

# STEEL

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For forty-eight years—IRON TRADE REVIEW

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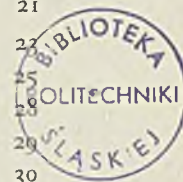
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As the Editor Views the News . . . . .	21
Four Union Groups in Steel; More Wage Adjustments . . . . .	22
Financial Reports Disclose Widespread Profits Pick-Up . . . . .	23
Bethlehem Plans New Rod and Bar Mill . . . . .	24
Republic Steel Corp. Opens Niles Tin Plate Plant . . . . .	29
Steel Imports Lower in January . . . . .	30
Steelworks Operations for the Week . . . . .	31
All-Time Record for February Ingots . . . . .	31
Men of Industry . . . . .	32
Obituaries . . . . .	33
Activities of Steel Users and Makers . . . . .	35
Mirrors of Motordom . . . . .	37
Windows of Washington . . . . .	41
No Single Formula Will Suit Varied Labor Situations— <i>Editorial</i> . . . . .	43
The Business Trend—Charts and Statistics . . . . .	44
Which Grain Size? . . . . .	46
Materials Handling . . . . .	53
Surface Treatment and Finishing of Metals . . . . .	60
Welding, Etc.— <i>Robert E. Kinhead</i> . . . . .	64
Molybdenum-Tungsten Steel Widely Accepted . . . . .	66
Power Drives . . . . .	70
New 4-High Mill Rolls Strip for Tinning . . . . .	72
Stainless Billets Cut by Oxyacetylene Flame . . . . .	73
New Furnace Treats Rails . . . . .	74
Unusual Caisson Strengthens Bridge Pier . . . . .	76
Automatic Clutch and Transmission for Motor Coaches . . . . .	79
Discuss Foundry Problems at Birmingham . . . . .	85
Progress in Steelmaking . . . . .	86
New Equipment Descriptions . . . . .	91
Recent Publications of Manufacturers . . . . .	100
Market Reports and Prices . . . . .	103-124
New Construction and Incorporations . . . . .	125
Index to Advertisers . . . . .	132



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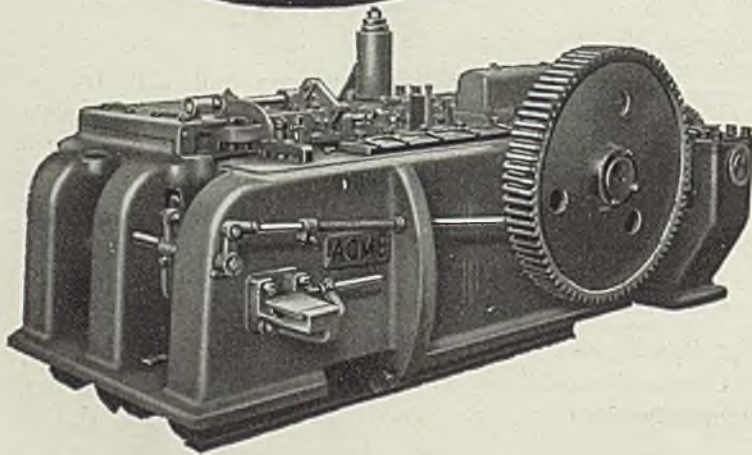
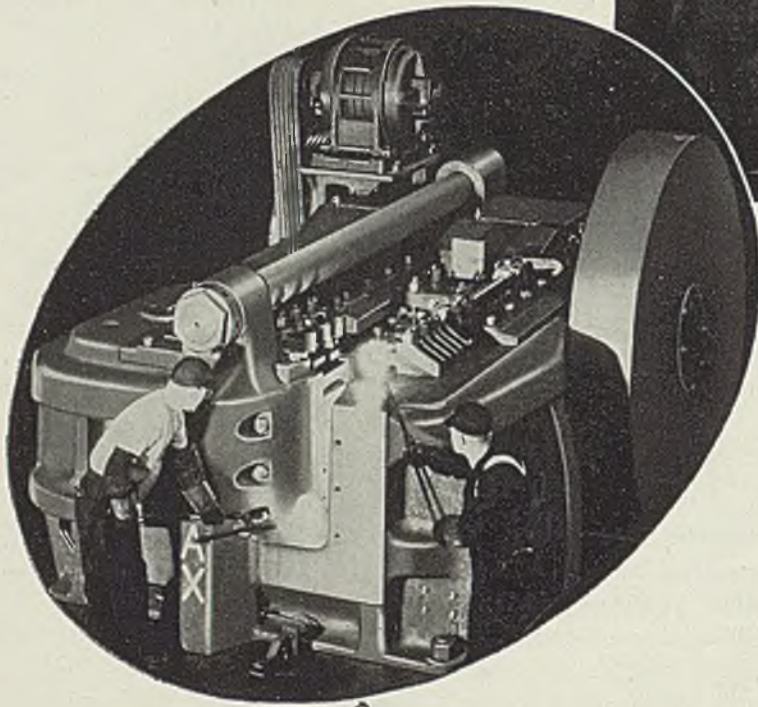
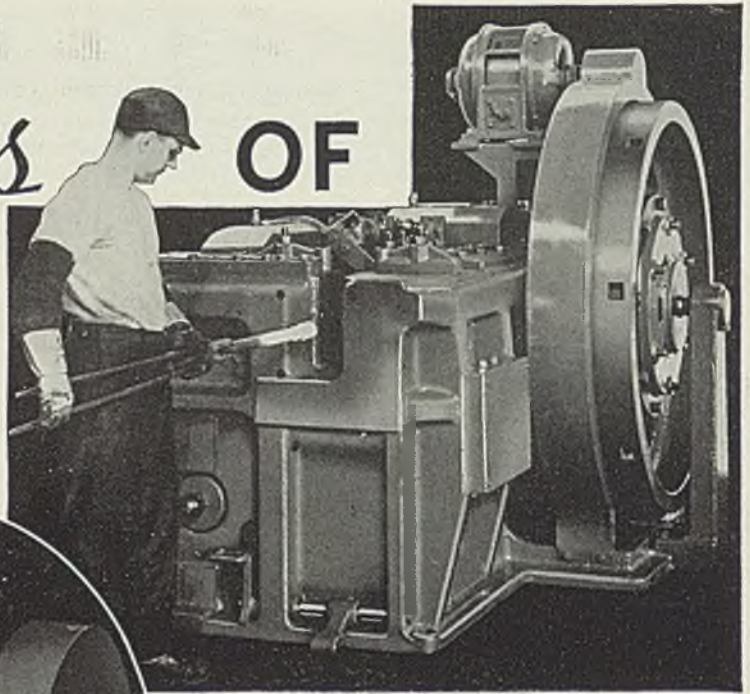
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## As the Editor Views the News

**H**IGHLIGHTING industrial news of the week is the sharp contrast between the labor situations in steel and motordom. While a new outbreak of strikes in and around Detroit was reducing automobile output from 126,925 to 101,684 units (p. 37), steelworks operations were being maintained at 87 per cent of capacity (p. 31), under peaceful labor conditions. Executives of U. S. Steel and of some of the independent steel producers conferred with representatives of their employes (p. 23) on the details of the wage and hour changes announced in the previous week. No outward signs of discord were apparent while these negotiations were in progress.

• • •

Notwithstanding this surface calm, a strong undercurrent of suspense prevails throughout the iron, steel and metalworking industries. Employers and employees in hundreds of plants are waiting for the next act in the drama of labor relations in the steel industry. Will the independent producers follow the lead of

### Await Cues in Steel Drama

the Steel Corporation in recognizing an outside union, or will they pursue a different course? The outcome on this point (p. 43) will exert a strong influence upon future developments, not only in regard to the labor movement generally but also in the alignment of companies in the primary and secondary divisions of industry.

• • •

Traditionally the action of U. S. Steel on matters of public policy has been the signal for similar action by the majority of independent producers. In some instances it has been possible to trace the influence of the Corporation's example through the processing and fabricating branches of industry to the very shipping

### Will Tradition Be Broken?

platforms of the remotest manufacturers. A definite rift in the primary steel industry over labor relations probably would weaken the force of this tradi-

tion. It might result in the formation of two factions in steelmaking, with the Corporation and some independents in one camp, and a group of dissenting independents in the other. Thousands of employes and employers today are speculating upon the implications of a situation of this kind. The majority of industrial companies will continue to sit tight until the policies of the major steel producers have been decided.

• • •

Intraplant and interplant handling of materials and parts has become such an important factor in efficient manufacturing that some companies now look upon materials handling as a major division of plant operation. One company has recognized this condition by establishing a materials handling department (p. 53), under the direction of a materials supervisor, who has authority over materials distribution in all operating departments. The problem differs so radically in metalworking establishments of differing character and size that the separate department plan probably is adapted to conditions in a limited number of plants. Nevertheless the idea indicates that effective organization, as well as good equipment, is essential to economical materials handling.

### Organization Is Important

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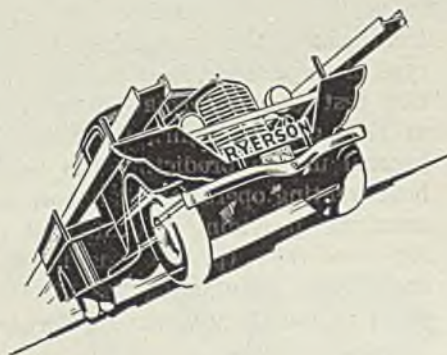
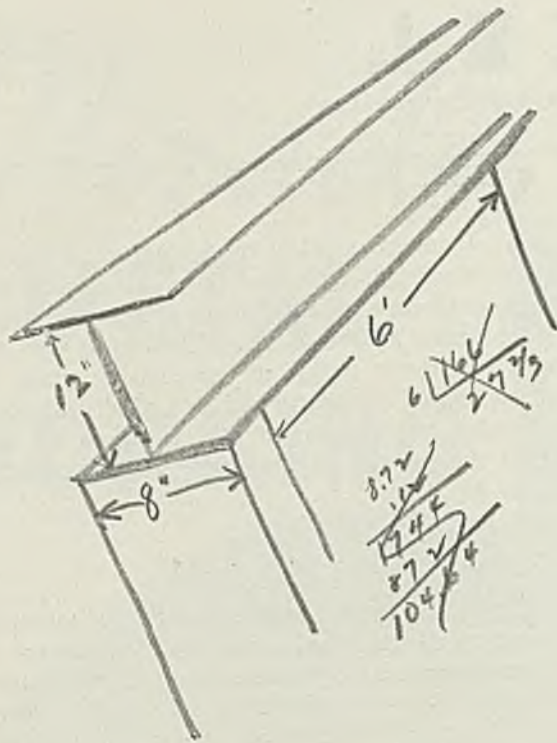
Metallurgists and others who deal with the behavior of steel always can find grounds for argument when the subject of grain size is introduced.

### Predicting Steel Behavior

In an article entitled "Which Grain Size?" (p. 46) three authorities, discussing the McQuaid-Ehn test, arrive at the conclusion that grain surface at the temperature of treatment is the essential factor in determining the type of response to heat treatment. As the McQuaid-Ehn test gives information as to grain surface only at 1700 degrees Fahr., the authors declare that its general use in predicting the behavior of steels in heat treating operations is not warranted. . . . Equipment for providing a controlled thermal treatment for steel rails (p. 74) was inspected last week at the formal opening of the U S S Brunorized rail plant at the Gary works of Carnegie-Illinois.

*E. L. Shaner*





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# Four Union Groups Working in Steel; Wage-Salary Adjustments Spread

**P**EACEFUL adjustments continued to be made last week in the steel labor situation, with wage increases extended to skilled and semiskilled classes and liberalizing of vacation policies. Indications are that the wage and salary advances will shortly blanket the industry.

The Steel Workers Organizing committee has not pushed its demands for recognition from independent steel companies, following its contract with Carnegie-Illinois. The industry now is confronted with four organized labor groups: SWOC, employe representatives, American Federation of Labor, and in the Chicago district employe representatives who have apparently set up an independent union.

In automobile plants the labor situation continues highly unsettled, with new flare-ups occurring almost daily. As of last Friday, nine plants of Chrysler Corp. in the Detroit area were closed, throwing 65,000 out of work. A similar situation prevailed at three Hudson Motor Co. plants, affecting 10,000. Late in the week, a strike closed the plant of Reo Motor Car Co. at Lansing, Mich., where 3000 are employed.

## Situation Is Confusing

Thousands of employes in parts manufacturers' plants have been made jobless by these shutdowns, and sporadic sitdowns in other plants have added to the confusion.

Carnegie-Illinois Steel Corp. announced a salary increase for "white collar" employes, effective March 16. It will benefit all office workers making \$5000 a year or less and includes more than 4000 men and women in the Pittsburgh area alone.

"Individual adjustments may be made for more than 10 per cent, but the total adjustments must not exceed more than 10 per cent of the salaries for the employes affected in each group," the company said.

With this announcement, Carnegie-

Illinois brings to an end its current pay rate revisions. Only the important question of vacations with pay, a concession won for the first time last year for the hundreds of thousands of steelworkers, remains to be settled. No conclusion on vacations has been reached.

While the company's employe representatives argued that vacations up to two weeks should be granted workers of long service, the management took the stand that last year's paid holiday for steelworkers did not create precedent and that capacity mill production schedules likely to

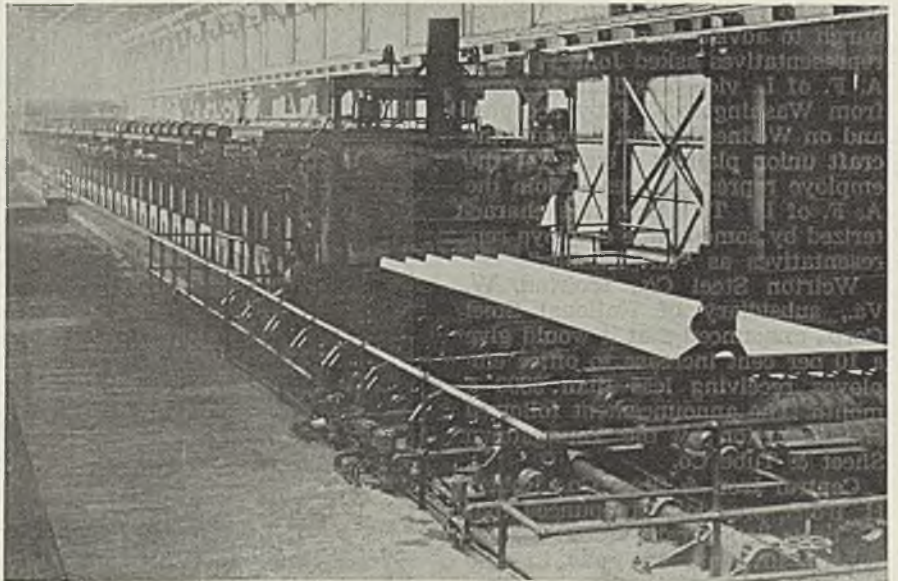
run into early summer make it difficult to set up a vacation schedule.

The 80 cents a day wage raise for all skilled and semiskilled steel workers, announced through the grievance committee, and other concessions made recently are expected to be covered in a comprehensive contract.

Carnegie-Illinois' employe representatives in the Pittsburgh district lost no time looking out for their own interests after learning that the CIO had succeeded in gaining recognition.

Members of the newly formed

## Railroad Executives Inspect New Furnace for Treating Rails



**S**EVERAL hundred railroad presidents, engineers and leading industrialists were guests of the Carnegie-Illinois Steel Corp. March 10 for inspection of the new Brunorized rail plant, Gary works. At dinner at the Blackstone hotel, Chicago, brief talks were given by B. F. Fairless, president of the company; W. A. Irvin, president, United States Steel Corp.; and C. E. Denney, president, Erie railroad, who spoke for the railway group. The Brunorizing process embodies special reheating methods that refine grain size in steel rails to give them greater stamina. See article page 74



grievance committee assumed full power to negotiate for its adherents.

"We cannot permit the representatives of a small minority to dictate the policy which shall govern our constituents and possibly prove detrimental to their welfare," explained the group, referring to the CIO.

The employe representative committee obtained a conference with Carnegie-Illinois officials and later announced that it had secured 10 cents an hour increase for semi-skilled and skilled workers. It made a request for paid vacations next summer. It asked that paydays be changed to every other Friday instead of the twice-a-month schedule now in force.

Meanwhile, CIO officials indicated that they prefer to proceed with Carnegie-Illinois toward completion of the agreement signed March 2, before becoming involved with independent producers. No definite announcement was made, however.

Monday, March 15 CIO leaders and Carnegie-Illinois officials are scheduled to meet in a conference which was provided for in the agreement of March 2 and which will be "for the purpose of effectuating a written agreement on working conditions, application of wage rates, hours, rules and a method of adjudication and disputes arising under the terms of the agreement." Originally scheduled for March 10, this conference was postponed by mutual agreement.

#### Union Plan Unworkable

Rebuffed by William Green, president, American Federation of Labor, who refused to come to Pittsburgh to advise them, the employe representatives asked John P. Frey, A. F. of L. vice president, to come from Washington. Frey accepted and on Wednesday put forward the craft union plan as a basis for the employe representatives to join the A. F. of L. This plan was characterized by some of the employe representatives as "unworkable."

Weirton Steel Co., Weirton, W. Va., subsidiary of National Steel Corp., announced that it would give a 10 per cent increase to office employes receiving less than \$300 a month. The announcement followed similar action by the Youngstown Sheet & Tube Co.

Central Iron & Steel Co., Robert H. Irons, president, announced that its basic labor rate would be advanced 10 cents an hour in conformity with action taken by other steel companies. The company is one of the largest producers of steel for the federal government, particularly the navy department, and adoption of the 40-hour week, time and one-half for overtime, will meet requirements of the Walsh-Healey act. Central Iron & Steel has about completed contracts for seven de-

stroyers, three submarines and a 10,000-ton cruiser for the navy.

American Rolling Mill Co., Middletown, O., raised wages 10 cents an hour. This will increase its payroll approximately \$3,000,000 per year and affects more than 14,000 hourly employes. Salaries of employes in most brackets also will be raised.

#### REPUBLIC ANNOUNCES WAGE ADJUSTMENT, VACATION PLAN

Wage adjustment and a 1937 vacation plan for the 42,000 employes of Republic Steel Corp.'s northern mills and subsidiaries were announced last week following a conference between 18 employe representatives and the management.

Employes on the payroll May 1 with a record of three years or more continuous service will be entitled to vacations with pay during the current year, or at their option additional pay in lieu of vacation.

Employes with three years' service and less than five will receive three days' vacation; those with five years' service and less than ten, six days; those with ten years' service and less than 15, 8 days; those with 15 years' service or over, ten days. Daily pay under the vacation plan will be computed on average hourly earnings for April, first full month

at new wage schedule, multiplied by eight (hours in average working day).

Workers in the northern mills will receive an increase of 10 cents an hour. This will apply to all hourly, tonnage, day and piece workers and represents adjustments not covered by increase from 52½ cents an hour to 62½ cents recently announced for common labor, effective March 16.

Time and a half will be paid to all hourly, tonnage, and piece rate workers for all overtime in excess of eight hours in any one day and in excess of 40 hours per week, but overtime will not be paid twice for the same hours. Working hour schedules now in force will be continued for the present.

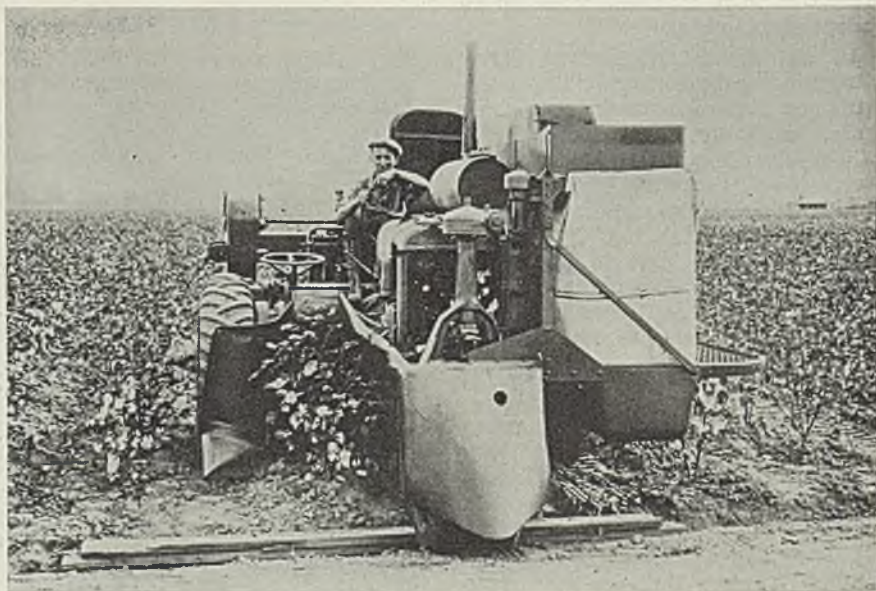
Plant employes' salaries will be adjusted on a basis of 10 cents per hour.

#### STEEL & WIRE EMPLOYEES DISCUSS VACATION POLICY

Liberalization of vacation policy was among questions discussed by the advisory committee of the employe representation plan of the American Steel & Wire Co. at Cleveland last week.

After deliberating among themselves on this, details of seniority, \$5 minimum wage in all districts and hourly working schedules under

### Potential Steel Market Seen In Cotton Pickers



**A** LARGE potential market for steel and machinery may be opened if current efforts to manufacture a mechanical cotton picker for general use are successful. Although such experiments are not new, having been recorded as long ago as 1850, the McCormick-Deering Farmall picker, shown above, is the latest product of one of the present leaders in the field, International Harvester Co., Chicago. Manufacture of pickers for commercial sale is not expected for some time. According to experts, the social and economic dangers inherent in possible displacement of human labor are not as great as they have been represented. However, on a plantation yielding half a bale an acre, such a machine equals the capacity of 20 to 25 hand-pickers



the new wage and hour agreement, committee members discussed the problems with the management. All were taken under advisement.

Committee went on record as supporting the employe representation plan "as the best collective bargaining method for company employes."

Representatives from Cleveland, Pittsburgh, Duluth, Chicago and Worcester, Mass., districts attended.

#### JONES & LAUGHLIN GIVES INCREASES, VACATIONS

Jones & Laughlin Steel Corp., Pittsburgh, has granted 15 per cent salary increases to employes earning under \$2500, with advances to those between \$2500 and \$5000, graduated downward. Skilled and semi-skilled workers will be raised 10 cents an hour with time and a half for overtime. Piecework and tonnage rates will be adjusted to yield a similar increase.

Annual vacations of one week with pay will be continued for hourly and tonnage workers with five years or longer service.

#### BETHLEHEM MAKES ANNUAL REPORT TO EMPLOYEES

An innovation in corporate reporting activities was announced by Bethlehem Steel Corp. in its "Annual Report to Employes," contained in the company's magazine *Bethlehem Review*. Wage increases pension status, vacations with pay and similar topics are covered.

The report emphasizes that Bethlehem for many years has practiced collective bargaining in dealing with employes, before the principle became publicized and enacted into law. Last year 722 major cases were settled, 592 in favor of the employes. Vacations with pay will be continued, following the plan's inauguration in 1936. Pension disbursements last year amounted to \$840,000, paid entirely by the corporation. Since the fund was started, \$8,434,820 has been paid out.

#### ALL-TIME EMPLOYMENT RECORD IN JANUARY

An all-time record of 548,000 persons on the steel industry's payrolls was attained during January, the American Iron and Steel institute announced last week. The report represents companies employing approximately 95 per cent of the industry's workers.

Employment in January showed a gain of 76,000 workers, or 18 per cent over 1929, and nearly 21 per cent over January, 1936. Of the 548,000 employes in January, 496,000 were wage earners paid on an hourly, piecework or tonnage basis.

Owing to the Ohio river flood, and strikes in some consuming industries, total payrolls of the industry in January were slightly lower than in December, 1936.

# Financial Reports Reveal Widespread Profit Pick-Up

UNITED STATES STEEL CORP., in its pamphlet report sets forth as net income for 1936 of \$50,583,356, compared with \$1,146,708 for 1935.

This sum available for dividends remained from gross earnings of \$112,320,376 after payment of depreciation, depletion and obsolescence allowances of \$56,818,589, and interest charges of \$4,918,431. Dividends paid on preferred stock included the regular 7 per cent and a total of 7 per cent on arrearages. State and local, federal and social security taxes amounted to \$52,895,411.72.

The corporation's financial position as of Dec. 31, 1936, compared with the corresponding date of the preceding year, is shown in the following table. Net working assets are after deduction of declared dividends which do not become due and payable until after close of the current year.

	Dec. 31, 1936	Dec. 31, 1935
Gross working assets, incl. advances on contracts, etc....	\$488,583,356	\$456,852,996
Current liabilities	103,557,709	69,531,148
Net working assets	\$385,025,647	\$387,321,848

A broadening and expanding demand for all iron and steel products, the report stated, was brought about by the revival in general business activity which was noticeable at the beginning of 1936 and which became increasingly evident as the year progressed. Except for interruptions caused by unusually severe winter weather and flood conditions in March, the improvement continued by gradual steps to the end of the year.

Significantly, the report states that no part of the increased income for the year came from higher prices. In fact, prices for domestic sales in 1936 averaged approximately 2.1 per cent lower than those on equivalent tonnage of similar products for 1935.

The improved showing arose primarily from an increase of approximately 47 per cent in the aggregate tonnage of rolled and finished products shipped. In 1936 this total was 11,029,616 tons, against 3,555,403 tons in 1935.

"The improvement has come about through a regularly advancing volume of orders, the expansion being identified more prominently and definitely than in recent years in those classes of steel products which

commonly are referred to as durable or capital goods," says the report.

The corporation as a whole operated at a rate of 59.3 per cent of capacity of rolled and finished steel products during 1936. In 1935 the average rate was 38.8. A decrease of 884,600 tons in the rated capacity of steel ingots and castings as of Jan. 1, 1937, compared with the previous year has come about from the dismantling of obsolete bessemer furnaces and from changed operating practices in open hearth furnaces, necessitated by the proportionately large volume of special and alloy steels now produced in place of former ordinary steels.

Annual capacities of the subsidiary companies in the following lines of production at Jan. 1, 1937 were:

	Tons
Blast furnace, pig iron, spiegel and ferromanganese	20,665,000
Steel ingots and castings	25,772,400
Rolled and finished steel products for sale	17,929,400

Shipments of all classes of products in 1936 compared with shipments during 1935 were as follows:

	Domestic and Export Shipments	
	1936 Tons	1935 Tons
Rolled and finished steel products	10,784,273	7,347,549
Pig iron, ingots, ferro and scrap	763,257	277,199
Limestone, coal, coke and iron ore	3,057,383	2,797,809
Sundry materials and by-products	417,093	249,598
Total	15,022,006	10,672,155

Employment in 1936 averaged 222,372 workers, contrasted with 194,820 in 1935, a gain of 27,552. Total pay rolls increased \$87,289,313 during 1936 to \$338,866,121, from \$251,576,808 in 1935. Average hours worked per week per employe was 39.6 in 1936.

Under the corporation's plan, 854 retiring employes were granted pensions during 1936. The total accumulative number of pensions in force Dec. 31 was 12,454.

Expenditures by the corporation and subsidiaries in 1936 for improvements, expansion and purchase of additional capital property totaled \$76,480,863.

Included in this amount was \$54,951,681 for manufacturing properties, exclusive of by-product coke plants; \$4,037,437 for by-product coke plants; \$1,337,970 for coal properties; \$598,773 for iron ore proper-



ties; \$13,804,228 for railroads, and \$800,880 for water.

The number of stockholders Dec. 31, 1936, was 217,055, compared with 231,901, Dec. 31, 1935.

### **BETHLEHEM'S NET INCOME MORE THAN TRIPLE 1935**

Net income of the Bethlehem Steel Corp. last year of \$13,901,006 more than tripled the \$4,291,253 reported for the preceding year of 1935. This and other striking gains in the position of the corporation in 1936 were revealed in the annual report issued last week.

The net billed value of products shipped and of other classes of business done during the year was \$288,053,862, against \$192,836,148 in 1935; estimated net amount of business booked was \$337,729,073, against \$210,033,718; and the estimated net billing value of unfilled orders Dec. 31 was \$123,690,462, compared with \$74,015,251 at the end of the preceding year.

Cash expenditures for additions and improvements to properties during 1936 amounted to \$16,193,549. Estimated cost of completing the construction authorized and in progress at the end of the year was \$38,118,800, with principal construction under way at Sparrows Point, Md.

Cash and demand deposits at the end of 1936 in banks and marketable securities valued at the lower of cost or market amounted to \$36,890,906 (excluding \$24,908,000 on deposit with a trustee), compared with \$31,819,219 at the end of 1935.

An increase of more than 50 per cent was provided for taxes, the aggregate allowance for such purposes being \$12,033,346, against \$7,511,254 for the preceding year. The provision for 1936 included \$1,317,812 for unemployment insurance and railroad retirement taxes.

### **Properties Are Consolidated**

Ten of the subsidiary companies were merged or dissolved in 1936 as a part of the program for consolidating in ownership the physical properties of the subsidiary companies and reducing the number of such companies.

The daily average number of employees during the year, excluding Saturdays, Sundays and holidays, was 66,694, against 50,522, with the number for December 85,822, up approximately 23 per cent from the corresponding month in 1935. Average earnings per hour of employees, exclusive of selling and administrative forces, was 72.1 cents, against 70.7 cents in 1935.

Operating employees of five years or more affiliation were granted one week's vacation with pay at a cost of approximately \$990,000. Vacations previously had been limited chiefly to office and clerical forces.

Pensions to retired employes amounted to \$839,844, compared with \$840,255 in the preceding year; \$1,171,661 was paid under the corporation's relief plan for sickness or disability, and to dependents of deceased employes.

Total income, after all charges except depletion and depreciation, was \$29,953,857, against \$18,873,152. Current assets on Dec. 31 were \$145,635,176, including \$75,792,021 inventories, compared with \$108,742,597, including \$57,701,507 inventories the preceding year. Current liabilities were \$40,616,016, against \$26,391,306.

Surplus was \$57,562,527, against \$74,487,447, reflecting the issuance of 933,887 shares of 5 per cent preferred stock to eliminate arrears in the same number of 7 per cent shares early in 1936, coincident with the transformation of the New Jersey corporation into the present Delaware corporation.

### **REPUBLIC STEEL SHOWS SUBSTANTIAL PROGRESS**

Republic Steel Corp., summarizes substantial progress since September, 1935, in its annual report. Net profit for 1936 amounted to \$9,586,922 after depreciation, depletion, interest, taxes and other charges. Corresponding profit for 1935 was \$4,455,734.

Position of the corporation as affecting prospective dividends on common stock has been materially changed since September, 1935. T. M. Girdler, chairman and president, says.

"At that time unpaid preferred stock dividends amounted to more than \$17,500,000. The corporation had an earned surplus deficit of more than \$2,500,000. Its working capital was approximately \$38,000,000 and it faced a mortgage restriction which prevented dividend payments until some \$29,000,000 surplus could be restored.

"By comparison, as of Dec. 31, 1936, cumulative unpaid dividends on the preferred stock amounted to approximately \$3,000,000, the earned surplus of the corporation as shown by the balance sheet was \$2,709,769, its working capital has been increased to approximately \$73,000,000 and the mortgage which contained the restriction had been cancelled through refunding of bonds."

### **Report Includes Subsidiaries**

Much of the improvement in elimination of cumulative dividends was credited to exchange by stockholders of the 6 per cent cumulative convertible preferred, to prior preference and common under the plan adopted in September, 1935. Eighty per cent of the preferred had been exchanged when the offer was withdrawn Dec. 7, 1936. Similarly 98.5 per cent of Truscon Steel Co. preferred had been exchanged on termination of offer for this issue on

Dec. 4, 1936. Operations of Truscon Steel Co. and of Corrigan, McKinney Steel Co. are included in the Republic financial statements.

Operating facilities received a large share of attention with the starting of construction of a 98-inch continuous strip mill at Cleveland, which when completed late this year will have an annual capacity of 720,000 tons. Additions were made to electric weld tube mills at Youngstown. At Warren, O., improvements to increase tin plate production were made. A completely integrated four-stand tandem cold strip mill at Niles, O., and other improvements recently have been completed (see page 72).

Rate of operations for the year was 70.9 per cent of capacity and for the last quarter was 80.3 per cent, with that rate holding through January and February of 1937.

