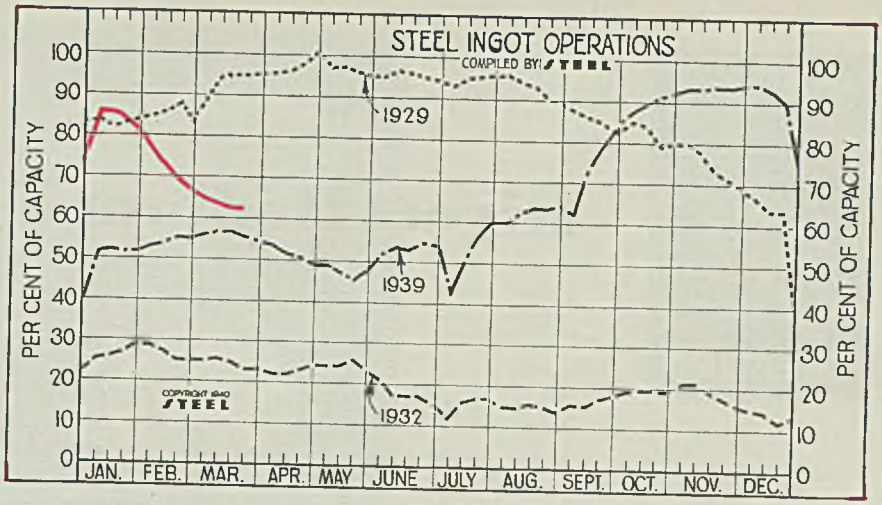
*Preliminary.

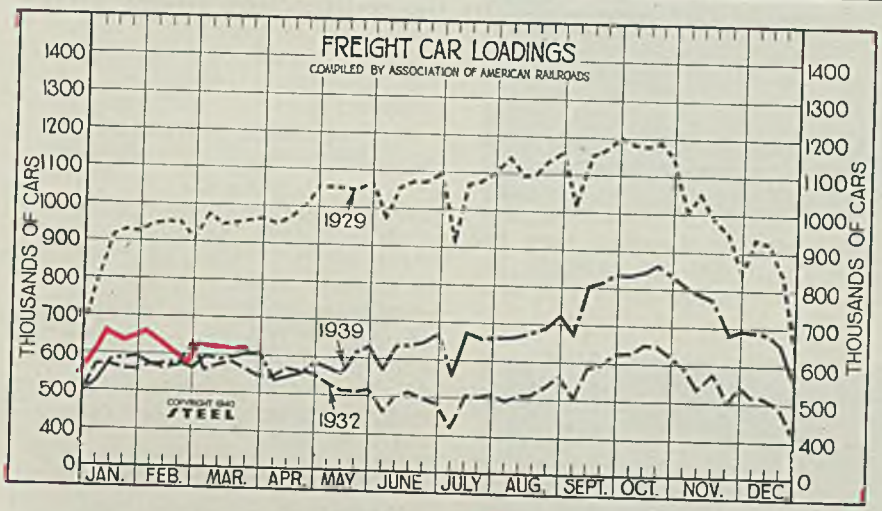
## Steel Ingot Operations

(Per Cent)

| Week ended | 1939 | 1938 | 1937 |
|---|---|---|---|
| Dec. 23 | 90.5 | 52.0 | 23.0 |
| Dec. 30 | 75.5 | 40.0 | 21.0 |

| Week ended | 1940 | 1939 | 1938 | 1937 |
|---|---|---|---|---|
| Jan. 6 | 86.5 | 51.5 | 26.0 | 79.5 |
| Jan. 13 | 86.0 | 52.0 | 29.0 | 79.0 |
| Jan. 20 | 84.5 | 51.5 | 30.5 | 80.0 |
| Jan. 27 | 81.5 | 51.5 | 33.0 | 76.0 |
| Feb. 3 | 76.5 | 53.0 | 31.0 | 79.5 |
| Feb. 10 | 71.0 | 54.0 | 30.0 | 81.0 |
| Feb. 17 | 69.0 | 55.0 | 31.0 | 83.0 |
| Feb. 24 | 67.0 | 55.0 | 30.5 | 84.0 |
| Mar. 2 | 65.5 | 56.0 | 29.5 | 86.0 |
| Mar. 9 | 63.5 | 56.5 | 30.0 | 87.0 |
| Mar. 16 | 62.5 | 56.5 | 32.0 | 90.0 |
| Mar. 23 | 62.5 | 55.5 | 35.0 | 91.5 |




## Freight Car Loadings

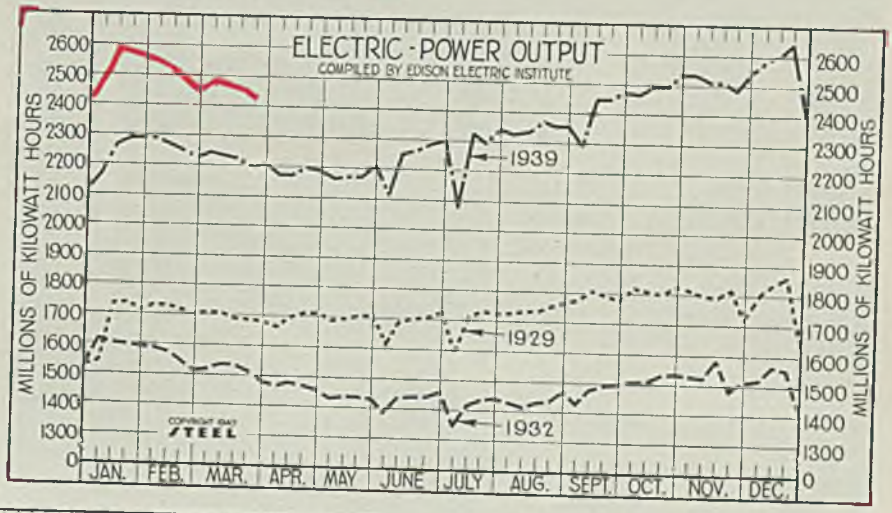
(1000 Cars)

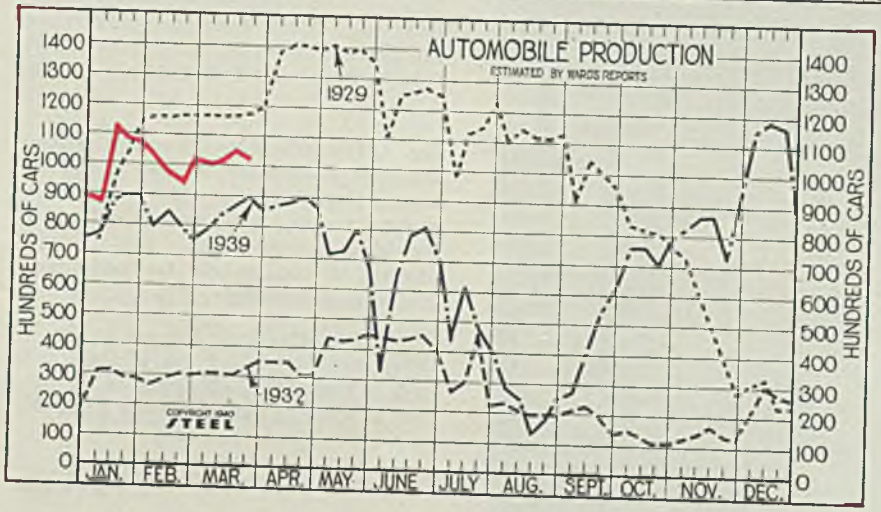
| Week ended | 1940 | 1939 | 1938 | 1937 |
|---|---|---|---|---|
| Dec. 23 | | 655 | 574 | 460 |
| Dec. 30 | | 550 | 500 | 457 |
| Jan. 6 | 592 | 531 | 552 | 699 |
| Jan. 13 | 668 | 587 | 581 | 700 |
| Jan. 20 | 646 | 590 | 570 | 670 |
| Jan. 27 | 650 | 594 | 553 | 660 |
| Feb. 3 | 553 | 577 | 565 | 675 |
| Feb. 10 | 627 | 580 | 543 | 692 |
| Feb. 17 | 608 | 580 | 536 | 715 |
| Feb. 24 | 595 | 561 | 512 | 697 |
| Mar. 2 | 634 | 599 | 553 | 734 |
| Mar. 9 | 621 | 592 | 557 | 749 |
| Mar. 16 | 619 | 595 | 540 | 761 |
| Mar. 23 | 620 | 605 | 573 | 727 |

## Electric Power Output

(Million KWH)

| Week ended | 1940 | 1939 | 1938 | 1937 |
|---|---|---|---|---|
| Dec. 23 | | 2,641 | 2,363 | 2,085 |
| Dec. 30 | | 2,404 | 2,121 | 1,998 |
| Jan. 6 | 2,473 | 2,169 | 2,140 | 2,244 |
| Jan. 13 | 2,593 | 2,270 | 2,115 | 2,264 |
| Jan. 20 | 2,572 | 2,290 | 2,109 | 2,257 |
| Jan. 13 | 2,566 | 2,293 | 2,099 | 2,215 |
| Feb. 3 | 2,541 | 2,287 | 2,082 | 2,201 |
| Feb. 10 | 2,523 | 2,268 | 2,052 | 2,200 |
| Feb. 17 | 2,476 | 2,249 | 2,059 | 2,212 |
| Feb. 24 | 2,455 | 2,226 | 2,031 | 2,207 |
| Mar. 2 | 2,479 | 2,244 | 2,036 | 2,200 |
| Mar. 9 | 2,464 | 2,238 | 2,015 | 2,213 |
| Mar. 16 | 2,460 | 2,225 | 2,018 | 2,200 |
| Mar. 23 | 2,424 | 2,199 | 1,975 | 2,147 |




## Auto Production

(1000 Units)

| Week ended | 1940 | 1939 | 1938 | 1937 |
|---|---|---|---|---|
| Dec. 23 | | 117.7 | 92.9 | 67.2 |
| Dec. 30 | | 89.4 | 75.2 | 49.6 |
| Jan. 6 | 87.5 | 76.7 | 54.1 | 96.8 |
| Jan. 13 | 111.3 | 86.9 | 65.7 | 91.7 |
| Jan. 20 | 108.5 | 90.2 | 65.4 | 81.4 |
| Jan. 27 | 106.4 | 89.2 | 59.4 | 74.1 |
| Feb. 3 | 101.2 | 79.4 | 51.4 | 72.3 |
| Feb. 10 | 96.0 | 84.5 | 57.8 | 72.8 |
| Feb. 17 | 95.1 | 79.9 | 59.1 | 95.7 |
| Feb. 24 | 102.6 | 75.7 | 57.0 | 111.9 |
| Mar. 2 | 100.9 | 78.7 | 54.4 | 127.0 |
| Mar. 9 | 103.6 | 84.1 | 57.4 | 101.7 |
| Mar. 16 | 105.7 | 86.7 | 57.5 | 101.0 |
| Mar. 23 | 103.4 | 89.4 | 56.8 | 97.0 |


# Direct Radiant Firing Methods

*New type of radiant roof furnace features high heat penetration rate, exact control of heat distribution, extremely wide range of heat inputs. Permits furnace sizes to be reduced in many cases*

By JAMES KNIVETON
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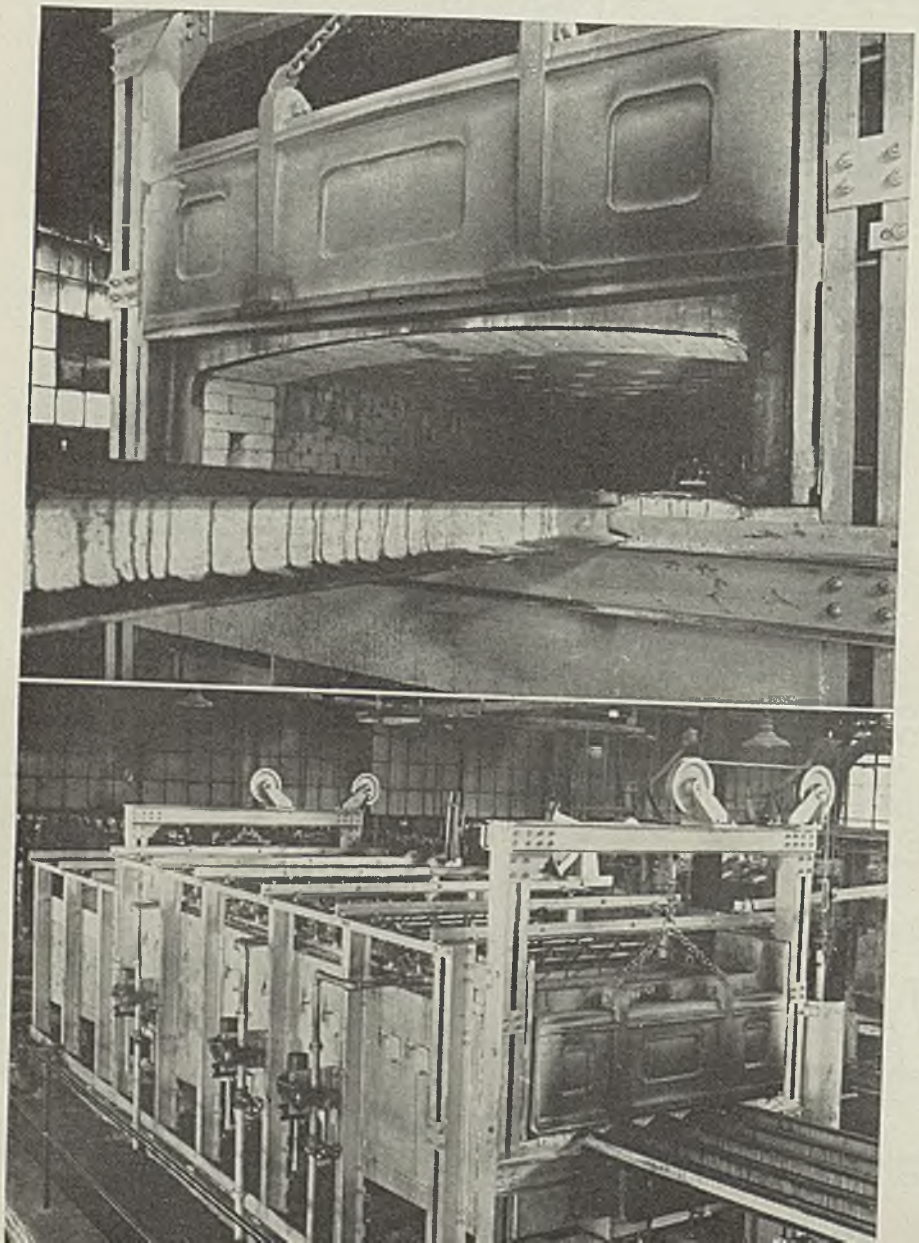
■ USE OF direct-fired radiant gas furnaces is a comparatively new development of benefit in meeting the increasingly exacting metallurgical requirements encountered in heat treating metals. The method has a number of important advantages which appear to warrant its consideration in many applications.

One of the outstanding features of direct firing by radiant burners is that heating chambers may be uniformly heated by radiants located in a suspended flat roof and at no other place in the furnace structure. This arrangement is quite new and offers a simple method of converting existing furnaces and an economical method of building new ones.



### Production Is Increased

Typical of conversion jobs possible using direct-firing radiants is a box-carburizing furnace having a chamber 6 feet wide, 6 feet 6 inches long and 33 inches high. Here 36 radiants were installed in the roof to replace electric heating units in the side walls. Parts to be carburized are packed in boxes 18 inches high, 4 feet 3 inches long and 2 feet 1 inch wide.

Former heating cycle required 12 hours. The same work now is done in 8¾ hours with identical charges. This permits approximately 25 per cent increase in production to be obtained from this converted furnace due to the faster heating. Overall operating efficiency of this furnace is 48 per cent. Because of the excellent results obtained with this unit, seven additional furnaces are being converted at this plant.

In spite of the fact that all of the

Fig. 1. (Upper)—Here 78 radiant burners heat a chamber 16 feet 10 inches long, 6 feet 6 inches wide in drawing and normalizing steel storage cylinders for high pressure gas. Burners are spaced to compensate for additional mass of cylinders at their ends

Fig. 2. (Lower)—Same furnace as Fig. 1. When heating over 1 ton of steel per hour, furnace fuel efficiency is 54 per cent in spite of opening doors some 20 times per hour

heat input is from radiant burners in the roof, exacting tests of temperature throughout the charge show penetration to be quicker and more uniform since the furnace was converted. This faster penetration is due to high radiant heat energy from the incandescent cavity of the burners and to rapid circulation of products of combustion in the chamber. Localized overheating is eliminated because combustion is complete within the cavity of radiant units.

Possibly first reaction of one not familiar with operation of radiant burners is that underside of roof would be at higher temperature than balance of furnace. Actually, however, the temperature within 2 inches of the roof is no higher than at any other point in the furnace. Tests with thermocouple located throughout heating chamber show variation to be within 10 degrees Fahr. of the controlled temperature.

Another radiant roof installation, a continuous furnace in which parts are heated in boxes 12 inches high at 1300 degrees Fahr., showed a temperature differential between top and bottom of box of only 50 degrees Fahr. within 40 minutes after charging.

### Suitable for Many Applications

Radiant roofs are advantageous for sheet normalizing, wire patenting, strand annealing, annealing of cylinders or pipes, roller hearths for heat treatment of gears or other parts that can be carried with this conveying method, billet heating, box carburizing and many other furnace applications.

Though the installations cited above are fired entirely from flat roofs, advantages of radiant firing are not confined to that type of furnace construction. Vertical furnaces, suitable for heating charges suspended in the furnace or passing through on a continuous conveyor have been constructed and are showing interesting results.

Direct radiant firing offers no unusual limitations for the furnace designer. Chamber temperatures of industrial applications in ovens and furnaces range all the way from 300 to 2400 degrees Fahr. There are no limits as to size of working area as furnaces ranging from 3 to 1400 cubic feet already have been constructed.

Figs. 1 and 2 show a continuous furnace employing 78 radiant burners located in the roof. Heating

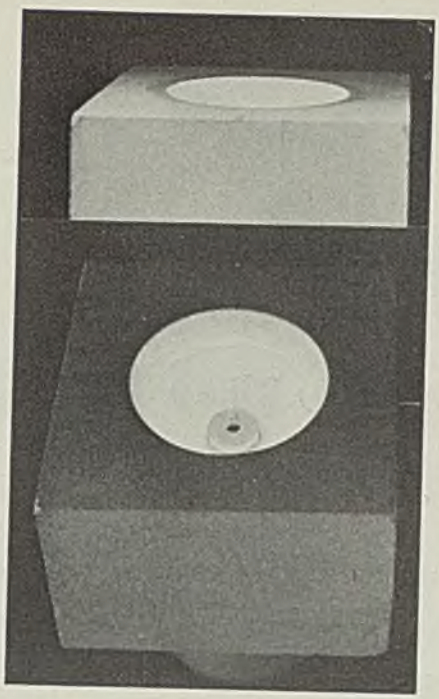


Fig. 3—Views of radiant gas burner in operation. Note no flame comes from the mouth

chamber is 16 feet 10 inches long and 6 feet 8 inches wide. Furnace is used for drawing and normalizing alloy steel pressure cylinders.

Specifications for this furnace required: First, an exceptionally low burner turn-down for operation at 900 to 1000 degrees Fahr., yet with a high heat input available for operations performed at high temperatures; second, flexibility of heat input from side wall to side wall of furnace chamber to compensate for additional mass at ends of cylinders. When operating at 1300 degrees Fahr. and heating over 1 ton of steel per hour, this furnace has a fuel efficiency of 54 per cent. This high rate is maintained despite the fact that doors for charging and discharging are opened 20 times for a total of approximately 5 minutes in each hour of operation.

Fig. 4 shows a roller-hearth furnace with 58 burners installed in the roof. It is used for heating steel sheets. The same type of furnace may be used in normalizing forgings, annealing shells loaded in trays, box carburizing, malleablizing or similar operations.

### Radiants Readily Controlled

Of utmost importance on many applications is the extremely wide range of heat inputs possible. Each individual radiant can be turned up or down to provide a high ratio between maximum and minimum firing rates. A single burner, for instance, will operate well at gas consumption rates varying from 1½ cubic feet of manufactured gas at ⅛-inch of water burner pressure to 62 cubic feet per hour at 30 inches pressure. In addition, a large number of radiants can be employed and part of them turned on or off as desired to give extremely flexible heat distribution to fit the nature of the charge. Each burner is subject to individual adjustment, so it is possible to obtain fine variations of heat distribution. Thus, it is quite easy to obtain any heat balance desired, regardless of type of charge.

Efficiency of radiant-fired furnaces is extremely high because not only does the turbulence set up by combustion of the gas assure complete consumption of the fuel, but the additional advantages of convective heat also increase efficiency.

In addition, the burners them-

(*Please turn to Page* 100)

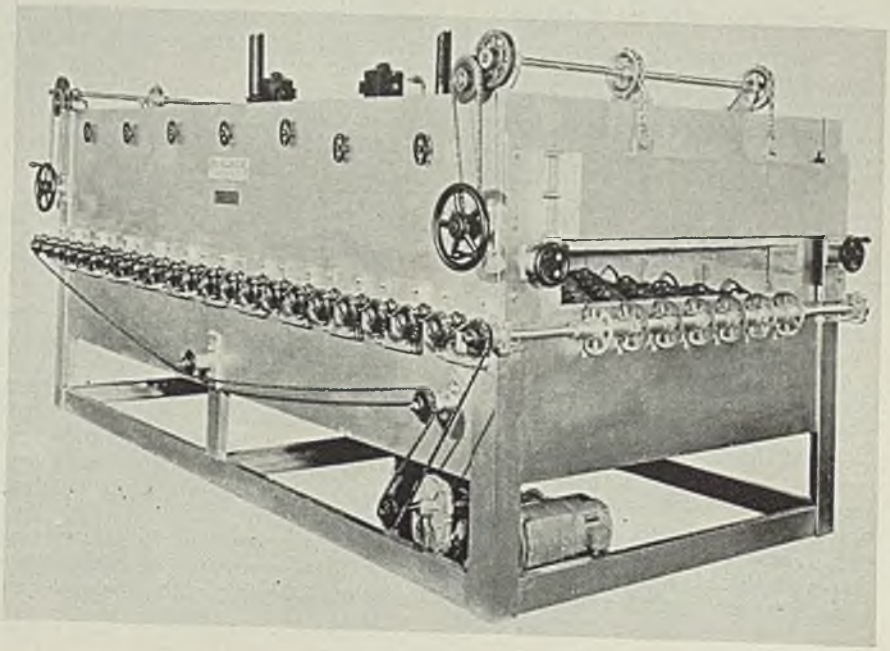


Fig. 4—This roller hearth furnace has 54 radiant burners installed in the roof. It is used in heating steel sheets. Same type furnace can be used in normalizing, annealing, box carburizing or malleablizing work also

# Profits Under the Social

*Smart manufacturers, by adjustments which enable them to derive fullest benefits under the experience rating system, actually improve their competitive position. One company saves about $21,000 yearly*

■ EXPERIENCE to date under the social security system reveals certain potentialities and trends which are of vital importance to industry, and which are not thoroughly understood. It becomes apparent that many manufacturers, by virtue of differences in state laws, may have to locate their plants in other states if they hope to remain in business. It also becomes apparent that many manufacturers, located in states whose laws provide for experience rating, can improve their profit possibilities materially—if they are sufficiently intelligent and practical—by making the adjustments necessary in order to co-operate to the fullest extent under these laws.

### Profits Can Still Be Realized

Sufficient experience has been accumulated to prove that the social security system in a great many cases need not prevent manufacturers from making money, to the benefit of both stockholders and employes As a matter of fact, the social security program now must be recognized as a foremost executive problem. Its cost must not be regarded as a tax but as an operating cost.

Importance of this viewpoint becomes apparent when it is realized that labor costs comprise about 40 per cent of the floor value of manufactured products. This tax of 4 per cent for old-age benefits and unemployment compensation combined, figures out to 1.6 per cent on the value of the goods produced. Many large corporations are satisfied with profit as small as one-quarter of 1 per cent of the value of goods produced. Business that secures a profit of 1 per cent on the value of the goods is exceptional. Thus the amended social security act has developed for the employers of the United States a cost problem which has a vital bearing on the entire problem of profits.

To get a better perspective of management's problems under the social security system, it is necessary to go back to 1921 when Prof. John R. Commons of the University of Wisconsin spoke before the judiciary committee of the Wisconsin state legislature. At that time, he held, the only way that the average worker in the country could be assisted by government was to make certain laws which would require the employer to give definite specified protection. The tax cost to the employer should be measured by the degree of his co-operation.

In the terms of the social security act, this measure of employers' activity is known as *experience rating*. The federal law requires that the accumulated taxes in the unemployment compensation funds reach a minimum of 7½ per cent of an annual payroll before the tax cost can be reduced. The state laws, of which there are 48, represent 48 varieties of measuring experience rating. Some states including Pennsylvania and New York, allow no credit under any circumstances. Wisconsin, which wrote the original unemployment compensation law, permits a reserve of 10 per cent as the first measure of experience credits. Certain other states, including Ohio, require a reserve fund equal to 15 per cent of an annual payroll.

Proponents of these laws obviously did not realize that 76 per cent of the employing groups in the United States have 10 or less employes, giving such companies limited possibilities for reducing this tax cost. Nor did they realize that 97 per cent of the employing groups in the United States have 100 or less employes, making it probable that cost of getting a result in experience rating credits would exceed savings possible in the tax in terms of cash.

### Wisconsin, a Model State

However, when this problem is considered in relation to organizations employing upwards of 100, and from there up to that fraction of 1 per cent employing 10,000 or more, an entirely different situation is presented. Today in Wisconsin—the only state which as yet can be used as a complete illustration of the possibilities of experience rating—there are more than 4000 employers who have reduced their tax costs by at least $1700 to every $100,000 payroll, because of their experience for three or more years.

If employers in Wisconsin can get such results, employers in other states who will reach an experience rating position in 1942 can take heart. They should study results in Wisconsin and they should make a complete examination of methods by which Wisconsin employers have obtained results. In this way they will benefit by the earlier experience under that Wisconsin law which was the parent of the unemployment section of the social se-

# Security System

By

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The author of this article has had much experience with the effect of employment compensation in the state of Wisconsin where it has been in operation long enough for its effects definitely to be known. Clarence B. Bartlett is an industrial analyst with a large clientele in the midwest, particularly among Wisconsin manufacturers. He is active in the affairs of Industrial Co-Ordinators Inc., whose Cleveland office is his headquarters.

curity act, and consequently the forerunner of the 48 state laws now in effect in the United States.

Examination of results in Wisconsin constitutes an interesting study. Let us examine some of these results by industrial classification.

The leather manufacturing industry is a logical starting point in this study, not only because it has been notable for years as an unusually stable one from an employing standpoint, but also because it has been an exceptionally unstable one in the value of the product that it produces. Hides from which leather is produced have the widest variation in value of any product in the American commodity market, dating from World war values.

### Leather Profits Small

This has put the leather manufacturer in a position where the normal practice is to carry an inventory that would be considered entirely out of line in the metal working industry. With a large inventory on hand and with technical requirements demanding carrying through of the process to a semi-inventory stage once the hide has been started through, consequent stability of employment requirements is self-evident. Unemployment compensation laws now require that no changes shall be made in employment practices of this industry—regardless of the level of its operations. Incidentally, leather is produced largely in Wisconsin, Ohio, Massachusetts and Pennsylvania, and profit on leather has not averaged a cent on the dollar at any time since the World war.

Such profit as leather manufacturers have been able to make has resulted from intelligent buying and selling, and not because of variation in manufacturing efficiency. Forty per cent of the cost of every dollar's worth of leather produced is labor cost. And now the social security act saddles on an additional cost represented by the tax of 1.6 per cent on every dollar's worth of leather manufactured.

The experience rating clauses of the Wisconsin law, however, are such that any Wisconsin manufacturer who is taking full advantage of his possibilities now has a tax of only 1.3 per cent of his taxable payroll or 5.2 mills on every dollar's worth of leather produced. The Ohio manufacturer, if he proceeds with the same degree of intelligence as does the Wisconsin manufacturer, can be in 1942 in a position where his tax will be 9.2 mills on every dollar produced. Even then, in Ohio the leather manufacturers' profit possibilities—based on experience over the past 22 years—will practically be cancelled out by this tax.

On the other hand, in the state of Pennsylvania, where no experience credit is allowed, the leather manufacturer will have an arbitrary in cost of 1.6 per cent on every dollar's worth of goods produced, regardless of the fact that he has not been able to make a profit of more than one cent on the dollar.

The Massachusetts manufacturer, in line with the law as amended last August, will be in a position (provided he reaches the Wisconsin manufacturers' conditions) where his cost will be equal to 1.8 per cent of his labor bill, or 7.2 mills on every dollar's worth produced. This will be two mills higher than in Ohio and four mills higher than in Wisconsin.

This difference in the cost possibility of these four states is due directly to the fact that in Pennsylvania the minimum tax cost under the state law is 3 per cent of the payroll, under the Ohio law it will be 1 per cent of the payroll, under the Massachusetts law it will be one-half of 1 per cent, while under the Wisconsin law the state tax can be reduced to nothing. This result actually has been accomplished by some of the leading leather manufacturers in Wisconsin.

Approximately 90 per cent of the leather in the United States is made in those two states where the cost is the highest. One does not require deep penetration into the subject to realize that under such conditions the social security act is likely to lead to a change in the to-

tal trend in the leather business if these factors continue to be in effect.

The ice and coal business furnishes a remarkable illustration of what can be done on this cost factor. The very nature of this business is such that approximately 60 per cent of those employed ordinarily have been laid off as the demand for ice lapsed in the fall. The largest ice and coal company in Wisconsin had a payroll approximating $800,000. This company realized that when the Wisconsin law went into effect it faced a potential cost for unemployment compensation amounting to $8000 a year. Thereupon it revised its employment practices so that instead of hiring ice men and coal men to suit the seasons, employes were hired by the year to handle ice in one season, coal in the other, and both products at periods where the two seasons merged. Sales training courses were instituted to convert the regular employes into "wagon salesmen." Instead of paying them by the week on a basis satisfactory to the labor organizations as in the past, these men were put on a commission basis. They already had established contacts with housewives, who are buyers of the two products involved. The result was that by the time compensation was payable in the state of Wisconsin, the number of employes laid off in one year had been so reduced that it involved a cost for unemployment compensation of only $440.

### Employe Earnings Increase

In addition to this eminently satisfactory result, it developed that the employes were earning from $50 to $75 a week, at the same time bringing a comparable increase in business to the company.

Unemployment compensation law in this case furnished definite incentive by which the company and its employes have profited materially. This would be true even if the tax cost remained the same, but under the Wisconsin law this company actually is saving approximately $2700 in tax cost for every $100,000 of payroll, or a total of about $21,000 per year.

A fabricator of metal products whose business ranges from the sale of a few pounds of castings at 4 or 5 cents a pound, to orders running into millions of dollars annually, studied its past experience and came to the conclusion that its unemployment compensation cost under the Wisconsin law would run in the region of 50 per cent of its total accumulated through the tax rate annually. It realized that such a situation would have to be changed. It co-ordinated the activity of the organization to a point where its total compensation costs were approximately one-sixtieth of its total tax bill, with the result that today it is enjoying the minimum tax.

It is self-evident that the company with a highly seasonal business can reduce its tax cost for unemployment, provided it can discover a product which will serve to fill in its "off-season." This is well illustrated by the case of the large toy manufacturer in Wisconsin who added bicycles to his line of production, thereby eliminating seasonal slumps.

### Some Companies Limited

A large Ohio storage battery manufacturer announced, while this article was being written, that it has decided to increase the inventory in the off-season sufficiently to effect a considerable degree of stability of employment. This, of course, is the best method of reducing unemployment compensation payments when it is financially possible, and when nature of the inventory is such as to make storage physically possible. It must be recognized, however, that where perishability, rapid style changes, excessive bulk, heavy interest payments, etc., must be taken into consideration, this solution has rather limited possibilities.

Now let us consider the machine tool industry as an illustration of what can be done in the metalworking industries. This serves as a good illustration: First, because the majority of machine tool manufacturers make comparatively limited lines of tools; second, because even though they do have a spread in the types of tools they make, causes for rise and fall in the volume of business are uniform over the entire line; third, because bulk of their production is such that inventory possibilities are limited; fourth, because a study of the machine tool index for the years since the unemployment compensation law became effective in Wisconsin shows definitely that this industry has a very irregular business volume.

In the face of these facts, it is significant that a Wisconsin machine tool builder recently stated that in four years he has not had a single case of unemployment on which he has had to pay compensation. This manufacturer could not make that statement, however, if he were operating under the Ohio law.

Let us then take the machine tool industry in Ohio as an illustration, bearing in mind that the Ohio law is one of the most difficult ones in the United States under which to obtain a satisfactory experience rating position. As a first step, Ohio manufacturers now potentially in such a position that their tax cost will be reduced in 1942 (the first year possible under the Ohio law) have had to study the technical requirements of the law and turn them into practical operating practices.

First they found that if an applicant for employment already had 20 weeks of service in the state of Ohio, as a new employe he represented a potential cost for Unemployment Compensation at such time as he might be laid off for any cause whatsoever. They found that this new employe already had established his rate of compensation, based on his earnings before taking the new position. They found that the so-called "waiting period" for drawing compensation between the time of quitting work and securing a new job was cumulative.

In operating practice this means that thorough research must be made into the history of every new employe. This practice is not new in industry, but under the law errors in this history can for the first time cost money, not only because


they might show up in the employe's ability to do his work, but also because in the correcting of the mistake a new cost for unemployment compensation is developed.

As a cost has been developed for the act of hiring and firing in itself, it has become necessary to coordinate sales quotas and factory production programs more accurately than in the past, before authority for placing any new employe is given. The Ohio law calls for payment for partial unemployment. That is, if any employe falls below 60 per cent of his average he becomes eligible for unemployment compensation. In view of the fact that the "waiting period" is cumulative, it has become necessary

to keep the record of each employe in such a way that it can be determined instantly just how much of this waiting period has been served in cases where working time of the employe has had to be shortened.

This has brought to the fore an entirely new concept of payroll accounting. Absent time on a payroll now has to be accounted for just as intelligently as does the time that the employe has been present. This is so that absent time for which the employer is responsible can be separated from absent time the employe is responsible, in the latter case no compensation rights being accumulated.

It finally was found, through studying of the technical requirement of the law, that an effort to develop the minimum amount of unemployment compensation entailed no particularly new factors in the practices of a well organized business. It was further found that in practice the measure of the cost for unemployment compensation

was the degree of co-ordination among all departments of the business.

It then became apparent that the logical first step was a series of conferences to invest department heads with the knowledge and responsibility necessary for instructing the entire organization in the meaning of this entirely new type of law affecting operations. These conferences also forewarned department heads as to where the costs would develop, the natural consequence being various suggestions of ways and means whereby these costs could be held down to a minimum.

As the machine tool industry is subjected to violent fluctuations in total productive hours, and as it is evident that the largest portion of the cost for unemployment compensation would develop during periods of curtailed production, a study was made of what could be done about this most important element in the entire problem.

Recognizing that average skill of workers in the machine tool industry is high, and recognizing therefore that high cost is involved in securing and training employes, it readily was apparent that such employes should be at a premium when any work at all is available. It also was recognized that under past practices when a man was laid off, it had been this ex-employe's responsibility—rather than that of his employer—to find such work as might be available.

### Employers Look for Jobs

Because there now is a definite cost attached to this situation, this practice has in effect been reversed. In other words, it now is the employer's responsibility to see that his ex-employe receive any such work as is available. The costs which this "reversed practice" have eliminated can only be appreciated when they come under personal observation.

No one group of employers faces a more difficult problem than the suppliers of parts for automobiles. This is due to the highly seasonal nature of the automobile business. Nevertheless, some producers of automobile parts—because of their study of costs due to practical requirements as affected by the unemployment compensation law—have reduced their compensation payments to a point where they no longer are of great moment as a cost factor. This contrasts sharply with the position of some other fabricators of automobile parts who still persist in the belief that they must accept a maximum cost under the laws of the states in which they operate because they cannot control the schedule requirements of their products month by month.

To anyone who has been intimate with the problems of hundreds of different types of conditions, it is apparent that if the fabricators of automobile parts with a number of plants in more than one state can produce a satisfactory result under experience rating, others can do likewise.

The requirement that develops a cost measured by the stability of a payroll has produced a situation which is not getting the degree of attention on the part of executive minds in business that it deserves, considering the importance of the problem.

The one outstanding requirement that this new type of law is producing is the recognition of the fact that the cost of the social security act is an *operating cost,* and therefore should not be measured by the same yardstick as is applied to the 200 or more other taxes which industry is now paying.

If this law has produced an operating problem, it follows logically that the first thing for industry to do is to teach its operating officials something of the new responsibilities that the law has developed. It further is apparent that the relations between manufacturing, personnel, sales and executive policies need re-examination and co-ordination if a desirable result is to be reached.

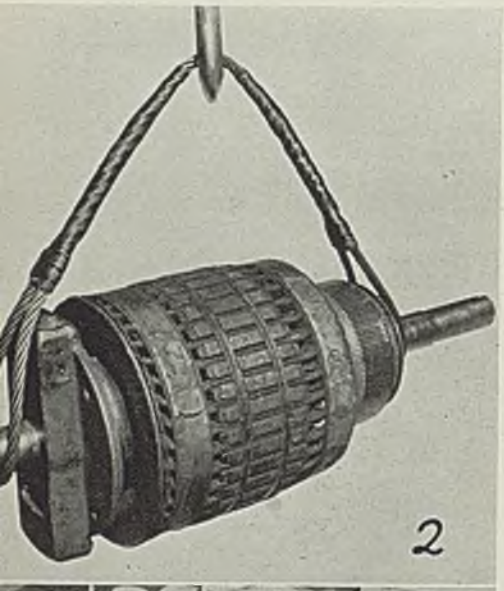
While, because of the comparative newness of these laws, actual proved results as yet have been possible only in Wisconsin, industries all over our country are working on this problem and are getting potential results in varying measures, regardless of handicaps or advantages of various state requirements.

An experiment in Elyria, O., where a group of employers is facing this problem as a unit, is based on the self-evident fact that people live in a community because in the long run they have been able to earn a living in that community. Bear in mind that in Ohio, as in all other states, costs for unemployment compensation are measured by the working experience of the employe within that state, regardless of how many employers he may have had within a current year.

### $90,000 Saved in One Year

This Elyria group saved more than $90,000 in compensation payments in the first year under the Ohio law. In other words, these employers created better than $180,000 worth of wages for employes who had worked for one or more of the employers in the group.

Companies in this group are engaged in various lines of manufacture, ranging all the way from lace paper to automobile bodies and steam shovels. Results achieved by this group present definite proof of the fact that success in keeping at a minimum costs due to the federal social security act can be measured by the degree to which co-ordinated executive activity is achieved. Consequently, it is an obvious fact that the problem facing manufacturers throughout the country is an executive problem. Proper handling of this problem insures manufacturers—despite steadily growing governmental activities affecting their policies—are in a position to make money as in the past, thus insuring the continued existence of their companies and benefiting their stockholders and their employes.

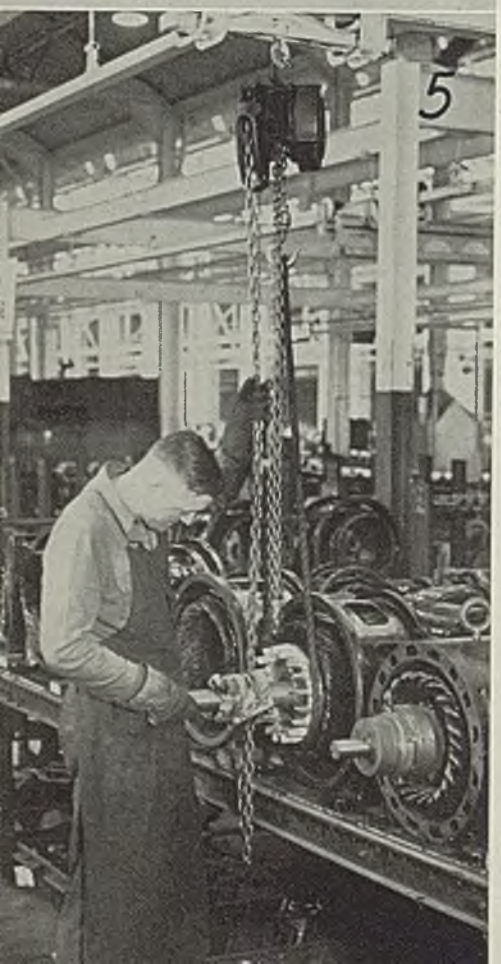



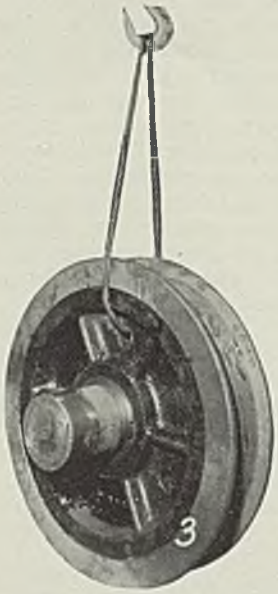

■ DUE TO their ease of application and ability to solve complicated handling or lifting problems, slings are finding an increasingly greater usage in metal producing and fabricating shops. Pliability, smoothness and quick attachment make cable slings satisfactory and safe for many uses.

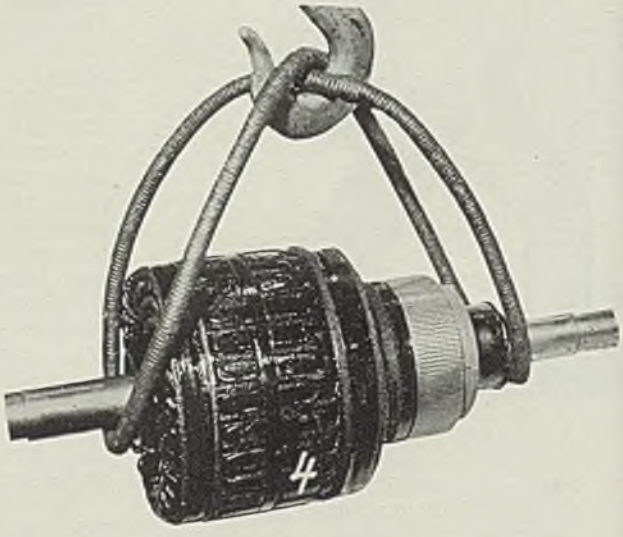
Four eyelet-end and two endless cable slings for handling small pieces are shown in Fig. 1. Eyelet sling in Fig. 2 easily slips over ends of armature shaft. Blocks avoid damage. In Fig. 3, a cable sling affords easy attachment of wheel to crane hook.

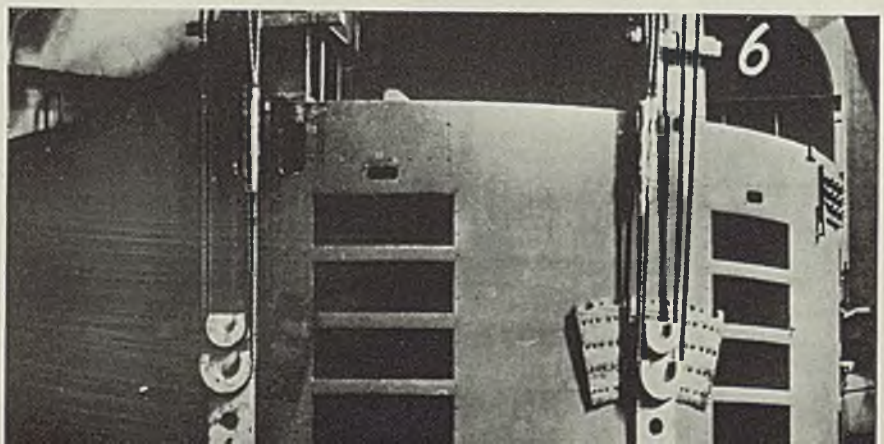
A figure-eight hitch aids in lifting the armature in Fig. 4. In motor manufacturing, slings are a great help. An endless rope sling with a hand hoist and short section of overhead monorail aids assembly in Fig. 5 and avoids damage to shaft surfaces.

Multiple slings, Fig. 6, were used in placing Westinghouse generators at Boulder dam. Previous experience with chains and hooks gave some distortion due to failure to equalize. Here round forms temporarily bolted to the stator gave proper equalization and no distortion. Sections of lamination under the forms are merely to hold them away from the stator surface. Upper bracket of the machine was bolted in place during the lift to give the big circle added rigidity.



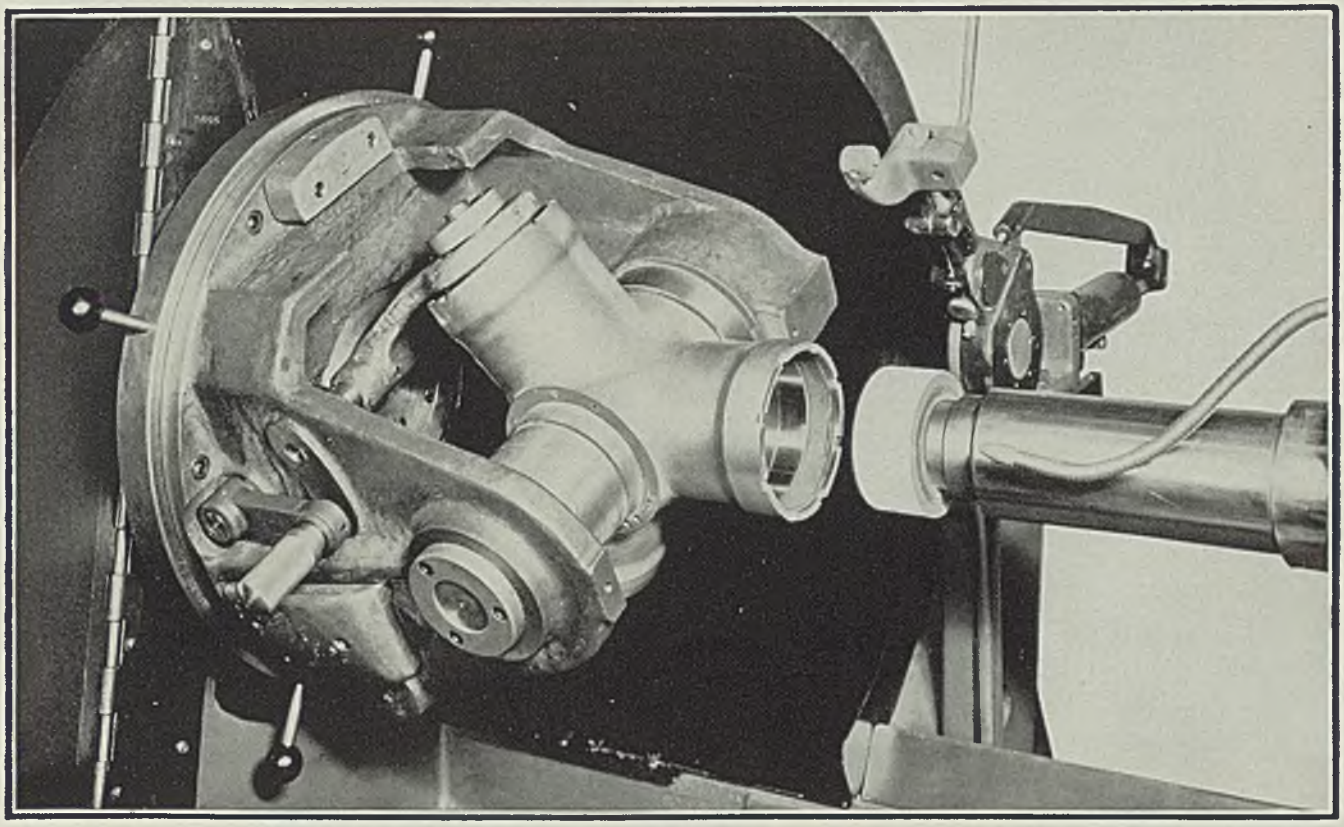



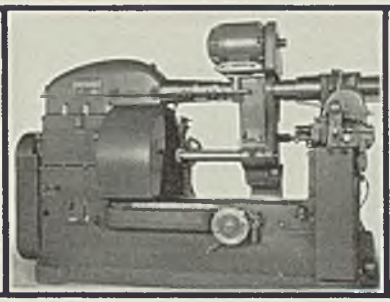



# Giving Production a TAIL WIND,,

## BY GRINDING AIRPLANE ENGINE PARTS ON BRYANT GRINDERS



BRYANT Internal Grinders are like a "Tail Wind" to production schedules in the plants of aircraft engine manufacturers throughout the world. We illustrate the Bryant No. 24-36 with the exclusive Bryant feature of single slide control, and single lever operating control. This means faster handling, easier operation, and greater accuracy than any other machine offered for this class of work. This machine is shown grinding the inside bores in a three-blade propeller hub. The holding fixture is designed so that all three bores may be ground in one setting, merely by taking out the locating plug, revolving the fixture one-third of a revolution, and inserting the locating plug again. . . . Bryant experience in designing fixtures and machines to handle a wide range of jobs is a real asset — why not let us show you how to make profits on the tough jobs?



**BRYANT**
**CHUCKING GRINDER COMPANY**
**Springfield, Vermont**


# Simple Open-Hearth Control

*Fuel supply regulated manually to meet requirements of "heat". Dampers then are set automatically to maintain correct furnace pressure. An induced-draft damper control holds fuel-air ratio*

By REGINALD TRAUTSCHOLD
Engineering Consultant
55 Mountain Avenue
Caldwell, N. J.

■ REAL simplicity earmarks the efficient system of metered combustion control on an open-hearth furnace at a prominent steel plant in the South. The total fuel input to the furnace, as computed in B.t.u., is continuously measured and the volume of air supplied for combustion proportioned accurately to furnace requirements, simultaneous adjustments in rates of fuel and air supplied to the furnace being made automatically to meet any and all variations in heat demand.

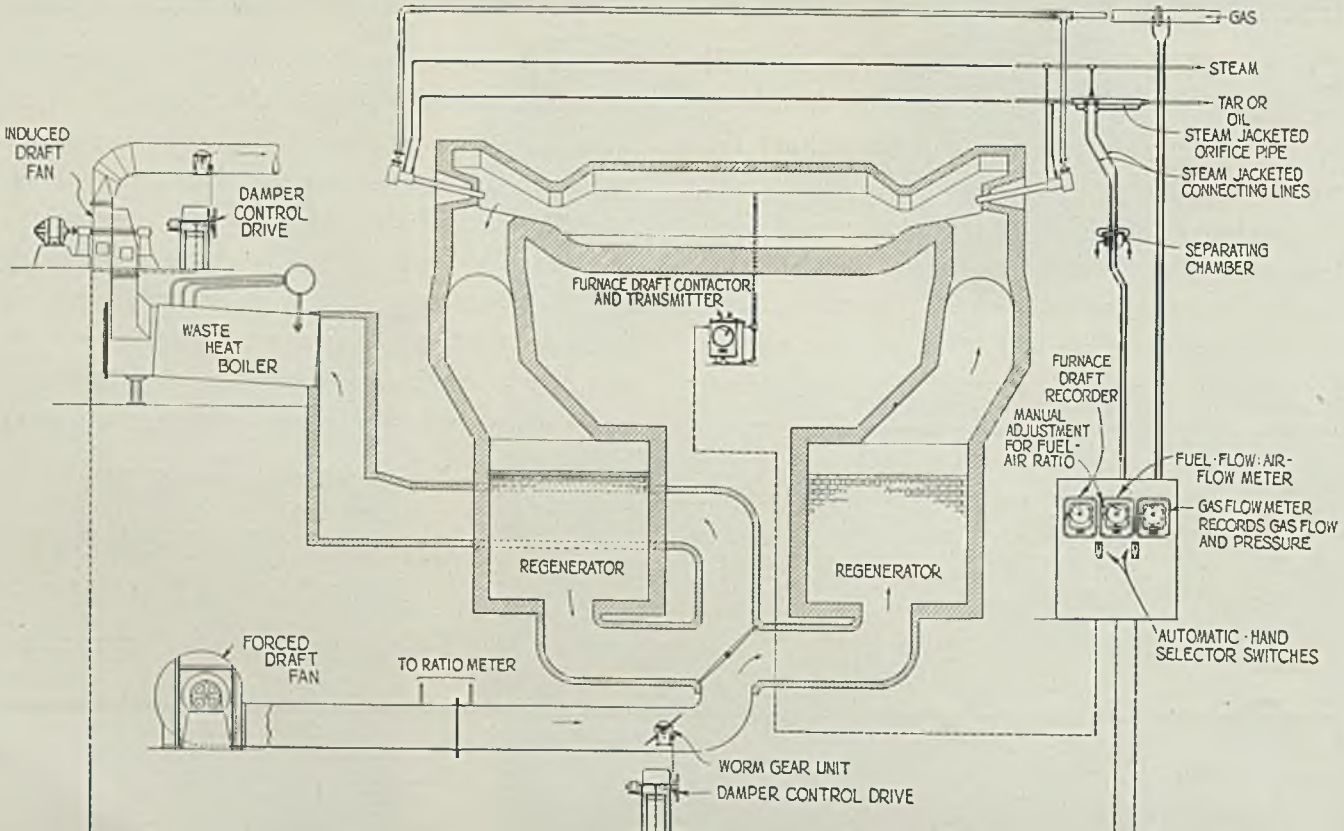
In this particular case, the fuel input is made up of gas, oil, tar, or any combination of these three fuels. Each fuel is carefully metered by separate recording instruments as it is fed to the furnace. The air supply for combustion then is proportioned to the combined or total B.t.u. fuel input. Information provided by the metering equipment enables sensitive control to be exercised over both the fuel and air supplies throughout all stages of the "heat." Dependable comparison can be made of results obtained with various methods of furnace operation.

Once the best operating procedure is empirically determined, the control system holds the furnace at its maximum capacity and efficiency. Automatically adjusting the fuel-air ratio and the furnace draft, it balances the air supply to the B.t.u. input to give the best furnace operation consistent with economical operation.

Three metering instruments with their respective regulatory accessories are employed: One records total heat input and at the same time—on the same slowly rotating chart—plots graphs traced by independently actuated pens to show both air flow and fuel gas flow. A second instrument posts the gas flow and gas pressure. A third records the open-hearth furnace draft.

First of these instruments is connected by linkages to the fuel-feed meters to co-ordinate the reading of the latter in terms of total flow of

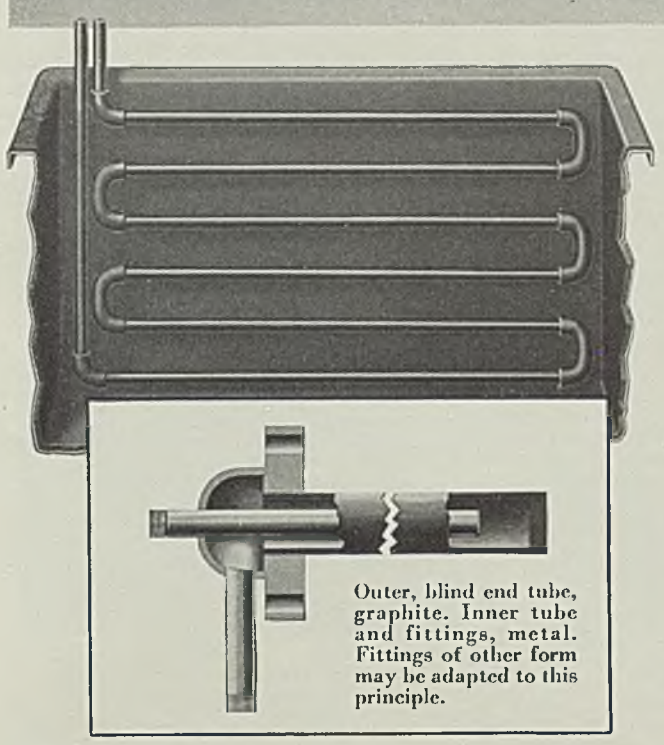
(*Please turn to Page* 99)




**Schematic diagram of the control system described. Courtesy Bailey Meter Co., 1050 Ivanhoe road, Cleveland**

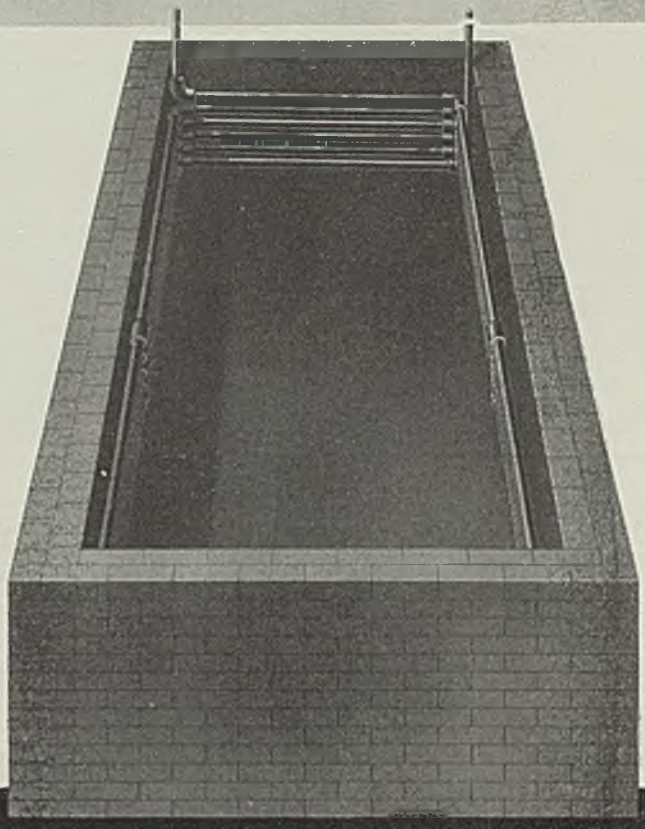
# AVOID DILUTION OF CORROSIVE BATHS

## AND SOLUTIONS HEATED BY INJECTION OF LOW PRESSURE STEAM





Outer, blind end tube, graphite. Inner tube and fittings, metal. Fittings of other form may be adapted to this principle.



- Graphite pipe and fittings have high heat conductivity, low coefficient of thermal expansion and good mechanical strength.
- They are immune to reaction with most of the materials encountered in chemical manufacturing industries at the concentrations and temperatures ordinarily employed.
- They resist the corrosive action of all acids, alkalies and salt solutions except those of highly oxidizing character.

## USE NATIONAL GRAPHITE PIPE AND FITTINGS

TRADE-MARK

- They are sufficiently impervious to carry low pressure steam without disturbing seepage.

*If a less pervious material than graphite is required, "Karbate" No. 2, a graphite base, corrosion resistant product, can be used on most applications.*

"NATIONAL" Carbon and Graphite Brick, Tile and Special Structural Shapes are used for lining vats and tanks and for other types of construction where resistance to corrosion is an essential property.

**NATIONAL CARBON COMPANY, INC.**

Unit of Union Carbide UCC and Carbon Corporation

Carbon Sales Division: Cleveland, Ohio

GENERAL OFFICES
30 East 42nd Street, New York, N. Y.

BRANCH SALES OFFICES
New York, Pittsburgh, Chicago, St. Louis, San Francisco

THE WORDS "NATIONAL," "KEMPRUF" AND "KARBATE" ARE TRADE-MARKS IDENTIFYING PRODUCTS OF NATIONAL CARBON COMPANY, INC.

# Foundrymen Arrange Program for Convention and Show in Chicago

■ A WELL-BALANCED series of technical, management and shop operation sessions will feature the forty-fourth annual convention of the American Foundrymen's association in Chicago, May 6-10. Technical sessions include a broad sweep of papers and committee reports on steel, gray iron, malleable and nonferrous foundry practice, refractories, sand research and patternmaking. In addition, several divisions will hold roundtable luncheons. Management sessions will focus attention on foreman and apprentice training, safety and hygiene, and costs. Two shop courses are scheduled—one on gray iron and the other on sand.

General convention events will include an informal stag smoker on the evening of May 7; the annual meeting and board of awards lecture on the morning of May 8; the annual banquet on the evening of May 9; several group dinners; and plant visitations throughout the week. Medals will be awarded at the business meeting.

A special microprojection demonstration showing the growth of crystals as metal changes from liquid to solid state will be presented on three days to enable as many as possible to see it.

The Foundry and Allied Industries show, to be held in International Amphitheater, will include 250 exhibits. Saturday, May 4, had been designated Preview Day for the benefit of local foundrymen. During convention week, the show will be open from 9 a.m. to 5:30 p.m. on Monday, Tuesday and Thursday; 11 a.m. to 6 p.m. on Wednesday; and 9 a.m. to 3:30 p.m. on Friday.

Headquarters for registration will be at International Amphitheater. Technical sessions during exhibit hours will convene in meeting rooms in the Saddle and Sirloin club adjacent to the Amphitheater; other sessions will be at the Palmer House.

Details of convention sessions are as follows:

**Monday, May 6**

MORNING

*Gray Iron Shop Course*

Session 1—"Cupola Operation." Discussion leader: John Grennan, University of Michigan, Ann Arbor, Mich.

AFTERNOON

*Plant Visitation*

Wisconsin Steel Works of International Harvester Co. and Museum of Science and Industry.

EVENING

*Engineering School and Plant Instructors*

Annual dinner. Discussion subject: "Dissemination of Information on Cast Metals to Students."

*Plant and Plant Equipment*

"Cooling and Storage of Foundry Sand," by H. L. McKinnon, C. O. Bartlett & Snow Co., Cleveland.

"Foundry Equipment at Indianapolis Plant, International Harvester Co.," by F. H. Amos, International Harvester Co., Chicago.

**Tuesday, May 7**

MORNING

*Sand Shop Course*

Session 1—"Nonferrous Shop Sand Control." Discussion leader: Donald May, Crane Co., Chicago.

*Apprentice Training*

"An Adaptable Apprentice Program," by A. L. Armantrout, Carnegie-Illinois Steel Corp., South Works, Chicago

"A Graduate Apprentice's Review of His Training," by C. W. Wade, Caterpillar Tractor Co., Peoria, Ill.

"Technique of Training Foundry Apprentices," by A. H. Wornom, Newport News Ship Building & Dry Dock Co., Newport News, Va.

*Malleable Cast Iron*

"Composite Molding in a Malleable Foundry," by Sam Healy, Saginaw Malleable Iron Division, General Motors Corp., Saginaw, Mich.

"An Unusual Structure in Malleable Iron," by Enrique Touceda, Malleable Founders' Society, Albany, N. Y.

"A Sand Control Program in a Malleable Foundry," by D. F. Sawtelle, Malleable Iron Fittings Co., Branford, Conn.

*Nonferrous*

"Procedure To Obtain Maximum Physical Properties in Melting a Given Alloy," by W. B. George, R. Lavin & Sons, Chicago.

"Improvements in Gas Melting Furnaces in the Nonferrous Foundry," by E. W. Williams, Equitable Gas Co., Pittsburgh.

AFTERNOON

*Patternmaking*

"Pattern Coating Materials," by Frank Cech, Cleveland Trade school, Cleveland, and V. J. Sedlon, Master Pattern Co., Cleveland.

"Pattern Color Markings," by G. V. Lustig, Barber-Colman Co., Rockford, Ill.

*Malleable Cast Iron*

"Effects of Manganese in Second-Stage Graphitization," by D. P. Forbes, P. A. Paulson and G. K. Minert, Gunite Foundries Corp., Rockford, Ill.

"Heat Treatment of Malleable Iron," by R. J. Cowan, Surface Combustion Corp., Toledo, O.

*Nonferrous*

"Nonferrous Applications of Top Pouring Methods," by A. K. Higgins, Allis-Chalmers Mfg. Co., Milwaukee.

"Tentatively Recommended Practices on Sand Cast Bronze, Red Brasses and Semi-red Brasses."

Annual business meeting of Nonferrous division. Reports of officers and committees.

*Gray Iron Shop Course*

Session 2—"Cupola Practice." Discussion leader: Donald J. Reese, International Nickel Co. Inc., New York.

EVENING

Smoker and Entertainment.

*Refractories*

"Comparison of Refractories for Cupola Service," by J. A. Bowers, American Cast Iron Pipe Co., Birmingham, Ala.

"Linings for Desulphurizing Ladles," by John Lowe, Vilter Mfg. Co., Milwaukee.

*Crystallization of Cast Metals*

"Growth of Crystals, Illustrated by Microprojection," demonstration by Dr. C. W. Mason, Cornell university, Ithaca, N. Y.

**Wednesday, May 8**

MORNING

*Sand Shop Course*

Session 2—"Gray Iron and Malleable Practice." Discussion leaders: Frank Brewster, Baker Perkins Co., Saginaw, Mich., and Charles Schofield, Chevrolet Motor Co., Gray Iron Foundry, Saginaw, Mich.

*Annual Business Meeting*

Reports of officers.

Awarding of medals.

Board of awards lecture, by Charles E. Wilson, executive vice president, General Motors Corp., Detroit.

NOON

*Nonferrous*

Luncheon and roundtable meeting. Discussion subjects: "Metal Covers, Fluxes, Deoxidizers and Degasifier Practice."

*Malleable*

Luncheon and roundtable meeting.

AFTERNOON

*Foundry Sand Research*

"Flowability of Molding Sands," by P. E. Kyle, Massachusetts Institute of Technology, Cambridge, Mass.

"Effect of Sand on Properties of Cast Iron," by Harry Dietert, Harry W. Dietert Co., Detroit.

"Effect of Sand on Properties of Cast Iron," by H. Womochel and C. C. Sigerfoos, Michigan State college, East Lansing, Mich.

"Notes on Clay Bonding of Molding Sand," by Harry L. Daasch, University of Vermont, Burlington, Vt.

*Gray Iron Shop Course*

Session 3—"Cupola Control by Gas Control," by S. C. Massari, Association of Manufacturers of Chilled Car Wheels, Chicago.

EVENING

*Nonferrous*

Annual dinner of Nonferrous division.

*Crystallization of Cast Metals*

"Growth of Crystals, Illustrated by Microprojection," demonstration by Dr. C. W. Mason, Cornell university, Ithaca, N. Y.

**Thursday, May 9**

MORNING

*Sand Shop Course*

Session 3—"Core Room Practice." Discussion leader: Fred L. Weaver, Great Lakes Foundry Sand Co., Detroit.

*Foreman Training*

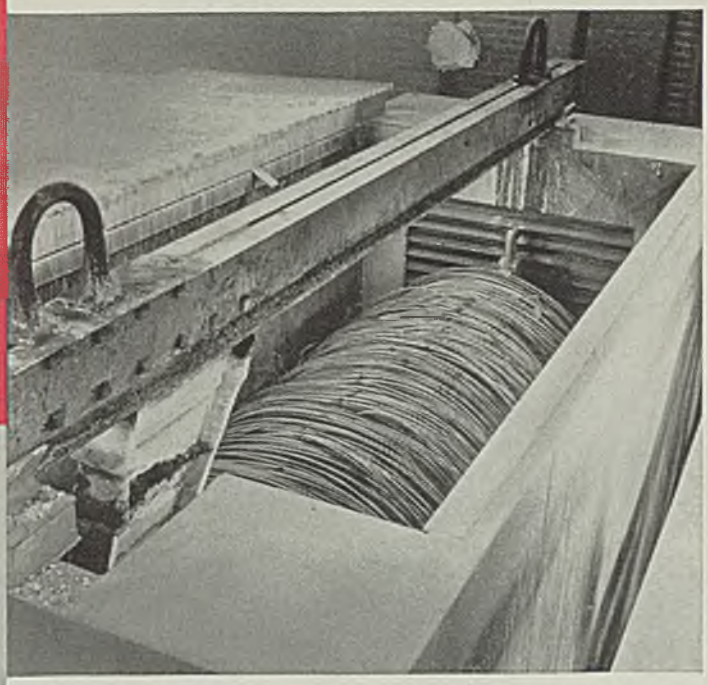
Roundtable discussion.

*Steel*

"Application of External Chills," by W. F. McKee, Key Co., East St. Louis, Ill. Committee reports.

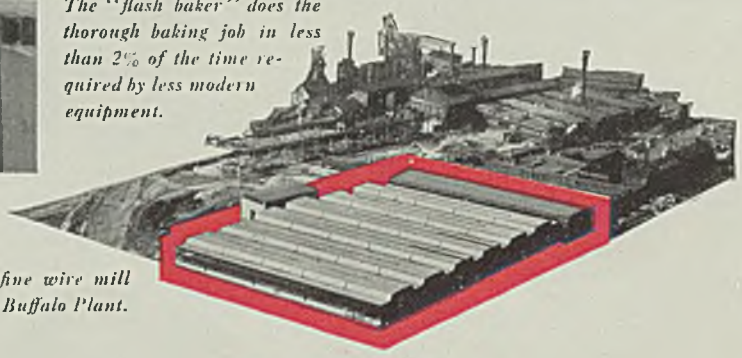
# NEW LAUNDERIZING EQUIPMENT

## turns hours into minutes!



*The process is continuous. Several batches may be "launderized" at the same time.*

*The "flash baker" does the thorough baking job in less than 2% of the time required by less modern equipment.*



*The new million-dollar fine wire mill of the Wickwire Spencer Buffalo Plant.*

Yes, in our new million-dollar fine wire mill at Buffalo, wire is *launderized!* The equipment responsible for this super-cleansing process is the most modern available—a straight line cleaning unit in combination with "flash bakers".

Yokes holding a ton and a half of rods travel by overhead crane and complete quickly and efficiently the cycle of acid immersion, washing, sulling, lime immersion and baking.

High pressure water jets scour the surface of rods and wire after cleaning and washing away all dirt and acid smut.

Next, the flash bakers go into action—and in approximately six minutes they do the thorough baking job which less modern equipment requires six hours to complete!

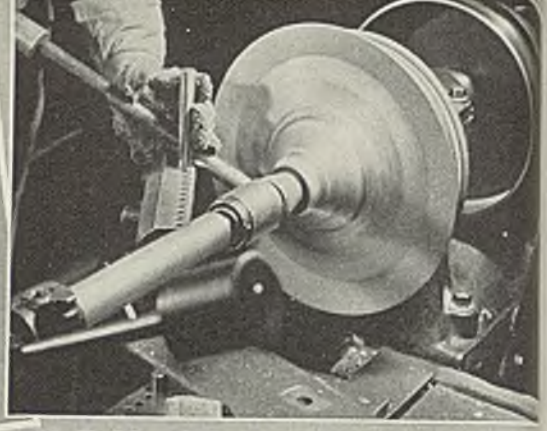
Such progress in the technique of manufacturing steel wire is characteristic of the Wickwire Spencer Steel Company, producers for more than a century of highest quality steel wire and wire products. Write us today about your wire requirements.