### **EARNINGS STATEMENTS**

Wheeling Steel Corp., Wheeling, W. Va., reports net earnings of \$4,115,387 for 1936, compared with \$3,497,626 in 1935. This equals \$4.70 a share on the common after provision for only annual requirements on the preferred stock, against \$3.11 in 1935. Accumulated dividends on the preferred stock as of Dec. 31, 1936, totaled \$23.50 a share. The company charged directly to earned surplus losses of \$751,037, attributed to the flood of March, 1936.

\* \* \*

Sharon Steel Corp., Sharon, Pa., reports net income of \$1,305,852 for 1936, after all charges including a provision of \$44,000 for surtax on undistributed profits; compared with \$1,009,153 in 1935. Net sales totaling \$21,185,510 gained 36 per cent and operations averaged 87 per cent of ingot capacity throughout 1936.

\* \* \*

Eastern Rolling Mill Co., Baltimore, reports net income of \$72,074 for 1936, compared with a net loss of \$134,267 in 1935. This equals 34 cents a share against a deficit of 64 cents in 1935.

\* \* \*

In its annual report Otis Steel Co., Cleveland, shows net profit of \$1,980,149 for 1936, compared with \$2,228,664 in 1935. Last year's profit was reached after charges in excess of \$600,000 for increased provision against depreciation, federal security tax and federal tax on undistributed earnings for which no provision was necessary in 1935.

\* \* \*

Sloss-Sheffield Steel & Iron Co., Birmingham, reports net income of \$868,463 for 1936, including provision of \$98,728 for surtax on undistributed profits. In the preceding



year it reported a net loss of \$25,220.

Taylor-Wharton Iron & Steel Co., High Bridge, N. J., reports net profit of \$88,667 for 1936, compared with \$31,073 in 1935.

### CLEVELAND-CLIFFS LOOKS FOR CAPACITY YEAR

Cleveland-Cliffs Iron Co., Cleveland, records a sharp reduction in funded debt, increase in volume of business and earnings, further reduction of inventory and improved credit position in its pamphlet report for 1936.

The report signed by E. B. Greene, president, and W. G. Mather, chairman, says "We are looking forward to a year that will test our capacity."

Net earnings were \$3,145,294 after depreciation, depletion, taxes and interest. In addition, company's equity in net profit of subsidiaries approximated \$251,000. In 1935 Cleveland-Cliffs' net totaled \$2,440,547.

Collateral loans were reduced from \$5,000,000 to \$1,664,802 during the year, and since have been eliminated, the balance sheet shows. First mortgage sinking fund bonds at year's end had been reduced to \$14,894,647. Total funded debt was thus cut from \$21,050,000 a year ago to \$16,559,449 on Dec. 31, and now totals \$14,894,647. Debt reduction was effected partly through sale of collateral and partly from treasury cash.

Current assets are \$13,953,104, in-

cluding \$3,436,165 cash, and current liabilities are \$4,637,746. Company earned \$6 a share of preferred stock and paid dividends of \$3, leaving an accumulation of \$24.66 a share Dec. 31.

Company's ore shipments increased 45 per cent from 2,969,234 tons to 4,307,216 tons. Shipments of logs, saw wood, chemical wood and coal also increased.

### SHEET & TUBE RESUMES DIVIDEND ON COMMON

Youngstown Sheet & Tube Co. has declared a regular quarterly dividend of 75 cents per share on its common shares, payable April 1 to record March 20.

The board of directors called for redemption on April 20 of \$5,000,000 principal amount of convertible 3½ per cent debentures, at par and accrued interest, with a premium of 4 per cent on the principal amount. The numbers of debentures to be called will be determined by lot by the Guaranty Trust Co., New York. These debentures may be converted on or before, but not after, date of redemption, on the basis of 16 common shares for each \$1000 principal amount.

With the completion of this redemption, more than \$20,000,000 of the \$30,000,000 convertible debentures originally issued will have been converted or redeemed, leaving less than \$10,000,000 still outstanding.

## Ferromanganese Advanced \$15

FERROMANGANESE will be advanced \$15 to \$95, duty paid, effective April 1 on contracts and March 15 on spot business. Silicomanganese is advanced \$11, to \$100 for 2½ per cent, \$105 for 2 per cent and \$115 for 1 per cent.

Manganese briquets are up ¼-cent to 5 cents per pound in car lots, 5½ cents in ton lots and 5¾ cents in less than ton lots.

Ferrochrome is advanced ½ cent to 10½ cents with spot up correspondingly. Low carbon ferrochrome is unchanged.

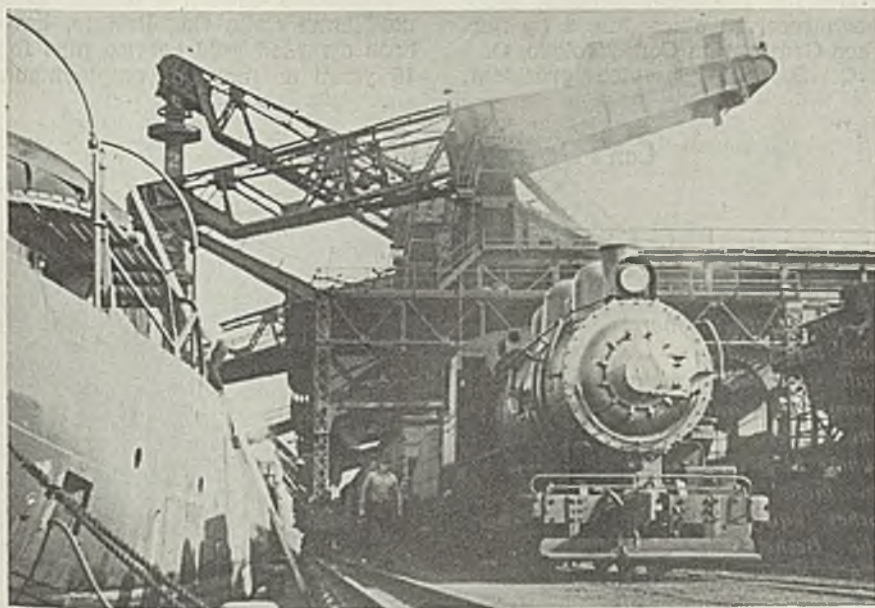
The sharp increase in ferromanganese was not unexpected in view of the heavy increases in manganese ore and ocean freight rates among other items of cost.

Domestic spiegeleisen is up \$4 to \$30, Palmerton, Pa., effective March 15 on spot and noncontract tonnage, and April 1 on contracts.

## U. S. Steel's Shipments Pass January Rate

Shipments of finished steel by the United States Steel Corp. in February, 1,133,724 tons, were 16,194 tons under those of January, because of the shorter month. Shipments in February this year were 457,409 tons larger than in the same month of 1936. The weekly average rate of shipments in February was 283,431 tons, compared with 269,748 tons in January. Cumulative shipments for two months of 1937 were 2,283,642 tons, compared with 1,397,729 tons for the corresponding period of 1937.

### "Safety First" Controls "Direct Ore"



ICE and insurance play an important part in opening the Great Lakes iron ore season when ore is scooped from vessels and loaded directly into cars for shipment to furnaces. Double rates are charged by insurance companies on boats that start before April 15. Owners who carry their own insurance reserves are conservative, seldom starting until dangerous ice is gone. Shipments may not begin before April 10.

### U. S. STEEL CORP. SHIPMENTS (Inter-company shipments not included) (Tons)

	1937	1936	1935	1934
Jan.	1,149,918	721,414	534,055	331,777
Feb.	1,133,724	676,315	583,137	385,500
Mar.	.....	783,552	668,056	583,209
April	.....	979,907	591,728	643,009
May	.....	984,097	593,915	745,063
June	.....	886,065	578,108	985,337
July	.....	590,851	547,794	369,938
Aug.	.....	923,703	624,497	378,023
Sept.	.....	961,803	614,933	370,306
Oct.	.....	1,007,417	686,741	343,962
Nov.	.....	882,643	681,820	366,119
Dec.	.....	1,067,365	661,515	418,630
Y'rly adj.....	.....	.....	123,750	†19,907
Total	.....	\$10,825,132	7,347,549	5,905,966

\*Addition. †Deduction. ‡Subject to adjustment.



# Bethlehem Plans New Rod and Bar Mill, More Wire Capacity at Maryland Plant

**B**ETHLEHEM STEEL CO. has announced plans for a new four-strand rod and bar mill and also increased wire drawing and finishing capacity for its plant at Sparrows Point, Md.

The new mill will be located adjacent to the present rod mill, and will be tied in as a major unit in the Maryland plant's existing rod and wire finishing facilities. It will use a common billet storage yard and deliver rod products into an enlarged drawing and finishing unit which will be served also in part by the rod capacity of the present mill.

In the high speed, four-strand mill that plans call for, four billets rather than two, as in the present two-strand mill, can be passed through the roll stands at one time. Also, the new four-strand mill will be operated at higher speed. Its capacity can be rated at more than 20,000 tons per month, almost double that of the existing mill.

Among other innovations in the layout will be facilities for finishing bars, as well as rods, in a separate building primarily designed for production of reinforcing bars, which have not heretofore been produced at the Maryland plant. However, the greater part of the product of the new mill will be converted into rods, both to meet growing demands of manufacturers who draw upon Bethlehem as a source of rod supply, and to meet greater demands of enlarged wire drawing capacity and finished wire products capacity.

## More Finished Products

This increased wire drawing capacity with the more ample source of rod supply that the new mill makes available also will allow for increase in output of finished wire products, such as nails, barbed wire and bale ties, already important items of manufacture at the plant.

Due to the tidewater location of the Maryland plant the increased capacity will be of especial advantage to Bethlehem in expediting water shipments to the Atlantic seaboard, Gulf and Pacific coast states. Included in the new unit are warehousing and bar fabricating facilities that will enable Bethlehem to make truck shipments of concrete reinforcing bars, directly from the warehouse, to the Baltimore and Washington markets. Production of reinforcing bars at the Maryland plant also will afford a nearer and more adequate source of supply of this product through the company's present warehousing and fabricat-

ing facilities in Philadelphia and New York.

Cost of the new mill and enlarged facilities has not been determined exactly, but is a part of the \$35,000,000 program announced in 1936.

Approximate additional employment provided by enlargement of the rod and wire mill will be 500 men. This is in addition to some 2000 new jobs that in part already have been created at the Maryland plant as result of the program underway for increasing tin plate, and flat-rolled steel products capacity, including erection of a 56-inch continuous strip-sheet mill. Construction will be completed in the early fall, it is expected, and the plant will operate soon thereafter.

With completion of other miscellaneous improvements and betterments now in process the Maryland plant will have steel ingot capacity of approximately 200,000 tons per month and modern facilities for a full line of products in rods, concrete reinforcing bars, wire, pipe, plates, skelp, rails, sheet, strip and tin plate.

## Steel Mills Placing Heat Treating Equipment Orders

Contracts for nearly \$1,000,000 worth of gas heat-treating equipment for the steel industry have been received since Jan. 1 by Surface Combustion Corp., Toledo, O.

C. B. Phillips, vice president,

ascribes this to the realization by the steel industry that a long period of extensive construction and building work, "involving a tremendous demand for steel," is certain.

Contracts received in 1937 include: Bethlehem Steel Co., \$191,000 for Lackawanna, N. Y., plant, one at \$225,000 and another at \$140,000 for Sparrows Point, Md.; Tennessee Coal, Iron & Railroad Co., Fairfield, Ala., \$299,000; Granite City Steel Co., Granite City, Ill., \$109,000; Youngstown Sheet & Tube Co., Youngstown, O., \$108,000.

## Rustless Iron To Expand Plants, Double Capacity

Rustless Iron & Steel Corp., Baltimore, will double its capacity for semifinished and finished products by plant improvements and additions during 1937. Directors have approved a \$625,000 construction program, including the following: \$175,000 for enlargement of two electric furnaces and addition of a third; \$230,000 for a new 12-inch merchant bar mill and additional equipment for present 20-inch and 9-inch mills; \$60,000 for additional cold drawing and finishing equipment; \$110,000 for new car substation and distributing system to supplement and eventually to replace present system; \$50,000 for miscellaneous equipment.

Additional expenditures for supplementary facilities such as annealing and pickling, warehousing and shipping probably will be made during the year.

Fifty-nine employes of the Donner-Hanna Coke Co., Buffalo, have been awarded gold service pins for 15 years or more of employment.

## Can't Do Without the Blacksmith

*THE smithy has not gone with the horse and buggy days. He still is found, and in considerable number, in the modern steel mills, where he is called upon to mend chains and other equipment. At the Bethlehem Steel Co.'s plants the smithy wears goggles, made of a safety glass which is heat treated for strength and toughness*





# Republic Opens Tin Plate Plant

CIVIC leaders of Niles, O., on March 11 celebrated the most important event in that city's industrial history, the formal opening of Republic Steel Corp.'s new tin plate plant built at a cost of approximately \$3,500,000.

More than 500, including a representative group of Republic officials headed by C. M. White, vice president in charge of operations, attended a luncheon sponsored, in honor of this event, by the Niles board of trade and held in the McKinley memorial building.

The new plant is on a site originally occupied by one of the earliest tin plate plants in the United States. That was the old Falcon tin house which was built nearly 50 years ago by William Harris. Early in the twenties the site was acquired by Niles Steel Products Co. which subsequently was absorbed by Republic.

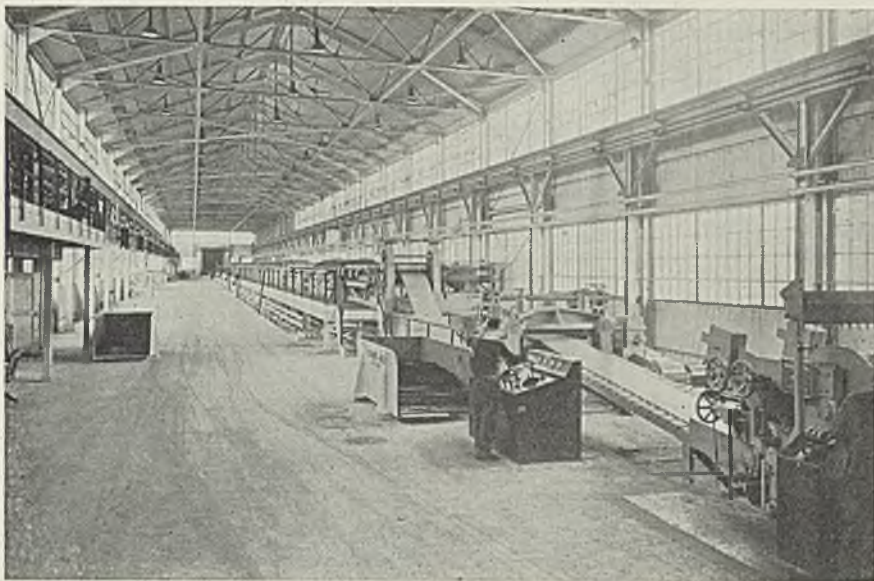
Described on pages 72-73 of this issue, the history of the new mill already reflects some unusual performances. Although excavation for the new buildings comprising the major portion of the plant was not started until Oct. 14 last year, the new 4-high tandem, strip mill which cold rolls the plate to be tinned was turned over on Feb. 28. The installation proved trouble free from the start. In fact, the first coil pickled, oiled and rolled on that day proved to be a salable coil.

## People Wanted the Plant

A significant note was struck by John H. Rose, president, Niles board of trade who, in his welcoming address, dwelt on the importance of industrial payrolls as the foundation for the community's prosperity.

Mr. White, introduced by John P. Hosack, vice president, Mahoning Valley Steel Co., Niles, responded by making it clear that Republic had selected Niles as the site for the new mill only after it had become assured that the people of Niles wanted the plant. He recalled that Niles had not always been as friendly to industry as at present.

Other speakers were N. J. Clarke, vice president in charge of sales, and Charles H. Elliott, Warren-Niles district manager for Republic. Other Republic officials at the luncheon included F. E. Flynn, general superintendent, Warren works, C. Joe Duby, chief engineer, Warren-Niles district, C. G. Medley, sales manager, Warren-Niles district, Joseph Echols, superintendent, Niles tin mill and Samuel Brown, superintendent, Niles sheet mills. A tour of the mill followed luncheon.



*THIS view of Republic Steel Corp.'s new 4-high mill for rolling cold strip steel for tinning, at Niles O., shows the delivery end of continuous pickler, with strip steel passing from pickle tanks through shear and being recoiled on reel at extreme right*

## Mahoning Valley Approves Modernization Project

Mahoning Valley Steel Co., Niles, O., has approved plans for modernizing its eight sheet mill plant this summer. The initial expenditure will be about \$100,000. Improvements include erection of a building 75 x 240 feet for storage and processing, changing present equipment of old-style sheet mills to continuous pack and pair furnaces and automatic feeding and catching tables.

Wage increases of 10 cents an hour will be granted to hot mill workmen and other employes, effective March 16.

Officers re-elected at the annual meeting were: President, W. A. Thomas; treasurer and vice president, John Hosack; secretary, John M. Thomas; assistant secretary, R. W. Wilson; and assistant treasurer, George L. Wick.

## Census Shows Great Gains in Machine Tools

Employment and production in machine tool industry in 1935 showed striking increases as compared with 1933 and substantial increases over 1931, according to the bureau of census.

Machine-tool manufacturers employed 28,186 wage earners in 1935, an increase of 121.7 per cent over 12,714 reported for 1933, and their wages, \$37,260,565, nearly tripled as compared with the 1933 figure, \$12,596,212. Total production of machine tools in 1935 was valued at \$85,068,851, an increase of 255.4 per

cent over \$23,936,232 reported for 1933.

The census survey embraces establishments engaged primarily in the manufacture of power-driven machines generally covered by the designation machine tools. Certain types of machines designed for working metal do not come within the scope of this classification.

## Machine Tool Orders Decline in February

Machine tool orders index for February was 165.2, compared to 200.3 in January and 257.7 in December, 1936, according to the National Machine Tool Builders association, Cleveland. February's business was only slightly higher than average month for last half of 1936, not counting high month of December.

Average for last three months was carried forward by December-January rush to 207.7. This suggests a temporary top, since to continue upward would require heavier volume of orders for March than were placed in December.

Domestic orders were responsible for 74 per cent of February's business, the remainder going to foreign countries.

## 131,961 Visit G. E. Plant

A total of 131,961 persons visited the Schenectady plant of the General Electric Co. during 1936, an average of more than 2500 a week. This was an increase of approximately 8000 over 1935. Visitors registered from practically every state and several foreign lands.



# Imports of Steel Lower in January

IMPORTS of steel and iron products, exclusive of scrap, into the United States in January totaled

ORIGIN OF JANUARY IMPORTS				
	Gross Tons			
	Iron ore	Pig iron	Man-ganese ore	Ferro-man-ganese
Norway	26,577			1,953
Germany		200		
Netherlands		4,652		282
Mexico	491			
U. S. S. R.		1,614	7,236	
France				25
Canada	61	564		
British India		5,404	9,956	
Cuba	44,000		3,172	
Brazil			3,630	
Chile	107,600			
Poland				78
Australia	4,008			
Gold Coast			7,816	
Iran	2,826			
Netherland				
India			617	
Japan				32
<b>Total</b>	<b>185,563</b>	<b>12,434</b>	<b>32,427</b>	<b>2,370</b>

	Sheets, skelp and sawplate	Structural steel	Steel bars	Hoops and bands
	Belgium	1,429	5,981	3,529
France	47	1,815	1,046	603
Germany		73	176	49
Sweden	1		262	
Austria			4	
United Kingdom	7		87	1
Netherlands		50		5
Czechoslovakia			4	
Japan	10			
Canada			2	
Australia	2			
<b>Total</b>	<b>1,496</b>	<b>7,919</b>	<b>5,104</b>	<b>2,141</b>

## FOREIGN TRADE OF UNITED STATES IN IRON AND STEEL

	Gross Tons			
	1937		1936	
	Imports	Exports	Imports	Exports
Jan.	43,063	201,511	50,489	241,564
Feb.			43,358	213,802
March			56,720	264,337
April			49,621	301,987
May			59,391	314,950
June			59,910	294,951
July			47,940	296,738
Aug.			60,697	295,341
Sept.			59,993	235,571
Oct.			64,509	261,882
Nov.			61,970	203,297
Dec.			52,584	244,156
<b>Total</b>			<b>666,838</b>	<b>3,162,694</b>

40,642 gross tons, valued at \$1,716,324, compared with 42,775 tons, valued at \$1,792,520 in January, 1936, and 38,514 tons valued at \$1,706,333 in December, 1936, according to the metals and minerals division of the department of commerce.

Imports of steel and iron scrap, practically all from Canada, totaled 2421 tons in January, compared with 14,070 tons in December and 7714 tons in January, 1936. This shrinkage may be the result of Great Britain's draft on Canadian scrap.

Pig iron was the leading import product in tonnage, 12,434 tons, compared with 10,423 tons in December and 15,033 tons in January, 1936. Structural shapes were in second place with 7919 tons, followed by bars, ferromanganese, hoops and bands and wire rods.

Belgium led in tonnage shipped here with 14,588 tons, in a wide variety of products, India second with 5404 tons, entirely pig iron, Netherlands third with 5091 tons, France

fourth with 3671 tons, Sweden fifth with 3107 tons and Germany sixth with 3063 tons. This is the first time in several months that Germany has not been first or second in rank.

## UNITED STATES IMPORTS FOR CONSUMPTION OF IRON AND STEEL PRODUCTS

Articles	Gross Tons		
	Jan., 1937	Dec., 1936	Jan., 1936
Pig iron	12,434	10,423	15,033
Sponge iron	279	55	308
Ferromanganese*	2,370	3,675	2,248
Spiegeleisen	660	3,860	2,040
Ferrosilicon†	53	21	—
Ferrosilicon‡	114	50	96
Other ferro alloys§	2	—	—
Steel ingots, bl'ns	109	1	—
Billets	51	100	68
Concrete rein. bars	772	254	131
Hollow bar, drill steel	164	125	205
Bars, solid, hollow	5,104	3,476	3,055
Iron slabs	137	—	147
Iron bars	17	61	174
Wire rods	1,626	1,386	1,974
Boiler, other plate	20	—	50
Sh'ts, skelp, saw pl.	1,496	1,489	2,096
Die blocks, blanks	2	7	4
Tin plate, taggers, terneplate	41	46	4
Structural shapes	7,919	5,303	4,679
Sheet piling	1	—	507
Sashes, frames**	—	—	—
Rails, fastenings	180	597	262
Cast-iron pipe, ftgs.	177	225	—
Mail, iron pipe ftgs.	29	32	4
Welded pipe	249	466	362
Other pipe	475	1,525	2,096
Cotton ties	—	—	—
Hoops, bands	2,141	1,670	1,899
Barbed wire	1,585	1,529	2,237
R'nd iron, stl. wire	325	417	447
Teleg., tel. wire	6	—	—
Flat wire, strips	282	289	232
Wire rope, strand	227	180	185
Other wire	278	259	109
Nails, tacks, staples	1,171	704	2,177
Bolts, nuts, rivets	24	23	18
Horse, mule shoes	24	61	14
Castgs., forgings	115	205	88
<b>Total gross tons</b>	<b>40,642</b>	<b>38,514</b>	<b>42,775</b>
Iron, steel scrap	2,421	14,070	7,714
<b>GRAND TOTAL</b>	<b>43,063</b>	<b>52,584</b>	<b>50,489</b>

\*Manganese content; †chrome content; ‡silicon content; §alloy content; \*\*Formerly included with "Structural shapes".

## Better House Trailers, at Lower Prices Result from Larger Use of Steel

THE house trailer "craze" which swept the nation last year is continuing to grow and more steel per unit is being used in their construction. A conservative estimate of 1937 production is 250,000, which will require at least 50,000 tons of steel. Eventually the term "all-steel" may be as synonymous of trailers as of automobiles.

Enlarged production is resulting in a better product at a lower cost.

Covered Wagon Co., Mount Clemens, Mich., leading builder, has announced a four-passenger model priced at \$495, which embodies most of the conveniences of last year's higher priced units.

In the accompanying picture are 12 Covered Wagons headed for Seattle, on an order for immediate delivery of 45.

The new \$495 trailer has an electrically welded steel automobile

chassis, in which medium carbon steel is used, with 6-inch side members double flanged. Sidewall construction is of a special steel bonded to three-ply plywood.

Springs are 10-leaf semi-elliptic, 1 3/4 x 38 inches, bronze bushed. The axle is 1 1/2-inch molybdenum steel, and the wheels are pressed steel. Exclusive features are the tempered spring steel drawbar and a patented steel safety coupler.





# Production

**S**TEEL ingot production increased 1 point last week to 87 per cent, highest level since September, 1929, and compares with 57½ and 48 per cent respectively, in the same weeks of 1936 and 1935. Details follow:

**Youngstown**—Up 1 point to 85 per cent, due principally to Republic Steel Corp. adding another open hearth to its active list.

**Cleveland-Lorain**—Off 1½ points to 78 per cent. Otis Steel Co. had one furnace down the greater part of the week for repairs.

**Central eastern seaboard** — Up fractionally to 57½ per cent. No important change is expected in the immediate future. The lag in operations is attributed primarily to excess ingot capacity, compared with processing capacity.

**Detroit**—Down 5 points to 95 per cent, as one open hearth was taken off for repairs. Twenty of 21 furnaces are active.

**Pittsburgh**—Up 1 point to 89 per cent, another high mark in the recent history of this district.

**Wheeling**—Held at 96 per cent for the second consecutive week.

**New England**—Held at 97 per cent, with all open hearths being pushed at capacity with the exception of one small unit.

**Buffalo**—Continued at 90 per cent. Most of the units now in production will be maintained as long as operations are physically possible.

**Birmingham**—Steady at 77 per cent.

**St. Louis**—Unchanged at 82 per cent, with little change indicated for this week.

**Chicago**—Increased 1½ points to 82½ per cent, a new high for the recovery and the heaviest tonnage output for this period in history. Indications point to maintenance of this rate or a higher level during the next four to six months. Blast furnace schedules are steady, with 30 of 39 stacks active.

**Cincinnati**—Rose 4 points to 68 per cent. Two open hearths of one company are idle, and seven others are being rehabilitated.

## Approve Bar Color Code

Proposed simplified practice recommendation R166-37 for a color code for marking steel bars has been approved by industry and is to be promulgated as of April 1, 1937, according to the division of simplified practice.

This recommendation, proposed and developed by a committee of the National Association of Purchasing Agents, is limited to a color code for marking commonly used grades of steel, as represented by S. A. E. numbers.

## District Steel Rates

	Percentage of Open-Hearth Ingot Capacity Engaged in Leading Districts		Same week	
	Week ended March 13	Change	1936	1935
Pittsburgh . . .	89	+ 1	43	38
Chicago . . . . .	82½	+ 1½	62	51
Eastern Pa. . . .	57½	+ ½	39	28
Youngstown . . .	85	+ 1	71	58
Wheeling . . . . .	96	None	78	92
Cleveland . . . .	78	- 1½	75	72
Buffalo . . . . .	90	None	42	38
Birmingham . . .	77	None	69	55½
New England . . .	97	None	51	53
Detroit . . . . .	95	- 5	94	88
Cincinnati . . . .	68	+ 4	76	†
St. Louis . . . . .	82	None	†	†
Average . . . . .	87	+ 1	57½	48

†Not reported.

## All-Time Record For February Ingots

**T**ONNAGE of open-hearth and bessemer steel ingots produced in February was the highest for that month in history, 50 per cent higher than February, 1936. The weekly rate was 3½ per cent higher than for January, the latter month setting an all-time record for total production, according to figures by the American Iron and Steel institute.

Ingot production totaled 4,424,659 gross tons in February, compared with 2,964,418 tons in February, 1936, and 4,328,713 tons in February, 1929.

A shorter month than January, which produced 4,736,697 tons, February attained a weekly average production of 1,106,165 tons.

Tonnage in February was at the rate of 84.46 per cent of the capacity of the industry, the highest percentage operated in seven years.

Experienced observers in the steel industry feel that the present rate is close to the practical peak and that a recession may be expected within the next two or three months, not from lack of demand for steel but from inability to keep plants operating at the present rate. Few new open-hearth furnaces have been built, most of the expansion resulting from enlarging existing facilities. At present it is estimated most furnaces are being pushed beyond their rated capacities, sometimes as much as 10 tons per heat, and, under pressure for steel, repairs are being delayed as far as possible.

Duplexing is also being resorted to in many cases, a charge of steel being blown in the bessemer converter, the refined steel then being added to an open-hearth bath. This reduces materially the time necessary for completing the open-hearth refining process and enables more heats to be made.

A result of this is expected to be necessary for extensive repairs as open hearths reach the point where relining and partial rebuilding is necessary. Refractory makers are several months behind in shipments. Some observers look for a drop of as much as 10 points in the steel operating rate before summer.

## Steel Ingot Statistics

	Monthly Production—Complete for Bessemer; Open Hearth, Calculated from Reports of Companies Making 98.03 per cent							
	—Open Hearth—		—Bessemer—		—Total—		Weekly production, all companies, in gross tons	Number of weeks in month
	Gross tons	Per cent of capacity	Gross tons	Per cent of capacity	Gross tons	Per cent of capacity		
1937								
Jan. . . . .	4,444,903	84.43	291,794	54.30	4,736,697	81.64	1,069,232	4.43
Feb. . . . .	4,092,990	86.10	331,669	68.35	4,424,659	84.46	1,106,165	4.00
2 mos. . . . .	8,537,893	85.12	623,463	60.89	9,161,356	82.87	1,086,756	....
1936								
Jan. . . . .	2,849,557	54.88	196,389	32.21	3,045,946	52.50	687,572	4.43
Feb. . . . .	2,761,973	56.92	202,445	35.53	2,964,418	54.67	716,043	4.14
2 mo. . . . .	5,611,530	55.80	398,834	33.77	6,010,364	53.48	701,326	....
March . . . . .	3,157,579	60.81	185,040	30.35	3,342,619	57.61	754,542	4.43
April . . . . .	3,637,479	72.34	304,775	51.62	3,942,254	70.16	918,940	4.29
May . . . . .	3,744,161	72.10	302,092	49.55	4,046,253	69.73	913,375	4.43
June . . . . .	3,649,948	72.58	334,897	56.72	3,984,845	70.92	928,868	4.29
July . . . . .	3,596,125	69.41	326,606	53.69	3,922,731	67.76	887,496	4.42
Aug. . . . .	3,844,570	74.04	350,560	57.50	4,195,130	72.30	946,982	4.43
Sept. . . . .	3,858,060	76.90	303,048	51.45	4,161,108	74.23	972,221	4.28
Oct. . . . .	4,227,291	81.41	317,710	52.11	4,545,001	78.33	1,025,900	4.43
Nov. . . . .	4,007,859	79.70	329,553	55.82	4,337,412	77.19	1,011,052	4.29
Dec. . . . .	4,127,049	79.66	304,596	50.07	4,431,645	76.55	1,002,635	4.42
Total . . . . .	43,461,651	70.92	3,457,711	48.06	46,919,362	68.52	897,463	52.28

Percentages of capacity for 1937 are calculated on weekly capacities of 1,188,452 gross tons for open-hearth ingots, 121,308 tons for bessemer and 1,309,760 tons total, based on annual capacities as of Dec. 31, 1936, as follows: Open-hearth ingots, 61,965,862 gross tons; bessemer, 6,325,000 tons; for 1936, on weekly capacities of 1,172,160 gross tons open-hearth ingots, 137,624 tons bessemer, 1,309,784 tons total, based on annual capacities as of Dec. 31, 1935, as follows: Open-hearth ingots 61,280,509 gross tons, bessemer 7,195,000 gross tons.



# Men of Industry

**W**K. COOPER has resigned as assistant general manager, New York Shipbuilding Co., Camden, N. J., to become vice president and general manager, Una Welding Inc., Cleveland, manufacturer of arc welders, automatic equipment and welding rods. Before joining the Shipbuilding company in 1933, he was associated with Spicer Mfg. Co., Toledo, O.

A. A. Probeck, associated with the Una organization as a sales representative from 1927 to 1931, has rejoined the company as vice president and sales manager. Prior to joining Una in 1927 he had been connected with the Federal Machine & Welding Co., Warren, O., for many years, returning to that company in 1931 in an executive capacity.

R. B. Fehr has been made chief engineer of the company. He has spent most of his time on experimental research, commercial development of various products and processes, and problems in production. He has held successive positions as development engineer, Rail Welding & Bonding Co., Cleveland, and technical director, Gear Processing Inc., Detroit and Cleveland.

George A. Noren, member of the engineering staff, Fedders Mfg. Co., Buffalo, has been elected a director.

John W. Haigis has been elected a director, Greenfield Tap & Die Corp., Greenfield, Mass., succeeding Charles L. Stoddard.

Lewis B. Lindemuth, consultant for steel work operations, formerly at 405 Lexington avenue, New York, is now located at 134 East Forty-seventh street, New York.

Russell M. Scott, formerly foundry manager, Packard Motor Car Co., Detroit, has become connected with the foundry department, Pontiac Motor Co., Pontiac, Mich.

Noble Jones, for the past 15 years connected with the Allegheny Steel Co. at its West Leechburg, Pa., plant, has been appointed general manager, Barium Stainless Steel Corp., Canton, O.

H. P. Reid has been appointed operating engineer, Universal Atlas Cement Co., Chicago, subsidiary of the United States Steel Corp. Mr. Reid formerly was special engineer and has been with the company 14 years.

Howard B. Hall has been appointed by Foster Wheeler Corp., New York, as regional director in



W. K. Cooper



A. A. Probeck



R. B. Fehr

charge of its Cleveland, Cincinnati and Pittsburgh territories. Mr. Hall will make his headquarters in the Cleveland office of the corporation at 526 Superior avenue.

R. E. Ludwick, formerly sales

manager, Cleveland Crane & Engineering Co., Wickliffe, O., is now in charge of Chicago district sales for Conco Engineering Works, Chicago, division of H. D. Conkey & Co., Mendota, Ill. manufacturer of cranes and overhead material handling equipment. He will be assisted by William L. Hutton in the outlying district. In the Calumet district, sales are handled by Frank H. Gill and Donald Meissner.

Richard W. Dinzle, who recently resigned from the Baldwin Southwark Co., where he had been in charge of engineering for the Southwark division, has become associated with Watson-Stillman Co., Roselle, N. J., as chief engineer.

Edward A. Bacon has become president and treasurer, George H. Smith Steel Casting Co., Milwaukee, which he recently purchased. Other officers are: Secretary, W. J. Donnelly; controller, P. W. Kaufmann.

J. R. Hoover, for the past six years assistant manager of chemical sales, mechanical rubber goods division, B. F. Goodrich Co., Akron, O., has recently been made manager of that department. He takes over the duties of Dr. H. E. Fritz who will devote his efforts to the sale and development of a new synthetic elastic material recently introduced by Goodrich.

Nelson W. Pickering has been re-elected president, Farrel-Birmingham Co. Inc., Ansonia, Conn. The following officers have also been re-elected: Chairman of the board, Franklin Farrel Jr.; vice presidents, Carl Hitchcock and Armin G. Kessler; treasurer, Frederick M. Drew Jr.; assistant treasurer, Laurie K. Blackman; secretary, George C. Bryant; assistant secretary, William B. Marvin.

Charles H. Dishman has been appointed western district manager of sales, Granite City Steel Co., Granite City, Ill. Joseph Smithers has been named assistant to Mr. Dishman. Offices are located in the R. A. Long building, Kansas City, Mo. Richard W. Orthwein has been made district manager of sales for the St. Louis district, with offices at 1805 Boatmen's Bank building, St. Louis.

William A. Purtell, active in the management of Billings & Spencer Co., Hartford, Conn., for the past several months in the capacity of director and chairman of the management committee, has been elected president. He succeeds Frederick C. Billings who has been elected chairman of the board. Mr. Billings will continue his active in-



terest in the affairs of the company. In addition to being president of Billings & Spencer, Mr. Purtell will also continue his duties as president and general manager, Holo-Krome Screw Corp., Hartford, Conn. Mr. Purtell is a member, American Society for Metals and American Supply & Machinery association.

Fred J. Esslinger, well-known consultant on welding, and associated with the steel and welding industries for 12 years, has been retained by Riverside Steel Co., Wheeling, W. Va., fabricator of welded and riveted products, as welding advisor. The company recently extended its facilities to do electric arc welding and is now prepared to design and fabricate welded work of various types in thicknesses up to two inches.

Charles S. Payson, New York, has been elected a director, American Rolling Mill Co., Middletown, O. Mr. Payson, who is in the finance and management business and is the publisher of *The Commentator*, is a director of the Rustless Iron Corp., Baltimore, and it was from him that the American company recently acquired a substantial part of its holdings in the Rustless corporation. He is also a director, Marine Midland Corp.

R. B. Tewksbury has been elected chairman of the board, Oster Mfg. Co., Cleveland, manufacturer of pipe and bolt threading equipment. Roger Tewksbury has been made president and treasurer, Arthur S. Gould, vice president, and Harry A. Maurer, secretary. The first three formerly acted in the capacities of president, vice president and secretary, respectively, while Mr. Maurer was general superintendent of the company's plants at Erie, Pa., and Cleveland.

A. Van Hassel, formerly vice president and treasurer, has been appointed president, Magor Car Corp., Passaic, N. J., succeeding R. J. Magor, who will continue as chairman of the board. L. C. Haigh, formerly secretary, and J. W. Leis, formerly plant manager, have been elected vice presidents, and W. P. Smith and R. C. Warburton, have been elected secretary and treasurer, respectively. All will have headquarters at 30 Church street, New York, except Mr. Leis, who will be located in Passaic.

Fred Grotts, for the past seven years associated with Continental Roll & Steel Foundry Co., Pittsburgh, has severed his connection with that company to become vice president and technical ad-



Fred J. Esslinger

visor, Lebanon Steel Foundry Co., Lebanon, Pa. While Mr. Grotts was with Continental he was metallurgical director of the company's three divisions—Hubbard Steel Foundry Co., East Chicago, Ind.; Wheeling Mold & Foundry Co., Wheeling, W. Va., and Duquesne Steel Foundry Co., Coraopolis, Pa., with his headquarters at East Chicago, Ind.

R. C. Heaslett, heretofore metallurgical engineer for the eastern division of Continental Roll & Steel Foundry, has succeeded to the position left vacant by Mr. Grotts.

Thomas A. Brown, heretofore employed in the industrial engineering department, Carnegie-Illinois Steel Corp., has been appointed assistant to manager of industrial relations, Pittsburgh district. Other appointments announced by Carnegie-Illinois are:

L. P. Ray, management representative and assistant chief clerk at Farrell, has been moved up to the newly created position of superintendent of industrial relations at the Farrell works, which includes under



W. L. Weaver

Who has been appointed manager of stainless castings sales, Ludlum Steel Co., Watervliet, N. Y., as noted in STEEL, March 1, page 29

its jurisdiction the blast furnace at Cleveland.

Charles Magnani, plant industrial engineer, Duquesne works, has been appointed assistant to chief industrial engineer.

James Allison, field service metallurgist for Union Drawn Steel Co. in the New York and New England area, has been appointed factory manager, Billings & Spencer Co., Hartford, Conn. Mr. Allison has served as plant metallurgist in the Hartford, Conn., plant of Union Drawn Steel, worked in the open-hearth department of Crucible Steel Co., and in the finishing mills of Jones & Laughlin Steel Corp., American Bridge Co. and Mesta Machine Co. He is a member, American Society for Metals.

## Died:

CHARLES WESLEY SR., 71, president, Wesley Steel Treating Co., Milwaukee, in that city, March 4. For many years he was in charge of the heat treating department, A. O. Smith Corp., organizing his own company in 1915.

Grant S. Boyd, 52, purchasing agent, General Steel Wares Ltd., Toronto, Ont., in Toronto, Feb. 20.

Armin W. Kaiser, 50, Milwaukee district sales manager, Linde Air Products Co., in that city, Feb. 27.

Leo Finegan, 57, sales manager, Flannery Bolt Co., Pittsburgh, in that city, March 8.

Edwin C. Ewing, member of a pioneer steel family and first president of Wheeling Corrugating Co., March 7 at Wheeling, W. Va.

Moise Dreyfus, 75, formerly president, Ohio Iron & Metal Co., Chicago, in Phoenix, Ariz., March 6. He founded the Ohio company in 1898, and retired in 1920.

H. W. Green, 56, traffic manager, Kearney & Trecker Corp., Milwaukee, maker of milling machines, in Milwaukee, March 3. He joined the firm 35 years ago.

Charles L. Reierson, 64, general sales manager, Gilbert & Bennett Mfg. Co., manufacturer of wire fencing and other products, New York, and former president, Remington Arms Co., in Bronxville, N. Y., March 2.

R. T. Hazelton, 54, treasurer and works manager for 18 years, Cincinnati Shaper Co., Cincinnati, in that city, March 3. Mr. Hazelton was well known for his designing and development of machine tools for use in the metalworking trades.



# Meetings

## A.F.A. PLANNING SESSION ON SAFETY AND HYGIENE

**S**AFETY and hygiene as it relates to the foundry industry will be discussed at considerable length at the annual convention of the American Foundrymen's association in Milwaukee, May 3-7. Within the past few months, the association has prepared tentative codes of recommended practices for testing and measuring air flow in exhaust systems and practices for grinding, polishing and buffing equipment sanitation. Additional codes are to be developed.

A session will feature the following four papers: "Eye and Respiratory Protection," by John Holzbog, personnel manager, Chain Belt Co., Milwaukee; "Foot and Leg Protection," by M. W. Dundore, production manager, Beloit Iron Works, Beloit, Wis.; "Safety as Effected by Maintenance," by James Thomson, chief engineer, Continental Roll & Steel Foundry Co., East Chicago, Ind; and "Good Housekeeping," by Dr. E. G. Meiter, director industrial hygiene laboratory, Employers Mutual Liability Insurance Co., Milwaukee.

Manufacturers of protective devices will exhibit equipment in the foundry show to be held with the convention.

## PURCHASING AGENTS PLAN CONVENTION IN PITTSBURGH

Twenty-second annual convention of the National Association of Purchasing Agents will be held in the William Penn hotel, Pittsburgh, May 24-27, and from advance reservations an unusually large attendance is indicated. More than 115 manufacturers will be represented with exhibits in the Inform-A-Show to be held concurrently with the meeting.

Thomas D. Jolly, general purchasing agent, Aluminum Co. of America, and president of the Pittsburgh purchasing agents association, is chairman of the program committee. G. A. Renard, 11 Park Place, New York, is national secretary.

## CONCRETE STEEL GROUP TO CONVENE IN HOT SPRINGS

Thirteenth annual meeting of the Concrete Reinforcing Steel institute is being scheduled for April 30-May 1 at the Homestead hotel, Hot Springs, Va. The program is to be announced shortly. William S. Thomson, 201 North Wells street, Chicago, is secretary.

## ARRANGES SYMPOSIUM ON STEAM GENERATING COALS

Fuel engineering division of Apalachian Coals Inc., Cincinnati, announces a symposium on marketing steam coals to be held at the Queen

City club, Cincinnati, March 22. This is the eighteenth in a series sponsored by the organization. The meeting, it is stated, is intended to comply with many requests for engineering information on steam coals. Representatives from the bureau of mines, engineering schools and research organizations will attend.

## GRAY IRON FOUNDERS SET MEETING DATE IN JUNE

Annual meeting of the Gray Iron Founders' society is to be held at Hotel Cleveland, Cleveland, June 11-12. W. W. Rose, 33 Public Square building, Cleveland, is executive vice president of the organization.

## Feature Stainless Steel Use In Textiles at Exposition

Featuring stainless steel and its increasingly successful application in the textile industry, subsidiary companies of the United States Steel Corp. will present a colorful exhibit at the Southern Textile exposition, Greenville, S. C., April 5 to 10. Cen-

## Convention Calendar

**March 15-19—Oil Burner Institute.** National Oil Burner and Air Conditioning convention and exposition at Convention Hall of Commercial Museum, Philadelphia. G. Harvey Porter, 30 Rockefeller Plaza, New York, is managing director.

**March 21-27—American Ceramic society.** Annual convention at Waldorf Astoria hotel. Ross C. Purdy, 2525 North High street, Columbus, O., is secretary.

**March 23-26—American Management association.** Packaging, Packing and Shipping conference and exposition at Pennsylvania hotel, New York. Alvin E. Dodd, 330 West Forty-second street, New York, is president.

**April 12-15—American Chemical society.** Ninety-third meeting at University of North Carolina, Chapel Hill, N. C. Dr. Charles L. Parsons, 728 Mills building, Washington, is secretary.

**April 15—National Council of American Shipbuilders.** Annual convention at Whitehall club, New York. C. C. Knerr, 11 Broadway, New York, is secretary.

**April 19-24—International Association for Testing Materials.** Second international congress in London. K. Headlam-Morley, 28 Victoria street, London S.W. 1, is honorary secretary.

**April 26-27—American Zinc Institute.** Nineteenth annual meeting at Hotel Statler, St. Louis. Ernest V. Gent, 60 East Forty-second street, New York, is secretary.

**April 26-28 — Galvanizers Committee.** Second meeting at Hotel Statler, St. Louis. Ernest V. Gent, 60 East Forty-second street, New York, is secretary.

**April 26-29—Chamber of Commerce of the United States.** Twenty-fifth annual meeting in Washington. D. A. Skinner, 1615 H street, Washington, is secretary.

**April 30-May 1—Concrete Reinforcing Steel Institute.** Thirteenth annual meeting at Homestead hotel, Hot Springs, Va. William S. Thomson, 201 North Wells street, Chicago, is secretary.

tral attraction will be a presentation of the advantages of stainless steel as used for dye tanks and vats. Also on display will be roofing and siding, featuring the new shingle for industrial housing, and pipe and tubing as used in the textile industry, including mechanical tubing, stainless tubing, scale free pipe, copper-steel pipe, Durolite pipe, and boiler tubes.

## Republic Spends \$422,000 In Painting Properties

Recognizing the great value of well painted surfaces, Republic Steel Corp. during 1936 spent more than \$422,000 in painting its mills and other properties, in comparison with \$287,000 spent in 1935 and \$262,000 in 1934.

Besides its protective function, paint has a decidedly beneficial effect on general morale of men in Republic's plants, according to E. M. Richards, assistant vice president in charge of operation. Painted surfaces foster greater efficiency, also provide better illumination and sanitation.

Experts in charge of this work for Republic state that a survey of all mill buildings is made once a year when it is decided which buildings shall be painted. "In practically all our plants where the maintenance force is large enough to include regular painters, the painting is done by our own men," says Mr. Richards. "In some instances we have had contract work done, as in the painting of open-hearth stacks in Chicago."

## Safety Trophy Won by All Universal Atlas Co. Plants

When the Hudson, N. Y., Universal, Pa., and Waco, Tex., plants of the Universal Atlas Cement Co., United States Steel Corp. subsidiary, were recently awarded trophies for operating throughout 1936 without a single disabling accident, the entire company attained a 100 per cent representation, all other plants having previously won the trophy from one to five times.

The trophy given annually for the last 13 years by the Portland Cement association goes only to plants which operate a full calendar year without a lost-time accident.

"Members of our plant organizations made this record possible," said Mr. Huth in his report. "Perfect safety records like these for any period can come only through a combination of fine team work and individual care. The accident rate for all plants declined 69 per cent in the last four years."



# Activities of Steel Users and Makers

**D**URALOY CO., Pittsburgh, which recently sustained damages by fire to its plant at New Cumberland, W. Va., has purchased a large part of the well-equipped foundry owned by the United States Pipe & Foundry Co. at Scottdale, Pa. This plant includes machine and pattern shops, storeroom, testing laboratory change room and offices. Electric furnaces, centrifugal casting machines and other equipment which escaped damage at the old plant has been moved to Scottdale, and the company is now operating on full schedule.

National Supply Co., Pittsburgh, has moved its office from the Clark building to the Grant building.

Molybdenum Corp. of America has moved its Pittsburgh offices from 1609 Grant building to 3201 Grant building.

Kelco Mfg. Co., Baltimore, has removed its plant and offices to 4020 East Baltimore street at Haven street.

Harnischfeger Corp., Milwaukee, has appointed R. D. Jenkins & Sons, Reno., as exclusive agent for excavators and welders. This organiza-

tion will work in conjunction with the San Francisco offices of Harnischfeger.

Spang, Chalfant & Co. has moved its office from the Clark building, Pittsburgh, to the Grant building, Pittsburgh.

Frank Foundries Corp., Moline, Ill., has installed a third electric furnace for use in melting high alloy cast iron.

Lindsey Wagon Co., Laurel, Miss., manufacturer of 8-wheel log wagons and self loading skidders, has added to its line a steel axle, roller bearing, tractor trailer.

Frank B. Pope Co., Koppers building, Pittsburgh, is now representing the A. P. Green Fire Brick Co., Mexico, Mo., in addition to its own refractories.

H. Kramer & Co., Chicago, manufacturer of brass and bronze ingots, has established a sales office at 828 North Broadway, Milwaukee. Don E. Stephens is the representative in charge.

Rupert Diecasting & Stamping Corp., Kansas City, Mo., has effected improvements during recent months which have resulted in approximately doubling the company's manufacturing capacity.

Moak Machine & Tool Co., Port Huron, Mich., has expanded the capacity of its electric welding de-

partment. The company also recently has engaged in the grinding of backing up rolls for 4-high strip mills.

Herr-Harris Co., 910 Fulton building, Pittsburgh, has been appointed sales representative in the Pittsburgh district for George P. Reintjes Co., Kansas City, Mo., manufacturer of refractory walls and arches.

E. Leitz Inc. has removed its headquarters in New York from 60 East Tenth street to the Heckscher building, 730 Fifth avenue. A modern, well-equipped machine shop is available for the repairing and servicing of all optical instruments.

Chaso Tool Co., Royal Oak, Mich., manufacturer of thread chasers, has under construction a new building of limestone and glass brick to be air conditioned with an overhead heating and cooling system. The building will provide room for production of two new types of die heads added to the company's line.

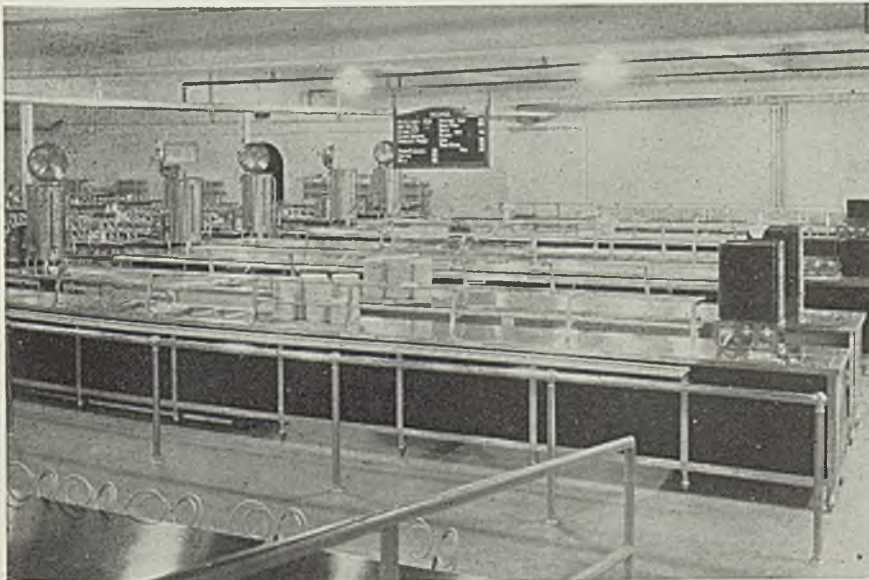
Pennsylvania Pump & Compressor Co., Easton, Pa., has appointed the following district representatives: McVoy-Hausman Co., 2019 Sixth avenue, North, Birmingham, Ala.; John A. Dodd, 101 Marietta building, Atlanta, Ga.; Ryan Sales Corp., 160 Second avenue, North, Nashville, Tenn.

Central Machine Works Co., Minneapolis, has placed in production a new machine for turning soap into lather. Marketed to barber shops under the tradename Barsope, it is of steel finished in white porcelain enamel and with nickel plated trim. It is fitted with a water connection and an electric heating unit.

Pangborn Corp., Hagerstown, Md., manufacturer of blast cleaning and dust collecting equipment, is making extensive additions to its plant and adding new equipment, involving an expenditure of approximately \$80,000. Pangborn's payroll is the largest in the 33 years history of the business and the plant is operating in two shifts.

R. & T. Co., 1526 West Twenty-fifth street, Cleveland, formed when the Riester & Thesmacher Co., Cleveland, went into bankruptcy in 1933, has altered its charter, changing the name back to Riester & Thesmacher Co. The company fabricates sheet metal products, in a plant containing 40,000 square feet. Milton A. Thesmacher, son of the late George Thesmacher, one of the founders, is president; A. E. Riester, the other founder, is vice president, and D. V. Burt is secretary-treasurer.

## Cafeteria Equipped Entirely with Stainless Steel



**A** CAFETERIA for employes of the National Cash Register Co., in which practically all the equipment, except dishes, is made of stainless steel recently was opened in Dayton, O. It presents a remarkable appearance of brightness and cleanliness. The steel was supplied by the American Rolling Mill Co., Middletown, O.



# APPLY THE MULT-AU-MATIC METHOD TO YOUR SMALL, HIGH SPEED WORK

For years the Multi-Au-Matic Method has been establishing records of Performance.

Today, Multi-Au-Matics are not only maintaining established Performance Standards, but they are also reaching out toward new goals.

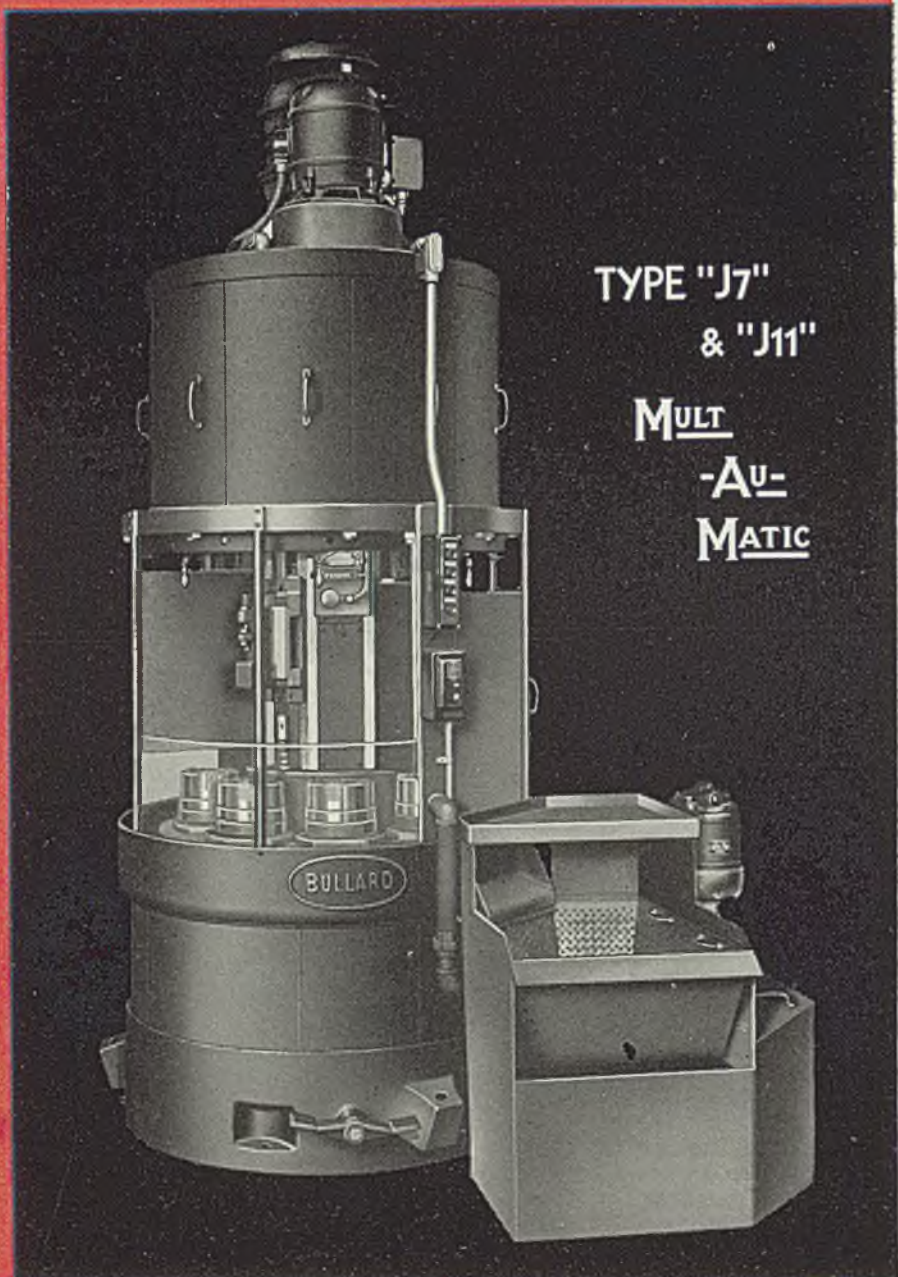
The heavier machines for the heavier jobs—they're Bullard Type "D" Multi-Au-Matics.

For the smaller work requiring higher speeds—then, that's Bullard Type "J" series. Small, sturdy machines with inbuilt accuracy, and a Flexibility to meet the conditions of nearly any tooling problem.

When planning equipment orders, don't pass up the possibilities of Bullard Type "J-7" and "J-11" as applied to your work. Fast-Savings.

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& "J11"

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# MIRRORS OF MOTORDOM

DETROIT

**W**HILE closing of all Chrysler divisions last week occasioned considerable surprise here in view of the strength of the union in these plants and the hitherto cordial labor relations which the corporation has enjoyed, an analysis of the situation indicates the tie-up may have been anticipated and also that the UAW probably had an unannounced motive in calling the strike.

So carefully had details of starting the strike been worked out, it was only a matter of a few minutes before operations had ceased, guard details assigned to gates, and military discipline started among the men in the plants. The signal to start the strike was given by a phone call to each plant from a union organizer who merely muttered the words "My hand is up"—and the fun began.

## Membership "Drive"

At first no one was allowed to leave the plants, which gave union organizers a perfect set-up to put a little pressure on all men who were not members. This, it is believed by some, is the real story behind the strike. The UAW treasury, strained to near the breaking point by months of heavy overhead expenses, needed reinforcing. What better method to use than to seal these plants employing some 65,000 and then to turn organizers loose on all who were not paying their \$1 monthly dues to the UAW?

Despite the union's claim of 95 per cent membership in Chrysler plants, the actual figure is reliably reported to be far below this level and large numbers of workers were on organizers' lists for "cultivation." This must have been a sad picture to the Chrysler management, which for years has met and conferred cordially with the various works councils from its plants.

As far as grievances go, the UAW naturally had to figure out some excuse for calling the walkout; the

only one which could be manufactured was a demand for the UAW to be recognized as sole bargaining agency, to which the management naturally would not accede, because the policy of the industry has been determined to deal with all groups, regardless of strength.

Speed with which the strike was called was equalled by the speed with which stop orders were issued on materials, tools, parts and other supplies. Instructions were rushed to all suppliers the same day to hold up orders. Briggs, supplying bodies, was forced to suspend. City Auto Stamping and Electric Auto-Lite in Toledo, large Chrysler suppliers, were slowed down to a walk. To steel suppliers the interruption was a welcome respite in the rush of trying to expedite deliveries of automobile steel, and some were of the opinion the prompt issuance of stop orders meant a protracted shutdown. Others took the view that Chrysler, operating on more of a day-to-day buying policy, naturally would be quick to suspend orders. The corporation values daily manufacturing output at \$5,000,000.

With only a few exceptions, the tie-up at Chrysler patterned the General Motors strike. B. E. Hutchinson, chairman of the finance committee, seems to be the "Knudsen" of the Chrysler negotiations. Richard T. Frankenstein, age 30, assumes the role Homer Martin, age 35, took for the UAW in the GM conferences. Chrysler attorneys have petitioned circuit court for an injunction to evict several thousand union men who are occupying the company's plants. Governor Murphy returned from Florida to be present should his services be needed.

**M**EANWHILE at Hudson, about 600 men occupied two of the company's three plants, causing complete suspension and throwing 11,000 out of jobs. Negotiations between the management and UAW representatives were cloaked in se-

crecy, although it was reported little progress was being made toward reaching a settlement, in view of the UAW insistence on being recognized as sole bargaining agency.

Negotiations between General Motors and UAW drew to a close last week and Saturday some 200 union representatives from various plants of the corporation were to be here to learn details of the agreement. During the week, however, it became apparent how little control the union has over its men. For a time, Chevrolet and Fisher Body plants in Flint were closed by a strike over a minor matter which was settled quickly. In St. Louis, Chevrolet assembly plants were likewise closed for a day by a strike negotiated by UAW members who complained foremen were discriminating against them in favor of members of an employees' organization. This, too, was settled speedily.

However, it will be recalled before negotiations started, union leaders guaranteed not to call any strikes pending outcome of the conferences. This very evidently they were unable to accomplish.

## To Shackle Unions?

Irresponsibility of labor unions of the UAW type is bringing increasing emphasis to the need for legislation requiring incorporation of unions and an accounting of their funds and activities. Many in Detroit will tell you such legislation is considerably nearer to being introduced at Washington, following recognition of CIO members by steel companies. The CIO movement throughout the country is getting beyond the control of its own sponsors, and federal incorporation seems to be the best answer.

If such legislation were passed, unions would be responsible for the acts of their members and would be subject to suit for property damage, unfair competition and other practices which today are countenanced by authorities. It is reported John Lewis of the CIO regards the incorporation proposal favorably, believ-





# MIRRORS OF MOTORDOM

ing it will strengthen his hand against Mr. Green's A. F. of L. The latter organization, incidentally, is working hand in hand with the MESA union which caused the trouble in die shops a couple of years ago. They are pitting their combined strength against the CIO.

**M**UCH talk is heard of higher car prices, but the best opinion seems to be this talk is being sponsored by dealers as a club to get prospects to sign orders. Certainly higher retail prices would appear justified in view of higher labor and material costs, but car builders are going to make every effort to continue through on 1937 models at present prices. It is even possible prices on 1938 models will not be marked up, as it is entirely feasible to absorb higher costs by removing some gadgets here and there, and trimming on this part and that part.

Reflecting the swing of the economic pendulum, demand for larger models continues to improve. In the Buick series, for example, more buyers are selecting the 80 and 90 models than in previous months. No doubt this mirrors a greater affluence among car buyers, as a result of wage increases and more particularly the millions which have been made in the stock market in the last two years. Thus as Wall street was once indicted for bringing on the depression, now it may be credited, in part at least, for restoring a greater measure of prosperity in the automobile industry.

**T**OOLO and die shops are showing increasing disappointment over prospects for new model work. More and more 1938 looks like a year of minor changes, requiring no great outlay for new dies, especially in view of the rising toll of labor disturbances. Some local die shops also are disgruntled at the policy of certain auto plants in letting die work outside of Detroit. They feel that with their heavy investment in tools, tryout presses and skilled labor they are entitled to a better break on automobile die business.

**M**OVING ahead at top speed, Packard is achieving new records on the production sheets. A one-hour strike of 90 designing engi-

## Automobile Production

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

	1935	1936	1937
Jan. ....	300,335	377,306	399,426
Feb. ....	350,346	300,874	*352,750
March ....	447,894	438,992	.....
April ....	477,059	527,726	.....
May ....	381,809	480,571	.....
June ....	372,085	469,355	.....
July ....	345,297	451,474	.....
Aug. ....	245,075	275,951	.....
Sept. ....	92,728	139,785	.....
Oct. ....	280,316	229,989	.....
Nov. ....	408,550	405,702	.....
Dec. ....	418,317	519,132	.....
Year ....	4,119,811	4,616,857	.....

\*Estimated.

Calculated by Cram's Reports

Week ended:

Feb. 20. ....	95,698
Feb. 27. ....	111,915
March 6. ....	126,975
March 13. ....	101,684

neers last week, members of a new white-collar union, the Society of Designing Engineers, was held "just to show the management what we could do." It was settled amicably and quickly and the men returned to their boards where working drawings of next year's Packards are being evolved. Incidentally, Packard is said to be farther along than any of the other leading builders on plans for 1938 models.

Rearrangement of certain Packard departments to put them on a more efficient basis is continuing, and car output has passed the 3300-per week mark. February production totaled 12,824 against 4574 last year, and plans for March call for 15,000.

Ford, with a weather eye on the Chrysler labor entanglement, has opened up production another notch, last week accounting for 33,000 V-8s and 800 Lincolns. This makes the daily rate of assemblies about 6600, approaching Ford's record rate of 7000 daily.