WICKWIRE SPENCER STEEL COMPANY

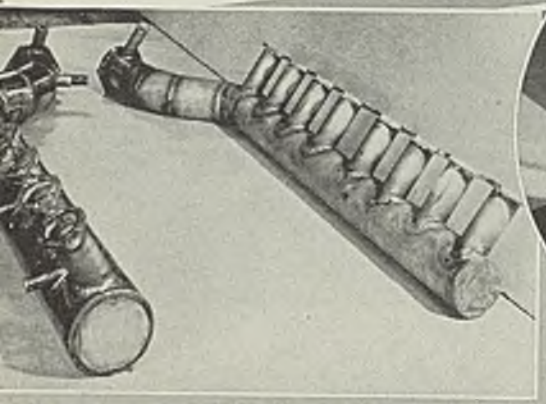
500 Fifth Ave., N.Y.; Buffalo, Chicago, Detroit, Worcester. Pacific Coast Headquarters: San Francisco. Warehouses: Los Angeles, Seattle. Export Sales Department: New York

# WISSCO WIRE BY WICKWIRE SPENCER

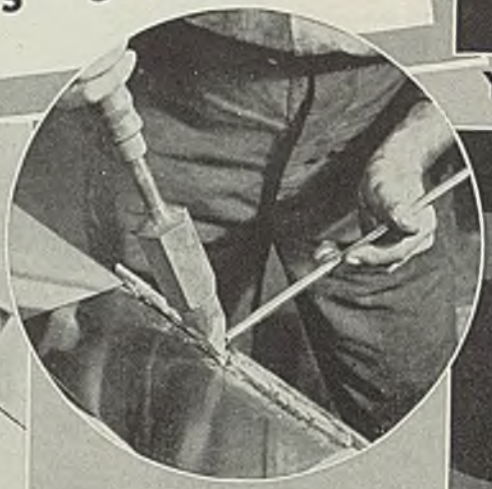
# SOME OF THE THINGS YOU CAN DO WITH *Enduro* STAINLESS STEEL



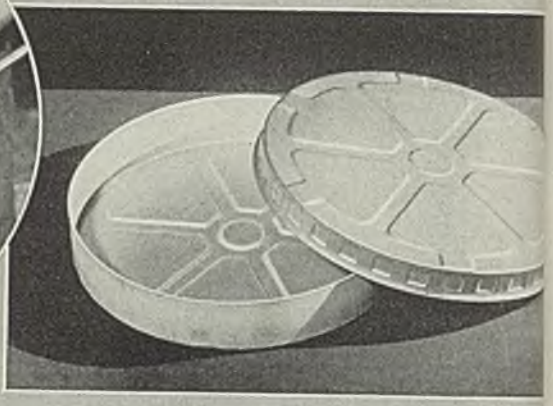
YOU CAN SPIN IT



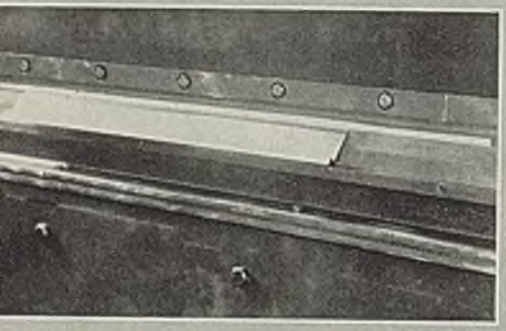
YOU CAN WELD IT



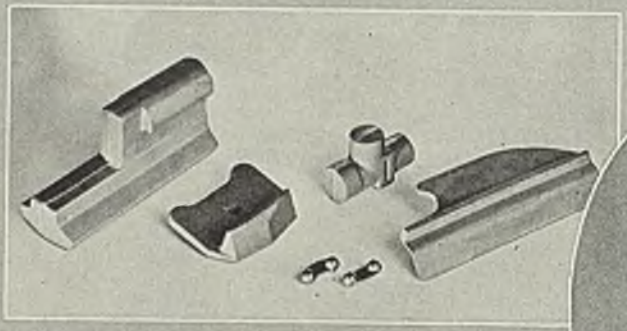
YOU CAN SOLDER IT



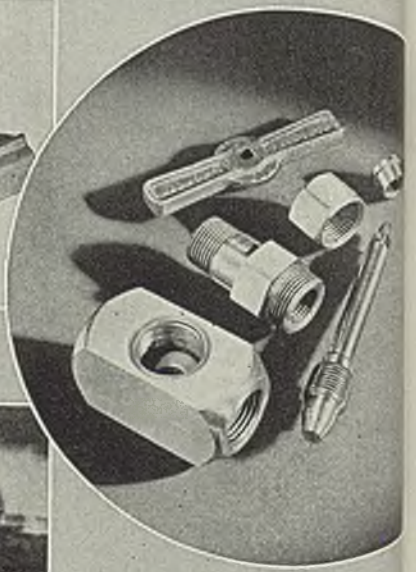
YOU CAN STAMP IT



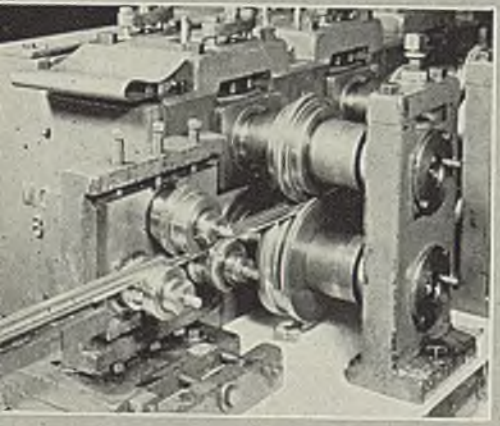
YOU CAN BEND IT



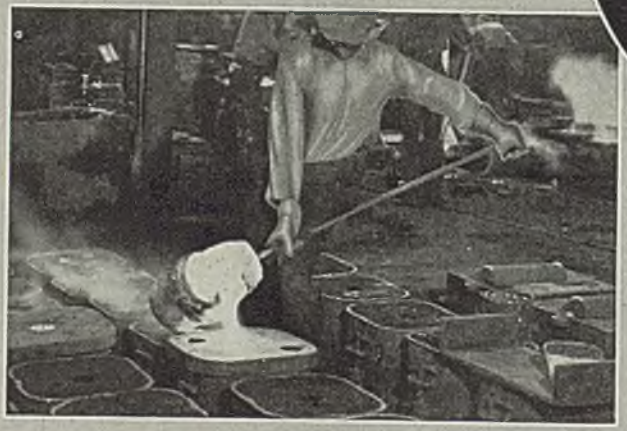
YOU CAN FORGE IT



YOU CAN MACHINE IT



YOU CAN ROLL IT



YOU CAN CAST IT

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REPUBLIC STEEL

*In fact, nearly anything you can do with other steels you can do with Republic ENDURO Stainless Steel. May we send you an informative book—"The Fabrication of Enduro"? Write Republic Steel Corporation, Alloy Steel Division, Massillon, Ohio;*

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NILES STEEL PRODUCTS DIVISION
STEEL AND TUBES DIVISION
UNION DRAWN STEEL DIVISION
TRUSCON STEEL COMPANY

*Sand Research*

Report of technical director, foundry sand research committee.

"Recent Experiments with Gray Iron Synthetic Molding Sands," by Fulton Holtby and Herbert Scoble, University of Minnesota, Minneapolis.

"Some Considerations of Effects of High Temperature on Sands," by Dr. H. Ries, Cornell university, Ithaca, N. Y.

"Sand Control in British Foundries," by J. J. Sheehan, Austin Foundries, Birmingham, England. Exchange paper of Institute of British Foundrymen.

NOON

*Gray Iron*

Luncheon and roundtable meeting.

AFTERNOON

*Gray Iron*

"Effects of Sulphur on Properties of Electric Furnace Cast Irons," by Fulton Holtby and R. L. Dowdell, University of Minnesota, Minneapolis.

"Effect of Varying the Silicon Content of Cast Iron," by F. G. Sefing, International Nickel Co. Inc., New York.

"Desulphurization of Cast Iron from Practical Operating Standpoint," by W. Levi, Lynchburg Foundry Co., Radford, Va.

*Steel*

"Effects of Welding on Structure of Some Cast and Wrought Steels," by A. J. Smith and J. W. Bolton, Lunkenheimer Co., Cincinnati.

Committee reports.

"Chaplets in Steel Castings," by H. F. Taylor, Naval Research Laboratory, Anacostia Station, Washington.

*Safety and Hygiene*

"A Safety Program for Small Foundries," by P. E. Rentschler, Hamilton Foundry & Machine Co., Hamilton, O.

"Workmen's Compensation and Occupational Disease Insurance," by Roger Bronson, Chicago.

*Gray Iron Shop Course*

Session 4—"Ladle Additions of Graphite to Cast Iron," by A. H. Dierker, Ohio State university, Columbus, O.

*Crystallization of Cast Metals*

"Growth of Crystals, Illustrated by Microprojection," demonstration by Dr. C. W. Mason, Cornell university, Ithaca, N. Y.

EVENING

*Annual Dinner*

Dinner and dance.

**Friday, May 10**

MORNING

*Sand Shop Course*

Session 4 — "Steel Foundry Practice." Discussion leader: L. H. Hahn, Sivyer Steel Casting Co., Chicago.

*Gray Iron*

"Damping Capacity, Electric and Thermal Conductivities and Endurance Properties of Some Gray Irons," by C. H. Lorig and V. H. Schnee, Battelle Memorial Institute, Columbus, O.

"Cast Iron Cylinder Bores—Observations on Microstructure, Composition, Hardness and Wear," by E. K. Smith, Electro Metallurgical Co., Detroit.

"Tendency of Some Cast Irons to Seize Under Sliding Friction," by A. H. Dierker, Ohio State university, Columbus, O.

*Steel*

"Application of Controlled Directional Solidification to Large Steel Castings," by J. A. Duma and S. W. Brinson, Norfolk Navy Yard, Norfolk, Va.

NOON

*Steel*

Luncheon and roundtable meeting.

AFTERNOON

*Gray Iron*

"Pearlitic Interval in Gray Iron," by Alfred Boyles, Battelle Memorial Institute, Columbus, O.

"Formation of Various Types of Graphite Patterns in Gray Cast Iron," by C. D'Amico and R. Schneidewind, University of Michigan, Ann Arbor, Mich.

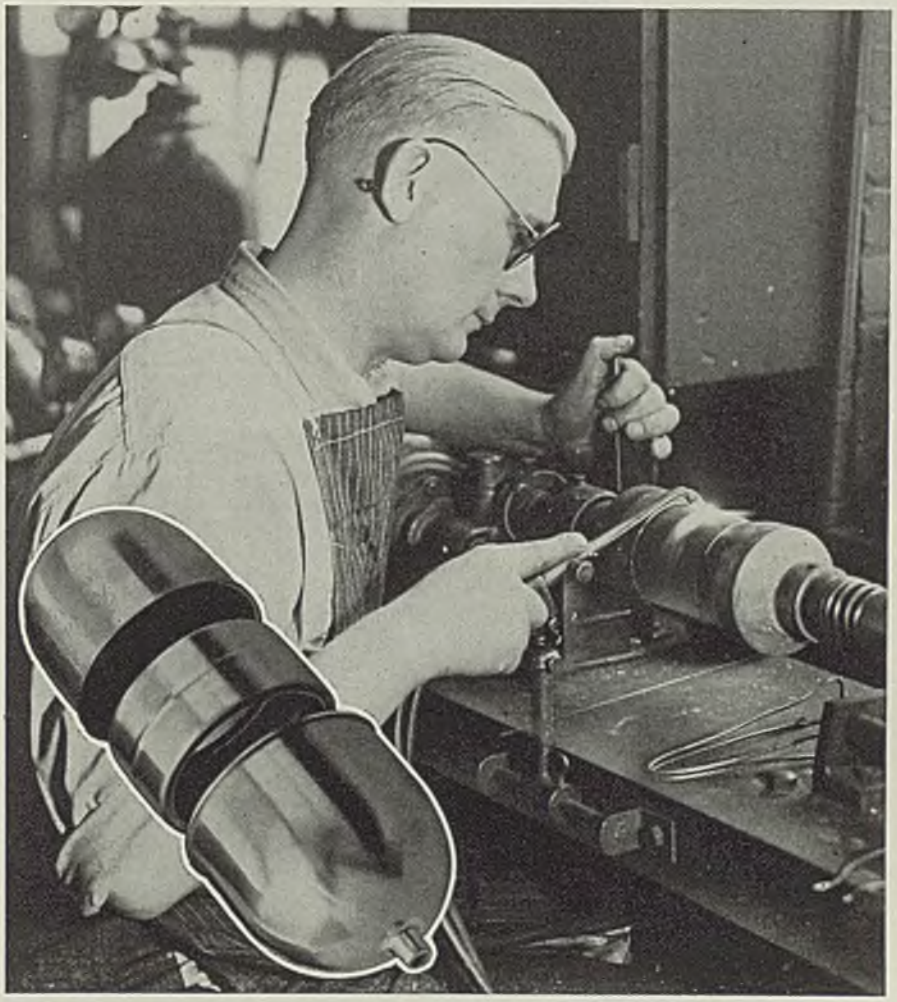
"Effects of Boron on Cast Iron," by G. M. Cover, Case School of Applied Science, Cleveland.

## New Chemical Has Many Industrial Uses

■ Ethyl polychlorobenzene, a new highly stable liquid for industrial uses, is announced by E. I. du Pont de Nemours & Co., Wilmington, Del. Properties suggest its application as a heat transfer fluid for electric condensers, pressure control mechanisms and as a nonflammable lubricant.

It can be boiled with aqueous solutions, including 20 per cent caustic soda or 20 per cent sulphuric acid, without appreciable change. Boiling range is high, 270 degrees Cent. to 320 degrees Cent. It sludges and darkens on long and continued refluxing at elevated temperatures in contact with iron, with a slight generation of hydrochloric acid. Chemical is less affected by copper and still less by aluminum. It is composed of ethyl tetrachlorobenzene and ethyl pentachlorobenzene in approximately equal proportions.

## Gas Welding on Lathe



■ Floats for column gages, made by Reliance Gauge Column Co., 5902 Carnegie avenue, Cleveland, consist of two halves or cups drawn from monel metal 0.016 to 0.062-inch thick with a steel reinforcing ring inside cups to align halves in assembly before welding.

Inset in the illustration shows two halves with reinforcing ring in between. A semi-automatic process is used to gas weld halves of float without use of rods. Halves are placed in a specially-built variable-speed lathe with speed controlled by a lever near operator's left hand. An oxyacetylene reducing flame melts edges of flanges to form weld. Excessive heat is absorbed by heavy jaws clamping float. Illustration courtesy International Nickel Co. Inc., 67 Wall street, New York.


# Coal Handling, Storage

*Caterpillar tractor hauling a carryall and pushing a bulldozer moves 130 tons of coal per hour. Piling method is developed which eliminates rise in temperature of coal stored for periods of 18 months and longer*

■ ONE THOUSAND tons of coal a day—that's the requirement of Dow Chemical Co. located on the shores of the Tittabawasse river at Midland, Mich. When a plant's coal requirements reach figures as large as that, several major problems of handling and storage present themselves. However, the same well planned methods also are suitable for smaller plants—in fact any plant storing coal.

This company's unique coal handling and storage methods have been attracting considerable attention. Wherever coal is used in quantities, these methods are either being studied or already have been adopted. The plan is simple, feasible, efficient and economical. It requires only a low overall capital investment.

Until 1937, the coal was stored in conical piles of 8000 to 12,000 tons each. See Fig. 2. Temperatures were taken weekly and an average rise in temperature of 0.5 degrees per day was noted. This is caused by the chemical reaction between oxygen in the air and the coal constituents.

In the past, coal was dumped directly from lake boats. Slack was piled loosely just as it fell, allowing free entry to air. In such a pile, natural classification soon caused a separation of fine and coarse particles, the former being more firmly compacted than the larger pieces. When a second load was piled on the first, the same thing happened, likewise with each succeeding load.

A glance at the cross section of the conical pile in Fig. 2 shows the oblique stratification caused by this method. Between each fine layer lies a coarse one which constitutes a sort of flue or series of them since it is loosely compacted. In case of fire, these operate in much the same fashion as their counterparts in chimneys. In other words, the warm air rising through them allows cold air to filter through the coal at the bottom of the pile and feed the flames.

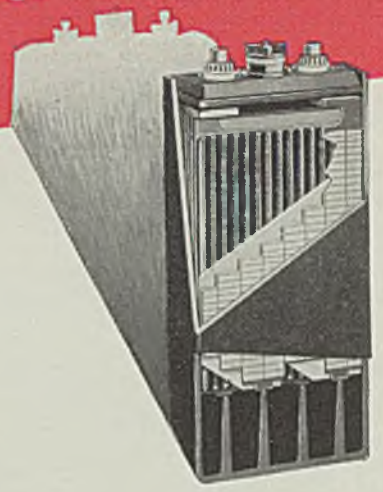
### Storage of Coal a Problem

It was often found necessary to repile the coal to eliminate this fire hazard. While this involved considerable expense, the cost was minor compared to that sustained when fires started, as anyone who has had the experience of subduing a blaze in a large coal pile can testify.

Until three years ago, however, the conical method of piling still seemed the most economical, but when at that time it became necessary to carry a larger stock for a longer period of time, various other possibilities in storage procedure were investigated. At this plant it was necessary to move the coal from where the freighters discharged it to a point 250 or 300 feet away. The problem was to store it in such a manner that additional handling would not be necessary, and it could be allowed to

**Fig. 1—A modern heating and air-conditioning device has been installed in this iron horse for the comfort and health of the operator. Hauling a carryall and shoving a bulldozer, this unit handles an average of 130 tons of coal per hour**

# MORE AND MORE BUYERS ARE LOOKING BACK OF THE PRODUCT WHEN THEY BUY



MOST storage batteries look very much alike—on the outside. With jars of black rubber and painted trays of wood or steel, even Exides look very little different from others. And if Exide develops a new size or type, such as the TLM, the ML, the FLM, and the MEH types, it is not many months before other manufacturers have a size to meet the Exide rating.

But what really matters are the things you seldom see—what is inside a cell, and what is back of the product.

Inside an Exide-Ironclad cell you will find a real difference. The construction of an Exide-Ironclad positive plate is unlike that of all others in this country. The active material of the plate is contained in hard rubber tubes slotted horizontally to permit free access of the electrolyte. 12½% more plate surface is exposed to the action of the electrolyte than in the regular flat pasted plate construction of the same dimensions.

This is but one advantage. The active material is so firmly held in place and its loss so greatly retarded that the Exide-Ironclad delivers two to three times the life of a battery with ordinary plate construction. All the inherent advantages of the regular type of lead battery are fully retained—its high power ability, high electrical efficiency, and low internal resistance, with great ruggedness and dependability in addition. Only the Exide-Ironclad can give you all these advantages.

Looking further, you see the company behind the battery, a company that is one of America's great institutions. Started 51 years ago with a small plant and an organization of five men, it consists today of vast factories with many acres of floor space and of assembling plants in principal cities the country over. It is a company grown to be the largest of its kind in the world because of the genuine merit of its products and its reputation for fair dealing.

It has always been devoted exclusively to the manufacture of one product—storage batteries—and its foundation policy has been to build its product for each class of service with the full measure of excellence that its long experience and ample resources could provide.

Behind the product also is a nation-wide service organization, which does not wait for you to call on it, but makes regular and frequent visits to plants in which Exides are used, with the purpose of insuring you the utmost in performance and the longest possible life from the battery.

Today, more and more buyers are looking back of the product before they buy. That is why more and more buy Exide. When you need a battery, don't base your selection on outside appearance only. Look behind it as well as inside—and you, as have thousands of others, will see why your new battery must be an Exide.

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**IRONCLAD**
**BATTERIES**
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*The World's Largest Manufacturers of Storage Batteries for Every Purpose*
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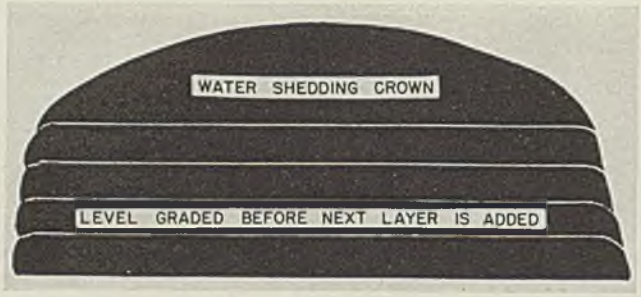


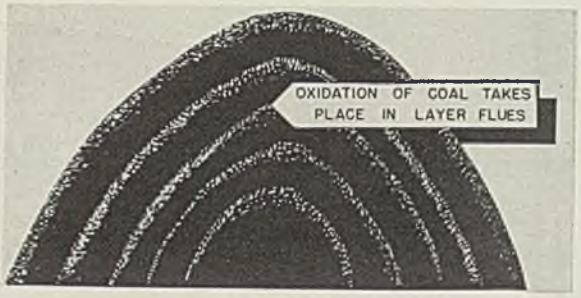




**Fig. 2—Stacking of coal in horizontal (at left) rather than oblique (at right) piles eliminates formation of flues and reduces the fire hazard. When no fire-breeding oxygen filters in, spontaneous combustion is prevented**

remain safely in such storage for many months.

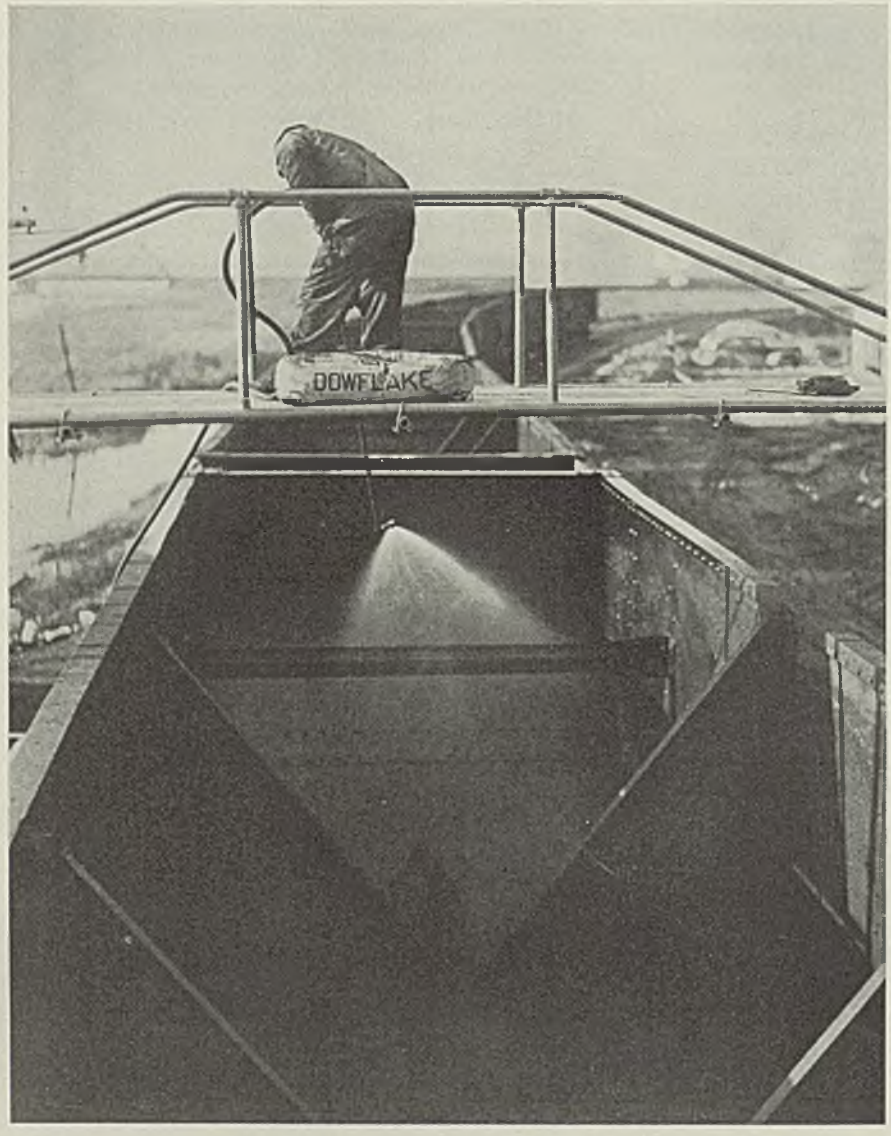
Coal now is stored in horizontal rather than oblique strata. See Fig. 2. This eliminates the formation of flue and reduces the fire hazard. There is little need to fear spontaneous combustion since coal is packed so tightly that little of the fire-breeding oxygen can filter in. Without oxygen, the coal cannot oxidize. Oxidation of course was the cause of the original heat. In the three years that Dow has been employing this method in the storing of its coal, no rises in temperature have been noted, even after 18 months of continuous storage.

Since this method of piling coal gives an extremely compact flat plateau, it is necessary to round off the top to insure proper drainage. With the correct pitch it is possible to achieve this with no appreciable increase in moisture content.

For loading, transporting and compacting, one caterpillar tractor hauling a carryall and shoving a bulldozer is used. This unit handles an average of 130 tons per hour. The cab is equipped with a special heating and air conditioning system and has other features

(*Please turn to Page* 101)

**Fig. 3—Coal is transported from Dow's docks at Bay City to the plant at Midland by railroad cars. Before loading the cars, they are sprayed with a calcium chloride solution which prevents the coal from freezing to the sides of the car**




## Machinable Insulating Material May Be Molded

■ Dielectric material in special size panels and full size sheets are now available in three grades from Chemetals Corp., Jamestown, N. Y. It can be machined to close tolerances, and also may be molded.

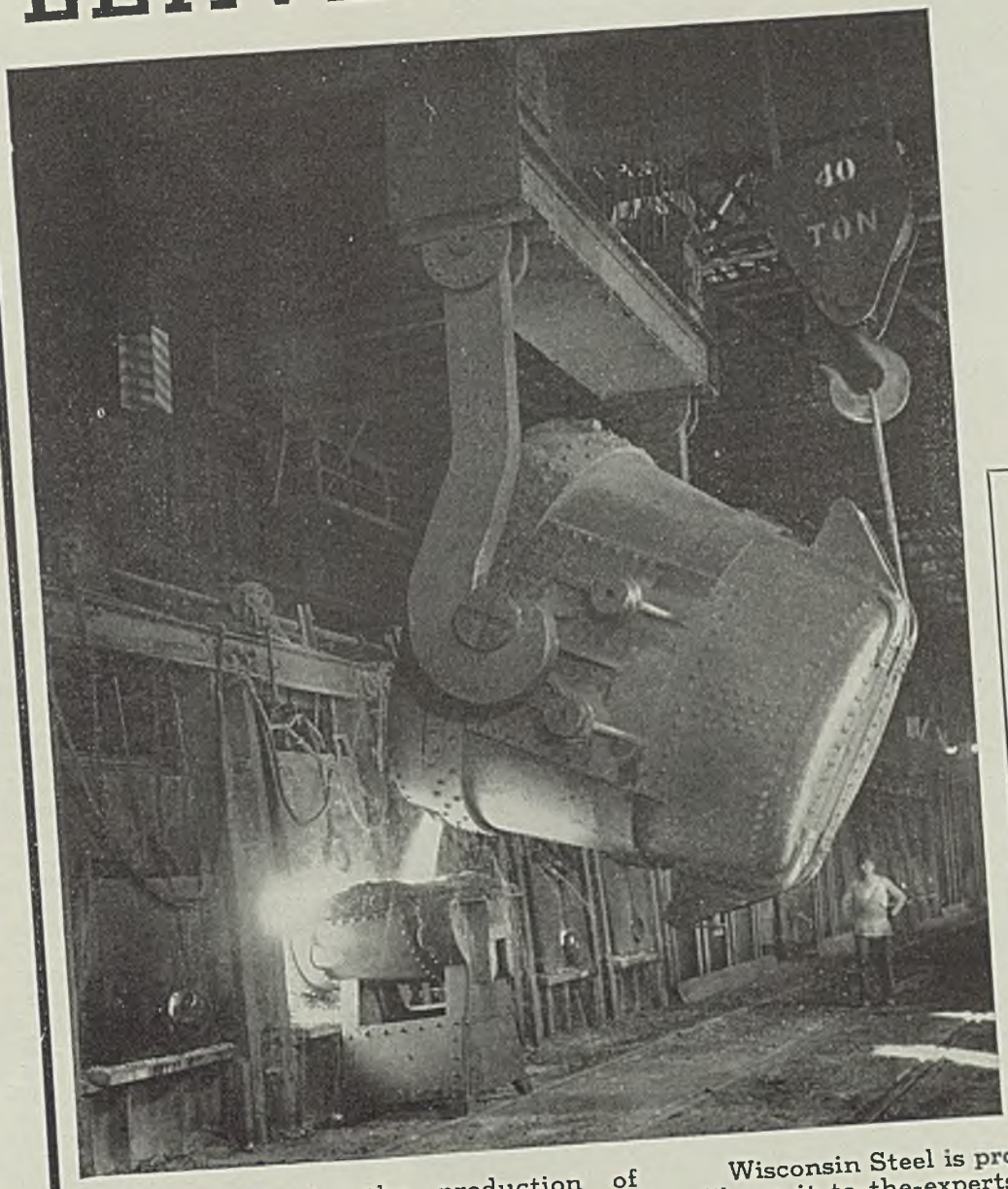
Insulating material, Chemetals D Board, passes the insurance underwriters' tests for mechanical strength, water absorption, flame and electrical resistance together with other requirements. Chemetals W Board is an acid and waterproof material, and Chemetals H Board is for heat resisting requirements.

## Welding Practice as Followed in Britain

■ *Welding Engineer's Pocket Book*, first American edition, cloth, 240 pages, 4 x 6¼ inches; published by Chemical Publishing Co. Inc., New York; supplied by STEEL, Cleveland, for $1.50.

A pocket volume, this book includes a wealth of information on various phases of welding as practiced in Great Britain. In view of increasing applications of welding and necessity of obtaining uniform results, tests for qualifications for welding operatives for various types of work are important, particularly in electric arc and oxyacetylene welding, where the result depends greatly on the human factor. Material in this volume serves as a guide to operators and those responsible for ascertaining the ability of operators.

# LEAVE IT TO *Experts*

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Every step in the production of Wisconsin Steel is entrusted to highly trained technical men. Men who know ore and coal are on the job at the mines. Men who know coke supervise the coking operations. Experts work closely with the laboratory in checking, testing, and inspecting the pig iron and other raw materials going into the manufacture of steel. Skilled metallurgists keep a constant vigil over the quality of the finished product.

Wisconsin Steel is produced under this "leave-it-to-the-experts" policy so that you get all the benefits. It is your assurance of high quality.

Ask us to send a representative to give you more information about these alloy and carbon steel and pig iron products.

**WISCONSIN STEEL COMPANY**

General Offices:
180 North Michigan Avenue Chicago, Illinois
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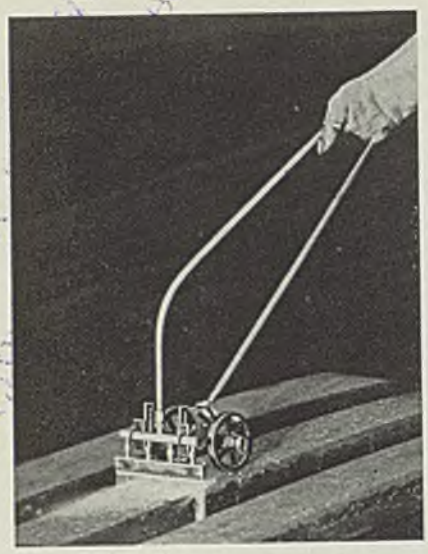
# WISCONSIN STEEL



By J. G. MAGRATH
Air Reduction Sales Co
Lincoln Building
New York

# FLA

***Deleterious effects of scale on steel surfaces are eliminated by removal and surface dehydration using oxyacetylene torches with special tips. Equipment also valuable in cleaning and paint removal***

■ GRADUAL recognition that thermalscaling of ferrous metals is a cause of both manufacturing and surface treatment difficulties has resulted in rapidly spreading interest in means for the swift removal of surface accumulations of this kind. Scale on steel billets in the mill prevents close inspection and makes it difficult to locate minute defects and very thin seams prior to flame scarfing or chipping.

On structural steel, loosening and flaking off of all mill scale takes the paint with it. Such conditions expose the steel prior to finish-painting and permit moisture to find its way between the remaining scale and the steel. After finish painting, it continues its destructive action so frequently inspection within a year shows large areas of exposed steel, atmospherically oxidized. Heavy maintenance costs are the result.

Heavy or hard scale on forgings and steel castings often damages cutting tools and sometimes conceals defects that may later cause failure.

In flame descaling billets, slabs, rounds, bar stock, blooms and ingots in the steel mill, the oxyacetylene torch is used in combination with brush-type tips, positioned so the enveloping flame completely covers the scaled surface for the width or expanse of the tip flames. These tips are mounted on wheeled carriages or hard-faced skids and are traversed over the surface at from 10 to 20 linear feet per minute to remove the maximum amount of scale. The high temperature rapidly heats the scale without overheating the base metal. A differential expansion results, causing the scale to lift, crack and fly off in particles ranging from 1/16 to ¼-inch in cross dimensions on billets, bars, rounds and slabs and from ⅛ to 1-inch cross dimension on forgings and steel castings.

While not providing complete scale removal on all grades of steels, it serves satisfactorily for most grades of carbon and low alloys. It reduces the tonnage pass-

Abstract from paper presented at annual meeting of American Welding society in Chicago, October, 1939.

Top of page, flame descaling steel billets using a multiflame tip mounted on wheeled carriage. Right angle assemblies are provided for descaling two faces of billets, one vertical and one horizontal, at one pass

A flat multiflame tip with hard-faced skids may be used. These tips likewise can be arranged to descale two surfaces at one pass

ME

# Descaling Cleaning Dehydrating

ing through the pickle and thus the amount of pickle waste. To supplement pickling, loose scale may be flame descaled and the remaining removed in a brief pickle with acid of reduced strength.

Flame descaling leaves a natural surface which is not recognized at first glance as being a "clean" surface. Close examination, however, discloses that the true unaltered surface of the metal is exposed. There is no chemical or physical action upon, or discoloring of, the base metal. The process is rapid and can be fitted into a production line.

On steel castings and forgings, flame descaling rapidly heats the high temperature and annealing scale without materially heating the base metal and causing unusual stresses to develop. While scale on steel castings will generally free itself in particles of 1/64 to ⅛-inch thickness and from ⅛ to 1-inch in cross dimension, forging scale may range to 3/16-inch in thickness and ¼ to ½-inch in cross dimension. Steel-casting scale will free itself down to the scale-steel interface with one pass, whereas forging scale may break free in two or more layers, requiring a second pass of the flames after the surface has sufficiently cooled from the first pass.

A round tip is generally accepted as a universal tip for forgings and steel castings. Its double circular group of neutral clear-cone flames provides a large volume of concentrated heat. It may be used on flat or irregular surfaces and for projections, corners and remote recesses. Ordinarily the tip is held in a vertical or near-vertical position about 2 inches from the work, swinging it sideways right and left for a spread of about 12 inches, progressively moving in a forward direction. Some tenacious scale may require that the tip be held closer to or against the work at an angle of about 45 degrees. A hard-faced annular protective and wearing ring is provided on the tip for this purpose.

For large flat areas, broad flat multiflame tips are used to advantage. They are available in widths from 2 to 12 inches in 2-inch increments. Mounted on renewable hardfaced skids, they are guided across the surface at 5 to 10 linear feet per minute, flame impingement angle approximately 45 degrees.

There is no graining, indentation or chisel marking. Defects, seams and fissures are exposed. The process is comparatively quiet and is safe in that there is little dust and it flies no considerable distance. It may be conducted in areas adjacent to other plant operations thereby eliminating handling or rehandling costs.

Size of object is not a limitation. Castings weighing from 1 pound to 100 tons or larger may be descaled. The flames will reach remote crevices and deep openings as the apparatus is flexible. There is no chemical or physical action upon, or discoloration of the base metal. Where painting follows on castings or forgings, the added beneficial action of surface dehydration is obtained.

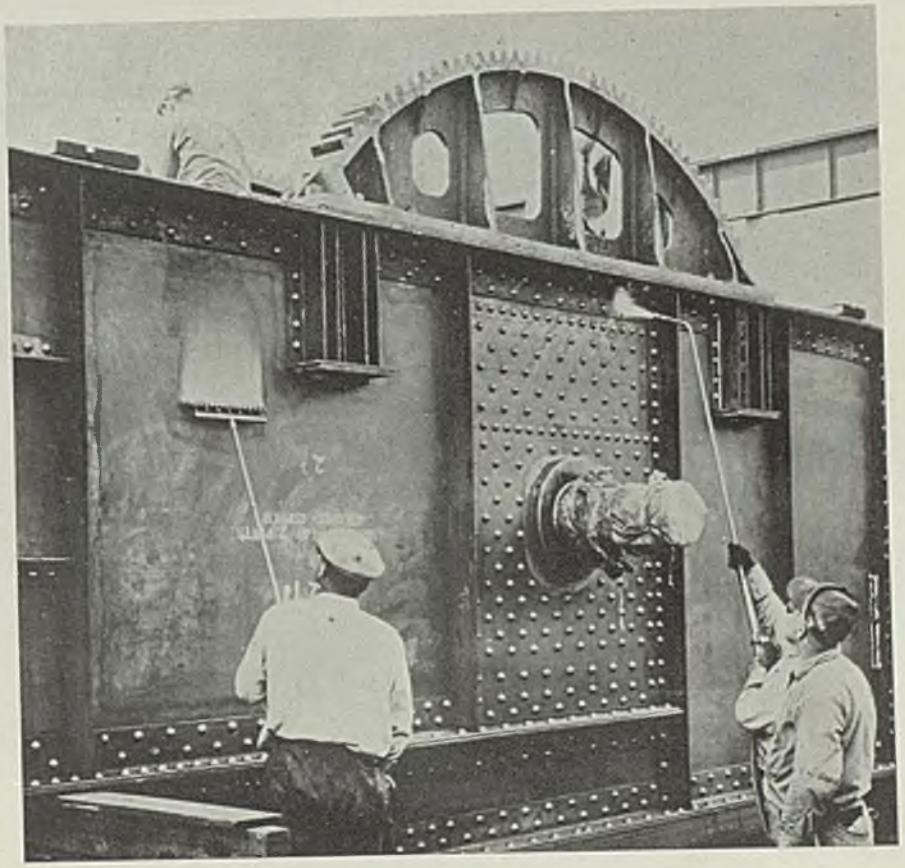
### Process Now Being Tested

Flame cleaning and dehydration is new and at present is being subjected to practical tests under normal conditions on erected steel bridge structures in the East. The process is based, promoted and accepted upon the theory that:

Occluded moisture within and beneath the scale and on the surface of the steel creates a condition favorable to the progressive loosening of the tenacious mill scale that would otherwise remain tight and afford protection. If painted with moisture present, as the scale loosens the paint likewise flakes off. Further, that incipient rust is a holder of moisture, causing deleterious action upon the steel.

Heating the steel above 212 degrees Fahr. expands or explodes free semitenacious scale, drives off moisture within the scale and rust as well as on the steel surface, leaving it in a warmed state very conducive to the adherence of paint.

If semitenacious mill scale is lifted free with partially loosened scale and powdered rust removed by hand wire-brushing and if the surface is fully dehydrated with the surface and edges of the remaining tight mill scale fully painted, then



Flame cleaning and dehydrating a bascule bridge girder at fabricating shop yard. Web plates are worked with a flat tip, rivet heads and irregular surfaces with a round tip

an inactive and protected surface is provided.

Accepting this theory, the high-temperature oxyacetylene flame provides a speedy, economical means of doing such work.

Flat tips mounted on renewable steel hardfaced wearing skids, provide a row of closely spaced small brush-like flames, guided across the surface at 10 to 20 linear feet per minute, flame impingement angle approximately 45 degrees. Widths of tips range from 2 to 12 inches in 2-inch increments. These are used generally on flat surfaces. Round tips having hard-faced annular wearing rings are more efficient for cleaning rivet heads, fittings, faying surfaces, corners and other projections inaccessible to flat tips. Rivet heads particularly carry a heavy scale.

As the flame progresses along the surface, a variable amount of the mill scale is loosened and cracked off due to the differential expansion between the scale and the base metal. Conversion to steam of occluded moisture within and beneath the scale explodes the scale clear of the steel surface. Fully loosened scales fly in a shower of small flakes and minute particles which rapidly fall earthward. There is no dust hazard. A further amount is partially loosened to such degree that it is easily broken free by a light wire-brushing immediately

The flames remove surface impurities other than oil and grease which are removed (degreased) beforehand with mineral spirits, benzine or gasoline. Sufficient heat is imparted to the steel to raise its surface temperature to a point above 212 degrees Fahr. (but below 300 degrees Fahr.) driving off all moisture. Sufficient heat remains in the steel for an extended period to allow for painting before recondensation of moisture occurs on the surface.

The process provides its own regulation and inspection. The operator quickly self-regulates his speed in that if operator moves too fast he will not lift sufficient scale. If he moves too slowly, the surface will be slightly fused but not to an injurious extent. Amount of scale that will loosen is dependent upon the age of the steel members and to what extent exposed.

Steel, fresh from the rolling mill and with little or no weather exposure, will seldom provide greater than a 10 to 15 per cent scale lift. On the other hand, steel which has been exposed for several months to atmospheric change may permit a scale-lift of 50 to 60 per cent.

The scale which will not lift either with the flame or the wire brushing that follows has proved on inspection to be definitely tight scale. There is no point in removing such scale, provided moisture is driven out.

The process provides a smooth natural surface with no graining of the steel. Application may be made in the shop adjacent to other plant machinery or in the field. There are no steel handling or re-handling costs. The application is simple and safe. There is little dust, so no health hazard.

Adherence to the recommended procedure is compulsory, if satisfactory results are to be expected.

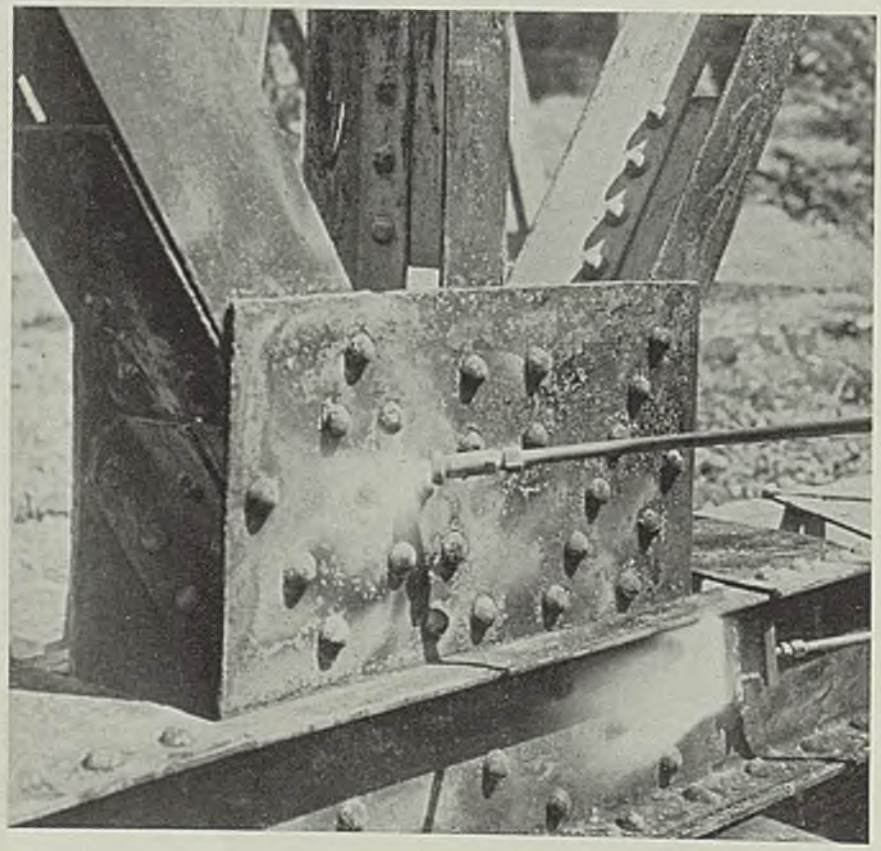
Paint burning and surface conditioning of old painted steel structures have met with considerable success. In the past, ineffectual methods of surface cleaning have resulted in large expenditures on steel bridge surface maintainance. A number of bridge engineers have arrived at the conclusion that the only satisfactory method of reconditioning such surfaces is the removal of the old paint either down to the base paint coat or down to the steel where possible, followed by properly conditioning of the base surface and repainting.

### Moisture Destructive Agent

Of more recent date is the recognition that dehydration of the surface, driving off all moisture, is an essential. If moisture is present when repainting occurs, it will continue its destructive action so intinue its destructive action.

Excellent results in paint burning and surface conditioning are provided by oxyacetylene multiflame apparatus. Quick results are obtained by using the round tip with multiple orifices on rivet heads and irregular surfaces and the various width flat tips for plane surfaces. The flames are quickly passed over the scaled, rusted and painted surface with a progressive reciprocating action. Rust and scale are freed and the old paint is caused to loosen and cockle. Sufficient heat is imparted to drive off moisture and to remain until painted, but not enough to cause any injurious action to the structure. Power wire-brushing immediately follows removing the loosened scale and cockled paint.

Where seven or eight coats of old paint are encountered, several passes of the flames with intermittent light hand wire-brushing can be employed. Considerable success has been experienced using a multiflame flexible head tip with heads which can be spread apart or bunched together as desired to fit the dimension and shape of structure being cleaned. Where advisable, scrapers may be employed between and after flame passes. If deterioration has progressed to an unusual degree resulting in a measurable thickness of iron oxide, it is advisable to flake off such accumulation with scrapers beforehand.



**Paint burning and surface conditioning an old bridge. Power wire brushing which follows will easily remove loosened rust, scale and cockled paint to permit a repainting job that will have the appearance of new steel**

Advertisement

# COPPER ALLOY BULLETIN

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

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

## Copper Tubing Used In Sorting Molecnles

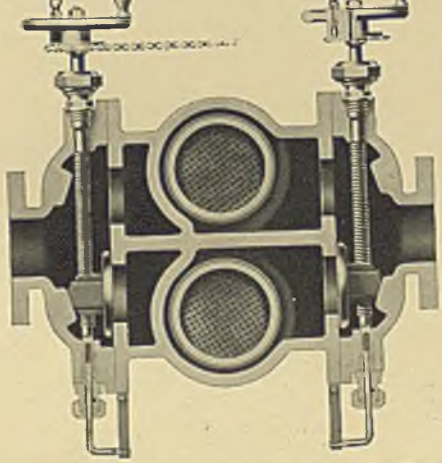
Seven thousand feet of copper tubing are used in a new spherical mass spectrometer, devised by Dr. John A. Hipple, Jr., Westinghouse Research Fellow, to sort molecules and their constituent atoms roughly according to their weight.

Electric power flowing through the copper tubing, which forms a shell around a vacuum tube, is used to create a magnetic field. The new device will be used in an attempt to uncover information about the way various gases break up into atoms.

## Duronze III Reduces Weight in Strainers

By substituting Duronze* III Rod for the leaded copper formerly used, Elliott Company has been able to effect a saving in weight in its Twin Oil Strainers. These strainers—the equivalent of two strainers in one—combine effective straining with uninterrupted service.

In addition to the weight saving, Duronze III offers strength advantages over leaded



copper—an important factor in production, since the rods are threaded for almost their entire length.

# Seamless Tubing Offers Unusual Potentialities for Fabricators

### *Can be Produced in Special Sizes and Shapes To Allow Economical Manufacture of Many Parts*

Seamless tubing, because it can be produced in special diameters, wall thicknesses, shapes, and lengths to meet customers' specifications, offers an interesting starting point for the fabrication of many types of parts. Miscellaneous hardware, screw machine parts, valves, door checks, lamp parts, fishing rod handles, and plumbing goods are a few of the possible applications.

Seamless tubing is available in a wide variety of alloys and tempers to meet individual requirements. It offers the manufacturer of parts an opportunity to purchase his materials in a form that may permit substantial savings, such as elimination of boring operations, savings in machining, and reduction in the amount of scrap.

### Typical Applications

Screw machine parts which must have a center hole, for example, can often be fabricated from seamless tubing furnished with the proper dimension of hole. Other applications may require a tube with a square, hexagonal, or octagonal exterior, and seamless tubing can be supplied in these shapes as well as round.

In other cases seamless tubing may prove more economical for the production of parts previously fabricated from sheet by cupping and drawing processes. The up-to-the-minute tube extrusion equipment recently installed at Bridgeport makes possible the production of tubing to meet these varied requirements.

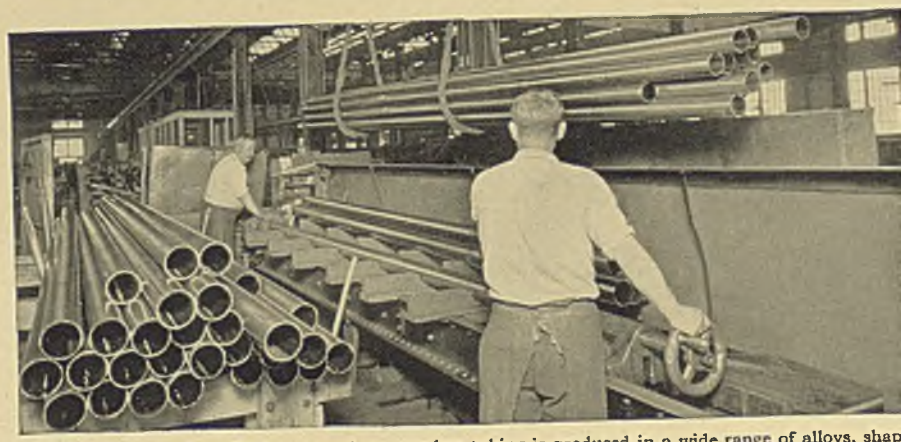
The suitability of seamless tubing for many applications is frequently determined by its relative economy compared with other forms of metal. The question whether its higher initial cost as raw material will be offset by savings in fabricating costs can best be determined by a study of the specific applications. Fabricators interested in the potentialities of seamless tubing are invited to discuss their problems with Bridgeport metallurgists.

### *1939 Index Now Ready*

The 1939 COPPER ALLOY BULLETIN index is now available for free distribution. All references which appeared in the BULLETIN during 1939 are thoroughly indexed and cross-indexed, including the products which appeared in the New Developments column. Write Bridgeport Brass Company for your copy of this helpful index.

## Flexible Couplings End Copper Tubing Fatigue

A flexible coupling for copper tubing provides a safeguard against vibratory action and prevents tube fatigue, it is claimed by the manufacturer. Fitting consists of an adapter body seated to receive a gasket which is swaged into the tubing by compression on a locknut. When the fitting is assembled, a flexible seat is formed which is said to permit the tubing to flex through a movement of several degrees.



View of the tube mill at Bridgeport, where seamless tubing is produced in a wide range of alloys, shap and sizes to meet specific requirements.

## ALLOYS OF COPPER

*This is the tenth of a series of articles on the properties and applications of the copper alloys, and begins the subject of 70-30 Brass.*

### 70-30 BRASS

From the standpoint of the theoretical metallurgist, it is perhaps surprising that the copper-zinc alloys possessing the highest physical strength are so seldom encountered in practice. The alloys containing 72-75% copper have greater strength and ductility than any of the other alpha copper-zinc alloys. Improvement in these properties over the 70-30 alloy, however, is not great enough to offset the higher cost.

Two former uses of these alloys of higher copper content are not generally followed now. The 75-25 alloy was used for brazed tubing, when this tubing was a standard product—probably because its higher melting temperature permitted ready brazing. The 72-28 alloy has been used to some extent for spring wire, because of its high strength, but 70-30 is now more commonly used.

### EFFECT OF COPPER CONTENT

The change in copper content from 80% to 70% is accompanied by an increased yellow color and the development of the properties common to the yellow brasses. Care must be taken to avoid subjecting the yellow brasses to service conditions under which season cracking or dezincification may occur. While the 80% alloy is more resistant to this type of failure, the alloys below 80% do not vary appreciably among themselves in this respect, and there is little to be gained by using the more costly 75-25 alloy in place of the 70-30.

For many years the 70-30 alloy has been used in this country for making cartridge cases, and the term "Cartridge Brass" has become synonymous with the 70-30 alloy. This use arises from the need for a combination of strength and ductility that cannot be so readily obtained in the lower copper content alpha alloys. Cartridge case production involves severe deep drawing, with maximum strength and ductility in the finished case. 70-30 brass is also used for other operations requiring maximum ductility.

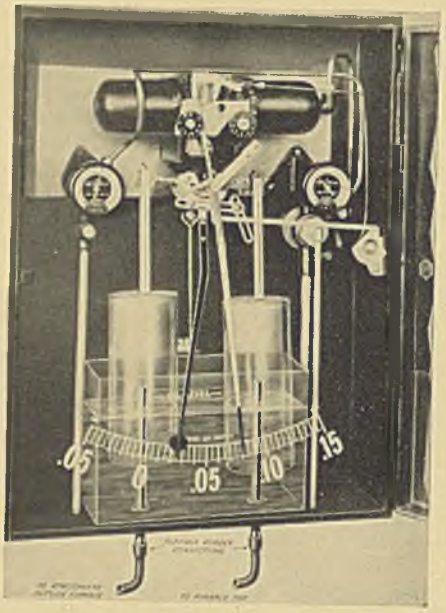
The 70-30 alloy is also widely used for brass tubing where maximum ductility is required, as in forming, bending, and expanding operations. Perhaps the largest use of this tubing is in wrought plumbing fittings and fixtures, where ductility for forming must be combined with a good surface for plating.

The subject of 70-30 brass will be continued in next month's issue.

## Brass Plays Vital Role In Controller Accuracy

The corrosion resistance of brass is an essential factor in the accurate functioning of The Brown Instrument Company's Furnace Pressure Controller. This instrument, designed for automatic control of low-range pressures and drafts, is so sensitive that it will instantly detect a change in pressure as small as 0.001" of water.

Operation is controlled by two inverted bells drawn from brass sheet. One bell is connected to the furnace tap, the other to atmospheric pressure. Since any change in




weight of the bells as a result of corrosion would throw the instrument out of calibration, the ability of brass to resist corrosion is a marked advantage.

Low costs of materials and tools are contributing factors in Brown Instrument Company's selection of brass for this application.

### *Memos on Brass—No. 8*

Brass is admirably adapted to cold heading because it is malleable before cold working, and acquires high strength, without becoming brittle, in the cold working process. Bolts, compression nuts, screws, and many other parts can be formed by this process.

## NEW DEVELOPMENTS

**A flexible cable** for arc welding is said to use fine stranded copper wire, enclosed inside a separator that permits stripping the outer rubber casing, in order to attach connectors without having to clean the rubber from the wire. It is available in sizes with current-carrying capacities ranging from 75 to 550 amperes. **(No. 20)**

**A sheet gager** is described as a mechanical micrometer that permits fast, accurate checking of the thickness of metal sheets. It uses a dial that is graduated in increments of 0.001 inch, and it is reported that the standard model will give from 8 to 38 gage readings per minute. **(No. 21)**

**A soldering tool** has a tip heated by a mixture of air and acetylene. Separate tubes pass through handles and shanks to deliver the air and acetylene. It is said that transmission of heat to tubes is minimized, so that the gas mixture remains cool until it reaches the combustion area. **(No. 22)**

**Insulated copper braids** are said to be useful for making connections between moving parts in enclosed equipment or where connectors may be exposed to accidental contacts. They are completely insulated except for ferrule ends. **(No. 23)**

**Heavier cuts and feeds** are reported to be possible with a new process for hardening high speed steel. Method is said to result in a hardness of 66 Rockwell C and a tensile strength of 600,000 pounds per square inch. It is claimed that breakage of tools is practically eliminated. **(No. 24)**

**A new liquid** is said to be suitable for stripping baked enamels, varnishes, lacquers, and paints from metals. According to the maker, it floats the finish away from the metal in two minutes or less; is used at a temperature of about 190-213 degrees F.; leaves a clean bright surface; does not affect brass, bronze, or copper. **(No. 25)**

**A threading tool** is said to cut bolt threads from ¼ to 1 inch and pipe threads from ⅛ to ¾ inch, either right or left hand, coarse or fine threads, American or British Whitworth standard. It is said that more than 100 sizes and kinds of dies are available. **(No. 26)**

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


## PRODUCTS OF THE BRIDGEPORT BRASS COMPANY

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

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

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

*Trade-name.

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

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

**LEDRITE* ROD**—For making automatic screw machine products.

"Bridgeport" BRASS CO.

*Established 1865*

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

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

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

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

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

# BRIDGEPORT BRASS

# BETWEEN HEATS WITH Shorty

*This will introduce "Shorty" Long. He works in the operating department of any steel plant. He gets around the mill a lot, "fans" with the open-hearth crews over in the melter's shanty, stops for a chat with the gang handling the levers up in the roller's pulpit, passes the time of day with the blower over at the blast furnace and is always welcome in the "front office."*

*"Shorty" will be telling in mill parlance some of the things that happen behind the scenes out in the plant. Now and then he will slip in some "inside dope," as he calls it, to let readers of* STEEL *in on certain things about to break in the steel industry.*

*But here is "Shorty."*

■ Say fellers:

On my day off at the plant last week, hopped a bus for a trip down the river to see my brother-in-law, "Skippy" Kirsch. He's a slagger over in No. 2 shop. Know 'im? Well, son, if you don't you've missed somethin'. He knows his stuff down in the pit and there's no monkeyin'.

Noticed a 11-furnace open-hearth shop across the river. Had brown fumes pourin' out a couple of stacks. Guess the boys on the floor were oreing down their heats. Thought came to me—wonder if the helpers were a crabbin' because they had to go after some rabbles? Heard one of the boys workin' on No. 5 at my place complainin' the other day. Trouble with some of those blue spectacled guys today is that they're too soft. Nothin' when I started out to use a half dozen rabbles a heat; but say, when you ask some of them to get on the end of one today they start a cussin'. Too bad they've never had some of those 24-hour tricks.

Mill 'cross the river must a been doin' pretty good for there was a lot a cars parked over near the gate and some of the boys wearin' skull caps were climbin' out of high-polished "cans," I'm tellin' you. Ah sure, I know they're not all paid for, but when you see some of the good lookin' sheets they're truckin' out of the mill to Detroit nowadays, you sort of get the itch. Ever had it yourself? Salve's no good for it, buddy. You don't get rid of it until you sign on the dotted line. I know and so do you.

By the way, heard the other day the boys from Detroit were snoopin' round the mill tryin' to get a line on some 90-inch fender stock. Understand only a couple or so mills in the country can roll it. New headlights make it kind of a tough job for the presses to work up but I guess the boys are tryin' their best to get their specifications on the mills just the same.

Well fellers, got a lot more stuff to tell you next week, so until then, I'll be seein' you.

"Shorty" Long

## White Metal Used for Photographic Negatives

■ Method of using light-gage nonferrous white metal for photographic negatives has been developed by Dr. Robert W. Carter, Taylor-Sloane Corp., 342 Madison avenue, New York. Metal is passed through an electrochemical treatment that inhibits it to certain chemical reactions. It then is treated by photographic emulsion coaters and dried in a coating alley.

In making negatives on metal no special apparatus is required. Technique is similar to that used for ordinary film. Developing and fixing of image is carried out in usual baths and standard formulae. In this connection, metal does not absorb any of the chemicals. It may be washed repeatedly and dried in a short time. Greatest advantage is it will not stretch or contract in photographic processes.

In making duplicates, metal negative may be placed in a standard epidiascope and copied upon paper or sensitized metal in usual manner. For enlargements, cellulose negative may be used and most positive accuracy obtained as co-efficients of expansion and contraction of metal base are constant at all temperatures.

As metal film has a reflective index as high as 85 per cent it can be utilized by motion picture machines. Light, in this respect, is placed in front of machine and a beam from light directed upon film as it passes through gate aperture. Image is reflected through lens to screen.

## Pickling Agent Insures More Uniform Action

■ New addition agent, Pickleen, for acid pickling recently developed by Enthone Co., New Haven, Conn., is said to save acid, clean metals of all greases and insure more uniform action.

Product is noninflammable, harmless to the skin and odorless. It is added to sulphuric or hydrochloric acid metal pickles to reduce their surface tension giving the acid solutions the same wetting and penetrating action as alkaline detergents. Only 1 pound of Pickleen is required for each 50 gallons of acid solution.

## "Bachelor's" Kitchen

■ Illustrated is the combination sink, electric burner and refrigerator introduced recently by Dwyer Products Corp., Michigan City, Ind., for use in bachelors' quarters, offices, etc. Top with recessed electric light raises to uncover porcelain enamel work surface with electric burners and sink recessed into it. Bottom of cabinet contains refrigerator, refrigerator unit, cutlery drawer and shelf storage space. Doors open by pressure on metal tabs and unit can be plugged into any 110-volt alternating current line.


# Organizing a Weldery

*To keep overhead down, plant must be laid out for maximum production in smallest possible floor space. If near market, location in small town advantageous. Well-trained workmen are essential*

**PART I**

By RICHARD W. STERNKE
Production Manager
Lakeside Bridge & Steel Co.
Milwaukee

■ THE COMMERCIAL weldery is a new type of plant which has come into existence during comparatively recent years to meet the demand for welded steel parts on a production basis. Regardless of whether a weldery is a portion of a large production or is part of a fabricating plant or is an entirely independent organization, those in charge may obtain some valuable information from the following material because here are described the underlying principles of operation showing a profit of $40,000 on one year's output of 1200 tons of welded products at $0.095 per pound, or gross sales of $228,000.

The principles for organizing and running a commecrial weldery detailed here are based on 20 years' experience in operating a structural steel fabricating plant. Starting with one 300-ampere welding machine 15 years ago, a commercial weldery has been built up within that plant using 18 welding machines at present to make a wide variety of welded products.

While there are larger as well as smaller organizations, a typical plant may be considered one having a monthly output of 100 tons of such items as machinery frames, bases, parts, gear cases, bearings, special tanks, hoppers, truck bodies, etc.

From paper in contest sponsored by James F. Lincoln Arc Welding Foundation, Box 5728, Cleveland.

**TABLE I—Initial Investment**

| | |
|---|---|
| Real estate | $5,000 |
| Buildings (factory and office), including heating equipment. | 60,000 |
| Railroad siding | 2,000 |
| Shop equipment | 74,000 |
| Office equipment | 1,500 |
| Raw material inventory, 200 tons (plates, bars, etc.) | 8,500 |
| Working capital | 28,000 |
| Total | $179,000 |

If a used building and part used equipment were purchased, this initial investment could be reduced to approximately $140,000.

### Small Town Taxes Lower

Plants should be located in or near some large manufacturing center to have a market close at hand for output of the weldery. If a railroad side track is available, a location outside of a large city or in a small town will be an advantage over a large city because of lower taxes and less labor disturbances. Plant should be laid out to get maximum production from smallest possible floor space and building volume, thereby keeping the first cost as low as possible as well as minimizing cost of heating, ventilating and lighting.

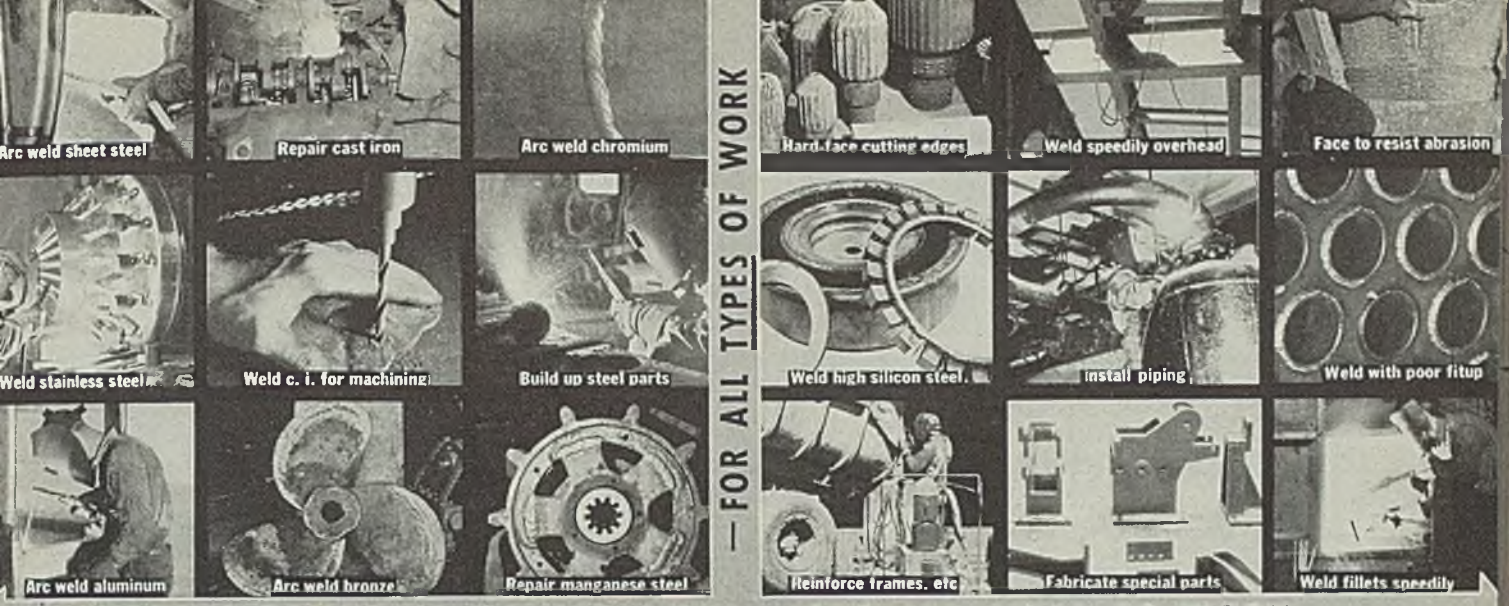
A good layout could be provided in a brick and steel building 100 x 140 feet with a center bay having a 50-foot span crane runway and a bay 25 feet wide on each side along the full length of the building.

Table I shows a schedule of original investment. It is based on cost of a new building and new equipment. However, there are many good industrial plants available which could be used as they are or altered at small cost to suit the requirements. Since many of these are distressed properties facing foreclosure, the owners may be willing to sell at a price much lower than cost of a new building.

Table II lists the machine and equipment required for shop of this size. While figures given likewise are for new equipment, good used

**TABLE II—Equipment Required for Commercial Weldery**

| | Approx. Cost Installed |
|---|---|
| 9 Arc welding machines, 400 amperes | $8,000 |
| 2 Dual stationary grinders, 12" | 450 |
| 1 Portable cutting machine | 50 |
| 1 No. 6 oxygraph | 1,750 |
| 1 Radiograph | 515 |
| 1 Bending brake, 10' between housings, ½" cap. | 8,000 |
| 1 Hydraulic straight press, 8' long bed 4' throat 4' gap | 10,000 |
| 2 Welding positioning machines | 4,500 |
| 1 Drill press, 4' radial | 2,400 |
| 1 Air compressor, 200 cu. ft. per min. | 2,000 |
| 3 Portable grinders (air) | 375 |
| 3 Chipping hammers (air) | 110 |
| 4 Fitting-up tables (cast iron slabs 6' x 12'—finished) | 1,600 |
| 1 Annealing furnace (oil burning), 7' x 23' I.D. | 5,000 |
| 1 Wet sand blasting equipment | 750 |
| 8 Jib cranes, 18' boom, 2-ton chain hoist | 3,000 |
| 2 3-ton cranes, floor control, 25' span | 8,000 |
| 1 10-ton crane, cab control, 50' span | 7,500 |
| Miscellaneous small tools and fixtures | 10,000 |
| Total | $74,000 |




## CURRENT RANGE 40 TO 250 AMPS. — FOR ALL SIZES OF WORK . . .


# LOOK WHAT $243 WILL BUY!

## The New 200-Amp. LINCOLN "Shield-Arc Jr."

**Covers the entire Welding Front**


- Current range 40 to 250 amps. with *continuous* control. Welds speedily all sizes of work from paper-thin sheets to heavy plates with electrodes as large as ¼-inch.
- D.C. arc permits high quality welding of all types of work—steel, alloys and non-ferrous metals.
- "Job Selector" permits setting for any *type* of arc to suit working conditions or type of joint.
- Designed and built to permit sustained welding at high speed.
- Price only $243 (portable model) f. o. b. Cleveland, freight prepaid.

**ENGINE DRIVEN.** 200-amp. rating. Weighs less than 900 lbs. Occupies floor space less than 8 sq. ft. Equipped with "Job Selector" and Current Control. Dependable industrial

**ELECTRIC DRIVEN.** Uses as little as 5c worth of power per hour. Also in ratings of 75, 100 and 150 amps. (Price $158, up.)

**COUPLED MODEL.** 200-amp. rating. Operates at 1800 r.p.m. Ideal for "build-your-own" engine driven or motor driven welders. Equipped with "Job Selector"

## ORDER YOUR 200-AMP. "JUNIOR" TODAY!

***Call the nearest Lincoln office today about this outstanding welder or mail the coupon***

The LINCOLN ELECTRIC CO., Dept. Y-15, Cleveland, O.

I'm interested in the New 200-amp. *"Shield-Arc Jr."* ☐ Electric Driven ☐ Engine Driven ☐ Coupled Model. Send particulars including payment details.

Name Position

Company

TABLE III—Organization of Men and Machines For Shop

| No. of Machines | Dept. or Machine | Men | Hourly Rate | Supervisor |
|---|---|---|---|---|
| | Templates and layout | 2 | @ 80c | |
| 1 | —Oxygraph | | | |
| 1 | —Radiograph | 2 | @ 70c | |
| 1 | —Portable cutting torch | | | |
| | Crane operator | 1 | @ 60c | |
| | Maintenance (electrician) | | | |
| | (mechanic) | 1 | @ 75c | 1 Foreman @ 90c |
| | Sweeper | | | |
| 1 | —Straightening machine | 1 | @ 50c | |
| | (hydraulic press) | 2 | 1 @ 75c, 1 @ 65c | |
| 1 | —Bending brake | | | |
| 1 | —Drill press | | | |
| 1 | —Air compressor | 1 | @ 65c | |
| | Tool room | | | |
| | Fitting | | | |
| 4 | —Welding machines | 4 | 2 @ 75c, 2 @ 65c | 1 Foreman @ 90c |
| 5 | —Welding Machines | 5 | 3 @ 75c, 2 @ 70c | |
| 3 | —Portable grinders | | | |
| 3 | —Chipping hammers | 3 | @ 60c | |
| 1 | —Annealing furnace | | | |
| 1 | —Sandblast room | 1 | @ 70c | 1 Foreman @ $1 (who also is asst. supt. and inspector) |
| | Floor man (stock clerk) (moving material) | 1 | @ 70c | |
| | Apprentices | 2 | @ 40c | |

Total Shop Men—29 (excluding watchman) Working Hours—40 hours per week
1 Watchman @ $90 per month. Av. weekly payroll, approx. $800.

machines can be obtained at up to 50 per cent reduction. Also the hydraulic press might be built in the weldery.

For most satisfactory service, all welding equipment should be new because improvements have been numerous during the past few years. Old machines not only are obsolete but cut down speed and efficiency of welding operators.

Assuming purchase of a used building, crane, bending brake, oxygraph cutter, emery wheel, drill press, annealing oven and new hydraulic press, welding equipment, positioning machine and fixtures, fitting slabs, sand blast equipment, etc., total initial investment possibly might be reduced to 30 or 40 per cent below cost of all new equipment.

### Experienced Men Needed

Development of welding has been so rapid that there are not enough experienced men available to fill executive and engineering positions. While many engineering and vocational schools are giving instruction in welding, most men obtainable from such sources have inadequate training and experience for top engineering positions although well fitted to become expert welders and foremen. Most engineers qualified to design welded work have had previous experience in other metalworking shops and have obtained their welding knowledge by observation and discussion of welding problems with a shop superintendent in charge of welding. Accumulating this experience is a slow process but appears best and only way available at the present time. A good structural engineer can become a good welding engineer if he will apply himself assiduously to getting the necessary training.

Most modern welderies are training young men in their shops. Starting with a high school or vocational school graduate of good intelligence, it requires from 2 to 3 years of intensive training, study and experience to make a good welder and about 5 years to make a good fitter.

Weldery of the size and capacity under consideration could be operated satisfactorily with 39 men including the supervisory staff and office force as enumerated in Table III. All shop supervisors including superintendent and foremen should have had several years of experience in some metalworking plant, preferably a steel-fabricating plant or a boiler shop. This is essential because these men should be thoroughly experienced in working steel plates and shapes and should be familiar with the behavior of mild steel and high-carbon steel when bent hot or cold and when machined, sheared, punched or cut with an oxyacetylene torch.

(Concluded next week)

## All-In-One Welding Cable Eliminates Kicking

■ New all-in-one welding cable employing method of neutralizing induction to eliminate cable kicking is announced by Progressive Welder Co., 3050 East Outer drive, Detroit. Due to its design, the unit known as No-Kik welding cable, eliminates interference with work. Welding current cables, water cooling lines and control cable are all sheathed in a single, seamless flexible rubber covering. Instead of two current carrying cables, the development has four. Method of arranging duplicate positive and negative cables neutralizes each others magnetic fields. At gun and transformer ends, each pair of positive and negative cables is joined together to provide a solid attachment. Currently offered in 250,000, 400,000 and 750,000 circular mils capacities and in 6, 8 and 10-foot lengths as standard, it may be supplied with special adapters for any gun welder-transformer combination.

## Research on Nepheline Syenite Published

■ Publication of bulletin 103 entitled, "Nepheline Syenite in Ceramic Wares" by C. J. Koenig, research engineer, is announced by Ohio State university, engineering experiment station, Columbus, O. The bulletin is the result of research made with the co-operation of Great Lakes Foundry Sand Co. and American Nepheline Corp. Some 74 pages, including diagrams, illustrations and tables are embodied in the publication which is offered at 40 cents.

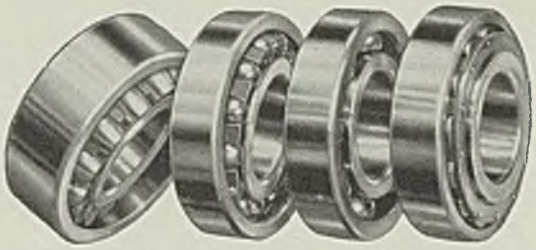
## Condensed Handbook on British Foundry Work

■ *Molding and Other Foundry Work*, by William Bell, past president Scottish branch, Institute of British Foundrymen; cloth, 124 pages, 4¾ x 7¼ inches; published by Chemical Publishing Co. Inc., New York; supplied by STEEL, Cleveland, for $1.50.

This may be regarded as a condensed or abridged version of a description covering the broad general subject of foundry practice, as applied particularly to jobbing foundries in Great Britain. In the limited space available the author presents information and instruction in a manner that cannot fail to be of benefit to the apprentice and to the jobbing journeyman whose opportunities for acquiring a technical education were not equal to the opportunities for acquiring the practical tricks of the trade.