Though it might be imagined the UAW will move in on Ford after altercations with General Motors and Chrysler, and although placards carried in union parades at the time of the General Motors strike read: "Chrysler and Ford next" there is little likelihood of any direct attempt to tie up operations at the Rouge plant. If any move is made

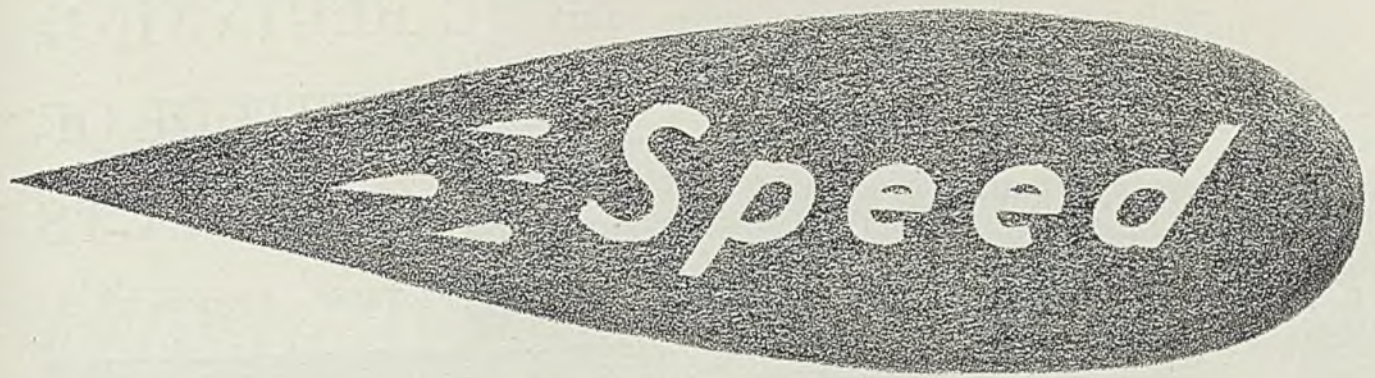
in the direction of Ford it will be through parts suppliers, and up to the present Ford representatives have been able to force quick adjustments in parts plants where disputes affected Ford supplies.

Total automobile production for the week skidded 25,000 units from last week to 101,684, the drop in Chrysler and Hudson output annihilating a slight increase in General Motors figures. Total for Chrysler was 4995; for General Motors 49,760

**W**ORK is starting on the new 1000-ton blast furnace for Great Lakes Steel Corp., which by the end of the year will provide the plant hot metal capacity of some 2500 tons daily, dispensing with the need for shipping pig iron from the Hanna furnaces at Buffalo. The new stack will be between the two present Hanna stacks on Zug island, 2 miles from the Great Lakes mills at Ecorse. Shortly, it is believed, plans will be announced for new coke oven capacity at the plant. . . It is reported another steel producer in this district is contemplating plans for increasing electric furnace melting capacity. . . Harbor lights in Toledo have been manned 26 days ahead of any previous year in the history of the port. . . Leake Stamping Co. is a new entrant in the pressed metal field, with a plant located on the Dixie highway north of Toledo. . . Studebaker sales for February ran over 40 per cent ahead of the same month a year ago. . . Much favorable comment is being heard on Graham's "tower" instrument panel unit of Tenite—a molded cellulose acetate plastic. . . One hundred new double-deck rear-engine buses with Banker monodrive semi-automatic transmissions have been placed in operation by the Fifth Avenue Coach Co. in New York.

Directors of Hupp have notified New York and Chicago stock exchanges of a record date of March 20 for a special meeting of stockholders. After complying with the regulations of the exchanges new plans for refinancing the company will be announced to stockholders. . . The old Austin plant at Butler, Pa., is being refurbished by American Bantam Car Co. and will be in production by May 1 on a line of coupes, roadsters, speedsters and 1/4-ton trucks. Harry Miller of racing car engine fame is in charge of engineering and Thomas Hibbard in charge of design. . . By the end of the month Lincoln-Zephyr will have built more cars than in all of last year. . . AC Spark Plug is pushing a new line of "blue top" plugs comprising 27 types, against 82 types in a previous line. The plug derives its name from the blue insulator top with which it is provided.





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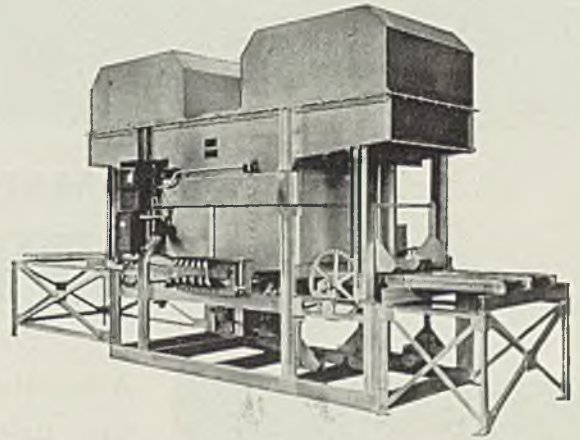
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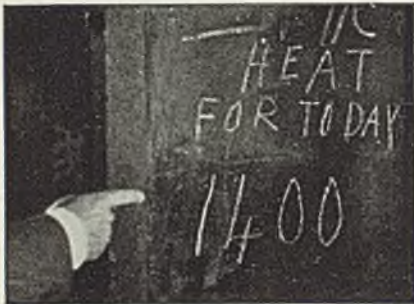


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# SPRING Steel



SPRINGMAKERS FOR MORE THAN THREE QUARTERS OF A CENTURY





# WINDOWS OF WASHINGTON

WASHINGTON

**F**IRST flush of the steel-labor agreement being over, the capital expressed little interest last week in what the steel industry is now doing. There seems to be a general opinion here, although no responsible government official will be quoted, that now that the larger steel companies have adopted shorter hours and higher wages, all the other steel producers will do the same thing.

There was some little flurry here when advanced steel prices were announced. One government official, who for obvious reasons cannot be quoted, told the writer on the basis of a study he had made of the new steel wages, that the steel industry "was very fair" in advancing its prices as it did.

## Know Little of Steel

It must be remembered, in thinking of Washington, that comparatively few persons here know much about the steel industry. Government officials and legislators generally, just "know what they read in the newspapers" and as the trade is well aware, that is generally not the true situation. There are a few officials, however, who watch the industry closely, and those few know some of the problems, and when their opinion is sought by higher-ups the reaction proves almost invariably favorable.

There is still some talk about the Walsh-Healey act and steel supplies for the government, although it is taking a different angle. It is believed that this emergency, at least for the time being, is over, but some are looking ahead and wondering what would happen if Miss Perkins should suddenly take it unto herself to set minimum wages in the steel industry, which she can well do under the law. This would not make so much difference at the moment but if some steel company took a navy contract for delivery of steel some two years from now and in the meantime Miss Perkins changed the

labor rate, just where would the steel company be?

It is pointed out in some quarters that this situation is not serious now, as the government is building only submarines and destroyers. But battleships will come later and it is just another thing that has to be kept in mind for the future.

Considerable interest has been evidenced in the trade as to just what the national relations board will do now in connection with its complaint against the Carnegie-Illinois Steel Corp. The best information obtainable is that it will not dismiss this case until the CIO withdraws its complaint. This has not yet been done. On the other hand, it is expected that the board will not hold further hearings in this case for several weeks and by that time it is believed the whole question will have been taken care of in some way or other.

After months of delay the President has at last appointed a maritime commission. General satisfaction has been expressed on the selections made, especially with the appointment of Joseph P. Kennedy, who made such a name for himself as chairman of the securities and exchange commission. The belief here is that Kennedy was appointed to this important new commission for organization purposes only and that when the commission gets working well he will probably get out of the picture as he did after the organization of the securities commission. Secretary of Commerce Roper, who is rather jittery about the whole maritime situation, at a press conference last week expressed himself as highly gratified that the President had put such an outstanding business man at the head of the new commission.

## HEAVY RELIEF BURDEN PREDICTED BY HOPKINS

Harry L. Hopkins, works progress administrator, has caused cold shivers to run down the spines of some leading industrialists, mem-

bers of the Roper business advisory council, when he told them, behind closed doors and in executive session, that the United States would have permanently on its payrolls 6,000,000 "units" and by this he meant both single persons and married, making a total of some 18,000,000 on government relief payrolls.

He explained by saying that this number would include the unemployables, as well as those taken care of in one way or another for social purposes, including social security. He estimated that this would cost the government about six billion dollars annually.

## Observer Usually Pessimist

Hopkins actually made these statements but observers close to the administration point out that Hopkins always looks at matters of this kind through dark glasses. On the other hand, it must be taken into consideration that he is the one in the administration in closest touch with matters of this kind. Those are his thoughts, whether right or wrong. In other words, while there was always some dispute whether even in the most prosperous times, there were 2,000,000 or 3,000,000 unemployed, under the Hopkins estimate there will be 6,000,000 with 12,000,000 more dependent on them. The fact of the matter is that the industrialists present, of whom there were a large number, were very gloomy over the outlook, especially when Hopkins told them that industry would not be able to take care of the situation, no matter how hard it tried.

At the Roper council meeting last week a request was placed before it from the President asking the council to look into the hour and wage situation. The council has already made a report on unemployment which the President has never mentioned.

One of the important announcements at the meeting from the standpoint of the steel industry was that Edward R. Stettinius Jr., chairman of the finance committee of the



United States Steel Corp., had succeeded Myron C. Taylor of the same corporation as a member of the council. Effort was made at a subsequent press conference with Secretary Roper to ascertain if there was any significance to this change. The secretary insisted that it was a routine change inasmuch as members of the council change from year to year although it is to be noted that many members of the council have been on the council since its organization.

The matter was of especial interest at the time because the rumors had then been printed, which have been current in Washington for months, that Mr. Taylor might be appointed to a diplomatic post. This has been officially denied by Mr. Taylor.

### **GREEN SAYS CIO WOULD RULE THROUGH MINORITY**

The fight between the CIO and the A. F. of L. continues, with Lewis apparently getting the better of President Green at every turn. However, Green is on the job and last week said that the time has come when all A. F. of L. unions, national, state and local, and their members "are called upon to draw a line and to make a distinction between the A. F. of L. and the CIO." Green made this statement in a letter sent by direction of the A. F. of L. executive council to officers and members of all the federation's affiliated organizations.

The necessity of this action, Green declared, has been brought about by the fact that the CIO was established with the avowed purpose of overriding the majority rule in the organized labor movement of the United States by a minority group, and that the CIO movement has persisted in this undemocratic policy from the time of its organization to date despite the endeavors of the executive council to adjust the controversy.

Pointing out that the CIO had refused to set up a committee to meet with a committee named by the A. F. of L. executive council for the purpose of devising ways and means to settle the dispute and thus bring about solidarity of labor, Green said that the only possible interpretation of the refusal of the CIO to appoint a committee "is that said organization is still determined to carry out its original declared purpose to impose the substitution of minority rule for majority control within the organized labor movement."

### **PRESIDENT WANTS LITTLE TALK ABOUT TAXATION**

There is every indication that the tax revision program will not be taken up by congress until some time in June as the administration is

anxious to have as little talk about taxes as possible.

It is pointed out in well informed circles that if the President waits until June it will be necessary to get quick action on any bill, which means a smaller amount of debate, due to the fact that some of the nuisance taxes expire in June and July. Another point is that government officials are anxious to see just what the March 15 tax returns show. These returns have been increasing and there is hope that tax payments may be high enough so the administration might be able to drop some of the so-called nuisance taxes, such as those on admissions, sporting goods, furs and the like.

It is reliably reported also that members of the ways and means committee of the house, where the bill will have to originate, have been considering possibility of altering the tax on undistributed corporate earnings to give more favorable treatment to corporations with deficits and debts and to those desiring to retain part of their earnings for plant improvements. This was one of the matters that congress tried to straighten out before the tax bill passed the last session but time for its consideration was too short. It is understood that house and senate tax leaders will get together shortly to discuss the whole tax program for this session.

### **WHAT TO DO ABOUT MADAM PERKINS IS PUZZLE**

Many things are awaiting the possible reorganization of government departments, which has been put up to congress by the President.

One is what is to become of Madam Perkins. There have been rumors here for months that something is to be done about her. There has been much dissatisfaction. Also Edward McGrady, assistant secretary of labor, does not get along well with her and the administration is anxious to keep him in the labor department. He has been effective in many ticklish situations since the beginning of the present administration.

The story, then, is that when the general departmental reorganization takes place that Miss Perkins will be the cabinet member in charge of the welfare department and that McGrady will go into the cabinet as secretary of labor. Otherwise, so the argument goes, if there were not that understanding, McGrady would have been out long ago.

There are rumors of many other changes, such as what is to be done with Dan Bell, acting director of the budget. Bell has held that position since the beginning of the Roosevelt administration and is considered a very capable person. The President has offered him the job of di-

rector but he has refused it because he came up from the ranks of government clerks and has a civil service status which even the directorship of the budget can not persuade him to give up. A place is to be found for him, it is reported, under the proposed reorganization.

### **SHIPBUILDERS PROTEST NAVAL STEEL MONOPOLY**

The national council of American shipbuilders last week filed a statement with members of congress and the secretary of the navy showing emphatic and challenging opposition to the majority program of the Nye munitions committee for a government monopoly of naval shipbuilding. The council represents the larger part of the shipbuilding and ship repair industry of the United States.

The shipbuilding industry analyzes the Nye committee recommendations as altogether "capricious and ineffectual as the peace measure for which they were advanced, but as tending, on the other hand, to create an actual war hazard." In addition, according to the report, the program contemplated by the recommendation is highly inimical to the national defense and the general efficiency of the United States navy.

The report warns against extension of government-owned shipbuilding facilities in this country because of the local political pressure which would be continually exerted to keep these government owned yards in full scale operation, thereby speeding rather than retarding the rearmament race.

### **WATCH GERMAN EXPORT PLAN**

Unofficial information has been sent to the department of commerce to the effect that the German export policy is shifting from that pushed a year ago by Dr. Schacht.

A year ago Dr. Schacht toured Europe advocating barter deals, since at that time Germany had little or no cash or exchange. The new policy, it is unofficially reported, is to sell for cash, which is now believed possible because of world preoccupation with rearmament. The plan was to have been explained a week or so ago at the opening of the Leipzig trade fair but for some reason or other, it was not mentioned.

Since Germany is the most serious competitor in the world machinery market, developments are being watched here closely. It is not clear from such reports as have been received here whether Germany intends to concentrate on armament exports for cash, which would mean less competition for the United States in industrial equipment, or whether exports will be equally strongly forced in both armaments and machinery.



## No Single Formula Will Suit Varied Labor Situations

**N**OW that the excitement which attended the announcement of U. S. Steel's deal with CIO has subsided somewhat, employers and employees in independent steel companies and in hundreds of other establishments throughout the metalworking industries are surveying the new situation which confronts them and are trying to determine the course of action they should pursue.

The problem that confronts many of these companies is outlined in the following, which conveys in substance the words of an industrial executive of a typical plant:

"We operate in a highly competitive labor market. Most of our 800 employees have been with us 10 years or more. Many of them own their own homes. In spite of the fact that a normal amount of labor trouble has occurred in our industrial community, we have never experienced a strike or lockout in our plant.

"Right now our employees are satisfied. They have no organization for collective bargaining. No question of hours or wages is involved at the present time.

"But after the newspapers came out with the announcement of the Steel Corporation's recognition of CIO, some of our employees came to me and asked me what it meant, and what they should do as a result of it. I told them that I did not know why the Steel Corporation acted as it did, but assured them that the management of our company, as in the past, would try to meet any reasonable request of its employees.

### Action of Steel Corporation Introduces Difficult Problems for Thousands of Satisfied Employees

"In the ensuing discussion, the men asked whether the new situation meant that they would be forced to join a CIO union, whether they could form an employe representation plan or whether they could remain on the existing status, whereby they deal direct with the management.

"I told them that on this point the management could hardly do otherwise than be governed by the wishes of the employees. If the men, after deliberation, decide they want a CIO union, the company will recognize CIO and sign a contract with it to negotiate for its members in our plant. If the men want an ERP, we will deal with them through that agency. If they choose to continue as in the past, we will gladly co-operate on that basis. If some of the men want CIO, others want ERP and still others want no formal organization, we will try to accommodate all three groups.

"Since this little conference, our employees have discussed the problem among themselves and have had

one large mass meeting. They have figured out the effect of the increase in unit wages and the shorter week and discovered that if the CIO formula were applied to their own hours and wages, they would be out of pocket as far as real earnings are concerned. They still are reluctant to ask for any change from the existing satisfactory conditions and, at the moment, seem to think that they should stand pat and await developments."

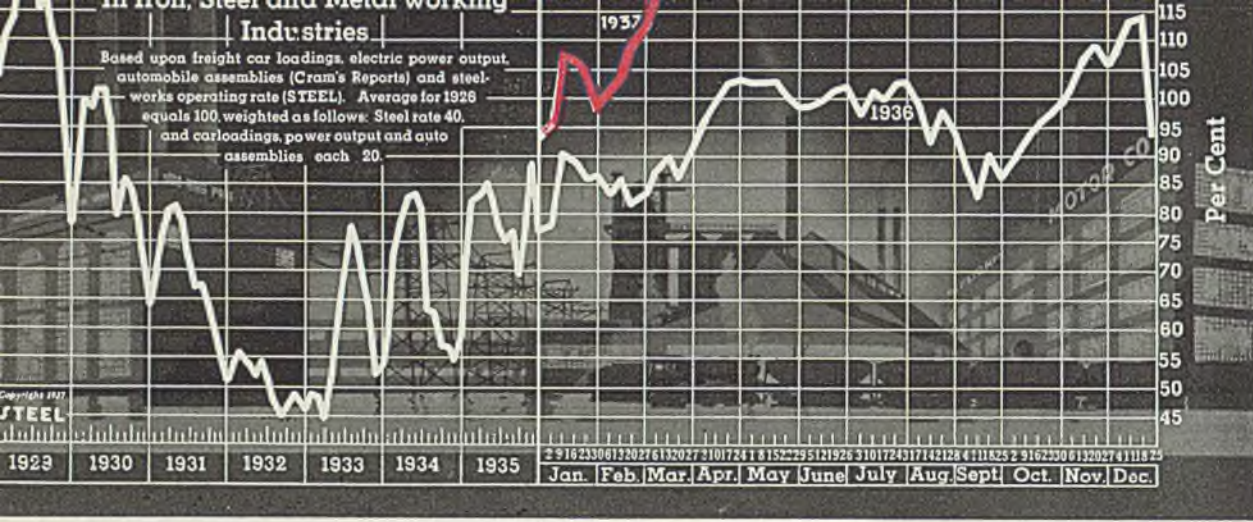
### Companies in Secondary Ranks of Steel Await Discussions of Independent Steel Producers

Multiply the situation reflected in the foregoing words by a thousand or more and you have a fairly accurate picture of what is going on in the discussions between employes and employers in the metalworking industries. The tradition that U. S. Steel is the bellwether of the industrial flock—not only among steel producers but also in many other branches of industry—is strong. Numerous employers and employes not directly involved in primary steel operations were wondering last week whether the independent steel producers would follow the lead of the Corporation. If they do, much of the force of the tradition will be preserved and many companies in secondary branches of the industry will feel that they must fall in line. If the independents, or at least some of the strongest, decide upon a course divergent from that announced by Big Steel, then the force of the tradition will be broken, a definite rift between steel producers will occur and employers and employes in the secondary ranks of steel will be free to choose to follow the leadership of either faction in the primary industry.

It would be foolish to predict what will happen, but it is important to note that ERP was established in plants of U. S. Steel subsidiaries in 1933, whereas some independents had been dealing with their employes through ERP for many years prior to NRA. Also it must be realized that some companies have dealt more fairly with employes than others. We can see no good reason why the present situation should call for a standard or identical solution when the conditions throughout industry vary within such wide limits.

Simple justice would dictate that the employers and employes of a company who have demonstrated convincingly over a long period of years their ability to deal with each other amicably and equitably, should be encouraged to continue the methods which have proved so effective. To discourage them, to force them to adopt something of doubtful value or to regiment them under a politically inspired strait-jacket is to admit that merit no longer is recognized as a virtue in America.





The

STEEL'S index of activity gained 5.2 points to 118.0 in the week ending March 6:

Week ending	1937	1936	1935	1934	1933	1932	1931	1930
Jan. 23	104.7	86.0	79.5	62.3	50.8	55.8	72.0	96.3
Jan. 30	99.6	86.6	81.8	66.9	49.9	56.2	72.9	97.4
Feb. 6	100.8	83.8	82.7	70.7	48.7	56.0	74.9	100.8
Feb. 13	101.9	85.9	82.8	72.4	48.3	55.5	75.4	100.9
Feb. 20	108.8	81.8	80.5	75.5	46.0	54.5	76.0	97.7
Feb. 27	112.8†	83.4	81.1	76.8	47.4	55.1	75.8	99.7
March 6	118.0*	87.7	82.0	78.6	43.4	54.1	79.2	98.3

†Revised. \*Preliminary.

## Index of Industrial Activity Touches New Recovery Peak

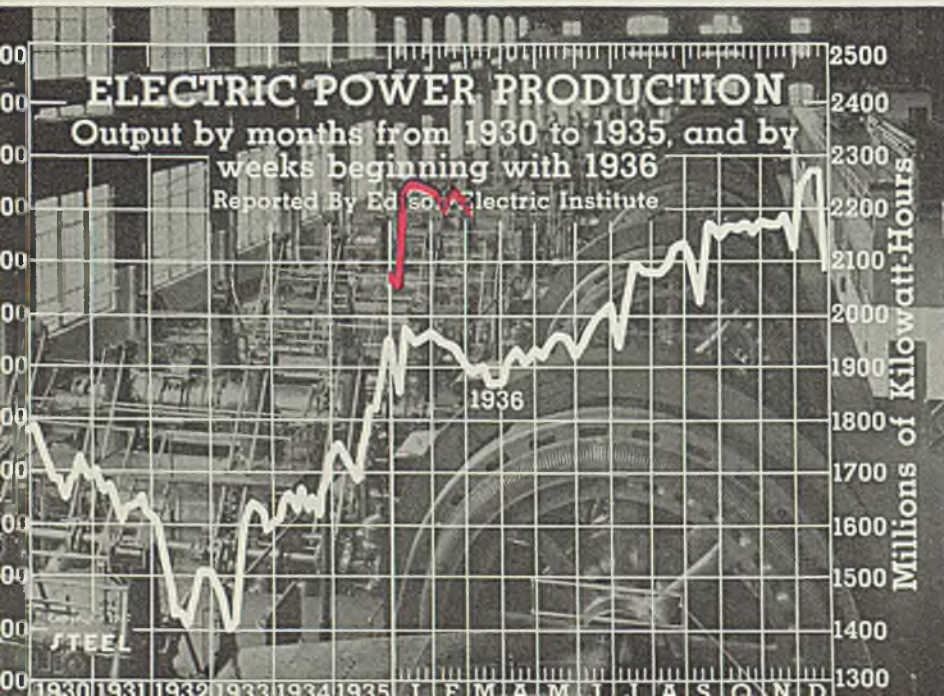
THE first week of March, which witnessed epochal developments in steel's labor relations policies, was marked by a spectacular new spurt in industrial activity. STEEL'S index leaped from 112.8 to 118, the highest point recorded since the week ending July 27, 1929, and only 10.7 points below the all-time high of 128.7 of the week ending June 8, 1929.

Contributing to the sharp gain were a 2-point advance in steelworks operations, an increase in automobile output from 111,915 to 126,975 cars and a substantial expansion in freight car loadings. Electric

power output, on the other hand, slumped slightly.

It is doubtful whether the pace of the week ending March 6 can be maintained steadily throughout the month. In that week the automobile industry was comparatively free of labor trouble. The General Motors truce still was effective and the difficulties which now beset Chrysler, Hudson, Briggs and other companies had not developed. The new flare-up in motordom will cut into the production figures for the second and third weeks of March.

Higher prices, announcement of which followed in the wake of the hour and wage decisions in the steel industry, introduce a factor which may prove to be highly important when the present heavy demand begins to taper off. Today's situation is not unlike that existing in the early days of the 1933 post-inauguration spurt.



	1937	1936	1935	1934
March 6	2199	1893	1724	1647
Feb. 27	2207	1903	1734	1658
Feb. 20	2211	1941	1728	1646
Feb. 13	2199	1950	1760	1641
Feb. 6	2201	1952	1763	1652
Jan. 30	2214	1962	1762	1636
Jan. 23	2256	1955	1781	1611
Jan. 16	2264	1949	1778	1625
Jan. 9	2244	1970	1772	1646
Jan. 2	2069	1854	1668	1564



# BUSINESS TREND

## Commodity Index Continues Steady Upward Trend

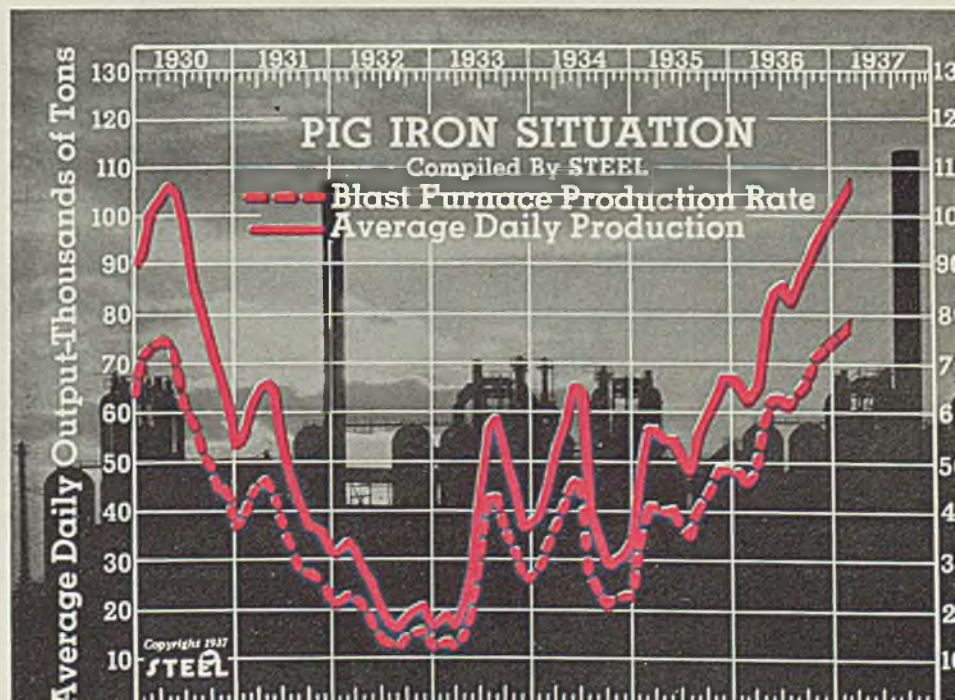
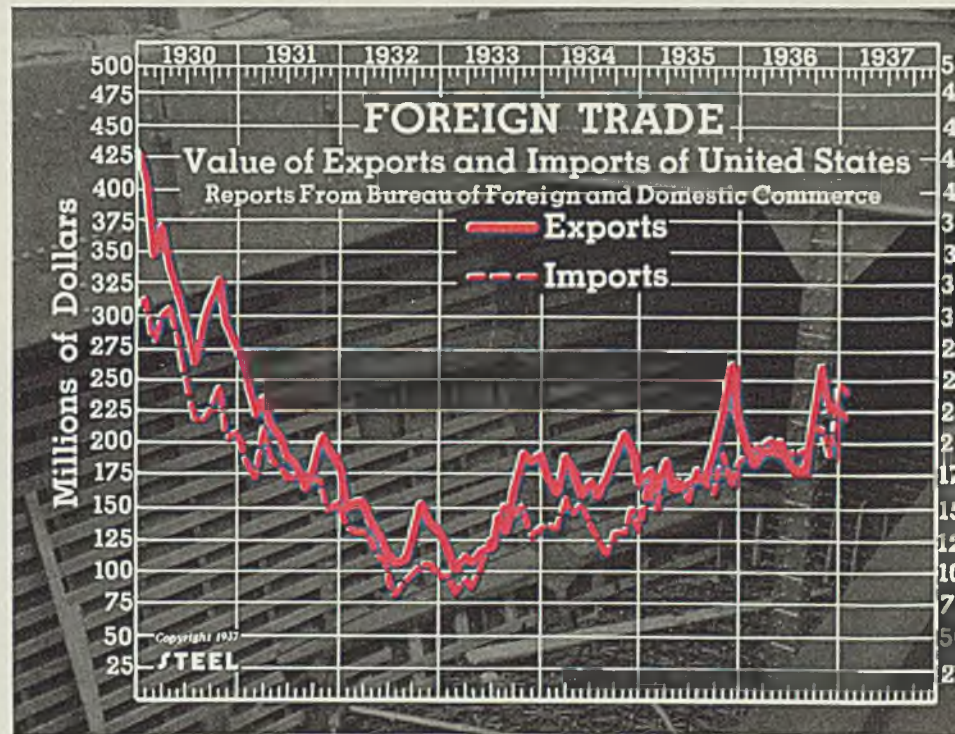
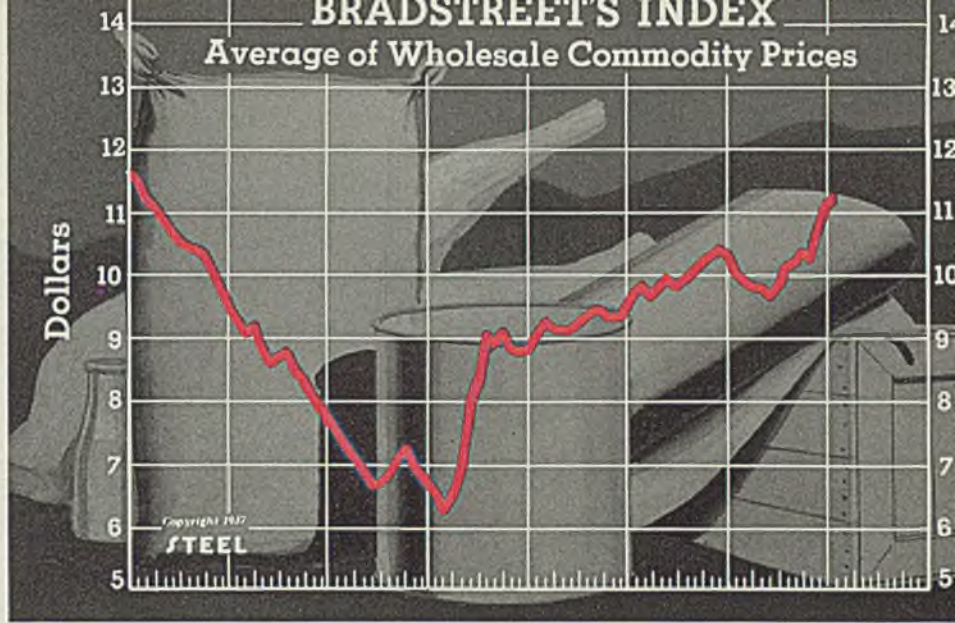
	1937	1936	1935	1934
Jan. 1.....	\$11.13	\$10.36	\$9.49	\$9.01
Feb. 1.....	11.23	10.02	9.78	9.26
Mar. 1.....		9.92	9.79	9.17
Apr. 1.....		9.85	9.66	9.16
May 1.....		9.81	9.79	9.14
June 1.....		9.73	9.90	9.24
July 1.....		9.85	9.84	9.32
Aug. 1.....		10.14	9.91	9.48
Sept. 1.....		10.19	10.00	9.45
Oct. 1.....		10.27	10.17	9.27
Nov. 1.....		10.22	10.28	9.29
Dec. 1.....		10.78	10.40	9.49

## January Foreign Trade Declines; Above Year Ago

	Dollars (000 omitted)		Dollars (000 omitted)	
	1937		1936	
	Exports	Imports	Exports	Imports
Jan. ....	221,550	240,396	198,654	187,482
Feb. ....			182,030	192,771
March .....			194,790	198,686
April .....			193,490	202,437
May .....			201,042	191,110
June .....			185,188	192,233
July .....			178,324	193,409
Aug. ....			178,249	195,016
Sept. ....			219,976	215,525
Oct. ....			264,708	212,001
Nov. ....			225,766	196,423
Dec. ....			229,739	244,321

## February Pig Iron Output Highest Since October, 1929

	Daily Average, Tons		Blast Furnace Rate, Per Cent	
	1937	1936	1937	1936
Jan. ....	103,863	65,461	76.6	48.2
Feb. ....	107,857	63,411	79.5	46.6
March .....		66,004		48.5
April .....		80,316		59.1
May .....		85,795		63.1
June .....		86,551		63.6
July .....		83,735		61.5
Aug. ....		87,475		64.3
Sept. ....		90,942		66.9
Oct. ....		96,509		71.0
Nov. ....		98,331		72.3
Dec. ....		100,813		74.2





# WHICH GRAIN SIZE?

BY C. H. HERTY JR., D. L. MC BRIDE AND E. H. HOLLENBACK  
Bethlehem Steel Co.