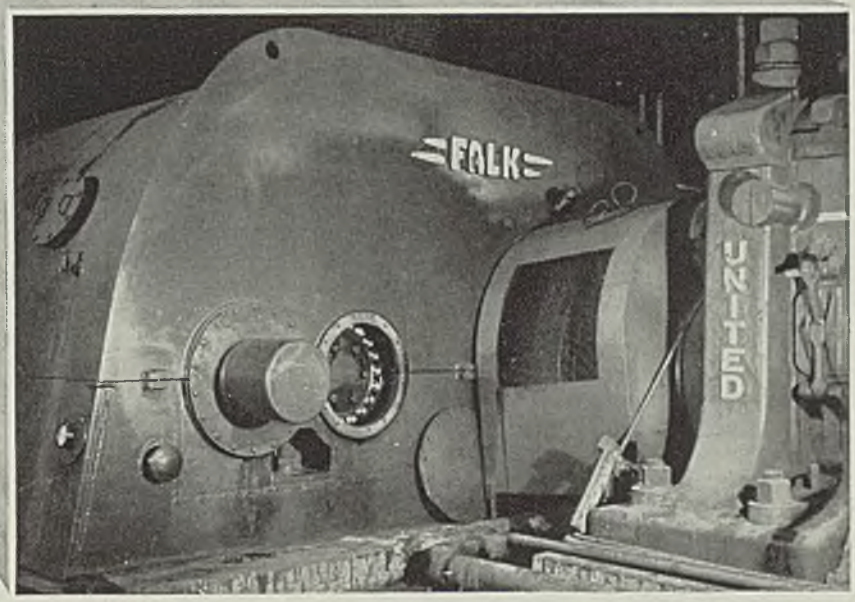
The text is supplemented by 10 tables and 71 illustrations. Scope of the work and general arrangement are shown by the following list of chapter headings: Introduction; foundry materials; molding sands, core sands and foundry facings; molding boxes, sling chains and ropes; chaplets and securing cores in molds; venting molds and cores; runners, gates and risers, denseners and feeding, shrinkage and contraction; pressure due to liquid metal in molds; molding, green sand, dry sand, loam and coremaking; cast iron and coke; the cupola; analysis for different classes of castings; mixing metal by analysis, foundry ladles.

# ARMCO, TOO, USES

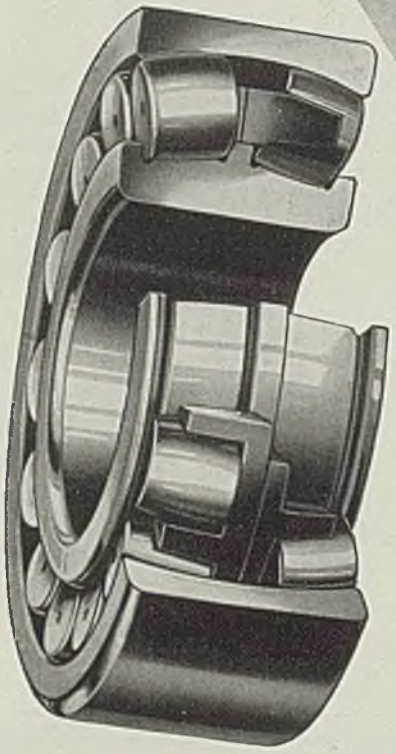


# SKF BEARINGS ON FALK DOUBLE REDUCTION GEARS

SKF
Puts the Right Bearing in the Right Place




*Double reduction gear, built by Falk Corp., delivering 4000 h.p. to a No. 3 roughing mill in the Middletown plant of the American Rolling Mill.*



BEARINGS THAT can take plenty of punishment are the kind of bearings you find on the intermediate shaft of this husky Falk double reduction gear. They're SKF Bearings, and that means ruggedness, long life and dependability.

SKF Spherical Roller Bearings have self-aligning characteristics that lengthen gear life and compensate for shaft deflections. They have the ability to sustain heavy loads, and the stamina to keep on sustaining them for years under severe service conditions.

To obtain these advantages on the equipment *you* build, send your specifications to our engineers TODAY. 4565

SKF
Ball and Roller Bearings

SKF INDUSTRIES, INC., FRONT ST. & ERIE AVE., PHILA., PA.

By HERBERT R. ISENBURGER
President
St. John X-Ray Service Inc.
Long Island City, N. Y.

# X-Ray Inspection

*Recent developments in industrial radiographic equipment and procedure broaden field for this form of nondestructive examination of metals and metal structures and speed-up locating of defects*

THE STRINGENT demands of industry as to quality of materials and workmanship gives prominence to the technique of material testing and inspection. Methods heretofore employed are becoming increasingly supplemented by x-ray, for through its use the minutest defect can be discovered and quality determined without injury to the object under examination. However, the maximum service of x-rays can be obtained only when the requisite aids, such as radiographic equipment and photographic materials, expert advice and proper interpretation of the results, are employed.

With the steadily growing demand of radiographic inspection in industry the art develops accordingly. Thus, more specialized x-ray units have been designed; time-saving procedure has been developed; material saving devices have been placed on the market; more trained personnel is available for consultation and help; and as experience is gained the application of x-ray inspection becomes more common and its usefulness more clearly resolved.

One of the most important parts of an x-ray installation is the x-ray tube. On its performance depends the energy output which gives the penetrating power as well as the sharpness of the resulting shadow picture. Both factors are ideally combined in the compact tube depicted in Fig. 1. This is a shock and rayproof tube powerful enough to penetrate 3 inches of steel in 1 minute with not more than 220 kilovolts and 8 milliamperes.

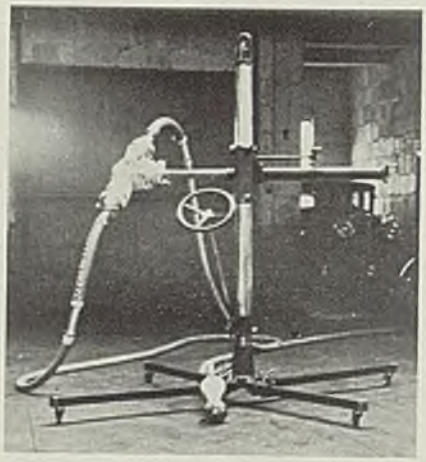


Fig. 1—Shock and rayproof x-ray tube mounted on flexible stand

A feature of this tube is the line-focus construction of the target. The area of the anode, bombarded by the stream of electrons emanating from the cathode, is a line as seen in the diagram, Fig. 2. To reduce this line to virtually a point source of x-rays, the anode surface is inclined at 19 degrees. When viewed from the direction of the central beam, the line appears as a spot. In this way a fine focal spot is assured utilizing the full energy output of the entire line. This accounts for great penetrating power and sharp details and definition in the exographs.

Besides a metal discharge chamber which absorbs most of the scattered and secondary "stem" radiation, a special electron grid which filters the rays and at the same time practically doubles the penetrating effect has been incorporated in this tube. The radiation is generated near the vicinity of the crest of the tension curve, and, therefore, the x-ray output with pulsating potential circuits is almost as large as on constant potential, but the half-value layer is larger than that obtained with tubes of conventional design operated on pulsating potential. Fig. 3 illustrates the principle of grid action.

While the compact design and practically point-source of radiation of this tube make it possible to work at close distance, this feature, at the same time, limits the area of exposure. The focus-film distance should be about twice as great as the length of the film. To obtain best results, the film

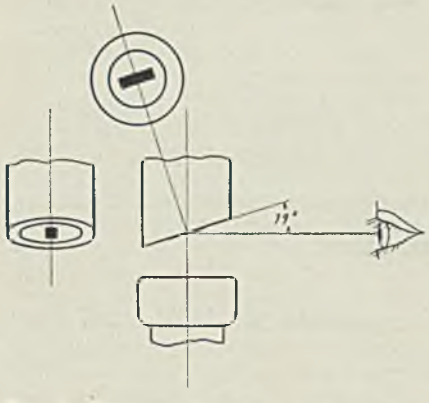


Fig. 2—Diagram illustrating line-focus principle of x-ray tube

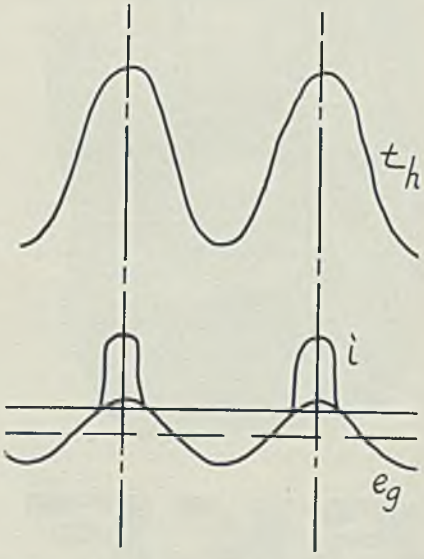



Fig. 3—Diagram illustrating principle of x-ray tube grid action

*for*

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B·S

# BROWN & SHARPE CUTTERS

TABLE I

Minimum Defects Detectable

| Thickness of steel, inches | Laboratory —Per cent of thickness— | Routine |
|---|---|---|
| ⅜ | 1¼ | 1½ |
| ¾ | 1 | 1 |
| 1¼ | 1 | 1¼ |
| 2 | 1¼ | 1½ |
| 2¾ | 1½ | 1¾ |
| 4 | 1¾ | 2 |

should be as close to the object as possible. The image of a defect is enlarged and distorted as the distance between it and the film is increased. This is one of the reasons why a 2 per cent defect, for instance, which is artificially located at the inside of an object (closer to the film) cannot be detected, whereas the 2 per cent marker placed on the tube side does show up.

The result of several years of practical experience and a great variety of special tests with our penetrameter[1] form the basis of Table I, which indicates the smallest possible defects which can be detected in various thicknesses of steel. While these results are considerably better than those obtainable with ordinary Coolidge tubes, they are not as good as recent reports indicate from the Kaiser Wilhelm Institute in Berlin-Dahlem.

As to the maximum thicknesses of metal to be penetrated successfully at various voltages, Table II shows the limitations obtained at 28-inch focus-film distance, and 5 milliamperes.

These results can be obtained only with the proper tools and knowledge of technique. An important tool already has been discussed in the foregoing. Its correct function depends upon the generating equipment and technique of application. It is determined by exposure charts, an example of which is given in Fig. 4.

These charts are for quick reference; for more accurate work, it is necessary, of course, to take into consideration such factors as the actual density of the material under investigation to determine the exposure factor,[2] and the length of the area under exposure. These factors do not make as great a difference on thickness below 2 inches of steel, but above 3 inches they are quite important and should be observed carefully.[3]

On greater thickness of material, whether steel, aluminum or anything else, we must take care of scattered rays coming from within such material. For this purpose different filter combinations have recently been developed by the writer and have been takn into consideration for the first time in the standard charts.[3]

Originally these filters were mounted in front of the individual film holders; now we have new cassettes with interchangeable fronts which contain the filter sets, Fig. 5.

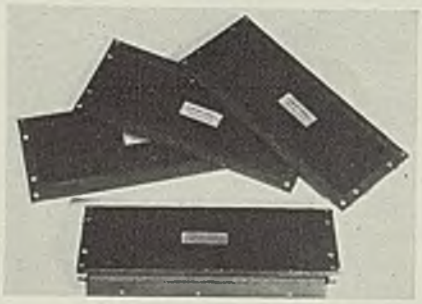


Fig. 5—Economy cassette with interchangeable filter fronts

[1]*X-Ray Symposium*, American Society for Testing Materials, 1936, pp. 22-24.

[2]*Transactions*, American Society for Metals, Vol. 23, 1934, pp. 614-620.

[3]*Metal Progress*, Oct. 1939, p. 418.

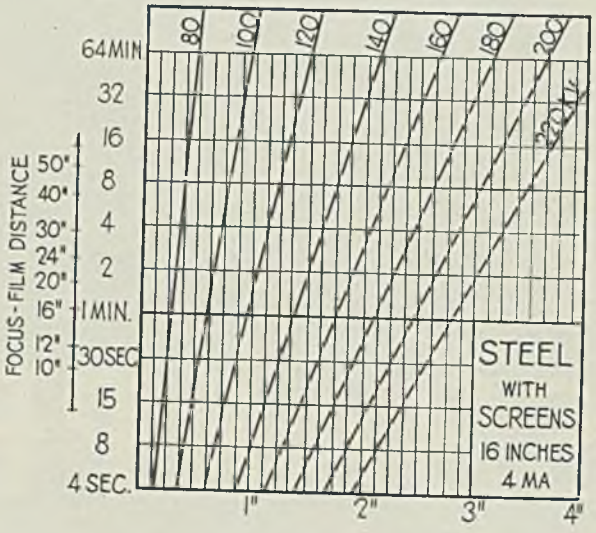



Fig. 4—X-ray exposure chart for steel

TABLE II

Practical Exposure Limits

| Kilovolts | Copper —Thickness in inches— | Steel | Aluminum |
|---|---|---|---|
| 100 | ⅜ | ¾ | 3½ |
| 150 | ¾ | 1½ | 6 |
| 200 | 2 | 2¾ | 10 |
| 250 | 2½ | 3½ | 13 |
| 300 | 3 | 4 | 15 |

Another advantage of these new cassettes is that they can always remain on the job. Only the lightweight folders[4] are taken back to the darkroom for loading the film, thereby eliminating the use of heavy and expensive metal cassettes. This enables the x-ray technician to have a larger supply of folders available, thus speeding up his work.

Another material saving device is in state of development. It has to do with the protection of the surface of intensifying screens which are easily spoiled by dust and other particles. Coating these surfaces with a fine film of a specially-prepared acetate base will lengthen the lifetime of intensifying screens almost indefinitely. And since these screens are necessary for best results and fast work, this development is of utmost importance for further progress in this field.

### How Defects Are Located

Such progress not only depends on time and material saving devices but improved technique and procedure play equally important parts. For example, it is frequently just as necessary to know where a defect is located than that it actually exists. In order to localize defects, we have developed the so-called "double exposure technique."[5] Today it is a simple matter to calculate how far from the inner surface a ⅝-inch displaced defect lies, for instance.

The thickness of this particular piece of steel we shall assume to be 1½ inches. Hence, the various displacements may be represented by a right triangle as in Fig. 8, with an altitude of 1½-inch and a base of ½-inch (the difference between the outer and inner displacements). Then by simple proportion the altitude of a similar triangle, with a base equal to the increased displacement of the defect over that of the inner marker, can be calculated. For the ⅝-inch displaced defect, this is ⅜-inch, meaning that the defect is ⅜-inch from the inner surface of the casting, for instance. Similarly, a defect of ¾-inch displacement in the present case lies

[4]STEEL, June 5, 1933, p. 76.

[5]*Industrial Radiography*, John Wiley & Sons, 1934, pp. 103-107.

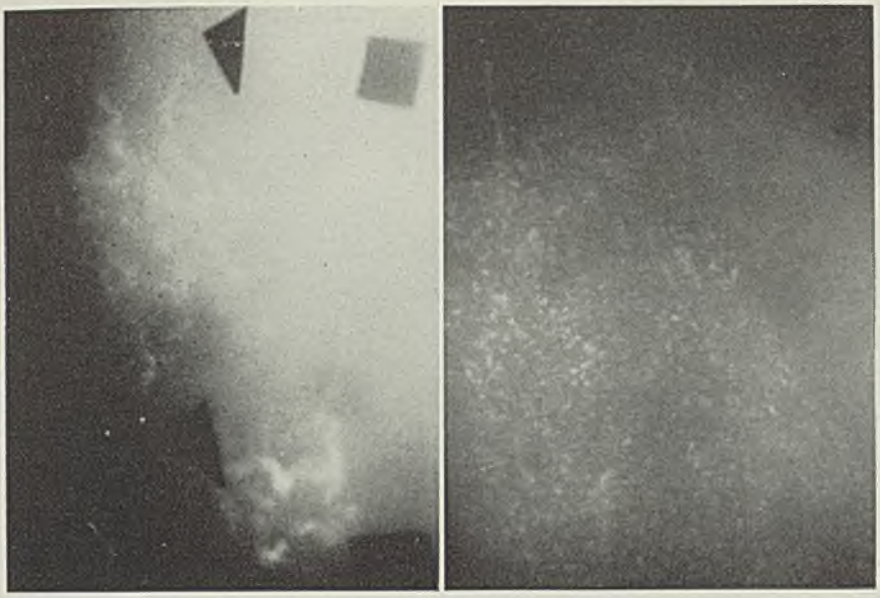


Fig. 6a (left)—Double exposure exograph of shrinkage in cast steel. Fig. 6b (right)—Exograph of same section after repair by welding

at the median line of the casting.

In this way, defects can be localized more easily, quickly and economically than by the stereoscopic method which necessitates the use of expensive equipment. This method makes it possible to observe the location of the defects about 10 minutes after the picture is made, while the negative is still in the fixing bath. Obviously, this speeds up production considerably. When using the stereoscope, it is necessary to wait until two negatives are completely dry and then depend on the judgment of the human eye.

To demonstrate from experience how a double exposure can be misused, Figs. 6a and 6b are presented. A fairly large cast steel valve body showed a shrinkage condition which was determined by double exposure, Fig. 6a, to be located at about the center of the wall. Inamuch as the casting was sound otherwise, the suggestion was made to use it "as is," that is. without repairing the shrinkage condition. However, the customer insisted on repairs. After the shrinkage condition had been found as indicated and was carefully chipped out, the cavity was repaired by welding in the customary way. Afterwards the section was re-x-rayed and a general porosity was found as shown in the exograph, Fig. 6b. As was anticipated, this condition proved to be worse than the original shrinkage.

In other words, if a casting is defective, it seldom pays to repair it. But if the defect is located in a position where sound metal is not absolutely necessary, it is permissible to use the casting which, in most cases, is better than to repair it.

It will be observed that the porosity in Fig. 6b is similar to the condition prevailing in Fig. 7c, which is an objectionable weld in ¾-inch steel plate stock. Fig. 7 shows three states of welds in the same material. Fig. 7a is perfectly sound (note the 0.005-inch hole showing in the penetrameter);[6] Fig. 7b shows acceptable porosity; and Fig. 7c shows nonacceptable porosity. In each case the beads have been machined off in accordance with navy specifications. The appearance of these welds is contrasted with Figs. 11a and 11b which represent welded seams in 1½-inch steel plate stock, top beads not removed. These two exographs show what two welders can accomplish with the same type of welding rod. Fig. 11a is a clean joint without major defects, whereas 11b is a poor weld with lack of penetration and slag inclusions.

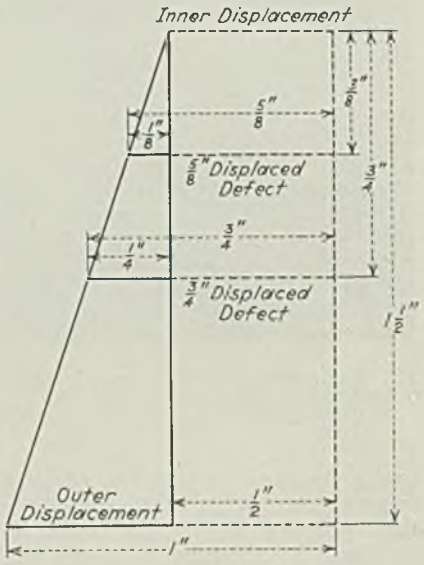



Fig. 8—Diagram illustrating double exposure technique

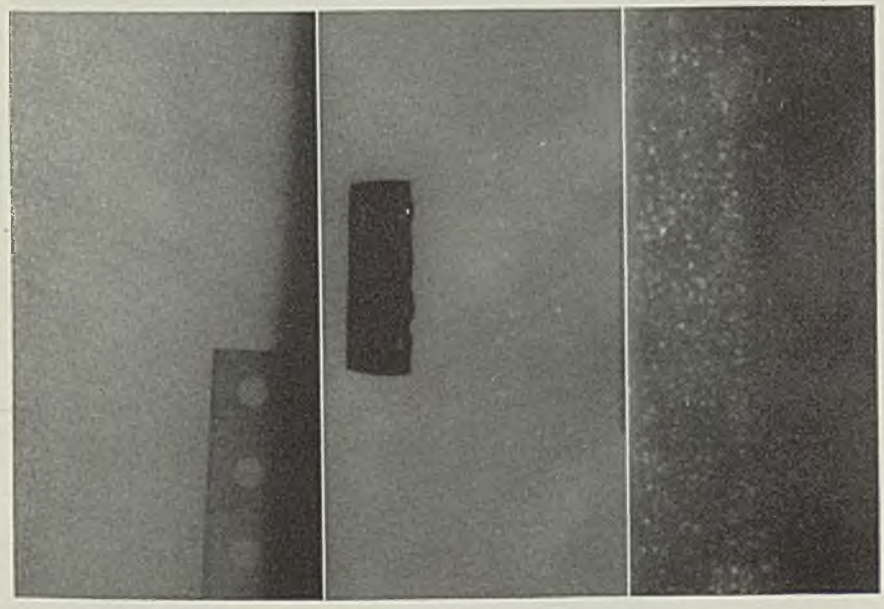


Fig. 7a (left)—Exograph of sound weld in ¾-inch steel plate stock. Fig. 7b (center)—Exograph of same plate stock with acceptable amount of porosity. Fig. 7c (right)—Exograph of same plate stock with nonacceptable porosity

Although the literature is full of examples where x-ray inspection has been employed on fusion welds, this method can be used equally successfully on fillet welds, provided a correct technique is employed.[7] Fig. 9 depicts an exograph of a fillet weld with blowholes. An important inspection job which included fillet welds was the examination of welded joints in the

[6] Addenda to *Unfired Pressure Vessel Code*, American Society of Mechanical Engineers, 1934, p. 117.

[7] *Industrial Radiography*, pp. 145-147.

Ruegendamm railroad bridges. X-ray inspection was prescribed for butt-welded joints of the first grade, that is, those designed on the assumption of the maximum permissible stress. As a result of the x-ray examination, rewelding for the correction of defects was necessary in: 3 per cent of the flange joints welded on site; 6 per cent of the flange joints welded in workshops; 10 per cent of the webb joints welded on site; and 14 per cent of the webb joints welded in shops.[8] These figures indicate that welding on site was carried out yet more carefully and successfully than in shops. This checks with our own experience with field welded pipe joints.

Another important field of application which recently has received more attention is the aircraft industry. Here, x-ray inspection of the smallest parts, Fig. 10, to the

Fig. 9—Exograph of fillet weld in steel indicating blowholes

entire fuselage structure is of vital importance. X-ray equipment for that purpose should not only be available in airplane factories, but all airports should be equipped with portable units for quick check-ups when the motor is overhauled or for any emergencies.

These few examples suffice to show that steady progress is being made. In a highly technical field like x-ray inspection, more so than other fields, it is of paramount importance to have the correct tools available and to possess sufficient knowledge and experience. Otherwise the results may be misleading and worse than if no inspection were made at all. When applied properly, x-rays offer a means to prove beyond any doubt the soundness of material.

[8]*Railway Gazette*, Jan. 20, 1939, p. 102.

## Specifications Released To Guide Enamel Users

■ A complete set of standard specifications for porcelain enamel supplies aimed at adequately informing purchasing agents and plant superintendents, has been prepared by Porcelain Enamel & Mfg. Co., Eastern and Pemco avenues, Baltimore.

They prescribe grades of material which have been found most suitable in producing high-quality porcelain enamelware, and furnish methods of test to determine whether or not materials purchased meet specifications.

Specifications include following porcelain enameling supplies: Ammonium carbonate, barium carbonate, bentonite, borax, calcium chloride, clear clay, powdered enameling clays, unrefined clays, cleaner, titanium dioxide, dyes for stainless enamels, epsom salt, feldspar, flint, magnesium carbonate (light), nepheline syenite, enamel opacifiers, ceramic coloring oxides, zinc oxide, pickling acid, potash alum, sodium aluminate, sodium nitrite, ammonium alum and soda ash.

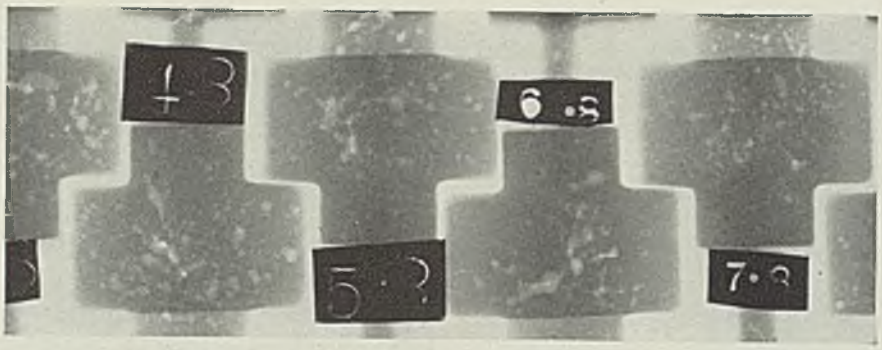


Fig. 10—Exograph of small aluminum aircraft parts, badly defective

## Bakelite Corp. Holds Last Technical Meeting

■ Third and last of a series of three technical meetings sponsored by Bakelite Corp., Unit of Union Carbide & Carbon Corp., 247 Park avenue, New York, was held at Franklin Institute in Philadelphia Tuesday evening, March 12.

D. J. O'Connor, president, Formica Insulation Co., spoke on "New Developments in Laminated Plastics," and discussed acceptance of laminated material by furniture designers and architects. George R. Meyercord, president, Haskelite Mfg. Corp., spoke on "Improved Bakelite Resin-Bonded Wood Structures." He described how plywood had been faced with metal to give it greater strength and how a thin sheet of asbestos was enclosed within the panel for greater fire protection.

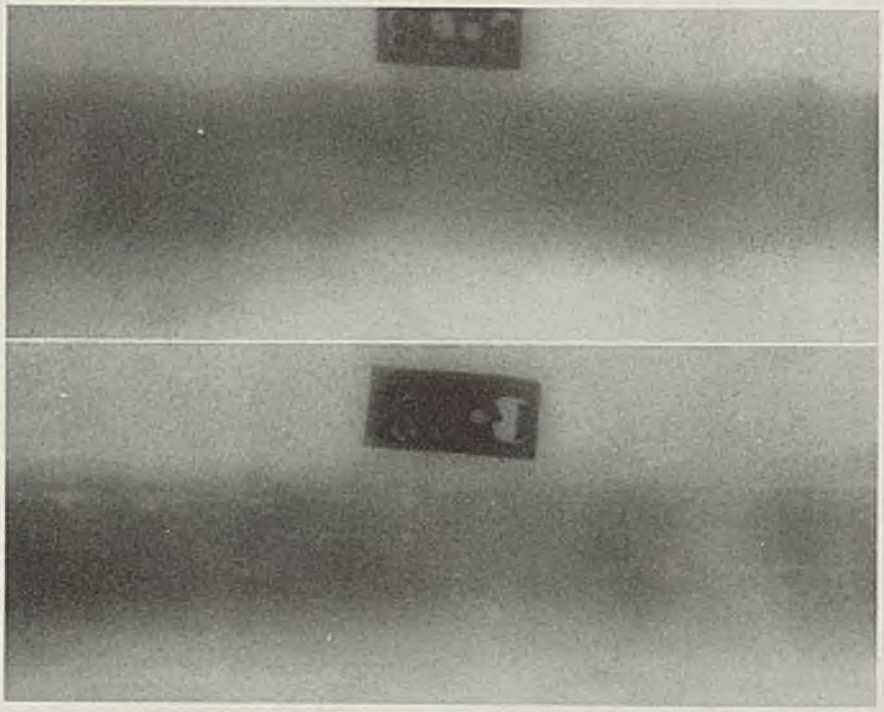
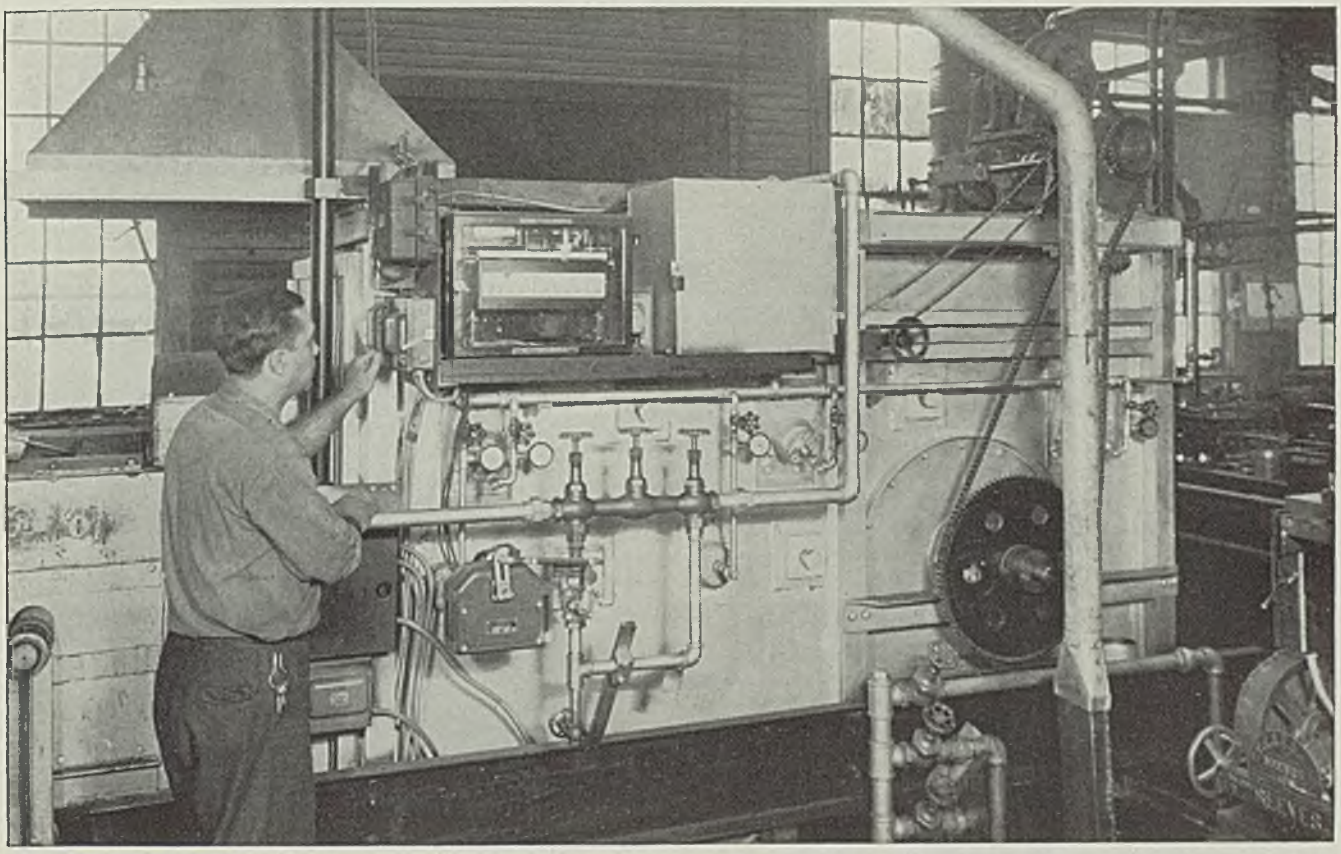


Fig. 11a (top)—Exograph of welded seam in 1½-inch steel plate showing sound weld metal. Fig. 11b (bottom)—Exograph of weld in similar material—made with same welding rod but a different welder—shows lack of fusion with slag inclusions



Continuous Gas-fired furnace installation in plant of Forsberg Manufacturing Company, Bridgeport, Conn. Photograph courtesy Bridgeport Gas Light Co.

# "Better Product . . . 25% fuel saving" with GAS Says Forsberg Manufacturing Company

By replacing old batch-type hardening and drawing furnaces with new continuous Gas-fired clean hardening equipment the Forsberg Manufacturing Company, Bridgeport, Conn., has been able to achieve a 25 per cent savings in fuel costs for heat-treating hacksaw blades and screw driver shafts.

Additional economies and production improvements resulting from the use of the new Gas furnace demonstrate the many-sided profits which can be reaped by replacing antiquated with up-to-date Gas-fired heating equipment.

Savings were recorded in labor through speedier handling of raw materials and finished products. Fuel cost was cut, too, while improved quality and wearing ability, as well as better appearance of finished products were chalked up after the new furnace had been installed a short time. The better heating characteristics of the new furnace have completely eliminated the necessity of hand-racking saw blades to keep them from warping during heat treatment, and the Forsberg Company engineers say: "The advantages to this company have even exceeded the exacting requirements laid before the furnace manufacturer."

This high-grade performance is not at all unusual with Gas-fired equipment. In your own manufacturing you may have a problem for which you will find Gas is the logical answer. Why not investigate? Get in touch with your Gas Company.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## Heavy-Duty Contactor

■ Cutler-Hammer Inc., 315 North Twelfth street, Milwaukee, has placed on the market 540 line of direct-current heavy-duty contactors for heavy mill duty. Contactors are available in 100, 150, 300, 600, 1200

and 1800-ampere sizes. Line embodies two achievements in design and construction. New, high efficiency arc blow-out quickly drives arc from contacts to large arc horns above contacts. The instantaneous rupturing of arc on arc horns, instead of on contacts, prolongs contact life. Heavy duty arc shields with carbofrax inserts opposite contact tips, lift off for inspection, yet set firmly in place during operation. Second achievement is in electric interlock. Contact troubles are eliminated by Dust-Safe, vertical contact construction and silver contacts. Rollers are of bakelite.

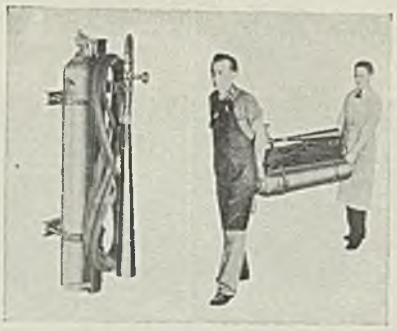
## Automatic Feeder

■ A. R. Pollasky, 3918 North Twenty-third street, Milwaukee, has developed an automatic blank feeder

which can be used in connection with any size or style of press, mechanical or hydraulic. Blank holders are designed to suit die and blank, and blanks are supported by springs placed to suit forming. Blank holders are filled by operator on either side of die, as the vacant space is advanced to the left of die on the forward travel and on the right side of die on the return travel. Tilting rail holder head allows this device to be used with an inclined press. Automatic carriage employed operates on compressed air. Pins in front and rear spacing bars control carriage. Carriage release is actuated by press slide, this can be timed on either the down stroke or up stroke. Operating speed of carriage is about 100 feet per minute. Besides feeding blanks to a forming die, this device can be used for riveting sub-assemblies, pressing in bushings, spot welding, riveting chain assemblies, feeding castings to a multiple drill head and various other operations.

## Fire Fighting Unit

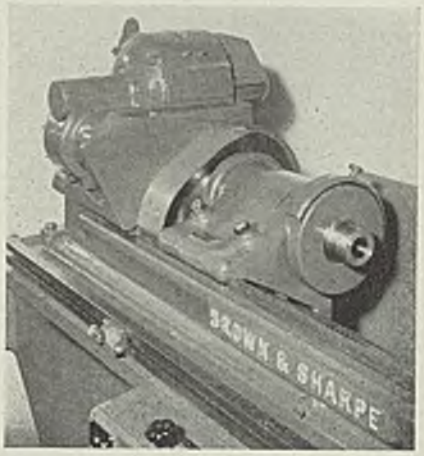
■ C-O-Two Fire Equipment Co., Newark, N. J., has announced a fire fighting unit which can be clamped to the wall as a fixed system installation or removed and carried as a portable unit. It consists of a 50-pound cylinder of carbon dioxide, 50-foot length of high-pressure, reinforced flexible rubber hose and a large discharge horn



fitted with quick-opening valve for controlling discharge of gas from cylinder. It discharges clean, dry, nondeteriorating carbon dioxide which penetrates every crack and corner and snuffs out fire instantly. Extinguishing agent is nondamaging to machinery, products or finishes.

## Revolving Headstock

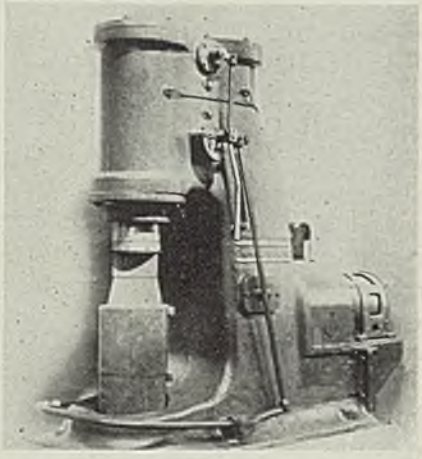
■ Brown & Sharpe Mfg. Co., Providence, R. I., has added to its line of attachments a revolving spindle headstock for its Nos. 20, 22 and 23 plain grinding machines. This attachment is for use when work requirements call for a chuck, spring collet or driving center, and when full table capacity of machine is not required. It consists of a spindle mounted on ball bearings, carried in a casting which is clamped in




position on table ways at right of machine headstock. Spindle is driven directly by work driving plate of the regular headstock. Use of unit reduces length capacity of machine by 14 inches.

## Forging Hammer

■ Chambersburg Engineering Co., Chambersburg, Pa., announces motor driven pneumatic forging hammer having a greater forging output, heavier anvil construction, higher impact speeds and greater rapidity of blows. Hammers are made in three types. One piece, having the anvil integral with the frames; solid frame, having separate anvils and a one-piece frame of rigid, reinforced construction; two-piece frame, having separate



anvils and with the frame rigidly mounted on a base plate which encircles the anvil. Ram guide is closely fitted in lower portion of ram cylinder and is bolted by an external flange to the bottom side of cylinder section of frame. Blows of the ram are controlled accurately with either a hand lever or foot treadle. Standard anvil

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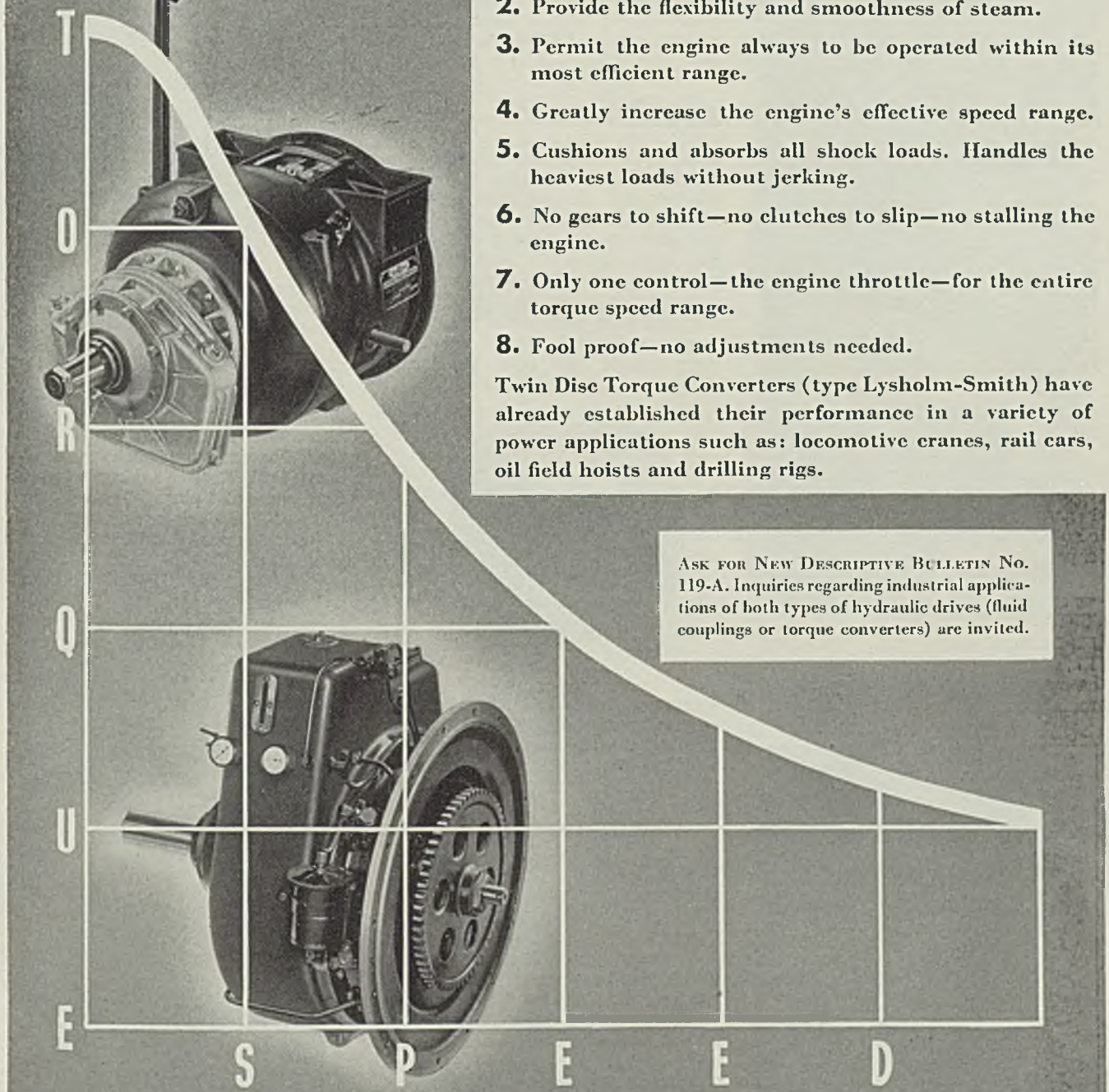
Twin Disc Torque Converters (type Lysholm-Smith) have already established their performance in a variety of power applications such as: locomotive cranes, rail cars, oil field hoists and drilling rigs.




Ask for New Descriptive Bulletin No. 119-A. Inquiries regarding industrial applications of both types of hydraulic drives (fluid couplings or torque converters) are invited.

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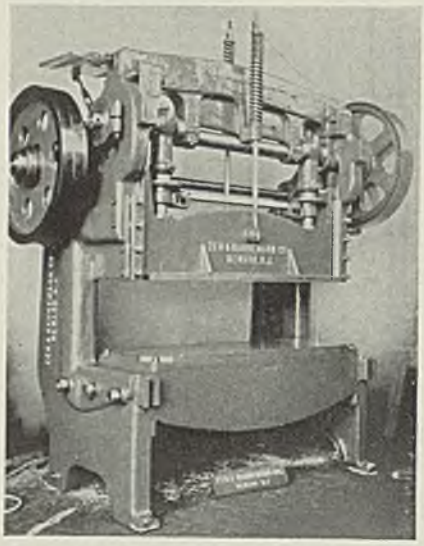
is 15 times rated capacity and consists of anvil and cap, cast steel die and keys. Equipment consists of one pair of steel dies, a belt-driven oil pump for the cylinders and a grease gun.

## Double-Crank Press

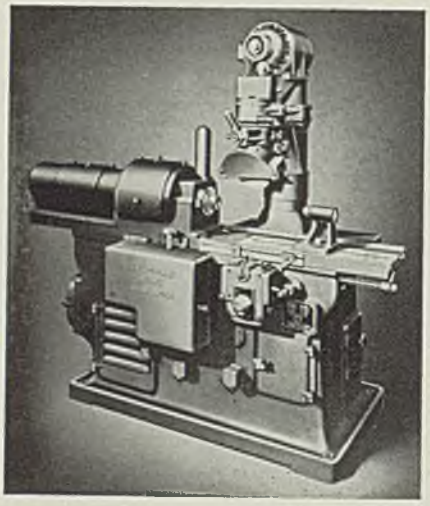
■ Zeh & Hahnemann Co., Newark, N. J., announces Type 13 presses of double crank, overhanging type ar-



ranged so various right to left dimensions can be furnished. They are available in 25 and 36-ton capacities. Slides on larger presses of this type are spring balanced. Unit illustrated is back geared, but plain also can be furnished and in larger capacities.

## Hob Sharpener

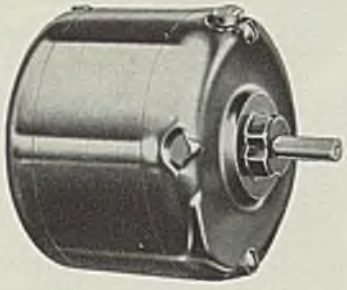
■ Barber-Colman Co., Rockford, Ill., offers No. 4 automatic hob sharpening machine for users of tools sizes up to 10-inch diameter



and 12-inch face. Machine has hydraulic table drive and spiral wheel-dresser which enables operator to grind true radial faces on high-spiral hobs or formed cutters. Machine upright supports grinding wheel head and its individual motor drive. Motor spindle is set on an angle to bring the rear convex cutting face of the wheel in a vertical position where it meets work. Entire wheel head can be raised or lowered to suit size of work, and wheel spindle can be run back as wheel is worn and redressed. For helical work, wheel can be swung about a vertical line which intersects work centerline, up to 30 degrees either side of zero. A straight-line wheel dresser is built into wheel guard and is used to dress grinding face of wheel for straight-gash and slight spiral hobs.

## Shaded Pole Motors

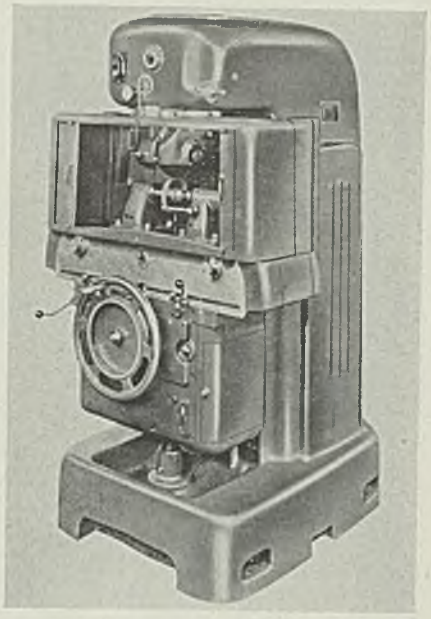
■ Robbins & Myers Inc., Springfield, O., announces a new line of shaded pole motors ranging from 1/300 to 1/20-horsepower. Motors are available at both 2 and 4-pole speeds, for 60 and 50 cycles and for 2-pole speeds (1275 revolutions per minute) for 25 cycles. Entire line is available in both normal and high torque designs. Frame modifications include open or enclosed con-



struction, round body, flat base or resilient mounting. A terminal box is integral with base in latter type. These motors are intended primarily for fan duty with cooling air over motor.

## Hydraulic Press

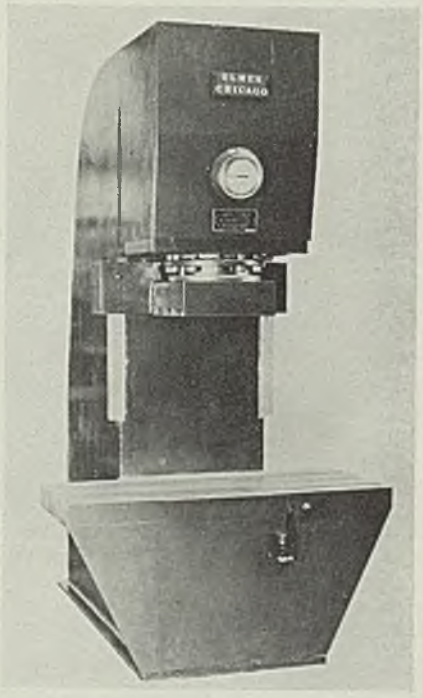
■ Charles F. Elmes Engineering Works, 230 North Morgan street, Chicago, announces general purpose open side hydraulic press which features steel construction and reinforced frame. Bed is at convenient working height from floor and is provided with slots for fastening jigs or fixtures. Control equipment is located within housing. Only operating levers and motor starter button are exposed. Push-button control may be provided if desired. Operation of press is by lever on right-hand side of press. Lever advances platen at high rate of speed, and when work is reached, platen automatically slows down. By movement of a rod, stroke of moving platen can be decreased to



cut down idle movement of platen. Louvres in rear of press provide ventilation to motor.

## Shaving Machine

■ National Broach & Machine Co., Shoemaker and St. Jean streets, Detroit, has developed an extra-heavy-duty Red Ring shaving machine featuring a 1-piece C-type frame. Cuts of 0.002-inch over pins, which is approximately 0.0003-inch on a

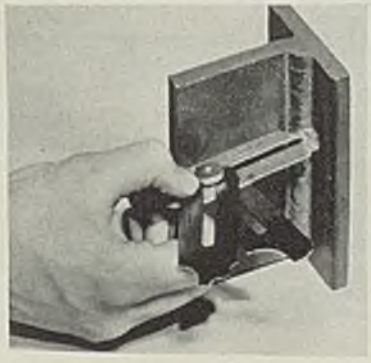


side, can be taken with exact measurements after each cut. Shaver utilizes a gashed helical gear

form tool in mesh with work gear, with axes of work gear and cutter crossed at an angle. Cutter gear drives work gear, as latter is traversed back and forth across cutter. Stock is removed in fine shavings. Horizontal serrations (washboard effect) are eliminated. Profile is corrected by generating action to within 0.0001-inch of that desired, it is claimed. Machine also provides for crowning gear teeth by means of a cam operating the table. Cam tilts table slightly making it follow a curved instead of a straight path. This makes teeth thinner by a slight amount at the end than the middle. Knee is supported by a 2½-inch feed screw. Cutter head has solid support on both sides of cutter to prevent spring. Work table is of box construction, 7½ inches deep, and has an upper surface 10 x 35 inches. Individual motor drives are used on cutter spindle, table and oil pump. Automatic feed is cut in or out by a second lever on the knee. Cycling of machine can be set for automatic operation.

## Fillet-Weld Gage

■ General Electric Co., Schenectady, N. Y., announces fillet-weld gage for use by welding inspectors and operators. Unit rapidly checks size of fillet welds on jobs which have to meet rigid specifications. Device



consists of three stainless-steel stampings held together by a bolt and a knurled thumb-nut. Either convex concave or standard fillets can be checked by fitting edge of gage flush against work so indicating portion of gage rests on weld bead. Gage can be used on fillets of the following sizes: 5/16-inch; ⅜-inch; ¼-inch; 7/16-inch; ½-inch and ⅝-inch.

## Eye Shield

■ Jackson Electrode Holder Co., 15122 Mack street, Detroit, has introduced an eyeshield characterized by lightness and wearing comfort. It is recommended for workmen engaged in buffing, polishing and light grinding operations, woodworking, and for helpers around

spot, flash and gun welding machines. Shield fits face snugly and does not interfere with prescription glasses. Wide vision is afforded through lenses of flexible, shatterproof Plastacele. Ventilation is provided through screened grommets. Shield folds flat and fits the vest pocket.

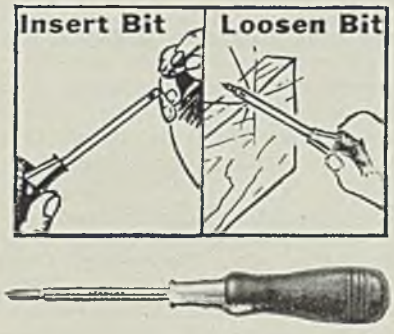
## Grinding Wheel Grader

■ Abrasive Engineering Corp., 710 Stephenson building, Detroit, has placed on the market type P portable Gradeometer which will grade grinding wheels of practically any size accurately, and is calibrated with large machines. Unit is guaranteed for one year.

Gradeometer is now priced at $350, however, it may be rented for a minimum period of 3 months at $25 per month. At the end of this time, if purchased, the full rental charge will be applied against purchase price.

## Replaceable-Tip Screw Driver

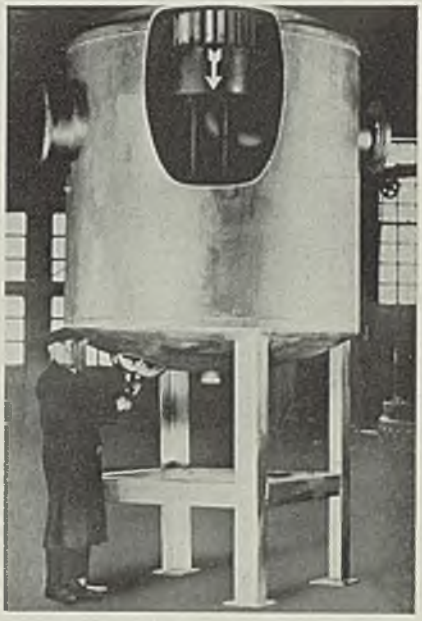
■ Stanley Tools, New Britain, Conn., announces new screw driver that takes tailormade bits to drive




definite sizes of screws. Tool holder has a chuck forged on the blade into which shank of bit is inserted. With the tool holder are 5 alloy steel bits, two for driving Phillips type screws and three for slotted head screws. Tool is valuable for industrial assembly work. When tip becomes worn, it can be removed and another inserted.

## Receiver-Purifier

■ Centrifix Corp., 3029 Prospect avenue, Cleveland, has designed new receiver-purifier for removing oil in exhaust steam lines. Unit shown has expansion and contact capacity sufficient to condense oil vapor. Design is such that after oil is condensed it is easily removed by the Centrifix internal purifier (note cutout view in picture) as well as all

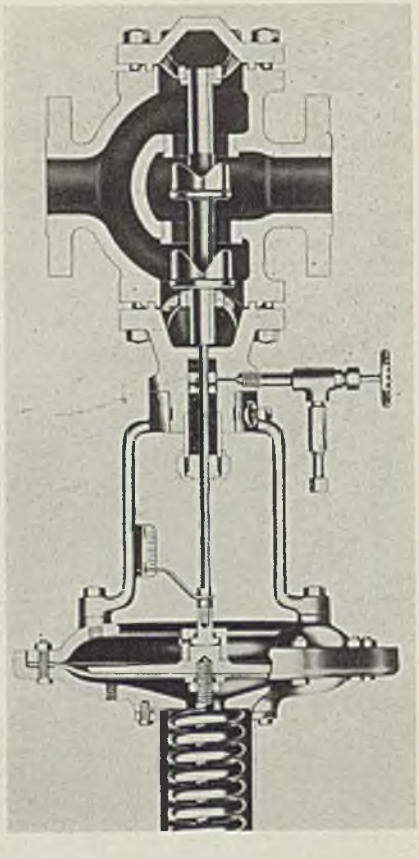


other bothersome entrainment. Drum proper is 6 feet in diameter nd 13 feet high. It can be installed in a 14-inch exhaust steam line. Equipment contains no moving parts and is self-cleaning.

## Stabilflo Valves

■ Foxboro Co., Foxboro, Mass., has improved line of Stabilflo controlled valves designed for accurate response to demands of a control instrument. Valve has a range of 50 to 1. When valve is lifted off the seats, the initial clearance flow is 2 per cent. From this 2 per cent flow to 100 per cent flow, valve gives equal percentage increases in flow for equal amounts of valve lift. V-port plunger is screwed and pinned to valve stem and designed for easy field reversal. A parabolic plug plunger and a wide ratio turned plug type also are available for exceptional control applications. Body and plunger of valve are de-

signed for high lift. Efficient operation of the complete line of valves is provided by the floating power motor. Suspended construction of motor eliminates need for guides



and antifriction bearings. Motor is protected by low center of gravity and rugged connection to valve. Bonnet is joined to valve body with ground tongue and groove connection. Use of a deep lubricated stuffing box and polished stainless steel valve stem reduces stuffing box friction to a minimum. Plungers are provided with top and bottom guides of polished stainless steel.

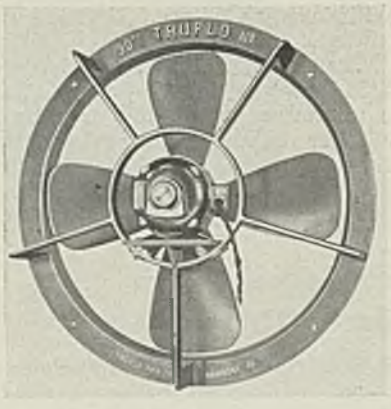
## Industrial Tractor

■ Clark Tructractor division, Clark Equipment Co., Battle Creek, Mich., announces Clarkat tractor, which is streamlined and steel turreted. Cap-

able of pulling 25 tons on trailers, the machine can thread crowded aisles easily, pass through narrow doorways and operate on congested platforms. Twin wheels at the bow assist the tractor in negotiating rough roadways. Driver sits comfortably and safely within a heavy ½-inch steel body, and has clean vision of his load and of his right-of-way. Power is capable of 24-hour continuous operation. Four-gallon gas tank is of ample capacity for average day's consumption. The machine is 38¼ inches wide and has a 57-inch turning radius. Equipment includes self starter, hydraulic brakes in rear drive wheels, air cushion tires in rear and universal coupler operated by driver without dismounting. Heavier model for use on damp and slippery factory floors and steel ramps, and for pushing extra heavy objects into position is available. It can pull 40 tons on trailers.

## Aluminum Wall Fans

■ Truflo Fan Co., Harmony, Pa., announces two series of wall fans of aluminum alloy construction, ranging in diameters from 12 to 36 inches and 42 to 48 inches, and employing 4 and 6-blade propellers, respectively. Motors have maximum capacity of 40,000 cubic feet of air per minute. Fans can be supplied with guard and automatic shutters. Frame and propeller

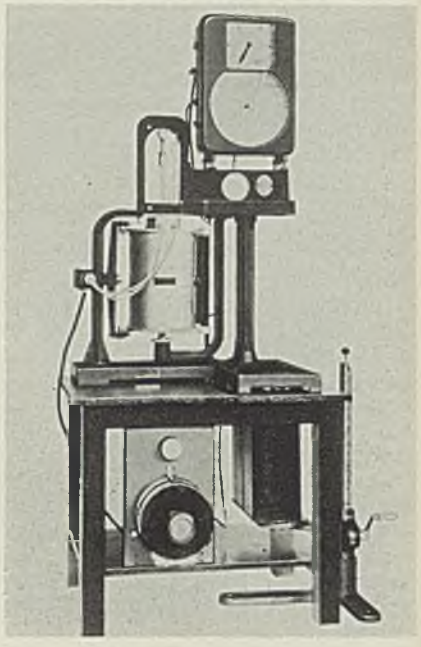


blades are both of aluminum alloy, each being cast in one piece.

Motors are available for single and variable speeds, and may have horizontal or vertical mountings. Speeds of larger fans range from 340 to 860 revolutions per minute, and the smaller ones, from 715 to 1750 revolutions per minute.

## Recording Dilatometer

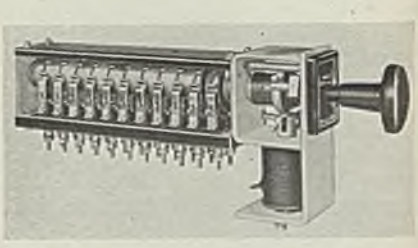
■ Bristol Co., Waterbury, Conn., announces model RB Rockwell-Bristol dilatometer which both indicates and makes an ink record of time-dilation and temperature-dilation changes simultaneously, during heating and cooling cycles of ferrous and nonferrous metals, ceramics and many other materials of rigid form. Temperatures are recorded on a Pyromaster Potenti-



ometer, 12-inch round chart. Time element is recorded by a separate pen through a Telechron clock.

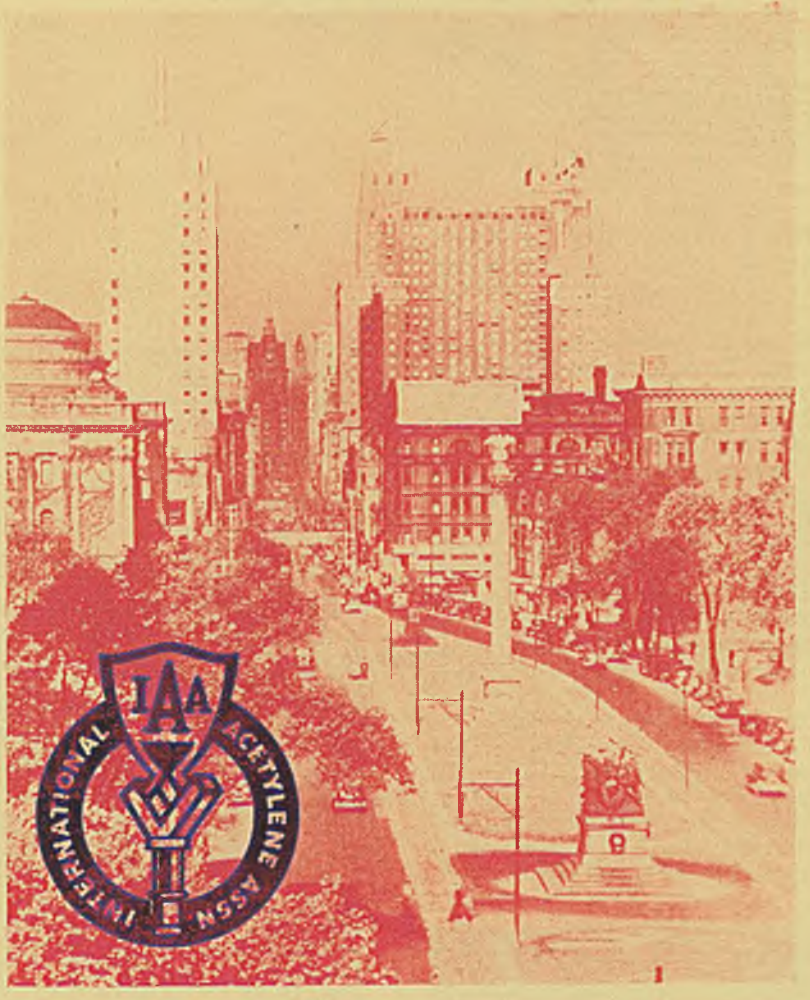
## Auxiliary Switch

■ Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., announces electrically operated auxiliary switch for making and breaking several circuits simultaneously. New switch is provided with any arrangement of make and break contacts up to 10. However, by means of geared switches and parallel or series arrangement of the switch coils, any desired number or combination of circuits can be handled. Two operating arrangements are provided. One type can be tripped from front of panel by rotating handle, as well as by energizing shunt trip coil. The other type can be tripped only by operating mechanism behind the panel. Position of



the handle provides visual indication of last operation of the switch. New switch is spring-operated. Contacts are normally held in the reset or open position against force of a torsional spring by a position latch. Two independent latches and springs are used to insure positive action.

# International Acetylene Association Convenes




In this special section, STEEL reviews progress and expanding applications of the oxyacetylene processes in an endeavor to focus attention upon the fortieth annual convention of the International Acetylene association to be held April 10, 11 and 12, 1940, at Schroeder hotel, Milwaukee. Featured will be demonstrations, informal round-table discussions, new developments and trends in the industry.

Broken or cracked chromium-plated die castings are repaired by new technique using oxyacetylene flame, half-and-half solder and reinforcements

# Oxyacetylene Industry Points

A Report By
**H. L. ROGERS**
Chairman
Oxyacetylene Committee

■ REFERRING to the oxyacetylene committee report of 1929-30, it is interesting to note that practically all welding and cutting operations now carried on were mentioned but that their applications were restricted greatly in comparison with present practice. This may indicate that although engineers knew how to do these things then, they were not familiar enough with them to use them widely. Since that time, however, innumerable improvements in materials, machines and methods have taken place. A most notable feature of all these developments is that in place of skeptical and tentative acceptance, there is eager receptivity and a constant demand for still further improvements to provide better and cheaper ways of doing the hitherto impossible.

With all its completeness, the report of ten years ago could only devote a few short paragraphs to steel mills and list the uses of oxyacetylene processes in connection with maintenance, double lengthening of pipe and the oxygen lance. Since then billet deseaming, flame hardening, descaling and many other operations have fairly overshadowed the old applications. Several of these now are quite commonplace in other industries as well.

Heat treating was mentioned but without any realization of the future in store for flame hardening, flame softening and flame strengthening. Flame cleaning and dehydrating were not noted. Possibilities of flame machining were not foreseen although the growing importance of oxyacetylene cutting was recognized.

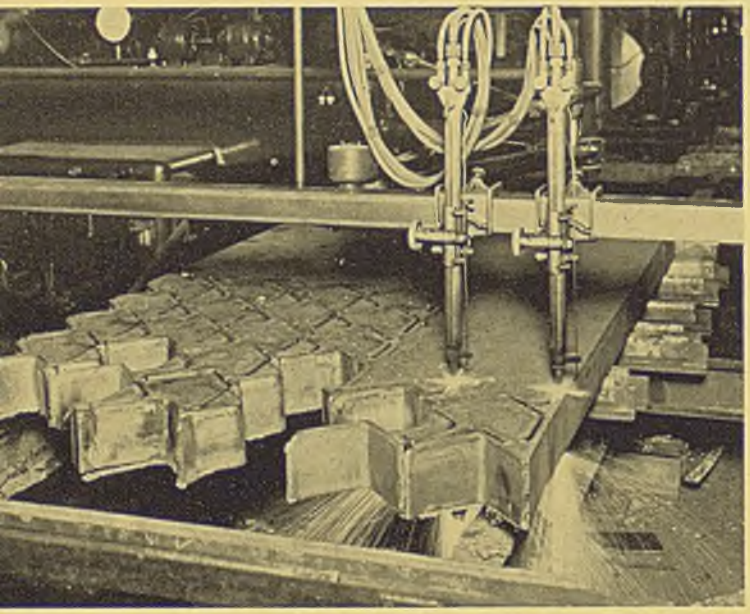
The phenomenal success of certain so-called miscellaneous uses of acetylene is based on the fact that the oxyacetylene flame's high temperature can be utilized to accomplish certain effects in extremely narrow limits of time and space, whereas this degree of heat was formerly regarded as merely a factor in getting a given weight of metal melted in a hurry or for producing quickly the starting temperature for cutting operations. Thus rate of heating is recognized as an indispensable part in certain operations other than welding and cutting.

In heat treating, for instance, the desired temperature can be imparted so quickly to specified and closely controlled depths of steel and cast iron parts that the unheated metal beneath has a definite quenching effect, supplementing the external application of cooling media such as air, water or oil. Likewise in descaling, the high temperature of the flame is imparted only to the scale on the surface of the castings or structural member so sudden expansion causes the scale to loosen.

Along the same line, use of oxyacetylene torches for wrinkle bending and bending or straightening of structural members represents a class of applications which have been reduced to economical practice.

These developments are mentioned to point out the newer conceptions of how this heat can be used.

Flame hardening specifically has so far passed the experimental stage that its successful application to an uncounted number of machine parts is taken for granted. Originally employed mainly for gear-tooth hardening, application to many other small parts soon followed. Later it was applied to larger areas such as latheways. Now treatment of interior and exterior



Large oxyacetylene cutting machines easily accommodate two or more torches in production work. Here axle brackets for road scrapers are being cut from 5-inch thick steel plate

# To Its ..... Latest Developments

cylindrical surfaces is becoming widely accepted. Although standard hand equipment works satisfactorily when little accuracy is required, specially designed torches and machines embody ingenious provisions for automatic control of heating, water-cooling and quenching within extremely close tolerances. Special tips provide optimum arrangement of flames for determining the boundaries and degree of the heat effect.

For large scale production work, elaborate automatic machines in successive operations light the tips, heat the parts to be treated, extinguish the flames and quench the surfaces while the parts are given any desired rotary or progressive motion. Without doubt, recent rapid growth of this important operation will continue during the next few years. The oxyacetylene committee has prepared for publication a pamphlet devoted entirely to this subject.

Flame softening of oxyacetylene-cut edges in certain alloys corrects any undesirable surface hardness that may interfere with machining operations or set the stage for incipient cracks. Flame strengthening gives added strength to reduced sections and included angles where stresses are concentrated. Today oxyacetylene heat treating is being applied to an increasing number of parts and materials on a production basis with a universality hardly second to welding itself with further expansions at hand.

Flame cleaning and dehydrating probably are best examples of new miscellaneous uses. The wide variety of scales and surface conditions encountered requires separate treatment for each. Recognizing this has enabled the proper type of flames at the correct speeds and angles of incidence to be devised. Since no operation can be called commercially successful unless its cost is justified, it appears in many cases that the oxyacetylene flame has no real competitor for some of this work. Its ability to loosen certain types of scale and at the same time automatically to provide a moisture free surface for subsequent painting without excessively heating the structure cannot be duplicated by any other known process.

Most widely publicized example of flame cleaning and dehydrating is the Golden Gate bridge which is subject to exceptionally severe weather conditions. Competent structural authorities have endorsed the process most enthusiastically. It is reported that from 60,000 to 70,000 tons of structural steel have been treated by this method during the past year. It is being applied to an increasingly large variety of parts and materials where conventional cleaning and painting methods have proved inadequate.

In fabricating countless structures and machines, the welding of parts cut from steel plate has been supplanting intricate castings for a considerable length of time. This trend, becoming more pronounced each year, is important because of the immense amount of flame cutting involved.

Machines for flame cutting now handle great areas, cut to almost unbelievably close tolerances and perform special operations such as trimming H-beams and beveling plate, greatly facilitating naval building and marine construction.

Preparing plate edges for welding deserves special attention. In addition to the simple bevel, double bevels and lands in several combinations can be produced by proper arrangement of two or three torches carried on one machine. These accomplish with a high degree of perfection the equivalent of costly and laborious machining operations. The large areas of plate exposed to the larger flame-cutting machines and the unlimited lengths of cut made possible by the mobility of others are important factors in the increasing use of oxyacetylene cutting in shipbuilding and heavy industries.

Although all flame cutting might logically be called flame machining, the latter term has properly been adopted to cover a growing list of specific operations where severing of parts is not the main consideration. Most practical and commercially valuable of these special operations are preparation of plate edges to U or J-bevels; removal of the backs of welds (bottom of V) for subsequent completion of weld; removal of defects in steel billets and slabs; punching holes; formation of various contours that represent a departure from a straightaway cut in the plane of torch travel.

Importance of correct tip design and of accuracy in tip manufacture is gaining well deserved recognition. Fullest growth of flame machining operations can hardly be attained otherwise. Advance along this line has been notable during the past year.

The term "billet gouging" is applied commonly to the torch removal of defects in billets. Performed either

**Cutting off gates and risers from castings using cutting blowpipe and oxygen lance is fast becoming routine practice. A 6-ton riser is being cut from a 9-ton crusher here**

V. H. Van Diver

G. T. Horton

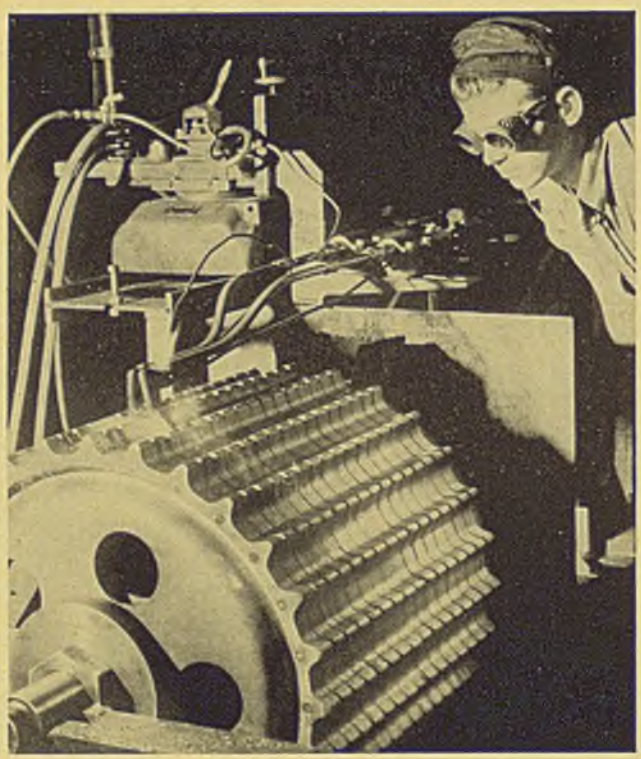
R. H. Leach

manually or by machine, this operation is of major importance to the steel industry. With increasing labor costs and low oxygen costs it has become firmly established as a basic oxyacetylene operation. Much development of torches, tips and auxiliary equipment, including that for facilitating oxygen distribution and measurement, is under way.

Oxyacetylene welding of high-pressure high-temperature piping is still an important field. Introduction of multilayer welding a few years ago has been followed and augmented by development of low-alloy welding rods, particularly the carbon-molybdenum class, that combine requisite tensile strength with high ductility to meet the severe requirements of power piping for pressures up to 2700 pounds per square inch and temperatures to 1000 degrees Fahr.

Improved fluxes for bronze and brass give low fuming characteristics and increase density and strength in the weld, another important development. Such fluxes may be applied in liquid form or as a coating on the rods. The importance of so-called braze welding should not be overlooked. It is generally recognized as the pre-eminent process for many "building up" operations such as on bearing surfaces. Besides it has many advantages as a method of joining steel and cast iron parts where time must be saved and where undue distortion or expansion from high heat must be avoided.

Flame hardening teeth on 16 rear-drive sprockets simultaneously is easy with this setup



Continued revision of the pamphlet on safe practices and education of users of oxyacetylene processes cannot fail to result in a greater degree of safety for operators and owners of equipment. The increased volume of applications in recent years could easily endanger our excellent safety record if all possible potential danger spots were not scrutinized, the uninformed guided and the unthinking warned.

During the past year, four pamphlets have been revised: "Sample Pipe Welding Specifications," "Tests for the Selection of Operators of Welding Equipment," "Design of Jigs for Oxyacetylene Welding" and "Safe Practices for the Installation and Operation of Oxyacetylene Welding and Cutting Equipment." One new pamphlet, "Flame Hardening by the Oxyacetylene Process", has been prepared and published. Still another, "Pipe Welding by the Oxyacetylene Process," is in preparation. The importance of this subject dictated the decision to begin work on it at this time but its scope made necessary leaving its completion to the succeeding committee.

Revisions to sample pipe-welding specifications consist principally of adding the provision that welding rods conform to A.W.S. and A.S.T.M. Specifications A 205-37 T, Grade 10; inclusion of welding galvanized pipe; and substitution of the guided bend test for the free bend test.

Operators' tests have been changed to clarify certain definitions and to specify the guided bend test. A description of that test is included.

Jig design pamphlet has been brought up to date by including typical examples of commercially available equipment for this work but the pamphlet is not being reprinted at this time because of the present number of copies still on hand.