+

SINCE early work of McQuaid and Ehn on carburizing steel, interest in and application of the McQuaid-Ehn test has increased to the point where this test is specified on a large tonnage of various grades of steel, especially carburizing and forging grades. In many other grades the test is used to determine grain size of a sample, and from this grain

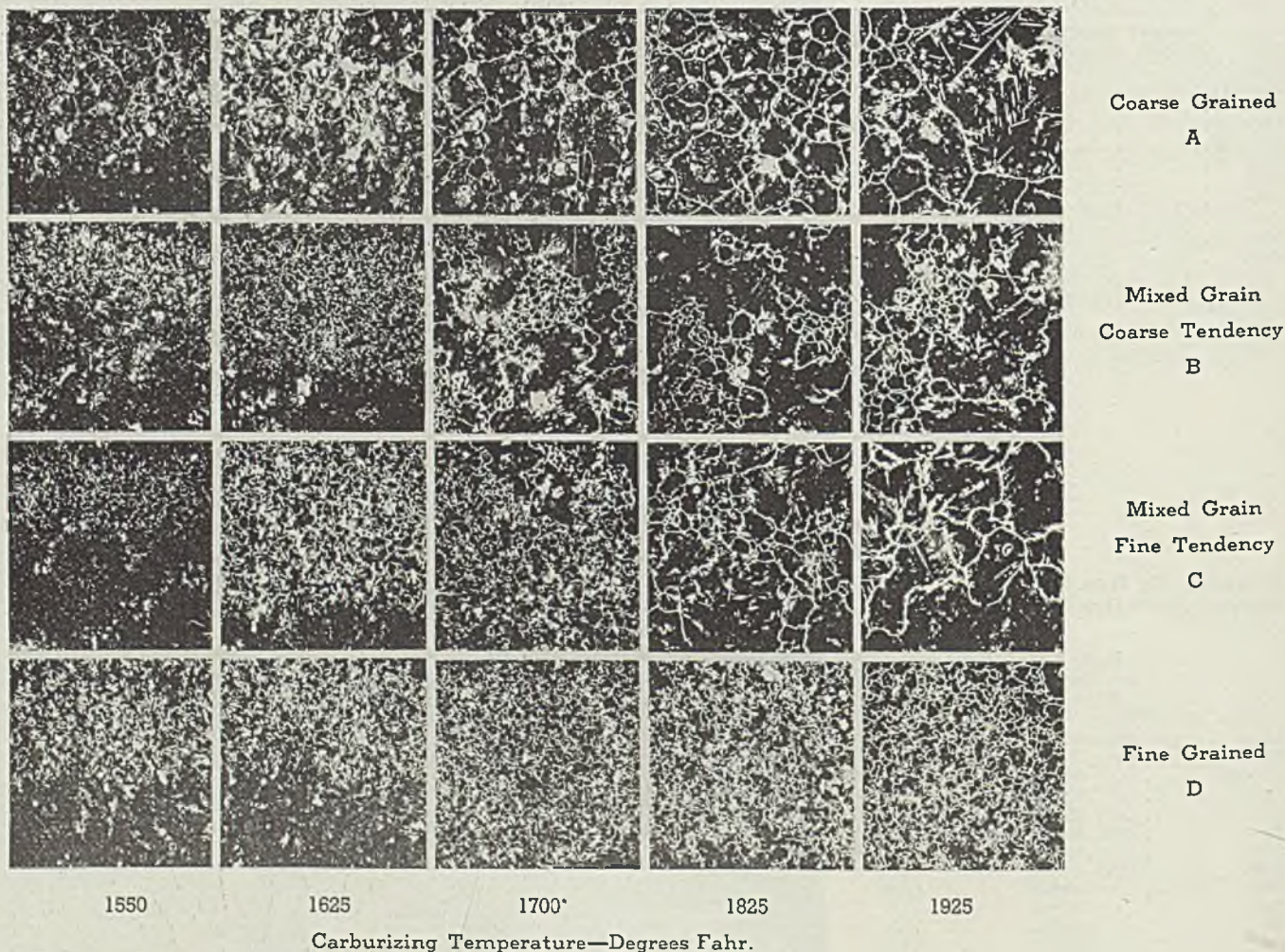
size certain general characteristics of the steel are predicted.

In using this test, the inference frequently is drawn that the observed grain size is that which exists in the steel during heat treatment. Variations in response to heat treatment for a given McQuaid-Ehn grain size are common, because the standard McQuaid-Ehn test does not indi-

cate the grain size existing in the steel except under the specific conditions of the test. For example, steels showing mixed grain in the test have been condemned for quenching operations because it was

*FIG. 1—Effect of temperature on grain size of carburized steels. 100 diameters reduced 49 per cent*

## CARBURIZED GRAIN SIZE



\*Temperature of McQuaid-Ehn test



believed that the mixed grain structure would cause cracking or excessive warpage. These steels are in general uniformly fine grained at the usual heat treating temperatures, 1600 degrees Fahr. or lower, and behave as such in heat treating operations.

This article purports to show the relationship between hardenability and grain size and to emphasize that the grain size important to hardenability is that formed at the heat treating temperature, and not that shown by the McQuaid-Ehn test, unless the steel is to be heat treated under the conditions of that test.

The McQuaid-Ehn test was first intended to classify steels with respect to their hardening characteristics after carburizing. The test consists of carburizing a sample at 1700 degrees Fahr. for 8 hours, followed by a box cool and subsequent examination of the carburized case and

**T**HE accompanying article, emphasizing that the grain size of steel important to hardenability is that formed at the heat treating temperature, constitutes a paper presented recently before several chapters of the American Society for Metals. The authors are associated with the Bethlehem Steel Co.; Mr. Herty and Mr. McBride as members of the development and research department at Bethlehem, Pa., and Mr. Hollenback as assistant engineer of tests at the Cambria plant at Johnstown, Pa.

core of the test specimen. Grain size usually is judged by the case, although the core and transition zone sometimes are used.

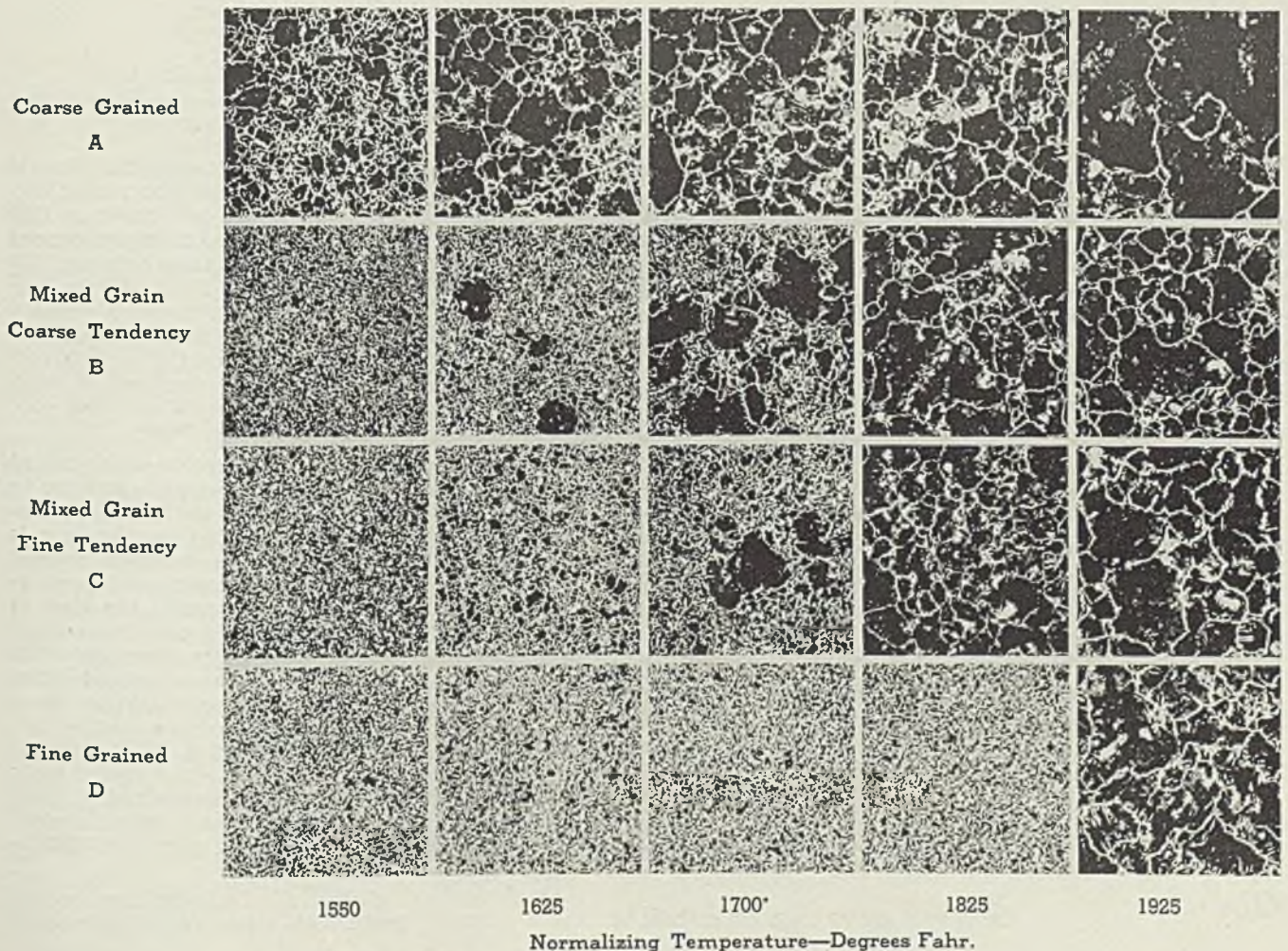
During carburizing, the steel absorbs carbon to the extent that the

case, usually about 0.03 inches deep, contains from 1.00 to 1.10 per cent carbon. The core has the carbon content of the sample used and the transition zone decreases in carbon content from case to core between these two limits. With the amount of carbon present and with the slow cooling in the box, cementite is precipitated at the austenitic grain boundaries and the observed grain size, therefore, is the true austenitic grain size of the carburized case at the temperature of carburizing. However, the case has increased in carbon content from that of the sample to 1.00 to 1.10 per cent, whereas the core has the carbon content of the sample. This change in carbon content in many instances has an effect on the grain size of the steel at the carburizing temperature. Furthermore, it must be remembered that the observed grain size is established during 8 hours at temperature.

When the carburizing temperature is varied, the observed grain size also varies, for example, the lower the carburizing temperature the finer the grain. As will be shown present-

**FIG. 2**—Effect of temperature on grain size of normalized steels. 100 diameters reduced 49 per cent

NORMALIZED GRAIN SIZE



\*Temperature of McQuaid-Ehn test



**Table I**  
**Chemical Analysis of Steels Investigated**

Steel No.	Carbon, per cent	Manganese, per cent	Phosphorus, per cent	Sulphur, per cent	Silicon, per cent	Aluminum, pounds, per ton
A	0.51	0.46	0.018	0.029	0.16	0.55
B	0.48	0.82	0.020	0.028	0.22	0.58
C	0.42	0.78	0.019	0.037	0.16	1.40
D	0.39	0.62	0.014	0.028	0.17	1.64

ly, this change in grain size with temperature is of great importance in heat treating operations.

The microstructure of the grain after the carburizing treatment often is used to judge the character of the steel. The familiar terms "normal" and "abnormal" are used to differentiate between two extremes in structure, as follows. A "normal" structure is one in which the grains are clearly outlined with a continuous network of cementite of fairly uniform width, the internal grain structure exhibiting no areas of divorced ferrite. When the pearlite is lamellar, the alternate plates of carbide and ferrite are in straight parallel lines. An "abnormal" structure is one in which divorced ferrite and globular cementite appear in either or both network and internal grain structure, the network usually being of variable width and discontinuous.

**Effect of Cooling Rate**

Inasmuch as the carbon in almost all instances is uniformly dissolved in the austenitic grain after an 8-hour soak at 1700 degrees Fahr., it is evident that the McQuaid-Ehn test will show the relative rates of coalescence of precipitated carbides during the cooling period. A normal steel has an external slow rate of coalescence of carbide, an abnormal steel a rapid rate. Therefore, it fol-

lows that the degree of abnormality can be controlled by varying the cooling rate after carburizing, and such actually is the case.

The fallacy of indiscriminately utilizing the grain size observed in the McQuaid-Ehn test for predicting properties developed in treatments other than carburizing now

number of simple test methods as described by Bain and Vilella<sup>1</sup>. In the following experiments a simple normalizing treatment has been used. Fig. 1 shows the change in grain size with temperature in the carburizing test for four types of steel. The steels were chosen so that one was coarse grained (A); one mixed-grained with a tendency to be coarse (B); one mixed-grained with a tendency to be fine (C); and one fine-grained (D), in the standard McQuaid-Ehn test. The analysis of these steels are given in Table I.

Fig. 2 shows the change in grain size of the same steels in the normalized condition. In this treatment the steels were held at temperature for 1 hour. The close parallelism between the two types of heat treatment is readily seen.

**STEEL A.** This steel is coarse

**Table II**  
**Grain Size of Carburized Samples**

Steel No.	Grains per square inch at				
	1550 deg. F.	1625 deg. F.	1700 deg. F.	1825 deg. F.	1925 deg. F.
A	30.0	8.1	6.7	2.9	2.6
B	200 *	180 *	18.0	5.5	4.4
C	200 *	182	100 *	4.2	1.9
D	200 *	196	150 *	85.0*	67.0

\*Estimated.

will be demonstrated by a consideration of the austenitic grain size characteristics of steel, and the relation between hardenability and austenitic grain size.

As indicated, the temperature at which the carburizing test is run determines the resulting grain size for a given sample. The austenitic grain size may be estimated by a

grained in the McQuaid-Ehn test and is medium grained, and rather uniformly so, when carburized at 1550 degrees Fahr. The most pronounced coarsening takes place between 1550 and 1625 degrees Fahr. In the normalized condition, the steel appears quite similar to the carburized condition, except that the sample normalized at 1550 degrees is somewhat finer grained than that carburized at 1550 degrees.

**STEEL B.** This steel is mixed grained with a marked tendency to be coarse in the McQuaid-Ehn test. As the carburizing temperature is raised, the steel becomes coarser but fine areas remain. At lower carburizing temperatures, the steel is fine grained. In the normalized samples much the same condition holds as in the carburized tests, with two exceptions: First, there are no fine grained areas at the two higher normalizing temperatures; and second, there are coarse spots in the sample normalized at 1625 degrees Fahr. which do not appear in the sample carburized at 1625 degrees.

**STEEL C.** This steel has a mixed grain with a fine grain tendency in

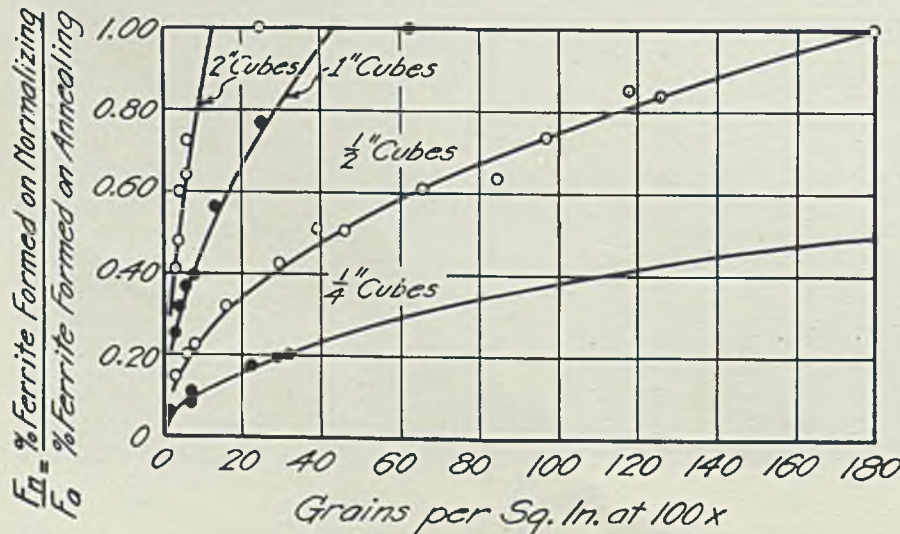


Fig. 3—Effect of grain size and mass on ratio of ferrite formed during normalizing and annealing

<sup>1</sup> National Metals Handbook, 1936, page 584.



the McQuaid-Ehn test. At higher temperatures the steel is coarse grained and at lower temperatures, fine grained. The normalized structure shows a perfect parallelism with the carburized structures for this steel, and at 1550 degrees Fahr. the normalized structure shows that the steel is typically fine grained. At 1625 degrees there is a slight coarsening, but the steel is still a fine grained steel.

**STEEL D.** This steel is a fine grained steel in the McQuaid-Ehn test and just begins to coarsen at about 1925 degrees Fahr. under carburizing test conditions. In the normalized condition the steel is fine grained at the four lower normalizing temperatures, except for a spot of coarse grain at 1825 degrees, but at 1925 degrees, the steel is definitely coarse grained. In comparing the 1925-degree carburizing and normalizing treatments, it is evident that some factor in the carburizing test has caused the coarsening temperature to be raised somewhat over that of the normalized steel.

From these results it is evident that steels which show mixed grain

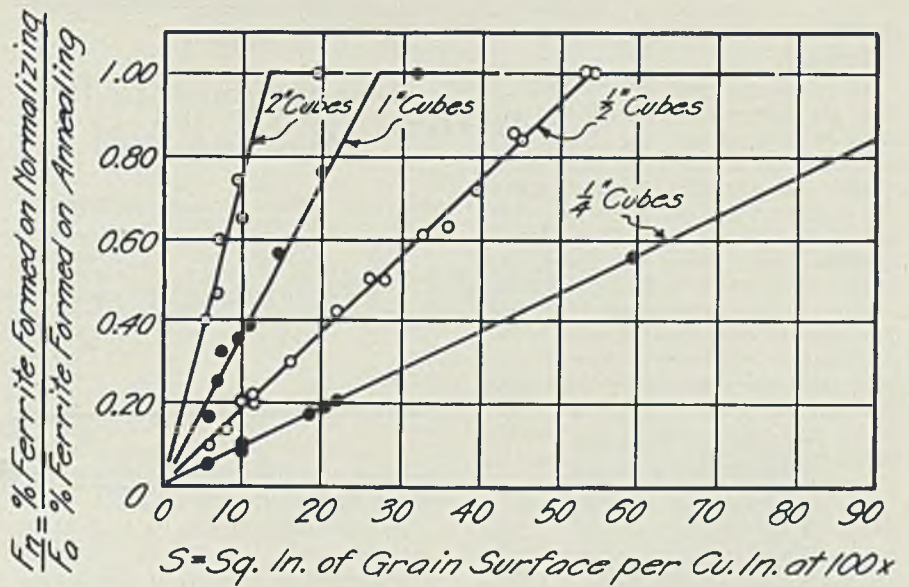


Fig. 4—Effect of grain surface and mass on ratio of ferrite formed during normalizing and annealing

widely different grain sizes at heat treating temperatures, as illustrated in Table IV.

From these data it is apparent

size at this temperature. Many of the variations in heat treating characteristics of steels of any given McQuaid-Ehn test rating may be attributed to differences in grain size at the heat treating temperature which were not indicated by the McQuaid-Ehn test.

Table III

### Grain Size of Normalized Samples

Samples Heated for 1 Hour at Various Temperatures and Air Cooled

Steel No.	Grains per square inch at				
	1550 deg. F.	1625 deg. F.	1700 deg. F.	1825 deg. F.	1925 deg. F.
A	88.0	13.2	8.3	5.5	3.4
B	165	150 *	80 *	5.5	3.3
C	200 *	170 *	140 *	8.5	3.4
D	171	170 *	170 *	135	2.5

\*Estimated.

in the McQuaid-Ehn test will be fine grained when heat treated from 1550 degrees Fahr. or lower, particularly if the mixed grain has a tendency to be toward the fine grained side. If the mixed grain in the McQuaid-Ehn test is preponderantly coarse, a uniform grain size is obtained at 1550 degrees, slightly larger than that of steels which are finer grained in the McQuaid-Ehn test. In a steel of this type there probably will be spots of coarse grained material in a matrix of fine grains when heat treated above 1550 degrees.

In both tests it is the austenitic grain which is outlined, in the carburized pieces by cementite, in the normalized pieces by ferrite. Tables II and III give the grain per square inch for all samples. These grain sizes were either counted or estimated from comparison with samples already counted.

Steels which are coarse grained in the McQuaid-Ehn test may show

that the results of the McQuaid-Ehn test on steels of Type A may be entirely misleading. For example, different responses would be expected from steels, C-3 and J when heat treated at 1550 degrees Fahr., because of the wide variation in grain

### Growth Rate Not Uniform

It has been shown<sup>1</sup> that the major change in grain size within the coarsening temperature range occurs during the first few minutes at temperature. At lower temperatures, the rate of grain growth with time decreases markedly; and for steels which are mixed-grained or fine-grained at 1700 degrees Fahr. or higher, the rate of grain growth is exceedingly slow at lower temperatures.

In heating a series of coarse and fine-grained (McQuaid-Ehn test) 0.40 per cent carbon steels to various temperatures, the actual time

<sup>1</sup> Co-operative Bulletin 65, Mining and Metallurgical Advisory Board, 1934, Carnegie Institute of Technology, Pittsburgh.

Table IV

### Change in Grain Size of Coarse Grained Steel

Steel No.	Chemical Analysis					McQuaid-Ehn grain size	Grains/sq. in. at 100X when normalized at 1550 deg. F.
	Carbon, per cent	Manganese, per cent	Phosphorus, per cent	Sulphur, per cent	Silicon, per cent		
J	0.39	0.73	0.016	0.031	0.07	2	15
AD	0.41	0.81	0.034	0.039	0.17	2	25
A-98	0.49	0.74	0.016	0.032	0.22	2-4	29
AO	0.51	0.77	0.021	0.031	0.24	2-4	29
X	0.33	0.44	0.011	0.029	0.16	2-4	32
B-98	0.45	0.78	0.018	0.035	0.19	2-4	48
B-100	0.45	0.72	0.019	0.030	0.20	2-4	53
B-99	0.46	0.81	0.020	0.028	0.19	2-4	70
C-3	0.51	0.46	0.018	0.029	0.16	2-4	88



required at temperature to give the major amount of coarsening was as in Table V.

After these time intervals there may be some change in grain size upon prolonged heating if the temperature is within the coarsening range, for example, a steel which has 6 grains per square inch when heated at 1832 degrees Fahr. for 15 minutes may show 5 grains per square inch when heated for 1 hour at the same temperature. However, if a steel is heat treated well below the coarsening temperature range, as is the case with fine grained and some mixed grained steels, no coarsening will occur even if the steel is held at temperature for as much as 48 hours.

For normal heat treating operations, involving fine or mixed grained McQuaid-Ehn steels, it is probable that the grain size established when the piece has come to temperature will be the grain size obtained after the prescribed soaking period. In heat treating coarse grained steels, a gradual increase in the austenitic grain size will occur with time until the stable grain size is attained. The time necessary for the attainment of this stable grain size varies with the temperature, being greater for the lower temperatures.

#### Influence on Hardenability

The most important feature of grain size undoubtedly lies in its influence on hardenability and the various properties of the steel following hardening treatments. To discuss this subject properly, it will be advisable to demonstrate the relationship between grain size, grain

Table V

### Time at Temperature for Major Coarsening

Temperature, degrees Fahr.	Silicon Killed Coarse Grained, minutes	Aluminum Mixed Grain, minutes	Treated Fine Grain, minutes
1450.....	480	.....	.....
1550.....	120	No growth in 2880	No growth in 2700
1742.....	10-20	0-20	No growth in 480
1832.....	10	0-15	30
1925.....	4	.....	10

surface and the reactions which take place during cooling of steel.

In air cooled hypoeutectoid plain carbon steels, ferrite and pearlite are formed as a result of the decomposition of austenite. If the steel is very slowly cooled, the amount of ferrite formed may be calculated from composition of the steel. With more rapid rates of cooling, less and less ferrite is formed because the equilibrium transformation range is passed through so quickly that a large part of the austenite remains undecomposed until a high supercool has been reached. Under these conditions austenite transforms into fine pearlite, lower in carbide and richer in ferrite, than a true pearlite of eutectoid composition.

The ratio of the ferrite formed on air cooling to ferrite formed on annealing can, therefore, be used to determine the rate of decomposition of the austenite on air cooling. If two samples of the same steel be so treated that two different grain

sizes are obtained, the effect of grain size on the rate of decomposition of austenite may be determined by the ferrite ratio mentioned above. McBride, Herty, and Mehl<sup>3</sup> studied this effect of grain size on the amount of ferrite formed on air cooling in various sized cubes. It was found that the ratio

*Per cent ferrite formed on normalizing* ÷ *Per cent ferrite formed on annealing*

when plotted against grains per square inch in the normalized sample gave smooth curves as shown in Fig. 3, indicating that the amount of decomposition was proportional to grain size. The larger the cube the greater the amount of ferrite formed on air cooling for a given grain size. From the grains per cubic inch of steel was calculated from the equation:

$$S = 4\sqrt[3]{G}$$

where  $S$  = square inches grain surface per cubic inch at 100 diameters and  $G$  = grains per square inch at 100 diameters.

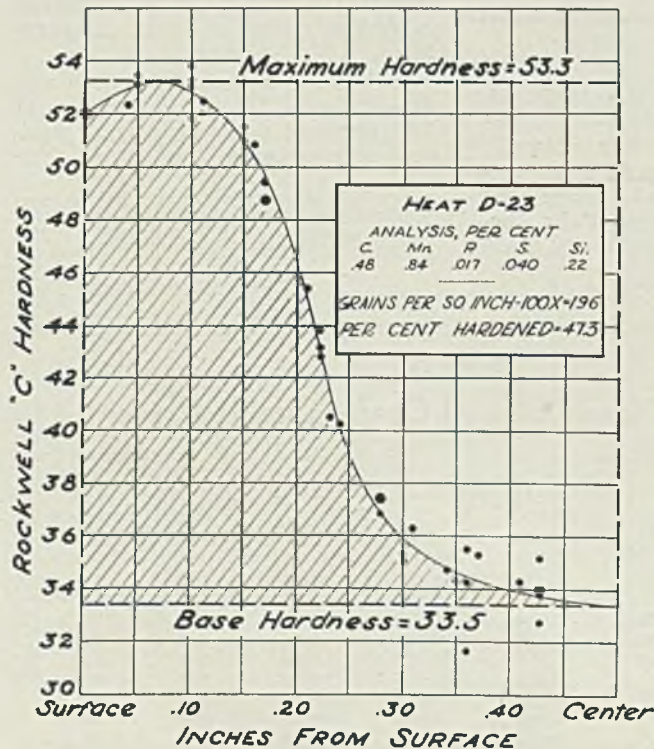
In this calculation it was assumed that the grains were spheres. The ferrite ratio when plotted against grain surface per cubic inch gave a straight line for each size of cube employed, as shown in Fig. 4. This was a definite indication that the rate of decomposition of the austenite was a direct function of the grain surface per unit volume of steel.

#### Relationships Are Established

The following tabulation shows the relation between A. S. T. M. grain size number, grains per square inch at 100 diameters, and square inches grain surface per cubic inch at 100 diameters, as calculated from the foregoing equation:

A. S. T. M. Grain No.	Grains per square inch at 100X	Square inches of grain surface per cubic inch at 100X
1	1	4.0
2	2	5.6
3	4	8.0
4	8	11.3
5	16	16.0
6	32	22.6
7	64	32.0
8	128	45.3
9	256	64.0

FIG. 5—Hardness penetration below the surface of a 1-inch round; water quenched from 1550 degrees Fahr. and drawn at 500 degrees Fahr.



It should be noted that to double the grain surface, the important factor, it is necessary to quadruple the number of grains per square inch, for example, an increase of two grain size numbers.

To obtain maximum hardness for a given chemical composition, it is necessary that the austenite decompose into martensite. In carbon steels austenite will not decompose into martensite on quenching unless (Please turn to Page 80)

<sup>3</sup>D. L. McBride, C. H. Herty Jr. and R. F. Mehl: "Effect of Deoxidation on the Rate of Formation of Ferrite in Commercial Steels," *Transactions, American Society for Metals*, Vol. 24, No. 2, page 281.



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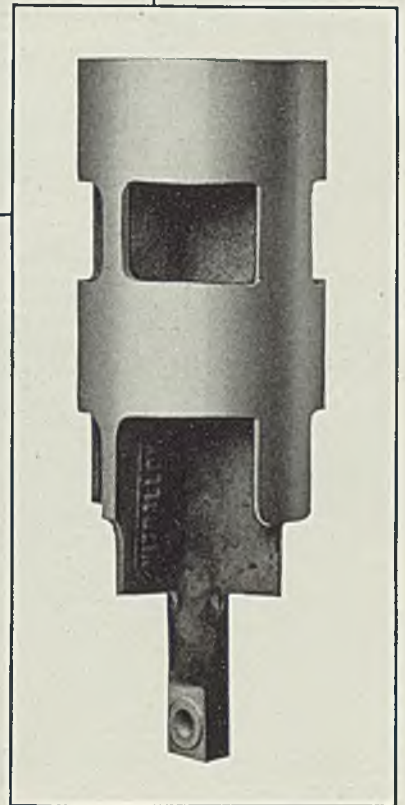
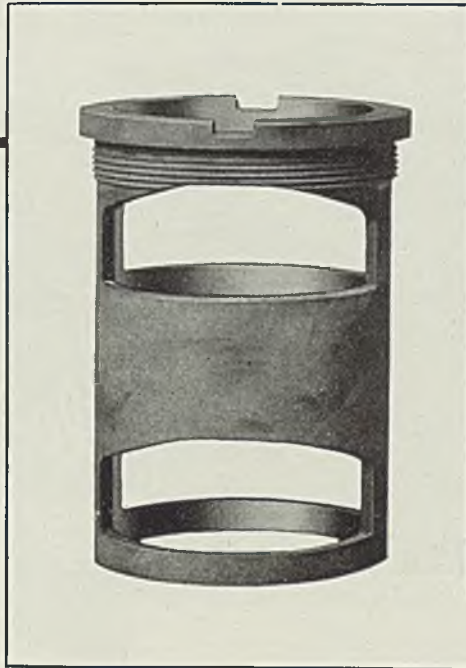
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*Internal valve parts for high pressure, high temperature power plant service. These parts are Vanadium Alloy Cast Steel, nitrided, made by the Milwaukee Steel Foundry Company, Milwaukee, for the Mercon Regulator Co., Milwaukee.*

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# MATERIALS HANDLING



## Centralized Materials Handling Is Plan Followed in Automobile Plant

**M**ATERIALS handling at the Buick Motor Car Co. plant, Flint, Mich., is not regarded by Buick executives as merely another incident to producing automobiles. On the contrary, it is considered today as a major division of operations, worthy of special and continuous study, and a co-ordinating force of prime importance to all other departments of the business. Recognition of this status is evident in the fact that materials handling throughout the entire plant is segregated in a separate department under the direction of Henry F. Rogers, materials supervisor. Within the authority of the latter is all intraplant distribution; interplant transportation is under the direction of the traffic department.

### System Was Inadequate

This is a comparatively new condition. Up to a few years ago, not quite as much attention was accorded to this subject of physical distri-

bution of raw materials, parts and finished products. As consumer demand for Buick cars increased, bringing with it constantly expanding production facilities, naturally the need for keeping materials on the move increased correspondingly. Cranes, conveyors, powered tractors and trucks, hoists and various other types of equipment were

added where needed, but control was not centralized, and consequently many shortcomings in the general system, while apparent to many department heads, were permitted at times to exist because other duties in manufacturing seemed more important.