Safe practices leaflet has demanded much consideration because of prominence of this subject. Many minor changes have been made in the text to clarify meanings, to avoid conflicts with rules of other regulatory bodies and to bring it up to date. The chapter on industry health has been rewritten in the light of increased knowledge of this subject.

Thus this committee has been concerned with six pamphlets during the year. It feels that a reasonably complete and up to date series of publications for the guidance of the industry now is available.

## It will pay you to attend the

# I.A.A. CONVENTION

**Milwaukee, Wis., April 10, 11 and 12**

**Headquarters — Schroeder Hotel**

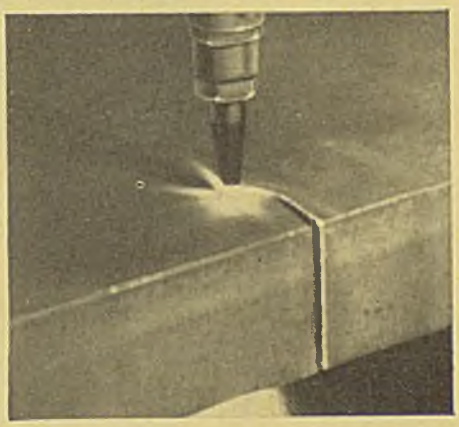
Whether you are engaged in welding and cutting as a business — or are primarily interested in the progress of industrial and manufacturing procedures in general — it will pay you to keep posted on the steady strides which the oxy-acetylene process is making in industry. Each year, newly developed techniques and applications of the "flame" present increased opportunities for profits — opportunities for stepping up production schedules, and for simplifying or improving the design of metal products.

At the 40th Convention of the International Acetylene Association — to be held in Milwaukee, Wis.; April 10, 11 and 12 — you will be able to hear talks by, and trade ideas with, some of the best-informed, most practical men in industry. From technical sessions, round table discussions, and live demonstrations, you can obtain a wealth of information about latest developments in the oxy-acetylene process — thoroughly dependable information and ideas which you can take back to your work to help you do a better job.

You will find the personal contact with others engaged in your industry most valuable. Plan to attend!

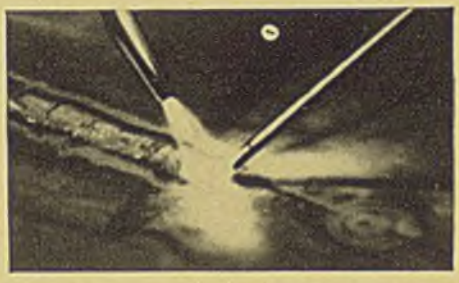
*Write to the Secretary today for an advance copy of the program!*

## Learn More About These Modern Processes



***Machine Cutting*** — including information on both portable and stationary oxy-acetylene cutting machines.

***Flame-Treating*** — Information on flame-hardening, flame-softening, and flame-strengthening of metal.



***Welding***—including hard-surfacing, sheet-metal and production welding, and other valuable applications.

***Heating*** — newest developments in bending, forming, forging, straightening, pressing, and similar operations.

***Hand-Cutting*** — latest procedures for gouging, rivet-cutting, deseaming, and other hand-cutting operations.

***Flame-Cleaning***—modern methods for forestalling paint flaking, and for quickly removing scale from steel.

## INTERNATIONAL ACETYLENE ASSOCIATION

**Established 1898**

**30 East 42nd Street, New York, N. Y.**

# Educational Exchange of Ideas *Is Aim of* I.A.A. Round-Table Discussions

■ ROUND-TABLE meetings where small groups get together to discuss informally specific phases of oxyacetylene processes will again feature the International Acetylene convention, April 10, 11 and 12 at Milwaukee. As in the past, outstanding engineers and executives in the various fields will be at hand to answer questions and offer authoritative ideas on problems relating to planning, economics, design, management, supervision and practical procedures.

Purpose and scope of round-table discussions can well be summarized by quoting one of last year's guests:

"I profited vastly by attending round-table discussions. The constructive ideas I carried away will be of great value in those activities of my job which involve oxyacetylene processes. At each of the two meetings I attended I heard an interesting and valuable discussion. The matter-of-fact informal way the meeting got down to business helped us get the most out of every minute. Since no record of the proceedings was kept, everyone felt free to ask questions or to aid in answering them.

"Practically everyone in the group had an opportunity to say something, and a good many of us had difficult problems on which we wanted advice. I was amazed at the help we were able to get from our group's technical advisers and from others in the group who had come up against a similar problem. Everyone seemed glad to pass along tips from his own experiences.

"I personally got much out of this fine exchange of ideas and am surely hoping that round-table discussions will be a part of all future I.A.A. conventions."

### Thirteen Sessions This Year

More subjects will be discussed this year as number of individual round-table sessions has been increased from nine to thirteen. Thus each person will be able more than ever before to select the subject and meeting which specifically interests him. Of course he may attend a number of sessions on different subjects if he chooses.

The round-table program will begin at 8:15 P.M. at Milwaukee Vocational school's auditorium, North Sixth and West State streets. Before the general meeting is broken up into smaller discussion groups, brief demonstrations will cover multiflame pipe welding, flame descaling, plate-edge preparation, wrinkle bending, flame cleaning, machine flame cutting, heating for bending and straightening.

Everyone present will be entitled to make one estimate as to the ultimate strength of a coupon cut from a bronze-welded joint to be tested to destruction in front of the assembly. The most accurate estimator will receive a valuable prize.

Each of the smaller round-table meetings will be held in one of the school's classrooms. A chairman will informally start each meeting. Several guest technical advisers whose experience qualifies them will answer questions on the subject under discussion.

Those interested in production methods in welding and cutting sheet steel undoubtedly will find the "sheet metal" meeting valuable as recent developments in techniques of welding and cutting, proper use of jigs and fixtures, prevention of distortion will be discussed.

The meeting on "repair and maintenance" will follow by only a few hours a technical session at which speakers will have presented uses of the oxyacetylene process for reclamation, repair, maintenance in shipbuilding, steel mills, foundries, railroad, agriculture.

Many manufacturers have adopted "hard facing," subject of another meeting, to increase the resistance of moving parts to corrosion and wear, particularly where great friction heat is generated. Hard facing also aids building-up and resurfacing worn valves of steam and internal combustion engines as well as pump shell parts, face plates, dipper teeth, etc.

### Shape-Cutting Brings Economies

The many uses of oxyacetylene cutting and the expanding applications of "stack cutting," where several steel sheets or plates are cut simultaneously after being piled and clamped, undoubtedly will give rise to an interesting exchange of ideas in the meeting on "machine cutting." Since shape cutting by the oxyacetylene process is used most widely in manufacturing operations, discussion probably will center around economies of welded fabrication of shape-cut parts, designing machinery for welded fabrication, planning a production line to include machine-cutting operations, shape cutting parts for minimum scrap, etc.

Session on riser cutting, flame cleaning, gouging and use of the oxygen lance should prove interesting because of recent growth of these processes. Removal of gates and risers from steel castings by oxyacetylene cutting has long been a routine procedure. Increasing use of chromium steel alloys has caused development of special cutting techniques.

Flame cleaning is a comparatively new process of preparing structural steel and plate for painting by removing semitenacious mill scale and by driving out occluded moisture from beneath the scale. If painting then is done before recondensation occurs, the paint should last longer, even under severe exposure.

Oxyacetylene gouging quickly and accurately removes a strip of surface metal from steel plate, forgings and castings. The immediate success of the gouging blowpipe for this work soon led to its use for a variety of maintenance and scrapping operations and, more recently, for preparing plate edges for welding.

Air-acetylene flame applications will be the subject of another round-table meeting. With a higher temperature than that of gasoline, coal gas or natural gas, this flame is nonoxidizing, noncarbonizing, instantly available and readily portable. These advantages make it an ideal source of heat for soldering, brazing, paint removal and other operations requiring lower temperatures than in oxyacetylene flames.

Another group will discuss alloy steels which, with oxyacetylene welding, have proved valuable for tanks,

(*Please turn to Page* 98)

*Welding*— The oxy-acetylene flame is the hottest flame known to science. With it, you can weld practically any metals —quickly, easily, and economically.

*Hard-Surfacing* — Haynes Stellite hard-surfacing materials can be applied efficiently with the oxy-acetylene flame to make wearing parts last longer.

*After Nearly 4 Decades of Use—*

# PREST-O-LITE ACETYLENE

## is today being used for all these operations!

*Hand-Cutting*— Because Prest-O-Lite cylinders are readily portable, iron and steel can be quickly cut in the shop or in the field.

*Machine-Cutting* — Using either stationary or portable oxy-acetylene cutting machines, steel parts with smooth edges can be quickly cut to shape.

*Flame-Hardening* — Oxy-acetylene flame-hardening imparts a hard surface case to metal parts without affecting the ductility of the core.

*Descaling* — Oxweld descaling apparatus permits quick removal of scale from annealed castings, structural steel, and other metal parts.

*Gouging*— Oxweld gouging nozzles are used for plate-edge preparation, for removing temporary or faulty welds, and for alteration of design on castings.

*Heavy Heating* —The oxy-acetylene flame is effectively applied by the Oxweld W-26 blowpipe for bending, forming, and heat-treating.

*Soldering*— Acetylene from Prest-O-Lite small tanks is used with Prest-O-Lite air-acetylene appliances for soldering, brazing, heating, and paint burning.

All these and other types of work are being performed profitably, conveniently, and effectively with the help of Prest-O-Lite acetylene. Linde Process Service can help you with any of these applications, or any others you may have in mind. Talk it over with the Linde man who calls on you.

THE LINDE AIR PRODUCTS COMPANY

*Units of Union Carbide and Carbon Corporation*

General Office: New York, N. Y. UCC Offices in Principal Cities

The words "Prest-O-Lite," "Haynes Stellite," "Oxweld," and "Linde" are trade-marks of Units of Union Carbide and Carbon Corporation.

Otto C. Voss

# Otto C. Voss Receives Morehead Medal For 1939

■ FOR the year 1939, the Morehead Medal has been awarded to Otto C. Voss for continuous pioneering, untiring educational effort and constructive sponsorship of oxyacetylene process applications. The medal will be presented to Mr. Voss during the opening session of the 40th annual convention of the International Acetylene association at Schroeder hotel, Milwaukee, April 10.

The Morehead Medal was established in 1922 by the Hon. John Motley Morehead, formerly United States minister to Sweden, in honor of his father, the late James Turner Morehead who, in 1892, sponsored the experimental work which led to the discovery of the modern electric-furnace method of producing calcium carbide. The medal is awarded annually by the International Acetylene association to the person (or persons) it believes has done most to advance the industry or the art of producing or utilizing calcium carbide or its derivatives.

Born in Germany in 1861, Otto C. Voss was ten years old when his family came to the United States where after preliminary schooling he entered the employ of the Burlington, Cedar Rapids & Northern railroad at Cedar Rapids, Ia., to learn the trade of boilermaker. Beginning in 1887, he was for 16 years in charge of all boiler work for the Anaconda Copper Mining Co. at Anaconda and Butte, Mont., during which time he became interested in improving methods and techniques for hammer and forge welding. This was the beginning of a life-long interest in promoting the principles and practices of joining metals.

### Superintends Boiler Shops

In 1903 Mr. Voss came east from Montana and became affiliated with the Springfield Boiler Co., Springfield, Ill. In 1905 he became superintendent of the boiler shop of Allis-Chalmers Mfg. Co. at Chicago. When this plant was moved to West Allis, Wisc., in February, 1914, Mr. Voss came to Milwaukee as superintendent of the boiler shop in the main Allis-Chalmers plant.

It was while at Chicago that his interest in the oxyacetylene process started to materialize. Learning about the process from technical literature, he obtained an oxyacetylene welding and cutting outfit, blowpipes and an acetylene generator. Since that time, every advance in apparatus, materials and technique for oxyacetylene welding, cutting, heating or other flame processes has had a firm believer and sponsor in Mr. Voss. He has promptly tested and investigated new procedures, used them enthusiastically once proved sound.

Shape cutting with automatic machines has been one of the most important of these developments. His sponsorship has developed into the widespread use of this application in industry. He installed and used the first oxyacetylene shape-cutting machine in the Middle West and set up production of shape-cut parts on a routine basis in Allis-Chalmers plants. Some of the first equipment cut out on the shape-cutting machine and welded by the oxyacetylene process were plates for pressure vessels, still being used after more than 30 years of service. This pioneer work was done in the face of many difficulties, including the lack of suitable welding rod, engineering and consultation services, operator training programs and similar facilities which are taken as a matter of course today.

Under his direction were produced the first oxyacetylene welded pressure vessels to pass codes. His direction of the fabrication of this equipment has done much to spread knowledge of these accomplishments and to encourage the acceptance of this method in other manufacturing plants.

### Turns Advances to Practical Use

His achievement has been in taking the advances suggested by scientists and laboratory workers and putting them into use in industry where there was a crying need for a practical hand to guide the work.

Mr. Voss has always been an active member of the American Welding society and helped organize and served as the first chairman of the Milwaukee section. He has given many talks and papers before other technical societies so doing much to further advance oxyacetylene welding and cutting. He is known nationally and often is consulted for his advice.

It would be a mistake to neglect the great work which Mr. Voss has done to inspire and train young men in welding. There are literally hundreds of young men in industry today who can point with pride to the fact that their present knowledge of welding and cutting procedures and their progressive viewpoint on new developments are due to their early training being under his direction and kindly supervision. Respected and beloved by a great number of his friends and associates in business, Mr. Voss lives in Miilwaukee where he is devoted to his son's family. He takes a great interest in outdoor sports and is still active, at 78, on his bowling team.

It is a fortunate coincidence that the association has found it possible to award this medal at the time that its convention is meeting for the first time in Milwaukee. It is fortunate, also, that the medal is being given at this time to a man, the grand old man of welding in Milwaukee. He truly represents the people of this city by his achievements in the industry, combining his naturally inherited care and workmanship with the ambition and aggressiveness which are the heritage of his American upbringing. The place of honor which he occupies among his fellow citizens and fellow workers is confirmed in a national way by the presentation of this medal.

# FOR ECONOMICAL PLATE CUTTING

# NATIONAL NO. 5 OXY-ACETYLENE CUTTING MACHINE

**PORTABLE**

•

**MOTOR DRIVEN**

•

**LIGHT WEIGHT**

•

**INEXPENSIVE**

EVERY shop with a problem of cutting steel sheets, plate, billets, or forgings for fabrication can use a National No. 5 Portable Cutting Machine to advantage. It will cut straight lines of any length with square or beveled edge—cut circles with square or beveled edge—cut strips of plate from two to thirty inches wide — cut arcs —cut simple irregular outlines by manual operation.

*Write for Literature and Complete Details*

## GENERAL SPECIFICATIONS

The body is a strong light weight durable aluminum alloy casting.

The handwheels are aluminum alloy selected for light weight and strength.

The gear housing, torch holder, torch bar end bracket and hose manifold are made of bronze for strength and long life.

Ball thrust bearings and oil checks on swivel wheels (two) eliminate binding.

Motor is insulated from slag and reflected heat.

Worm and gear provide positive vertical motion of torch — no rack to get sloppy.

The track is extra heavy cold-rolled welded steel with grooves and ends accurately machined.

Transmission assembly is a unit. Gears run in special grease.

Radius rod is ½" square stock — center point is hardened steel.

Extra long slide bearing assures smooth in-and-out racking of torch.

FOR BETTER WELDING AND CUTTING

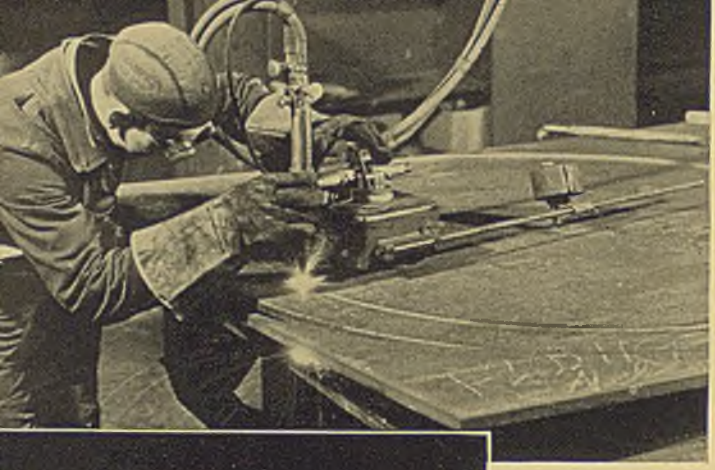
TORCHWELD

NON-FLASH EQUIPMENT

**NATIONAL CYLINDER GAS COMPANY**

205 W. Wacker Drive • Chicago, Illinois

# Mil
# As Steel



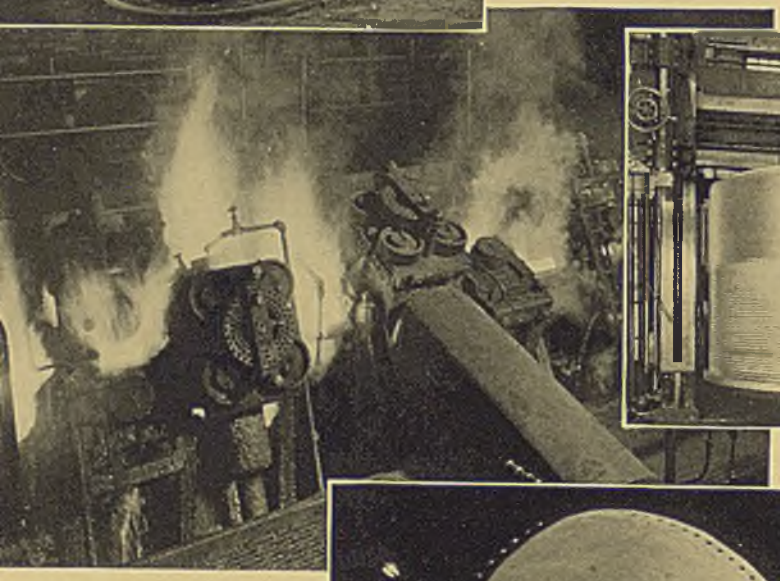
Above, condenser flanges being cut from steel plate

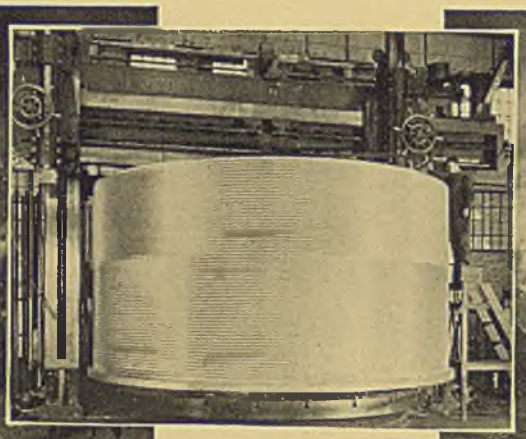
Left, cutting off riser on a large valve casting

■ PROGRAM for International Acetylene association's fortieth annual meeting, Schroeder hotel, Milwaukee, April 10, 11 and 12, includes a number of outstanding features. In addition to a presentation of the latest developments in general applications of the oxyacetylene processes as well as reclamation, repair and maintenance methods, machine flame cutting, foundry applications of the oxyacetylene processes and methods of reducing costs, this series of meetings also will include round table discussions of the above subjects.

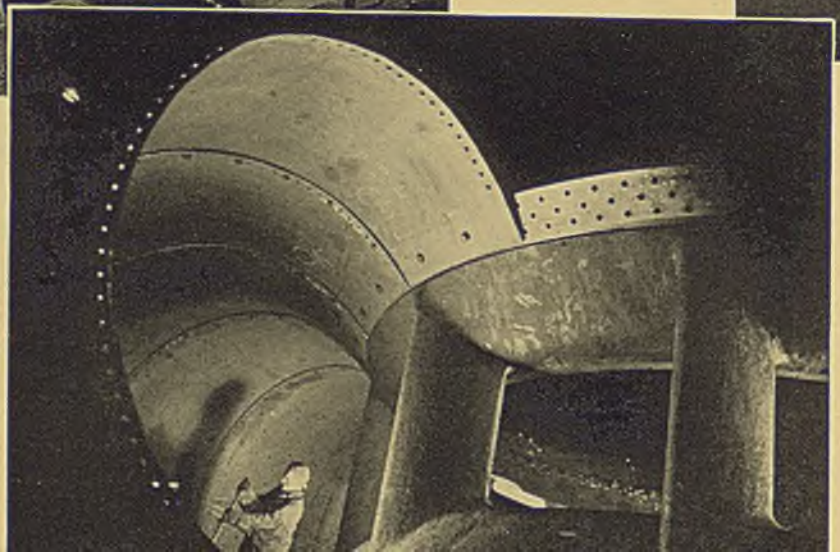
Selection of Milwaukee for this series of meetings is especially fitting because of its increasing importance as an industrial and shipping center. Milwaukee's many industrial enterprises make it outstanding as a steel fabricating and consuming center today.

On these and the following pages are presented views





Above, hot rolling steel tubes



Center above, mine hoist drum 18 feet diameter, 17 feet wide being grooved

Right, assembling casing of a big hydraulic unit

Above, 3-ton electric furnace being tilted to pour out charge

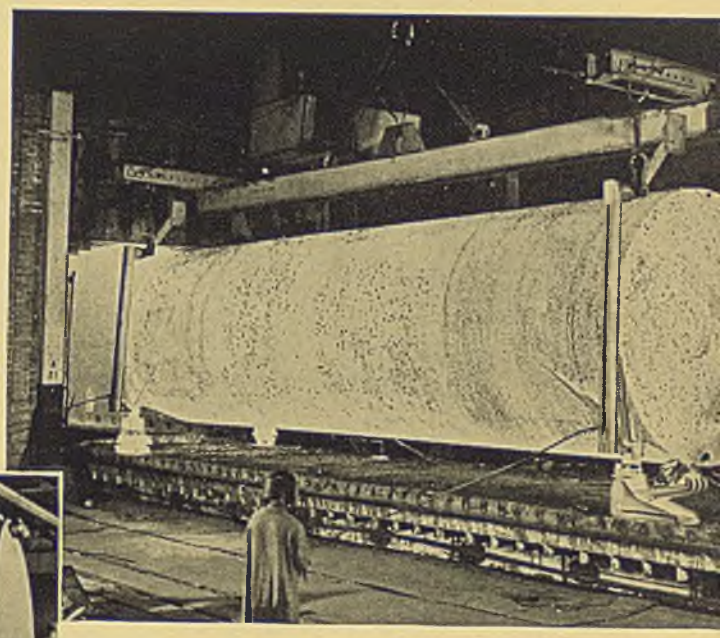
# waukee..... Is Important

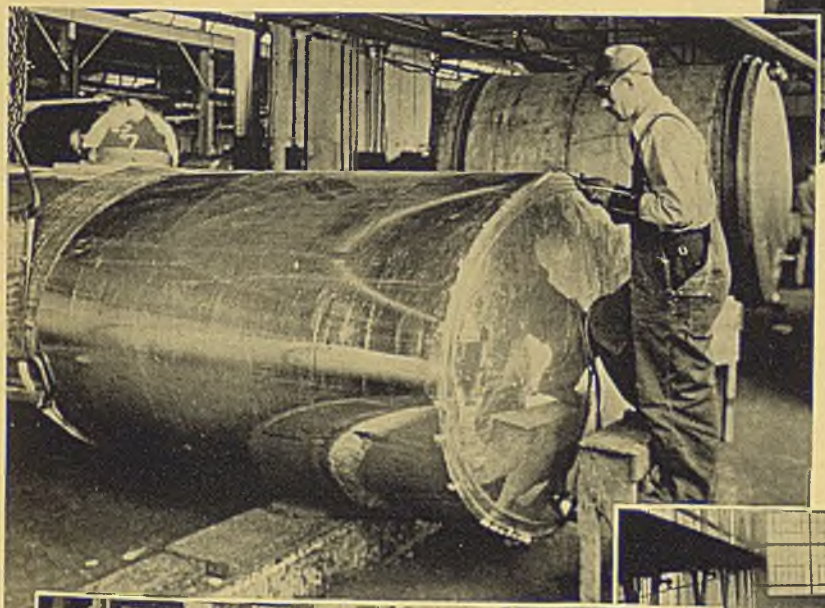
# Fabricating. Consuming Center

of typical operations found in Milwaukee manufacturing plants.

We are indebted to the following companies for making possible this illustrated section: Milwaukee Steel Foundry Co.; Falk Corp.; Geuder, Paeschke & Frey Co.; Nordberg Mfg. Co.; A. O. Smith Corp.; Sterling Wheelbarrow Co.; Bradley Washfountain Co.; Allis-Chalmers Mfg. Co.; Hevi Duty Electric Co.; Sivyer Steel Casting Co.; Vilter Mfg. Co.; Koehring Co.; Oilgear Co.; Allen-Bradley Co.; Square D Co.; Milcor Steel Co.; Perfex Corp.; Stearns Magnetic Mfg. Co.; Milwaukee Spinning Co.. Globe Steel Tubes Co.

Other companies also contributing to this section include: Kearney & Trecker Corp.; Doelger & Kirsten Inc.; Heil Co. Space does not permit use of all the excellent illustrations submitted.



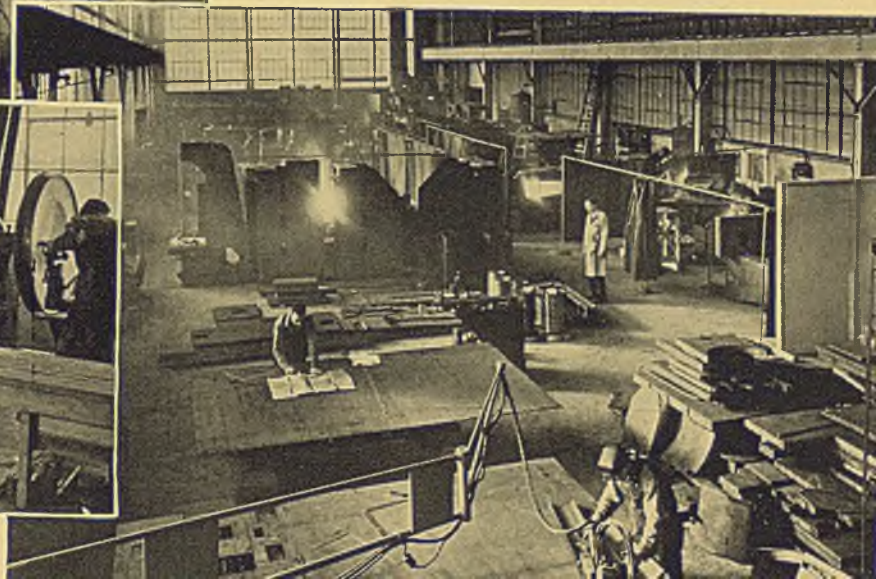


Above, this white-hot tank is just emerging from furnace where its glass lining was fired

Left, welding aluminum jacket on stainless steel tank

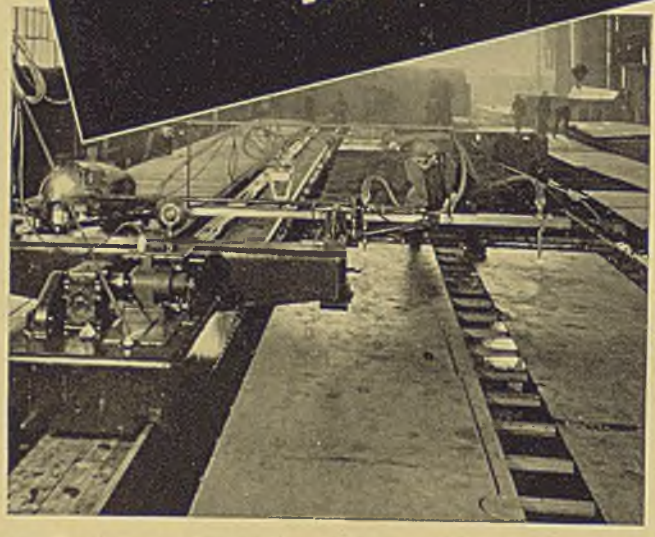
Lower left, men are spinning sheet metal shapes

Below, interior view of a typical fabricating shop



# Two Essential Steps

## MACHINE GAS CUT WITH AIRCO MACHINES



*Three views of the Airco No. 20 Travograph showing the extremely wide areas over which this machine can operate.*

### The first step—Machine Gas Cutting

Products welded from machine gas cut parts are strong and rugged—yet light in weight. Machine gas cutting speeds up production and lowers costs all down the line...a boon both to manufacturer and to consumer. » » » Where quantities of parts are required — whether large or small — the proper machine from Airco's complete line makes welded construction more profitable. Users of Airco Gas Cutting Machines are assured of the most efficient results because they benefit from the practical assistance of members of our Applied Engineering Department. Write for full details.

## AIR REDUCTION

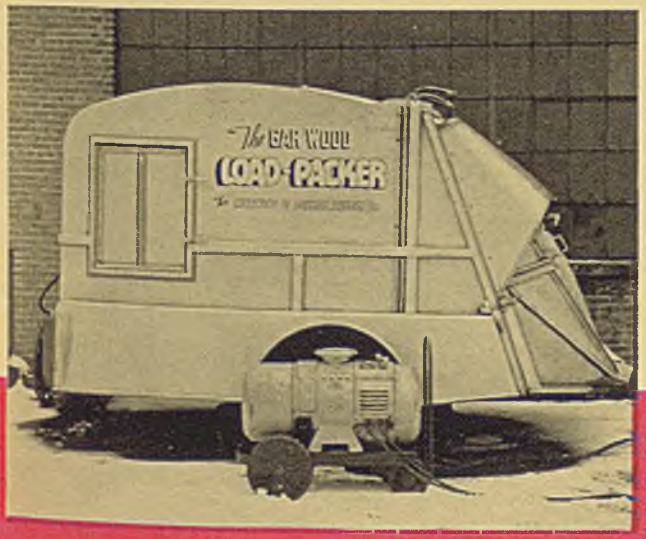
**GENERAL OFFICES: 60 EAST 42ND ST., NEW YORK, N. Y.**

**DISTRICT OFFICES IN PRINCIPAL CITIES**

# TO COST-SAVING WELDED FABRICATION

WELD WITH WILSON ARC WELDERS

*Here several Wilson "Hornets"* — newest of the line of electric welders that make the arc behave — are being used to fabricate garbage disposal trucks for the City of New York.*




## The second step—Arc Welding

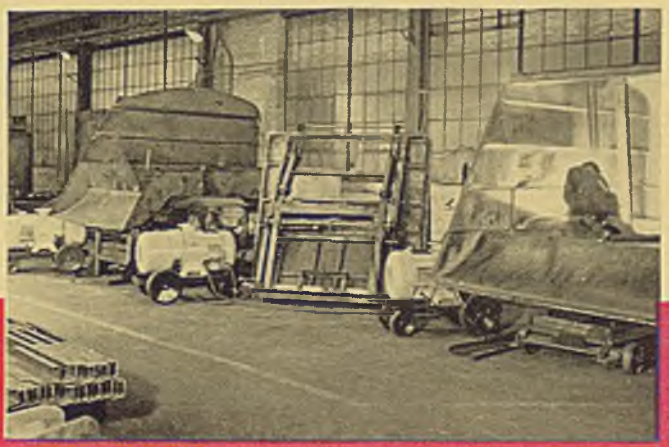
Speed in application, excellent performance, soundness of quality — that's the kind of welding you get when you use Wilson Arc Welders and Welding Electrodes.

Wilson Welders — our line includes types for every arc welding need — establish an arc of just the right character for any particular job. It is the inherent ability of Wilson machines to maintain a stable, uniform heat-generating arc that makes welding easier and assures better results at lower costs. Write for full details.

**WILSON WELDER & METALS COMPANY, INC.**

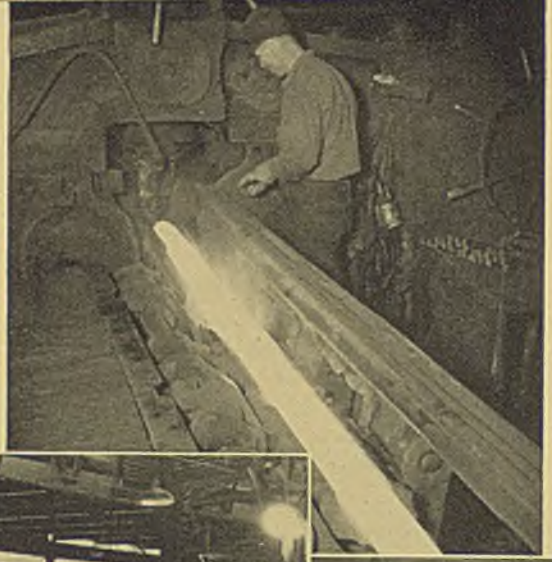
***General Offices:* 60 East 42nd Street, New York, N.Y.**

*Trade-Mark Reg. U. S. Pat. Off.



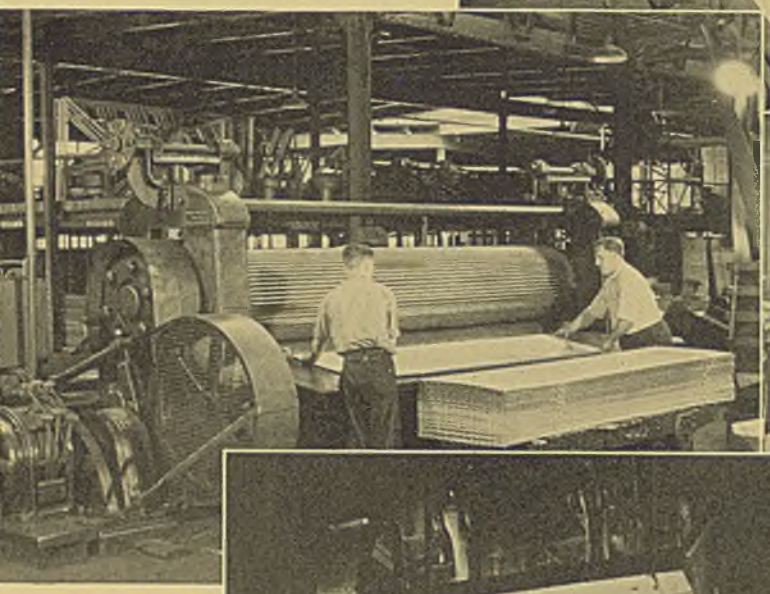
# Milwaukee

## Is Important as Steel Fabricator, Consumer

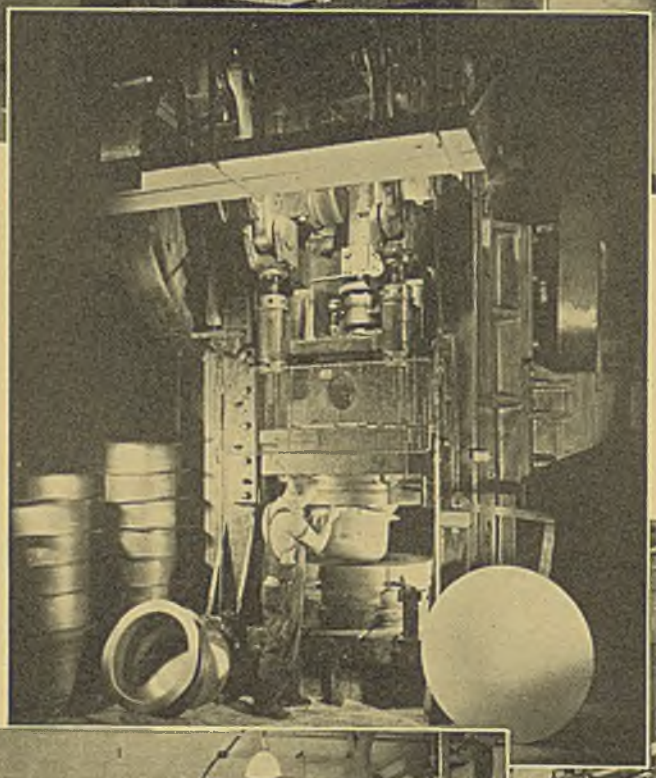


At left is shown a step in manufacture of steel tubes at a large tube mill. The hot metal is being pierced

Below is a powered roll corrugating machine turning out steel roofing



Below is a room in which a large volume of electrical control devices are put together, just part of a large plant devoted entirely to this product

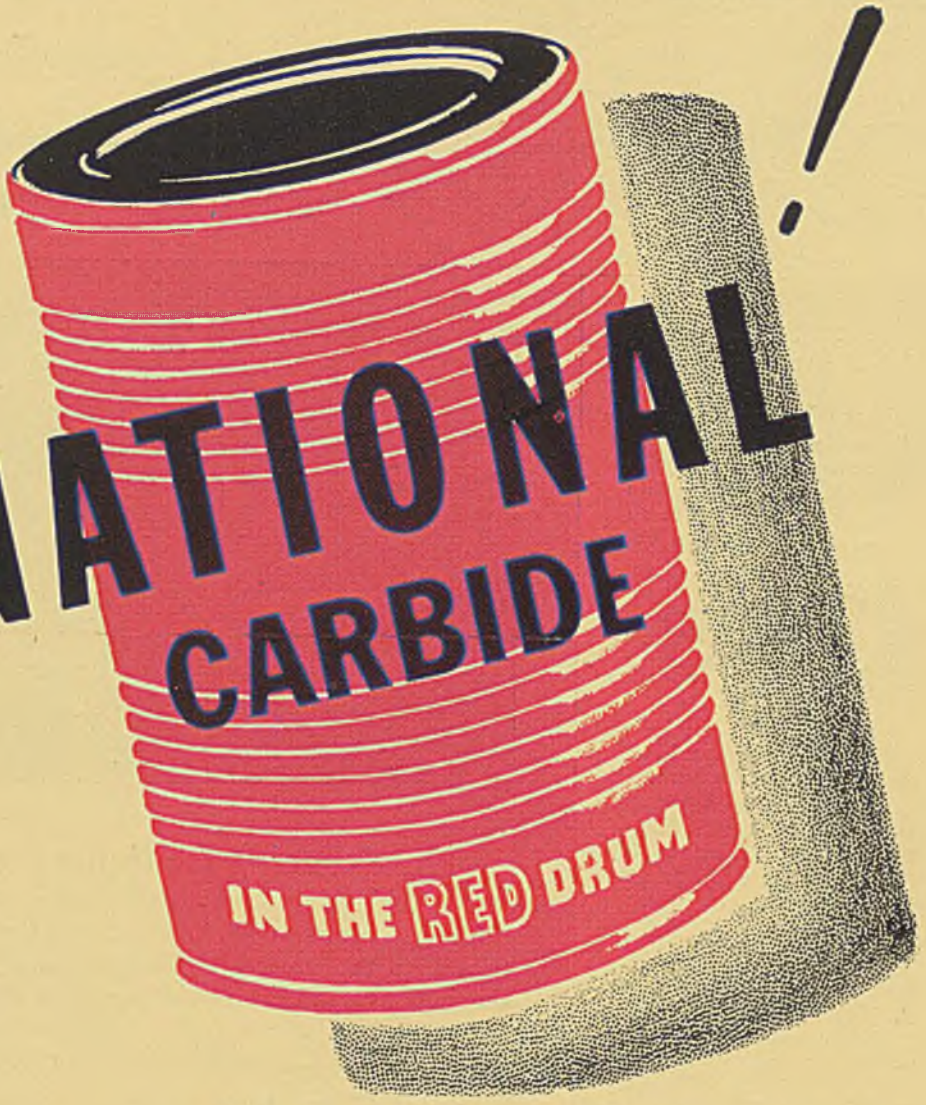


At left, huge press draws stainless steel tubs for washing machines from flat sheet

Lower left, about 4000 pounds of magnet laminations, contacts and small parts are punched from sheet material in these presses daily

View of fabricating floor in plant making electric furnaces

# MORE GAS FOR YOUR MONEY FROM




Gives *highest gas yield* because it is made from the best and purest raw materials obtainable and because its even size promotes gas generation. The air-tight *red drum* brings NATIONAL Carbide to you as fresh and dustfree as the day it was packed. Conspicuous wherever carbide is used, the *red drum* is the symbol of carbide economy. Write for the "STORY OF CARBIDE."

Self-Contained, Safe, Economical
NATIONAL CARBIDE LIGHTS and LANTERNS
Literature on Request

## NATIONAL CARBIDE CORPORATION

General Office: Lincoln Bldg., 60 East 42nd St., New York, N. Y.

**NATIONAL CARBIDE Distributing Service Covers the Country**

# Throughout Industry...

# Hard-Facing Eliminates Costly Shutdowns

## Hard-Facing Hints

FUEL PUMP ROCKER LEVERS —The increasing use of diesel engines offers many opportunities for wearproofing with Haynes Stellite alloy. The hard-faced fuel pump rocker lever illustrated is an ex-

ample of a diesel application. Since the replacement of this part would require considerable time, the longer life obtained through hard-facing eliminates several costly shutdowns.

FEED SCREWS — The first three flights of this feed screw for a wood briquet machine, shown before and after grinding, are hard-faced with Haynes Stellite rod to resist wear. To replace this part it is necessary

to shut down the machine with a consequent interruption of manufacturing operations. Therefore, the longer life of the hard-faced part means lower production costs.

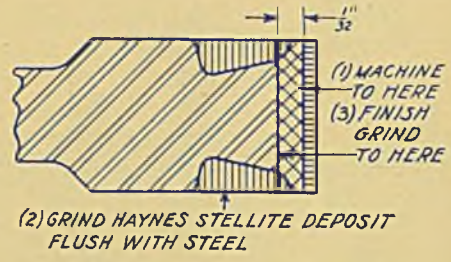
Write for the 104-page book, "Hard-Facing with Haynes Stellite Products," which shows how to apply these products and gives typical applications in many industries.

HAYNES STELLITE

*Red-hard, wear-resisting alloy of cobalt, chromium and tungsten*

## Hard-Facing Re-Squaring Shear Blades

Careful preparations and a fixture to eliminate warpage contribute to the successful hard-facing of large shear blades. As shown above, the fixture has clamps at 10-in. intervals to keep the blade flat. The sketch at the right indicates how the blade—originally oversized—is grooved for the deposit of Haynes Stellite hard-facing rod. After hard-facing, the excess metal is machined and ground off as sketched, leaving a sharp, wear-resistant cutting edge. *The blade shown lasted 2 to 3 times as long after hard-facing and eliminated many shutdowns for regrinding.*




This method of producing a wear-resistant edge by hard-facing is applicable to many types of cutting blades. Haynes Stellite engineers and Linde service operators can show you many other short-cuts to successful hard-facing. Call on them without obligation.

*Headquarters for Hard-Facing Materials*

## HAYNES STELLITE COMPANY

*Unit of Union Carbide and Carbon Corporation*

UCC

New York, N. Y. Kokomo, Indiana

Chicago — Cleveland — Detroit — Houston — Los Angeles — San Francisco — Tulsa

"Haynes Stellite" is a registered trade-mark of Haynes Stellite Company

# Machine Flame Cutting

## Convention to Emphasize Importance of the Process

Stack cutting lift brackets for doors. 12 at a time from ¼-inch at speed of 7 inches per minute. ets are turned out 20 times faste by a former method. No machin necessary

■ MACHINE flame-cutting is subject of this year's annual International Acetylene association lecture and panel discussion, on Thursday, April 11. Rapid advances in applications of the process have tended to increase variety of cuts possible, to increase speed and accuracy of cuts, and to increase the economies that can be obtained.

When oxyacetylene cutting by hand first was demonstrated, progressive technical men were quick to foresee that automatic cutting could be accomplished by a selfpropelled power machine which would carry the torch to make straight-line cuts or cuts according to any desired contour. It was first necessary, of course, to develop suitable equipment and proper operating procedures.

First step was to develop a propelling machine of proper strength to give it rigidity from vibration, and at the same time sufficient facility of movement to avoid excessive power requirements. High-strength lightweight metal alloys and antifriction bearings contributed much to meeting these qualifications. A smooth drive was imparted to the machine by using an electric motor. Since proper speed of cutting varies for different types of cutting and thicknesses of metal, practically all cutting machines today are constructed so blowpipe speed can be controlled accurately over a range from 2 to 30 inches per minute and upwards.

Improvements in the equipment have extended greatly its scope. A most important development was the tracing device which makes possible the exact reproduction along the line of cut of a predetermined shape or design. When large quantities of the same part are required or where operations of the machine are repeated at intervals, it is possible to construct permanent full-size templets which the tracer follows automatically, greatly increasing output of the cutting machine and making possible continuous production of an unlimited number of identical shapes.

Another factor of great influence is the variety of cutting machines available. Small machines taken to the work and transported from place to place are useful in practically all types of plate-fabricating, particularly where it is practical to operate the machine directly on the work. These small machines are useful in straight-line cutting, circle cutting and bevel cutting. Some are used also for cutting irregular shapes. Special operations include cutting gates, risers, billets, rounds and pipes.

For high production repetitive operations, the larger stationary cutting machine is preferred. Most machines of this type have a capacity for cutting shapes of great complexity either with templets or by hand-guidance, and for circle cutting, straight line and bevel cutting in any direction in a horizontal plane. Blowpipe carriage moves in all directions in the horizontal plane, and is mounted on a permanent track. The extra size, structural strength and rigidity of this permanent arrangement makes possible the mounting of more than one torch on the supporting carriage for simultaneous multiple cutting. As many as eight pieces can be cut simultaneously by eight cutting blowpipes mounted on one machine. Concentric circles for flanges and the like often are cut in one operation using two blowpipes.

A most important improvement in oxyacetylene cutting equipment has been development of precision-cutting nozzles which make it easy for the average operator to obtain consistently good cuts day in and day out. These new nozzles have resulted in such smooth cuts that in many instances no subsequent machining is necessary. Where finishing is required, it can be reduced to a minimum by flame cutting to extremely close tolerances.

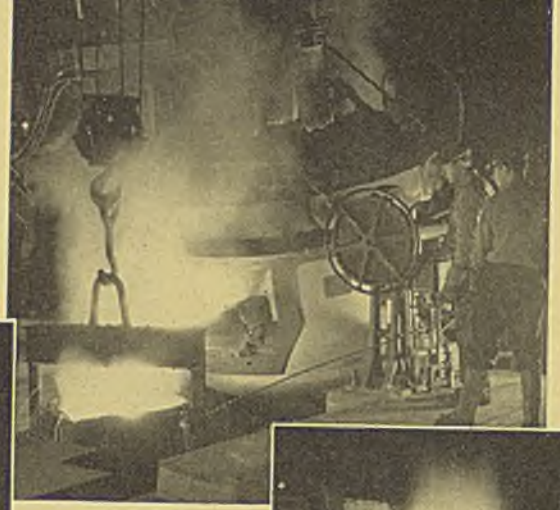
Improvements in technique and cutting methods have kept pace with these developments in equipment. Today almost any ferrous metal can be oxyacetylene flame cut. Standard cutting blowpipes can make machine cuts through any thickness of metal up to approximately 33 inches. Sections of greater thickness have been cut making a nonpenetrating cut on one side and then turning the piece over and making a second cut to join the first.

Oxyacetylene cutting has been stimulated by solving what had been some problems of cutting by extensive research. For example, it has been found that certain alloying elements in steel offer some resistance to the cutting action; and that the uncombined carbon in cast iron has a similar effect. It has been found also that quality of the cut depends to a great extent upon striking the correct ratio between thickness and kind of metal being cut, gas pressures, speed of blowpipe

(*Please turn to Page* 98)

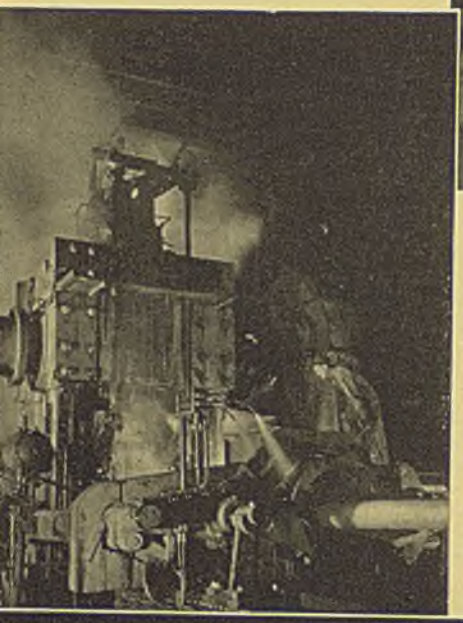
# Milwaukee

## Is Important As Steel Fabricating Center

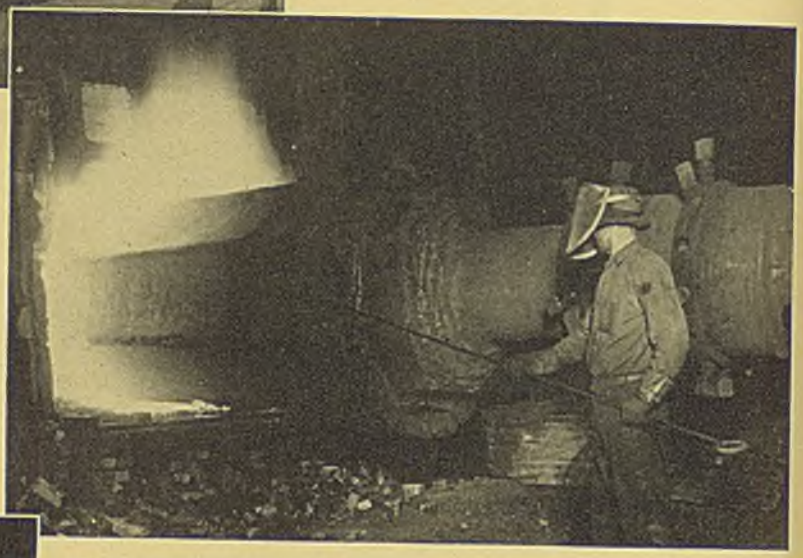


Left, tapping a 3½-ton charge of steel from an electric-arc melting furnace

Below, removing huge steel ingot from furnace for forging into a shaft

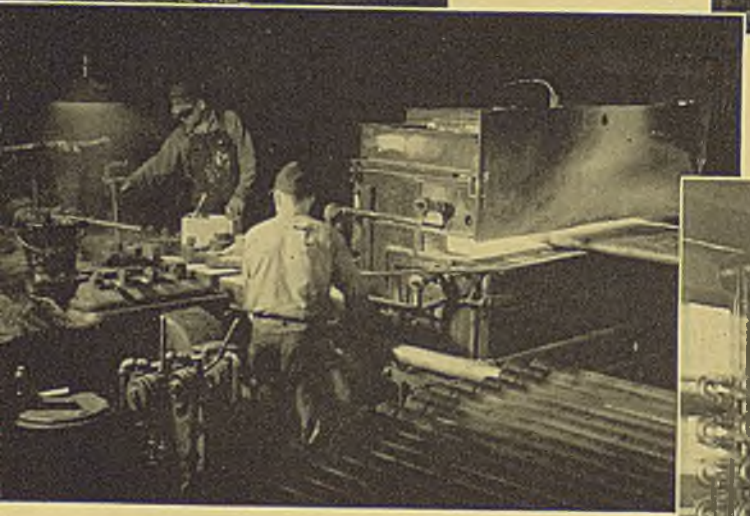


Left, forging pipe for oil wells. It will be used as casing



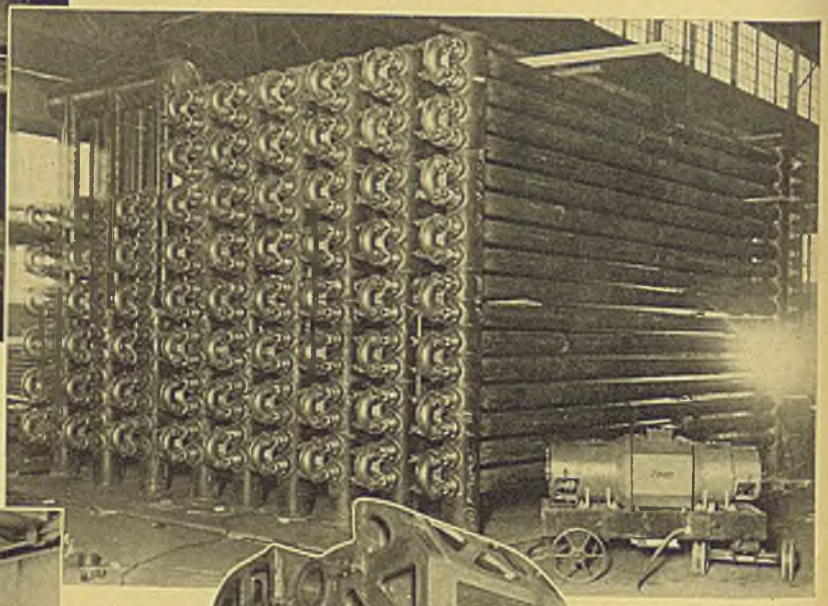
Below, welding a beer cooler for use in a large brewery

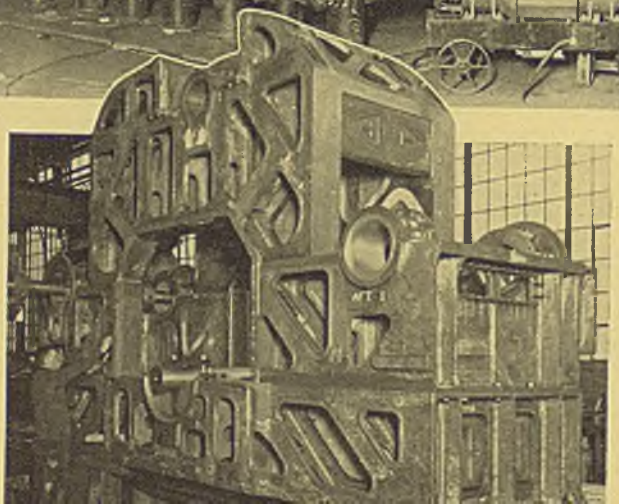
Bottom, boring a large cast-steel marine-drive housing



Above, upsetting ends of steel tubes while hot

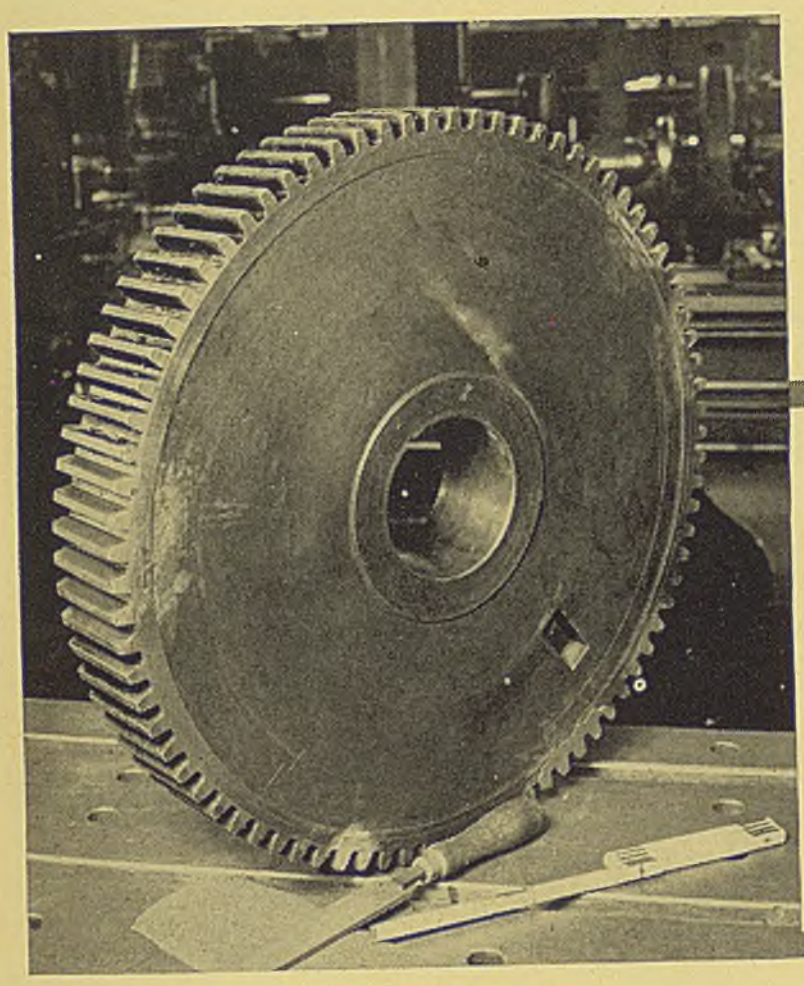
Below, this welded bed for record size press uses 11-inch plate and weighs 173,000 pounds





# ANACONDA 997

## a tough weld metal with low fuming characteristics



This steel gear broke down six different times over a period of three years. All repair welds were made with Anaconda 997 Low Fuming Rods, and *each succeeding fracture occurred outside of any previously welded area* — interesting evidence of the dependability of welds made with this tough Anaconda Rod.

IN the general oxy-acetylene repair welding of equipment made of copper alloys, nickel alloys, steel, cast iron and malleable cast iron, Anaconda 997 Low Fuming Welding Rods provide tough, high strength welds. When correctly used, they give off a minimum of fumes. This rod is manufactured under U. S. patents RE-17631 and 1525058.

Sixteen other Anaconda Copper Alloy Welding Rods are available for general and specific welding purposes. They can be obtained from welding supply houses everywhere.

Anaconda Publication B-13, a twenty-eight page descriptive and informative manual covering the whole list of Anaconda welding rods, should be in your files. Write for a copy, today. 89131

ANACONDA
from mine to consumer

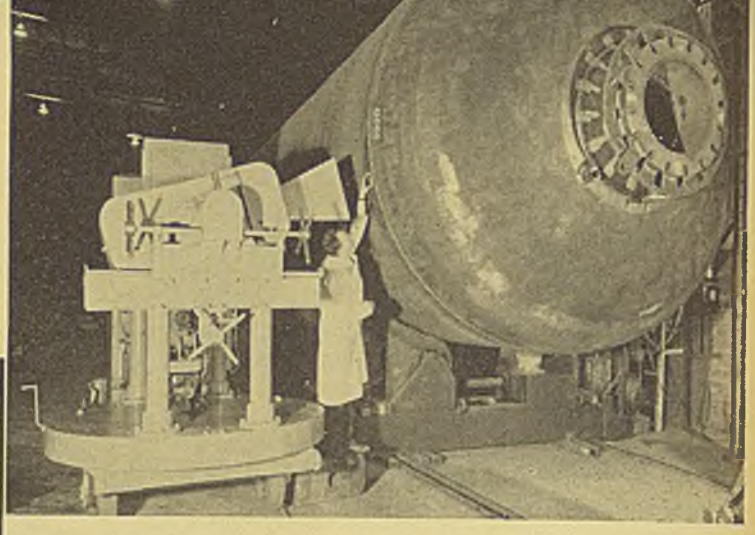
# Anaconda Welding Rods

THE AMERICAN BRASS COMPANY, General Offices: Waterbury, Connecticut

*In Canada: Anaconda American Brass Ltd., New Toronto, Ont.* • *Subsidiary of Anaconda Copper Mining Company*

# Milwaukee

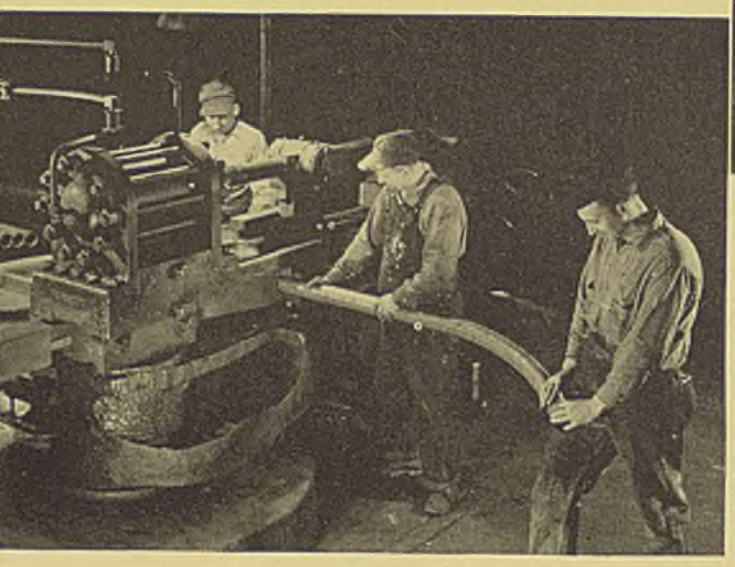
## Is Important as Steel Fabricator, Consumer



Above, a large oil-cracking vessel is having its welds X-rayed as a check on workmanship, materials

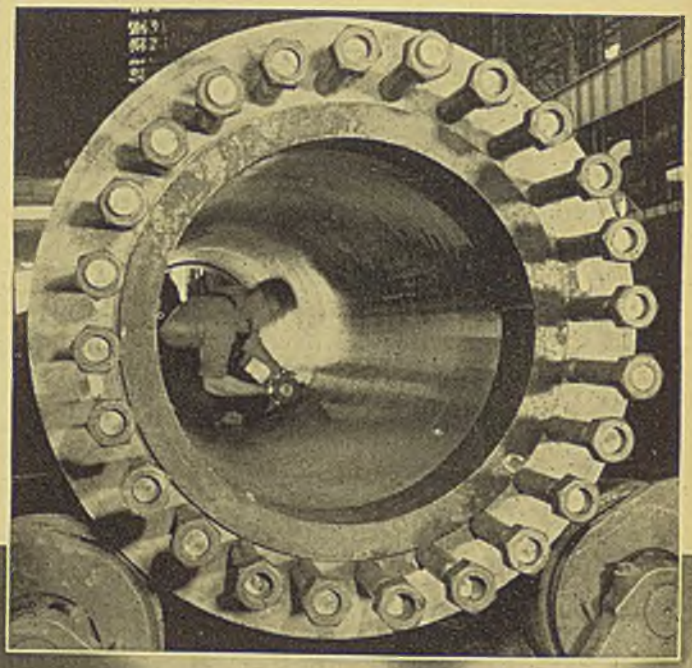
Below, polishing the inside stainless steel layer in a multi-layer vessel designed to withstand 2000 pounds per square inch. Walls are 3½ inches thick, of 16 layers

Bottom, welding a large marine gear housing of heavy plate



Above, machine for cold bending alloy steel boiler tubes

Below, finishing department in a plant making tank trucks. These include milk and gasoline trucks, all welded



Left, steel tubes are ground to extreme accuracy on this centerless grinder

# Program

## of the 40th Annual Convention of the International Acetylene Association, Milwaukee, April 10, 11 and 12, 1940

**Wednesday, April 10**

10 A. M.—SCHROEDER HOTEL

*Registration*

12:15 P. M.—CRYSTAL BALL ROOM, SCHROEDER HOTEL

*Opening Luncheon*

Chairman: H. P. Dolisie, president, International Acetylene association; managing director, Canadian Liquid Air Co. Ltd., Montreal.

Vice Chairman: Henry Booth, vice president and treasurer, International Acetylene association; sales manager, Shawinigan Products Corp., New York.

Address of Welcome by The Honorable Julius P. Heil, governor of Wisconsin.

Keynote Address by speaker to be announced.

President's Address by H. P. Dolisie.

Presentation of Morehead Medal by Elmer H. Smith, past president, International Acetylene association; president, Commercial Gas Co., Minneapolis.

Acceptance of Morehead Medal by Otto C. Voss, Allis-Chalmers Mfg. Co., Milwaukee.

2:30 P. M.—PERE MARQUETTE ROOM, SCHROEDER HOTEL

*Technical Section A "General Applications of the Oxyacetylene Process"*

Chairman: K. L. Hansen, consulting engineer, Harnischfeger Corp., Milwaukee; western vice president, American Welding society.

Vice Chairman: J. I. Banash, consulting engineer, International Acetylene association, Chicago.

Layout and Management of a Modern Welding Shop by author to be announced.

Oxyacetylene Welding of Carbon-Molybdenum Pipe for High-Temperature, High-Pressure Service. Part I—Laboratory Development by R. M. Rooke and F. C. Saacke, apparatus research and development dept., Air Reduction Sales Co., New York. Part II—Field Testing and Application by A. N. Kugler, mechanical engineer, applied engineering dept., Air Reduction Sales Co., New York.

Latest Practices in Welding Industrial Piping by author to be announced.

Low-Temperature Brazing with Silver Alloys by R. H. Leach, vice president, Handy & Harman, Bridgeport, Conn.

2:30 P. M.—GREEN ROOM, SCHROEDER HOTEL

*Technical Session B "Reclamation, Repair and Maintenance"*

Chairman: R. C. Woodward, Bucyrus-Erie Co., South Milwaukee.

Vice Chairman: E. L. Mills, vice president, Bastian-Blessing Co., Chicago.

Cutting in Shipbuilding and Repair by Robert E. King, engineer, Manitowoc Shipbuilding Corp., Manitowoc, Wis.

Welding in the Maintenance of Foundry and Steel Mill Equipment by author to be announced.

Railroad Welding Practices by G. M. Magee, research engineer, engineering division, Association of American Railroads, Chicago.

Maintenance of Agricultural Equipment by D. K. Struthers, extension agricultural engineer, Iowa State College, Ames, Iowa.

H. P. Dolisie

8:15 P. M.—MILWAUKEE VOCATIONAL SCHOOL AUDITORIUM

*Round Table Discussions and Demonstrations*

Honorary Chairman: Otto C. Voss, advisory superintendent, tank and plate shop, Allis-Chalmers Mfg. Co., Milwaukee.

General Chairman: G. T. Horton, president, American Welding society; president, Chicago Bridge and Iron Co., Chicago.

General Vice Chairman: J. J. Crowe, manager, apparatus research and development dep., Air Reduction Sales Co., New York.

Narrator: W. B. Browning, service engineer, The Linde Air Products Co., Chicago.

Demonstrations to be made include multiflame pipe welding, flame descaling, plate-edge preparation, wrinkle bending, flame cleaning, machine flame cutting and heating for bending and straightening.

Subjects of group meetings include flame hardening; low-temperature brazing and soldering, and other air-acetylene applications; hard facing; machine cutting; nonferrous metals; alloy steels; riser cutting, flame cleaning, gouging and use of the oxygen lance; repair and maintenance; safety and fire protection; testing of welds; sheet metal; pipe welding and wrinkle bending; the welding engineer; heating and straightening.

**Thursday, April 11**

12:15 P. M.—CRYSTAL BALL ROOM, SCHROEDER HOTEL

*Annual Luncheon and Business Meeting*

Chairman: H. P. Dolisie, president, International Acetylene association.

Vice Chairman: H. S. Smith, chairman, executive committee, International Acetylene association, New York.

Address: Health Aspects of the Oxyacetylene Process by Dr. A. G. Cranch, industrial toxicologist, New York.

Discussion by Dr. A. G. Kammer,

medical director, Inland Steel Co., Chicago; Dr. O. A. Sander, Milwaukee; Dr. Eugene L. Walsh, Northwestern University Medical School, Chicago.

Reports of . . .

Oxyacetylene Committee by H. L. Rogers, Air Reduction Sales Co., New York.

Consulting Engineer by J. I. Banash, consulting engineer, International Acetylene association, Chicago.

Public Relations and Technical and Engineering Committees by H. S. Smith, Prest-O-Lite Co. Inc., New York.

Secretary by H. F. Reinhard, Union Carbide Co., New York.

Treasurer by Henry Booth, Shawinigan Products Corp., New York.

Auditing Committee Report by Philip Kearny, K-G Welding & Cutting Co., New York.

Membership Committee by Henry Booth, New York.

Report of Nominating Committee, and Election of Officers.

2:30 P. M.—CRYSTAL BALL ROOM, SCHROEDER HOTEL

*Technical Session*
*"Machine Flame Cutting"*

This will feature a special lecture, followed by a panel discussion led by the chairman.

**The air-acetylene torch is an ideal source of heat for soldering, brazing, paint removal and similar work which does not require a flame with the extremely high temperature of the oxy-acetylene torch**

General Chairman: J. H. Zimmerman, development manager, The Linde Air Products Co., New York; formerly associate professor of mechanical engineering, Massachusetts Institute of Technology.

Machine flame cutting lecture by H. C. Boardman, research engineer, Chicago Bridge & Iron Co., Chicago; past president, American Welding society.

Panel discussion by Richard W. Sternke, shop superintendent, Lakeside Bridge & Steel Co., Milwaukee.

Chester C. Mott, National Cylinder Gas Co., Chicago.

Dr. George V. Slottman, manager, applied engineering dept., Air Reduction Sales Co., New York.

**Friday, April 12**

2:00 P. M.—GREEN ROOM, SCHROEDER HOTEL

*Technical Session A*

*"Foundry and Heavy Industry Applications of the Oxyacetylene Process"*

Chairman: Eugene A. Balsley, welding engineer, Link-Belt Co., Chicago; chairman, Chicago section, American Welding society.

Vice Chairman: J. W. Dunham, vice president, National Cylinder Gas Co., Chicago. Efficiency Control in Oxyacetylene Cutting by E. K. Carlson, superintendent, Chicago Bridge & Iron Co., Chicago.

Flame Cleaning, Dehydrating and Descaling by J. G. Magrath, Air Reduction Sales Co., New York.

Oxyacetylene Gouging—a Flame-Machining Process by R. F. Flood, service engineer, The Linde Air Products Co., Chicago.

Heavy Cutting and Application of the Oxygen Lance by author to be announced.

2:00 P. M.—PERE MARQUETTE ROOM, SCHROEDER HOTEL

*Technical Session B*

*"Speeding Fabrication and Production"*

Chairman: Richard W. Sternke, shop superintendent, Lakeside Bridge & Steel Co., Milwaukee; chairman, Milwaukee section, American Welding society.

Vice Chairman: C. T. Price, vice president, Compressed Industrial Gases Inc., Chicago.

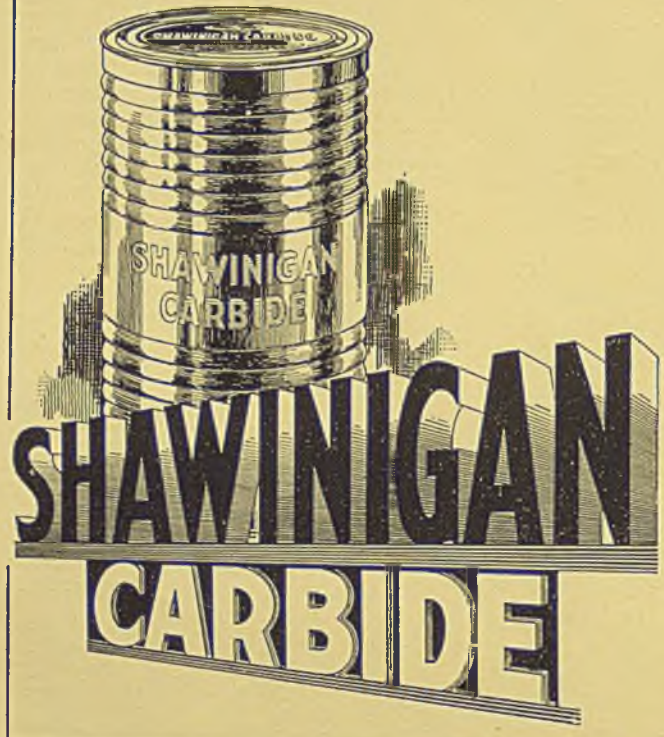
Welding and Brazing of Light-Gage Metal by R. G. Rodgers, works manager, and Walter R. Campbell, superintendent Electrolux division, Servel Inc., Evansville, Ind.

Design and Construction of Jigs and Fixtures for Oxyacetylene Welding by John Haydock, managing editor *American Machinist,* New York.

Automatic Bronze Welding by Roland Hawley, foreman, welding dept., Oil Gear Co., Milwaukee.

Welding for Enameling by J. C. Lewis, president, Associated Engineers Inc., Fort Wayne, Ind.