During the depression years, and particularly in the past two, centralized control and study of equipment and methods have been instituted. One of the first surveys completed dealt with floor-operated equipment. A more scientific approach to selection of "rolling stock" resulted in the decision that definite standards be set forth to cover floor



FIG. 1 (right)—A fleet of approximately 150 electric industrial trucks are kept busy in the Buick plant. The fork truck shown here is handling strapped packs of sheet steel

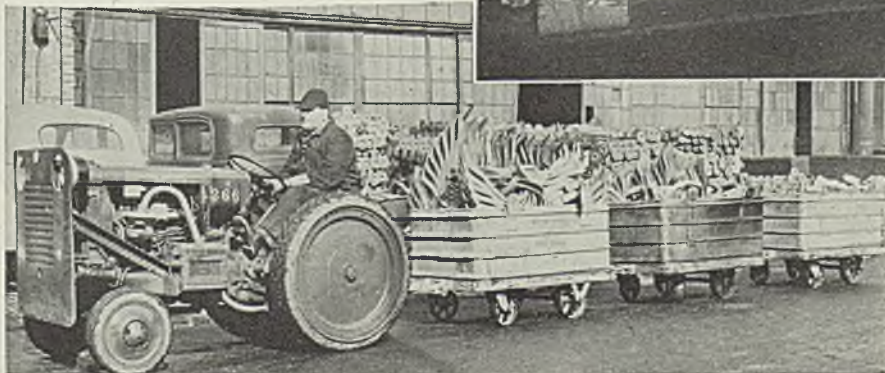


FIG. 2 (left)—Interplant handling is performed largely by gas-powered tractors and trailers under direction of the traffic department. Appropriate slogans stenciled on the sides of the trailers stress safety



# MATERIALS HANDLING



truck chassis. When this study had been completed, it was determined that a real economy would be effected by utilizing trucks, the original cost of which was \$10 or \$12 higher per unit, but which would be designed to eliminate certain hazards in operation, discovered in previous practice.

The truck chassis, which is now standard equipment throughout the Buick plant, has among its specifications the following: 10-inch casters with 3-inch face and 12 1/2-inch rear

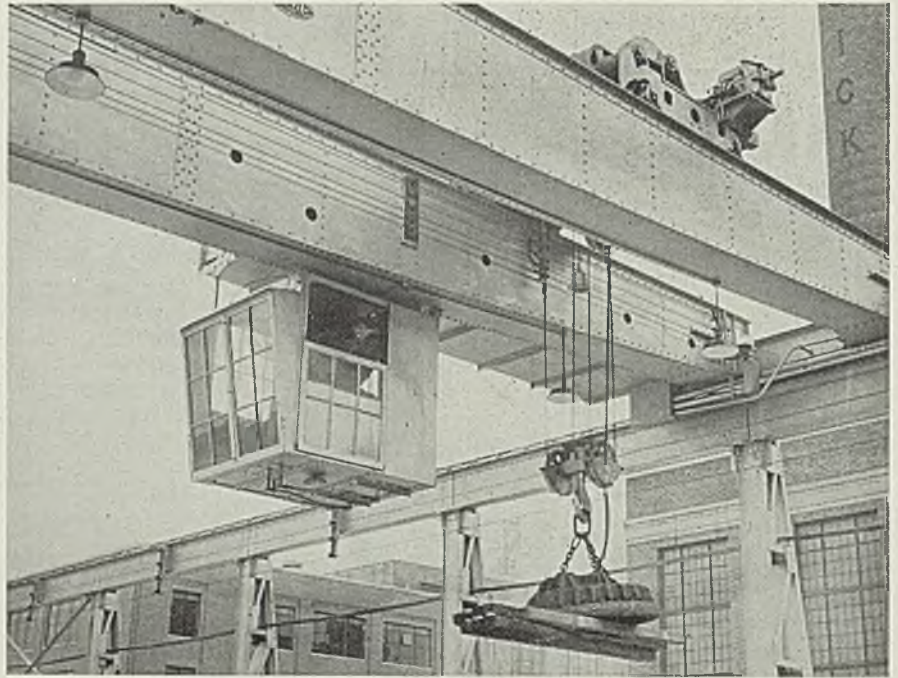
FIG. 3—This electric overhead crane equipped with lifting magnet, was installed in the storage yard recently to speed up the handling of steel needed in production departments

wheels; roller bearing throughout; yoke to be cast steel; king bolt of high carbon steel; rear tire molded on wheels, wheels to have 3 1/2-inch face; cast steel hub; ball load bearing 7-inch diameter with 5/8-inch balls.

Following decision of specifications, the materials handling department purchased 1500 trucks of the new design, equipped with safety couplers, so that a single unit may be pushed around with a minimum of exertion on the part of an operator, or a train of them utilized as trailers behind a power tractor.

One of the tractors and its trailer train are shown in Fig. 2. Incidentally, it should be mentioned that rubber tires are used wherever it

ling steel. This unit is shown in Fig. 3. Supervisor Rogers explained that this crane became necessary due to demands for increased capacity in the steel storage yard. Additional volume of steel requirements made it absolutely essential that new handling equipment be acquired. Two conditions caused this. First of all, the sales of Buick cars necessitated step-up in production, and in addition to making forgings for its own cars, the Flint forge shop has been making some for Oldsmobile. Thus, the combined operations consume steel stock to the extent of



is desirable to eliminate noise and vibration.

Floor truck equipment is not the only newly installed item of handling equipment at Flint. Another recent installation is a new electric crane, magnet equipped, for hand-

approximately 400 tons a day for forgings alone.

An additional innovation in materials handling practice, and one which is decidedly ingenious, is a new transfer car, located at the unloading platform of the body storage



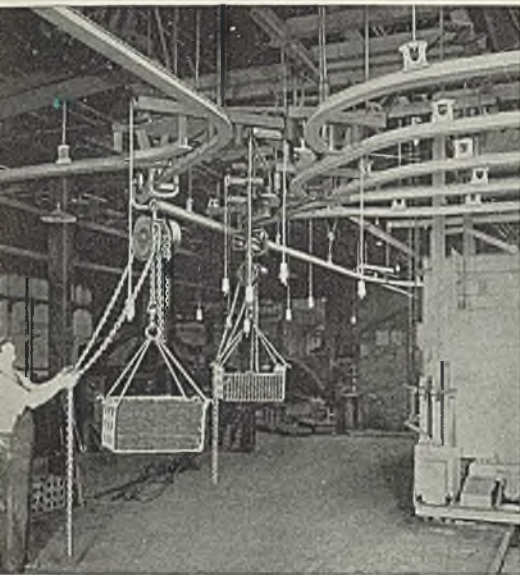
FIG. 5 (right)—Transfer car delivering bodies from two decks—by gravity from the upper deck and manually through a side door from the lower deck. Inside the plant, bodies are stored by a small tractor

FIG. 4 (left)—View of the new transfer car in position of alignment with a double-deck trailer which delivers bodies to the plant 14 at a load





# CLEVELAND TRAMRAIL MATERIALS HANDLING EQUIPMENT



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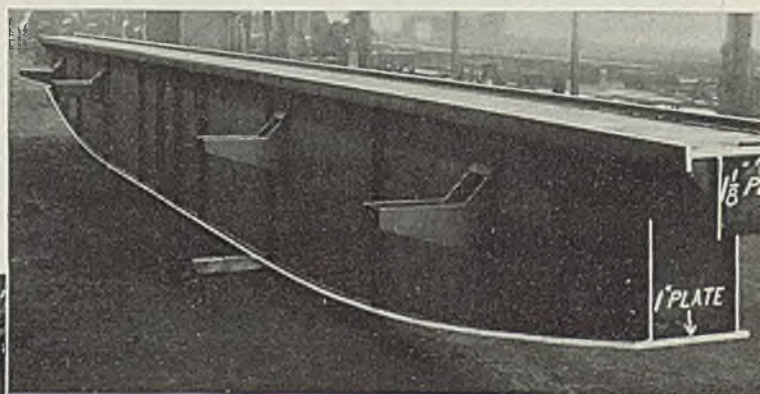
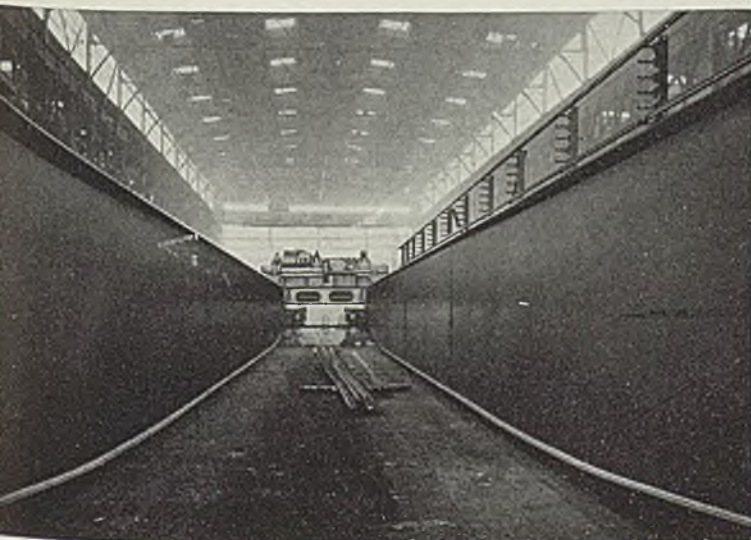


Photo 2027

- The Photo 2027 shows a heavy girder of a soaking pit crane. Note the heavy plates, heavy welds and reinforced top cover plate. A girder designed and built for hard work.



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# MATERIALS HANDLING



building and used to facilitate unloading of car bodies. The operation is interesting, speedy and in keeping with the management's efforts to remove hazards in all handling throughout the plant. The car, shown in Figs. 4 and 5, was designed after long and serious study and effort on the part of Neil M. Lowney of Fisher Body Corp. and Supervisor Rogers of Buick.

The Fisher plant in Flint is located about 2 miles from Buick, and bodies are transported in specially constructed double-decked trailers, with a capacity of seven bodies on each deck. Upon arrival of a trailer load at the Buick plant, the transfer car is moved automatically sideways and lined up with the rear of the trailer, the latter meantime having been moved up a ramp into position. By means of a hydraulic hoist, the body of the trailer is raised to take the weight off the springs and to line the trailer decks up with both decks of the transfer car. The body trucks thus are centered and the bodies descend by gravity to the transfer car, which is equipped with drag chains, for safely conveying the body trucks through the car decks.

The bodies, each on its respective truck, move down by gravity from

the upper deck of the car, as shown in Fig. 5; those on the lower deck are moved by hand out a side door of the car and are pushed inside the body storage department, where a

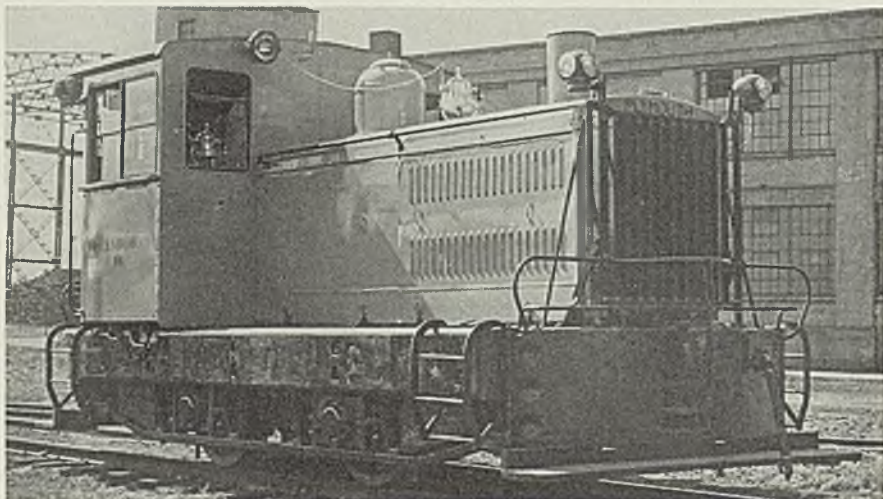


FIG. 6—This recently acquired industrial locomotive is kept busy most of the time in switching loaded and empty freight cars around the plant yard

small tractor moves each to its allotted space.

Another comparatively recent acquisition is an industrial locomotive for use in yard switching operations. This locomotive, shown in Fig. 6, has proved its efficiency and econ-

from the common carrier at all times when cars must be moved without delay about the plant yard, and in view of the additional expense involved in such switching service when performed by the com-  
(Please turn to Page 99)

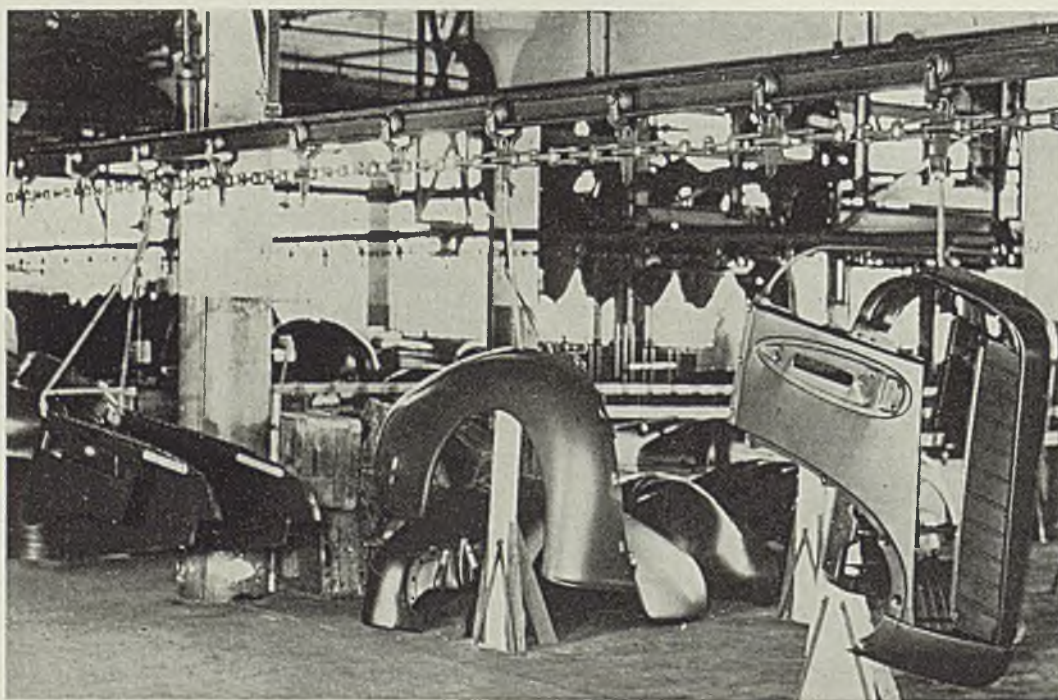


Fig. 7—Shown here is a dual-purpose conveyor in the Buick plant, Flint, Mich., which handles radiator mounting strap and shell assembly, hood and fenders. Conveyor lines are synchronized with car assembly line so that items of particular color and specifications reach the assembly point at the proper time



# HITTING THE BULL'S EYE

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MANUFACTURERS OF  
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JAMESTOWN, N. Y.

August 5 1936.

Vanadium Corporation of America  
Graybar Building,  
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Gentlemen:

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We are more than pleased to give you this information. The steel in this wrench is a grade of USS CARILLOY made by the Carnegie-Illinois Steel Corporation. We have had unusually good luck with this alloy; in hundreds of thousands of forgings, we have had less than a dozen broken pieces.

This record certainly speaks well for the marvelous steel produced by this company, which in our opinion is one of the most dependable in the country.

Trusting this information will be of value,  
Very truly yours,  
J. P. DANIELSON CO.  
A. H. Swanson  
Secretary.

Here is their interesting letter. We thank the Danielson Company and the Vanadium Corporation for their generous permission to reproduce it in this advertisement. We gladly share with them the credit for this amazing production record—over 99,988 unbroken pieces per hundred thousand forgings!

Notice the strong, thin nose of this little Danielson open end wrench. Notice also that, in spite of its lack of thickness, USS Carilloy Steel makes it twice as strong as ordinary thicker wrenches. Imagine how much longer it will last—how much more easily it will reach difficult, inaccessible bolts.





# 99,988 OUT OF 100,000!

## AN ACTUAL RECORD

*How U·S·S Carilloy Steel is helping this Manufacturer to reduce Costs . . . and to make a More Saleable Product*

ONLY by chance did we happen to learn of this interesting letter written by the J. P. Danielson Company. Note especially these important words:

*"The steel in this wrench is a grade of USS Carilloy . . . We have had unusually good luck with this alloy; in hundreds of thousands of forgings, we have had less than a dozen broken pieces."*

Note that this letter was addressed to the Vanadium Corporation of America. It is so obviously unsolicited—so completely candid—we believe it will interest every user of alloy steels.

Gladly we share the credit for this remarkable production record. We take off our hat to the Danielson Company for their skillful shop practice.

Yet with all due modesty, we point out that such performance would not be possible without consistent, dependable uniformity. Without the same composition, the consistent phys-

ical properties—heat after heat, shipment after shipment, duplicate order after duplicate order.

Notice also how the improved properties of USS Carilloy Steels are giving the Danielson Company a strong competitive advantage. Helping them sell more wrenches. We quote from their sales catalog:—

*"Danielson Wrenches are thin—yet they have twice the strength of other thicker wrenches."*

In recent advertisements you have read of the consistent, dependable uniformity of USS Carilloy Steels. The precision control of composition, heat treatment and physical properties. The steps we have taken to make this control possible—such as our enlarged metallurgical staff and the concentration of all alloy production in alloy plants.

These two quotations are interesting evidence from an unbiased source. Evidence that USS Carilloy Steels can, and do, help to reduce waste . . . lower production cost . . . gain a real competitive advantage . . . turn out a better, more saleable product.



### HOW FINER ALLOYS ARE MADE

USS Carilloy Steels are precision products in the manufacture of which composition and temperature are held within closest tolerances.

To insure utmost uniformity in heat after heat, we have recently concentrated our alloy production. All USS Carilloy Steels are now produced in special plants—exclusively devoted to high grade alloys—by specialists who make nothing else. In addition we have recently enlarged our metallurgical staff.

Illustration shows Heroult Electric Furnace manufactured by American Electric Furnace Company.

## U·S·S CARILLOY (alloy) STEELS

CARNEGIE-ILLINOIS STEEL CORPORATION

*Pittsburgh and Chicago*

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



# UNITED STATES STEEL

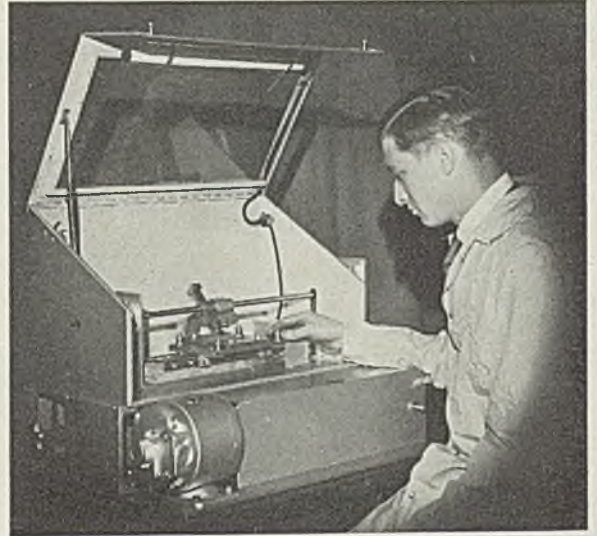




# *SURFACE TREATMENT AND FINISHING OF METALS*

## Impact Tester for Organic Finishes

BY H. G. ARLT  
Bell Telephone Laboratories, Inc.  
New York



**O**RGANIC finishes are now made so hard and adhere so firmly a nail coated with them can be driven into hard wood without appreciably damaging the finish. With this surprising degree of toughness attainable the vital importance of making tests to determine the impact resisting qualities of different finishes, so that

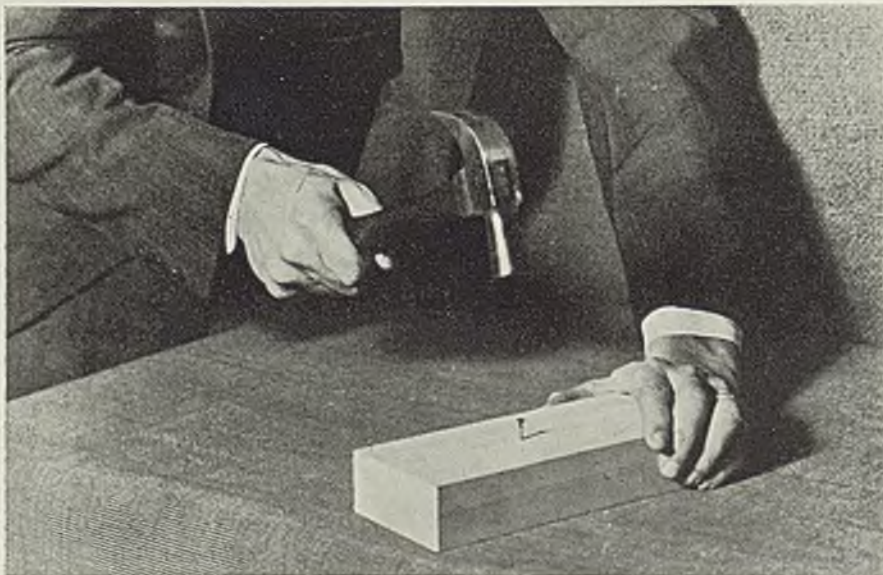
good finishes can be distinguished from poor ones, is evident. Such impact tests give information regarding the adherence characteristics of a finish to its base material and the deformability under impact stress of the organic coating—qualities which measure the ability of the finish to withstand the handling incident to assembly and subsequent use in the

Illustrating the machine in which finishes are tested by striking them glancing blows with a rotating hammer. Blows of constant or uniformly increasing intensity may be struck

field. To carry out tests of this character more effectively, a new impact machine has been developed recently by the Bell Telephone Laboratories Inc., New York.

The earliest type of impact test was of a qualitative nature and consisted of striking the finish under test with the rounded end of a hammer. The next development was to make the test quantitative by dropping the hammer from definite heights. This type of test is also made by using hardened steel balls as the impact device. Tests made in this fashion can be used to measure the resistance of a finish to a single blow of selected energy value or to repeated blows of either the same or different energy levels.

To obtain better control and to stimulate the battering action to



Even this drastic treatment did not appreciably damage the organic finish which coated the nail. A finish such as this can be selected from its lesser competitors only by effective test methods





★ Since Mo-Max Ground Tool Bits were placed upon the market several months ago, thousands of users have discovered that they produced better and more economical results than any Bits used before.

Mo-Max Ground Tool Bits are made of Mo-Max High Speed Steel.\* This is one of the reasons why they are better and economical.

Mo-Max Tool Bits are made in the same factory that produces fine "Cleveland" Twist Drills, Reamers, and other cutting tools. They are ready to be sharpened according to your requirements. Try Mo-Max Ground Tool Bits for cutting all steels, stainless steels, cast iron, and general machine shop work. Ask your "Cleveland" Distributor to send you some for trial—without charge, of course.

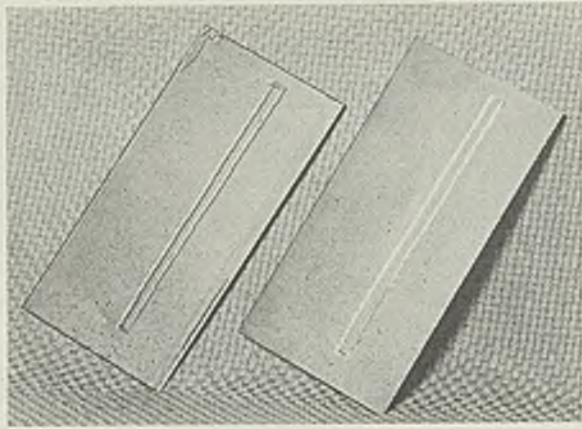
The **CLEVELAND** TWIST DRILL COMPANY  
 1242 EAST 49<sup>th</sup> STREET  
 CLEVELAND

TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

30 READE ST. NEW YORK    9 NORTH JEFFERSON ST. CHICAGO    654 HOWARD ST. SAN FRANCISCO  
 6515 SECOND BLVD., DETROIT    LONDON - E. P. BARRUS, LTD. - 35-36-37 UPPER THAMES ST. E.C.4

\* Covered by Patents Nos. 1,937,334—1,998,953—1,998,954—1,998,955—1,998,956—1,998,957. Other patents pending.





**P**ANEL on left was struck a series of blows of constant intensity. Breakdown under blows of increasing severity is shown by change of color in path of hammer on right panel

which a switchboard keyshelf is subjected by falling plugs the so-called "Wood-pecker" machine was developed. With this device, the blows are delivered by a spherical hammer located at the end of a cam-actuated lever arm and the intensity of blow is controlled by a coiled spring. Testing machines of this type have been constructed in the laboratories to deliver a series of blows on constant energy either at a single spot, or on a small area over which the blows are evenly distributed by providing a mechanism to move the specimen. These devices have been used for testing keyshelf facings and similar materials as well as for testing finishes.

#### Rotating Hammer Used

More recently, the impact resistance of finishes has been tested by another type of apparatus in which the blow is delivered by a hammer loosely pivoted on a rotating shaft in such a fashion as to scuff the surface while subjecting it to a glancing blow, thus removing any loosened particles of finish. The first device of this type was arranged to deliver repeated impact blows of uniform intensity uniformly over a small area. It soon became evident, however, that the information needed was not so much the number of blows of a given intensity which a finish can withstand as how hard a single blow the finish will resist. To meet this requirement the early design was modified to provide a constantly increasing speed of rotation of the shaft controlling the energy level of impact while the base panel was moved so that each new blow would strike a fresh but closely adjoining area.

Since it has been found necessary to determine the resistance of finishes to both constant and increasing impact, an apparatus has been developed in which both of these features are combined. In this new machine the panel is moved longitudinally past the rotating hammer in such a manner that the finish under test is either subjected to a number of impacts of uniform intensity on the

same area or to a series of blows of gradually increasing intensity, where each blow strikes in a different spot on the finish.

In the new apparatus the specimen is clamped to a carriage which moves in a horizontal plane under a rotating hammer so that the finished surface receives a glancing blow each time the hammer revolves. The intensity of the blow delivered can be controlled by varying the speed of rotation. The hammer and carriage are driven in synchronism by a motor which advances the specimen two one-hundredths of an inch for each revolution of the hammer, thus presenting a fresh portion of the finish for each blow. The variable hammer speed is obtained by a double set of belt-driven cone pulleys which are located between the motor and the hammer shaft. By spreading one pair of these cones and bringing the other pair together the effective speed ratio of the pulleys can be changed.

#### Speed Control Is Automatic

Spreading is controlled by a screw drive attached to the motor the specimen so that the speed of the hammer automatically increases as the specimen advances. When blows of constant intensity are required the screw is advanced to the point which gives the desired hammer speed and disengaged. The speed of rotation then remains constant as the specimen advances. The impact hammer is enclosed under a cover equipped with a double layer of safety glass through which the action on the finish may be observed safely while the test is being made. The appearance of the test specimen is shown in an accompanying illustration.

When blows of constant intensity are delivered the specimen is moved back and forth under the hammer until the finish is destroyed and the number of repetitions is taken as a gage of impact resistance. With blows of increasing intensity the test is continued through one complete cycle of hammer blows, in which case the intensity required

for destruction by a single blow is taken as the measure of resistance. The rate of the hammer in revolutions per minute at the point of failure can be found from a previous determination of the speed corresponding to different positions of the specimen.

The new impactometer permits rapid and economical impact testing of finishes over a wider range of impact values than have previously been available with this type of device.

## Polishing Wheel Adhesive Announced to Trade

An adhesive developed especially for polishing wheels is announced by Udylyte Co., Detroit. This adhesive, known as Flexogrip, is said to have an extremely low surface tension and high penetrating qualities which improve the bond between the wheel or belt and abrasive grain. It is possible to force dry wheels using this adhesive as it dries rapidly under heat. Also, it becomes brittle under friction heat and fractures into small areas when the wheel runs and comes in contact with the work. This exposes fresh cutting edges to the work and promotes faster cutting.

Flexogrip is furnished in two types. Type A is specially formulated for grains coarser than No. 80. Type B will hold grains finer than No. 80 up to and including FF grade abrasives. The adhesive is applied as received and requires no thinner. It is shipped in standard steel containers in 25, 50, and 100 pound lots from Detroit.

## New Rubberizing Compound Requires No Primer

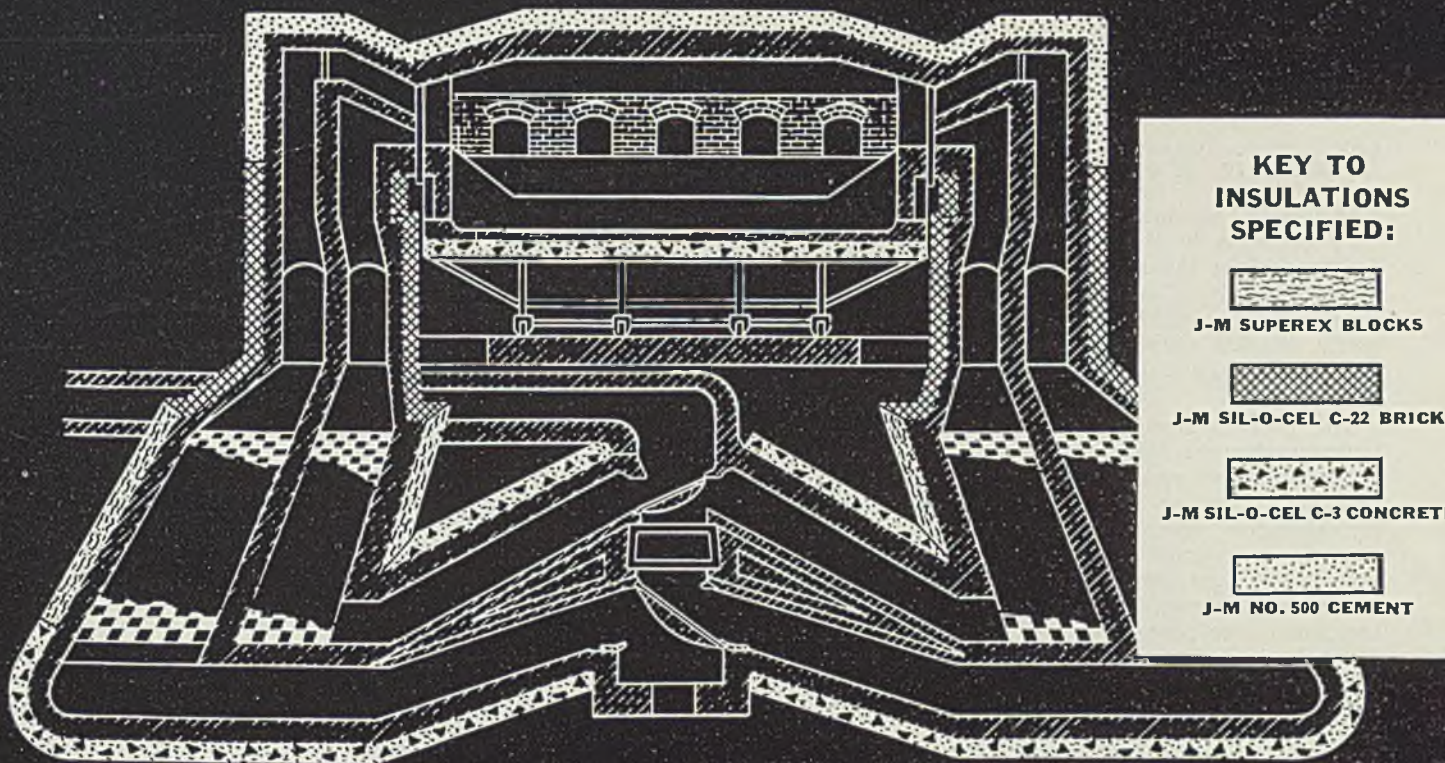
A rubber compound which incorporates the quality of a primer with a self-curing, cold-curing rubber and which can be applied by unskilled labor by dipping, spraying or hand brushing is announced by Self-Vulcanizing Rubber Co., Chicago. This compound, known as Selfvulc Insulator, is said to be an electrical insulator and water-proofer, it is claimed to resist corrosion caused by alkalis, salt solutions, mild acids and their fumes.

This new product is said to make a steadfast bond in one application without the use of a primer. Repeat coats may be added to any desired thickness. A vulcanizing period of one hour is required for each coat. It can be used for covering girders, ducts, ventilators, hoods, pipes, tanks, vats, walls, ceilings, bodies and frames of tank cars and many other metal surfaces subject to corrosion.

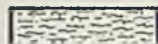


PICTURE  
OF

# What the WELL-INSULATED OPEN HEARTH looks like...



**KEY TO  
INSULATIONS  
SPECIFIED:**



J-M SUPEREX BLOCKS



J-M SIL-O-CEL C-22 BRICK



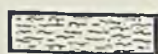
J-M SIL-O-CEL C-3 CONCRETE



J-M NO. 500 CEMENT

## Perspective cross-section of open-hearth system shows the *right* use of the *right* J-M Insulations in effecting lower melting costs and improved furnace operation

**N**O question but what complete insulation . . . with materials *designed* specifically for the purpose . . . can contribute to maximum efficiency and economy in open-hearth operation. And, in properly controlled furnaces, can also appreciably lengthen the refractory life. Out of Johns-Manville's full line of insulations, the following materials are recommended:



**J-M SUPEREX  
BLOCKS.**

Specially calcined diatomaceous silica blended and bonded with asbestos fiber . . . to make the most efficient, economical block insulation for temperatures up to 1900° F. Recommended for walls

of regenerator system above ground and over tops of regenerators.