Shawinigan Products Corporation
EMPIRE STATE BUILDING
NEW YORK CITY



# How Columbium and Manganese Simplify Welded Fabrication of Chromium Steels . . .

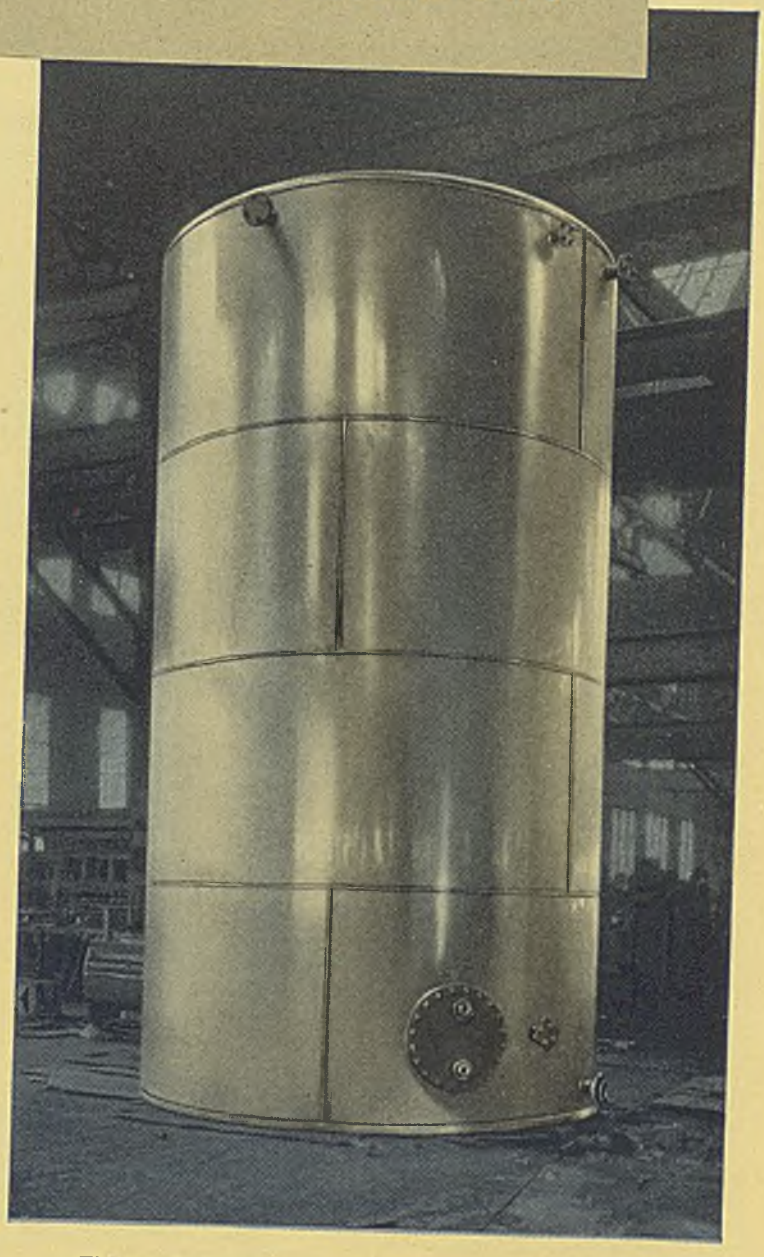
**Columbium** in stainless steels of the austenitic chromium-nickel type, such as the 18-8, the 25-12, and the 25-20 steels, prevents susceptibility to intergranular corrosion. The use of columbium-bearing stainless steels and columbium-bearing welding rod makes it unnecessary to heat-treat equipment made of these steels after fabrication to restore full corrosion resistance to the weld zone. Columbium also renders the metal immune to the detrimental effects of heating to the customary stress relieving temperatures.

**Columbium** in steels containing from 3 to 16 per cent chromium minimizes their air-hardening tendencies. Thus it is possible to weld or cut these steels without the development of air hardening in the weld zone or cut edge. The resistance to air hardening imparted by columbium also facilitates the hard-facing of these steels.

**Manganese** in amounts from 1½ to 4½ per cent in steels of the austenitic chromium-nickel type improves their weldability and minimizes the effect of welding stresses by increasing hot ductility. This is of particular advantage in the modified 18-8, the 25-12, and the 25-20 steels.

We do not make steel, but in more than 30 years' experience in the production and use of "Electromet" ferro-alloys we have acquired a vast amount of information on the properties of steels made from these alloys. When you have a job which involves fabricating high-chromium steels by welding, let us help you with your alloy specifications.


ELECTRO METALLURGICAL COMPANY
*Unit of Union Carbide and Carbon Corporation*
30 East 42nd Street, UCC New York, N. Y.
In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

*This tank, 10½ feet in diameter and almost 21 feet long, for storing a corrosive organic chemical did not have to be heat-treated after fabrication because it is made of columbium-bearing stainless steel welded with columbium-bearing rod. The stainless steel is fully corrosion-resistant in the as-welded state.*

**Electromet**
Trade-Mark
**Ferro-Alloys & Metals**

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

## Round-Table Discussions

(*Concluded from Page* 80)

vessels and machine parts subjected to corrosive materials or gases. Welded high-strength steels make possible stronger, lighter equipment. The tremendously increased use of these steels results in constant improvement of fabricating techniques.

There also are literally hundreds of forging, forming, straightening, bending and pressing operations that can be performed effectively and economically by the intense localized heat of the oxyacetylene flame. Recent applications utilizing new large-capacity heating blowpipes and multiflame heads will be reviewed at session on "heating and straightening."

An outstanding heating operation of increasing importance is wrinkle bending of pipe, a subject which together with pipe welding will occupy the attention of another group.

In the meeting on "weld testing," methods of examining and qualifying welds will be discussed. Considerable interest is expected to be displayed in standards recently adopted by United States navy.

Safe locations and surroundings, proper handling of gases and equipment is theme of meeting on "safety and fire protection." Representatives of Underwriters' Laboratories Inc., Factory Mutual Laboratories, National Safety Council and other important safety groups will be present to advise and suggest proper procedures.

There is no registration fee connected with attending any of these meetings. Everyone is invited to come. Tickets may be obtained at the door or from representatives of the International Acetylene association at registration desk on 5th floor of Schroeder hotel from 9:00 A.M. to 5:30 P.M. each day of the convention.

## Machine Flame Cutting

(*Concluded from Page* 91)

movement, etc. Result of all these studies has been the scientific development of specific cutting techniques which have qualified the process to meet the rigid requirements of an ever-increasing number of users.

One outstanding development in recent years is stack cutting. Stack cutting involves piling a number of plates one on top of the other, clamping or welding them tightly together, and making the cut as if the clamped plates were one piece of solid metal. This makes practical the cutting of thin sheets. Altogether, the process has resulted in an increase in the production capacity of the oxyacetylene cutting machine, greater uniformity of the shape-cut parts, and lower unit cost. Stack cutting is an important contribution to mass production methods.

Machine flame cutting has become for many manufacturers more economical and more practical than any other fabricating method. Sufficient experience has become available so in any given production setup selection of proper cutting machine, proper location in the plant, and most economical flow of work to and from the machine can all be worked out on a scientific basis.

Economical organization of work is well exemplified by a shop engaged in repetitive fabrication of large steel parts. The stationary cutting machine has a cutting range sufficient to allow for the progressive cutting of four different parts side by side. As the production of each of these parts is repeated from time to time, permanent, full-size templets have been constructed which can be slipped into position almost instantly on the cutting machine table by the guiding action of permanently located jigs and stops. This speedy method of fixing the proper position of the templet facilitates a rapid and economical change from one production setup to another.

The sheets or plates are cut in stacks but are loaded onto the jigs one at a time. Loading is speeded considerably by means of removable stop keys which definitely locate each stack of material in its proper position without any further adjustment. Material is loaded progressively; that is, the jigs are filled starting at one end of the machine and proceeding to the jig at the opposite end. The loading of one jig and the unloading of another

**Wrinkle bending is one of many localized heating applications easily done with an oxyacetylene torch**

continues while the cutting operation is being performed on the stack in the jig in between, and the entire operation becomes a complete and continuous cycle of loading, cutting and unloading.

Like most processes, oxyacetylene cutting has been both the cause and result of new products and new production methods. The ability of cutting machines to turn out shape-cut parts more rapidly and more economically than ever before has stimulated the growth of welded construction. The amendment of various codes and specifications of regulatory organizations to permit, and in some cases to specify, equipment constructed by the welding of shape-cut parts is significant. Progress in designing also has played an important part, for not only has the designer developed countless new and improved structures for welded fabrication but he has also been instrumental in furthering the economies of the process by designing the individual component parts so that cutting time and excess steel scrap can be minimized.

Even in the short time since its introduction on a commercial scale, oxyacetylene machine-cutting has brought about profound changes in the shaping and conditioning of ferrous materials. Formerly, the severing, cutting or machining of these metals could be accomplished only by shearing, sawing, turning, planing, milling, or other mechanical means, and always involved considerable amounts of power and time. This type of work is done today by oxyacetylene cutting with ease, speed and accuracy. The process has made it economically possible to fabricate rolled steel up to any commercial thickness and size for such items as the bases, housings and forms of heavy machinery and equipment. In conjunction with welding in production work, machine flame-cutting is effecting important improvements and economies in metal fabrication, and the limits of the applications as yet have not been approached.

## Open-Hearth Control

(*Concluded from Page 44*)

fuel as measured in B.t.u. content. It is calibrated and adjusted so most satisfactory furnace operation occurs when graphs traced by the fuel-flow (B.t.u. input) and air-flow pens are superimposed one upon the other. This indicates the best obtainable predetermined fuel-balance for the existing fuel feed as measured by the gas pressure.

Any tendency of these critical graphs to separate, either due to a lack or an excess of air for the current fuel supply, causes an electrically actuated control drive to shift the setting of the induced draft damper one way or the other. This admits more or less air as the needs dictate until the sensitive rebalance between fuel-air relationship is re-established. Combustion conditions thus are held automatically at the highest efficiency.

### System Saves Fuel

Fuel supply is regulated manually according to requirements of the "heat." Forced draft damper is controlled automatically according to fuel feed requirements to maintain correct pressure in furnace. Induced draft damper automatically is controlled to hold the desired fuel-air ratio.

The chief benefits gained by virtue of this system of automatic control of blast-furnace operation are four-fold:

Substantial savings in fuel. The gas, oil and tar in whatever proportions they may be consumed are burned to the best advantage.

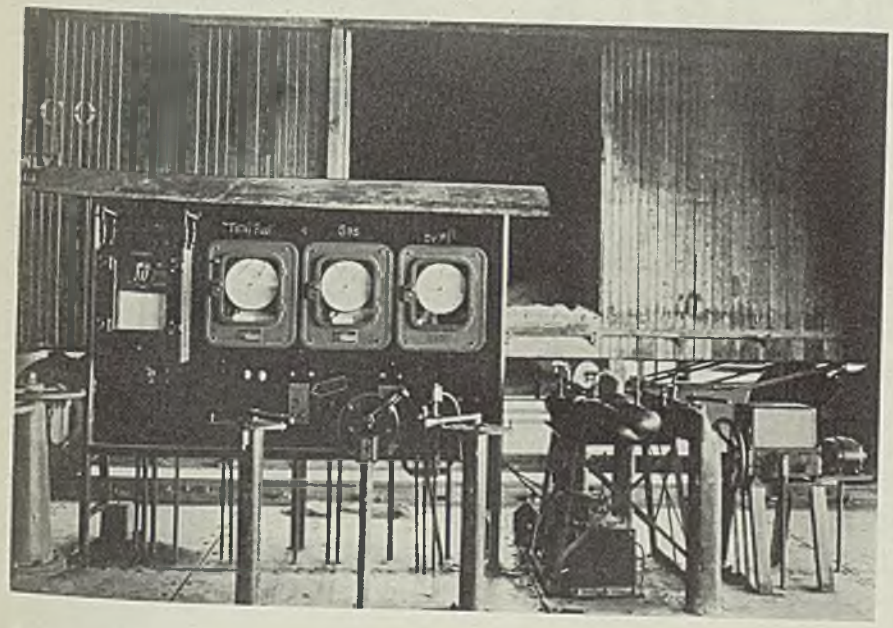
Increased furnace capacity and output. The B.t.u. input is governed strictly in accordance with heat requirements. Holding optimum operating conditions saves considerable time and accelerates melting of the charge.

Reduction in furnace upkeep and maintenance. Destructive over-heating of grates and furnace linings is sharply curtailed.

Improvements in uniformity and quality of melted metal. Possibly these latter are most important.

Any accurate appraisal of these benefits is difficult, for from a dollars and cents viewpoint they may differ widely. Savings in fuel, for example, based upon attainments in eleven installations, averages 14 per cent—4½ per cent as the lowest and 22 per cent at the highest. Increased furnace capacities were estimated in half a dozen cases to run from 4 to 15 per cent, with a mean of 7½ per cent. Improvements in product quality, reductions in furnace upkeep and maintenance costs, etc., are even more difficult to evaluate, yet they may at times completely overshadow the economies that are more readily measured.

**Installation of metered combustion control on open-hearth furnace at prominent southern steel plant brings about important economies**



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## Industrial Gas Sales Subject of Conference

■ Gas executives from 22 states, including the Pacific coast, Gulf states, Atlantic seaboard and Great Lakes, as well as two provinces of Canada, gathered at the Commodore Perry hotel, Toledo, O., March 28-29, for the American Gas association's fifth annual conference on industrial gas sales. Registration totaled 175. The conference also constitutes the spring meeting of the Midwest Industrial Gas Sales council of the association's industrial gas section.

F. M. Adams, vice president and general manager, Surface Combustion Corp., Toledo, O., and president, National Association of Gas Appliance and Equipment Manufacturers was among the speakers at the opening session.

E. M. Tharp, vice president and general manager, Ohio Fuel Gas Co., Columbus, O., addressed the first day's luncheon on the industrial gas load.

A complete report of the conference will be presented in next week's issue of STEEL.

## Wire Association Holding Meeting in Worcester

■ Annual Worcester, Mass., regional meeting of the Wire association will be conducted at Hotel Bancroft, that city, April 11. Program includes an afternoon visit to the steel mills, open hearths, rolling mills and austempering unit of American Steel & Wire Co.; a dinner at Putnam & Thurston's restaurant with J. R. Longwell, chief engineer, Carboloy Co. Inc., Detroit, speaking on tungsten carbide; and a floor show and entertainment.

Only American citizens will be permitted to make the plant inspection by arranging reservations by April 9, stating their birthplace and present citizenship. R. R. Tatnall, Wickwire Spencer Steel Co., Worcester, Mass., is chairman of the meeting committee.

## Texas Chapter ASM Nominates Officers

■ Officers nominated by Texas chapter, American Society for Metals, at the annual banquet recently held in Houston, Tex., include: Chairman, Wade W. Hampton, Hughes Tool Co., Houston, Tex.; vice chairman, George W. Harrington, Reed Roller Bit Co., Houston, Tex.; secretary-treasurer, Charles F. Lewis, Cook Heat Treating Corp., Houston, Tex.

Named to the executive committee for one-year terms were Ed Hogan, Hughes Tool Co.; Ken Johnson, Reed Roller Bit Co.; Louis Kennon, L. K. Pump Valve Co., Houston, Tex.; M. P. Laurent, engineer, Houston, Tex.; H. Jeddy Pearce, Texas Iron Works, Houston, Tex.; L. M. Wittlinger, Texas Electrical Steel Casting Co., Houston, Tex.

Nominated for two-year terms on the executive committee were: Carl Bacher, W. K. M. Co., Houston, Tex.; Nolan Clark, Reed Roller Bit Co.; L. M. Cole, Warner & Swasey Sales Corp., Houston, Tex.; Alex Vallance, Reed Roller Bit Co.; H. B. Hughes, Hughes Tool Co.; H. B. Young, Mission Mfg. Co., Houston, Tex.

## Radiant Firing Methods

(*Concluded from Page 37*)

selves posess a number of desirable characteristics. A large portion of the heat produced in the furnace is radiant in character, assuring rapid penetration into the charge. Combustion is complete within the tunnel, Fig. 3, so there is no flame to impinge on the charge, no matter how close the radiants are placed. These features often permit designing engineers to reduce furnace sizes as there is no danger of localized overheating.

Heat generated by each radiant is subject to direction, so forced circulation within the furnace is not required. The effective straight lines of radiant heat permit the unit to have a greater heat-covering range than its size would at first indicate to one not familiar with its operation. The radiant effect which gives the burner its great heat covering capacity is obtained through an exceptionally wide range of heat-generating rates. This affords close control of temperature without undesirable hot spots even at maximum heat output.

These burners consist of a special refractory cup-shaped combustion tunnel in the center of which is a slotted refractory burner tip. An air-gas mixture under pressure passes in uniform streams through each of the slots at such an angle that combustion takes place immediately on surface of refractory tunnel producing incandescence.

Value of an incandescent surface is not only in the high rate of radiation which incandescence assures, but of essential importance is the ability of the heated surface to maintain ignition and to assist in combustion. Such a burner can be throttled to a pressure as low as ⅛-inch water column. With increased fuel supply, the incandescent surface holds the flame, preventing it from blowing off. Operating range is from ⅛ to 54 inches water column.


# Therm-O-flake
## INSULATION BRICK

One of lightest insulation brick available—(about one pound each).

Has low thermal conductivity, and is most economical for efficient insulation.

Can be compacted without breaking and cuts easily.

Especially valuable for back up work behind fire brick walls.

Acts as expansion cushion between furnace walls and binding structure.

*Write for Information and Prices*

Other **Therm-O-flake** Products

Made from Exfoliated Vermiculite

Granules - Brick - Block - Concrete

Illinois Clay Products Company

JOLIET, ILL.


## Blue Bearing Truing Paste Is Nondrying

■ Dykem Co., 2301 North Eleventh street, St. Louis, has developed a new paste, Hi-Spot Blue No. 107, for use in locating high spots when scraping bearing surfaces. It does not dry out and remains in condition on the work indefinitely.

The paste spreads easily and evenly, and transfers clearly from master surface gage to show up high spots on the bearing surface. It is especially valuable for scraping on flat bearing surfaces of lathes, planers and milling machines. Single tubes are available at 50 cents.

## Recommended Rasps and Files Practice Approved

■ Current revision of "Simplified Practice Recommendation R6," files and rasps, has been accorded required degree of acceptance by the industry, and is to become effective April 1, 1940, according to division of simplified practice, national bureau of standards. Revised recommendation will be identified as R6-40.

Simplification of files and rasps was first undertaken by the industry in co-operation with the war industries board in 1918. At that time the number of varieties was cut from 1351 to 619. In 1923 the industry approved the promulgation by the United States department of commerce of the original simplified practice recommendation on files and rasps, which further reduced the number of varieties to 496. Current revision brings the number of stock varieties down to 377, or 76 per cent of the 1923 figure, and only 28 per cent of the number of varieties produced before 1918.

Until printed copies are available, mimeographed copies of this simplified practice recommendation may be obtained without charge from Washington.

## Coal Handling, Storage

(*Concluded from Page* 52)

which help contribute to the comfort of the operator.

Another costly item in many coal-handling programs is the freezing of coal to the sides of hopper-bottom railroad cars. To prevent this, the insides of cars are sprayed with a solution of calcium chloride during cold weather. This material is nonfreezing even at temperatures well below zero Fahr. and so forms a nonfreezing coating on the sides. This, in turn, prevents the coal from sticking to sides of the cars and assures complete removal of coal when bottom hopper is opened.

A thorough investigation of other techniques of stocking and handling coal shows this method to be one of the most efficient and least costly ever developed.

# FINANCIAL

(*Concluded from Page* 15)

ployment data for each quarter and full year of 1939:

| Quarters | Av. No. Employes | Total Payroll | Av. Hrs. Per Emp. Per Wk. | Av. Earnings Per Hr. |
|---|---|---|---|---|
| First | 208,907 | $83,065,315 | 34.5 | $0.896 |
| Second | 207,291 | 80,396,436 | 33.2 | 0.897 |
| Third | 221,395 | 90,599,167 | 34.6 | 0.900 |
| Fourth | 257,783 | 114,516,793 | 37.8 | 0.894 |
| 1939 | 223,844 | $368,577,711 | 35.2 | $0.897 |
| 1938 | 202,108 | 282,209,332 | 29.7 | 0.902 |
| Inc. over 1938 | 21,736 | $86,368,379 | 5.5 | $0.005 |

In discussing general conditions Mr. Stettinius stated:

"During the year, in addition to increased demand for heavy goods, there was a continuation of the trend toward lighter steels, which further justified the expenditure the management has made in recent years for new plants and facilities to meet this situation. With continued improvement in business we may expect further expansion in the demand for lighter steels and, with renewed flow of capital the capacity of the corporation to produce heavy steels may be even more rapidly utilized."

Balance sheet summary:

| | 1939 | 1938 |
|---|---|---|
| Gross sales and revenue | $904,151,897 | $632,533,383 |
| Total operating expense | 844,199,329 | 634,683,621 |
| Net operating earnings | 59,952,568 | 2,150,238* |
| Net income | 41,119,934 | 7,717,454* |
| Preferred dividends | 25,219,677 | 25,219,677 |
| Year's surplus | 15,900,257 | 32,937,131* |
| Earned surplus Dec. 31 | 263,319,270 | 247,419,013 |
| Current assets, total | 575,877,137 | 482,378,097 |
| Current liabilities | 143,888,691 | 89,506,296 |
| Funded debt | 216,502,209 | 233,467,373 |
| Inventories | 294,593,046 | 279,518,604 |
| Capital surplus | 38,462,801 | 38,462,801 |

*Loss.

Available 1939 rated annual capacities in net tons: Blast furnaces, 22,957,000; steel ingots and castings, 28,885,000; rolled and finished steel products for sale, 19,759,000.

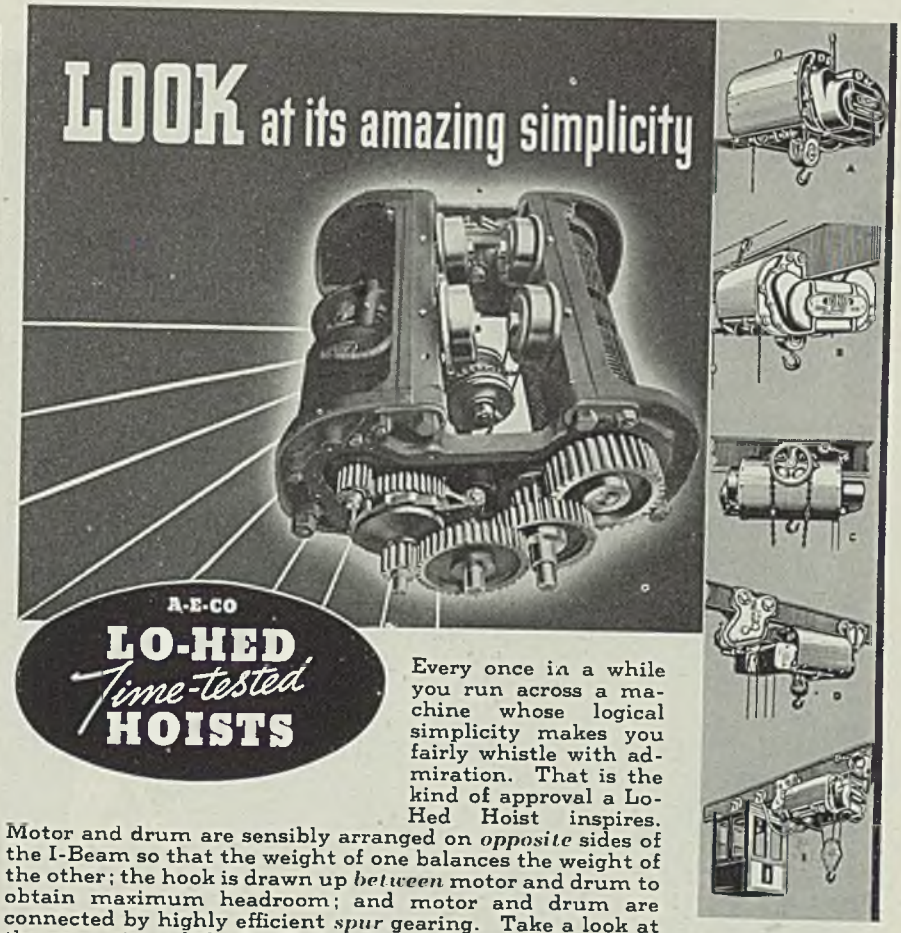
Production statistics:

| | 1939 (Net Tons) | 1938 (Net Tons) | Per Cent Increase |
|---|---|---|---|
| Iron ore | 24,109,887 | 12,197,324 | 98 |
| Manganese, zinc ores | 115,010 | 105,283 | 9 |
| Coal | 21,623,834 | 13,841,727 | 56 |
| Coke | 12,091,676 | 7,005,896 | 73 |
| Other raw materials | 12,852,375 | 7,817,952 | 64 |
| Pig iron, spiegel, ferro | 13,655,719 | 7,631,962 | 79 |
| Steel ingots | 17,625,676 | 10,525,056 | 67 |
| Rolled, finished steel for sale | 11,996,811 | 7,226,579 | 66 |
| Cement, barrels | 13,327,000 | 10,695,500 | 25 |

Percentage of capacity operations in rolled and finished steel products for sale by all subsidiaries, compared:

| Quarter | 1939 (Per cent) | 1938 (Per cent) |
|---|---|---|
| First | 51.7 | 32.3 |
| Second | 48.1 | 31.4 |
| Third | 55.8 | 34.2 |
| Fourth | 86.9 | 46.9 |
| Year | 60.7 | 36.2 |

■ E. A. Kinsey Co. Inc., Cincinnati, sales agent for heavy duty machine tools, mill supplies and specializing in abrasives and safety equipment, moved its Indianapolis branch from 235 South Meridian street, to 725 North Capitol avenue.


Every once in a while you run across a machine whose logical simplicity makes you fairly whistle with admiration. That is the kind of approval a Lo-Hed Hoist inspires. Motor and drum are sensibly arranged on *opposite* sides of the I-Beam so that the weight of one balances the weight of the other; the hook is drawn up *between* motor and drum to obtain maximum headroom; and motor and drum are connected by highly efficient *spur* gearing. Take a look at the open-view of the Lo-Hed and we believe you'll say, "If I'd designed it myself, I couldn't have done better." • This unique time-tested construction of the Lo-Hed Hoist gives you low headroom, and an unusually compact, strong, and well-balanced hoist. Remember it also has every *worthwhile* time-tested feature a hoist needs: Heavy duty hoist type motor, automatic lowering brake, anti-friction bearings, stub tooth spur gears, plow-steel cable, 100% positive automatic upper limit stop, dust and moisture-proof controller. (Construction varies slightly for classes of Lo-Heds.) Investigate Lo-Hed time-tested construction. Write today for the complete Lo-Hed Catalog shown below.



THERE'S A LO-HED ELECTRIC HOIST FOR EVERY PURPOSE

A—Bolt Suspension Type.
B—Plain Trolley Type.
C—Hand-Geared Type.
D—Motor Driven Trolley Type.
E—Cab-Controlled Type.

CAPACITIES FROM ¼ to 12 TONS

AMERICAN ENGINEERING COMPANY

2484 ARAMINGO AVENUE, PHILADELPHIA, PA.

*OTHER A-E-CO PRODUCTS:* TAYLOR STOKERS, MARINE DECK AUXILIARIES, HELE-SHAW FLUID POWER

*Look in your classified telephone directory under "A-E-CO LO-HED HOISTS" for your nearest representative.*

MAIL THIS COUPON NOW


AMERICAN ENGINEERING COMPANY
2484 Aramingo Avenue, Philadelphia, Pa.

☐ Please send me your 20 page complete catalog of Lo-Hed Hoists.
☐ Ask your representative to call.

Name_____
Company_____
Street Address_____
City_____ State_____
(Please print plainly)

# Activities of Steel Users, Makers

■ AMERICAN BRAKE SHOE & FOUNDRY CO., New York, has purchased the Great Lakes Forge Co., Chicago, which operates board and steam hammer equipment, varying in weight from 1200 to 10,000 pounds falling weight. The plant has ample die making capacity and a modern heat-treating department. American Forge division of the Brake Shoe company, which will operate the Great Lakes Forge Co., specializes in upset forgings, and the addition of the Great Lakes Forge plant to the facilities of this division brings the combined forgings production capacity to over 50,000 tons annually.

G. C. Hodgson, president, and associated with Great Lakes Forge Co. 20 years, is retiring. Officers of Great Lakes Forge are: President, W. E. Crocombe; vice president in charge of sales, H. Mulford; vice president in charge of manufacturing, A. R. Nettenstrom; vice president, A. L. Moses; general sales manager, F. L. Moore.

♦

Frick-Reid Supply Corp. has moved its Pittsburgh office to 311 Ross street building, from its headquarters on the North Side.

♦

Whitlock Coil Pipe Co., Hartford, Conn., has changed its name to Whitlock Mfg. Co.

♦

Link-Belt Speeder Corp., Chicago, has opened a New York office at 856 East 136th street, to handle sales and service of Link-Belt speeder shovels, draglines and cranes. E. H. Kliebenstein is in charge.

♦

Link-Belt Co., stoker division, Chicago, has appointed George Power Co., Atlanta, Ga., as retail dealer in the sale of its stokers in that territory. Engineering, installation and servicing will be handled by Campbell Coal Co., Link-Belt's distributor in Atlanta.

♦

Chiksan Tool Co. has moved from Fullerton, Calif., to Brea, Calif., where it has purchased property from Shell Oil Co., comprising a modern office building and facilities for housing the factory, testing department and stock warehouse of Chiksan Tool.

♦

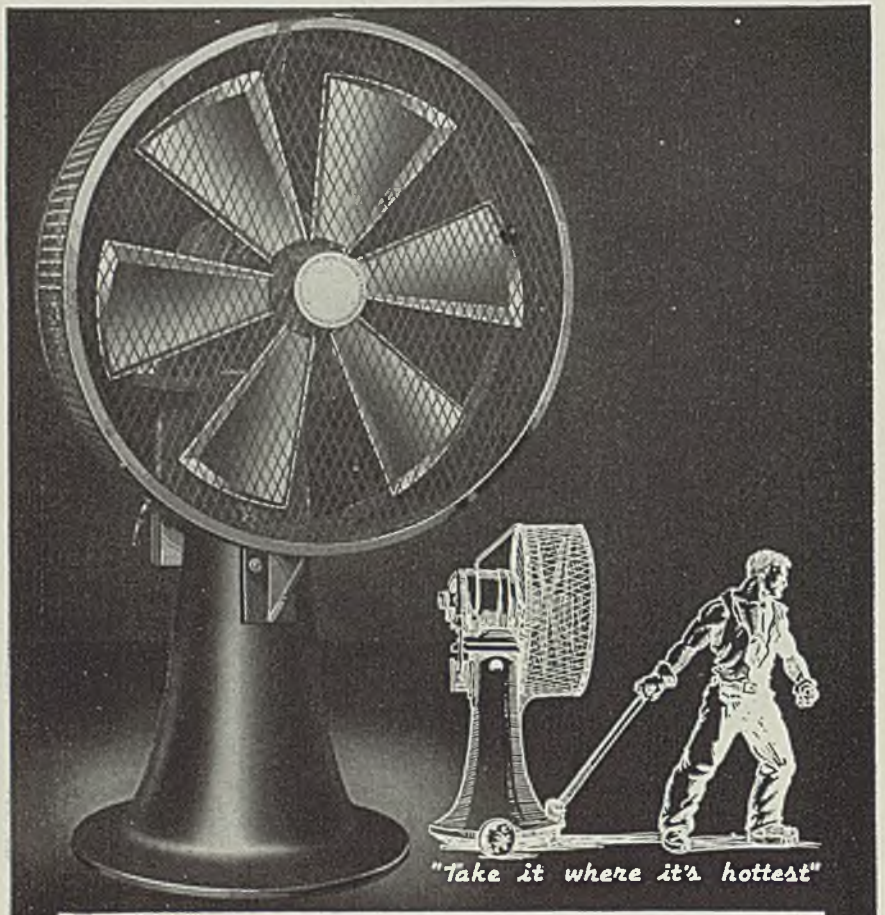
A. C. Wiebe, molding equipment representative for the F. J. Stokes Machine Co. in the New York metropolitan district, has moved his offices from 150 Nassau street to 103 Park avenue. This removal consolidates the molding equipment with other equipment divisions of the company.

♦

George H. Alexander Machinery Ltd., Birmingham, England, is erecting two plants in Great Britain for the fabrication of Kennametal tools. The company was licensed in December, 1938, by McKenna Metals Co., Latrobe, Pa., to sell Kennametal tools throughout the British Empire.

♦

George S. May, Chicago business man, has announced plans for organization of a foundation to engage in research work in the interests of private business enterprise. The organization, to be known as the George S. May Business Foundation, has been granted a nonprofit Illinois charter and will open offices in Chicago and New York. Research engineers will be maintained in a number of leading cities, and subjects scheduled for early study are: Bonus payment plans for supervisors and executives; modern methods of market analysis; effect of public opinion on business; and value of trade associations to business.


**Perkins Man Coolers** create refreshing recirculation of air without chilling drafts.

**Perkins Man Coolers** help to maintain production schedules in the hottest places.

**Perkins Man Coolers** decrease labor turnover and help to make contented workers.

**PERKINS MAN COOLERS** ARE MADE IN OSCILLATING AND STATIONARY TYPES, BOTH PORTABLE.

**B. F. PERKINS & SON, INC.** **HOLYOKE, MASS.**

*Engineers and Manufacturers*

**PERKINS MAN COOLERS**

TRADE MARK REG. U. S. PAT. OFF.

# Static Market Shows No Definite Trend

***Buying better but insufficient to stem downward production rate. Tin plate output up. Exports increase***

**MARKET IN TABLOID ★**

**Demand**
*Continues steady but below production rate.*

**Prices**
*Hold firmly in practically all lines.*

**Production**
*Resumes downward trend, off 1½ points to 61 per cent.*

■ WHATEVER changes in demand for steel products may be underway, they are too slight to indicate a trend or quicken production. Orders for commoner products have tended to improve recently but the gain has not been significant and has not overtaken the reduction in mill backlogs.

The downtrend in production, interrupted a week ago when the rate remained unchanged, has been resumed and last week saw a loss of 1½ points to 61 per cent. While the curve still is declining there are signs of flattening as mill operations at several centers have steadied and finishing mill schedules are more stable. Yet such improvement as there is has not been sufficient to indicate an upturn. Sheet and strip production shows little lessening but tin plate output has recovered somewhat from its first quarter low. Tin plate demand seasonally should be greater in second quarter and predictions by a leading producer are for as good a year as in 1939, or better.

Often blamed for adverse conditions, the belated spring and unseasonable weather undoubtedly has had a serious effect in some lines of steel products. Buying has been delayed in the South and rural purchasing over the entire country has been affected by unusual cold and heavy snow. Whether this has merely delayed buying or cut down total movement is difficult to determine.

Placing of 1000 box cars by the New York Central for a subsidiary company is the high light in railroad buying at the moment, involving about 10,000 tons of steel. Other railroad buying is negligible. A large part of rails and track accessories booked last fall remains to be rolled and some mills have backlogs to extend through June. Further buying is expected, several roads having carbuilding programs under consideration.

Export demand is a bright feature and March bookings from abroad are expected to be a peak. Heavy demand for sheets and plates in Canada, for war purposes largely, has filled Dominion mills for months ahead and producers in the United States are receiving inquiries for quick delivery tonnages.

February exports of steel and iron products rose to 436,585 gross tons, about 10 per cent above January. Exports for two months this year were three times those of the corresponding months last year and equaled or exceeded figures for each of the full calendar years 1931, 1932 and 1933. The increase was largely due to shipments to European countries, though other areas also took heavier totals.

Building projects involving shapes and reinforcing bars continue to increase in number as the season advances but most are for moderate tonnage. The proportion of private work is larger, though public jobs continue to provide a large portion. Currently about half the total number of structures placed or pending falls into the private class. This is a fairly sharp change from conditions a few months ago.

Automobile production last week was 103,370 units, 25 less than in the preceding period. Chrysler gained 4820, practically replacing its loss of the previous week. General Motors made 200 fewer cars, Ford dropped 2350 and other makers made 2295 less. Production has been at practically the same level for weeks, except for a bulge of about 2000 cars to more than 105,000 the week of March 16, a peak for that month.

Slowly continued recession in quotations on steel and iron scrap has caused STEEL'S composites to yield further. The iron and steel composite stands at $36.81, a decline of 3 cents from the previous week, and the scrap composite at $16.17, a drop of 8 cents. The finished steel composite is unchanged at $56.10.

Decline in production was general last week, though at most points it was small. Detroit was the only area showing an increase, 1 point to 79 per cent. Pittsburgh was unchanged at 57½ per cent, Birmingham at 78 per cent, New England at 65 per cent and Youngstown at 43 per cent. Chicago slipped off 3 points to 56½ per cent, Eastern Pennsylvania 1 point to 59, Wheeling 2 points to 71, Cleveland 5 points to 69, Buffalo 7 points to 44, Cincinnati 5½ points to 45½ and St. Louis 19 points to 39 per cent. For the most part schedules for this week indicate no material change from present levels.

# COMPOSITE MARKET AVERAGES

| | Mar. 30 | Mar. 23 | Mar. 16 | One Month Ago Feb., 1940 | Three Months Ago Dec., 1939 | One Year Ago Mar., 1939 | Five Years Ago Mar., 1935 |
|---|---|---|---|---|---|---|---|
| Iron and Steel .... | $36.81 | $36.84 | $36.86 | $36.97 | $37.18 | $36.40 | $32.36 |
| Finished Steel .... | 56.10 | 56.10 | 56.10 | 56.10 | 56.10 | 56.50 | 54.00 |
| Steelworks Scrap.. | 16.17 | 16.25 | 16.59 | 16.98 | 17.88 | 14.98 | 10.75 |

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel, hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

# COMPARISON OF PRICES

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

## Finished Material

| | Mar. 30, 1940 | Feb. 1940 | Dec. 1939 | Mar. 1939 |
|---|---|---|---|---|
| Steel bars, Pittsburgh | 2.15c | 2.15c | 2.15c | 2.25c |
| Steel bars, Chicago | 2.15 | 2.15 | 2.15 | 2.25 |
| Steel bars, Philadelphia | 2.47 | 2.47 | 2.47 | 2.57 |
| Iron bars, Chicago | 2.25 | 2.30 | 2.15 | 2.15 |
| Shapes, Pittsburgh | 2.10 | 2.10 | 2.10 | 2.10 |
| Shapes, Philadelphia | 2.215 | 2.215 | 2.215 | 2.215 |
| Shapes, Chicago | 2.10 | 2.10 | 2.10 | 2.10 |
| Plates, Pittsburgh | 2.10 | 2.10 | 2.10 | 2.10 |
| Plates, Philadelphia | 2.15 | 2.15 | 2.225 | 2.15 |
| Plates, Chicago | 2.10 | 2.10 | 2.10 | 2.10 |
| Sheets, hot-rolled, Pittsburgh | 2.10 | 2.10 | 2.10 | 2.15 |
| Sheets, cold-rolled, Pittsburgh | 3.05 | 3.05 | 3.05 | 3.20 |
| Sheets, No. 24 galv., Pittsburgh | 3.50 | 3.50 | 3.50 | 3.50 |
| Sheets, hot-rolled, Gary | 2.10 | 2.10 | 2.10 | 2.15 |
| Sheets, cold-rolled, Gary | 3.05 | 3.05 | 3.05 | 3.20 |
| Sheets, No. 24 galv., Gary | 3.50 | 3.50 | 3.50 | 3.50 |
| Bright bess., basic wire, Pitts. | 2.60 | 2.60 | 2.60 | 2.60 |
| Tin plate, per base box, Pitts. | $5.00 | $5.00 | $5.00 | $5.00 |
| Wire nails, Pittsburgh | 2.55 | 2.55 | 2.55 | 2.45 |

## Semifinished Material

| | | | | |
|---|---|---|---|---|
| Sheet bars, Pittsburgh, Chicago | $34.00 | $34.00 | $34.00 | $34.00 |
| Slabs, Pittsburgh, Chicago | 34.00 | 34.00 | 34.00 | 34.00 |
| Rerolling billets, Pittsburgh | 34.00 | 34.00 | 34.00 | 34.00 |
| Wire rods, No. 5 to ⅜-inch, Pitts. | 2.00 | 2.00 | 1.98 | 1.92 |

## Pig Iron

| | Mar. 30, 1940 | Feb. 1940 | Dec. 1939 | Mar. 1939 |
|---|---|---|---|---|
| Bessemer, del. Pittsburgh | $24.34 | $24.34 | $24.34 | $22.34 |
| Basic, Valley | 22.50 | 22.50 | 22.50 | 20.50 |
| Basic, eastern, del. Philadelphia | 24.34 | 24.34 | 24.34 | 22.34 |
| No. 2 foundry, Pittsburgh | 24.21 | 24.21 | 24.21 | 22.21 |
| No. 2 foundry, Chicago | 23.00 | 23.00 | 23.00 | 21.00 |
| Southern No. 2, Birmingham | 19.38 | 19.38 | 19.38 | 17.38 |
| Southern No. 2, del. Cincinnati | 22.89 | 22.89 | 22.89 | 20.89 |
| No. 2X, del. Phila. (differ. av.) | 25.215 | 25.215 | 25.215 | 23.215 |
| Malleable, Valley | 23.00 | 23.00 | 23.00 | 21.00 |
| Malleable, Chicago | 23.00 | 23.00 | 23.00 | 21.00 |
| Lake Sup., charcoal, del. Chicago | 30.34 | 30.34 | 30.34 | 28.34 |
| Gray forge, del. Pittsburgh | 23.17 | 23.17 | 23.17 | 21.17 |
| Ferromanganese, del. Pittsburgh | 105.33 | 105.33 | 105.33 | 85.27 |

## Scrap

| | | | | |
|---|---|---|---|---|
| Heavy melt. steel, No. 2, E. Pa. | 15.50 | $17.75 | $18.50 | $15.75 |
| Heavy melt. steel, No. 2, E. Pa. | 16.00 | 16.31 | 17.60 | 13.375 |
| Heavy melting steel, Chicago | 15.25 | 15.75 | 16.25 | 14.25 |
| Rails for rolling, Chicago | 18.25 | 18.25 | 19.75 | 17.25 |
| Railroad steel specialties, Chicago | 18.00 | 18.50 | 18.50 | 16.25 |

## Coke

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

# STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

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

## Sheet Steel

**Hot Rolled**

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

**Cold Rolled**

| | |
|---|---|
| Pittsburgh | 3.05c |
| Chicago, Gary | 3.05c |
| Buffalo | 3.05c |
| Cleveland | 3.05c |
| Detroit, delivered | 3.15c |
| Philadelphia, del. | 3.37c |
| New York, del. | 3.39c |
| Granite City, Ill. | 3.15c |
| Middletown, O. | 3.05c |
| Youngstown, O. | 3.05c |
| Pacific Coast points | 3.65c |

**Galvanized No. 24**

| | |
|---|---|
| Pittsburgh | 3.50c |
| Chicago, Gary | 3.50c |
| Buffalo | 3.50c |
| Sparrows Point, Md. | 3.50c |
| Philadelphia, del. | 3.67c |
| New York, delivered | 3.74c |
| Birmingham | 3.50c |
| Granite City, Ill. | 3.60c |
| Middletown, O. | 3.50c |
| Youngstown, O. | 3.50c |
| Pacific Coast points | 4.00c |

**Black Plate, No. 29 and Lighter**

| | |
|---|---|
| Pittsburgh | 3.05c |
| Chicago, Gary | 3.05c |
| Granite City, Ill. | 3.15c |

**Long Ternes No. 24 Unassorted**

| | |
|---|---|
| Pittsburgh, Gary | 3.80c |
| Pacific Coast | 4.50c |

**Enameling Sheets**

| | No. 10 | No. 20 |
|---|---|---|
| Pittsburgh | 2.75c | 3.35c |
| Chicago, Gary | 2.75c | 3.35c |
| Granite City, Ill. | 2.85c | 3.45c |
| Youngstown, O. | 2.75c | 3.35c |
| Cleveland | 2.75c | 3.35c |
| Middletown, O. | 2.75c | 3.35c |
| Pacific Coast | 3.35c | 3.95c |

## Corrosion and Heat-Resistant Alloys

*Pittsburgh base, cents per lb.*

**Chrome-Nickel**

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

**Straight Chromes**

| | No. 410 | No. 430 | No. 442 | No. 446 |
|---|---|---|---|---|
| Bars | 18.50 | 19.00 | 22.50 | 27.50 |
| Plates | 21.50 | 22.00 | 25.50 | 30 50 |
| Sheets | 26.50 | 29.00 | 32.50 | 36.50 |
| Hot strip | 17.00 | 17.50 | 24.00 | 35.00 |
| Cold stp. | 22.00 | 22.50 | 32.00 | 52.00 |

## Steel Plate

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

**Steel Floor Plates**

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

## Structural Shapes

| | |
|---|---|
| Pittsburgh | 2.10c |
| Philadelphia, del. | 2.21½c |
| New York, del. | 2.27c |
| Boston, delivered | 2.41c |
| Bethlehem | 2.10c |
| Chicago | 2.10c |
| Cleveland, del. | 2.30c |
| Buffalo | 2.10c |
| Gulf ports | 2.45c |
| Birmingham | 2.10c |
| St. Louis, del. | 2.34c |
| Pacific Coast points | 2.70c |

## Tin and Terne Plate

**Tin Plate, Coke (base box)**

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

**Mfg. Terne Plate (base box)**

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

## Bars

**Soft Steel**

*(Base, 20 tons or over)*

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

**Rail Steel**

*(Base, 5 tons or over)*

| | |
|---|---|
| Pittsburgh | 2.05c |
| Chicago or Gary | 2.05c |
| Detroit, delivered | 2.15c |
| Cleveland | 2.05c |

| | |
|---|---|
| Buffalo | 2.05c |
| Birmingham | 2.05c |
| Gulf ports | 2.40c |
| Pacific Coast points | 2.65c |

**Iron**

| | |
|---|---|
| Chicago | 2.25c |
| Philadelphia | 2.37c |
| Pittsburgh, refined | 3.50-8.00c |

**Reinforcing**

*New Billet Bars, Base*

| | |
|---|---|
| Chicago, Gary, Buffalo, Cleve., Birm., Young., Sparrows Pt., Pitts. | 1.90c |
| Gulf ports | 2.25c |
| Pacific Coast ports | 2.25c |

*Rail Steel Bars, Base*

| | |
|---|---|
| Pittsburgh, Gary Chicago, Buffalo, Cleveland, Birm. | 1.90c |
| Gulf ports | 2.25c |
| Pacific Coast ports | 2.25c |

*The above represent average going prices. Last quotations announced by producers were 2.15c, mill base, for billet bars and 2.00c for rail steel.*

## Wire Products

*Pitts-Cleve.-Chicago-Birm. base per 100 lb. keg in carloads*

| | |
|---|---|
| Standard and cement coated wire nails | $2.55 |

(Per pound)

| | |
|---|---|
| Polished fence staples | 2.55c |
| Annealed fence wire | 3.05c |
| Galv. fence wire | 3.30c |
| Woven wire fencing (base C. L. column) | 67 |
| Single loop bale tie, (base C.L. column) | 56 |
| Galv. barbed wire, 80-rod spools, base column | 70 |
| Twisted barbless wire, column | 70 |

**To Manufacturing Trade**

*Base, Pitts. - Cleve. - Chicago-Birmingham (except spring wire)*

| | |
|---|---|
| Bright bess., basic wire | 2.60c |
| Galvanized wire | 2.60c |
| Spring wire | 3.20c |

Worcester, Mass., $2 higher on bright basic and spring wire.

## Cut Nails

Carload, Pittsburgh, keg..$3.85

## Cold-Finished Bars

| | Carbon | Alloy |
|---|---|---|
| Pittsburgh | 2.65c | 3.35c |
| Chicago | 2.65c | 3.35c |
| Gary, Ind. | 2.65c | 3.35c |
| Detroit | 2.70c | *3.45c |
| Cleveland | 2.65c | 3.35c |
| Buffalo | 2.65c | 3.35c |

* Delivered.

## Alloy Bars (Hot)

(Base, 20 tons or over)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem 2.70c
Detroit, delivered 2.80c

| S.A.E. | Alloy Diff. | S.A.E. | Alloy Diff. |
|---|---|---|---|
| 2000 | 0.35 | 3100 | 0.70 |
| 2100 | 0.75 | 3200 | 1.35 |
| 2300 | 1.55 | 3300 | 3.80 |
| 2500 | 2.25 | 3400 | 3.20 |

4100 0.15 to 0.25 Mo. 0.55
4600 0.20 to 0.30 Mo. 1.50-2.00 Ni. 1.10
5100 0.80-1.10 Cr. 0.45
5100 Cr. spring flats 0.15
6100 bars 1.20
6100 spring flats 0.85
Cr. N., Van. 1.50
Carbon Van. 0.85
9200 spring flats 0.15
9200 spring rounds, squares 0.40
Electric furnace up 50 cents.

## Strip and Hoops

*(Base, hot strip, 1 ton or over; cold, 3 tons or over)*

**Hot Strip, 12-inch and less**

| | |
|---|---|
| Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, Birmingham | 2.10c |
| Detroit, del. | 2.20c |
| Philadelphia, del. | 2.42c |
| New York, del. | 2.46c |
| Pacific Coast points | 2.70c |
| Cooperage hoop, Youngs., Pitts.; Chicago, Birm. | 2.20c |
| Cold strip, 0.25 carbon and under, Pittsburgh, Cleveland, Youngstown | 2.80c |
| Chicago | 2.90c |
| Detroit, del. | 2.90c |
| Worcester, Mass. | 3.00c |

| Carbon | Cleve., Pitts. |
|---|---|
| 0.26—0.50 | 2.80c |
| 0.51—0.75 | 4.30c |
| 0.76—1.00 | 6.15c |
| Over 1.00 | 8.35c |

Worcester, Mass. $4 higher.

**Commodity Cold-Rolled Strip**

| | |
|---|---|
| Pitts.-Cleve.-Youngstown | 2.95c |
| Chicago | 3.05c |
| Detroit, del. | 3.05c |
| Worcester, Mass. | 3.35c |

Lamp stock up 10 cents.

## Rails, Fastenings

*(Gross Tons)*

| | |
|---|---|
| Standard rails, mill | $40.00 |
| Relay rails, Pittsburgh 20—100 lbs. | 32.50-35.50 |
| Light rails, billet qual., Pitts., Chicago, B'ham. | $40.00 |
| Do., rerolling quality | 39.00 |

*Cents per pound*

| | |
|---|---|
| Angle bars, billet, mills | 2.70c |
| Do., axle steel | 2.35c |
| Spikes, R. R. base | 3.00c |
| Track bolts, base | 4.15c |
| Car axles forged, Pitts., Chicago, Birmingham | 3.15c |
| Tie plates, base | 2.15c |

Base, light rails 25 to 60 lbs., 20 lbs., up $2; 16 lbs. up $4; 12 lbs. up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base plates 20 tons.

## Bolts and Nuts

*F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.*

**Carriage and Machine**

| | |
|---|---|
| ½ x 6 and smaller | 68.5 off |
| Do. larger, to 1-in. | 66 off |
| Do. 1⅛ and larger | 64 off |
| Tire bolts | 52.5 off |

**Stove Bolts**

In packages with nuts separate 72.5 off; with nuts attached add 15%; bulk 83.5 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

| | |
|---|---|
| Step bolts | 60 off |
| Plow bolts | 68.5 off |

**Nuts**

| Semifinished hex. | U.S.S. | S.A.E. |
|---|---|---|
| ½-inch and less | 67 | 70 |
| ⅝-1-inch | 64 | 65 |
| 1⅛-1½-inch | 62 | 62 |
| 1⅝ and larger | 60 | .. |

**Hexagon Cap Screws**

| | |
|---|---|
| Upset, 1-in., smaller | 70.0 off |

**Square Head Set Screws**

| | |
|---|---|
| Upset, 1-in., smaller | 75.0 off |
| Headless set screws | 64.0 off |

## Piling

| | |
|---|---|
| Pitts., Chgo., Buffalo | 2.40c |
| Gulf ports | 2.85c |
| Pacific coast ports | 2.90c |

## Rivets, Washers

*F.o.b. Pitts., Cleve., Chgo., Bham.*

| | |
|---|---|
| Structural | 3.40c |
| ⅞-inch and under | 65-10 off |

Wrought washers, Pitts., Chi., Phila., to jobbers and large nut, bolt mfrs. l.c.l. $5.40; c.l. $5.75 off

## Welded Iron, Steel Pipe

Base discounts on steel pipe. Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less on butt weld, 1 point less on lap weld, 1 point less on butt weld. Chicago delivery 2½ and 1½ less, respectively. Wrought pipe, Pittsburgh base.

**Butt Weld**

Steel

| In. | Blk. | Galv. |
|---|---|---|
| ⅛ | 63½ | 54 |
| ¼ | 66½ | 58 |
| 1—3 | 68½ | 60½ |

Iron

| | | |
|---|---|---|
| ¾ | 30 | 13 |
| 1—1¼ | 34 | 19 |
| 1½ | 38 | 21½ |
| 2 | 37½ | 21 |

**Lap Weld**

Steel

| | | |
|---|---|---|
| 2 | 61 | 52½ |
| 2½—3 | 64 | 55½ |
| 3½—6 | 66 | 57½ |
| 7 and 8 | 65 | 55½ |
| 9 and 10 | 64½ | 55 |
| 11 and 12 | 63½ | 54 |

Iron

| | | |
|---|---|---|
| 2 | 30½ | 15 |
| 2½—3½ | 31½ | 17½ |
| 4 | 33½ | 21 |
| 4½—8 | 32½ | 20 |
| 9—12 | 28½ | 15 |

**Line Pipe**

Steel

| | |
|---|---|
| 1 to 3, butt weld | 67½ |
| 2, lap weld | 60 |
| 2½ to 3, lap weld | 63 |
| 3½ to 6, lap weld | 65 |
| 7 and 8, lap weld | 64 |
| 10-inch lap weld | 63½ |
| 12-inch, lap weld | 62½ |

Iron

| | Blk. | Galv. |
|---|---|---|
| ¾ butt weld | 25 | 7 |
| 1 and 1¼ butt weld | 29 | 13 |
| 1½ butt weld | 33 | 15½ |
| 2 butt weld | 32½ | 15 |
| 1½ lap weld | 23½ | 7 |
| 2 lap weld | 25½ | 9 |
| 2½ to 3½ lap weld | 26½ | 11½ |
| 4 lap weld | 28½ | 15 |
| 4½ to 8 lap weld | 27½ | 14 |
| 9 to 12 lap weld | 23½ | 9 |

## Boiler Tubes

*Carloads minimum wall seamless steel boiler tubes, cut lengths 4 to 24 feet; f.o.b. Pittsburgh, base price per 100 feet subject to usual extras.*

**Lap Welded**

| Sizes | Gage | Steel | Charcoal Iron |
|---|---|---|---|
| 1½ "O.D. | 13 | $ 9.72 | $23.71 |
| 1¾ "O.D. | 13 | 11.06 | 22.93 |
| 2" O.D. | 13 | 12.38 | 19.35 |
| 2¼ "O.D. | 13 | 13.79 | 21.68 |
| 2¼ "O.D. | 12 | 15.16 | ..... |
| 2½ "O.D. | 12 | 16.58 | 26.57 |
| 2¾ "O.D. | 12 | 17.54 | 29.00 |
| 3" O.D. | 12 | 18.35 | 31.36 |
| 3½ "O.D. | 11 | 23.15 | 39.81 |
| 4" O.D. | 10 | 28.66 | 49.90 |
| 5" O.D. | 9 | 44.25 | 73.93 |
| 6" O.D. | 7 | 68.14 | ..... |

**Seamless**

| Sizes | Gage | Hot Rolled | Cold Drawn |
|---|---|---|---|
| 1 "O.D. | 13 | $ 7.82 | $ 9.01 |
| 1¼ "O.D. | 13 | 9.26 | 10.67 |
| 1½ "O.D. | 13 | 10.23 | 11.79 |
| 1¾ "O.D. | 13 | 11.64 | 13.42 |
| 2" O.D. | 13 | 13.04 | 15.03 |
| 2¼ "O.D. | 13 | 14.54 | 16.76 |
| 2¼ "O.D. | 12 | 16.01 | 18.45 |
| 2½ "O.D. | 12 | 17.54 | 20.21 |
| 2¾ "O.D. | 12 | 18.59 | 21.42 |
| 3" O.D. | 12 | 19.50 | 22.48 |
| 3½ "O.D. | 11 | 24.62 | 28.37 |
| 4" O.D. | 10 | 30.54 | 35.20 |
| 4½ "O.D. | 10 | 37.35 | 43.04 |
| 5" O.D. | 9 | 46.87 | 54.01 |
| 6" O.D. | 7 | 71.96 | 82.93 |

## Cast Iron Pipe

*Class B Pipe—Per Net Ton*

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

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

## Semifinished Steel

**Rerolling Billets, Slabs**

*(Gross Tons)*

| | |
|---|---|
| Pittsburgh, Chicago, Gary, Cleve., Buffalo, Young., Birm., Sparrows Point | $34.00 |
| Duluth (billets) | 36.00 |
| Detroit, delivered | 36.00 |

**Forging Quality Billets**

| | |
|---|---|
| Pitts., Chi., Gary, Cleve., Young., Buffalo, Birm. | 40.00 |
| Duluth | 42.00 |

**Sheet Bars**

| | |
|---|---|
| Pitts., Cleveland, Young., Sparrows Point, Buffalo, Canton, Chicago | 34.00 |
| Detroit, delivered | 36.00 |

**Wire Rods**

| | |
|---|---|
| Pitts., Cleveland, Chicago, Birmingham No. 5 to ⅝-inch incl. (per 100 lbs.) | $2.00 |
| Do., over ⅝ to 41/64-in. incl. | 2.15 |

Worcester up $0.10; Galveston up $0.25; Pacific Coast up $0.45.

**Skelp**

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

## Coke

*Price Per Net Ton*

**Beehive Ovens**

| | |
|---|---|
| Connellsville, fur. | $4.35- 4.60 |
| Connellsville, fdry. | 5.00- 5.75 |
| Connell. prem. fdry. | 5.75- 6.25 |
| New River fdry. | 6.25- 6.50 |
| Wise county fdry. | 5.50- 6.50 |
| Wise county fur. | 5.00- 5.25 |

**By-Product Foundry**

| | |
|---|---|
| Newark, N. J., del. | 11.38-11.85 |
| Chicago, outside del. | 10.50 |
| Chicago, delivered | 11.25 |
| Terre Haute, del. | 10.75 |
| Milwaukee, ovens | 11.25 |
| New England, del. | 12.50 |
| St. Louis, del. | 11.75 |
| Birmingham, ovens | 7.50 |
| Indianapolis, del. | 10.75 |
| Cincinnati, del. | 10.50 |
| Cleveland, del. | 11.05 |
| Buffalo, del. | 11.25 |
| Detroit, del. | 11.00 |
| Philadelphia, del. | 11.15 |

## Coke By-Products

*Spot, gal., freight allowed east of Omaha*

| | |
|---|---|
| Pure and 90% benzol | 16.00c |
| Toluol, two degree | 25.00c |
| Solvent naphtha | 27.00c |
| Industrial xylol | 27.00c |

*Per lb. f.o.b. Frankford and St. Louis*

| | |
|---|---|
| Phenol (less than 1000 lbs.) | 14.75c |
| Do. (1000 lbs. or over) | 13.75c |

*Eastern Plants, per lb.*

| | |
|---|---|
| Naphthalene flakes, balls, bbls. to jobbers | 6.75c |

*Per ton, bulk, f.o.b. port*

| | |
|---|---|
| Sulphate of ammonia | $28.00 |

## Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25 sil.; 50c diff. below 1.75 sil. Gross tons.

| Basing Points: | No. 2 Fdry. | Malle-able | Basic | Besse-mer |
|---|---|---|---|---|
| Bethlehem, Pa. | $24.00 | $24.50 | $23.50 | $25.00 |
| Birdsboro, Pa. | 24.00 | 24.50 | 23.50 | 25.00 |
| Birmingham, Ala.§ | 19.38 | ..... | 18.38 | 24.00 |
| Buffalo | 23.00 | 23.50 | 22.00 | 24.00 |
| Chicago | 23.00 | 23.00 | 22.50 | 23.50 |
| Cleveland | 23.00 | 23.00 | 22.50 | 23.50 |
| Detroit | 23.00 | 23.00 | 22.50 | 23.50 |
| Duluth | 23.50 | 23.50 | ..... | 24.00 |
| Erie, Pa. | 23.00 | 23.50 | 22.50 | 24.00 |
| Everett, Mass. | 24.00 | 24.50 | 23.50 | 25.00 |
| Granite City, Ill. | 23.00 | 23.00 | 22.50 | 23.50 |
| Hamilton, O. | 23.00 | 23.00 | 22.50 | ..... |
| Neville Island, Pa. | 23.00 | 23.00 | 22.50 | 23.50 |
| Provo, Utah | 21.00 | ..... | ..... | ..... |
| Sharpsville, Pa. | 23.00 | 23.00 | 22.50 | 23.50 |
| Sparrow's Point, Md. | 24.00 | ..... | 23.50 | ..... |
| Swedeland, Pa. | 24.00 | 24.50 | 23.50 | 25.00 |
| Toledo, O. | 23.00 | 23.00 | 22.50 | 23.50 |
| Youngstown, O. | 23.00 | 23.00 | 22.50 | 23.50 |

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

| Delivered from Basing Points: | | | | |
|---|---|---|---|---|
| Akron, O., from Cleveland | 24.39 | 24.39 | 23.89 | 24.89 |
| Baltimore from Birmingham | 24.78 | ..... | 23.66 | ..... |
| Boston from Birmingham | 24.12 | ..... | ..... | ..... |
| Boston from Everett, Mass. | 24.50 | 25.00 | 24.00 | 25.50 |
| Boston from Buffalo | 24.50 | 25.00 | 24.00 | 25.50 |
| Brooklyn, N. Y., from Bethlehem | 26.50 | 27.00 | ..... | ..... |
| Canton, O., from Cleveland | 24.39 | 24.39 | 23.89 | 24.89 |
| Chicago from Birmingham | †23.22 | ..... | ..... | ..... |
| Cincinnati from Hamilton, O. | 23.24 | 24.11 | 23.61 | ..... |
| Cincinnati from Birmingham | 23.06 | ..... | 22.06 | ..... |
| Cleveland from Birmingham | 23.32 | ..... | 22.82 | ..... |
| Mansfield, O., from Toledo, O. | 24.94 | 24.94 | 24.44 | 24.44 |
| Milwaukee from Chicago | 24.10 | 24.10 | 23.60 | 24.60 |
| Muskegon, Mich., from Chicago, Toledo or Detroit | 26.19 | 26.19 | 25.69 | 26.69 |
| Newark, N. J., from Birmingham | 25.15 | ..... | ..... | ..... |
| Newark, N. J., from Bethlehem | 25.53 | 26.03 | ..... | ..... |
| Philadelphia from Birmingham | 24.46 | ..... | 23.96 | ..... |
| Philadelphia from Swedeland, Pa. | 24.84 | 25.34 | 24.34 | ..... |
| Pittsburgh district from Neville Island | Neville base, plus 69c, 84c, and $1.24 freight. | | | |
| Saginaw, Mich., from Detroit | 25.31 | 25.31 | 24.81 | 25.81 |

| | No. 2 Fdry. | Malle-able | Basic | Besse-mer |
|---|---|---|---|---|
| St. Louis, northern | 23.50 | 23.50 | 23.00 | .... |
| St. Louis from Birmingham | †23.12 | .... | 22.62 | .... |
| St. Paul from Duluth | 25.63 | 25.63 | .... | 26.13 |

†Over 0.70 phos.

**Low Phos.**

Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $28.50, base; $29.74 delivered Philadelphia.

| Gray Forge | | Charcoal | |
|---|---|---|---|
| Valley furnace | $22.50 | Lake Superior fur. | $27.00 |
| Pitts. dist. fur. | 22.50 | do., del. Chicago | 30.34 |
| | | Lyles, Tenn. | 26.50 |

**†Silvery**

Jackson county, O., base: 6-6.50 per cent $28.50; 6.51-7—$29.00; 7-7.50—$29.50; 7.51-8—$30.00; 8-8.50—$30.50; 8.51-9—$31.00; 9-9.50—$31.50; Buffalo, $1.25 higher.

**Bessemer Ferrosilicon†**

Jackson county, O., base; Prices are the same as for silveries, plus $1 a ton.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Manganese differentials in silvery iron and ferrosilicon, 2 to 3%, $1 per ton add. Each unit over 3%, add $1 per ton.

## Refractories

*Per 1000 f.o.b. Works, Net Prices*

**Fire Clay Brick**

*Super Quality*

| | |
|---|---|
| Pa., Mo., Ky. | $60.80 |

*First Quality*

| | |
|---|---|
| Pa., Ill., Md., Mo., Ky. | 47.50 |
| Alabama, Georgia | 47.50 |
| New Jersey | 52.50 |

*Second Quality*

| | |
|---|---|
| Pa., Ill., Ky., Md., Mo. | 42.75 |
| Georgia, Alabama | 34.20 |
| New Jersey | 49.00 |

Ohio

| | |
|---|---|
| First quality | 39.90 |
| Intermediate | 36.10 |
| Second quality | 31.35 |

**Malleable Bung Brick**

| | |
|---|---|
| All bases | $56.05 |

**Silica Brick**

| | |
|---|---|
| Pennsylvania | $47.50 |
| Joliet, E. Chicago | 55.10 |
| Birmingham, Ala. | 47.50 |

**Ladle Brick**

*(Pa., O., W. Va., Mo.)*

| | |
|---|---|
| Dry press | $28.00 |
| Wire cut | $26.00 |

**Magnesite**

| | |
|---|---|
| Domestic dead - burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk | 22.00 |
| net ton, bags | 26.00 |

**Basic Brick**

*Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.*

| | |
|---|---|
| Chrome brick | $50.00 |
| Chem. bonded chrome | 50.00 |
| Magnesite brick | 72.00 |
| Chem. bonded magnesite | 61.00 |

## Fluorspar

| | |
|---|---|
| Washed gravel, duty pd., tide, net ton | $25.00-$26.00 |
| Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail. | 22.00 |
| Do. barge | 22.00 |
| No. 2 lump | 22.00 |

## Ferroalloy Prices

**Ferromanganese,** 78-82%, lump and bulk, carlots tide., duty pd. $100.00
Ton lots 110.00
Less ton lots 113.50
Less 200 lb. lots 118.00
Do., carlots del. Pitts. 105.33

**Spiegeleisen,** 19-21% dom.
Palmerton, Pa., spot 32.00
Do., 26-28% 39.50

**Ferrosilicon,** 50% freight allowed, c.l. 69.50
Do., ton lot 82.00
Do., 75 per cent 126.00
Do. ton lots 142.00
Spot, $5 a ton higher.

**Silicomanganese,** c.l., 2½ per cent carbon 103.00
2% carbon, 108.00; 1%, 118.00
Contract ton price $12.50 higher; spot $5 over contract.

**Ferrotungsten,** stand., lb. con. del. cars 1.90-2.00

**Ferrovanadium,** 35 to 40%, lb., cont. 2.70-2.80-2.90

**Ferrophosphorus,** gr. ton, c.l., 17-18% Rockdale, Tenn., basis, 18%, $3 unitage, 58.50; electrolytic, per ton, c. l., 23-26% f.o.b. Monsanto, Tenn., 24% $3 unitage 75.00

**Ferrochrome,** 66-70 chromium, 4-6 carbon, cts. lb., contained cr., del. carlots 11.00c
Do., ton lots 11.75c
Do., less-ton lots 12.00c

67-72% low carbon:

| | Carloads | Ton lots | Less ton |
|---|---|---|---|
| 2% carb. | 17.50c | 18.25c | 18.75c |
| 1% carb. | 18.50c | 19.25c | 19.75c |
| 0.10% carb. | 20.50c | 21.25c | 21.75c |
| 0.20% carb. | 19.50c | 20.25c | 20.75c |

Spot ¼c higher

**Ferromolybdenum,** 55-65% molyb. cont., f.o.b. mill, lb. 0.95

**Calcium molybdate,** lb. molyb. cont., f.o.b. mill 0.80

**Ferrotitanium,** 40-45%, lb., con. tl., f.o.b. Niagara Falls, ton lots $1.23
Do., less-ton lots 1.25
20-25% carbon, 0.10 max., ton lots, lb. 1.35
Do, less-ton lots 1.40
Spot 5c higher

**Ferrocolumbium,** 50-60%, contract, lb. con. col., f.o.b. Niagara Falls $2.25
Do., less-ton lots 2.30
Spot is 10c higher

**Technical molybdenum trioxide,** 53 to 60% molybdenum, lb. molyb. cont., f.o.b. mill 0.80

**Ferro-carbon-titanium,** 15-18%, tl., 6-8% carb., carlots, contr., net ton $142.50
Do, spot 145.00
Do, contract, ton lots 145.00
Do, spot, ton lots 150.00

15-18% tl., 3-5% carbon, carlots, contr., net ton 157.50
Do, spot 160.00
Do, contract, ton lots 160.00
Do, spot, ton lots 165.00

**Alsifer,** contract carlots, f.o.b. Niagara Falls, lb. 7.50c
Do, ton lots 8.00c
Do, less-ton lots 8.50c
Spot ½c lb. higher

**Chromium Briquets,** contract, freight allowed, lb. spot carlots, bulk 7.00c
Do., ton lots 7.50c
Do., less-ton lots 7.75c
Do., less 200 lbs. 8.00c
Spot, ¼c higher.

**Tungsten Metal Powder,** according to grade, spot shipment, 200-lb. drum lots, lb. $2.50
Do., smaller lots 2.60

**Vanadium Pentoxide,** contract, lb. contained $1.10
Do, spot 1.15

**Chromium Metal,** 98% cr., 0.50 carbon max., contract, lb. con. chrome 84.00c
Do., spot 89.00c
88% chrome, contract 83.00c
Do., spot 88.00c

**Silicon Metal,** 1% iron, contract, carlots, 2 x ⅛-in., lb. 14.00c
Do., 2% 12.50c
Spot ¼c higher

**Silicon Briquets,** contract carloads, bulk, freight allowed, ton $69.50
Ton lots 79.50
Less-ton lots, lb. 3.75c
Less 200 lb. lots, lb. 4.00c
Spot ¼-cent higher.

**Manganese Briquets,** contract carloads, bulk freight allowed, lb. 5.00c
Ton lots 5.50c
Less-ton lots 5.75c
Spot ¼c higher

**Zirconium Alloy,** 12-15%, contract, carloads, bulk, gross ton $97.50
Do, spot 102.50

34-40%, contract, carloads, lb., alloy 14.00c
Do, ton lots 15.00c
Do, less-ton lots 16.00c
Spot ¼c higher

**Molybdenum Powder,** 99%, f.o.b. York, Pa. 200-lb. kegs, lb. $2.60
Do, 100-200 lb. lots 2.75
Do, under 100-lb. lots 3.00

**Molybdenum Oxide Briquets,** 48-52% molybdenum, per pound contained, f.o.b. producers' plant 80.00c

# WAREHOUSE STEEL PRICES

*Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials*

| | Soft Bars | Bands | Hoops | Plates ¼-in. & Over | Structural Shapes | Floor Plates | Sheets: Hot Rolled | Sheets: Cold Rolled | Sheets: Galv. No. 24 | Cold Rolled Strip | Cold Drawn Bars: Carbon | Cold Drawn Bars: SAE 2300 | Cold Drawn Bars: SAE 3100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Boston | 3.98 | 4.16 | 5.16 | 3.85 | 3.85 | 5.66 | 3.81 | 4.78 | 4.86 | 3.46 | 4.13 | 8.63 | 7.23 |
| New York (Met.) | 3.84 | 3.96 | 3.96 | 3.76 | 3.75 | 5.56 | 3.58 | 4.60 | 4.50 | 3.51 | 4.09 | 8.59 | 7.19 |
| Philadelphia | 3.85 | 3.85 | 4.35 | 3.55 | 3.55 | 5.25 | 3.55 | 4.55 | 4.75 | 3.51 | 4.06 | 8.56 | 7.16 |
| Baltimore | 3.95 | 4.05 | 4.45 | 3.70 | 3.70 | 5.25 | 3.55 | .... | 5.05 | .... | 4.05 | .... | .... |
| Norfolk, Va. | 4.15 | 4.25 | .... | 3.90 | 3.90 | 5.45 | 3.75 | .... | 5.40 | .... | 4.15 | .... | .... |
| Buffalo | 3.35 | 3.82 | 3.82 | 3.62 | 3.40 | 5.25 | 5.35 | 4.40 | 4.25 | 3.42 | 3.75 | 8.15 | 6.75 |
| Pittsburgh | 3.35 | 3.60 | 3.60 | 3.40 | 3.40 | 5.00 | 3.35 | .... | 4.75 | 3.35 | 3.65 | 8.15 | 6.75 |
| Cleveland | 3.25 | 3.50 | 3.50 | 3.40 | 3.58 | 5.18 | 3.35 | 4.05 | 4.72 | 3.20 | 3.75 | 8.15 | 6.75 |
| Detroit | 3.43 | 3.43 | 3.68 | 3.60 | 3.65 | 5.27 | 3.43 | 4.50 | 4.84 | 3.40 | 3.80 | 8.45 | 7.05 |
| Cincinnati | 3.60 | 3.67 | 3.67 | 3.65 | 3.68 | 5.28 | 3.42 | 4.37 | 4.67 | 3.45 | 4.00 | 8.50 | 7.10 |
| Chicago | 3.50 | 3.60 | 3.60 | 3.55 | 3.55 | 5.15 | 3.35 | 4.30 | 4.60 | 3.50 | 3.75 | 8.15 | 6.75 |
| Twin Cities | 3.75 | 3.85 | 3.85 | 3.80 | 3.80 | 5.40 | 3.60 | 4.95 | 5.00 | 3.83 | 4.34 | 8.84 | 7.44 |
| Milwaukee | 3.63 | 3.73 | 3.73 | 3.68 | 3.68 | 5.28 | 3.48 | 4.43 | 4.98 | 3.54 | 3.88 | 8.38 | 6.98 |
| St. Louis | 3.62 | 3.72 | 3.72 | 3.47 | 3.47 | 5.07 | 3.38 | 4.32 | 4.95 | 3.61 | 4.02 | 8.52 | 7.12 |
| Kansas City | 4.05 | 4.15 | 4.15 | 4.00 | 4.00 | 5.60 | 3.90 | .... | 5.00 | .... | 4.30 | .... | .... |
| Memphis | 3.90 | 4.10 | 4.10 | 3.95 | 3.95 | 5.71 | 3.85 | .... | 5.25 | .... | 4.31 | .... | .... |
| Chattanooga | 3.80 | 4.00 | 4.00 | 3.85 | 3.85 | 5.68 | 3.75 | .... | 4.40 | .... | 4.39 | .... | .... |
| Tulsa, Okla. | 4.44 | 4.54 | 4.54 | 4.33 | 4.33 | 5.93 | 4.24 | .... | 5.71 | .... | 4.69 | .... | .... |
| Birmingham | 3.50 | 3.70 | 3.70 | 3.55 | 3.55 | 5.88 | 3.45 | .... | 4.75 | .... | 4.43 | .... | .... |
| New Orleans | 4.00 | 4.10 | 4.10 | 3.80 | 3.80 | 5.75 | 3.85 | .... | 4.80 | 5.00 | 4.60 | .... | .... |
| Houston, Tex. | 4.05 | 6.20 | 6.20 | 4.05 | 4.05 | 5.75 | 4.20 | .... | 5.25 | .... | .... | .... | .... |
| Seattle | 4.00 | 3.85 | 5.20 | 3.40 | 3.50 | 5.75 | 3.70 | 6.50 | 4.75 | .... | 5.75 | .... | .... |
| Portland, Oreg. | 4.25 | 4.50 | 6.10 | 4.00 | 4.00 | 5.75 | 3.95 | 6.50 | 4.75 | .... | 5.75 | .... | .... |
| Los Angeles | 4.15 | 4.65 | 6.45 | 4.00 | 4.00 | 6.40 | 4.30 | 6.50 | 5.25 | .... | 6.60 | 10.65 | 9.80 |
| San Francisco | 3.50 | 4.00 | 6.00 | 3.35 | 3.35 | 5.60 | 3.40 | 6.40 | 5.15 | .... | 6.80 | 10.65 | 9.80 |

| | SAE Hot-rolled Bars (Unannealed): 1035-1050 | 2300 Series | 3100 Series | 4100 Series | 6100 Series |
|---|---|---|---|---|---|
| Boston | 4.18 | 7.50 | 6.05 | 5.80 | 7.90 |
| New York (Met.) | 4.04 | 7.35 | 5.90 | 5.65 | .. |
| Philadelphia | 4.10 | 7.31 | 5.86 | 5.61 | 8.56 |
| Baltimore | 4.10 | .... | .... | .... | .... |
| Norfolk, Va. | .... | .... | .... | .... | .... |
| Buffalo | 3.55 | 7.10 | 5.65 | 5.40 | 7.50 |
| Pittsburgh | 3.40 | 7.20 | 5.75 | 5.50 | 7.60 |
| Cleveland | 3.30 | 7.30 | 5.85 | 5.85 | 7.70 |
| Detroit | 3.48 | 7.42 | 5.97 | 5.72 | 7.19 |
| Cincinnati | 3.65 | 7.44 | 5.99 | 5.74 | 7.84 |
| Chicago | 3.70 | 7.10 | 5.65 | 5.40 | 7.50 |
| Twin Cities | 3.95 | 7.45 | 6.00 | 6.09 | 8.19 |
| Milwaukee | 3.83 | 7.33 | 5.88 | 5.63 | 7.73 |
| St. Louis | 3.82 | 7.47 | 6.02 | 5.77 | 7.87 |
| Seattle | 5.85 | .... | 8.00 | 7.85 | 8.65 |
| Portland, Oreg. | 5.70 | 8.85 | 8.00 | 7.85 | 8.65 |
| Los Angeles | 4.80 | 9.40 | 8.55 | 8.40 | 9.05 |
| San Francisco | 5.00 | 9.65 | 8.80 | 8.65 | 9.30 |

**BASE QUANTITIES**

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds, except 0-1999 pounds (hot rolled sheets only) in New York; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300-4999 pounds in Portland, Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in Birmingham.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Kansas City and St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 300-4999 in San Francisco, Portland; any quantity in Twin Cities; 300-1999 in Los Angeles.