**J-M SIL-O-CEL  
C-22 BRICK.**

A calcined diatomaceous-silica insulation in brick form for temperatures up to 2000° F. Because of their high heat resistance, these insulating brick are particularly recommended for insulating slag pockets and uptakes.



**J-M SIL-O-CEL  
C-3 CONCRETE.**

A lightweight, semi-refractory insulating concrete made from calcined diatomaceous-silica granules. Recommended under the furnace hearth, in flues, and in those sections of the regenerator system below ground.



**J-M No. 500 CE-  
MENT.**

An expanded vermiculite base cement with high covering capacity, good adhesion, working qualities and insulating value. For furnace roof and wall sections above the charging floor.

\* \* \*

The above recommendations are based on the performance records of these J-M Insulating Materials in many open-hearth systems. Used as indicated, they will increase efficiency and reduce operating costs to a degree you cannot afford to overlook. For data sheets on all J-M Industrial Insulations, address Johns-Manville, 22 E. 40th St., N. Y. C.



**Johns-Manville INDUSTRIAL INSULATION**





# WELDING, ETC.

BY ROBERT E. KINKEAD

## Women in Welding

**W**OMEN welding operators are common in the electrical industry and in the manufacture of kitchen utensils. Owing to an acute shortage of skilled operators in many districts consideration is being given to the training of women operators.

The problem seems to us sociological rather than technical. Women can perform repeat welding operations as well as men under any circumstances and in general survive the monotony of such operations better than men. It goes without saying women welding operators should be paid on exactly the same basis as men for the same work. So far, most of the welding done by women is bench welding where they may be segregated from men workers to a proper degree. It would be difficult to imagine successful use of women operators in general shop work where they were intermingled with men operators.

Likely the future will see a much

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

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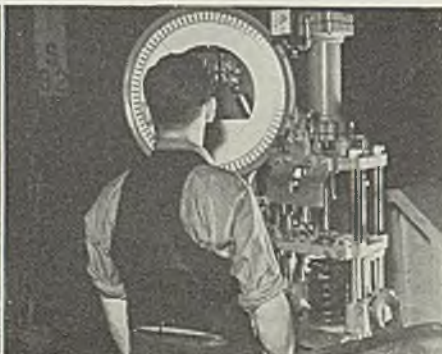
larger proportion of women welding operators and perhaps draftsmen and engineers. The plain fact is that there is developing a tremendous economic suction now in the direction of offering attractive wages to those who can and will work. No other solution appears to the problem of how the public can support the vast army of public servants and private individuals who are unable or unwilling to work in productive industry.

Most of the blunders made by manufacturers who have failed to make a success of women welding operators could have been avoided. Women should be employed and treated as women. Women would rather work for a male foreman

## Testing Accuracy of Automotive Parts



**A**CCURATE tests are required on many parts going into Pontiac cars. Top shows testing the balance of a propeller shaft, bottom right balancing tests on engine fans, bottom left compression tests on knee action coil springs



than for a female foreman. Women operators should be as strictly segregated as possible. This prevents loss of social standing with the men of the plant due to the fact they perform manual operations. Women operators who are treated fairly and in accordance with these particular necessities will be efficient and loyal to the management.

♦ ♦ ♦

## Difficulties May Be Cured

**M**ORE and more manufacturers are beginning to complain that their welding departments are out of control. We have no way of knowing the facts, but it is quite likely machine shops, foundries and erection shops are also getting out of control for the same reason the welding departments go haywire. The reason is usually found in the fact the amount of work being handled has increased from 50 to 100 per cent per man employed. To increase personnel by 50 or 100 per cent is out of bounds so far as cost is concerned. But a solution has to be found. It is usually found in better methods and better facilities.

A welding department is often thrown in with other departments and lacks adequate floor space or material handling equipment or both. Methods are those employed when welding was a new and marvelous process and savings so great accurate cost studies never were made. Given that background, a welding department will usually be in trouble when a large increase in output is demanded.

The necessity for procedure control becomes apparent when a heavy production schedule is being carried with a large percentage of new welding operators. The engineering department must take its full share of responsibility if the shop is to function well.

All these difficulties which beset a welding department can be cured promptly when management gets around to the point of realizing such action is necessary. But it frequently happens the situation will get pretty bad before any thorough-going remedies are applied.

♦ ♦ ♦

A welding wire coating expert recently demonstrated a welding rod with which it was easy to weld overhead with the coating in contact with the work. Such self-consuming rods seem to be the welding rods of the future for electric arc welding. Most of the advances in the use of welding have been the result of some inventor making it easier to do welding. Reducing the skill required to do welding reduces the cost of welding.



# METALINE

## Metaline Oilless Bronze Bearings

are the solution to many difficult lubricating problems. This is particularly true in the steel industry where, due to heat, oil volatilizes and carbonizes, thus damaging journals and work in process.

Why not investigate the adaptability of Metaline Bearings in your plant where it is impossible or impracticable to use oil or grease because of heat, water or inaccessibility?

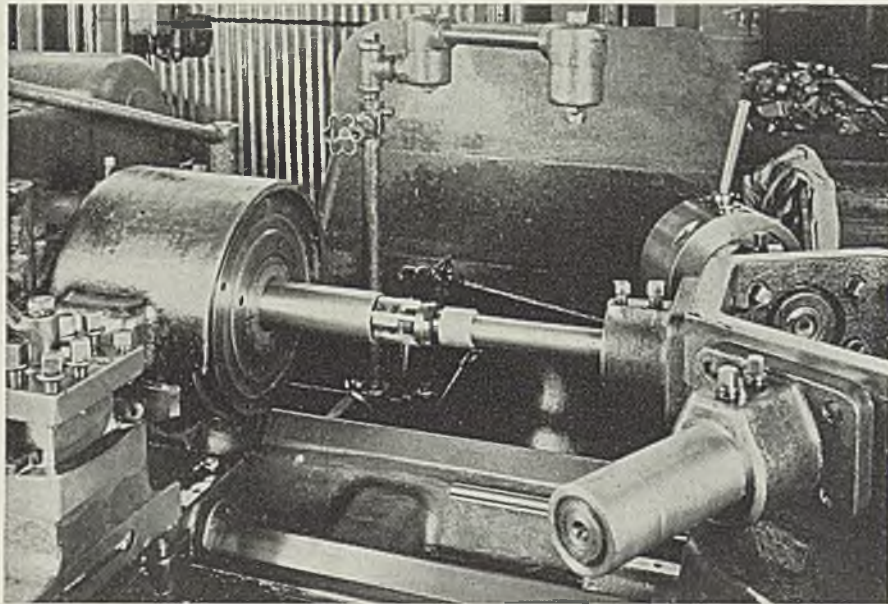
Our engineering staff will welcome the opportunity of discussing your bearing problems. Write us direct.

**R. W. RHOADES METALINE CO., INC.**

50-3rd ST., LONG ISLAND CITY, N. Y.

# OILLESS \* BRONZE BEARINGS





Reamers must possess exceptional hardness without sacrifice of toughness, therefore are made of high speed steel. This shell reamer is of the adjustable type

## Molybdenum-Tungsten High Speed Steel Is Finding Wide Acceptance in Industry

INDUSTRIAL use of the molybdenum-tungsten high speed steels has shown a steady and rapid increase during the past three years, 1934-1936, and the quantity being consumed in industry has arrived at a substantial percentage of all high speed steel consumed in this country. It is evident, therefore, that this type of steel no longer is to be considered experimental.

It will be recalled that molybdenum-tungsten high speed steel was developed by the Cleveland Twist Drill Co., Cleveland, and was first described by the company's metallurgist, J. V. Emmons, in a paper presented before the 1932 annual convention of the American Society for Steel Treating, now American Society for Metals. Prior to introducing the steel commercially early in 1935 under the tradename "Mo-Max" (see STEEL, Jan. 28, 1935, page 31), and the two years which followed, the company pursued exhaustive development and service tests. A considerable amount of the experience thus gained has been incorporated by Mr. Emmons in a 24-page booklet entitled "The Molybdenum-Tungsten High Speed Steels Mar-

keted Under the General Tradename Mo-Max."

While the molybdenum-tungsten steels include low alloy steels as well as high, Mr. Emmons considers principally the high speed steels made to the following analysis: Carbon, as desired; chromium, 3.50-4.00; molybdenum, 8.00-9.50; tungsten, 1.30-1.80; and vanadium, 0.90-1.30 per cent. Carbon content is selected for specific tool requirements in the same manner as has been done in the past for other high speed steels. In general, molybdenum-tungsten steels require about 0.08 to 0.10 per cent higher carbon content than the 18 per cent tungsten type because they take this additional amount of carbon into solution when hardened. The method of selection is as follows:

	Carbon Range, per cent	
	18-4-1 steel	Molybdenum-tungsten steel
For tools of great toughness .....	0.54-0.60	0.64-0.70
For tools of moderate hardness and toughness .....	0.61-0.67	0.71-0.77
For tools of great hardness .....	0.68-0.74	0.78-0.84

The low carbon range, it is stated, is useful for dies, planer tools, and other tools subject to shock. The intermediate range is useful for drills, milling cutters and broaches, and the high carbon range for reamers and lathe tools requiring great red hardness. Rockwell hardness of properly hardened and tempered tools, in general, will fall within the following limits:

	Hardness, Rockwell C
Tough carbon range .....	60-64
Moderate carbon range .....	62-66
Hard carbon range .....	64-68

On record at present are over 5400 drill tests in which molybdenum-tungsten drills were compared with those made of 18-4-1 (18 tungsten, 4 chromium and 1 per cent vanadium) high speed steel. These tests were made in a large number of different materials and under a wide variety of drilling conditions. Results show, it is claimed, that the new drills have an average superiority of about 20 per cent.

Performance of reamers has been relatively better than in the case of twist drills, it is stated. The fact that the reamers have exceptional



hardness without loss of toughness has given them an advantage in the majority of the reaming jobs upon which tests have been run.

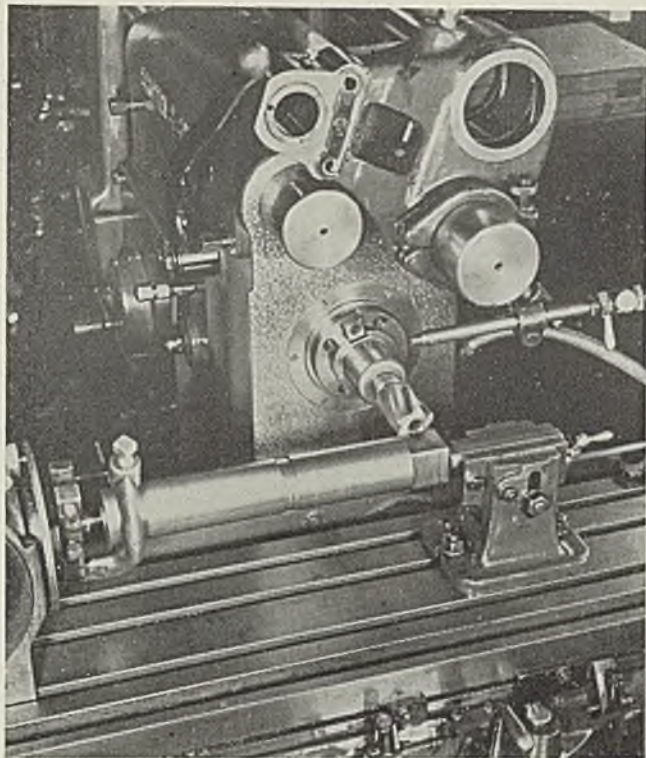
Lathe tools and tool bits made of molybdenum-tungsten high speed steel are becoming more popular. Other tools with which consistently satisfactory performance has been obtained are milling cutters, hobs, circular saws, thread rolling dies, counterbores, broaches, lathe centers, forming tools, dies for both hot and cold work, and thread chasers. In general, Mr. Emmons asserts, some grade of molybdenum-tungsten steel appears to be suitable for any application for which other high speed steels have been successful in the past.

#### Carbon Content Important

In making use of molybdenum-tungsten high speed steel, care must be exercised that the proper carbon content is selected. The steel forges at slightly lower temperature than 18-4-1 high speed steel and is so plastic that it forges with ease. Starting to forge at a temperature between 1900 and 1950 degrees Fahr. is recommended.

In heating for forging, the aim should be always to bring the bars or pieces up to an even uniform heat which varies as little as possible throughout the section. To accomplish this with large sections, it is desirable to preheat thoroughly at comparatively low temperatures, say 1300 to 1500 degrees Fahr. before heating more rapidly up to full forging temperature. Long soaking at the forging temperature is not recommended. Annealing always is

◆  
*HIGH speed steel is utilized for milling cutters which are made in a variety of sizes and types. The cutter in use on this machine is an end mill*  
◆



necessary after forging, this to be done the same as for other high speed steels and in the same heats if desired. Pack annealing at about 1550 degrees Fahr. is recommended.

The steel can be welded to carbon and alloy steel shanks or bodies when desired, the electric fusion method perhaps being preferable for this purpose. When this process is used, the welded pieces should be cooled slowly and then should have a full anneal to refine and toughen

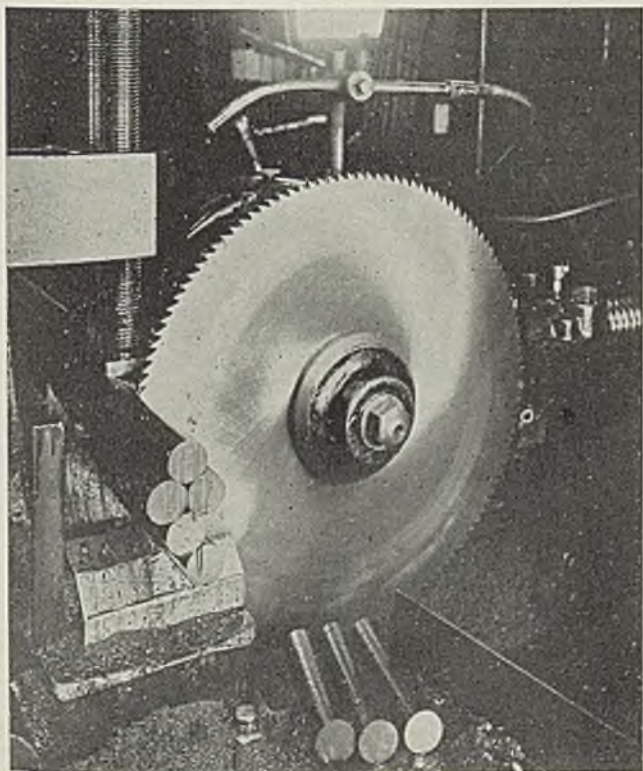
the weld before hardening. For some tool applications, brazing may be preferable to welding—the brazing can be done at the same time as the hardening and only the usual tempering is then required for toughening.

Hardening is accomplished at considerably lower temperatures than are ordinarily used for 18 per cent tungsten high speed steels, consequently the hardener should be informed fully in regard to this. The hardening range is 2150 to 2250 degrees Fahr. Those using the steel for the first time will find it advisable to make preliminary experiments with test pieces before hardening quantities of tools or dies.

#### Controlled Hardening Needed

It is not true, as has sometimes been asserted, that molybdenum-tungsten steel has a narrower hardening range than 18-4-1 high speed steel, but it is true, as for any other high speed steel, that for best results hardening should be controlled carefully with proper consideration for the carbon content and the type of tool being hardened. A quick and inexpensive check on hardening temperatures may be obtained by examination of the fracture of hardened test pieces and by a check upon the hardness after tempering. The appearance of the fractures on properly hardened work should be the same as those of other correctly hardened high speed steels. For maximum hardness, the steel should be hardened at as high a temperature as possible without serious coarsening of the fracture. The precise hardening temperature that is

◆  
*THIS circular saw cutting off tool blanks from round bars is made from molybdenum-tungsten high speed steel*  
◆





best depends not only on the carbon content of the steel but also on the type of service required of the tool or die. For cutting tools, high hardness usually is desirable and as a rule it is best to use a hardening temperature of at least 2200 degrees Fahr.

Exact instructions cannot be given as to the proper time to hold tools at the hardening heat, because this varies so much with the size of the section being hardened. A general principle to be followed, however, is that the piece should be brought up to the hardening heat, held there long enough to insure that the entire section is up to heat,

typical samples selected at random is as follows:

**CHEMICAL ANALYSIS**

	Steel No. 1, per cent	Steel No. 2, per cent
Carbon .....	0.75	0.80
Chromium .....	3.61	3.65
Molybdenum .....	8.66	9.01
Tungsten .....	1.61	1.35
Vanadium .....	1.07	1.23
Manganese .....	0.14	0.16
Silicon .....	0.27	0.29

**ROCKWELL C HARDNESS**

Drawing Temperature, degrees Fahr.	Quenched from		
	2150 deg. F.	2200 deg. F.	2240 deg. F.
Steel No. 1			
Not drawn .....	66	65	65
940 .....	63	63	63

red heat, sprinkled with borax powder or rolled in a box of borax, then returned to the furnace for further heating. The borax melts, covering the tool with a thin protective film which remains while the tool is being brought up to the hardening temperature. A small amount of borax is all that is necessary. Heavy films are to be avoided as thick glassy deposits are hard to remove. The tools must be cleaned later by sand blasting or by pickling in acetic acid.

For the reason just given, the following method of using borax often is preferred: Prepare a saturated water solution of the borax and after the tool has been warmed up in the furnace, dip it in the hot borax solution, then remove it quickly. The tool dries from its own heat, leaving on it a small incrustation of borax which melts to a thin, scarcely perceptible film when heating is continued.

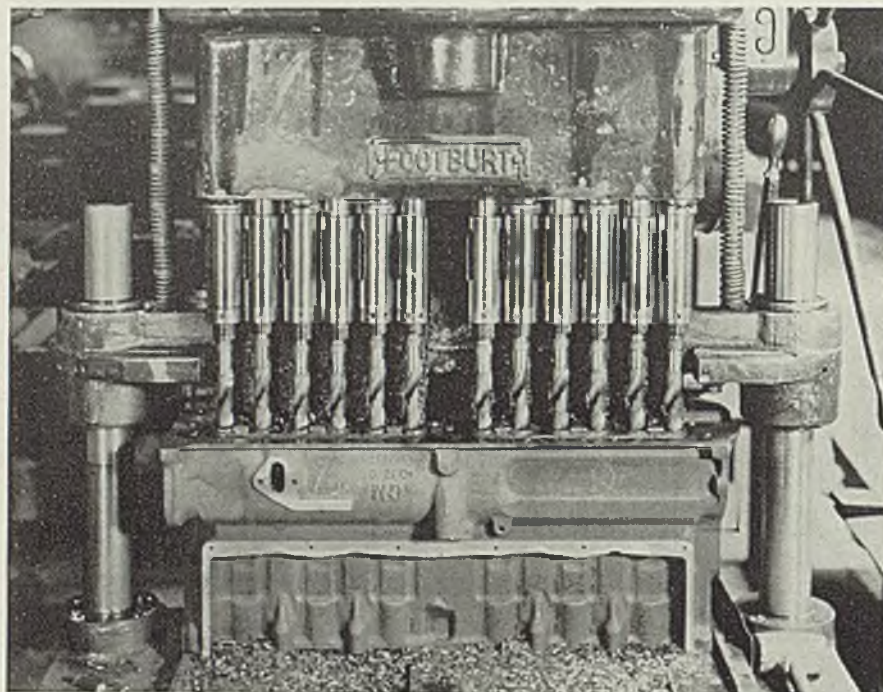
When hardening in an open type of furnace, it is best to use an oxidizing flame with a low preheating temperature, 1200-1300 degree Fahr., but a flame as nonoxidizing as possible for the final heating at the high temperature. Since some furnace refractories are made from materials which are attacked by melted borax, it is advisable to use a thin heat-resisting alloy plate on the bottom of the furnace when hardening tools with borax. Even an ordinary sheet steel plate is better than none at all as possible chemical action between the furnace bottom and tools, with pitting of the tools, thus is avoided.

**Economy at Low Temperature**

On production hardening, it has been observed that the lower hardening temperatures required by molybdenum-tungsten steel result in notable furnace economy. The fuel or electric current cost is less. The furnace lasts longer and pyrometer maintenance sometimes is less. The working conditions for the operator are also improved by the lower furnace temperatures.

After heating for hardening, quenching in oil usually is to be preferred; optional methods are cooling in a dry air blast, or quenching into a hot salt bath. When oil is used as a quenching bath, the same precautions should be taken as when handling other high speed steels. The oil should not be extremely cold, and after the tools have cooled to the temperature of oil, they should be removed and drawn or tempered.

Tempering is done exactly the same as with other types of high speed steel. A tempering treatment of 30 to 60 minutes at 1050 degrees Fahr. will produce the highest secondary hardness in specimens (Please turn to Page 98)



A considerable amount of high speed steel goes into the manufacture of twist drills. A multiple spindle drilling operation is illustrated here

then soaked for a few seconds longer. With tools 1-inch diameter or larger, soaking time at heat may be as much as 1 minute, but for small sections such as ¼ to ½-inch diameter, actual time at heat should be from 15 to 30 seconds only, as a longer holding time will coarsen the grain. This is especially true when maximum hardening temperatures over 2200 degrees are being used.

**Microstructure Does Not Vary**

Microstructures of properly hardened molybdenum-tungsten steel will be found to be almost indistinguishable from those of other high speed steels. Hardness tests by means of Rockwell or file test will tell whether the desired hardness has been obtained. Effect of varying the hardening and tempering temperatures upon Rockwell C hardness of two

990 .....	64	64	64
1040 .....	65	66	66.6
1090 .....	64	66	66
1140 .....	63	64	65.5
1190 .....	61	62	64

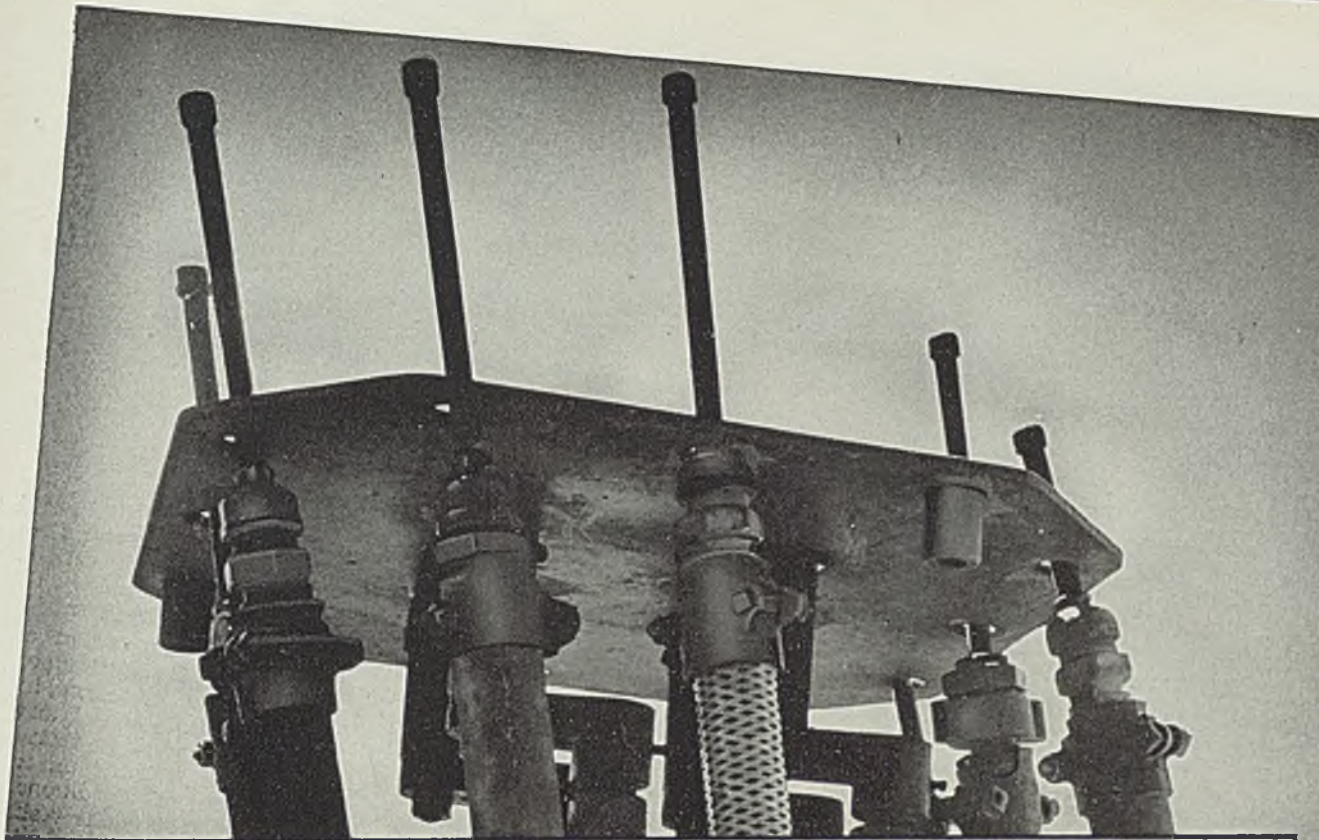
**Steel No. 2**

Not drawn .....	66	66	64
940 .....	63	63	63
990 .....	64	65	64.5
1040 .....	65	66.5	67
1090 .....	64.6	66	67
1140 .....	63	65	66
1190 .....	62	63	65.5

On tools which cannot be ground after hardening, precautions should be taken to prevent decarburization or soft skin. Methods of doing this are well known and include the use of special muffles designed to produce a nonoxidizing atmosphere, certain salt baths, and in cases where such furnace equipment is not available, the use of borax coatings.

When the borax method is used, the tool is first preheated to a dull





# MILLIONS FOR DEFENSE

**T**HIS is the U. S. Rubber steam hose testing rack. Like a battery of anti-aircraft guns, its purpose is defensive. Subjecting U. S. Matchless Burst-Proof Steam Hose to destructive blasts of superheated steam, it mercilessly reveals possible performance failure—in advance of production and sale!

Champion of economy, efficiency, and lowered operating costs, this warlike instrument is more than an ingenious laboratory device. It is the symbol of U. S.

Rubber's unremitting war against inefficiency—its millions of research dollars and millions of factory man-hours *freely spent in defense* of the purchaser's investment. It symbolizes what we mean when we say that U. S. Rubber Mechanical Goods have built into them—

## SERVICE BEYOND PRICE AND SPECIFICATIONS

*The new 1937 U. S. Hose Catalog contains 48 pages packed full of illustrations and data. All new hose items are shown. Also it includes section devoted to couplings.*



**United States Rubber Company**



March 15, 1937

United States Rubber Products, Inc., New York, N. Y.



# POWER DRIVES



## Supporting Lineshafts

**W**ITH the increasing tendency toward higher speed of lineshafts, especially where the equipment is operated at relatively high speed, care is necessary to provide shaft and mounting with greater rigidity to withstand increased stresses and vibrations. Unbalanced load under such speed conditions may interfere with operations.

For example, one light lineshaft operated at 600 revolutions per minute and driving a group of high-speed mixing units, vibrated excessively under load even though the bearings were spaced on 6-foot centers and the load was light. This was remedied by installing additional bearings in between each hanger to provide support on 3-foot centers.

With the development of anti-friction bearings it is no longer necessary to step motor speeds down to about 200 revolutions per minute on the lineshaft and then step up again to 600 to 900 revolutions per minute, or more, at the machine, as is required with polishers, grinders, and some other types of equipment. Lineshafts are operating successfully at 600 to 900 revolutions per minute. These high speed installations, however, require greater care in the design and installation than do shafts operated at lower speeds. Using concrete pedestals with pillow blocks is recommended for shafts of larger diameters.

## Permanent Maintenance

**E**XPERIENCE of maintenance men and their familiarity with the plant and the maintenance, service, inspection and repair policies of the company have an important bearing on the quality of the work performed with consequent reductions in cost and increased reliability and freedom from interruptions. In plants with a constant

turnover in this department the men have less incentive to keep the interests of the employer in mind.

To overcome this one company has adopted the policy of hiring such men with the understanding that after 6 months of satisfactory service they are permanent employees. They are not laid off, but transferred to production departments or other work made for them to keep them employed. As a result there is a waiting list of qualified, steady men recommended by men on the force for vacancies as they occur. Also, the men have no excuse for soldiering.

New construction and change-over work is planned for two or three months in advance thus eliminating the wide fluctuations from rush to slack periods, so common in this type of work. By having time limits on the work men can be shifted to take care of emergencies without disrupting schedules. Also, any work which can be performed in advance may be used as fill-in to keep the men employed.

The practice of scheduling work to provide steady employment of the maintenance force will assume greater importance under the operation of the unemployment compensation section of the Social Security acts which penalizes labor turnover to a varying degree under state regulations.

## Using Flexible Couplings

**W**HEN installing flexible couplings, the general practice is to align as closely as possible while the equipment is idle and then assume that the alignment will be maintained while in operation. Under ordinary conditions this will be true, if the foundations and mounting are solid and substantial, or both connected units are mounted on a solid base.

In a particular crusher drive this procedure required modification. As a result of the shock and vibration in operation and the separate mount-

ings of the crusher and motor the operating alignment, which varied continually, was considerably different from stationary alignment.

The solution was the use of a flexible coupling of the disk type, which permits wide variation in angular and parallel alignment, and the resetting of the motor to obtain the best alignment possible under service rather than idle conditions. Life of the easily replaceable disk, which received all the punishment, is naturally shortened under these severe conditions but it can be renewed easily and at little expense.

When expanding one plant, a row of individually driven machines replaced bench workers in front of windows without obstructing light to the group driven machines installed farther back in the shop.

The only practical check on refilling fuses properly is careful selection of the man placed at this work. Only reliable and trustworthy employees can be assigned to this task. At the same time the contacts should be cleaned and all fastening screws properly tightened.

When the plant service man is called in an emergency, the telephone clerk obtains as much information as possible as to the nature and cause of the interruption. As a result the service man can take with him whatever is necessary to get the drive going again in about 95 per cent of the calls. This practice has reduced time out by about 30 per cent.

When machines with individual motor drives are shifted in position, the cost and time required to make the electrical connections is an important item of expense. This cost may be decreased by mounting controls on the machines which then may be moved as units and using box or trough ducts for power feeder lines, thus permitting shorter connecting conduit runs.



# Ease of installation IS ONLY ONE OF MORSE COUPLING FEATURES

You can install a MORSE FLEXIBLE COUPLING in short order. But easy connection and disconnection are only one reason MORSE FLEXIBLE COUPLINGS ring the bell with thousands of manufacturers.

Because there are so many teeth—each with a bit of play and packed in grease—on the Morse Standard Couplings; and because of the resiliency of the rubber flexing medium in the MORFLEX couplings, both absorb those punishing load shocks that would otherwise pound the life out of motors and machines.

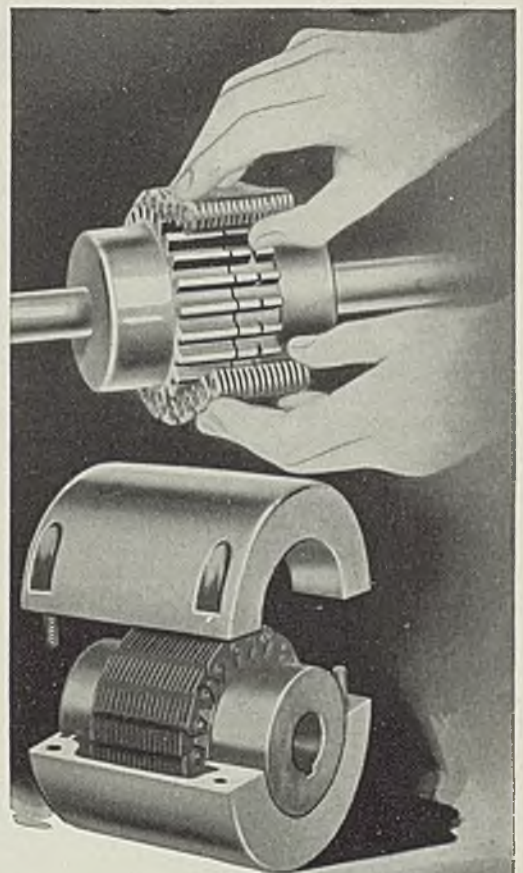
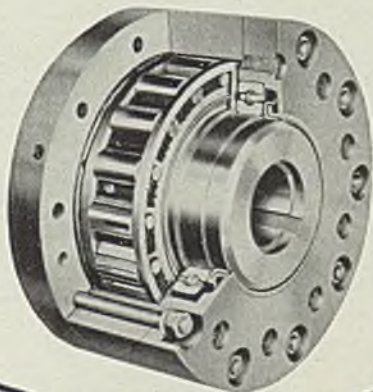
These husky performers, too, compensate for minor shaft misalignments. They work for you efficiently year in and year out.