Galvanized Sheets: Base, any quantity in New York, 150-1499 pounds in Cleveland, Milwaukee, Pittsburgh, Baltimore, Norfolk; 150-1049 in Los Angeles; 300-4999 in Portland, Seattle, San Francisco; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, St. Louis, Tulsa; 1500 and over in Chattanooga, Philadelphia; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco, 1000 and over in Portland, Seattle; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

# CURRENT IRON AND STEEL PRICES OF EUROPE

Dollars at Rates of Exchange, March 28

## Export Prices f.o.b. Port of Dispatch—

*By Cable or Radio*

| | British gross tons U. K. ports £ s d | Continental North Channel or Sea ports, gross tons: Quoted in dollars at current value | Continental North Channel or Sea ports, gross tons: **Quoted in gold pounds sterling £ s d |
|---|---|---|---|
| Foundry, 2.50-3.00 Si. | $21.60 6 0 0 | $33.23 | 3 18 0 |
| Basic bessemer | ..... | ..... | ..... |
| Hematite, Phos. .03-.05 | 22.50 6 5 0 | ..... | ..... |
| Billets | ..... ..... | $31.95 | 3 15 0 |
| Wire rods, No. 5 gage | ..... ..... | 61.34 | 7 4 0 |
| Standard rails | $37.80 10 10 0 | $48.99 | 5 15 0 |
| Merchant bars | 2.17c 13 9 0 | 2.74c | 7 4 0 |
| Structural shapes | 1.95c 12 2 6 | 2.85c | 7 10 0 |
| Plates, †¼ in. or 5 mm. | 2.07c 12 17 6 | 3.25c | 8 11 0 |
| Sheets, black, 24 gage or 0.5 mm | 2.74c 17 0 0 | 3.06c | 8 1 0° |
| Sheets, gal., 24 ga., corr. | 3.14c 19 10 0 | 4.29c | 11 6 0 |
| Bands and strips | ..... ..... | 2.68c | 7 1 0 |
| Plain wire, base | ..... ..... | 3.23c | 8 10 0 |
| Galvanized wire, base | ..... ..... | 3.90c | 10 5 0 |
| Wire nails, base | ..... ..... | 3.71c | 9 15 0 |
| Tin plate, box 108 lbs. | $ 5.85 1 12 6 | ..... | ..... |

British ferromanganese $100.00 delivered Atlantic seaboard duty-paid.

## Domestic Prices at Works or Furnace—

*Last Reported*

| | £ s d | | French Francs | | Belgian Francs | | Reichs §§Mar |
|---|---|---|---|---|---|---|---|
| Fdy. pig iron, Si. 2.5. | $19.98 5 11 0(a) | $16.08 | 788 | $32.15 | 940 | $25.33 | 63 |
| Basic bess. pig iron | 18.81 5 4 6(a) | ..... | ..... | 30.78 | 900 | 27.94 | (b) 69.50 |
| Furnace coke | 5.70 1 11 8 | 4.59 | 225 | 11.29 | 330 | 7.64 | 19 |
| Billets | 33.75 9 7 6 | 23.73 | 1,163 | 43.61 | 1,275 | 38.79 | 96.50 |
| Standard rails | 1.80c 11 3 0 | 1.43c | 1,588 | 2.20c | 1,375 | 2.38c | 132 |
| Merchant bars | 2.25c 14 0 0†† | 1.31c | 1,454 | 2.20c | 1,375 | 1.98c | 110 |
| Structural shapes | 2.00c 12 8 0†† | 1.27c | 1,414 | 2.20c | 1,375 | 1.93c | 107 |
| Plates, †¼-in. or 5 mm. | 2.01c 12 10 6†† | 1.66c | 1,848 | 2.58c | 1,610 | 2.29c | 127 |
| Sheets, black | 2.82c 17 10 0‡ | 1.97c | 2,193‡ | 3.04c | 1,900‡ | 2.59c | 144‡ |
| Sheets, galv., corr., 24 ga. or 0.5 mm. | 3.22c 20 0 0 | 2.57c | 2,850 | 5.12c | 3,200 | 6.66c | 370 |
| Plain wire | 3.14c 19 10 0 | 2.11c | 2,340 | 3.20c | 2,000 | 3.11c | 173 |
| Bands and strips | 2.37c 14 15 0†† | 1.47c | 1,632 | 2.32c | 1,450 | 2.29c | 127 |

†British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price

British quotations are for basic open-hearth steel. Continent usually for basic-bessemer steel.

(a) del. Middlesbrough. 5s rebate to approved customers. (b) hematite. °Close annealed.

††Rebate of 15s on certain conditions.

**Gold pound sterling not quoted. §§Last prices, no current quotations.

# IRON AND STEEL SCRAP PRICES

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

**HEAVY MELTING STEEL**

| | |
|---|---|
| Birmingham, No. 1. | 15.00 |
| Bos. dock No. 1 exp. | 15.00 |
| New Eng. del. No. 1 | 14.00 |
| Buffalo, No. 1 | 16.00-16.50 |
| Buffalo, No. 2 | 14.50-15.00 |
| Chicago, No. 1 | 15.00-15.50 |
| Chicago, auto, no alloy | 14.00-14.50 |
| Chicago, No. 2 auto | 12.00-12.50 |
| Cincinnati dealers | 12.50-13.00 |
| Cleveland, No. 1 | 16.00-16.50 |
| Cleveland, No. 2 | 15.00-15.50 |
| Detroit, No. 1 | †12.50-13.00 |
| Detroit, No. 2 | †11.50-12.00 |
| Eastern Pa., No. 1 | 16.50-17.00 |
| Eastern Pa., No. 2 | 15.50 |
| Federal, Ill. No. 2 | 13.00-13.50 |
| Granite City, R. R. | 14.25-14.75 |
| Granite City, No. 2 | 13.25-13.50 |
| Los Ang., No. 1, net | 11.50-12.00 |
| Los Ang., No. 2, net | 10.50-11.00 |
| N. Y. dock No. 1 exp. | 14.00 |
| Pitts., No. 1 (R. R.) | 17.50-18.00 |
| Pittsburgh, No. 1 | 16.50-17.00 |
| Pittsburgh, No. 2 | 15.00-15.50 |
| St. Louis, R. R. | †13.75-14.25 |
| St. Louis, No. 2 | †13.00-13.50 |
| San Fran., No. 1, net | 11.50-12.00 |
| San Fran., No. 2, net | 10.50-11.00 |
| Seattle, No. 1 | 14.50-15.50 |
| Toronto, dlrs., No. 1 | 11.00 |
| Valleys, No. 1 | 16.25-16.75 |

**COMPRESSED SHEETS**

| | |
|---|---|
| Buffalo, new | 15.00-15.50 |
| Chicago, factory | 14.00-14.50 |
| Chicago, dealers | 13.00-13.50 |
| Cincinnati, dealers | 12.00-12.50 |
| Cleveland | 15.50-16.00 |
| Detroit | †13.00-13.50 |
| E. Pa., new mat. | 17.00-17.50 |
| E. Pa., old mat. | 14.00-14.50 |
| Los Angeles, net | 9.00- 9.50 |
| Pittsburgh | 16.50-17.00 |
| St. Louis | †11.00-11.50 |
| San Francisco, net | 9.00- 9.50 |
| Valleys | 15.75-16.25 |

**BUNDLED SHEETS**

| | |
|---|---|
| Buffalo, No. 1 | 14.50-15.00 |
| Buffalo, No. 2 | 13.00-13.50 |
| Cleveland | 11.50-12.00 |
| Pittsburgh | 15.50-16.00 |
| St. Louis | †9.00- 9.50 |
| Toronto, dealers | 9.75 |

**SHEET CLIPPINGS, LOOSE**

| | |
|---|---|
| Chicago | 10.00-10.50 |
| Cincinnati, dealers | 8.00- 8.50 |
| Detroit | †9.00- 9.50 |
| St. Louis | †8.50- 9.00 |
| Toronto, dealers | 9.00 |

**BUSHELING**

| | |
|---|---|
| Birmingham, No. 1. | 13.00 |
| Buffalo, No. 1 | 14.50-15.00 |
| Chicago, No. 1 | 14.00-14.50 |
| Cincin., No. 1, deal. | 9.00- 9.50 |
| Cincin., No. 2 deal. | 3.00- 3.25 |
| Cleveland, No. 2 | 9.50-10.00 |
| Detroit, No. 1, new | †12.00-12.50 |
| Valleys, new, No. 1 | 15.00-15.50 |
| Toronto, dealers | 5.50- 6.00 |

**MACHINE TURNINGS (Long)**

| | |
|---|---|
| Birmingham | 5.00 |
| Buffalo | 10.00-10.50 |
| Chicago | 8.50- 9.00 |
| Cincinnati, dealers | 5.00- 5.50 |
| Cleveland, no alloy | 8.50- 9.00 |
| Detroit | †7.00- 7.50 |
| Eastern Pa. | 10.00-10.50 |
| Los Angeles | 4.00- 5.00 |
| New York | †6.50- 7.00 |
| Pittsburgh | 10.25-10.75 |
| St. Louis | †6.50- 7.00 |
| San Francisco | 5.00 |
| Toronto, dealers | 7.00- 7.25 |
| Valleys | 10.00-10.50 |

**SHOVELING TURNINGS**

| | |
|---|---|
| Buffalo | 11.50-12.00 |
| Cleveland | 9.50-10.00 |
| Chicago | 9.50-10.00 |
| Chicago, spcl, anal. | 12.50-13.00 |
| Detroit | †7.50- 8.00 |
| Pitts., alloy-free | 12.00-12.50 |

**BORINGS AND TURNINGS**
*For Blast Furnace Use*

| | |
|---|---|
| Boston district | †3.00 |
| Buffalo | 10.00-10.50 |
| Cincinnati, dealers | 3.75- 4.25 |
| Cleveland | 9.50-10.00 |
| Eastern Pa. | 9.50 |
| Detroit | †7.25- 7.75 |
| New York | †5.25- 5.75 |
| Pittsburgh | 9.00- 9.50 |
| Toronto, dealers | 6.75 |

**AXLE TURNINGS**

| | |
|---|---|
| Buffalo | 16.50-17.00 |
| Boston district | †8.00- 8.50 |
| Chicago, elec. fur. | 15.50-16.00 |
| East. Pa. elec. fur. | 16.50-17.00 |
| St. Louis | †10.00-10.50 |
| Toronto | 6.00- 6.50 |

**CAST IRON BORINGS**

| | |
|---|---|
| Birmingham | 7.50 |
| Boston dist. chem. | †7.75- 8.00 |
| Buffalo | 10.00-10.50 |
| Chicago | 9.00- 9.50 |
| Cincinnati, dealers | 3.75- 4.25 |
| Cleveland | 9.50-10.00 |
| Detroit | †7.25- 7.75 |
| E. Pa., chemical | 14.50-15.00 |
| New York | †7.00 |
| St. Louis | †5.00- 5.50 |
| Toronto, dealers | 6.75 |

**RAILROAD SPECIALTIES**

| | |
|---|---|
| Chicago | 17.75-18.25 |

**ANGLE BARS—STEEL**

| | |
|---|---|
| Chicago | 17.75-18.25 |
| St. Louis | †14.75-15.25 |

**SPRINGS**

| | |
|---|---|
| Buffalo | 19.50-20.00 |
| Chicago, coil | 18.50-19.00 |
| Chicago, leaf | 17.50-18.00 |
| Eastern Pa. | 20.50-21.00 |
| Pittsburgh | 20.50-21.00 |
| St. Louis | †16.00-16.50 |

**STEEL RAILS, SHORT**

| | |
|---|---|
| Birmingham | 16.50 |
| Buffalo | 21.50-22.00 |
| Chicago (3 ft.) | 18.00-18.50 |
| Chicago (2 ft.) | 18.50-19.00 |
| Cincinnati, dealers | 19.00-19.50 |
| Detroit | †19.50-20.00 |
| Pitts., 3 ft. and less | 20.50-21.00 |
| St. Louis, 2 ft.& less | †18.00-18.50 |

**STEEL RAILS, SCRAP**

| | |
|---|---|
| Birmingham | 16.00 |
| Boston district | †14.00-14.50 |
| Buffalo | 17.00-17.50 |
| Chicago | 15.50-16.00 |
| Cleveland | 18.50-19.00 |
| Pittsburgh | 18.50-19.00 |
| St. Louis | †15.25-15.75 |
| Seattle | 18.00-18.50 |

**PIPE AND FLUES**

| | |
|---|---|
| Chicago, net | 10.00-10.50 |
| Cincinnati, dealers | 9.75-10.25 |

**RAILROAD GRATE BARS**

| | |
|---|---|
| Buffalo | 13.00-13.50 |
| Chicago, net | 9.50-10.00 |
| Cincinnati, dealers | 8.50- 9.00 |
| Eastern Pa. | 15.00-15.50 |
| New York | †10.50-11.00 |
| St. Louis | †10.00-10.50 |

**RAILROAD WROUGHT**

| | |
|---|---|
| Birmingham | 14.00 |
| Boston district | †9.50-10.00 |
| Eastern Pa., No. 1 | 18.00-18.50 |
| St. Louis, No. 1 | †10.50-11.00 |
| St. Louis, No. 2 | †13.25-13.75 |

**FORGE FLASHINGS**

| | |
|---|---|
| Boston district | †10.00 |
| Buffalo | 14.50-15.00 |
| Cleveland | 15.00-15.50 |
| Detroit | †11.50-12.00 |
| Pittsburgh | 15.50-16.00 |

**FORGE SCRAP**

| | |
|---|---|
| Boston district | †7.00 |
| Chicago, heavy | 18.00-18.50 |

**LOW PHOSPHORUS**

| | |
|---|---|
| Cleveland, crops | 21.50-22.00 |
| Eastern Pa. crops | 20.50-21.00 |
| Pitts., billet, bloom, slab crops | 21.50-22.00 |

**LOW PHOS. PUNCHINGS**

| | |
|---|---|
| Buffalo | 19.50-20.00 |
| Chicago | 17.50-18.00 |
| Cleveland | 17.50-18.00 |
| Eastern Pa. | 21.00-21.50 |
| Pittsburgh | 20.00-20.50 |
| Seattle | 15.00 |
| Detroit | †13.25-13.75 |

**RAILS FOR ROLLING**
*5 feet and over*

| | |
|---|---|
| Birmingham | 16.50 |
| Boston | †15.75-16.00 |
| Chicago | 18.00-18.50 |
| New York | 15.50-16.00 |
| Eastern Pa. | 20.00-20.50 |
| St. Louis | †17.50-18.00 |

**STEEL CAR AXLES**

| | |
|---|---|
| Birmingham | 18.00 |
| Boston district | †16.00-16.50 |
| Chicago, net | 20.00-20.50 |
| Eastern Pa. | 22.00 |
| St. Louis | †18.00-18.50 |

**LOCOMOTIVE TIRES**

| | |
|---|---|
| Chicago (cut) | 18.00-18.50 |
| St. Louis, No. 1 | †15.25-15.75 |

**SHAFTING**

| | |
|---|---|
| Boston district | †17.00 |
| New York | †18.00-18.50 |
| Eastern Pa. | 23.00-23.50 |
| St. Louis, 1¼-3¾" | †16.50-17.00 |

**CAR WHEELS**

| | |
|---|---|
| Birmingham, iron | 13.00 |
| Boston dist., iron | †13.00-13.25 |
| Buffalo, steel | 21.00-21.50 |
| Chicago, iron | 16.50-17.00 |
| Chicago, rolled steel | 17.50-18.00 |
| Cincin., iron, deal. | 16.50-17.00 |
| Eastern Pa., iron | 20.00-20.50 |
| Eastern Pa., steel | 20.50-21.00 |
| Pittsburgh, iron | 18.50-19.00 |
| Pittsburgh, steel | 20.50-21.00 |
| St. Louis, iron | †15.50-16.00 |
| St. Louis, steel | †16.50-17.00 |

**NO. 1 CAST SCRAP**

| | |
|---|---|
| Birmingham | 16.00 |
| Boston, No. 1 mach. | †14.50 |
| N. Eng. del. No. 2 | 14.00-14.50 |
| N. Eng. del. textile | 17.75-18.25 |
| Buffalo, cupola | 16.50-17.00 |
| Buffalo, mach. | 17.50-18.00 |
| Chicago, agri. net | 12.50-13.00 |
| Chicago, auto net | 14.50-15.00 |
| Chicago, railroad net | 14.00-14.50 |
| Chicago, mach. net | 14.25-14.75 |
| Cincin., mach. deal. | 16.00-16.50 |
| Cleveland, mach. | 20.00-21.00 |
| Detroit, cupola, net | †14.50-15.00 |
| Eastern Pa., cupola | 19.00-20.00 |
| E. Pa., No. 2 yard | 16.50 |
| E. Pa., yard fdry. | 16.50-17.00 |
| Los Angeles | 16.50-17.00 |
| Pittsburgh, cupola | 17.50-18.00 |
| San Francisco | 14.50-15.00 |
| Seattle | 14.00-16.00 |
| St. Louis, breakable | †14.00-14.50 |
| St. Louis, agri. mach. | †16.00-16.50 |
| St. L., No. 1 mach. | †17.00-17.50 |
| Toronto, No. 1, mach., net dealers | 16.50 |

**HEAVY CAST**

| | |
|---|---|
| Boston dist. break. | †12.75-13.25 |
| New England, del. | 15.00-15.50 |
| Buffalo, break | 14.50-15.00 |
| Cleveland, break, net | 15.25-15.75 |
| Detroit, auto net | †15.50-16.00 |
| Detroit, break | †11.00-11.50 |
| Eastern Pa. | 18.50 |
| Los Ang., auto, net | 13.00-14.00 |
| New York break | †13.50-14.00 |
| Pittsburgh, break | 15.00-15.50 |

**STOVE PLATE**

| | |
|---|---|
| Birmingham | 10.00 |
| Boston district | †10.50-11.00 |
| Buffalo | 14.00-14.50 |
| Chicago, net | 8.50- 9.00 |
| Cincinnati, dealers | 8.25- 8.75 |
| Detroit, net | †9.00- 9.50 |
| Eastern Pa. | 15.00-15.50 |
| New York fdry. | 10.00 |
| St. Louis | †11.00-11.25 |
| Toronto dealers, net | 12.00 |

**MALLEABLE**

| | |
|---|---|
| New England, del. | 21.00 |
| Buffalo | 16.50-17.00 |
| Chicago, R. R. | 18.50-19.00 |
| Cincin., agri., deal. | 13.25-13.75 |
| Cleveland, rail | 20.50-21.00 |
| Eastern Pa., R.R. | 21.00-21.50 |
| Los Angeles | 12.50 |
| Pittsburgh, rail | 21.00-21.50 |
| St. Louis, R. R. | †15.75-16.25 |

## Ores

**Lake Superior Iron Ore**

*Gross ton, 51½ % Lower Lake Ports*

| | |
|---|---|
| Old range bessemer | $5.25 |
| Mesabi nonbessemer | 4.95 |
| High phosphorus | 4.85 |
| Mesabi bessemer | 5.10 |
| Old range nonbessemer | 5.10 |

**Eastern Local Ore**

*Cents, unit, del. E. Pa.*

| | |
|---|---|
| Foundry and basic 56-63%, contract | 9.00-10.00 |

**Foreign Ore**
**(Prices nominal)**

*Cents per unit, c.i.f. Atlantic ports*

| | |
|---|---|
| Manganiferous ore, 45-55% Fe., 6-10% Mn. | 14.00-15.00 |
| Swedish low phos. | 14.00 |
| North African low phos. | 14.00 |
| Spanish, No. African basic, 50 to 60% | 14.00 |
| Chinese wolframite, short ton unit, duty paid | $23.00-23.50 |
| Scheelite, imp. | $23.50-24.50 |
| Chrome ore, Indian, 48% gross ton, cif. | $26.00-28.00 |

**Manganese Ore**

*Including war risk but not duty, cents per unit cargo lots.*

| | |
|---|---|
| Caucasian, 50-52% | 48.00-50.00 |
| So. African, 50-52% | 48.00-50.00 |
| Indian, 49-50% | nom |
| Brazilian, 48-52% | 46.00-48.00 |
| Cuban, 50-51%, duty free | 61.20 |

**Molybdenum**

| | |
|---|---|
| Sulphide conc., per lb., Mo. cont., mines | $0.75 |

*—The Market Week—*

# Sheets, Strip

Sheet & Strip Prices, Pages 104, 105

**Pittsburgh**—Sheet and strip specifications tend to improve, but gains have not been significant. Production has declined less rapidly the past month than in February, sheet mill schedule lately holding near 50 per cent and strip output close to 40. Galvanized sheet operations still move counter to the upward trend common for this period, though additional curtailment recently has been slight, providing an average of about 50 per cent. Export business has expanded moderately. Only small-lot buying by the automotive industry is in prospect.

**Chicago** — Total volume of bookings is improved, but small recent gains noted in some quarters have been held, while sales in general show no further losses. Production has eased off somewhat, but deliveries in some cases are improved. Most orders are in the nature of fill-ins and forward buying has been small, due, it is thought, to the fairly comfortable stocks still held by a number of users.

**Boston**—Fill-in buying of narrow cold strip is slightly heavier, although little general purchasing for the replenishment of stocks has appeared. Consumption tends upward in some consuming industries and prompt delivery is requested on the bulk of current orders. Backlogs with some mills have practically disappeared and further reductions are being made in production schedules.

**New York**—Some leading sheet sellers here look for April to mark a definite upturn in sheet specifications, while certain others doubt if there will be a strong upsurge before the middle of May. All are agreed, however, that the trend of demand has hit bottom for the present. In fact, some sellers report a mild gain in March, compared with February.

Deliveries of hot-rolled sheets range two to three weeks and cold-rolled sheets around three weeks. Galvanized sheets, not available from stock, are being offered at around three to four weeks as a general rule, although certain of the larger producers cannot do this well.

**Buffalo**—Sheet and strip output show strong resistance to further tapering. Automotive manufacturers are placing releases steadily and continue one of the chief sources of support.

**Philadelphia**—Two large makers of automobile bodies, frames and parts are scheduled to start tooling for 1941 models within the next two weeks. One maker of frames for


FOLLOW THE LEAD OF BIG INDUSTRY in cutting Fuel Costs!

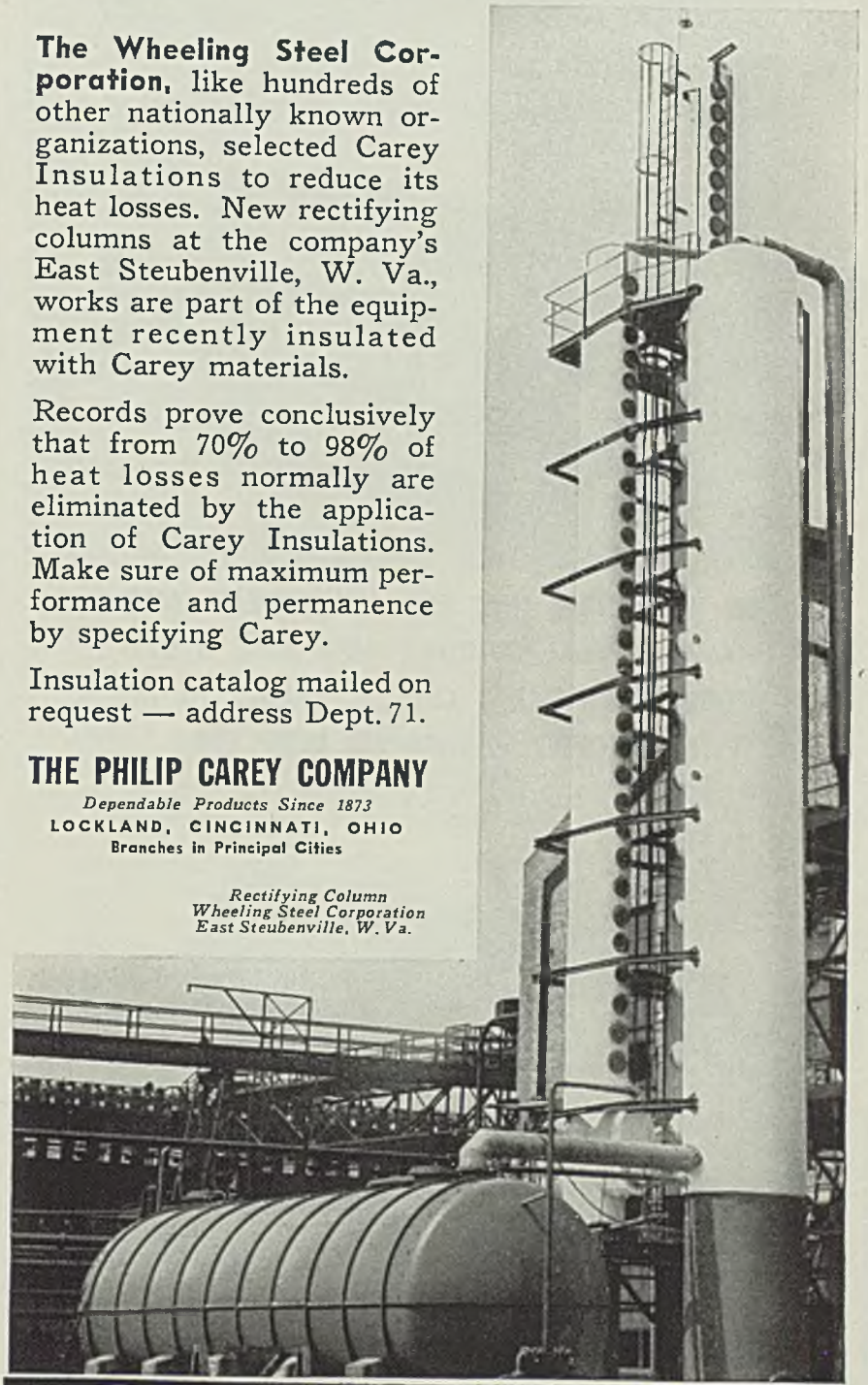
**The Wheeling Steel Corporation,** like hundreds of other nationally known organizations, selected Carey Insulations to reduce its heat losses. New rectifying columns at the company's East Steubenville, W. Va., works are part of the equipment recently insulated with Carey materials.

Records prove conclusively that from 70% to 98% of heat losses normally are eliminated by the application of Carey Insulations. Make sure of maximum performance and permanence by specifying Carey.

Insulation catalog mailed on request — address Dept. 71.

THE PHILIP CAREY COMPANY
*Dependable Products Since 1873*
LOCKLAND, CINCINNATI, OHIO
Branches in Principal Cities

*Rectifying Column*
*Wheeling Steel Corporation*
*East Steubenville, W. Va.*



Carey MAGNESIA—ASBESTOS HEAT INSULATIONS

General Motors has built up a large bank of parts and the 1940 run will be completed in a few weeks. It is understood no lower price has been uncovered so far in figuring 1941 jobs. Miscellaneous buying is quiet.

**Birmingham, Ala.** — Better weather has caused an expected increase in demand. Sales have been delayed by unseasonable weather. Strip output has improved.

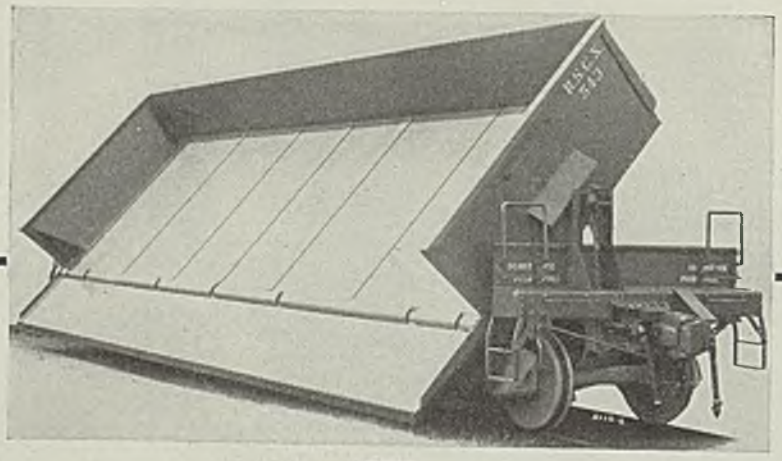
**Cincinnati** — Buying of sheet and strip has improved, miscellaneous needs sharing with automotive demand. The gains are broad but below seasonal expectations. Galvanized, still laggard, is believed near an upturn.

**Toronto, Ont.**—Demand for sheets is increasing. Canadian producers are pushing delivery dates well into July and have no sheets available for spot delivery. Consumers are turning to United States sources of supply and local representatives of American producers report sharp gain in sales.



DID YOU KNOW THAT YOU CAN INCREASE YOUR WASTE DISPOSAL EFFICIENCY 60% WITH A 27% REDUCTION IN INITIAL COST . . . THANKS TO THE NEW KOPPEL 50-YARD AIR DUMP CAR?

We shall welcome the opportunity of explaining the "how and why" of this statement at your convenience.



KOPPEL

PRESSED STEEL CAR CO., INC.

GRANT BUILDING (Koppel Division) PITTSBURGH, PA.

NEW YORK CHICAGO


# Plates

Plate Prices, Page 104

**Pittsburgh** — Business is fairly steady but not well distributed. Railroaod demand is light, with prospects somewhat uncertain although regarded as hopeful. Needs of structural fabricators also are slow, while shipyards and barge builders continue to provide good outlets. Miscellaneous buying is irregular but little changed in total.

**Chicago** — Manufacturers of heavy equipment and machinery such as derricks and cranes are among the most active consumers currently. Total volume of bookings, however, shows little variation in recent weeks. Some support still is gained from oil industry tank and public bridgework requirements. Increased need of plates for new freight car building is anticipated.

**Boston** — Less-than-car lot volume continues to feature plate buying which shows little improvement. Shipyard specifications are steady, but railroads and other leading consumers are placing meager tonnage. Boiler and structural shops have small backlogs and few specified projects, including water tanks, are active. Fabricating shop inventories are small.

**New York** — Plate business has recently improved, with a result that specifications for the month just closed were about on a parity with those in February, according to leading sellers here. A further increase is anticipated as the new month gets under way, due primarily to the probability of a sharp increase in building construction. It is also believed that the oil companies, which have been moving very slowly so far this year, will become more active. In fact, two oil tank jobs for installation in this district and totaling about 1700 tons, have just recently been placed. Prices appear slightly steadier.

**Philadelphia** — New York Shipbuilding Corp., Camden, N. J., has distributed 11,000 tons of plates, shapes and bars for two cruisers, most going to one Cleveland and one Pittsburgh interest and the remainder to an eastern mill. Bureau of supplies and accounts, navy, has not placed 8000 to 10,000 tons of material, which is estimated to fill navy yard requirements over the next six months, on which bids were taken March 12. Mills express dissatisfaction over change in method of buying navy steel and may ask for return to former system of bidding for specific tonnage. Bidding March 12 brought out concessions up to $3 per ton on plates, Light tank work is more active. A

concerted move has been made to bolster export prices, which had slipped from about 2.80c to 2.00c. The market now is 2.10c.

**Birmingham, Ala.** — No immediate improvement is in sight for plates unless railroad car demand increases. Production, however, is holding its own and car orders are expected momentarily.

**Seattle**—Several large projects are pending, including a crude oil pipe line from Cut Bank, Mont., to Spokane, Wash., and an oil tank job at Seattle for Richfield Oil Co. Announcements are expected in the near future. Important tonnages are involved in proposed caissons for Puget Sound Navy Yard dock No. 5, $400,000 available, bids at Washington, April 24. Plans are in preparation and bids will be called in May or June by navy department for gas and oil storage, magazines, etc., totaling $75,000 for the Tongue Point, Oreg., air base.

**San Francisco** — Bids open April 17 for another wind tunnel at Moffett Field, California, calling for 2200 tons of plates and shapes. Bids will be opened April 18 for eight 110-inch and two 91-inch outlet gates for the Friant dam, Central Valley project, California. So far this year 15,880 tons have been placed, compared with 14,782 tons for the same period a year ago.

**Toronto, Ont.** — Plate consumption in Canada is heavy and new demand is opening up steadily. Canadian production is solidly booked for months and most new demand is going to the United States. Demand for ship plate also is increasing. Imports of plates from the States are reported at the highest level in years.

## Plate Contracts Placed

895 tons, two rectangular tanks, Patchogue Oil Terminal Corp., Brooklyn, to J. K. Welding Co. Inc., Long Island City, N. Y.

750 tons, 110,000-barrel and spheroid tanks, Shell Oil Co., Sewaren, N. J., to Chicago Bridge & Iron Co., Chicago.

## Plate Contracts Pending

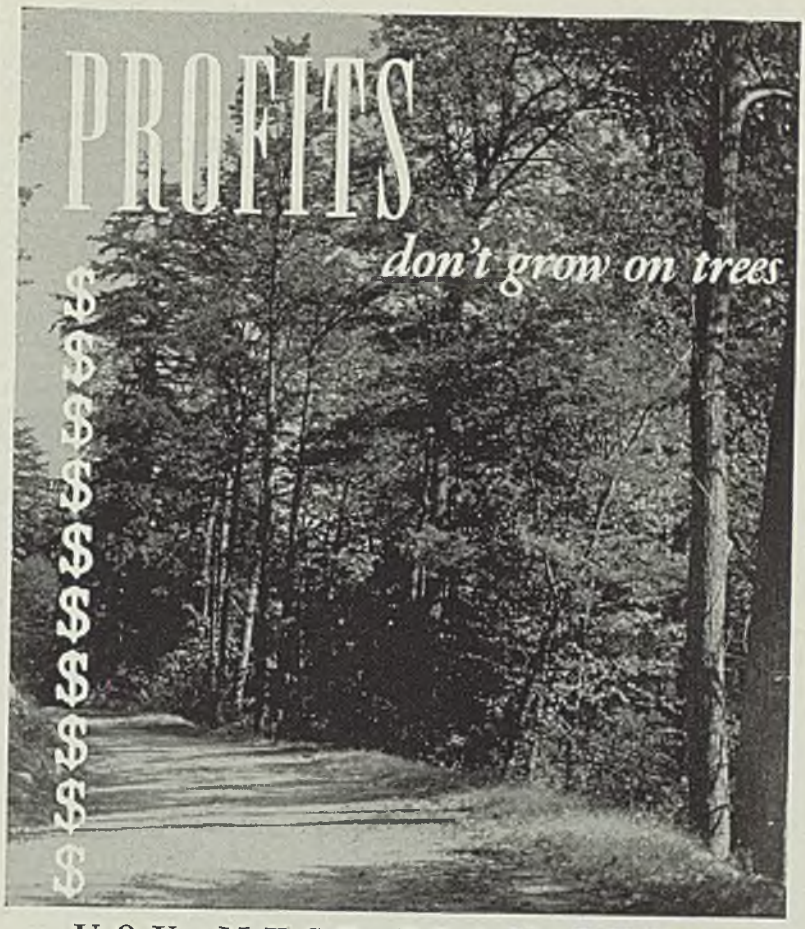
2200 tons, wind tunnel at Moffett Field, California; bids April 17.

2100 tons, large sized welded steel pipe, replacement work on Los Angeles aqueduct; J. F. Shea Co., Inc., 617 South Olive street, Los Angeles, low on general contract at $496,253.

300 tons, outlet pipe, Friant dam, Central Valley project, California, specification 903; bids April 18.

Unstated, caissons for dock No. 5, Puget Sound navy yard; bids to navy department, Washington, April 24; $400,000 available.

Unstated, magazines and oil storage tanks, air base, Tongue Point, Oreg.; bids to navy department in May or June.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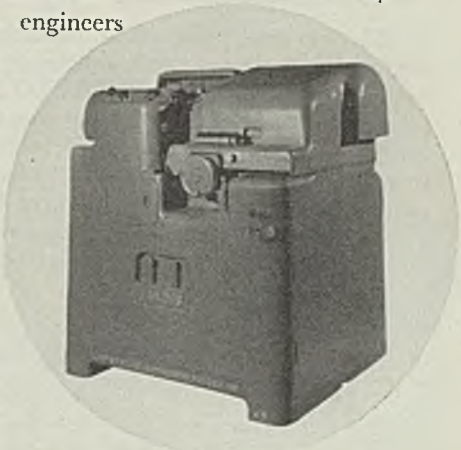

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# Bars

Bar Prices, Page 104

**Pittsburgh**—Buying is slow to further recent small gains, with consumers generally covering only a short distance ahead and some only now find it necessary to supplement inventories with additional purchases. Certain special alloys continue active, with improved export demand helping to sustain both carbon and alloy business.

**Chicago** — Some mills show improvement in carbon bar demand, others indicating increased alloy bar interest, while demand is generally unchanged. As end of brisk farm implement production nears, makers are easing bar demands. Automotive work remains quite prominent, and some improvement in railroad requirements for freight car material is expected in the near future.

**Boston** — Miscellaneous demand for hot-rolled carbon bars shows spotty improvement and buying of alloy stock is well maintained. Machine tool builders and shops assembling aircraft are leading consumers, the latter on the up grade. Government shops and shipyards continue to release a steady volume of alloy material. Deliveries of heat-treated stock are slightly improved.

**New York** — Commercial bar business has taken a turn for the better, with sellers anticipating a generally more satisfactory month in April. Specifications from machine tool builders, airplane equipment manufacturers and government shops are outstanding. Deliveries on plain carbon bars range two to three weeks, reflecting no recent change; alloy bars, around five to six weeks; and special heat treated bars, 12 to 15 weeks in some cases.

**Philadelphia** — Cold-finished bar releases from manufacturers of bearings, screw machine products, spark plugs and gears have improved moderately following a quiet period. Hot-rolled carbon bars continue slow. Government arsenal buying has been light recently but it is understood requirements may increase if plan materializes to use bars instead of forgings for small shells.

**Birmingham, Ala.** — Demand has not shown seasonal increase, although production has held up well in view of the lack of orders.

**Buffalo**—Bar mills maintain production at about 60 per cent. Some gain is noted in new buying but incoming business is still insufficient for present operations. Mills report most first quarter tonnage has been cleared. Consumers inventories are considered light and any general business rebound would likely mean immediate buying.


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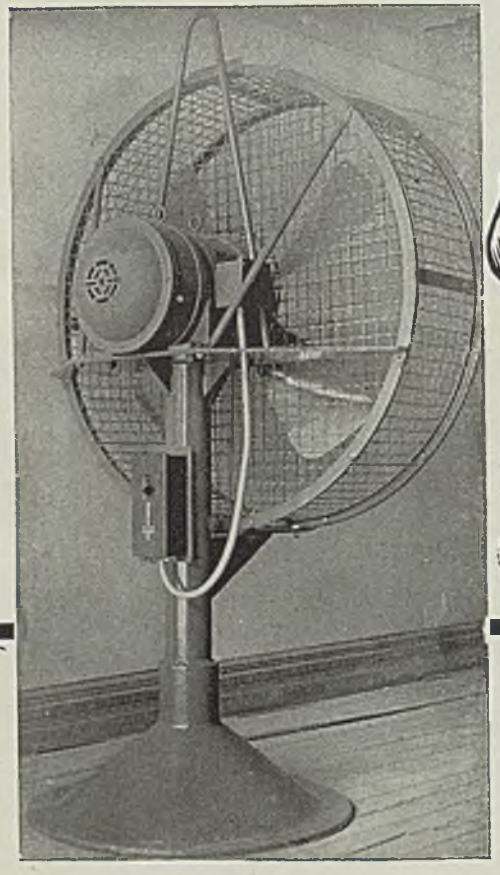

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# Pipe

Pipe Prices, Page 105

**Pittsburgh** — Total demand tends upward, although recent changes in some tubular products have been slight. Oil country goods, as well as standard pipe, are more active in southern markets than was true earlier this year, when well drilling and building construction were retarded by the weather. The outlook for oil country products is fairly good for the long term, in view of expectations for a small increase in drilling operations the next few months. Standard pipe business in northern markets is gaining gradually. Activity in mechanical tubing is quiet and unchanged.

**New York** — More seasonable weather conditions are stimulating demand for merchant pipe, with much better business anticipated in April. March bookings were gen-

erally disappointing to sellers, with resale prices generally unsettled.

**Birmingham, Ala.**—Inquiries continue reasonably active, with production maintained at three to four days a week.

**Seattle**—Largest tonnage immediately pending is 300 tons of 4 to 8-inch for Cle Elum, Wash., bids opened March 27. Award is also pending at Raymond, Wash., for 100 tons. Dayton, Wash., has state WPA approval for proposed $21,000 project involving three miles of 2 to 6-inch cast pipe.

**San Francisco** — While cast iron pipe awards are moderate over 3600 tons are pending. Awards aggregated 563 tons and brought the year's total to 7584 tons as compared with 6641 tons for the corresponding period in 1939.

### Cast Pipe Placed

220 tons, 3 to 6-in., Metzger water district, Portland, Oreg., to United States Pipe & Foundry Co., Burlington, N. J.

143 tons, 6 to 14-inch, Sacramento, Calif., to American Cast Iron Pipe Co., Birmingham, Ala.

### Cast Pipe Pending

342 tons, 8 to 20-inch, Glendale, Calif.; bids April 4.

100 tons, 6 and 8-inch, Walnut Park, Calif.; bids April 2.

## Rails, Cars

Track Material Prices, Page 105

The 1000 steel box cars ordered by the New York Central for service on the Pittsburgh & Lake Erie railroad will be built in the Pittsburgh district at the McKees Rocks, Pa., plant of Pressed Steel Car Co. and the Butler, Pa., plant of Pullman-Standard Car Mfg. Co. The equipment will require about 10,000 tons of steel.

Additional car buying is pending and in prospect, and builders remain fairly optimistic regarding the outlook.

Rail mills have sufficient backlog to support operations through second quarter, this principally representing tonnage placed last fall. Track material producers look for a fair amount of secondary buying later in the year.

### Car Orders Placed

New York Central, 1000 all-steel box cars for Pittsburgh & Lake Erie, 500 to Pressed Steel Car Co., Pittsburgh, and 500 to Pullman-Standard Car Mfg. Co., Chicago.

### Car Orders Pending

Norfolk & Southern, 40 pulpwood cars and 12 cabooses.

### Buses Booked

A.c.f. Motors Co., New York: Nine coaches for San Diego Electric Railway Co., San Diego, Calif., and two for Toye Bros. Yellow Cab Co., New Orleans.

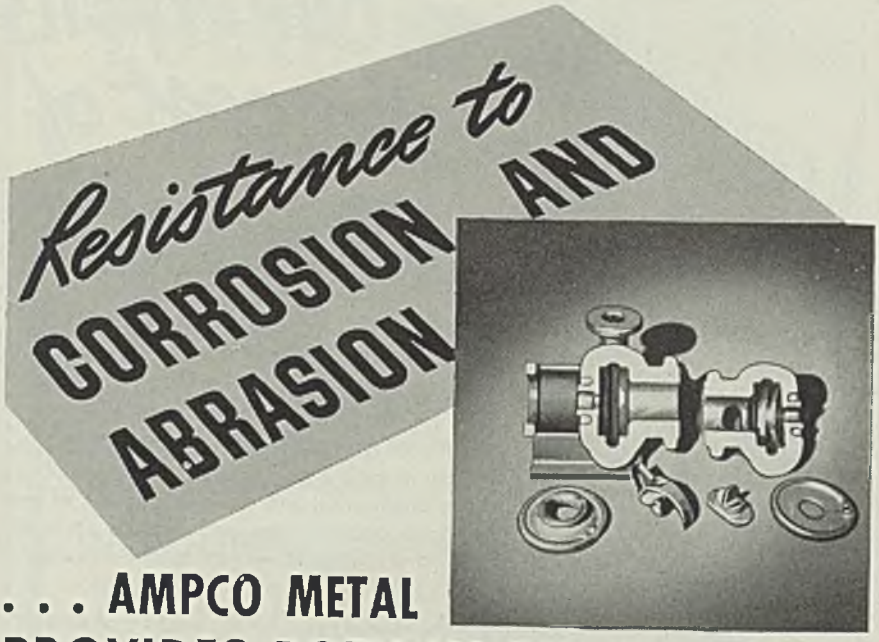
General Motors Corp.: Fifteen diesel powered buses for Chicago, Burlington & Quincy for operation by Burlington Trailways.

## Wire

Wire Prices, Page 105

**Pittsburgh**—Changes in demand for wire and wire products are small. Merchant items are slightly more active, but the season for some materials has been delayed in certain northern sections where unfavorable weather continues to be a handicap. Buying of manufacturers' wire and wire rods remains rather slow. Export markets are providing relatively large orders.

**Chicago** — Outlook is more cheerful. Sales have increased in the past week, although gain is not large. Market is expected to open up wider shortly. March bookings were improved over February's. Farm implement wire requirements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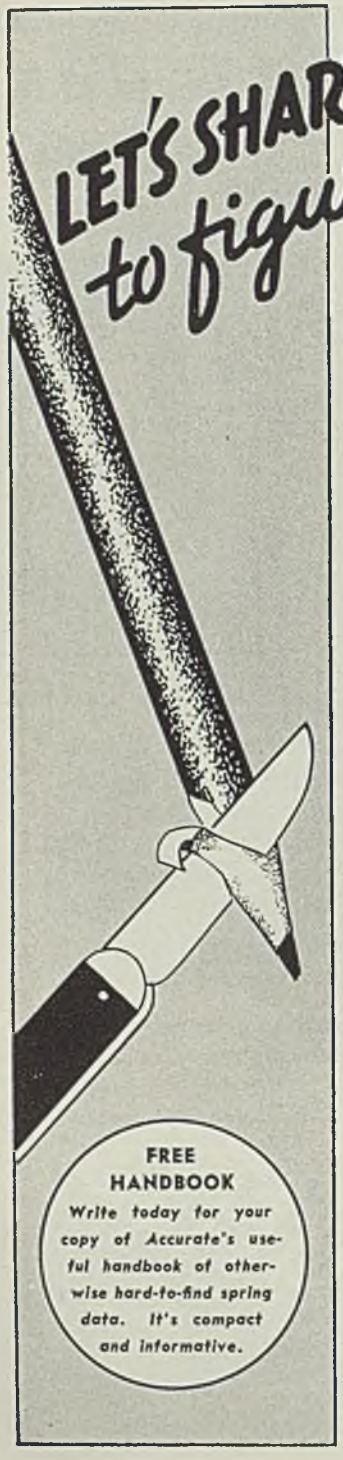
still are good, though farm machinery production is slowing down noticeably.

**Birmingham, Ala.**—Seasonal business has sustained production, and the arrival of spring has given some spurt to rural demand. Buying continues to be in small lots.

## Tin Plate

Tin Plate Prices, Page 104

Changes in tin plate specifications are small, but the tendency in both demand and production appears upward. Production has gained 3 points to 56 per cent, compared with 60 per cent a year ago. First quarter shipments were in line with expectations, according to some producers. Export business is slightly more active, and although improvement has been less than in a number of other steel products, foreign trade holds above the pre-war volume. Indicative of the recent trend in container business, Continental Can Co. reports a 15 per cent gain over a year ago in 1940 sales to date.

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# Shapes

Structural Shape Prices, Page 104

**Pittsburgh** — Small lots dominate structural awards and inquiries. Absence of larger projects is retarding business gains, despite appearance of a growing number of private jobs lately. Small fabricators generally have little backlog. Predictions of an active spring in building construction have yet to be reflected in work involving structural material.

**Chicago** — General volume still is unimproved. There are a number of small structural projects out, but sizable jobs still are lacking to such an extent that inclement weather is not believed chiefly to blame for the quiet. Judson-Pacific Co., San Francisco, booked 975 tons for Eel river bridge, North Scotia, Calif.

**Boston**—While a few more small-sized private construction projects are appearing, structural tonnage has been slow to show seasonal improvement and tonnage placed thus far this year is well below that for the corresponding period, 1939. Public works, except for construction connected with the national defense program, lags; also bridges. New inquiry, however, includes a two-span plate girder bridge, Springfield, Vt., 228 tons, closing April 12.

**New York**—New projects, both public and private continue to come out and contracts are being closed steadily. While public work is important a larger proportion of private is noted.

Fabricated structural steel contracts closed in February totaled 92,526 tons, 18 per cent greater than 78,829 tons in January. Bookings for the first two months were 92.9 per cent of the total for the some months in 1939. February shipments were 91,875 tons, compared with 109,496 tons in January. Shipments for the two months exceeded those of the first two months of 1939 by 19 per cent, according to the American Institute of Steel Construction, New York.

**Philadelphia** — McCloskey & Co.,

### Shape Awards Compared

| | Tons |
|---|---|
| Week ended March 30 | 9,917 |
| Week ended March 23 | 16,768 |
| Week ended March 16 | 14,252 |
| This week, 1939 | 32,489 |
| Weekly average, year, 1940 | 18,685 |
| Weekly average, 1939 | 22,411 |
| Weekly average, February | 31,399 |
| Total to date, 1939 | 305,242 |
| Total to date, 1940 | 242,912 |

Includes awards of 100 tons or more.

Philadelphia, is low on base bids for hangars for Washington airport at Gravelly Point, Va., requiring 2500 tons shapes. John McShain, Philadelphia, is low on first and second alternates, requiring 3350 and 4200 tons of shapes, respectively. Private work pending includes two buildings for Armstrong Cork Co., Lancaster, Pa.

**Buffalo** — With jobs already in contractors' hands running around 15,000 tons, interest in the structural steel market is growing. Steel awards on five grade crossing elimination jobs and the Rainbow Bridge are likely to be signed in the next week or so.

**San Francisco** — Although few structural lettings were reported placed, pending business is heavy and exceeds 19,000 tons. Awards aggregated 1891 tons and brought the aggregate for the year to 53,090 tons as compared with 35,396 tons for the corresponding period in 1939. Colorado Fuel & Iron Co. took 1000 tons for supports for three tunnels on the Tucumcari project, New Mexico.

**Toronto, Ont.** — Building activities continue at a high rate and most structural steel fabricators report improvement in business over last year.

## Shape Contracts Placed

1000 tons, tunnel supports, Tucumcari project, New Mexico, to Colorado Fuel & Iron Co., Pueblo, Colo.

975 tons, bridge over Eel river, North Scotia, Calif., to Judson-Pacific Co., San Francisco, through A. Soda & Sons, general contractor.

635 tons, building, Poinsett Mfg. Co., Pickens, S. C., to Truscon Steel Co., Youngstown, O.

580 tons, lock gates, Watts Bar dam, Tennessee, for Tennessee Valley authority, to Lakeside Bridge & Steel Co., Milwaukee.

505 tons, state highway bridge PSC-6600, Monroe county, New York, to American Bridge Co., Pittsburgh.

480 tons, structural laboratory, Philadelphia, to Lehigh Structural Steel Co., Allentown, Pa., through Ralph S. Hertzog, Philadelphia.

325 tons, case structures, plans 10-3, Sun Oil Co., Marcus Hook, Pa., to Phoenix Bridge Co., Phoenixville, Pa.

305 tons, bridge SP-829-B, Terrebonne parish, Louisiana, to Nashville Bridge Co., Nashville, Tenn.

300 tons, power house, for Tri-State Power Co-operative, LaCrosse, Wis., to Mississippi Valley Structural Steel Co., Decatur, Ill.

293 tons, undercrossing, Fremont street, South Pasadena, Calif., for state, to Consolidated Steel Corp., Los Angeles.

280 tons, piling, Texas Co., Indiana Harbor, Ind., to Inland Steel Co., Chicago, through Great Lakes Dredge & Dock Co., Chicago.

275 tons, store building, S. S. Kresge Co., Lincoln, Neb., to Lincoln Steel Works, Lincoln, Nebr.

273 tons, state highway bridge, Marion, Ind., to Pan-American Bridge Co., New Castle, Ind.

267 tons, state highway bridge, Flat Rock, Ind., to Pan-American Bridge Co., New Castle, Ind.

250 tons, highway bridges, contract 343, Wawarsing, N. Y., for city of New York, to Bethlehem Steel Co., Bethlehem, Pa.

230 tons, Kankakee bridge 187.11, Howe, Ill., for New York Central railroad, to American Bridge Co., Pittsburgh.

225 tons, engineering research laboratory, for Texas Co., Glenham, N. Y., to Lehigh Structural Steel Co., Allentown, Pa.

225 tons, boiler house, for Naugatuck Chemical Co., Naugatuck, Conn., to Berlin Construction Co., Berlin, Conn.

200 tons, extension to building 101, for Aluminum Co. of America, Cleveland, to Bethlehem Steel Co., Bethlehem, Pa.

200 tons, addition to office building, for American Rolling Mill Co., Middletown, O., to International Steel Co., Evansville, Ind.

190 tons, Benedictine high school, Cleveland, to Builders Steel Works Co., Pittsburgh.

180 tons, alterations to subway, Seventh and Lexington avenues, New York, to Bethlehem Steel Co., Bethlehem, Pa.

170 tons, Red Head Brand building, Chicago, to Wendnagel & Co., Chicago.

165 tons, building, Celluloid Co., Newark, N. J., to F. G. Schaefer Iron Works, Edgewater, N. J.

160 tons, laboratory, Skidmore college,


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140 tons, bridge No. 9, R-113, Washington county, Pennsylvania, to Fort Pitt Bridge Works, Pittsburgh.

140 tons, building, General Cable Co., Bayonne, N. J., to Belmont Iron Works, Eddystone, Pa.

140 tons, state bridge, Potterville, Mich., to R. C. Mahon Co., Detroit.

134 tons, bridge for city of Boise, Idaho, to unnamed interest.

125 tons, crane runway for scrap yard, Schiavone-Bonomo Corp., Brooklyn, N. Y., to American Bridge Co., Pittsburgh.

120 tons, chemical building, Dewey & Almy Co., Stickney, Ill., to Wendnagel & Co., Chicago.

110 tons, bridge, section 3-V-F, Pleasant Hill, Pike county, Illinois, to Midland Structural Steel Co,. Cicero, Ill.

110 tons, bridge SAP-921-A, Tillman county, Oklahoma, to George C. Christopher & Son Iron Works, Wichita, Kan.

110 tons, gymnasium and auditorium, for Sisters of St. Dominic, Detroit, to Whitehead & Kales Co., Detroit.

100 tons, post office, Orlando, Fla., to Aetna Iron & Steel Co., Jacksonville, Fla.; J. P. Cullen & Son, Janesville, Wis., general contractor.


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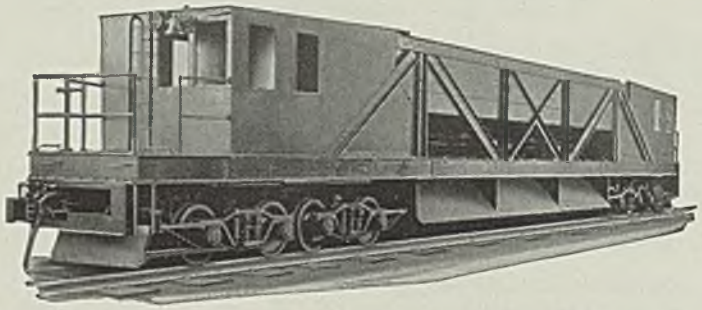

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## Shape Contracts Pending

7000 tons, first two sections Atlantic avenue grade crossing elimination project Brooklyn, N. Y.

3000 tons, hotel, Ottawa, Ont., for Ford Hotels Co., Rochester, N. Y.

2125 tons, additional buildings for Aluminum Co. of America, Vancouver, Wash.; bids being taken.

2055 tons, Washington airport, Gravelley Point, Va.; McCloskey & Co., Philadelphia, low on base bid, John McShain Inc., Philadelphia, low on alternates requiring 3350 and 4200 tons, respectively.

1200 tons, buildings, naval medical center, Bethesda, Md., for United States government.

550 tons, factory building, for Kentucky Macaroni Co., Louisville, Ky.

500 tons, warehouse, for Obear-Nester Glass Co., East St. Louis, Ill.

500 tons, convent at Amos, Que.; Jules Caron, 324 Bonaventure street, Three Rivers, Que., architect.

450 tons, diversion tunnel, bureau of reclamation, Loveland, Colo.

400 tons, bridge 34, for Northern Pacific railway, Gibbon, Wash.

400 tons Y.M.C.A. building, Vancouver, B. C.

330 tons, civil aeronautics administration building, North Beach airport, New York, for treasury department.

300 tons, state bridge, McCreary county, Kentucky.

300 tons, Odd Fellows Temple Ltd. building, Gore street, Hamilton, Ont.

300 tons, telephone building, Sudbury, Ont., for Bell Telephone Co. of Canada Ltd., Toronto.

300 tons, factory and office buildings, Scarboro Township, Ont., for Metal Stampings Ltd., 435 Fleet street West, Toronto.

300 tons, industrial building at prison, San Quentin, Calif.; bids opened.

300 tons, hangar No. 7 for Oakland port commission, Oakland, Calif.; bids April 1.

300 tons, manufacturing building, Armstrong Cork Co., Lancaster, Pa.; bids April 15.

275 tons, factory building for Dow Chemical Co., Midland, Mich.

250 tons, state bridge, Cheboygan, Mich.

250 tons, steel sheet piling, Everett, Wash.; bids April 3.

228 tons, two-span plate girder bridge, length 285.66 feet overall, route U. S. 5, Springfield, Vt.; bids April 12, H. E. Sargent, commissioner of highways, Montpelier, Vt.

220 tons, skip bridge, for Republic Steel Corp., Cleveland.

220 tons, addition to plant, for Hygienic Tube & Container Corp., Newark, N. J.

219 tons, bridge, Sullivan county, Pennsylvania; bids to highway department, Harrisburg, Pa., April 5, also involves 64 tons of reinforcing bars.

200 tons, incinerator garage, Pittsburgh, for city.

200 tons, building, for Harold H. Clapp Inc., Rochester, N. Y.

200 tons, arena and sports palace for Junior Chamber of Commerce, Victoria, B. C.

200 tons, school chapel assembly for school commission of St. Leo de Westmount, Westmount, Que.

200 tons, glass plant, Millville, N. J., for Armstrong Cork Co., Lancaster, Pa.; bids April 8.

176 tons, including bearing and sheet steel piling, East Fullerton creek dam,

Orange county, California, for United States engineer office, Los Angeles; bids soon.

175 tons, store building, for Sears, Roebuck & Co., Chicago.

130 tons or more, cranes for Fern Ridge dam, Oregon, and Wapato project, Washington state; Cyclops Iron Works, San Francisco, low.

130 tons, bridge over Georgian creek for Sacramento county, California; bids April 9.

120 tons, state bridge, Benzie County, Michigan.

120 tons, state bridge, Thompsonville, Mich.

120 tons, store building, for S. S. Kresge Co., Reading, Pa.

120 tons, bridge A-426, Fox Lake, Ill., for Chicago, Milwaukee, St. Paul & Pacific railroad.

120 tons, building addition, for Electro-Motive Corp., La Grange, Ill.

110 tons, building, for W. W. Vicinus, Rochester, N. Y.

110 tons, field house, St. Joseph's college, Rensselaer, Ind., bids in.

# Reinforcing

Reinforcing Bar Prices, Page 105

**Pittsburgh** — Pending business in reinforcing bars is slow to increase, awards recently having been in excess of new inquiries. A fairly large number of private building jobs are included among orders, although public projects generally take the heaviest tonnage. Prices continue disorganized, wide variations existing on recent lettings. Some jobs are going at the full 2.15c market for billet bars but on others 1.60c has prevailed. Rail steel bars generally are quoted at a differential of $3 a ton under the billet price.

**Chicago** — Market is benefitting from a large number of small projects but new jobs of larger proportions are lacking. Total tonnage pending on the market has held well but has not increased as earlier expected, due in part to poor construction weather. Bethlehem Steel Co., Bethlehem, Pa., booked 208 tons for the W. C. Ritchie Co. box factory, Chicago.

**New York** — While bridge and highway requirements are heavier, current buying is light with concrete bar prices still subject to shading. For additional buildings, Willowbrook state hospital, Staten Island, close to 500 tons are required. Grade crossing eliminations loom as an encouraging outlet in the near future.

**Philadelphia** — While prices are soft on fabricated material plain bars have not weakened greatly. Some local fabricators continue to pay 1.90c net after quantity deduction and the minimum reported is 1.85c. The market is slightly more active.

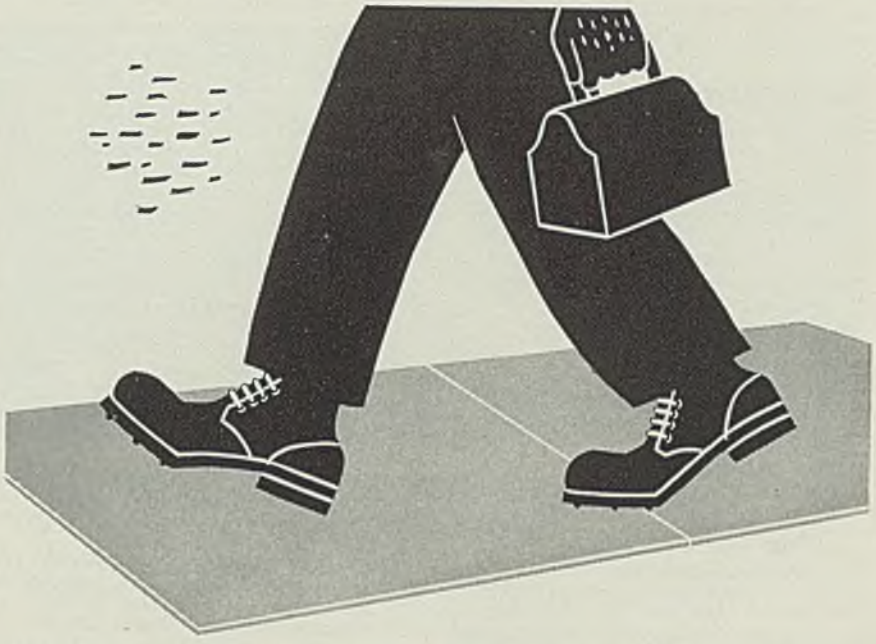
**Seattle**—Demand continues below seasonal levels and second quarter prospects indicate no material upturn. Bethlehem Steel Co. has taken 100 tons involved in the Okanogan, Wash., postoffice and Providence hospital addition, Seattle, and is reported to have 1050 tons from reclamation bureau for Coulee dam. An unstated tonnage is involved in the $500,000 addition to the Spokane, Wash., postoffice. Bids are in for the Great Northern railway bridge

## Concrete Bars Compared

| | Tons |
|---|---|
| Week ended March 30 | 11,495 |
| Week ended March 23 | 7,504* |
| Week ended March 16 | 7,686 |
| This week, 1939 | 11,872 |
| Weekly average, year, 1940 | 7,559 |
| Weekly average, 1939 | 9,197 |
| Weekly average, February | 5,457 |
| Total to date | 142,937 |
| Total to date, 1940 | 98,264* |

*Revised.

Includes awards of 100 tons or more.

He put it to the "HOB-NAIL" Test!

• Yes, that's just what happened in a manufacturer's roughshod test on painted sheets of galvanized ARMCO PAINTGRIP and ordinary galvanized.

To compare paint adherence he placed a painted sheet of both metals on the floor in a three-foot hallway. Employees walked on them four times daily—hob-nails and all!

After four months, paint on the PAINTGRIP panel was evenly worn but not chipped. Paint on the ordinary galvanized sheet revealed peeling, caused by brittleness of the paint and lack of adherence.

A decisive test, that! Yet paint adherence is only one of the reasons why ARMCO PAINTGRIP can help you save money and make money. PAINTGRIP needs no pre-treatment, no weathering. Its special bonderized finish takes paint and helps preserve it. There are no zinc oxides at the surface to dry out paint and rob it of its elasticity.

Why not try ARMCO PAINTGRIP for your painted products? Then you can get a good idea of the shop-savings, and the increased service life PAINTGRIP can give your products. Write The American Rolling Mill Company, 1180 Curtis St., Middletown, Ohio.

ARMCO PAINTGRIP

at Kettle Falls, Wash., requiring 290 tons.

**San Francisco** — The reinforcing market is active and 4484 tons were placed last week. This brought the year's aggregate to 29,271 tons, compared with 55,724 tons for the same period last year. Blue Diamond Corp. booked the second largest letting of the year, 3275 tons for the Sepulveda dam in Los Angeles.

**Toronto, Ont.** — While reinforcing awards for the week were below the level of the preceding three or four weeks, a number of projects are under consideration which will further stimulate demand soon.

## Reinforcing Steel Awards

3275 tons, Sepulveda dam, Los Angeles, to Blue Diamond Corp., Los Angeles.

1400 tons, store, Sanders Mfg. Co., Detroit, to Bethlehem Steel Co., Bethlehem, Pa.; Bryant & Detwiler, contractors.

1050 tons, for Coulee dam, Washington state, reported awarded to Bethlehem Steel Co., San Francisco, by bureau of reclamation.

1000 tons, office building for Ontario hydroelectric commission, University avenue, at Toronto, to Truscon Steel Co. of Canada Ltd., Toronto.

820 tons, retaining wall and pumping station, Toby creek, Pennsylvania, for United States engineers' flood control program on Susquehanna river, to Carnegie-Illinois Steel Corp., Pittsburgh, through T. M. Callahan, Reading, Pa., contractor.

500 tons, four buildings for Aluminum Co. of America, Vancouver, Wash., to Mercer Steel Co., Portland, Oreg.

430 tons, Fern Ridge dam, Oregon, materials by bureau of reclamation; Morrison-Knudsen Co., Boise, Idaho, general contractor.

400 tons, pier No. 2, Philadelphia navy yard, to Bethlehem Steel Co., Bethlehem, Pa., through Ralph S. Herzog, Philadelphia.

350 tons, bins, Lehigh Portland Cement Co., Oglesby, Ill., to Inland Steel Co., Chicago; John S. Metcalf, contractor.

300 tons, indoor arena, Uline Ice Co., Washington, to Bethlehem Steel Co., Bethlehem, Pa.; White Construction Co., contractor.

300 tons, Navy place housing project, Washington, to Bethlehem Steel Co., Bethlehem, Pa.; Charles H. Tompkins, contractor.

300 tons, post office, Orlando, Fla., to Truscon Steel Co., Youngstown, O.; J. P. Cullen & Son, Janesville, Wis., general contractor.

250 tons, bureau of reclamation, invitation 38,162-A, Odair, Wash., to Bethlehem Steel Co., Seattle, Wash.

245 tons, state viaduct, 343-foot, Washington county, Oregon, to unstated interests; Jacobsen-Jensen Co., Portland, general contractor.

225 tons, building 2, Willowbrook, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.; Silverblatt & Lasker Co., New York, contractor.

225 tons, bathhouse, connecting portico and service building, New London, Conn., for city, to Bethlehem Steel Co., Bethlehem, Pa.; Corsino Construction Co., contractor.

213 tons, garage, Dearborn street and Wacker drive, Chicago, to Calumet Steel Co., Chicago.

200 tons, box factory, W. C. Ritchie Co., Chicago, to Inland Steel Co., Chicago; Campbell-Laurie & Landers, contractors.

190 tons, hospital, Atlantic county, New Jersey, to Bethlehem Steel Co., Bethlehem, Pa., through Golder Construction Co., Philadelphia.

180 tons, Elizabeth housing project, Akron, O., to Pollak Steel Co., Cincinnati.

165 tons, bureau of reclamation, invitation 38,167-A, Kettle Falls, Wash., to Bethlehem Steel Co., Seattle, Wash.

150 tons, plant addition, Industrial Rayon Corp., Painesville, O., to Republic Steel Corp., Cleveland, through Paterson-Leitch Co., Cleveland; George A. Rutherford Co., contractor.

125 tons, Delaware aqueduct, contract 343, board of water supply, New York, to Bethlehem Steel Co., Bethlehem, Pa.; Reiss & Weinsier Inc., contractor.

101 tons, grade separation, Scotten avenue, Detroit, to Great Lakes Steel Corp., Detroit; through Concrete Steel Fireproofing Co. Bryant & Detwiler, contractor.

100 tons, Okanogan, Wash., postoffice and Providence hospital, Seattle, to Bethlehem Steel Co., Seattle.

## Reinforcing Steel Pending

1300 tons, Washington Airport, Gravelley Point, Va.; McCloskey & Co., Philadelphia, low on base bid.

500 tons, ten hospital buildings, state hospital, Willowbrook, N. Y.; bids April 17.

495 tons, state highway project 23, Franklin and Madison counties, Ohio.

434 tons, quartermaster department, Fort Mason, Calif.; bids opened.

360 tons, five pumping stations, Toby creek, Pennsylvania, for Susquehanna river flood control; bids to army engineers, Baltimore, April 26.

350 tons, building at Phoenix, Ariz., for Sears, Roebuck & Co.; general contract to Del E. Webb Construction Co., 1633 West Jefferson street, Phoenix, Ariz.

340 tons, factory, Kentucky Macaroni Co., Louisville, Ky.

305 tons, bachelor quarters, naval air base, Alameda, Calif.; bids opened.

290 tons, Great Northern railway bridge, Kettle Falls, Wash.; bids in to reclamation bureau, Coulee, Wash.

250 tons, plant, Andrew Jergens Co., Belleville, N. J.

240 tons, building, Vannegot Hardware Co., Indianapolis.

237 tons, bridge and culvert, Willington, Conn.

158 tons, highway work in Tehama and in Shasta county, California, for state; bids April 10.

100 tons, bureau of reclamation, invitation 27,672-A, Deer Creek, Utah; bids opened.

100 tons, manufacturing building, Armstrong Cork Co., Lancaster, Pa.; bids April 15.

## Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 105

Sustained upturn in specifications in April is expected by bolt and nut makers. Building requirements should pick up noticeably, it is believed, and there should be better buying among the distributors, who have been operating on stocks purchased principally last fall. Shipyard releases are satisfactory, although railroad specifications may not take much of a spurt until later in the spring when rail laying becomes more general. The Battery-Brooklyn tunnel, New York, on which specifications are expected out shortly, will require well over $500,000 worth of bolts and nuts, it is estimated.

# Pig Iron

Pig Iron Prices, Page 106

**Pittsburgh** — Buying remains slow, with shipments holding near the rate of the past several weeks. Deliveries are fairly steady, but March failed to develop a reversal of the previous trend. Sellers have completed the major portion of last fall's commitments, this suggesting a revival in purchases next quarter. Export inquiries are increasing but attract little interest among sellers in view of the unattractive price realization here on shipments to the Atlantic seaboard.

**Boston** — Pig iron buying is light and spotty with shipments, mostly in small lots for prompt delivery, barely being maintained. Machine tool shop requirements are outstanding, but foundries have caught up with castings demand in some instances. In other directions the trend in foundry melt is down slightly.

**New York**—With a slight gain in specifications in March, pig iron sellers, look for still greater improvement in April. Not only are consumer stocks becoming more depleted, but prospects indicate a heavier melt as the building season gets under way. Soil pipe foundry operations, in particular, should respond to improved weather conditions. Export demand is improving, following the slump of a fortnight or so ago.

**Philadelphia** — Foundry requirements have tapered slightly. One steel foundry is down to eight heats weekly. The gray iron trade is fairly busy but generally can promise deliveries within 10 days. Pig iron buying is restricted to an occasional carload or two.

**Buffalo**—Shipments continue remarkably well, with March volume 20 per cent above February. While forward buying continues to drag, producers report spot orders and releases in sufficient volume to maintain production at 71 per cent of capacity. Little first quarter tonnage was carried over.

**Cincinnati**—Moderate broadening

in melt resulted in heavier pig iron shipments last month than in January or February. Needs for heating equipment are gradually expanding and no letup is seen in machine tool building. Quiet contracting has put considerable second quarter tonnage on furnace books. Prices of by-product foundry coke are reaffirmed for April.

**St. Louis**—New business in pig iron continues light, sales consisting of a few orders of 50 to 100 tons for immediate shipment. It is expected March will show some improvement over February, but this will be a result of movement to points outside St. Louis. A drop in consumption is shown by the sharp decline of 17 points in ingot production.

**Birmingham, Ala.** — Pig iron production continues steady but demand has not shown much improvement. Two blast furnaces remain down.

**Toronto, Ont.** — Booking for second quarter is proceeding in a moderate way. A few of the larger melters have come into the market with fair sized contracts and others have issued inquiries, but so far there has been no rush to cover. Smaller melters are in the market at regular intervals and are taking spot delivery on lots up to 200 tons. The market as a whole, however, is somewhat draggy, despite recent improvement in daily melt, now around 70 per cent.

# Scrap

Scrap Prices, Page 108

**Pittsburgh** — Scrap is marking time, with prices generally unchanged but disclosing little strength. In occasional instances, however, sellers find difficulty in picking up desired tonnages at the current market. No. 1 steel holds at $16.50 to $17, with demand slow. Lists of the Pennsylvania and Baltimore & Ohio, closing this week, are expected to bring lower prices than a month ago.

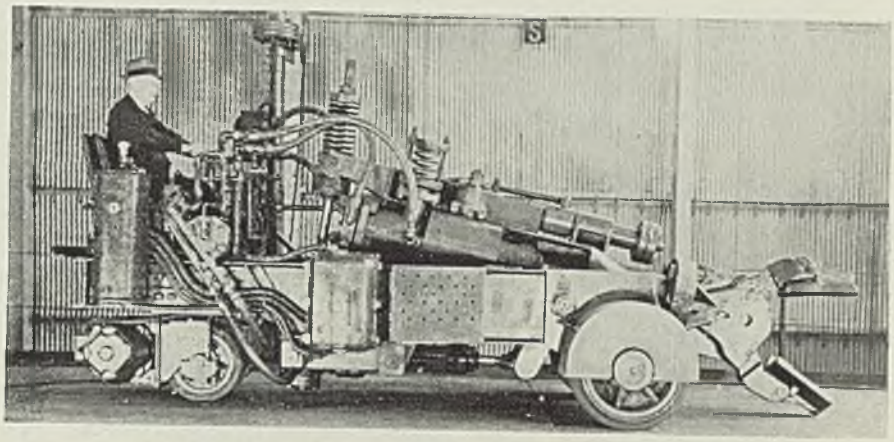
**Cleveland** — Small lots of miscellaneous scrap are moving but on heavier grades producers and dealers cannot agree on prices, which are nominally unchanged. Better weather is expected to stimulate trading.

**Chicago** — Market ended the week quietly, with No. 1 heavy melting steel at $15.00 to $15.50. Only active mill buyer was able to obtain material at $15.50 it was reported. Dealers ask in the neighborhood of $15.25 for No. 1 steel. Little material is moving. A number of prices have been adjusted downward in line with recent trading.

**Boston** — Domestic buying of iron and steel scrap is slack and prices have weakened further on some grades. Turnings are down 50 cents to $4.25 cars, while blast furnace scrap and skeleton in bundles are also lower. Prices for dock delivery, export, are unchanged but buying has subsided.

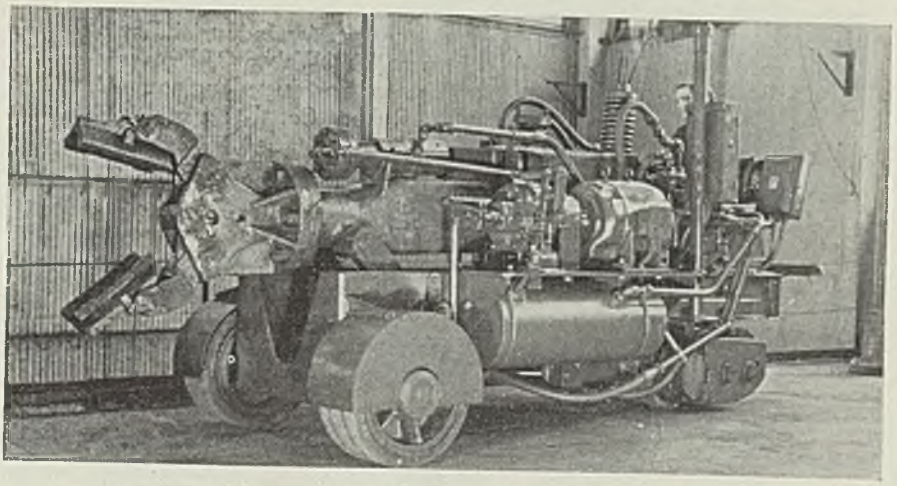
**New York** — Domestic buying of steelworks and foundry scrap continues slack and while most consumers are taking small shipments the volume of material being moved from this district is not large. In some instances scrap accumulated on barges has been shifted for shipment against domestic orders. Prices are unchanged for the most part, with mixed borings and turnings somewhat easier, as is heavy melting steel for domestic shipment. Due to uncertainty of available ship space brokers are not pressing for barge delivery and prices are unchanged.

**Philadelphia**—No. 1 heavy melting steel is down 50 cents on a sale of about 1000 tons at $16.50. No. 2

**AUTO FLOOR MANIPULATOR**

Here are two views of our latest 6000 lbs. capacity Auto Floor Manipulator designed to handle ingots or billets under hammer or press. Unrestricted by tracks or runways, its ability to turn on its own wheel base makes it invaluable when working in congested areas. It is fast, rugged and economical to maintain. This machine will help solve a tough handling problem. All motions are hydraulic except tractor motor and control.



**Edgar E. BROSIUS, Inc.**

*Designers and Manufacturers*

**PITTSBURGH SHARPSBURG BRANCH PA.**

*Brosius Equipment is covered by patents allowed and pending in the United States and Foreign Countries.*

# Behind the Scenes with STEEL

### Fever—104°

■ Spring is here, *tra-la, tra-la.* At least it was in no uncertain terms last Friday morning when we whistled our way down to work to peck this stuff out on the typewriter and dream wistfully of a new set of woods we saw the other day. By the time you read this, however, we may have the galoshes back out again and be mushing around in another four million feet of snow.

### Ode To The Lady Flu

■ This lovely winter we've enjoyed (gr-r-r) must have been the inspiration for this clever take-off of Robert W. Service's famous classic, in the March *Rex Reporter,* employe's house organ of the Chain Belt Co.

*A bunch of the germs were hitting it up*
*In the bronchial saloon;*
*Two bugs on the edge of the larynx*
*Were jazzing a rag-time tune.*
*Back in the teeth, in a solo game,*
*Sat dangerous Ack-Kershoo;*
*And watching his pulse was his light of love—*
*The lady that's known as Flu.*

### Welcome, Shorty!

■ On up front this week on page 59 we've got a fellow we'd like to have you meet. Hey, Shorty, wipe off that dirty mit of yours and shake hands with the folks. You'll like Shorty and what's more the guy knows what he's talking about.

### Two Stoppers

■ There have only been two of our alleged brain teasers that the class has completely and ignominiously flunked. One was H. G. Taylor's "how to find the exact center of a given straight line using nothing but a compass," and the other (to date) is last week's drunk and his row boat. Fred Chambers gives us a nice easy one this week which should put the batting average back up again. A farmer purchased 100 head of cattle for $100 at the following prices: Cows at $10.00 each; bulls at $3.00 each, and calves at 50 cents each. How many head of each did he buy?

### Moans & Groans

■ Those prices certainly give the right slant on the female end of the family. This spring weather today gives us a strange feeling that an awful crop of new outfits will very suddenly bring a mass raid on many a well-worn billfold. It was 16 degrees colder here in Cleveland on Easter than it was Xmas. But could that stem the tide? Heck no! Now they've cooked up a second Easter Sunday (Parade Day) for next week so you can't win.

### Next Week

■ Another dandy article is slated for next week—"Rubber Mountings for Industrial Equipment," by Walter C. Keys, mechanical products engineer, U. S. Rubber Co.

### Take A Bow

■ Top honors for one of the most descriptive heads we've seen on an ad in a long time goes to Bryant Chucking Grinder this week (p.43).—*Giving Production a Tail Wind!*

### And Another

■ And a swell example of the new *Tell All* advertising is on page 61—by Lincoln Electric.

SHRDLU



is also easier. Most grades are weak except heavy cast, which is still scarce and firm at $18.50. Export demand is not active. Specifications on the above sale are not rigid and the market may be more representative at $17, some brokers paying $16.50 against existing contracts.

**Buffalo**—Interest remains low but dealers refuse to accept lower bids of consumers despite the luli. Prices are mostly nominal. With additional tonnage contracted for at upper lake points, leading mill consumers have around 35,000 tons outstanding against orders. Additional small lots of cast scrap for export to Canada are reported within prevailing ranges.

**Detroit** — Signs are appearing of some bullishness in scrap buying and selling. Half a dozen automotive lists were up for bids last week and by next week a better indication will be had of whether the turn has been made. Meanwhile there appears no justification for changing prices.

**Cincinnati** — Prices of iron and steel scrap are unchanged in a dull market. Despite restricted consumer outlets, material in wanted grades is not readily obtainable as dealers look to early improvement in demand. Country collections are light, affected by recently lowered quotations and by adverse weather.

**St. Louis** — The scrap market in St. Louis is at a standstill. Mills are not buying because of previous heavy commitments and inventories in hand, and slow movement of finished products.

Dealers also are in the position of not buying for the present, as they have about cleaned up the short interest. Offerings from the country amount to comparatively little. Prices are unchanged.

**Seattle**—Export orders are small and infrequent and shippers find it almost impossible to obtain ocean space. Firm export quotations are lacking. Local stocks are fair. Seattle transportation commission is inviting bids for 1245 tons steel rails, 119 tons miscellaneous scrap and 31 tons copper wire, scrap and borings, salvage from the dismantled munipal street car system.

**Toronto, Ont.** — General conditions in the scrap market show little change. Dealers report scarcity of offerings, with northern Ontario supplies still frozen in, and little coming from holders in the local field. Steel scrap is in good demand with dealers filling orders from yard stocks. Cast scrap and stove plate are attracting special attention with inquiries for spot and future delivery, while dealers are closing or-

ders only for a couple of weeks ahead.

**San Francisco** — As far as can be ascertained no new orders for export material for shipment to Japan have been made during the past three months and inasmuch as there is no export market, prices on No. 1 and No. 2 heavy melting steel, f.a.s. Los Angeles and San Francisco, are being discontinued until movement again begins. No change in quotations is noted and No. 1 heavy melting steel, f.o.b. cars, metropolitan district of Los Angeles and San Francisco, holds at $11.50 to $12.00 a net ton, with No. 2 at $10.50 to $11.00 a net ton. Compressed sheets continue to be quoted at $9.00 to $9.50 a net ton with turnings and borings holding at $5.00 to $5.50 a net ton. A reduction in price of $1.00 a net ton, on the first three mentioned items, is looked for around the first of April.

## Warehouse

Warehouse Prices, Page 107

**Chicago** — Business continues fairly strong, with the last half of March showing improvement over first half, and the month as a whole generally surpassing February. Bars, sheets and strip steel are active, although all warehouse commodities are reported moving proportionately, with the possible exception of reinforcing bars and structural material.

**Philadelphia**—The number of orders holds steady but tonnage involved has declined slightly. Galvanized products are slow to reflect the usual spring upturn. Prices are fairly steady.

**Buffalo** — Distributors report March business was 10 to 15 per cent greater than February and 25 per cent or more above March, 1939. The upturn was attributed to miscellaneous buying, although some heavy lines dragged. Rumblings of price adjustments continue but no further changes have been made.

**Cincinnati**—Warehouse sales tend better, demand coming chiefly from industrial needs. Sheets are dull compared to fourth quarter activity as a reflection of mill delivery situation. New cutting schedules have been adopted, a general readjustment, discarding the charges based on poundage.

**St. Louis** — Warehouse business shows little sign of returning life, with small orders prevailing. Jobbers are beginning to face competition from mills on small orders. In one case a mill accepted an order for as little as 1800 pounds of structural shapes, which could have been


MARVEL

SAWS AND BLADES

Tomorrow's Blades TODAY!

Thousands of users—in fact, everyone who knows cutting steels and tools, recognizes that MARVEL High-Speed-Edge Hack Saw Blades are far-and-away the finest that can be made—that there is no equal steel—that only the patented composite MARVEL Blades can have this cutting edge and at the same time be *positively unbreakable*, in fact. Heavy duty, high speed, automatic production sawing machines have been made practical only because of MARVEL's high speed and unbreakable qualities. The cutting edge is of 18% Tungsten High Speed Steel, welded by a special process to a tough alloy back. Thus they are made positively unbreakable.

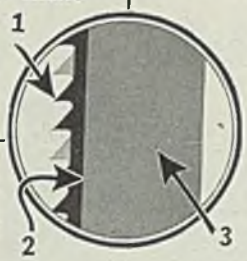
Increase the efficiency of your equipment—get higher running speeds and greater feed pressures, be assured of more cuts per dollar—turn to MARVEL High-Speed-Edge Hack Saw Blades!

*Buy from your local distributor*

1 *18% High Speed Tungsten Steel Cutting Edge.*

2 *Integrally Fused by electric weld.*

3 *Tough alloy back; positively unbreakable.*




ARMSTRONG-BLUM MFG. CO.

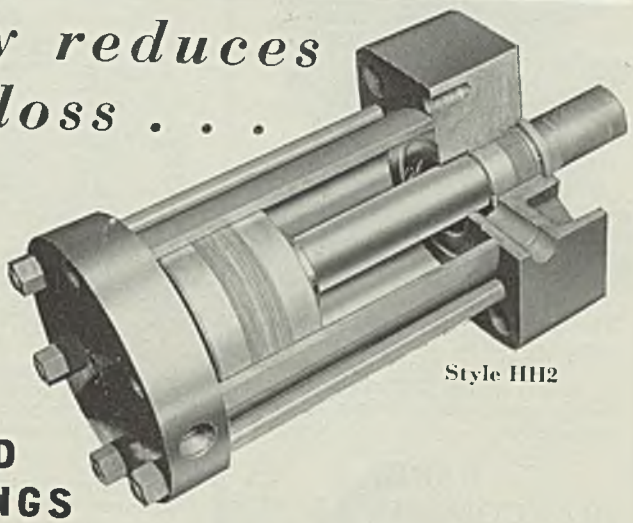
*"The Hack Saw People"*

5737 Bloomingdale Ave. Chicago, U. S. A.

*Eastern Sales Office:* 199 Lafayette St., New York



*Notably reduces power loss . . .*



Style HH2

T-J

HYDRAULIC CYLINDER PISTONS are SEALED with PACKINGS

On test these cylinders show a 95% average efficiency for pressures from 500 to 2000 pounds per square inch. This applies to "blank" end pressures, that is, the "push" stroke of the cylinder. "Rod" end pressure stroke efficiency is from two to three points lower (because of the added sealing friction of the piston rod packings), but only until the pressure reaches 1000 pounds per square inch where the 95% efficiency is attained.

Catalog H-37 reports on additional construction features, service characteristics and gives complete cylinder specifications. Your copy (which also includes important usable data on hydraulic installations) will be sent promptly. Address The Tomkins-Johnson Co., 611 N. Mechanic Street, Jackson, Michigan.

*this is a* TOMKINS-JOHNSON *product*

USE
MOORE RAPID
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FURNACES
for
MELTING
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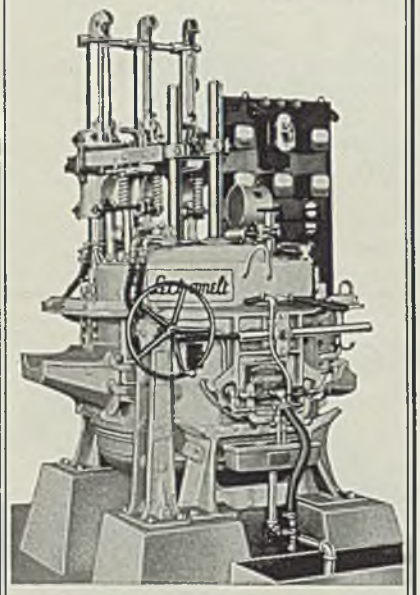
Alloy and Carbon Steels.
For Ingots and Castings.
Gray and Malleable Irons.
Copper, Nickel and Alloys.
Ferro-Alloys, Carbide.
Special Products.



The illustration shows a small capacity three phase direct arc LECTROMELT furnace. Furnaces as small as 500 lb. capacity are being used for pouring forging ingots.

RAPID
ECONOMICAL
RUGGED

BUILT IN STANDARD SIZES
25 LBS. TO 50 TONS CAPACITY

PITTSBURGH
LECTROMELT
FURNACE
CORP.

PITTSBURGH, PA.

filled from warehouse stocks. Wire products, such as fencing and nails, are moving better.

**Seattle**—Volume of warehouse sales is increasing appreciably as seasonal projects get under way. Sheets, bars, light plates and shapes are in best demand. Dealers find it difficult to obtain prompt deliveries from eastern manufacturers, due to scarcity of steamer space.

## Nonferrous Metals

**New York**——Continued lack of buying interest in nonferrous metal markets last week weakened the general price tone and resulted in lower prices for lead and tin. Consumption is holding fairly steady, however, as reflected in the moderate volume of shipments.

**Copper**—Selling pressure exerted by custom smelters lowered electrolytic copper prices to around 11.25c, Connecticut, on the outside market and to 11.25c, f.a.s. New York, on the export market. Mine producers remained virtually out of the market at 11.50c.

**Lead**—Following the initiative of American Smelting & Refining Co., leading sellers in the domestic lead market lowered quotations 10 points on Wednesday to the basis of 5.05c, New York, and 4.90c, East St. Louis. The reduction was made in an effort, which failed, to stimulate buying.

**Zinc**—In view of continued dull demand and weaknes in other metals, steadiness in zinc was outstanding. Prime western has held at 5.75c, East St. Louis, since Feb. 26, although during that period sales generally have been unusually light.

**Tin**—Straits spot prices fluctuated between 45.62½c, to 46.62½c in the domestic market with the daily changes reflecting the movements in London and Singapore. Offerings at 45.75c at the close failed to arouse buyers from their lethargy. . .**Aluminum**—Virgin aluminum ingot prices were reduced one cent on Monday to the basis of 19.00c, delivered, for ninety-nine per cent plus grade. This was the first price change since 1937.

## Ferroalloys

**Ferroalloy Prices, Page 106**

**New York** — With a turn in steelmaking operations anticipated shortly, ferroalloy sellers look for shipments next month to at least be comparable with those of March and February. They admit the pos-

## Nonferrous Metal Prices

| Mar. | Copper: Electro, del. Conn. | Copper: Lake, del. Midwest | Copper: Casting, refinery | Straits Tin, New York: Spot | Straits Tin, New York: Futures | Lead N. Y. | Lead East St. L. | Zinc St. L. | Aluminum 99% | Antimony Amer. Spot, N.Y. | Nickel Cathodes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 23 | 11.50 | 11.50 | 11.00 | 46.75 | 46.75 | 5.15 | 5.00 | 5.75 | 20.00 | 14.00 | 35.00 |
| 25 | 11.50 | 11.50 | 11.00 | 46.62½ | 46.62½ | 5.15 | 5.00 | 5.75 | 19.00 | 14.00 | 35.00 |
| 26 | 11.50 | 11.50 | 11.00 | 46.00 | 46.00 | 5.15 | 5.00 | 5.75 | 19.00 | 14.00 | 35.00 |
| 27 | 11.50 | 11.50 | 11.00 | 45.62½ | 45.50 | 5.05 | 4.90 | 5.75 | 19.00 | 14.00 | 35.00 |
| 28 | 11.50 | 11.50 | 11.00 | 45.75 | 45.75 | 5.05 | 4.90 | 5.75 | 19.00 | 14.00 | 35.00 |
| 29 | 11.50 | 11.50 | 11.00 | 45.75 | 45.62½ | 5.05 | 4.90 | 5.75 | 19.00 | 14.00 | 35.00 |

### MILL PRODUCTS

*F.o.b. mill base, cents per lb., except as specified. Copper brass products based on 11.50c Conn. copper*

**Sheets**

| | |
|---|---|
| Yellow brass (high) | 18.31 |
| Copper, hot rolled | 20.12 |
| Lead, cut to jobbers | 8.40 |
| Zinc, 100 lb. base | 11.00 |

**Tubes**

| | |
|---|---|
| High yellow brass | 21.06 |
| Seamless copper | 20.62 |

**Rods**

| | |
|---|---|
| High yellow brass | 14.26 |
| Copper, hot rolled | 16.62 |

**Anodes**

| | |
|---|---|
| Copper, untrimmed | 17.37 |

**Wire**

| | |
|---|---|
| Yellow brass (high) | 18.56 |

### OLD METALS

*Nom. Dealers' Buying Prices*

**No. 1 Composition Red Brass**

| | |
|---|---|
| New York | 7.00-7.25 |
| Cleveland | 8.00-8.25 |
| Chicago | 7.50-7.75 |
| St. Louis | 7.75-8.25 |

**Heavy Copper and Wire**

| | |
|---|---|
| New York, No. 1 | 8.75-9.00 |
| Cleveland, No. 1 | 9.00-9.25 |
| Chicago, No. 1 | 8.75-9.00 |
| St. Louis | 8.75-9.25 |

**Composition Brass Turnings**

| | |
|---|---|
| New York | 6.75-7.00 |

**Light Copper**

| | |
|---|---|
| New York | 6.75-7.00 |
| Cleveland | 7.00-7.25 |
| Chicago | 6.75-7.00 |
| St. Louis | 6.75-7.00 |

**Light Brass**

| | |
|---|---|
| Cleveland | 4.00-4.25 |
| Chicago | 4.25-4.50 |
| St. Louis | 4.50-4.75 |

**Lead**

| | |
|---|---|
| New York | 4.40-4.65 |
| Cleveland | 3.90-4.15 |
| Chicago | 4.15-4.40 |
| St. Louis | 4.00-4.25 |

**Zinc**

| | |
|---|---|
| New York | 3.00-3.25 |
| Cleveland | 2.75-3.00 |
| St. Louis | 3.25-3.50 |

**Aluminum**

| | |
|---|---|
| Mixed, cast, Cleveland | 8.50 |
| Borings, Cleveland | 6.50 |
| Clips, soft, Cleveland | 15.00 |
| Misc. cast, St. Louis | 8.75-9.00 |

### SECONDARY METALS

| | |
|---|---|
| Brass ingot, 85-5-5-5, less carloads | 11.75 |
| Standard No. 12 aluminum | 14.25-14.50 |

sibility of an actual increase, but declare it is a bit early for definite predictions to that effect.

Ferroalloy prices in general are steady, with ferromanganese holding at $100, duty paid, eastern seaboard, and spiegeleisen, 19 to 21 per cent, at $32, Palmerton, Pa., and 26 to 28 per cent, at $39.50.

## Steel in Europe

Foreign Steel Prices, Page 107

**London** (*By Cable*) — Iron and steel markets of Great Britain underwent no material change during the Easter vacation and production continues at full speed. A new steel rationing scheme goes into effect April 1, providing quarterly rationing for all classes of consumers, including the export trade, based on assessed requirements.

Belgium and Luxemburg report steelworks fully occupied on domestic and export orders. Rails and structurals are especially active.

## Steel Export Prices Move to Higher Level

Following weakness for some time steel export prices have strengthened perceptibly. Commercial steel bars, 2.10c; shapes, 2.20c; tank plates, 2.15c and ship plates, 2.25c for Scandinavian countries and 2.15c for South America; black sheets, 24-gage, 3.15c; galvanized sheets, 3.65c; hot strip, 2.30c; rerolling billets, $38; wire rods, $49. Strength is attributed to improved demand and to fact that prices had sunk to unprofitable levels.

## Brown & Sharpe Graduate Apprentices In Reunion

■ Apprentice graduates of the Brown & Sharpe Mfg. Co., Providence, R. I., numbering 425, from ten states and Canada, gathered for a reunion dinner at the Biltmore hotel in Providence, recently. Henry Buker, vice president and sales manager of Brown & Sharpe, and a '95 apprentice graduate, was toastmaster. Among the speakers was Clayton R. Burt, president, Pratt & Whitney division of Niles-Bement-Pond Co., Hartford, a graduate in 1896. He pointed out, "many graduates of Brown & Sharpe apprentice school are filling responsible positions in industry throughout the country."

Other prominent apprentice graduates at the reunion were: Frank H. Lord, retired, who completed his apprenticeship in 1882, and Charles



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*Corporation*
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R. Northrup. Syracuse, graduated in 1884.

The company has compiled a new list of Brown & Sharpe apprentice graduates in the form of a 48-page booklet.

Ajax Flexible Coupling Co., Westfield, N. Y., has completed erection of a new addition to its factory which will house the company's enlarged electric welding and assembly departments.


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## Machinery Exports at New High in February

■ Continuing at record level United States exports of industrial machinery rose to $28,995,673 in February, a new monthly high and a 40 per cent gain over February, 1939, valued at $20,752,939, according to figures by the machinery division, department of commerce. Most types of machinery participated in the increase, particularly metalworking, power-generating and textile.

Power-driven metalworking machinery was exported in February to the value of $13,691,528, a gain of 75 per cent over value of $7,832,893 in February. Five major export markets accounted for most of this total, France, Japan, Soviet Russia, Canada and the United Kingdom. The latter increased its purchases from $1,119,785 in February, 1939, to $5,382,935, the others making less spectacular gains. Power-generating equipment gained 106 per cent over February last year, $1,805,935 against $876,964. Construction and conveying machinery increased from $1,765,537 to $1,983,992.

## SWOC Repudiated in Pottstown, Pa., Election

■ Workers in the Pottstown, Pa., structural fabricating works of Bethlehem Steel Co. repudiated the Steelworkers Organizing Committee by a large majority in an election completed March 26.

Election was held to name representatives of the employes' representation plan for collective bargaining. Employes so voting thereby expressed the desire to be represented for collective bargaining under the plan.

Of the 1198 eligible voters, 1010, or 84.2 per cent, voted under the plan. Election followed an unsuccessful attempt by SWOC to close the plant March 13. Operations were hampered in some departments but the plant remained open. Strike of the minority group, comprising SWOC members, was precipitated when its president, James Yost, plant worker, was laid off a day and a half for infraction of safety rules. The striking workers returned after five days.

### SWOC DENIED EXCLUSIVE BARGAINING RIGHTS

Babcock & Wilcox Tube Co. workers at Beaver Falls, Pa., last week voted 1008 to 809 against exclusive bargaining rights for SWOC. The latter has had contract for own members and sought sole bargaining privileges.

## Farm Equipment Exports Resume Upward Trend

Recovering from the reduced level of January, exports of agricultural machinery in February totaled $4,496,638, a gain of 16 per cent over $3,870,648 in February, 1939, the machinery division, department of commerce reports. Tillage implements gained 34 per cent over last year, $691,912 against $516,586. Harvesting machinery exports at $309,603 were 25 per cent above the $246,879 total in February last year. Tractors, parts and accessories advanced 13 per cent.

## Fewer Consumers Roll Own Steel Today

A quarter-century ago about one out of every six rolling mills in the nation was operated by steel consumers who rolled for themselves all or part of their steel requirements, according to the American Iron and Steel institute. In 1916 there were 380 rolling mill plants, and of these 58 were operated by consumers of steel solely for their own use.

Today only 14 of the nation's 375 rolling mill plants are operated by steel consumers exclusively for the purpose of supplying some part of their steel requirements. The change reflects the increased capacity of the steel industry, the improvement in products and services and the generally declining price level in recent years.

A few other steel consumers operate rolling mills but sell in the open market a substantial part of the steel they produce.

Included in the list were railroads and railroad equipment makers, horseshoe manufacturers, hand tool makers, and producers of hardware, machinery, milk cans, cutlery and kitchen utensils.

Products of the concerns which now operate rolling mills solely for their own use include automobiles, tin cans, railroad equipment, hardware and furniture. Since few, if any, of the concerns supply all of their steel requirements, they are among the regular customers of the steel industry.

## Inland Files $36,000,000 Bond Refunding Issue

Registration statement covering $36,000,000 principal amount of first mortgage 3 per cent bonds, series F, due April 1, 1961, was recently filed by Inland Steel Co., Chicago, with the securities and exchange commission.

Net proceeds from the bonds' sale, together with treasury funds, will be used to redeem, at 105, $35,000,000 principal amount of outstanding 3¾ per cent series D bonds, requiring $36,750,000. Accrued interest on the series D bonds from Feb. 1, 1940, to redemption date will be paid from company's treasury funds.

Electrical vacuum cleaner sales rose to 144,373 units in February, a gain of 20.1 per cent over January and 28.5 per cent over February, 1939, according to C. G. Frantz, executive secretary of Vacuum Cleaners Manufacturers association. Sales for two months this year totaled 264,541 units, a gain of 23.1 per cent over same period in 1939.

## 1939 Electric Refrigerator Sales Total 1,819,641

Aggregate household electric refrigerator sales of 16 manufacturers in United States last year totaled 1,819,641. This was an increase of 628,014 or 53 per cent over 1,191,627 sold in 1938, according to reports of the National Electrical Manufacturers' association. Record sales for the industry were 2,203,335 refrigerators in 1937.

World sales last year were 1,980,195 units, compared to 1,358,956 in 1938.


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# Construction and Enterprise

### Ohio

CLEVELAND — Mueller Electric Co., 1577 East Thirty-first street, is preparing to erect a plant addition adjoining its present works.

CLEVELAND—Warner & Swasey Co., 5709 Carnegie avenue, will build addition of 30,000 square feet, increasing plant 15 per cent, to enlarge production of turret lathes. Addition includes three 1-story bays in rear of five-story building on Carnegie avenue plant. Charles J. Stilwell is president.

CLEVELAND—Cuyahoga county commissioners, George H. Stahler, clerk, plans extension of Bulkley boulevard freeway, requiring 13,500 feet steel piling, 50 tons structural steel, 150 tons reinforcing steel and other materials. Bids April 16.

CLEVELAND—Harshaw Chemical Co., 1945 East Ninety-seventh street, is taking bids on an addition to plant at 1000 Harvard avenue, one and two stories, brick and steel, 70 x 70 feet. Additional specialized equipment will be installed. William J. Harshaw is president.

CLEVELAND—H. & O. Builders' Products Co., 14107 Maplerow avenue, recently established, will start production at once of Strand overhead-type garage door. Ralph Orolim is president, M. Lachman secretary and Henry Hirsch treasurer.

ELYRIA, O.—Elyria Foundry Co., Filbert street, W. S. Golmar general manager, subsidiary of Industrial Brownhoist Co., Bay City, Mich., is having plans prepared by O. D. Conover, engineer, 1740 East Twelfth street, Cleveland. Tentative plans call for new building 60 x 100 feet and foundry addition 60 x 160 feet. Present pattern storage building probably will be torn down and materials used in new structures.

FOSTORIA, O.—Four principal railroads here co-operating in plan to relieve blocked street problem by an interlock system costing $250,000 to $300,000. Roads include New York Central Chesapeake & Ohio, Baltimore & Ohio and Nickel Plate.

LODI, O.—Alloy Fabrictors Inc., recently established here, is starting production of stainless steel counters and sinks for hospitals. C. E. Warnes is president.

MANSFIELD, O.—Nehi Co. of Georgia has leased building on West Third street and will install about $30,000 worth of equipment. Carl Goettinger, Atlanta, Ga., will move here as manager of north central Ohio territory.

MANSFIELD, O.—Hughes-Keenan Co., Newman street, has plans for reorganization after terminating receivership. C. H. Workman is attorney. Company builds hoists, cranes and heavy machinery.

PAINESVILLE, O.—Industrial Rayon Corp. has let contract to George A. Rutherford Co., 2725 Prospect avenue, Cleveland, for $4,000,000 extension of plant.

SPRINGFIELD, O.—City, W. E. Lucas, engineer, considers extension of Buck creek valley water supply, including construction of reservoirs and water purification plant.

WARREN, O. — Federal Machine & Welder Co., 212 Dana street, N.E., will build a factory addition costing $22,000. Warren Engineering Co., 402 Atlantic street N.W., has general contract.

WARREN, O.—Federal Machine & Welder Co. has let contract for a new engineering building with 8000 square feet floor space. Part will be used for engineering offices, remainder for research and metallurgical laboratories. Expected to be complete by May 15.

YOUNGSTOWN, O.—General Fireproofing Co., Dennick avenue, will expand its steel storage space about 45,000 square feet, on plans by Howard Burt, company's engineering department. Building will be brick, steel and sheet metal.

ZANESVILLE, O.—Shed-Ray Corp. has been incorporated with $25,000 capital, operating fund to be increased soon to $50,000. Will manufacture metal safety signs and other appliances, automatic signals. Production now under way at Cincinnati but headquarters and production to be moved here soon, other units to be added.

### New York

BUFFALO, N. Y.—Bethlehem Steel Co., Edward F. Entwisle, general manager Lackawanna works, Buffalo, will remodel bar mill facilities, erecting five buildings about 800 feet long, with 400,000 square feet floor space. Includes new 17-ton Hulett ore unloader and crane runway 800 feet long. Cost estimate is about $3,000,000.

DUNKIRK, N. Y.—Allegheny Ludlum Steel Corp., Brackenridge, Pa., and Dunkirk, will build an addition to its wire milling department here.

ELMIRA, N. Y.—Remington Rand Inc.,


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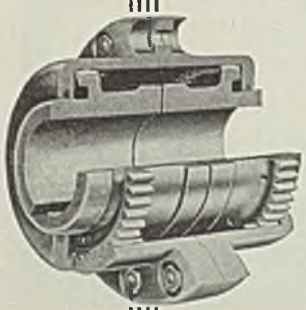

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Merchants Bank building, asks bids on a 1-story plant, 80 x 250 feet, and remodeling another building. Cost is estimated at $200,000 with equipment.

ITHACA, N. Y.—Ithaca Enterprises Inc., National Bank building, asks bids on a steel and concrete building 70 x 150 feet, to cost about $40,000 with equipment. C. C. Tallman, Seneca building, is architect.

SYRACUSE, N. Y.—Consolidated Can Co., West Grand avenue, Chicago, will build a 1-story steel and concrete plant addition, 125 x 200 feet, to cost about $40,000. W. Taylor, care owner, is engineer.

UTICA, N. Y.—Utica-Knitting Co., 1712 Erie street, is having plans prepared by Gibbs & Hill, Pennsylvania Station building, New York, for a power plant addition to cost about $50,000.

WELLSVILLE, N. Y.—Empire Gas & Fuel Co. Ltd., J. Bradley in charge, Wellsville, is drilling 4000 to 5000-foot wells and will require large tonnage of pipe, connecting pipe lines, booster stations and other equipment in Allegany county, to cost over $45,000.

YONKERS, N. Y.—City, R. J. Whitney, city manager, will install bin, crane and new burners at city incinerator.

### Pennsylvania

MARCUS HOOK, PA.—Sun Oil Co., 1608 Walnut street, Philadelphia, plans an additional refinery here, to cost about $4,300,000.

PHILADELPHIA — Election April 28 will include proposal for reconstruction of water supply system at cost of $18,000,000. Morris Knowles Inc., Westinghouse building, Pittsburgh, is engineer.

### Michigan

ALBION, MICH.—City plans construction of water-softening plant to cost $80,000 to $100,000.

DETROIT—Bundy Tubing Co., 10951 Hern avenue, has plans by Smith, Hinchman & Grylls, Marquette building, for a 1-story steel and concrete factory, boiler and powerhouse, to cost about $75,000.

DETROIT—Star Pattern & Tool Co., 227 Iron street, has been incorporated to deal in patterns and dies, with $10,000 capital, by Arthur Wooley, 3560 Pensington street.

DETROIT—Brooke Foundry Co., 5922 Epworth boulevard, has been incorporated to operate a foundry, with $5000 capital, by Elizabeth A. Brooks, 1217 Longfellow avenue.

GRAND RAPIDS, MICH. — Grand Rapids Die Casting Co., 120 Scribner avenue, N. W., has been incorporated to deal in machinery, with 50,000 shares no par value, by Lewis DeLeeuw, 1633 McDonald street, N. W.

### Illinois

CHICAGO—Herbert Corp., 3125 West Chicago avenue, has been organized to manufacture automatic phonographs. Herbert C. Johnson is manager. Company is a subsidiary of National Die Casting Co., Chicago, which will furnish die castings. Production is to start in early April.

CHICAGO—Highland Steel & Iron Co., 6254 South Ashland avenue, has been formed with 100 shares no par value by A. E. Foster and associates to deal in steel and iron products. George E. Weigel, 6254 South Ashland avenue, correspondent.

CHICAGO—Auto Clutch and Parts Service, 3125 West Fullerton avenue, will take bids on middle addition connecting two present buildings, one story, 25 x 35 feet, oil-fired hot water heating. Plans by L. F. Coleman, 6240 South Kimbark avenue, Chicago.

CHICAGO—Alert Foundry Inc., 2909 Indiana avenue, has been formed by Ben H. Adler and associates to establish foundry, patternshop and machine shop. Sonnenschein, Berkson, Lautmann, Levinsin and Morse, 77 West Washington street, correspondents.

EAST MOLINE, ILL. — International Harvester Co., Chicago, will build an addition to its plant for production of its new 4-foot combine and other implements.

VENICE, ILL.—Union Electric Co. of Illinois, care Union Electric Co. of Missouri, Twelfth and Locust streets, St. Louis, will take bids soon on an electric power generating plant, including two 40,000-kilowatt units, boilers, auxiliary equipment and accessories, to cost $8,000,000 to $10,000,000.

### Indiana

COLUMBUS, IND.—Cummins Engine Co. is building a research and testing laboratory with 10,600 square feet floor space, to cost about $200,000.

ELKHART, IND. — Elkhart Screen Products Inc. has been formed with 100 shares no par value to manufacture machine tools, by Harold Anderson, Hugh Havlish and C. Whitney Slabaugh.

### Missouri

KANSAS CITY, MO.—Butler Mfg. Co., Eastern avenue and Thirteenth street, manufacturer of steel tanks, has let



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contract to Swenson Construction Co., Victor building, for additional building, brick with steel trusses, 44 x 290 feet, with second story over 125 feet, for enlarged machine shop and shipping room.

ST. LOUIS—Emerson Electric Mfg. Co., after considering several other locations, has decided to remain in St. Louis and will build an additional plant on a site in the outskirts, as the first unit of an entire new plant in future.

WEST PLAINS, MO. — Ziegler Construction Co., American National Bank building, Nashville, Tenn., has been awarded contract for 297 miles transmission lines for Howell-Oregon electric co-operative. Midwestern Engineering & Construction Co., McBirney building, Tulsa, Okla., is consulting engineer.

### Wisconsin

KENOSHA, WIS. — Nash-Kelvinator Corp. is having plans prepared for a new machine shop in connection with its Kenosha plant.

MILWAUKEE—Square D Co. has let a contract to the Austin Co., Cleveland, for a plant and office building 238 x 430 feet.

WILSON, WIS.—Wisconsin Oil Refining Co. Inc., Sheboygan, Wis., asks bids on boilers, electric-driven oil pumps, steel tubing and high-pressure fittings for an oil refining plant.

### Minnesota

MINNEOTA, MINN.—Voters have authorized construction of municipal power plant for which survey has been made by G. M. Orr Co., 542 Baker Arcade building, Minneapolis. E. F. McMillin, is city clerk.

ROCHESTER, MINN.—Peoples Co-operative power association, H. C. Blumentritt, president, has assurance of REA allotment of $200,000 in July for 250 miles of transmission lines in five counties.

### California

DOWNEY, CALIF. — Aviation Mfg. Corp., 842 South Lakewood boulevard, will build an addition to its experimental building, to cost $36,000.

LOS ANGELES—Tool Engineering Co., 6601 South Main street, has been incorporated by George Hughes.

LOS ANGELES—Linde Air Products Co., 4771 Worth street, has permit for warehouse building 50 x 80 feet, costing $7800.

PASADENA, CALIF.—Cosmos Tool & Die Engineering Co., 707 South Raymond avenue, has been incorporated by Emil H. Schipper.

SAN DIEGO, CALIF. — Consolidated Gas & Electric Co. will build steam-electric generating plant costing $3,200,000 near foot of Ninth avenue as first unit in a project for three such plants.

### Washington

PUGET SOUND NAVY YARD, WASH. —Navy department will ask bids in May and June for $86,000 power and heating systems; ramps, roads and paving, $171,000 and gas and oil storage, magazines, gatehouse, etc., $75,000.

SEATTLE—City Light, the municipal light and power system, has $144,000 available for new work, $63,000 for two power substations, remainder for improving existing facilities.

SUMNER, WASH.—Fibreboard Inc. is building a 100 x 200-foot addition and installing additional equipment.

### Canada

VANCOUVER, B. C.—Boeing Aircraft of Canada Ltd., has bought additional site for addition to plant.

MONCTON, N. B.—Fundy Construction Co. Ltd., Isleville and Russell streets, Halifax, N. S., has been given contract for 14 buildings here for airport for war supply board, Ottawa, Ont.

HAMILTON, ONT.—Hydro Electric System of Hamilton, 12 King street East, will build outdoor substation of 50,000-kva capacity to cost $400,000, at Gage avenue and Burlington street. A. W. Bradt is general manager.

TORONTO, ONT.—Metal Stampings Ltd., 435 Fleet street West, has bought two acres at Danforth and Eastwood avenues, Scarborough Township, and will build a steel and brick industrial plant to cost about $100,000.

TORONTO, ONT.—Dominion Wheel & Foundries Ltd., 171 Eastern avenue, has plans and work will be started at once on $12,000 addition to its machine shop. James, Proctor & Redfern Ltd., 36 Toronto street, are engineers.

WINDSOR, ONT.—Ford Motor Co. of Canada Ltd. is pursuing expansion program to cost about $1,175,000. Includes remodeling of powerhouse, general contract to Hein Construction Co., 171 Aylmer street; physical laboratory; plant hospital; overhead conveyor system costing $60,000; machine shop and gas carburizing furnace.


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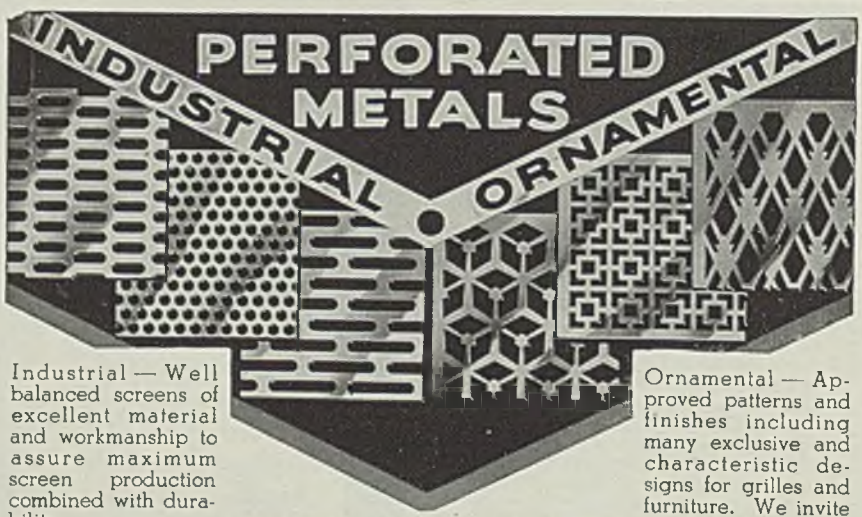


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Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

**BAR BENDERS**
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**BAR DRAWER AND STRAIGHTENING MACHINES**
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.

**BARGES (Steel)**
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Dravo Corp. (Engin'r'g Works Div.), Neville Island, Pittsburgh, Pa.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Maryland Dry Dock Co., Baltimore, Md.
Treadwell Construction Co., Midland, Pa.

**BARRELS (Steel)**
Petroleum Iron Works Co., Sharon, Pa.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

**BARS (Alloy)**
Ampco Metal, Inc., Dept. SI-29, 3830 W. Burnham St., Milwaukee, Wis.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Firth-Sterling Steel Co., McKeesport, Pa.
LaSalle Steel Co., Dept. 2A, P. O. Box 6800-A, Chicago, Ill.
Midvale Co., The Nicetown, Philadelphia, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Steel & Tube Co., Canton, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

**BARS (Brass, Bronze or Copper)**
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.

**BARS (Concrete Reinforcing)**
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., Youngstown, O.

**BARS (Iron)—See IRON (Bar)**

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**(*Also Stainless)**
*Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
*Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Weirton Steel Co., Weirton, W. Va.
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Youngstown Sheet & Tube Co., Youngstown, O.

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Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
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Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., Youngstown, O.

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Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
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Hyatt Bearings Division, General Motors Corp., Harrison, N. J.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

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Hyatt Bearings Div., General Motors Corp., Harrison, N. J.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
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Morgan Construction Co., Worcester, Mass.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

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Fafnir Bearing Co., New Britain, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
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Timken Roller Bearing Co., The, Canton, O.

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Firth-Sterling Steel Co., McKeesport, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Steel & Tube Co., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.
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Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Jones and Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
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Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
*Firth-Sterling Steel Co., McKeesport, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
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Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
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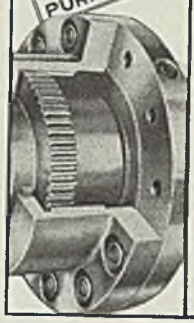

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**BUILDINGS (Steel)—See BRIDGES, BUILDINGS, ETC.**

**BULLDOZERS**
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
Beatty Machine & Mfg. Co., Hammond, Ind.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

**BURNERS (Acetylene)—See TORCHES AND BURNERS**

**BURNERS (Automatic)**
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Peabody Engineering Corp., 580 Fifth Ave., New York City.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

**BURNERS (Fuel, Oil, Gas, Combination)**
Babcock & Wilcox Co., The, 19 Rector St., New York City.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Peabody Engineering Corp., 580 Fifth Ave., New York City.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Stewart Furnace Div., Chicago Flexible Shaft Co., 1106 So. Central Ave., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

**BUSHINGS (Bronze)**
Ampco Metal, Inc., Dept. SI-29, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 28th and Smallman Sts., Pittsburgh, Pa.
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
Shenango-Penn Mold Co., Dover, O.
Shoop Bronze Co., The, 344-60 W. 6th Ave., Tarentum, Pa.

**BUSHINGS (Jig)**
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit, Mich.

**BUSHINGS (Oilless)**
Rhoades, R. W., Metaline Co., 50 Third St., Long Island City, N. Y.

**BY-PRODUCT PLANTS**
Koppers Co., Engineering and Construction Div., 100 Koppers Bldg., Pittsburgh, Pa.

**CAISSONS (Pneumatic)**
Dravo Corp., (Contracting Div.), Neville Island, Pittsburgh, Pa.

**CALCIUM METAL AND ALLOYS**
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

**CAP SCREWS—See SCREWS (Cap, Set, Safety-Set)**

**CAR DUMPERS**
Industrial Brownhoist Corp., Bay City, Mich.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

**CAR PULLERS and SPOTTERS**
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Link-Belt Co., 2410 W. 18th St., Chicago, Ill.

**CARBIDE**
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
National Carbide Corp., 60 E. 42nd St., New York City.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago, Ill.
Shawinigan Products Corp., Empire State Bldg., New York City.

**CARBURIZERS**
Houghton, E. F., & Co., 240 W. Somerset St., Philadelphia, Pa.

**CARS (Charging)**
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.

**CARS (Cinder Pot)**
Pressed Steel Car Co., (Koppel Div.) Grant Bldg., Pittsburgh, Pa.

**CARS (Dump)**
Pressed Steel Car Co., (Koppel Div.) Grant Bldg., Pittsburgh, Pa.

**CARS (Industrial and Mining)**
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Petroleum Iron Works Co., Sharon, Pa.
Pressed Steel Car Co., (Koppel Div.) Grant Bldg., Pittsburgh, Pa.

**CARS (Scale)**
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

**CASTING WASHER EQUIPMENT**
Pangborn Corp., Hagerstown, Md.,

**CASTINGS (Acid Resisting)**
American Brake Shoe & Fdry. Co., 230 Park Ave., New York City.
Ampco Metal, Inc., Dept. SI-29, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 28th and Smallman Sts., Pittsburgh, Pa.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
International Nickel Co., Inc., The, 67 Wall St., New York City.
National Alloy Steel Co., Blawnox, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.

**CASTINGS (Alloy Steel)**
Babcock & Wilcox Co., The, 19 Rector St., New York City.
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Damascus Steel Casting Co., New Brighton, Pa.
Detroit Alloy Steel Co., Foot of Iron St., Detroit, Mich.
National-Erie Corp., Erie, Pa.
Ohio Steel Fdry. Co., Lima, O.
Pittsburgh Rolls Corp., 41st and Willow Sts., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Union Steel Casting Co., 62nd and Butler Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

**CASTINGS (Brass, Bronze, Copper, Aluminum)**
Ampco Metal, Inc., Dept. SI-29, 3830 W. Burnham St., Milwaukee, Wis.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Bronze Die Casting Co., Franklin St. at Ohio River, Pittsburgh, Pa.
Cadman, A. W., Mfg. Co., 28th and Smallman Sts., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.
Shoop Bronze Co., The, 344-60 W. 6th Ave., Tarentum, Pa.

**CASTINGS (Controlled Grain Structure)**
Sorbo Mat Process Co., 1004 Market St., St. Louis, Mo.

**CASTINGS (Die)—See DIE CASTINGS**

**CASTINGS (Electric Steel)**
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Damascus Steel Casting Co., New Brighton, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
National-Erie Corp., Erie, Pa.
Otis Steel Co., The, Cleveland, O.
Reading Steel Casting Div. of American Chain & Cable Co. Inc., Reading, Pa.
West Steel Casting Co., 805 E. 70th St., Cleveland, O.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

**CASTINGS (Gray Iron, Alloy, or Semi-Steel)**
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Columbia Steel Co., San Francisco, Calif.
Detroit Gray Iron Foundry Co., Foot of Iron St., Detroit, Mich.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Oil Well Supply Co., Dallas, Texas.
Shenango Penn Mold Co., Dover, O.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

**CASTINGS (Heat Resisting)**
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
National Alloy Steel Co., Blawnox, Pa.
Shenango Penn Mold Co., Dover, O.

**CASTINGS (Malleable)**
American Chain & Cable Co. Inc., Bridgeport, Conn.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Erie Malleable Iron Co., W. 12th & Cherry Sts., Erie, Pa.
Lake City Malleable Co., 5026 Lakeside Ave., Cleveland, O.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

**CASTINGS (Manganese Steel)**
Damascus Steel Casting Co., New Brighton, Pa.

**CASTINGS (Steel)**
**(*Also Stainless)**
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Damascus Steel Casting Co., New Brighton, Pa.

# WHERE-TO-BUY

**CASTINGS (Steel)—Con.**
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
•Midvale Co., The, Nicetown, Philadelphia, Pa.
National-Erie Corp., Erie, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O.
Oil Well Supply Co., Dallas, Texas.
Otis Steel Co., The, Cleveland, O.
Pittsburgh Rolls Corp., 41st and Willow Sts., Pittsburgh, Pa.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.
Steel Founders' Society of America, 920 Midland Bldg., Cleveland, O.
Strong Steel Fdry Co., Hertel & Norris Ave., Buffalo, N. Y.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Union Steel Casting Co., 62nd and Butler Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
West Steel Casting Co., 805 E. 70th St., Cleveland, O.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

**CASTINGS (Wear Resisting)**
American Brake Shoe & Fdry. Co., 230 Park Ave., New York City.
Shenango Penn Mold Co., Dover, O.

**CASTINGS (Worm and Gear Bronze)**
Ampco Metal, Inc., Dept. Sl-29, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 28th and Smallman Sts., Pittsburgh, Pa.

**CEMENT (Acid Proof)**
Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia, Pa.

**CEMENT (High Temperature)**
Carborundum Co., The, Perth Amboy, N. J.
Norton Company, Worcester, Mass.

**CEMENT (Refractory, High Temperature)**
Johns-Manville Corp., 22 E. 40th St., New York City.

**CENTRAL STATION EQUIPMENT**
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

**CHAIN (Conveyor and Elevator)**
Baldwin Duckworth Div., 326 Plainfield St., Springfield, Mass.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.

**CHAIN (Draw Bench)**
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

**CHAIN (Malleable)**
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Lake City Malleable Co., 5026 Lakeside Ave., Cleveland, O.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

**CHAIN (Pickling)**
Bronze Die Casting Co., Franklin St. at Ohio River, Pittsburgh, Pa.

**CHAIN (Roller)**
Baldwin Duckworth Div., 326 Plainfield St., Springfield, Mass.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.

**CHAIN (Sling)**
American Chain & Cable Co. Inc., Bridgeport, Conn.

**CHAIN (Sprocket)**
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

**CHAIN (Steel-Finished Roller)**
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.

**CHAIN (Welded or Weldless)**
American Chain & Cable Co. Inc., Bridgeport, Conn.

**CHAIRS (Steel)**
Harter Corp., The, Sturgis, Mich.

**CHARGING MACHINES (Cupola)**
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.

**CHARGING MACHINES (Open Hearth)**
Morgan Engineering Co., The, Alliance, O.

**CHARGING MACHINES AND MANIPULATORS (Autofloor Type)**
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

**CHECKER BRICK**
Loftus Engineering Corp., 509 Oliver Bldg., Pittsburgh, Pa.

**CHECKS (Metal)**
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.

**CHROME ORE**
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

**CHROMIUM METAL AND ALLOYS**
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

**CHROMIUM PLATING PROCESS**
United Chromium, Inc., 51 E. 42nd St., New York City.

**CHUCKING MACHINES (Multiple Spindle)**
National Acme Co., The, E. 131st St. & Colt Rd., Cleveland, O.

**CHUCKS (Automatic Closing)**
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.

**CLAMPS (Drop Forged)**
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

**CLEANER (Floor-Oil Absorbent)**
Sta-Brite Mfg. Co., 3914 So. Wabash Ave., Chicago, Ill.

**CLEANING SPECIALTIES**
American Chemical Paint Co., Box 310, Ambler, Pa.
Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia, Pa.
Sta-Brite Mfg. Co., 3914 So. Wabash Ave., Chicago, Ill.

**CLIPS (Packaging)**
Consumer's Steel Products, 6454 E. McNichols Rd., Detroit, Mich.

**CLUTCHES (Friction)**
Jones, W. A., Fdry. & Mach. Co., 4437 W. Roosevelt Rd., Chicago, Ill.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Twin Disc Clutch Co., 1379 Racine Ave., Racine, Wis.

**CLUTCHES (Friction, Overrunning Single Revolution)**
Hilliard Corp., The, 111 W. 4th St., Elmira, N. Y.

**CLUTCHES (Magnetic)**
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Dings Magnetic Separator Co., 663 Smith St., Milwaukee, Wis.

**COAL OR COKE**
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Koppers Co., Gas & Coke Div., Pittsburgh, Pa.
Koppers Coal Co., 100 Koppers Bldg., Pittsburgh, Pa.
New England Coal & Coke Co., Boston, Mass.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., Youngstown, O.

**COAL, COKE, ORE AND ASH HANDLING MACHINERY**
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Koppers Co., Engineering & Construction Div., 100 Koppers Bldg., Pittsburgh, Pa.
Koppers-Rheolaveur Co., 100 Koppers Bldg., Pittsburgh, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.


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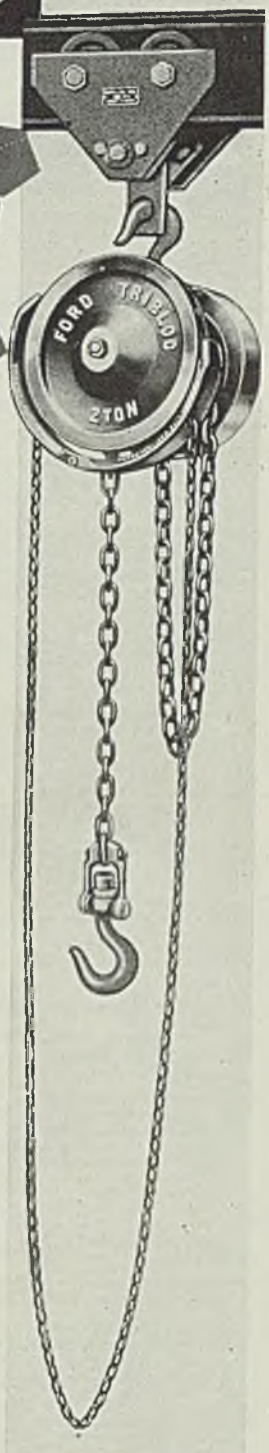


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Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.

**COKE OVENS (By-Product)**
Koppers Co., Engineering and Construction Div., 100 Koppers Bldg., Pittsburgh, Pa.

**COLUMBIUM**
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

**COMBUSTION BULBS**
Norton Company, Worcester, Mass.

**COMBUSTION CONTROLS**
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.
Morgan Construction Co., Worcester, Mass.
Norton Company, Worcester, Mass.

**COMMUNICATIONS SYSTEMS**
Graybar Electric Co., 420 Lexington Ave., New York City.

**COMPARATORS (Optical)**
Jones & Lamson Machine Co., Springfield, Vt.

**COMPENSATORS (Automatic)**
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.

**COMPRESSORS (Air)**
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
General Electric Co., Schenectady, N. Y.
Ingersoll-Rand Co., 11 Broadway, New York City.
Worthington Pump & Machinery Corp., Harrison, N. J.

**CONCRETE REINFORCING BARS —See BARS (Concrete Reinforcing)**

**CONDENSERS (Surface, Barometric, Multi-Jet)**
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Ingersoll-Rand Co., 11 Broadway, New York City.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
Worthington Pump & Machinery Corp., Harrison, N. J.

**CONDUITS (Electric)**
Youngstown Sheet & Tube Co., Youngstown, O.

**CONDUITS (Pressure-Treated Wood)**
Wood Preserving Corp., The, 100 Koppers Bldg., Pittsburgh, Pa.

**CONNECTING RODS**
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466 Pittsburgh, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.

**CONTRACTORS—See ENGINEERS AND CONTRACTORS**

**CONTROL SYSTEMS (Automatic)**
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

**CONTROLLERS (Combustion)—See COMBUSTION CONTROLS**

**CONTROLLERS (Electric)**
Allen-Bradley Co., 1320 So. Second St., Milwaukee, Wis.
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City.

**CONTROLS (Temperature)**
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

**CONVEYOR BELTS (High and Low Temperature)**
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

**CONVEYOR BELTS (Wire)**
Cyclone Fence Co., Waukegan, Ill.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

**CONVEYORS (Apron)**
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Mathews Conveyer Co., 114 Tenth St., Ellwood City, Pa.

**CONVEYORS (Chain)**
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Mathews Conveyer Co., 114 Tenth St., Ellwood City, Pa.

**CONVEYORS (Elevating)**
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Mathews Conveyer Co., 114 Tenth St., Ellwood City, Pa.

**CONVEYORS (Overhead Trolley)**
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.

**CONVEYORS (Roller—Power and Gravity)**
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Mathews Conveyer Co., 114 Tenth St., Ellwood City, Pa.

**CONVEYORS (Vibratory)**
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

**COPPER (Phosphorized)**
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.

**COPPERING COMPOUND**
American Chemical Paint Co., Box 310, Ambler, Pa.

**CORRESPONDENCE COURSES**
International Correspondence Schools, Box 9373, Scranton, Pa.

**COTTER PINS**
Hindley Mfg. Co., Valley Falls, R. I.
Hubbard, M. D., Spring Co., 409 Central Ave., Pontiac, Mich.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.

**COUNTERBORES**
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit, Mich.

**COUPLERS**
Hunt, C. B., & Son, Salem, O.

**COUPLINGS (Flexible)**
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
Baldwin-Duckworth Div., 326 Plainfield St., Springfield, Mass.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Foote Bros. Gear & Machine Corp., 5311 S. Western Blvd., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Hilliard Corp., The, 111 W. 4th St., Elmira, N. Y.
Horsburgh & Scott Co., The 5112 Hamilton Ave., Cleveland, O.

**COUPLINGS (Flexible)—Con.**
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
Lovejoy Flexible Coupling Co., 4973 W. Lake St., Chicago, Ill.
Poole Fdy. & Mach. Co. Woodberry St., Baltimore, Md.
Waldron, John, Corp., New Brunswick, N. J.

**COUPLINGS (Pipe)**
Bethlehem Steel Co., Bethlehem, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Oil Well Supply Co., Dallas, Texas
Republic Steel Corp., Dept ST, Cleveland, O.
Youngstown Sheet & Tube Co., Youngstown, O.

**CRANES, BRIDGE (Ore and Coal Handling)**
Dravo Corp. (Engin'r'g Works Div.), Neville Island, Pittsburgh, Pa.
Industrial Brownhoist Corp., Bay City, Mich.

**CRANES (Charging)**
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

**CRANES (Crecner, Erection)**
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Ohio Locomotive Crane Co., Bucyrus, O.

**CRANES (Electric)**
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

**CRANES (Gantry)**
Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Ohio Locomotive Crane Co., Bucyrus, O.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

**CRANES (Gasoline and Diesel)**
Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Ohio Locomotive Crane Co., Bucyrus, O.

**CRANES (Hand)**
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
Industrial Brownhoist Corp., Bay City, Mich.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

**CRANES (Jib)**
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Wright Mfg. Div. of American Chain & Cable Co. Inc., York, Pa.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

**CRANES (Locomotive)**
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Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Ohio Locomotive Crane Co., Bucyrus, O.

**CRANES (Monorail)**
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Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

**CRANES (Traveling)**
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Bethlehem Steel Co., Bethlehem, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Union Drawn Steel Co., Massillon, O.

**CRUSHERS**
American Pulverizer Co., 1539 Macklind Ave., St. Louis, Mo.

**CUSHIONS (Pneumatic)**
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

**CUTTERS (Die Sinking & End Milling)**
Barber Colman Co., 150 Loomis St., Rockford, Ill.
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.

**CUTTERS (Gang Slitter)**
Cowles Tool Co., 2086 W. 110th St., Cleveland, O.

**CUTTING AND WELDING—See WELDING**

**CUTTING OILS—See OILS (Cutting)**

**CYLINDERS (Air or Hydraulic)**
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.

**CYLINDERS (Pressure)**
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

**DEGREASERS**
Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia, Pa.

**DEOXIDIZERS**
Vanadium Corp. of America, 420 Lexington Ave., New York City.

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Ampco Metal, Inc., Dept. SI-29, 3830 W. Burnham St., Milwaukee, Wis.
Heppenstall Co., 47th and Hatfield Sts., Pittsburgh, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.,
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.

**DIE CASTINGS**
Bronze Die Casting Co., Franklin St. at Ohio River, Pittsburgh, Pa.

**DIE HEADS**
Jones & Lamson Machine Co., Springfield, Vt.

# WHERE-TO-BUY

Landis Machine Co., Inc., Waynesboro, Pa.
National Acme Co., The, E. 131st St. & Colt Rd., Cleveland, O.

**DIE-SINKING MACHINES**
Cincinnati Milling Machine Co., Oakley Sta., Cincinnati, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.

**DIES (Cast)**
Detroit Alloy Steel Co., Foot of Iron St., Detroit, Mich.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.

**DIES (Punching, Stamping, Blanking)**
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Niagara Machine & Tool Works, 637 Northland Ave., Buffalo, N. Y.
Van Syoc, G. W., 5-220 General Motors Bldg., Detroit, Mich.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

**DIES (Steel, Embossing)**
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.

**DOLOMITE—FLUX AND REFRACTORIES**

Basic Dolomite, Inc., Hanna Bldg., Cleveland, O.

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Kinnear Mfg. Co., 1780-1800 Fields Ave., Columbus, O.

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**DRAFTING ROOM EQUIPMENT**
Pease, C. F., Co., The, 2601 W. Irving Park Blvd., Chicago, Ill.

**DRILL HEADS (Multiple)**
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**DRILL RODS—See RODS (Drill)**

**DRILLING MACHINES (Radial)**
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**DRILLS (Portable—Pneumatic)**
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**DRILLS (Twist)—See TWIST DRILLS**

**DRIVES (Chain)**
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Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

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Foote Bros. Gear & Machine Corp., 5311 S. Western Blvd., Chicago, Ill.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
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United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

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**DRIVES (Reciprocating)**
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**DRUMS (Steel)**

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Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

**DRYERS (Compressed Air)**
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Peabody Engineering Corp., 580 Fifth Ave., New York City.
Research Corp., 405 Lexington Ave., New York City.
Ruemelin Mfg. Co., 3882 N. Palmer St., Milwaukee, Wis.
Western Precipitation Corp., 1016 W. 9th St., Los Angeles, Calif.

**ECONOMIC SERVICE**
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**ECONOMIZERS**
Babcock & Wilcox Co., The, 19 Rector St., New York City.

**ELECTRIC WELDING—See WELDING**

**ELECTRIC WIRING—See WIRE AND CABLE**

**ELECTRICAL EQUIPMENT**
Allen-Bradley Co., 1320 So. Second St., Milwaukee, Wis.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.

**ELEVATING AND CONVEYING MACHINERY—See CONVEYORS**

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Brassert, H. A., & Co., 310 S. Michigan Ave., Chicago, Ill.
McKee, Arthur G., & Co., 2422 Euclid Ave., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

**ENGINEERS (Consulting)**
Brassert, H. A., & Co., 310 So. Michigan Ave., Chicago, Ill.
Koppers Co., Engineering and Construction Div., 100 Koppers Bldg., Pittsburgh, Pa.
Lindemuth, Lewis B., 134 E. 47th St., New York City.
Loftus Engineering Corp., 509 Oliver Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2422 Euclid Ave., Cleveland, O.
Wean Engineering Co., Warren, O.

**ENGINES (Diesel)**
Cooper-Bessemer Corp., Mt. Vernon, O.

**ENGINES (Gas, Oil)**
Fairbanks, Morse & Co., Dept. 96, 600 So. Michigan Ave., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York City.
Worthington Pump & Machinery Corp., Harrison, N. J.

**ENGINES (Steam)**
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**FANS (Crane Cab)**
Trufio Fan Co., Harmony, Pa.

**FANS (Exhaust Ventilating)**
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Sturtevant, B. F., Co. Hyde Park, Boston, Mass.
Trufio Fan Co., Harmony, Pa.

**FANS (Portable)**
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Perkins, B. F., & Son, Inc., Holyoke, Mass.
Trufio Fan Co., Harmony, Pa.

**FANS (Temperature)**
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Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

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International Nickel Co., Inc., The, 67 Wall St., New York City.
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Vanadium Corp. of America, 420 Lexington Ave., New York City.

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Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
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**FIRE DOORS & SHUTTERS—See DOORS & SHUTTERS**

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**FLAME HARDENING**
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Linde Air Products Co., 30 E. 42nd St., New York City.
National-Erie Corp., Erie, Pa.

**FLANGES (Welded Steel)**
King Fifth Wheel Co., 5027 Beaumont Ave., Philadelphia, Pa.

**FLOORING (Monolithic)**
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.
Johns-Manville Corp., 22 E. 40th St., New York City.

**FLOORING (Steel)**
Alan Wood Steel Co., Conshohocken, Pa.
Blaw-Knox Co., Blawnox, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc. 16th & Rockwell Sts., Chicago, Ill.
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

**FLUE DUST CONDITIONERS**
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.
Research Corp., 405 Lexington Ave., New York City.
Western Precipitation Corp., 1016 W. 9th St., Los Angeles, Calif.

**FLUE GAS ANALYZERS**
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

**FLUORSPAR**
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

**FLUXES (Soldering, Welding & Tinning)**
American Chemical Paint Co., Box 310, Ambler, Pa.

**FORGING BILLETS—See BILLETS**

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Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.

**FORGING ROLLS**
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.

**FORGINGS (Brass, Bronze, Copper)**
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Ampco Metal, Inc., Dept. SI-29, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.
Revere Copper & Brass Co., 230 Park Ave., New York City.

**FORGINGS (Drop) (*Also Stainless)**
*Atlas Drop Forge Co., Lansing, Mich.
*Bethlehem Steel Co., Bethlehem, Pa.
Oil Well Supply Co., Dallas, Texas.
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

**FORGINGS (Hollow Bored)**
Atlas Drop Forge Co., Lansing, Mich.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.

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Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
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**FURNACE INSULATION—See INSULATION**

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**FURNACES (Electric Heating)**
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Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
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Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
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Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

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**GAGES**
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**GALVANIZING (Hot Dip)—Con.**

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American Tinning & Galvanizing Co., Erie, Pa.
Buffalo Galvanizing & Tinning Works, Inc., Buffalo, N. Y.
Cattie, Jos. P., & Bros., Gaul and Liberty Sts., Philadelphia, Pa.
Chain Products Co., The, Cleveland, O.
Diamond Expansion Bolt Co., Inc., Garwood, N. J.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Gregory, Thomas, Galvanizing Works, Maspeth, N. Y.
Hanlon-Gregory Galvanizing Co., 5515 Butler St., Pittsburgh, Pa.
Joslyn Mfg. & Supply Co., Chicago, Ill.
Koven, L. O., & Bro., Inc., Jersey City, N. J.
Lehigh Structural Steel Co., Allentown, Pa.
Missouri Rolling Mill Corp., St. Louis, Mo.
National Telephone Supply Co., The, Cleveland, O.
Penn Galvanizing Co., Philadelphia, Pa.
Riverside Foundry & Galvanizing Co., Kalamazoo, Mich.
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Western Precipitation Corp., 1016 W. 9th St., Los Angeles, Calif.

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Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Brassert, H. A., & Co., 310 So. Michigan Ave., Chicago, Ill.
Peabody Engineering Corp., 580 Fifth Ave., New York City.
Research Corp., 405 Lexington Ave., New York City.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
Western Precipitation Corp., 1016 W. 9th St., Los Angeles, Calif.

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Johns-Manville Corp., 22 E. 40th St., New York City

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Peabody Engineering Corp., 580 Fifth Ave., New York City.

**GAUGES (Indicating and Recording)**

General Electric Co., Schenectady, N. Y.

**GEAR BLANKS**

Ampco Metal, Inc., Dept. SI-29, 3830 W. Burnham St., Milwaukee, Wis.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Foote Bros. Gear & Machine Corp., 5311 S. Western Blvd., Chicago, Ill.
King Fifth Wheel Co., 5027 Beaumont Ave., Philadelphia, Pa.
National-Erie Corp., Erie Pa.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.
Waldron, John, Corp., New Brunswick, N. J.

**GEAR MACHINERY (Generating)**

Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.

**GEARS (Non-Metallic)**

Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.

**GEARS (Steel Laminated)**

Waldron, John, Corp., New Brunswick, N. J.

**GEARS (Worm)**

Cleveland Worm & Gear Co., 3280 E. 80th St., Cleveland, O.
Foote Bros. Gear & Machine Corp., 5311 S. Western Blvd., Chicago, Ill.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

**GEARS AND GEAR CUTTING**

Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Foote Bros. Gear & Machine Corp., 5311 S. Western Blvd., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Grant Gear Works, 2nd and B Sts., Boston, Mass.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Jones, W. A., Fdry. & Mach. Co., 4437 W. Roosevelt Rd., Chicago, Ill.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
National-Erie Corp., Erie, Pa.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., 25th St., Pittsburgh, Pa.
United Engineering & Fdry Co., First National Bank Bldg., Pittsburgh, Pa.

**GENERATING SETS**

Fairbanks, Morse & Co., Dept. 96, 600 So. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Reliance Electric & Eng. Co., 1081 Ivanhoe Rd., Cleveland, O.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

**GENERATORS (Acetylene—Portable and Stationary)**

Linde Air Products Co., The, 30 E. 42nd St., New York City.

**GENERATORS (Electric)**

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Chicago Electric Co., 1332 W. 22nd St., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-15.
Reliance Electric & Eng. Co., 1081 Ivanhoe Rd., Cleveland, O.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

**GOGGLES (Cleanser)**

Lenco Laboratories, Inc., The, 623 Bondi Bldg., Galesburg, Ill.

**GRABS — FOR SHEETS, COILS, INGOTS**

J-B Engineering Sales Co., 1743 Orange St., New Haven, Conn.

**GRATING**

Blaw-Knox Co., Blawnox, Pa.
Bravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

**GREASE (Lubricating)—See LUBRICANTS (Industrial)**

**GREASE RETAINERS AND SEALS**

Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.

**GRINDERS (Pedestal, High Speed)**

Sawyer Electrical Mfg. Co., 5715 Leneve St., Los Angeles, Cal.

**GRINDERS (Portable—Pneumatic)**

Ingersoll-Rand Co., 11 Broadway, New York City.

**GRINDERS (Precision Thread)**

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit, Mich.
Jones & Lamson Machine Co., Springfield, Vt.

**GRINDERS (Single Slide Internal)**

Bryant Chucking Grinder Co., Springfield, Vt.

**GRINDERS (Surface)**

Heald Machine Co., Worcester, Mass.
Norton Company, Worcester, Mass.

**GRINDING COMPOUNDS**

Houghton, E. F., & Co., 240 W. Somerset St., Philadelphia, Pa.
Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.

**GRINDING MACHINES (Automotive Reconditioning)**

Heald Machine Co., Worcester, Mass.
Landis Tool Company, Waynesboro, Pa.

**GRINDING MACHINES (Centerless, Internal and External)**

Cincinnati Milling Machine Co., Oakley Sta., Cincinnati, O.
Heald Machine Co., Worcester, Mass.

**GRINDING MACHINES (Chucking)**

Cincinnati Milling Machine Co., Oakley Sta., Cincinnati, O.
Heald Machine Co., Worcester, Mass.
Landis Tool Company, Waynesboro, Pa.

**GRINDING MACHINES (Crank Pin, Cam, Piston, Valve Face)**

Cincinnati Milling Machine Co., Oakley Sta., Cincinnati, O.
Landis Tool Company, Waynesboro, Pa.
Norton Company, Worcester, Mass.

**GRINDING MACHINES (Oscillating)**

Cincinnati Milling Machine Co., Oakley Sta., Cincinnati, O.
Landis Tool Company, Waynesboro, Pa.

**GRINDING MACHINES (Plain and Universal)**

Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine Co., Oakley Sta., Cincinnati, O.
Landis Tool Company, Waynesboro, Pa.
Norton Co., Worcester, Mass.

**GRINDING MACHINES (Roll)**

Cincinnati Milling Machine Co., Oakley Sta., Cincinnati, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Landis Tool Co., Waynesboro, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Norton Co., Worcester, Mass.

**GRINDING MACHINES (Rotary Surface)**

Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Heald Machine Co., Worcester, Mass.

**GRINDING MACHINES (Tool and Cutter)**

Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine Co., Oakley Sta., Cincinnati, O.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit, Mich.
Kearney & Trecker Corp., 5926 National Ave., Milwaukee, Wis.
Landis Tool Co., Waynesboro, Pa.
Norton Co., Worcester, Mass.

**GRINDING (Shear Knife)**

American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.

**GRINDING WHEELS**

Abrasive Co., Taconey & Fraley Sts. Philadelphia, Pa.
Abrasive Products Co., So. Braintree, Mass.
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

**GRINDING WHEELS (Segmental)**

Abrasive Company, Tacony & Fraley Sts., Philadelphia, Pa.
Abrasive Products Co., So. Braintree, Mass.
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Norton Company, Worcester, Mass.

**GUIDE SHOES**

Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

**GUIDES (Mill)**

Ampco Metal, Inc., Dept. SI-29, 3830 W. Burnham St., Milwaukee, Wis.
National-Erie Corp., Erie, Pa.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

**GUNS (Blast Furnace Mud)**

Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

**GUNS (Steam, Hydraulic, Electric)**

Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

**HAMMERS (Chipping, Riveting, Calking)**

Ingersoll-Rand Co., 11 Broadway, New York City.

**HAMMERS (Drop)**

Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.

**HAMMERS (Steam)**

Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The Alliance, O.

**HANGERS**

Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Grinnell Co., Inc., Providence, R. I.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

**HANGERS (Shaft)**

Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Division, General Motors Corp., Harrison, N. J.
New Departure Div., General Motors Corp., Bristol, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

**HEADING MACHINERY**

Ajax Mfg. Co., 1441 Chardon Rd., Cleveland, O.

**HEAT TREATING MATERIALS**

Houghton, E. F., & Co., 240 W. Somerset St., Philadelphia, Pa.

**HEATERS (Air)**
Babcock & Wilcox Co., The, 19 Rector St., New York City.
Maehler, Paul, Co., The, 2200 W. Lake St., Chicago, Ill.

**HEATERS (Electric Space)**
Cutler-Hammer, Inc., 315 No. 12th St., Milwaukee, Wis.

**HEATERS (Oven)**
Maehler, Paul, Co., The, 2200 W. Lake St., Chicago, Ill.

**HEATERS (Unit)**
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Grinnell Co., Inc., Providence, R. I.

**HELMETS (Blast Cleaning)**
Pangborn Corp., Hagerstown, Md.

**HITCHINGS (Mine Car)**
American Chain & Cable Co., Inc., Bridgeport, Conn.

**HOBBING MACHINES**
Barber Colman Co., 150 Loomis St., Rockford, Ill.

**HOBS**
Barber Colman Co., 150 Loomis St., Rockford, Ill.

**HOISTS (Chain)**
Ford Chain Block Div. of American Chain & Cable Co., Inc., 2nd & Diamond Sts., Philadelphia, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

**HOISTS (Electric)**
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Wright Mfg. Div. of American Chain & Cable Co. Inc., York, Pa.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

**HOISTS (Monorail)**
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard-Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

**HOISTS (Pneumatic)**
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
Ingersoll-Rand Co., 11 Broadway, New York City.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.

**HOOKS (Chain)**
American Chain & Cable Co., Inc., Bridgeport, Conn.

**HOOPS AND BANDS**
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

**HOSE (Rubber)**
Lowman-Shields Rubber Co., 209 First Ave., Pittsburgh, Pa.
United States Rubber Co., 1790 Broadway, New York City.

**HUMIDIFIERS (Industrial)**
Grinnell Co., Inc., Providence, R. I.

**HYDRAULIC MACHINERY**
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St.- Chicago, Ill.
Farquhar, A. B., Co., Limited, 403 Duke St., York, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Morgan Engineering Co., The, Alliance, O.
National-Erie Corp., Erie, Pa.
Treadwell Construction Co., Midland, Pa.

**HYDRAULIC PRESSES—See PRESSES (Hydraulic)**

**HYDRAULIC UNITS**
Barnes, W. F. & John, Co., 201 So. Water St., Rockford, Ill.
Chambersburg Engineering Co., Chambersburg, Pa .
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit, Mich.

**INDICATORS (Temperature)**
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

**INDICATORS (Blast Furnace Stock Line)**
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

**INGOT MOLDS**
Bethlehem Steel Co., Bethlehem, Pa.
Shenango-Penn Mold Co., Oliver Bldg., Pittsburgh, Pa.
Valley Mould & Iron Corp., Hubbard, O.

**INHIBITORS**
American Chemical Paint Co., Box 310, Ambler, Pa.
Parkin, Wm. M., Co., The, 1005 Highland Bldg., Pittsburgh, Pa.

**INJECTORS (Lead)**
Dietzel Lead Burning Co., Coraopolis, Pa.

**INSTRUMENTS (Electric Indicating and Recording)**
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
General Electric Co., Schenectady, N. Y.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

**INSULATING BLOCK**
Armstrong Cork Co., 985 Concord St., Lancaster, Pa.
Johns-Manville Corp., 22 E. 40th St., New York City.

**INSULATING BRICK**
Armstrong Cork Co., 985 Concord St., Lancaster, Pa.
Johns-Manville Corp., 22 E. 40th St., New York City.

**INSULATING POWDER AND CEMENT**
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Armstrong Cork Co., 985 Concord St., Lancaster, Pa.
Babcock & Wilcox Co., The, 19 Rector St., New York City.

**INSULATION (Building)**
Carey, Philip, Co., The, Dept. 71. Lockland, Cincinnati, O.

**INSULATION (Furnace, Boiler Settings, Ovens, Steam Pipe, Etc.)**
Armstrong Cork Co., 985 Concord St., Lancaster, Pa.
Johns-Manville Corp., 22 E. 40th St., New York City.

**IRON (Bar)**
Ryerson, Jos. T., & Son Co., 16th & Rockwell Sts., Chicago, Ill.

**IRON ORE**
Alan Wood Steel Co., Conshohocken. Pa.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The, Youngstown, O.

**JETS (Steam, for Pickling)**
Bronze Die Casting Co., Franklin St. at Ohio River, Pittsburgh, Pa.

**JIGS AND FIXTURES**
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.

**KETTLES (Galvanizing)**
Petroleum Iron Works Co., Sharon, Pa.

**KEYS (Machine or Woodruff)**
Moltrup Steel Products Co., Beaver Falls, Pa.

**KNIVES**
American Shear Knife Co., 3rd and Ann Sts., Homestead, Pa.
Cowles Tool Co., 2086 W. 110th St., Cleveland, O.

**LABORATORY WARE**
Norton Company, Worcester, Mass.

**LADLES**
Hollands Mfg. Co., 342-352 E. 18th St., Erie, Pa.
Petroleum Iron Works Co., Sharon, Pa.
Treadwell Construction Co., Midland, Pa.

**LAMPS (Industrial)**
General Electric Co., Dept. 166-S-B, Nela Park, Cleveland, O.
Hygrade Sylvania Corp., Salem, Mass.

**LAPPING MACHINES**
Cincinnati Milling Machine Co., Oakley Sta., Cincinnati, O.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit, Mich.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.
Norton Company, Worcester, Mass.

**LARRIES (Coal)**
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

**LATHE DOGS**
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

**LATHES**
Jones & Lamson Machine Co., Springfield, Vt.
LeBlond, R. K., Machine Tool Co., Dept. J-11, 2694 Madison Rd., Cincinnati, O.
Monarch Machine Tool Co., Sidney, O.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

**LATHES (Automatic)**
Jones & Lamson Machine Co., Springfield, Vt.
Monarch Machine Tool Co., Sidney, O.

**LATHES (Engine)**
Monarch Machine Tool Co., Sidney, O.

**LATHES (Roll Turning)**
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Lewis Fdry. & Mach. Co., P. O. Box 1586, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

**LATHES (Turret)**
Bullard Company, The, Bridgeport, Conn.
Jones & Lamson Machine Co., Springfield, Vt.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

**LEAD (Chemical, Corroding, Desilvered)**
St. Joseph Lead Co., 250 Park Ave., New York City.

**LEAD (Tellurium)**
National Lead Co., 111 Broadway, New York City.

**LEAD WORK**
Dietzel Lead Burning Co., Coraopolis, Pa.

**LEVELING MACHINES**
Erie Foundry Co., Erie, Pa.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
McKay Machine Co., Youngstown, O.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

**LIFT TRUCKS—See TRUCKS (Lift)**

**LIFTERS (Rubber, Vacuum)**
Lowman-Shields Rubber Co., 209 First Ave., Pittsburgh, Pa.

**LIFTING MAGNETS—See MAGNETS (Lifting)**

**LIGHTING (Industrial)**
General Electric Co., Dept. 166-S-B, Nela Park, Cleveland, O.
Graybar Electric Co., 420 Lexington Ave., New York City.
Hygrade Sylvania Corp., Salem, Mass.

**LINERS (Pump and Cylinder)**
Shenango-Penn Mold Co., Dover, O.

**LOCOMOTIVE CRANES—See CRANES (Locomotive)**

**LOCOMOTIVES (Diesel-Electric)**
Plymouth Locomotive Works, Plymouth, O.
Whitcomb Locomotive Co., Rochelle, Ill.

**LOCOMOTIVES (Diesel Mechanical)**
Plymouth Locomotive Works, Plymouth, O.
Whitcomb Locomotive Co., Rochelle, Ill.

**LOCOMOTIVES (Electric Trolley)**
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

**LOCOMOTIVES (Gasoline-Electric)**
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

**LOCOMOTIVES (Gasoline Mechanical)**
Whitcomb Locomotive Co., Rochelle, Ill.

**LOCOMOTIVES (Oil-Electric)**
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Ingersoll-Rand Co., 11 Broadway, New York City.

**LOCOMOTIVES (Storage Battery)**
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

**LUBRICANTS (Industrial)**
American Lanolin Corp., Railroad St., Lawrence, Mass.
Gulf Oil Corp. of Penna., Gulf Refining Co., 3813 Gulf Bldg., Pittsburgh, Pa.
Houghton, E. F., & Co., 240 W. Somerset St., Philadelphia, Pa.
New York & New Jersey Lubricant Co., 292 Madison Ave., New York City.
Penola, Inc., 34th & Smallman Sts., Pittsburgh, Pa.
Pure Oil Co., The, 35 E. Wacker Dr., Chicago, Ill.
Shell Oil Co., Inc., 50 W. 50th St., New York City.
Socony Vacuum Oil Co., Inc., 26 Broadway, New York City.
Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.
Tide Water Associated Oil Co., 17 Battery Place, New York City.

**LUBRICATING SYSTEMS**
Farval Corp., The, 3270 E. 80th St., Cleveland, O.

**MACHINE WORK**
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Treadwell Construction Co., Midland, Pa.

**MACHINERY (Second Hand)**
Emerman, Louis E., & Co., 1760 Elston Ave., Chicago, Ill.
Marr-Galbreath Machinery Co., 53 Water St., Pittsburgh, Pa.
West Penn Machinery Co., 1208 House Bldg., Pittsburgh, Pa.

**MACHINERY (Special)**
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Barnes, W. F. & John, Co., 201 So. Water St., Rockford, Ill.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Farquhar, A. B., Co., Limited, 403 Duke St., York, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Foote Bros. Gear & Machine Corp., 5311 S. Western Blvd., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.
National-Erie Corp., Erie, Pa.
National Roll & Fdry. Co., The, Avonmore, Pa.
Niagara Machine & Tool Works, 637 Northland Ave., Buffalo, N. Y.
Oil Well Supply Co., Dallas, Texas.
Shuster, F. B., Co., The, New Haven, Conn.
Tube Reducing Corp., 24 Grafton Ave., Newark, N. J.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

**MAGNESIA (Electrically Fused)**
Norton Co., Worcester, Mass.

**MAGNETIC SEPARATORS—See SEPARATORS (Magnetic)**

**MAGNETS (Lifting)**
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Dings Magnetic Separator Co., 663 Smith St., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

**MAGNETS (Separating)**
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

**MANGANESE METAL AND ALLOYS**
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

**MANGANESE ORE**
Samuel, Frank, & Co., Inc., The, Harrison Bldg., Philadelphia, Pa.

**MANIPULATORS**
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.

**MARKING DEVICES**
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.
Helmer-Staley, Inc., 321 W. Huron St., Chicago, Ill.

**METAL (Perforated)—See PERFORATED METAL**

**METAL BLAST ABRASIVES (Shot and Grit)**
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., 61st St. and A. V. R. R., Pittsburgh, Pa.

**METAL CLEANERS**
American Chemical Paint Co., Box 310, Ambler, Pa.
Houghton, E. F., & Co., 240 W. Somerset St., Philadelphia, Pa.
Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia, Pa.

**METAL FINISHES**
American Nickelold Co., 1310 Second St., Peru, Ill.

**METAL SPECIALTIES AND PARTS—See STAMPINGS**

**METAL STAMPINGS—See STAMPINGS**

**METALS (Nonferrous)**
International Nickel Co., Inc., The, 67 Wall St., New York City.

**MICROMETERS**
Brown & Sharpe Mfg. Co., Providence, R. I.

**MILLING CUTTERS**
Barber Colman Co., 150 Loomis St., Rockford, Ill.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit, Mich.

**MILLING MACHINES**
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine Co., Oakley Sta., Cincinnati, O.
Kearney & Trecker Corp., 5926 National Ave., Milwaukee, Wis.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.

**MILLING MACHINES (Milling and Centering Combined)**
Jones & Lamson Machine Co., Springfield, Vt.

**MILLS (Blooming, Universal, Plate, Sheet, Tin, Bar, Strip, Etc.)—See ROLLING MILL EQUIPMENT**

**MOLDS (Ingot)—See INGOT MOLDS**

**MOLYBDENUM**
Climax Molybdenum Co., 500 Fifth Ave., New York City.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

**MONEL METAL (All Commercial Forms)**
International Nickel Co., Inc., The, 67 Wall St., New York City.

**MONORAIL SYSTEMS**
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

**MOTORS (Electric)**
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Chicago Electric Co., 1332 W. 22nd St., Chicago, Ill.
Fairbanks, Morse & Co., Dept. 96, 600 So. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-15.
Reliance Electric & Eng. Co., 1081 Ivanhoe Rd., Cleveland, O.
Sawyer Electrical Mfg. Co., 5715 Leneve St., Los Angeles, Cal.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

**MUCK BAR**
Samuel, Frank, & Co., Inc., The, Harrison Bldg., Philadelphia, Pa.

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Bethlehem Steel Co., Bethlehem, Pa.
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*Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

**NAILS (Coated and Galvanized)**
Wickwire Brothers, 189 Main St., Cortland, N. Y.

**NAILS (Special Only—All Metals)**
Townsend Co., New Brighton, Pa.

**NICKEL (All Commercial Forms)**
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**NICKEL (Shot)**
International Nickel Co., Inc., The, 67 Wall St., New York City.

**NICKEL STEEL (Cold Drawn)**
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Republic Steel Co., Dept. ST, Cleveland, O.
Union Drawn Steel Co., Massillon, O.

**NOZZLES (Blasting)**
Pangborn Corporation, Hagerstown, Md.

**NOZZLES (Descaling)**
Aldrich Pump Co., The, Allentown, Pa.

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**(*Also Stainless)**
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap & Screw Co., 2934 E. 79th St., Cleveland, O.
Elastic Stop Nut Corp., 1001-S Newark Ave., Elizabeth, N. J.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Tinnerman Products, Inc., 2039 Fulton Rd., Cleveland, O.

**NUTS (Castellated)**
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Acme Co., The, E. 131st St. & Coit Rd., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

**NUTS (Self Locking)**
Elastic Stop Nut Corp., 1001-S Newark Ave., Elizabeth, N. J.

**NUTS (Semi-Finished)**
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Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

**NUTS (Wing)**
Parker-Kalon Corp., 200 Varick St., New York City.

**OIL RETAINERS AND SEALS**
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.
Garlock Packing Co., The, S 3-40, Palmyra, N. Y.

**OILS (CUTTING)**
Gulf Oil Corp. of Penna., Gulf Refining Co., 3813 Gulf Bldg., Pittsburgh, Pa.
Houghton, E. F., & Co., 240 W. Somerset St., Philadelphia, Pa.
Penola, Inc., 34th & Smallman Sts., Pittsburgh, Pa.
Pure Oil Co., The, 35 E. Wacker Dr., Chicago, Ill.
Shell Oil Co., Inc., 50 W. 50th St., New York City.
Socony-Vacuum Oil Co., Inc., 26 Broadway, New York City.
Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.
Tide Water Associated Oil Co., 17 Battery Place, New York City.

**OILS (Drawing)**
Houghton, E. F., & Co., 240 W. Somerset St., Philadelphia, Pa.

**OILS (Lubricating)—See LUBRICANTS (Industrial)**

**OILS (Rust Preventive)**
American Chemical Paint Co., Box 310, Ambler, Pa.

**OPEN-HEARTH FURNACES—See FURNACES (Open-Hearth)**

**OVENS (Annealing, Japanning, Tempering)**
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Machler, Paul, Co., The, 2200 W. Lake St., Chicago, Ill.
Stewart Furnace Div., Chicago Flexible Shaft Co., 1106 So. Central Ave., Chicago, Ill.

**OVENS (Coke, By-Product Recovery)**
Koppers Co., Engineering and Construction Div., 100 Koppers Bldg., Pittsburgh, Pa.

**OVENS (Core and Mold)**
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Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.

**OXY-ACETYLENE WELDING AND CUTTING—See WELDING**

**OXYGEN IN CYLINDERS**
Air Reduction Sales Co., 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago, Ill.

**PACKING (Asbestos or Rubber)**
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.
Garlock Packing Co., The, S 3-40, Palmyra, N. Y.
Johns-Manville Corp., 22 E. 40th St., New York City.
United States Rubber Co., 1790 Broadway, New York City.

**PACKINGS—MECHANICAL LEATHER (Cup, U-Cup, Flange and Vees)**
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.
Garlock Packing Co., The, S 3-40, Palmyra, N. Y.
Houghton, E. F., & Co., 240 W. Somerset St., Philadelphia, Pa.

**PAINT (Alkali Resisting)**
Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia, Pa.

**PAINT (Aluminum)**
Koppers Co., Tar & Chemical Div., 100 Koppers Bldg., Pittsburgh, Pa.

**PAINT (Heat Resisting)**
American Chemical Paint Co., Box 310, Ambler, Pa.

**PAINT (Industrial)**
Carey, Philip Co., The, Dept. 71, Lockland, Cincinnati, O.

**PAINT (Marking)**
Helmer-Staley, Inc., 321 W. Huron St., Chicago, Ill.
Koppers Co., Tar & Chemical Div., 100 Koppers Bldg., Pittsburgh, Pa.

**PAINT (Rust Preventive)**
American Chemical Paint Co., Box 310, Ambler, Pa.
Koppers Co., Tar & Chemical Div., 100 Koppers Bldg., Pittsburgh, Pa.

**PAINT (Stick Form)**
Helmer-Staley, Inc., 321 W. Huron St., Chicago, Ill.

**PARTS (Precision)**
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit, Mich.

**PENSTOCKS**
Treadwell Construction Co., Midland, Pa.

**PERFORATED METAL**
Chicago Perforating Co., 2443 W. 24th Pl., Chicago, Ill.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

**PHENOL RECOVERY PLANTS**
Koppers Co., Engineering and Construction Div., 100 Koppers Bldg., Pittsburgh, Pa.

**PICKLING COMPOUND**
American Chemical Paint Co., Box 310, Ambler, Pa.
Houghton, E. F., & Co., 240 W. Somerset St., Philadelphia, Pa.
Parkin, Wm. M., Co., The, 1005 Highland Bldg., Pittsburgh, Pa.
Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia, Pa.

**PICKLING EQUIPMENT**
International Nickel Co., Inc., The, 67 Wall St., New York City.

**PICKLING MACHINERY**
Erie Foundry Co., Erie, Pa.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

**PICKLING TANK LININGS**
Cellcote Co., 750 Rockefeller Bldg., Cleveland, O.
Keagler Brick Co., 1443 W. Market St., Steubenville, O.
Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia, Pa.

**PICKLING TANKS—See TANKS (Pickling)**

**PIERCER POINTS**
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

**PIG IRON**
Alan Wood Steel Co., Conshohocken, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Brooke, E. & G., Iron Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Jackson Iron & Steel Co., Jackson, O.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Samuel, Frank & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

**PILING (Iron and Steel)**
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 South Dearborn St., Chicago, Ill.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Co., Dept. ST, Cleveland, O.

**PILING (Pressure-Treated Wood)**
Wood Preserving Corp., The, 100 Koppers Bldg., Pittsburgh, Pa.

**PILLOW BLOCKS (Ball)**
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**PILLOW BLOCKS (Roller Bearing)**
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Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.

**PILLOW BOXES**
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

**PINS (Clevis)**
Townsend Co., New Brighton, Pa.

**PINIONS (Mill)**
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
National-Erie Corp., Erie, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.
United Engineering & Foundry Co., First National Bank Bldg., Pittsburgh, Pa.

**PINS (Taper)**
Moltrup Steel Products Co., Beaver Falls, Pa.

**PIPE (Brass, Bronze, Copper)**
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Revere Copper & Brass Co., 230 Park Ave., New York City.
Shenango-Penn Mold Co., Dover, O.

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**PIPE (Steel)**
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American Rolling Mill Co., The, 1180 Curtis St., Middletown, O.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
Youngstown Sheet & Tube Co., The, Youngstown, O.

**PIPE (Welded Steel)**
Treadwell Construction Co., Midland, Pa.

**PIPE BALLS**
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

**PIPE BENDING**
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**PIPE CUTTING AND THREADING MACHINERY**
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**PIPE FITTINGS**
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Crane Co., 836 So. Michigan Ave., Chicago, Ill.
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Oil Well Supply Co., Dallas, Texas.
Worthington Pump & Machy. Corp., Harrison, N. J.

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Petroleum Iron Works Co., Sharon, Pa.

**PIPE MILL MACHINERY**
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Yoder Co., The, W. 55th and Walworth Ave., Cleveland, O.

**PIPE STRAIGHTENING MACHINERY**
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Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

**PIPE TOOLS**
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Hollands Mfg. Co., 342-352 E. 18th St., Erie, Pa.

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Power Piping Co., Beaver and Western Ave., Pittsburgh, Pa.

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**PISTON RODS**
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Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Heppenstall Co., 47th and Hatfield Sts., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.
Union Drawn Steel Co., Massillon, O.

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Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

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*Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
*American Rolling Mill Co., The, 1180 Curtis St., Middletown, O.
*Bethlehem Steel Co., Bethlehem, Pa.
*Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Otis Steel Co., The, Cleveland, O.
*Republic Steel Corp., Dept. ST, Cleveland, O.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Worth Steel Co., Claymont, Del.
Youngstown Sheet & Tube Co., The, Youngstown, O.

**PLATES (Stainless Clad)**
*Granite City Steel Co., Granite City, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.

**PLATES (Steel—Floor)—See FLOORING (Steel)**

**PLATES (Terne and Tin)—See TIN PLATE**

**PLUGS (Expansion)**
Hubbard, M. D., Spring Co., 409 Central Ave., Pontiac, Mich.

**PLUGS (Rolling Mill)**
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

**POLES (Tubular Steel)**
National Tube Co., Frick Bldg., Pittsburgh, Pa.

**POLISHING MACHINERY (Tube and Bar)**
Medart Co., The, 3520 de Kalb St., St. Louis, Mo.

**POTS (Case Hardening)**
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

**POTS (Melting)**
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York, N. Y.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hollands Mfg. Co., 342-352 E. 18th St., Erie, Pa.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.

**PRECIPITATORS (Cottrell Electric)**
Research Corp., 405 Lexington Ave., New York City.
Western Precipitation Corp., 1016 W. 9th St., Los Angeles, Calif.

**PREHEATERS**
Babcock & Wilcox Co., The, 19 Rector St., New York City.

**PRESSED METAL PARTS**
Stanley Works, The, Pressed Metal Div., New Britain, Conn.

**PRESSES**
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Farquhar, A. B., Co., Limited, 403 Duke St., York, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Streine Tool & Mfg. Co., New Bremen, O.
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.

**PRESSES (Bending)**
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

**PRESSES (Extrusion)**
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.

**PRESSES (Forging)**
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
Erie Foundry Co., Erie, Pa.
Farquhar, A. B., Co., Limited, 403 Duke St., York, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

**PRESSES (Forming and Braking)**
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Farquhar, A. B., Co., Limited, 403 Duke St., York, Pa.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

**PRESSES (Hydraulic)**
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Farquhar, A. B., Co., Limited, 403 Duke St., York, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
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Farquhar, A. B., Limited, 403 Duke St., York, Pa.
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**PRESSES (Riveting)**
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**PRESSES (Scrap Bundling and Baling)**
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**PRESSES (Stamping)**
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

**PRESSES (Welding)—See WELDERS**

**PRESSURE VESSELS**
Babcock & Wilcox Co., The, 19 Rector St., New York City.

**PRODUCER GAS SYSTEMS—See GAS PRODUCER PLANTS**

**PUG MILLS (For Blast Furnaces and Sintering Plants)**
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.

**PULLEYS (Magnetic)**
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Dings Magnetic Separator Co., 663 Smith St., Milwaukee, Wis.

**PULVERIZERS**
American Pulverizer Co., 1539 Macklind Ave., St. Louis, Mo.

**PUMP HOUSES**
Dravo Corp. (Contracting Div.), Neville Island, Pittsburgh, Pa.

**PUMPS**
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Oil Well Supply Co., Dallas, Texas.
Roper, Geo. D., Co., Rockford, Ill.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

**PUMPS (Boiler Feed)**
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Brown & Sharpe Mfg. Co., Providence, R. I.
Fairbanks Morse & Co., Dept. 96, 600 So. Michigan Ave., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York City.
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

**PUMPS (Fuel Injection)**
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit, Mich.

**PUMPS (Hydraulic)**
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Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Roper, Geo. D., Co., Rockford, Ill.
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Worthington Pump & Machinery Corp., Harrison, N. J.

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Roper, Geo. D., Co., Rockford, Ill.
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Worthington Pump & Machinery Corp., Harrison, N. J.

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Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

**PUNCHING AND SHEARING MACHINERY**
Beatty Machine & Mfg. Co., Hammond, Ind.
Chambersburg Engineering Co., Chambersburg, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Continental Roll & Steel Fdry Co., E. Chicago, Ind.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

**PYROMETER TUBES**
Norton Company, Worcester, Mass.

**PYROMETERS**
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

**RAIL BREAKERS**
National Roll & Foundry Co., The, Avonmore, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

**RAILS (New and Relaying)**
Foster, L. B., Co., Inc., P. O Box 1647, Pittsburgh Pa.

**RAILS (Steel)**
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

**REAMERS**
Barber Colman Co., 150 Loomis St., Rockford, Ill.
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.
Greenfield Tap & Die Corp., Greenfield, Mass.

**REAMERS (Pneumatic)**
Ingersoll-Rand Co., 11 Broadway, New York City.

**REAMERS (Sand, Ingot Mold—Pneumatic)**
Ingersoll-Rand Co., 11 Broadway, New York City.

**REBUILT EQUIPMENT**
Emerson, Louis E., & Co., 1760 Elston Ave., Chicago, Ill.
Marr-Galbreath Machinery Co., 53 Water St., Pittsburgh, Pa.
West Penn Machinery Co., 1208 House Bldg., Pittsburgh, Pa.

**RECEIVERS**
Petroleum Iron Works Co., Sharon, Pa.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

**RECORDERS (Combustion)**
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

**RECORDERS (Pressure, Speed, Temperature, Time)**
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

**REDUCERS (Speed)—See SPEED REDUCERS**

**REDUCTION GEARS**
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Foote Bros. Gear & Machine Corp., 5311 S. Western Blvd., Chicago, Ill.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
National-Erie Corp., Erie, Pa.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

**REFRACTORIES (Dolomite)**
Basic Dolomite, Inc., Hanna Bldg., Cleveland, O.

**REFRACTORIES (Fire Clay)**
Babcock & Wilcox Co., The, 19 Rector St., New York City.
Eureka Fire Brick Co., 1100 B. F. Jones Law Bldg., Pittsburgh, Pa.
Globe Brick Co., The, East Liverpool, O.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Keagler Brick Co., 1443 W. Market St., Steubenville, O.
Standard Arch Co., Frostburg, Md.

**REFRACTORIES (For High Frequency Furnaces)**
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Carborundum Co., The, Perth Amboy, N. J.
Norton Company, Worcester, Mass.

**REFRACTORIES (Silicon Carbide)**
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.

**REGULATORS (Pressure)**
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.

**REGULATORS (Temperature)**
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

**REINFORCEMENT FABRIC (Electric Welded)**
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

**RESISTORS (Edgewound)**
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.

**RESISTORS (Graphite Disc)**
Allen-Bradley Co., 1320 So. 2nd St., Milwaukee, Wis.

**RHEOSTATS (Plating)**
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.

**RINGS (Steel)**
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
King Fifth Wheel Co., 5027 Beaumont Ave., Philadelphia, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.

**RINGS (Weldless) (*Also Stainless)**
*Midvale Co., The Nicetown, Philadelphia, Pa.

**RIVETERS (Hydraulic—Portable and Stationary)**
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

**RIVETERS (Jam, Pedestal, Staybolt, Squeeze, Stationary, Yoke—Pneumatic)**
Ingersoll-Rand Co., 11 Broadway, New York City.

**RIVETERS (Pneumatic)**
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

**RIVETING MACHINERY**
Chambersburg Engineering Co., Chambersburg, Pa.
Shuster, F. B., Co., The, New Haven, Conn.
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.

**RIVETS (*Also Stainless)**
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Champion Rivet Co., The, Harvard Ave. at E. 108th St., Cleveland, O.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Progressive Mfg. Co., The, Torrington, Conn.
*Republic Steel Corp., Union Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
*Russell Burdsall & Ward Bolt & Nut Co., Port Chester, Pa.
*Townsend Co., New Brighton, Pa.

**RODS (Brass, Bronze, Copper, Nickel Silver, Silicon-Bronze)**
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Revere Copper & Brass Co., 230 Park Ave., New York City.

**RODS (Drill)**
Firth-Sterling Steel Co., McKeesport, Pa.

**RODS (Rounds, Flats and Shapes) (*Also Stainless)**
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
*Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Steel & Tube Co., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.
Youngstown Sheet & Tube Co., The, Youngstown, O.

**RODS (Steel and Iron)**
Firth-Sterling Steel Co., McKeesport, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.

**RODS (Welding)—See WELDING RODS**

**RODS (Wire)—See WIRE PRODUCTS**

**ROLL COOLERS (Internal, Water)**
Hunt, C. B., & Son, Salem, O.

**ROLLER LEVELERS (Backed-up)**
Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.

**ROLLING DOORS & SHUTTERS—See DOORS AND SHUTTERS**

**ROLLING MILL BEARINGS—See BEARINGS (Rolling Mill)**

**ROLLING MILL EQUIPMENT**
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Fdry. & Mach. Co., P. O. Box 1586, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa
Morgan Construction Co., Worcester, Mass.
Morgan Engineering Co., The, Alliance, O.
National Roll & Foundry Co., The, Avonmore, Pa.
Streine Tool & Mfg. Co., New Bremen, O.
United Engineering & Fdry Co., First National Bank Bldg.
Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

**ROLLS (Bending and Straightening)**
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

**ROLLS (Rubber Covered)**
Lowman-Shields Rubber Co., 209 First Ave., Pittsburgh, Pa.

**ROLLS (Sand and Chilled)**
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O.
Pittsburgh Rolls Corp., 41st and Willow Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

**ROLLS (Steel and Iron)**
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hyde Park Fdry. and Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Fdry. Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O.
Otis Steel Co., The, Cleveland, O.
Pittsburgh Rolls Corp., 41st and Willow Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

**ROLLS (Tinning Machine)**
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa

**ROOFING AND SIDING (Corrugated and Plain)**
American Rolling Mill Co., The, 1180 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
New Jersey Zinc Co., 160 Front St., New York City.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Sons, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

**ROOFING (Plastic and Liquid)**
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.
Koppers Co., Tar & Chemical Div., 100 Koppers Bldg., Pittsburgh, Pa.

**RUBBER GOODS (Mechanical)**
Garlock Packing Co., The, S 3-40, Palmyra, N. Y.
Lowman-Shields Rubber Co., 209 First Ave., Pittsburgh, Pa.
United States Rubber Co., 1790 Broadway, New York City.

**RUST PREVENTIVES**
Alrose Chemical Co., Mill St., Cranston, R. I.
American Chemical Paint Co., Box 310, Ambler, Pa.
American Lanolin Corp., Railroad St., Lawrence, Mass.
Flood Co., The, 6217 Carnegie Ave., Cleveland, O.
Houghton, E. F., & Co., 240 W. Somerset St., Philadelphia, Pa.
Koppers Co., Tar & Chemical Div., 1100 Koppers Bldg., Pittsburgh, Pa.

**RUST PROOFING PROCESS**
American Chemical Paint Co., Box 310, Ambler, Pa.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Koppers Co., Tar & Chemical Div., 100 Koppers Bldg., Pittsburgh, Pa.

**SAFE ENDS (Boiler Tube)**
National Tube Co., Frick Bldg., Pittsburgh, Pa.

**SAFETY DEVICES**
Lenco Laboratories, Inc., The, 623 Bondi Bldg., Galesburg, Ill.

**SAFETY DEVICES (Electric)**
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.

**SALT TABLETS**
Morton Salt Co., 208 W. Washington St., Chicago, Ill.

**SAND CONDITIONING AND PREPARING MACHINERY**
Dings Magnetic Separator Co., 663 Smith St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

**SAWING MACHINES (Hot and Cold)**
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
Armstrong-Blum Mfg. Co., 5737 Bloomingdale Ave., Chicago, Ill.
Morgan Engineering Co., The, Alliance, O.
United Engineering & Fdry Co., First National Bank Bldg., Pittsburgh, Pa.

**SAWS (Band—Metal Cutting)**
Simonds Saw & Steel Co., Fitchburg, Mass.

**SAWS (Hack)**
Armstrong-Blum Mfg. Co., 5737 Bloomingdale Ave., Chicago, Ill.
Simonds Saw & Steel Co., Fitchburg, Mass.

**SAWS (Inserted Tooth, Cold)**
Simonds Saw & Steel Co., Fitchburg, Mass.

**SAWS (Metal Cutting)**
Simonds Saw & Steel Co., Fitchburg, Mass.
Youngstown Sheet & Tube Co., The, Youngstown, O.

**SCAFFOLDING (Tubular)**
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.

**SCALES**
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Fairbanks Morse & Co., Dept. 96, 600 So. Michigan Ave., Chicago, Ill.
Kron Co., The, Bridgeport, Conn.
Toledo Scale Co., 3216 Monroe St., Toledo, O.

**SCALES (Monorail)**
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Kron Co., The, Bridgeport, Conn.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

**SCALING TOOLS (Pneumatic)**
Ingersoll-Rand Co., 11 Broadway, New York City.

**SCHOOLS**
International Correspondence Schools, Box 9373, Scranton, Pa.

**SCRAP BALING PRESSES—See BALING PRESSES**

**SCREENS AND SIEVES**
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
Chicago Perforating Co., 2443 W. 24th Pl. Chicago, Ill.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.
Koppers Co., Engineering & Construction Div., 100 Koppers Bldg., Pittsburgh, Pa.
Ludlow-Saylor Wire Co., The, Newstead Ave. & Wabash R. R., St. Louis, Mo.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

**SCREENS (Vibrating)**
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

**SCREW EXTRACTORS**
Greenfield Tap & Die Corp., Greenfield, Mass.

**SCREW MACHINE PRODUCTS**
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Hindley Mfg. Co., Valley Falls, R. I.
National Acme Co., The, E. 131st St. & Colt Rd., Cleveland, O.
Progressive Mfg. Co., The Torrington, Conn.

**SCREW MACHINES (Automatic, Single and Multiple Spindle)**
Brown & Sharpe Mfg. Co., Providence, R. I.
Cone Automatic Machine Co., Windsor, Vt.
National Acme Co., The, E. 131st St. & Colt Rd., Cleveland, O.

# WHERE-TO-BUY

**SCREW PLATES**
Greenfield Tap & Die Corp., Greenfield, Mass.

**SCREW STOCK—See STEEL (Screw Stock)**

**SCREWS**
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp., 200 Varick St., New York City.
Progressive Mfg. Co., The, Torrington, Conn.
Townsend Co., New Brighton, Pa.

**SCREWS (Cap, Set, Safety-Set)**
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Acme Co., The, E. 131st St. & Coit Rd., Cleveland, O.
Standard Pressed Steel Co., Box 579, Jenkintown, Pa.

**SCREWS (Cold Headed)**
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Townsend Co., New Brighton, Pa.

**SCREWS (Conveyor)**
Lee Spring Co. Inc., 30 Main St., Brooklyn, N. Y.

**SCREWS (Drive)**
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp., 200 Varick St., New York City.
Townsend Co., New Brighton, Pa.

**SCREWS (Hardened Self-Tapping)**
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp., 200 Varick St., New York City.

**SCREWS (Machine)**
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Progressive Mfg. Co., The, Torrington, Conn.

**SCREWS (Machine, Recessed Head)**
American Screw Co., Providence, R. I.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Parker-Kalon Corp., 200 Varick St., New York City.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., Waterbury, Conn.

**SCREWS (Self Locking)**
Shakeproof Lock Washer Co., 2525 N. Keelor Ave., Chicago, Ill.

**SCREWS (Sheet Metal, Recessed Head)**
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Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Parker-Kalon Corp., 200 Varick St., New York City.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

**SCREWS (Socket, Cold Forged)**
Parker-Kalon Corp., 200 Varick St., New York City.

**SCREWS (Socket, Head, Cap)**
Standard Pressed Steel Co., Box 579, Jenkintown, Pa.

**SCREWS (Thread-Cutting)**
Shakeproof Lock Washer Co., 2525 N. Keelor Ave., Chicago, Ill.

**SCREWS (Thumb)**
Parker-Kalon Corp., 200 Varick St., New York City.

**SCREWS (Wood, Recessed Head)**
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Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.

**SEAMLESS STEEL TUBING—See TUBES**

**SEPARATORS (Magnetic)**
Cutler-Hammer, Inc., 315 No. 12th St., Milwaukee, Wis.
Dings Magnetic Separator Co., 663 Smith St., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland, O.
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

**SEPARATORS (Sand)**
Dings Magnetic Separator Co., 663 Smith St., Milwaukee, Wis.

**SHAFT HANGERS—See HANGERS (Shaft)**

**SHAFTING**
Bliss & Laughlin, Inc., Harvey, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
LaSalle Steel Co., Dept. 2A, P. O. Box 6800-A, Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.
Union Drawn Steel Co., Massillon, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

**SHAKERS**
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

**SHAPERS**
Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.

**SHAPES-SPECIAL (Brass or Copper)**
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**SHAPES (Steel)—See STEEL (Structural)**

**SHAPES, SPECIAL (Steel)**
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Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Fort Pitt Spring Co., P. O. Box 1377, Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Union Drawn Steel Co., Massillon, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

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American Shear Knife Co., 3rd and Ann Sts., Homestead, Pa.
Cleveland Punch & Shear Works, The, 3917 St. Clair Ave., Cleveland, O.
Henpenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.

**SHEARS**
Beatty Machine & Mfg. Co., Hammond, Ind.
Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.
Cleveland Punch & Shear Works, The, 3917 St. Clair Ave., Cleveland, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
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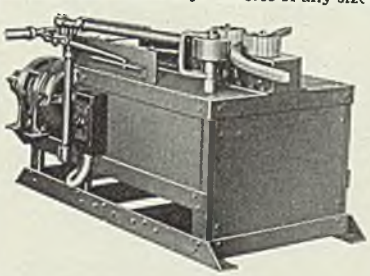

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Streine Tool & Mfg. Co., New Bremen, O.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

**SHEET BARS**

Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., The, Youngstown, O.

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Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
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**SHEET METAL PRODUCTS—See STAMPINGS**

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Streine Tool & Mfg. Co., New Bremen, O.

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American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Andrews Steel Co., The, Newport, Ky.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Otis Steel Co., The, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

**SHEETS (Brass, Bronze, Copper, Nickel Silver, Silicon-Bronze)**

American Brass Co., The, Waterbury, Conn.
Ampco Metal, Inc., Dept. SI-29, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.
Revere Copper & Brass Co., 230 Park Ave., New York City.

**SHEETS (Corrugated)**

American Rolling Mill Co., The, 1180 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

**SHEETS (Deep Drawing and Stamping)**

Alan Wood Steel Co., Conshohocken, Pa.
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 1180 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Otis Steel Co., The, Cleveland, O.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

**SHEETS (Electrical)**

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 1180 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Youngstown Sheet & Tube Co., The, Youngstown, O.

**SHEETS (Galvanized)**

American Rolling Mill Co., The, 1180 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

**SHEETS (Hot Rolled and Hot Rolled Annealed)**

Alan Wood Steel Co., Conshohocken, Pa.
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 1180 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Otis Steel Co., The, Cleveland, O.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

**SHEETS (Long Terne)**

Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

**SHEETS (Perforated)**

Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.

**SHEETS (Reinforced)**

Erdle Perforating Co., 171 York St., Rochester, N. Y.

**SHEETS (Roofing)—See ROOFING AND SIDING**

**SHEETS (Stainless)**

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 1180 Curtis St., Middletown, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Jessop Steel Co., 584 Green St., Washington, Pa.
Republic Steel Corp., Massillon, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.

**SHEETS (Stainless Clad)**

Granite City Steel Co., Granite City, Ill.

**SHEETS (Tin)—See TIN PLATE**

**SHEETS (Tin Mill Black)**

Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

**SHEETS—HIGH FINISH (Automobile, Metal Furniture, Enameling)**

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 1180 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Otis Steel Co., The, Cleveland, O.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

**SIEVES—See SCREENS AND SIEVES**

**SILICO-MANGANESE**

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

**SILICON METAL AND ALLOYS**

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

**SKELP (Steel)**

Alan Wood Steel Co., Conshohocken, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

**SLAG GRANULATING MACHINES (Blast Furnace and Open Hearth)**

Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

**SMALL TOOLS**

Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.

**SOAKING PITS**

Criswell, James, Co., Keenan Bldg., Pittsburgh, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

**SOLENOIDS (Electric)**

Cutler-Hammer, Inc., 315 No. 12th St., Milwaukee, Wis.

**SOLVENT (Degreasing)**

Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia, Pa.

**SPECIAL MACHINERY—See MACHINERY (Special)**

**SPEED REDUCERS**

Cleveland Worm & Gear Co., 3280 E. 80th St., Cleveland, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Foote Bros. Gear & Machine Corp., 5311 S. Western Blvd., Chicago, Ill.
Grant Gear Works, 2nd and B Sts., Boston, Mass.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Jones, W. A., Fdry. & Mach. Co., 4437 W. Roosevelt Rd., Chicago, Ill.
Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.
New Departure Div., General Motors Corp., Bristol, Conn.

**SPELTER (Zinc)**

St. Joseph Lead Co., 250 Park Ave., New York City.

**SPIEGELEISEN**

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
New Jersey Zinc Co., 160 Front St., New York City.
Samuel, Frank, & Co., Inc., The, Harrison Bldg., Philadelphia, Pa.

**SPIKES (Screw)**

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Dept. ST, Cleveland, O.

# WHERE-TO-BUY

**SPIKES (Screw)—Con.**
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

**SPINDLES (Grinding)**
Bryant Chucking Grinder Co., Springfield, Vt.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit, Mich.
Heald Machine Co., Worcester, Mass.

**SPLICE BARS (Rail)**
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

**SPRINGS (*Also Stainless)**
Accurate Spring Mfg. Co., 3823 W. Lake St., Chicago, Ill.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Duer Spring & Mfg. Co., Pittsburgh, Pa.
Fort Pitt Spring Co., P. O. Box 1377, Pittsburgh, Pa.
Hubbard, M. D., Spring Co., 409 Central Ave., Pontiac, Mich.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
Raymond Mfg. Co., Div. Associated Spring Corp., Corry, Pa.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.
Washburn Wire Co., 118th St. & Harlem River, New York City.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

**SPRINGS (Alloy)**
Fort Pitt Spring Co., P. O. Box 1377, Pittsburgh, Pa.

**SPRINGS (Coil and Elliptic)**
Fort Pitt Spring Co., P. O. Box 1377, Pittsburgh, Pa.

**SPRINGS (Oil Tempered—Flat)**
Davis Brake Beam Co., Laurel Ave., & P. R. R., Johnstown, Pa.

**SPRINKLERS (Automatic)**
Grinnell Co., Inc., Providence, R. I.

**SPROCKETS**
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.

**SPRUE CUTTERS**
Shuster, F. B., Co., The, New Haven, Conn.

**STACKS (Steel)—See BRIDGES, ETC.**

**STAINLESS STEEL—See BARS, SHEETS, STRIP, PLATES, ETC.**

**STAMPINGS**
Accurate Spring Mfg. Co., 3823 W. Lake St., Chicago, Ill.
American Tube & Stamping Plant, (Stanley Wks.), Bridgeport, Conn.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Davis Brake Beam Co., Laurel Ave., & P. R. R., Johnstown, Pa.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Hubbard, M. D., Spring Co., 409 Central Ave., Pontiac, Mich.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Raymond Mfg. Co., Div. Associated Spring Corp., Corry, Pa.
Shakeproof Lock Washer Co., 2525 N. Keelor Ave., Chicago, Ill.
Stanley Works, The, Bridgeport, Conn.
New Britain, Conn.
Toledo Stamping & Mfg. Co., 90 Fearing Blvd., Toledo, O.
Whitehead Stamping Co., 1669 W. Lafayette Blvd., Detroit, Mich.

**STAMPINGS (Blanking)**
Van Syoc, G. W., 5-220 General Motors Bldg., Detroit, Mich.

**STAMPS (Steel)**
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.

**STAPLES (Wire)**
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

**STARTERS (Electric Motor)**
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.

**STEEL (Alloy)**
Alan Wood Steel Co., Conshohocken, Pa.
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Columbia Steel Co., San Francisco, Calif.
Crucible Steel Company of America, 405 Lexington Ave., New York City.
Firth-Sterling Steel Co., McKeesport, Pa.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Jessop Steel Co., 584 Green St., Washington, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Simonds Saw & Mfg. Co., Fitchburg, Mass.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Steel & Tube Co., Canton, O.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Washburn Wire Co., Phillipsdale, R. I.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

**STEEL (Alloy, Cold Finished)**
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
LaSalle Steel Co., Dept. 2A, P. O. Box 6800-A, Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Union Drawn Steel Co., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

**STEEL (Chrome Cobalt)**
Detroit Alloy Steel Co., Foot of Iron St., Detroit, Mich.

**STEEL (Clad—Corrosion Resisting) (*Also Stainless)**
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Crucible Steel Company of America, 405 Lexington Ave., New York City.
*Granite City Steel Co., Granite City, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.
Superior Steel Corp., Carnegie, Pa.

**STEEL (Cold Drawn)**
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Union Drawn Steel Co., Massillon, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.


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**STEEL (Cold Finished)**

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
LaSalle Steel Co., Dept. 2A, P. O. Box 6800-A, Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Otis Steel Co., The, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Union Drawn Steel Co., Massillon, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

**STEEL (Corrosion Resisting)**

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 540 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Timken Steel & Tube Co., Canton, O.

**STEEL (Die)**

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Crucible Steel Company of America, 405 Lexington Ave.,
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Vanadium-Alloys Steel Co., Latrobe, Pa.

**STEEL (Drill)**

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa. New York City.
Crucible Steel Company of America, 405 Lexington Ave.,

**STEEL (Electric)**

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago. New York City.
Crucible Steel Company of America, 405 Lexington Ave., New York City.
Firth-Sterling Steel Co., McKeesport, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Timken Steel & Tube Co., Canton, O.

**STEEL (High Speed)**

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Crucible Steel Company of America, 405 Lexington Ave., New York City.
Firth-Sterling Steel Co., McKeesport, Pa.
Jessop, Wm., & Sons Co., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Vanadium-Alloys Steel Co., Latrobe, Pa.

**STEEL (High Tensile, Low Alloy)**

Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Otis Steel Co., The, Cleveland, O.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

**STEEL (Nitriding)**

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.

**STEEL (Rustless)—See STEEL (Corrosion Resisting)**

**STEEL (Screw Stock)**

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
LaSalle Steel Co., Dept. 2A, P. O. Box 6800-A, Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Union Drawn Steel Co., Massillon, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The, Youngstown, O.

**STEEL (Spring)**

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Fort Pitt Spring Co., P. O. Box 1377, Pittsburgh, Pa.
Washburn Wire Co., 118th St. & Harlem River, New York City. Phillipsdale, R. I.

**STEEL (Stainless)—See STEEL (Corrosion Resisting)**

**STEEL (Strip, Copper Coated)**

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Thomas Steel Co., Warren, O.

**STEEL (Strip, Hot and Cold Rolled) (*Also Stainless)**

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
*American Rolling Mill Co., The, 1180 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
American Tube & Stamping Plant, (Stanley Wks.), Bridgeport, Conn.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
*Firth-Sterling Steel Co., McKeesport, Pa.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Otis Steel Co., The, Cleveland, O.
Republic Steel Corp., Dept. ST, Cleveland, O.
*Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Seneca Wire & Mfg. Co., Fostoria, O.
*Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Tennessee Coal, Iron & Railroad Co. Brown-Marx Bldg., Birmingham, Ala.
Thomas Steel Co., Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City. Phillipsdale, R. I.
Weirton Steel Co., Weirton, W. Va.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

**STEEL (Strip, Tin Coated)**

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City.

**STEEL (Strip, Zinc Coated)**

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Thomas Steel Co., Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City.

**STEEL (Structural) *(Also Stainless)**

American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Belmont Iron Works, 22nd St. and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Treadwell Construction Co., Midland, Pa.
Weirton Steel Co., Weirton, W. Va.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., The, Youngstown, O.

**STEEL (Tool)**

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Crucible Steel Company of America, 405 Lexington Ave., New York City.
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland, O.
Detroit Alloy Steel Co., Foot of Iron St., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Jessop, Wm., & Sons Co., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc. 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Vanadium Alloys Steel Co., Latrobe, Pa.

**STEEL BUILDINGS—See BRIDGES, BUILDINGS, ETC.**

**STEEL DOORS & SHUTTERS—See DOORS & SHUTTERS**

**STEEL FABRICATORS—See BRIDGES, BUILDINGS ETC.**

**STEEL FLOATING AND TERMINAL EQUIPMENT**

Dravo Corp. (Engin'r'g Works Div.), Neville Island, Pittsburgh, Pa.

**STEEL PLATE CONSTRUCTION**

American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Belmont Iron Works, 22nd St., and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Petroleum Iron Works Co., Sharon, Pa.
Treadwell Construction Co., Midland, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

**STELLITE**

Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.

**STOKERS**

Babcock & Wilcox Co., The, 19 Rector St., New York City.

**STOPPERS (Cinder Notch)**

Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

**STOPPERS (Rubber)**

Rhoades, R. W., Metaline Co., 50 Third St., Long Island City, N. Y.

**STORAGE BATTERIES—See BATTERIES (Storage)**

**STRAIGHTENING MACHINERY**

Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Farquhar, A. B., Co., Limited, 403 Duke St., York, Pa.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Lewis Machine Co., 3450 E. 76th St., Cleveland, O.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Medart Co., The, 3520 de Kalb St., St. Louis, Mo.
Shuster, F. B., Co., The, New Haven, Conn.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.

**SULPHURIC ACID**

Cleveland-Cliffs Iron Co., The, Union Commerce Bldg., Cleveland, O.
New Jersey Zinc Co., 160 Front St., New York City.
Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia, Pa.

**SWITCHES (Electric)**

Cutler-Hammer, Inc., 315 No. 12th St., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.

**SWITCHES (Electric)—Con.**
General Electric Co., Schenectady, N. Y.
General Electric Co., Dept. 166-S-B, Nela Park, Cleveland, O.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

**TACHOMETERS**
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.

**TANK LININGS**
Cellcote Co., 750 Rockefeller Bldg., Cleveland, O.
National Carbon Co., W. 117th St. and Madison Ave., Cleveland, O.

**TANKS (Pickling)**
National Carbon Co., W. 117th St. and Madison Ave., Cleveland, O.
United States Rubber Co., 1790 Broadway, New York City.

**TANKS (Storage, Pressure, Riveted, Welded)**
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Petroleum Iron Works Co., Sharon, Pa.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
Youngstown Steel Tank Co., Oak St. and Andrews Ave., Youngstown, O.

**TANKS—WOOD OR STEEL (Rubber or Lead Lined)**
Dietzel Lead Burning Co., Coraopolis, Pa.
United States Rubber Co., 1790 Broadway, New York City.

**TANKS AND TOWERS**
Treadwell Construction Co., Midland, Pa.

**TANTALUM CARBIDE**
Carboloy Co., Inc., 11141 E. 8 Mile Rd., Detroit, Mich.

**TAPS AND DIES**
Greenfield Tap & Die Corp., Greenfield, Mass.
Landis Machine Co., Inc., Waynesboro, Pa.
National Acme Co., The, E. 131st St. & Colt Rd., Cleveland, O.

**TESTING MACHINERY (Materials)**
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.

**TERMINALS (Locking)**
Shakeproof Lock Washer Co., 2525 N. Keelor Ave., Chicago, Ill.
Thompson-Bremer & Co., 1640 W. Hubbard St., Chicago, Ill.

**TERNE PLATE—See TIN PLATE**

**THERMOMETERS**
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

**THREAD CUTTING TOOLS**
Landis Machine Co., Inc., Waynesboro, Pa.

**TIE PLATES**
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

**TIN PLATE**
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Weirton Steel Co., Weirton W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

**TIN PLATE MACHINERY**
Aetna-Standard Engineering Co., The, Youngstown, O.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Wean Engineering Co., Warren, O.

**TITANIUM**
Vanadium Corp. of America, 420 Lexington Ave., New York City.

**TONGS (Chain Pipe)**
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

**TONGS (Rail Handling)**
Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.

**TOOL BITS (High Speed)**
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.
Jessop Steel Co., 584 Green St., Washington, Pa.

**TOOL HOLDERS**
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

**TOOLS (Pneumatic)**
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Ingersoll-Rand Co., 11 Broadway, New York City.

**TOOLS (Precision, Lathe, Metal Cutting, etc.)**
Carboloy Co., Inc., 11141 E. 8 Mile Rd., Detroit, Mich.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit, Mich.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

**TOOLS (Tantalum Carbide)**
Carboloy Co., Inc., 11141 E. 8 Mile Rd., Detroit, Mich.

**TOOLS (Tipped, Carbide)**
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit, Mich.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

**TORCHES AND BURNERS (Acetylene, Blow, Oxy-Acetylene)**
Air Reduction Sales Co., 60 E. 42nd St, New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago, Ill.

**TOWBOATS**
Dravo Corp. (Engin'r'g Works Div.), Neville Island, Pittsburgh, Pa.

**TOWERS (Transmission)**
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.

**TOWERS (Tubular Hoisting)**
Dravo Corp., (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.

**TOY PARTS**
Townsend Co., New Brighton, Pa.

**TRACK ACCESSORIES**
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

**TRACK BOLTS**
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

**TRAILERS (Arch-Girder)**
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

**TRAMRAILS**
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

**TRANSMISSIONS—VARIABLE SPEED**
Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.

**TRAPS (Steam and Radiator)**
Johns-Manville Corp., 22 E. 40th St., New York City.

**TREADS (Safety)**
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Dravo Corp. (Machinery Div.,) 300 Penn Ave., Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

**TROLLEYS**
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Ford Chain Block Div. American Chain & Cable Co. Inc., 2nd & Diamond Sts., Philadelphia, Pa.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

**TRUCKS AND TRACTORS (Electric Industrial)**
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Towmotor, Inc., 1247 E. 152nd St., Cleveland, O.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

**TRUCKS AND TRACTORS (Gasoline Industrial)**
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Clark Tructractor Div., Clark Equipment Co., Battle Creek, Mich.
Towmotor, Inc., 1247 E. 152nd St., Cleveland, O.

**TRUCKS (Dump-Industrial)**
Towmotor, Inc., 1247 E. 152nd St., Cleveland, O.

**TRUCKS (Hydraulic Lift)**
Towmotor, Inc. 1247 E. 152nd St., Cleveland, O.

**TRUCKS (Lift)**
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Clark Tructractor Div., Clark Equipment Co., Battle Creek, Mich.
Towmotor, Inc., 1247 E. 152nd St., Cleveland, O.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

**TUBE MILL EQUIPMENT**
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Tube Reducing Corp., 24 Grafton Ave., Newark, N. J.

**TUBE MILL MACHINERY**
Tube Reducing Corp., 24 Grafton Ave., Newark, N. J.

**TUBE REDUCTION**
Tube Reducing Corp., 24 Grafton Ave., Newark, N. J.

**TUBES (Boiler)**
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Standard Tube Co., The, 14600 Woodward Ave., Detroit, Mich.
Steel & Tubes Division, Republic Steel Corp., Cleveland, O.
Timken Steel & Tube Co., Canton, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

**TUBES (Brass, Bronze, Copper, Nickel Silver)**
Bridgeport Brass Co., Bridgeport, Conn.

**TUBES (High Carbon)**
Steel & Tubes Division, Republic Steel Corp., Cleveland, O.

**TUBING (Alloy Steel) (*Also Stainless)**
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
*Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Columbia Steel Co., San Francisco, Calif.
*National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Steel & Tubes Division, Republic Steel Corp., Cleveland, O.
Timken Steel & Tube Co., Canton, O.
Tube Reducing Corp., 24 Grafton Ave., Newark, N. J.

**TUBING (Seamless Steel)**
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Steel & Tubes Division, Republic Steel Corp., Cleveland, O.
Standard Tube Co., The, 14600 Woodward Ave., Detroit, Mich.
Timken Steel & Tube Co., Canton, O.
Tube Reducing Corp., 24 Grafton Ave., Newark, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

**TUBING (Copper, Brass, Aluminum)**
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich
Shenango-Penn Mold Co., Dover, O.

**TUBING (Square, Rectangular)**
Steel & Tubes Division, Republic Steel Corp., Cleveland, O.

**TUBING (Welded Steel)**
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St Louis, Mo.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Tube Co., The, 14600 Woodward Ave., Detroit, Mich.
Steel & Tubes Division, Republic Steel Corp., Cleveland, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

**TUBULAR PRODUCTS**
Steel & Tubes Division, Republic Steel Corp., Cleveland, O.

**TUMBLING BARRELS (Coke Testing)**
Brosium, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

**TUNGSTEN CARBIDE**
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.

**TUNGSTEN CARBIDE (Tools and Dies)**
Carboloy Co., Inc., 11141 E. 8 Mile Rd., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.

**TUNGSTEN METAL AND ALLOYS**
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

**TURBINES (Steam)**
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

**TURBO BLOWERS—See BLOWERS**

**TURNTABLES**
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

**TURRET LATHES—See LATHES (Turret)**

**TWIST DRILLS**
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, O.
Greenfield Tap & Die Corp., Greenfield, Mass.

**VACUUM CLEANERS**
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

**VALVE CONTROL (Motor Operated Units)**
Cutler-Hammer, Inc., 315 No. 12th St., Milwaukee, Wis.

**VALVES (Blast Furnace)**
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa

**VALVES (Brass, Iron and Steel)**
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co. Inc., Bridgeport, Conn.

**VALVES (Check)**
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co. Inc., Bridgeport, Conn.

**VALVES (Control—Air and Hydraulic)**
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hunt, C. B., & Son, Salem, O.
Ross Operating Valve Co., 6474 Epworth Blvd., Detroit, Mich.

**VALVES (Electrically Operated)**
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Hunt, C. B., & Son, Salem, O.
Ross Operating Valve Co., 6474 Epworth Blvd., Detroit, Mich.

**VALVES (Gas and Air Reversing)**
Blaw-Knox Co., Blawnox, Pa.

**VALVES (Gate)**
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Crane Co., The, 836 So. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co. Inc., Bridgeport, Conn.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

**VALVES (Globe)**
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co. Inc., Bridgeport, Conn.

**VALVES (Hydraulic)**
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Hunt, C. B., & Son, Salem, O.

**VALVES (Hydraulic De-Scaling)**
Hunt, C. B., & Son, Salem, O.

**VALVES (Lead)**
Dietzel Lead Burning Co., Coraopolis, Pa.

**VALVES (Needle)**
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co. Inc., Bridgeport, Conn.

**VALVES (Steam and Water)**
Reading-Pratt & Cady Div. of American Chain & Cable Co. Inc., Bridgeport, Conn.

**VALVES AND FITTINGS—See PIPE FITTINGS**

**VANADIUM**
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

**VIADUCTS (Steel)—See BRIDGES, ETC.**

**VISES (Bench)**
Hollands Mfg. Co., 342-352 E. 18th St., Erie, Pa.

**WALKWAYS—See FLOORING—STEEL**

**WASHERS (Gas)**
McKee, Arthur G., Co., 2422 Euclid Ave., Cleveland, O.

**WASHERS (Iron and Steel)**
Hubbard, M. D., Spring Co., 409 Central Ave., Pontiac, Mich.
Thompson-Bremer & Co., 1640 W. Hubbard St., Chicago, Ill.

**WASHERS (Lock)**
American Nut & Bolt Fastener Co., Pittsburgh, Pa.
Beall Tool Co., East Alton, Ill.
Butcher & Hart Mfg. Co., Toledo, O.
Eaton Mfg. Co., Massillon, O.
National Lock Washer Co., The, Newark, N. J. and Milwaukee, Wis.
Philadelphia Steel & Wire Corp., Germantown, Philadelphia, Pa.
Positive Lock Washer Co., Newark, N. J.
Shakeproof Lock Washer Co., 2525 N. Keelor Ave., Chicago, Ill.
Thompson-Bremer & Co., 1640 W. Hubbard St., Chicago, Ill.
Washburn Co., The, Worcester, Mass.

**WASHERS (Spring)**
American Nut & Bolt Fastener Co., Pittsburgh, Pa.
Beall Tool Co., East Alton, Ill.
Butcher & Hart Mfg. Co., Toledo, O.
Eaton Mfg. Co., Massillon, O.
National Lock Washer Co., The, Newark, N. J., and Milwaukee, Wis.
Philadelphia Steel & Wire Corp., Germantown, Philadelphia, Pa.
Positive Lock Washer Co., Newark, N. J.
Shakeproof Lock Washer Co., 2525 N. Keelor Ave., Chicago, Ill.
Thompson-Bremer & Co., 1640 W. Hubbard St., Chicago, Ill.

**WELDERS (Electric—Arc, Spot, Seam, Flash, Butt, Automatic Projection, Hydromatic, Etc.)**
Federal Machine & Welder Co., Dana St., Warren, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-15.
Welding Equipment & Supply Co., 2720 E. Grand Blvd., Detroit, Mich.

**WELDING**
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-15.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

**WELDING AND CUTTING APPARATUS AND SUPPLIES (Electric)**
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-15.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago, Ill.
Wilson Welder & Metals Co., 60 E. 42nd St., New York City.
Welding Equipment & Supply Co., 2720 E. Grand Blvd., Detroit, Mich.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

**WELDING AND CUTTING APPARATUS AND SUPPLIES (Oxy-Acetylene)**
Air Reduction Sales Co., 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago, Ill.
Welding Equipment & Supply Co., 2720 E. Grand Blvd., Detroit, Mich.

**WELDING RODS (Alloys)**
American Agile Corp., 5806 Hough Ave., Cleveland, O.
Champion Rivet Co., The, Harvard Ave. at E. 108th St., Cleveland, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-15.
Maurath, Inc., 7311 Union Ave., Cleveland, O.
Metal & Thermit Corp., 120 Broadway, New York City.
Page Steel & Wire Div. of American Chain & Cable Co. Inc., Monessen, Pa.
Welding Equipment & Supply Co., 2720 E. Grand Blvd., Detroit, Mich.

**WELDING RODS (Bronze)**
Welding Equipment & Supply Co., 2720 E. Grand Blvd., Detroit, Mich.

**WELDING RODS OR WIRE**
Air Reduction Sales Co., 60 East 42nd St., New York City.
American Agile Corp., 5806 Hough Ave., Cleveland, O.
American Brass Co., The, Waterbury, Conn.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bridgeport Brass Co., Bridgeport, Conn.
Champion Rivet Co., The, Harvard Ave. at E. 108th St. Cleveland, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-15.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
Maurath, Inc., 7311 Union Ave., Cleveland, O.
Metal & Thermit Corp., 120 Broadway, New York City.
National Cylinder Gas Co., 205 W. Wacker Dr., Chicago, Ill.
Page Steel & Wire Div. of American Chain & Cable Co. Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Seneca Wire & Mfg. Co., Fostoria, O.
Washburn Wire Co., Phillipsdale, R. I.
Welding Equipment & Supply Co., 2720 E. Grand Blvd., Detroit, Mich.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Wilson Welder & Metals Co., 60 East 42nd St., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

**WHEELS (Car and Locomotive)**
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.

**WHEELS (Track)**
National-Erie Corp., Erie, Pa.

**WINCHES (Electric)**
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

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*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Firth-Sterling Steel Co., McKeesport, Pa.
*Page Steel & Wire Div. of American Chain & Cable Co. Inc., Monessen, Pa.
*Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Seneca Wire & Mfg. Co., Fostoria, O.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

**WIRE (Annealed, Bright, Galvanized)**
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Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co. Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Seneca Wire & Mfg. Co., Fostoria, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

**WIRE (Barb)**
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Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

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Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co. Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
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Washburn Wire Co.,
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Columbia Steel Co.,
Los Angeles, Calif.
Page Steel & Wire Div., of
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Monessen, Pa.
Republic Steel Corp., Dept. ST,
Cleveland, O.
Seneca Wire & Mfg. Co.,
Fostoria, O.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.
Washburn Wire Co.,
118th St. and Harlem River,
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Wickwire Spencer Steel Co.,
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Youngstown Sheet & Tube Co., The
Youngstown, O.

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Bethlehem Steel Co.,
Bethlehem, Pa.
Firth-Sterling Steel Co.,
McKeesport, Pa.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg.,
St. Louis, Mo.
Page Steel & Wire Div. of
American Chain & Cable Co., Inc.,
Monessen, Pa.
Pittsburgh Steel Co.,
653 Grant Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.
Washburn Wire Co., 118th St. &
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Pittsburgh Steel Co., 1653 Grant
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Townsend Co., New Brighton, Pa.

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Ludlow-Saylor Wire Co., The,
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Morgan Construction Co.,
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Pittsburgh Steel Co.,
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Republic Steel Corp., Dept. ST,
Cleveland, O.
Seneca Wire & Mfg. Co.,
Fostoria, O.
Tennessee Coal, Iron & Railroad
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*American Steel & Wire Co.,
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Bethlehem Steel Co.,
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Hazard Wire Rope Div. of American
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Jones & Laughlin Steel Corp.,
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# ADVERTISING INDEX

**Where-to-Buy Products Index carried in first issue of month.**

# ✦ ✦ ADVERTISING INDEX ✦ ✦

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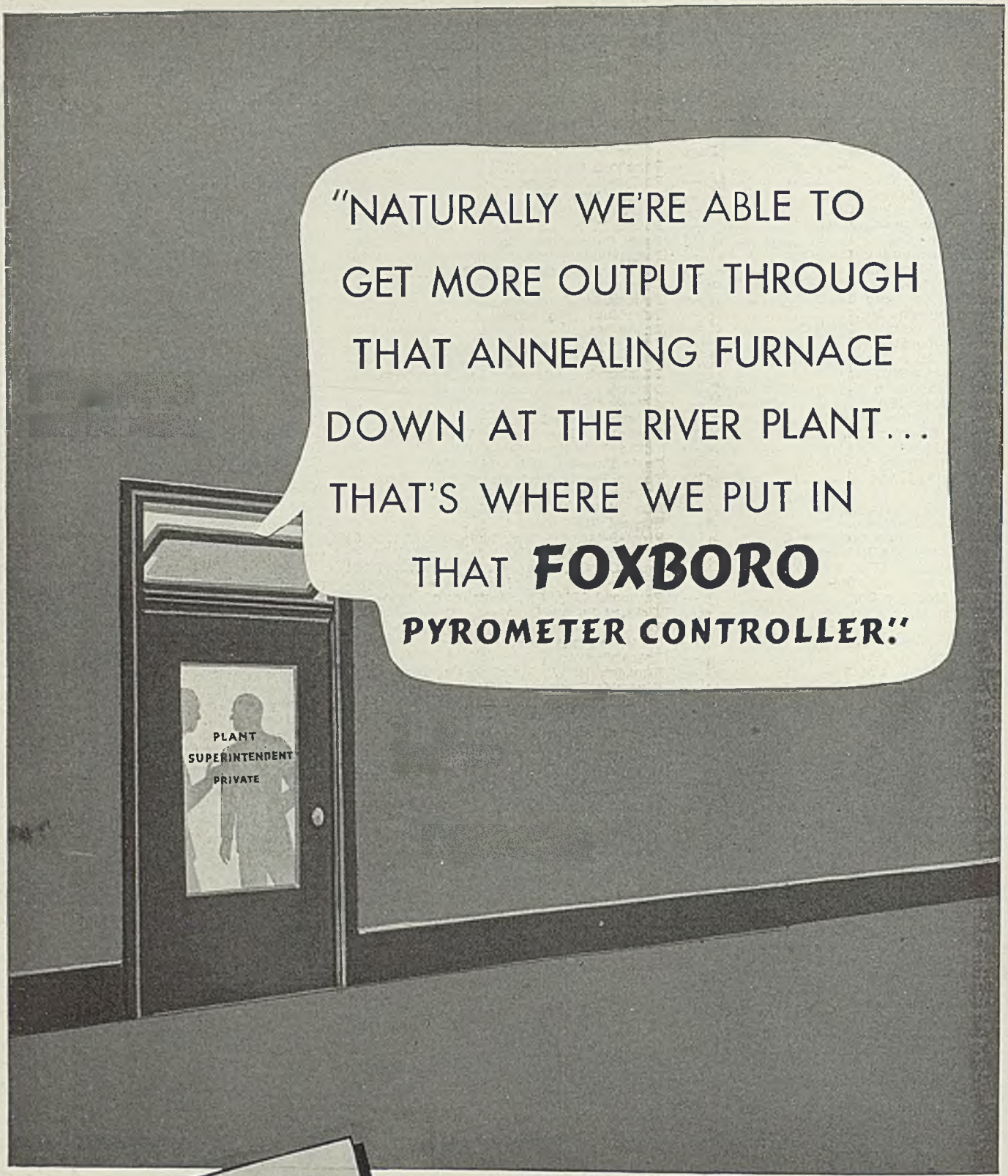


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