Why not talk with the Morse-trained transmission engineer in your territory. He will have some worthwhile suggestions to offer you.

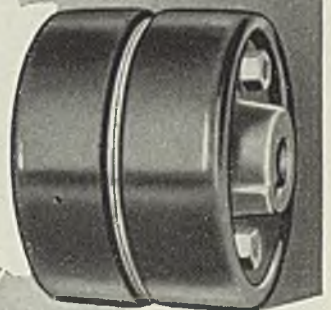
## THE NEW MORSE KELPO CLUTCH

Wherever there's need for alternate or intermittent power between motors and machines, Kelpo Clutches fit right in. Morse Kelpo clutches are outstanding performers. Each cam carries its full portion of the load. Because a very light spring pressure holds the cams in position, free-wheeling resistance is cut to a minimum. Because Kelpos contain more cams in any given diameter, they run on year after year—functioning dependably and quietly.

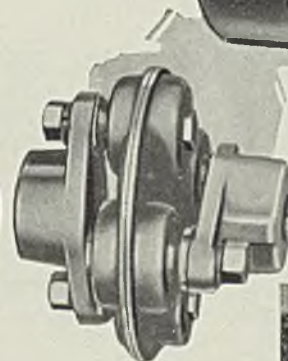
For more information about Morse Kelpo clutches, call the Morse man in your territory or write to Morse, Ithaca.



Connecting a Morse Flexible Coupling. Split, oil-tight case fits over the coupling.



Above: MORFLEX coupling with case in position.



Left: MORFLEX rubber-bushing type flexible coupling.

Write to Morse, or ask your dealer for this new stock book. It is packed with a wealth of facts about power transmission and describes Morse Silent and Roller Chains and Morse Flexible Couplings stocked for immediate delivery.



SILENT CHAINS    ROLLER CHAINS    FLEXIBLE COUPLINGS    KELPO CLUTCHES

# MORSE *positive* DRIVES

MORSE CHAIN COMPANY    ITHACA N. Y.    DIVISION    BORG-WARNER CORP.



# New 4-High Cold Mill Rolls Strip Steel for Tinning

**R**EPUBLIC STEEL CORP.'S new strip tin plate mill at Niles, O., was officially opened Mar. 11 by a trip of inspection by officers of the company and guests. The new plant has 300,000 square feet of floor space and of this amount about 177,000 square feet comprised the old No. 1 sheet mill plant at Niles which was abandoned several years ago. The new buildings, excavation for which was started last Oct. 14, required 1300 tons of structural steel. Hot strip coils rolled on No. 1 hot strip mill at the company's Warren, O., works are shipped to the Niles works where they are stored in the coil storage building and then transferred to the pickle building and, at

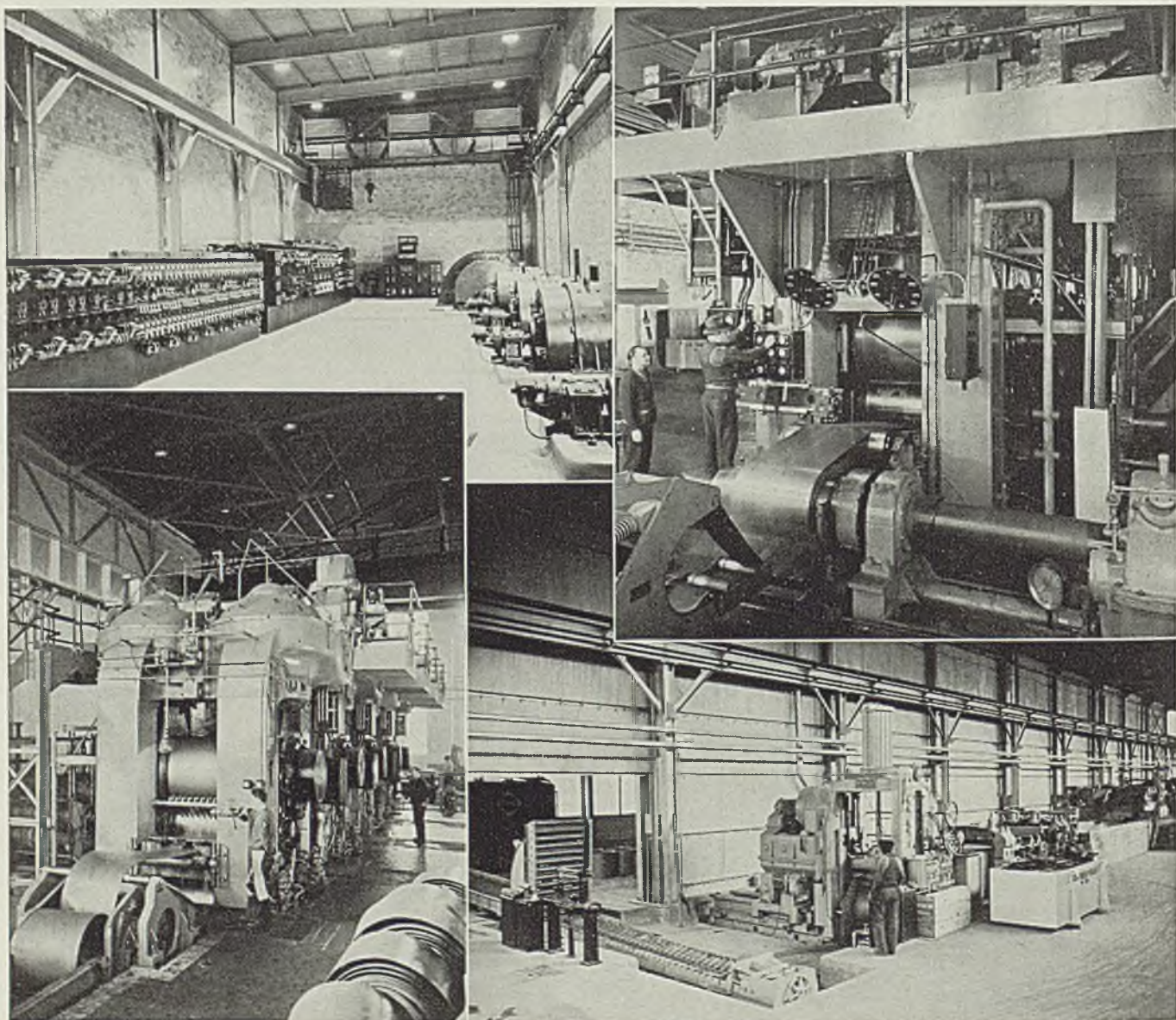
a maximum speed of 150 feet per minute, run through a 36-inch continuous pickling unit of modern design.

After pickling and oiling, the coils are transferred to the tandem mill building and cold reduced on the new mill to tin plate gages at top speed of 1350 feet per minute. The new strip mill consists of four stands of 4-high cold mills having rolls 18 and 49 inches in diameter and 42-inch face. Each stand is driven by a General Electric, direct current motor, the four motors having horsepower ratings, respectively, of 500, 1000, 1000 and 1500. The mill is equipped with automatic tension devices and flying micrometers. The rolled steel

is wrapped onto the reel on the fly without stopping.

After cold rolling, the coils of strip steel are run through two electro cleaning and cutting lines in which the oil is removed from the strip, the sides trimmed and the strip cut to lengths at a speed of 500 feet per minute. The cut lengths, now called black plate, are piled for the next operation, box annealing. For this operation the piles are transferred to the annealing building which is equipped with eight double chamber,

Main motor room of new strip tin plate plant at Niles is shown at top left; it has glazed tile walls and is lighted by mercury vapor lamps. At bottom left is the entry end of the 4-high tandem mill with coils entering the mill after having passed through the pickler. At top right is the delivery end of this mill showing automatic gager and control panel. At bottom right steel enters over a roller conveyor from which it is placed in the reel, fed into a roller leveler through the gap of a shear and thence into a stitching machine which joins the coils end to end for passage through a continuous pickler





"in" and "out" type box annealing furnaces with an electric, portable, charging machine. The stacks of black plate, after being hot annealed, are delivered to the 2-high tin cold rolls to go through a cold rolling process.

The 2-high cold rolls are arranged in four tandems of three stands each and are driven by three 500-horsepower motors. Rolls are 24 inches in diameter and 44 and 48 inches long. After being cold rolled the plate is transferred to a white pickler, of the vertical engine type, operated with compressed air. After being pickled, the plate is placed in boshes and held in the bosh storage preparatory to tinning. The boshes then are transferred to the tinning machines by means of an overhead electric traveling crane and the plate automatically fed through straightaway tinning machines and cleaners to automatic pilers. The equipment consists of eight straightaway tinning machines and cleaners,

seven of which are 64-inch, 2-way machines and the eighth a 75-inch, 3-way machine.

The piles of tin plate then are trucked to the assorting room for assorting and then to the boxing, storage and shipping warehouse. Both the tin house and assorting room include all modern features and are adequately ventilated and air conditioned.

An unusual construction record was established in building the new mill. Late in September work was started in removing old equipment and reconditioning existing buildings. Excavation for the new buildings and equipment was started Oct. 14, last year, the entire job having been completed in a little more than four months. The new buildings required 1300 tons of structural steel. The mill is employing some 400 men. In general, the plant has been laid out and arranged so that the order of processing the steel is in a continuous line.

inch. Then the torch is moved forward again, to position 4, cutting 1/16-inch of metal from position 2 to position 4. When moving from position 3 to position 4 the torch moves along the previous cut from position 3 to position 2 and cuts new metal from position 2 to position 4. The torch then is brought backward from 4 to 5 and the operations proceed as before.

Cutting oxygen pressure is left on all the time as best results seem to be obtained when the movements are made at about 60 cycles per minute, of actual timing; the actual cutting action is intermittent. Cutting is much easier after some heat has gotten into the piece.

#### Heat Before Cutting

On the heavier thicknesses it is advantageous to heat the front edge of the cut before starting. A flux rod is not necessary. When cutting the heavier thicknesses there is a drag of about 3 inches at the start of the cut but this is soon picked up after getting into the piece a short distance. Angle of the tip to the work is exactly the same as when cutting ordinary steel. It is not inclined and then straightened up as when cutting cast iron. The kerf is about 1/2-inch wide.

In a recent operation a 13 x 13-inch stainless steel billet was cut into two pieces in five minutes, using 90 to 100 pounds oxygen pressure, 10 pounds acetylene pressure and a size 9 tip. Total cost was \$1.10, including gases and labor. This performance indicates the possibilities. So far this development has been on the theory that in such an operation plenty of heat is necessary, and lots of oxygen at comparatively medium pressures. There seems little doubt that as operators get experience in such cutting of stainless steel billets the tip sizes and pressures will be reduced.

## Stainless Steel Billets Are Cut Economically by Oxyacetylene Flame

**B**Y USING the oxyacetylene cutting torch remarkable results have been obtained by some steel companies recently in reducing off analysis stainless steel billets to sizes small enough to be charged into furnaces for remelting. In some cases, for example, such billets were sawed, an expensive operation in view of the fact that this material must be annealed first. Even after such treatment the saws wear rapidly. With the proper equipment, it is possible to cut such stainless billets with great speed by means of the oxyacetylene flame.

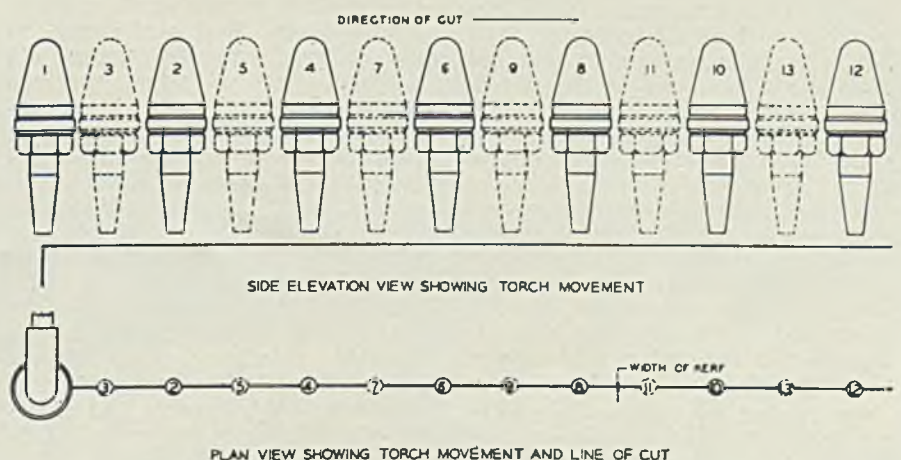
#### Similar to Cast Iron Process

The procedure is somewhat similar to that of cutting cast iron. A neutral flame, however, seems to give the best results, a carburizing flame working less satisfactorily. The principal factor is the correct manipulation of the torch. Where the torch is moved in semicircles or half moons along the line of cut when cutting cast iron, it is moved back and forth along the line of cut, always in a straight line, when cutting stainless steel. This method is illustrated in the accompanying drawing; the numbers on the torches represent the several positions of the torch in sequence of movement.

Starting at the edge of the material at 1, the cut is moved forward in the direction of cut to position 2,

BY FRED JUDELSON,  
Air Reduction Sales Co.,  
Philadelphia

the distance from 1 to 2 being about 1/16-inch. The 1/16-inch cut is about the longest that can be made with a single forward thrust of the torch. The torch then is moved backward to position 3, this distance being anywhere from 1/32 to 3/64-



This diagram illustrates the manipulation of the torch when cutting stainless steel by the oxyacetylene process. As shown, the torch is moved back and forth along the line of cut, always in a straight line



# New Furnace Treats Rails for Higher Ductility and Impact Resistance

**N**EW heat treating equipment at the rail mill of Carnegie-Illinois Steel Corp.'s Gary works has a capacity for processing 70 gross tons of rails per hour. The first of its kind ever installed in the United States in a rail mill, this furnace derives its name from John Brunner, who until his death last year was consulting engineer for the company. For many years he had been actively identified with the development of the process and equipment now in commercial use.

Brunorizing is designed to give the rails a controlled thermal treatment, resulting in greater ductility and higher resistance to impact. An additional treatment hardens the rail ends and reduces wear, or batter, at these vital points during service. A detailed discussion of the practice was published in *STEEL*, Oct. 21, 1935. The furnace is 250 feet long, 9½ feet wide and is gas-fired. Rails from the rolling mill are permitted to cool to a temperature of 900 to 1100 degrees Fahr. before being moved from the cooling bed to the furnace. Rails are introduced lengthwise in groups of five to eight and enter the furnace at intervals of three to five minutes. At the time a new group of rails enters the furnace, the six groups already undergoing treatment advance a rail length, and the most advanced group is ejected. The rails move on special alloy-iron, heat-resisting rollers and remain in the furnace 18 to 30 minutes, depending on the rail section.

## Divided In Eight Zones

During the interval between full-length forward travel, the rails are constantly moving back and forth several times a minute as the rollers oscillate part of a revolution. This promotes more uniform heating and lessens any tendency of the rollers to sag at the operating temperature. The furnace is divided into eight zones for automatic heat control and is equipped with fans to circulate the gases within the furnace, thereby providing more uniform heating. Recording pyrometers are connected with the temperature controls. The rails reach the desired temperature about half way through the furnace, leaving the remaining half of the travel for thorough equalization.

On leaving the furnace the rails are delivered to an adjoining roller table to be end hardened by jets of compressed air. This table is equipped at each end with manipulators for spacing the rails in align-

ment with the groups of quenching nozzles. The manipulators can be moved vertically in order to clear the upper surfaces of the table rollers when the rails move out of the furnace. An upward movement of the manipulators engages the rails after they are on the table, and horizontal movements transverse to the table then space the rails in exact positions to correspond with the quenching nozzles. Nozzles are suspended by carriages and also may be moved downward to clear the upper surfaces of the table rollers as the rails are moved out of the furnace. When the rails are properly spaced, a swing motion of the nozzle carriages brings the nozzles into engagement with the rail ends. A central valve operated by an electric switch is opened by the operator and air jets are directed against the ends of the rail heads. Duration of the air blast is controlled by an electric timing device which automatically closes the central air valve at the proper time. The rails then are conveyed to the cooling bed.

## New Heat Treating Method Yields Superior Results

So-called austempering of steel, developed by Dr. E. C. Bain, assistant to vice president, United States Steel Corp., and E. S. Davenport, both stationed at the corporation's laboratories at Kearny, N. J., is said to be characterized by a correct combination of correct heating and timed quenching under predetermined schedules, but to intermediate temperatures in contrast to the older quenching to ordinary temperatures. Steel hard enough to cut glass, tempered under old methods, snapped when pressure was exerted; on the other hand, austempered steel of like hardness, it transfer the process from the development to the production stage, is said, can be bent to any desired angle. Steel thus treated and formed into a long handled round pointed shovel and bent to an acute angle in a vice, returned to original shape as soon as the pressure was released. Toughness of steel specimens treated by the new method, it is said, probably exceeds that of the famous old swords known as Toledo blades.

It is anticipated that after the completion of new equipment, now under construction, which will

transfer the process from the development to the production stage, it will find a wide range of usefulness in treatment of small tools, springs and other hard steel products.

## German Writer Tells of Modern Foundry Practice

*Modern Steel Founding* (Moderne Stahlgießerei), by Osann; fabrikoid, 261 pages 6½ x 9¼ inches; published by Julius Springer, Berlin, Germany; supplied by *STEEL*, Cleveland; in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

This volume, which is in German, is designed for the practical man, college students and apprentices and for self instruction. It is divided into nine chapters covering various phases and the author has endeavored to condense the subject as much as possible. Chap. I, the introduction, outlines the procedure of steel production briefly, presents historical data and statistics on production, and describes the general principles employed in making steel. Chap. II discusses briefly crucible melting while Chap. III deals with melting in the open-hearth furnace.

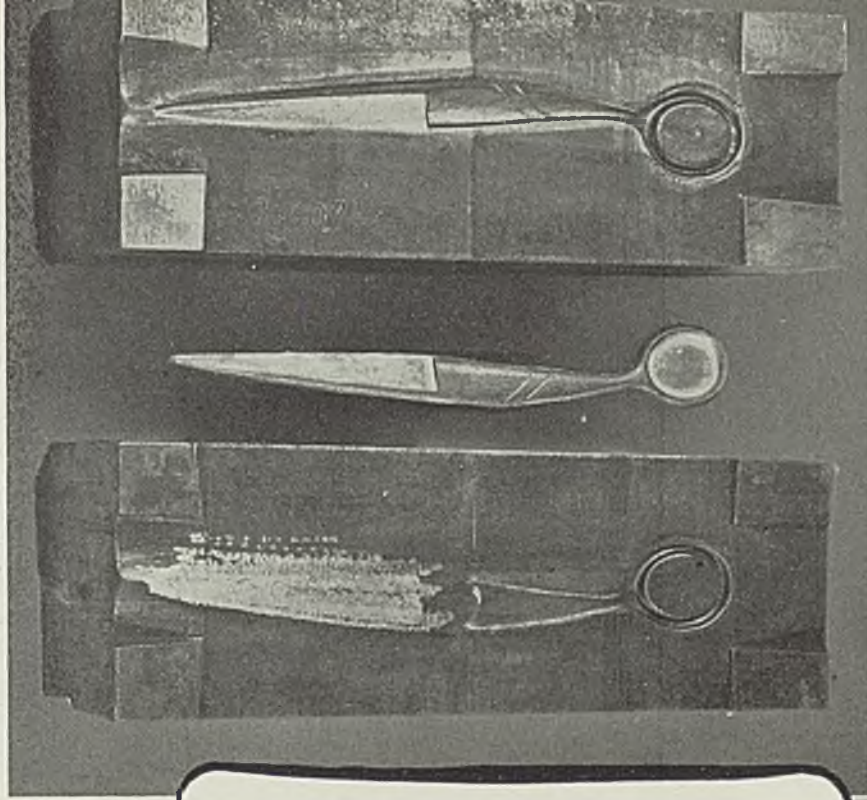
Steel production in the small or baby converter is discussed in Chap. IV, and Chap. V is concerned with the principles of electric melting. Melting in the arc-electric furnace is described in Chap. VI, and in the induction electric furnace in Chap. VII. Properties of plain carbon and alloy steels are presented and discussed in Chap. VIII. Chap. IX describes the production of steel castings, cleaning, annealing and heat treatment, welding, and cost accounting.

## Diamond Bores 200,000 Holes Before Relapping

Amount of work, from the standpoint of wearing quality, which the industrial diamond is capable of performing is indicated by the production record of a Koebel diamond tool used on an Ex-Cell-O boring machine in a Detroit automobile plant. The operation involved a finishing cut on wrist-pin holes of aluminum alloy pistons. The point of the diamond, weighing less than one-half carat, bored over 200,000 pistons before it had to be reshaped. In the operation dimensions were held to an accuracy of 0.00015-inch.

After the above period of service the diamond required only relapping to the correct radius to prepare it for a similar period of production life.





Day in and day out  
production of a sta  
sheer blank called  
steel that can ta  
20,000 blanks be  
grinds is somewh  
record. The heat  
ment of this die m  
Colonial No. 7 res  
a scleroscope of 92



"AM I GLAD  
I DECIDED ON  
**COLONIAL #7**  
FOR THIS JOB!"

I'LL BET HE PICKED UP  
THAT IDEA BY  
READING VANADIUM  
DATA BOOK

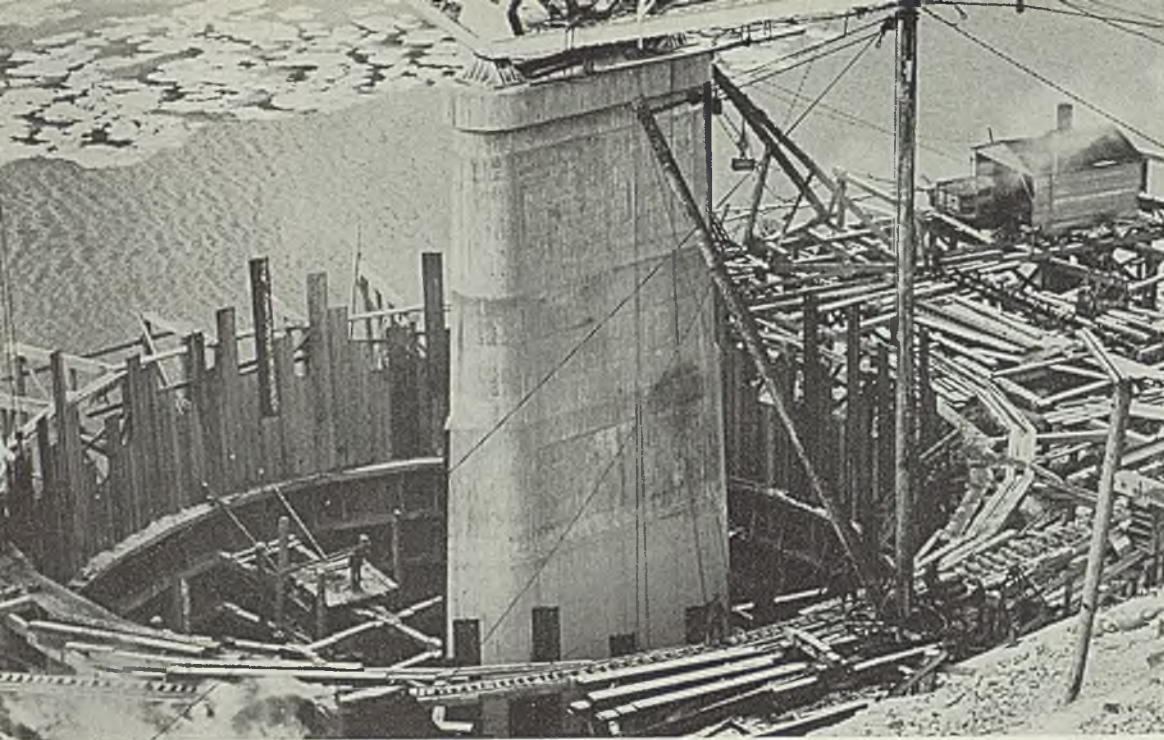


# Vanadium-Alloy

STEEL COMPANY

LATROBE PA.





**REALIGNMENT** of this fractured bridge pier required driving a ring of steel piling 110 feet in diameter and 80 feet deep around the pier, excavating material on the inside and placing a concrete "boot" around the 148-foot column

## Unusual Type of Caisson Devised To Realign and Strengthen Bridge Pier

**T**HREE hundred eighty-five tons of steel piling; 550 tons of 36-inch I-beams; five 300-ampere welding machines; 5 tons of welding rod; 52 hydraulic jacks, each of 100 tons capacity—these and sundry other items of materials and equipment entered into the job of tipping back a bridge pier which was only 9 inches out of plumb at the top of its 148-foot column. But 9 inches can cause quite a dangerous change in the line of the axis of the bridge.

The bridge in question is a cantilever structure less than a mile down stream from Grand Coulee dam in Washington. It is known as the Columbia river highway bridge and was built for the bureau of reclamation by J. H. Pomeroy Inc., San Francisco. Shortly after being opened for traffic a slippage of the east bank of the river, on which pier No. 2 is located, brought such pressure against the land side of the pier as to cause a fracture of the latter down near the foundation on bed rock. Then the pier and its column tipped slightly inward along the line of the axis of the bridge.

### Method Is New

The Pomeroy company was given the job of straightening and strengthening the pier. The method adopted had been untried in bridge-building history. In brief, what was done was to drive a circle of interlocking sheet steel piling, 110

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BY HENRY W. YOUNG

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feet in diameter, around the base of the pier. All the material was then excavated down to bed rock. When that point was reached, it was found the pier had tipped back into place of its own weight, as had been anticipated. The fracture, now barely discernible, had literally squeezed shut. The next step was to form a block of concrete around the whole base of the pier and extending some distance up on the surmounting column. This is in effect a massive concrete "boot" inside the caisson. The remainder of the space then was filled with earth.

### Rings Hold Back Water

This was not as simple as it sounds, especially in view of the lack of precedent. The piling had to be maintained in the form of a true circle against tremendous and unequal pressure from the outside. To accomplish this, a series of rings was employed, made of 36-inch I-beams, ranging from 132 to 230 pounds per foot, with the webs horizontal. These formed what might be termed "inside hoops" for the caisson. They were forced out against the piling and held there by shoring timbers or

rangers braced radically from the pier, and were held to the proper vertical spacing by timber uprights. There were 19 of these rings all told, from the top to the bottom of the excavation, some 80 feet.

Someone will say: "How are you going to 'force a ring outward'?" The answer is that each ring was fabricated inside the caisson. Each consisted of 26 segments of equal length. After the piling had been driven a short distance and the excavation made, these segments were lined up in the hole and forced out against the piling. When this had been done, the ends were butt welded 100 per cent, and thus the ring was formed tight against the piling. On part of this work, hydraulic jacks were used to do the forcing. The routine was drive, excavate and ring, in turn, until the bottom was reached.

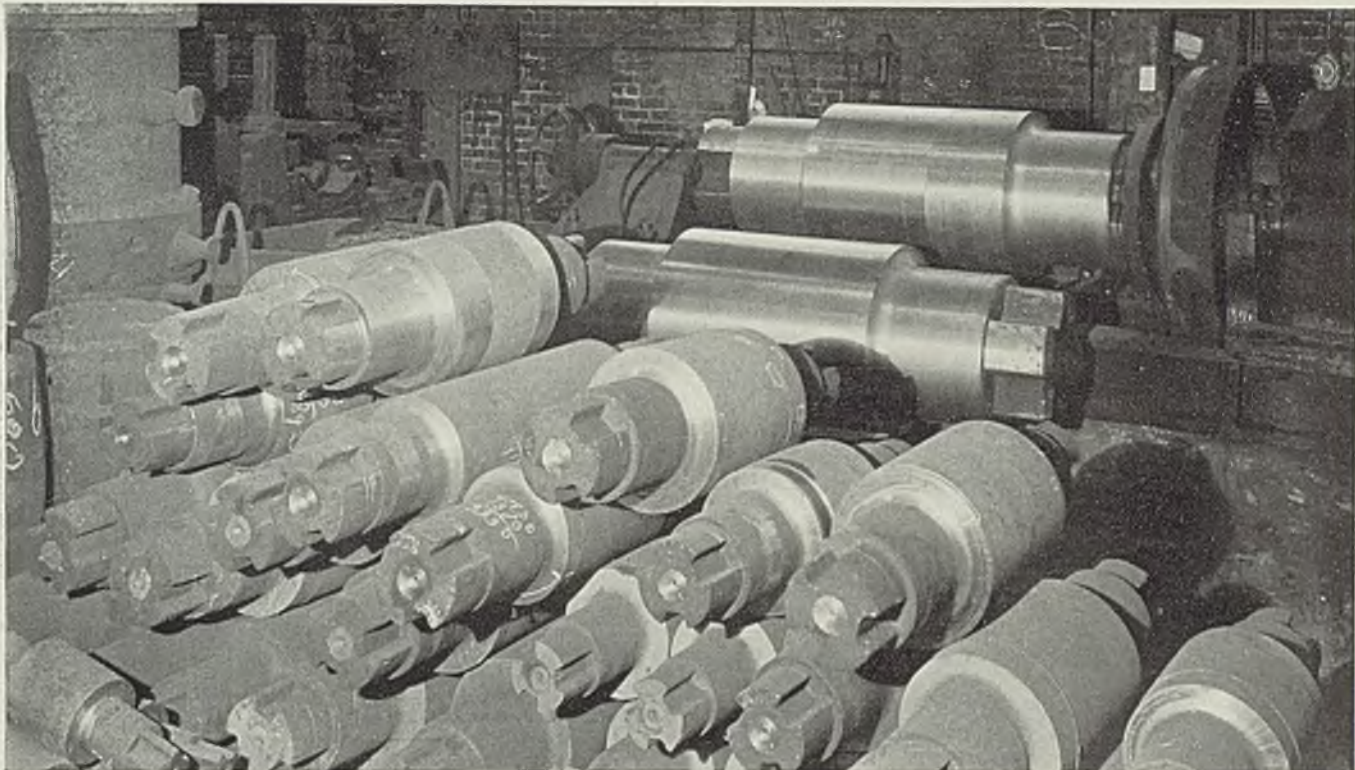
### Piling Is Welded

The piling used was Carnegie M-13 section, 16 inches wide and 37.3 pounds to the foot. It came in 40-foot lengths. Each section of piling was butt welded to the preceding one and a small scab plate was welded to each side in order to gain further strength.

Some conception of the magnitude of this work may be gained from the fact 25,000 cubic yards of excavation was necessary and that 8500 cubic yards of concrete was required for the slab.

The work was done for the bureau of reclamation, F. A. Banks being the construction engineer for the bureau in charge of this work. Charles G. Huber was superintendent in charge of the construction work for the Pomeroy company.





# Rolls . . . .

## Sand and Chilled Special Alloy Rolls

### ALSO COMPLETE EQUIPMENT FOR

THE FINISHING END OF  
STRIP MILLS  
TIN MILLS AND SHEET MILLS  
ROLLING MILL MACHINERY  
ROLL LATHES  
STRAIGHTENING MACHINES  
STRETCHER LEVELLERS  
SPIKE MACHINES  
TUBE MILL EQUIPMENT  
SPECIAL MACHINERY  
SHEARS

YOUNGSTOWN ROLLS deliver larger production before redressing because of high strength, improved toughness and maximum machining hardness.

We operate a large iron foundry with casting capacity of 100,000 pounds maximum per unit. We specialize in Alloy Irons, some of which were developed in this plant and are known as Palalloy. We are in a particularly advantageous position to handle your requirements for Nickel, Chrome and Molybdenum Alloys.

Let us figure on your next job—no obligation.

**THE YOUNGSTOWN  
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**OVER FIFTY YEARS OF SERVICE TO THE STEEL INDUSTRY**



# TWO Balanced.

## WIRE CONVEYOR BELTS by Cambridge

IF YOU CONVEY PRODUCTS THRU acids, brines, chemicals, scalding mixtures, washing solutions, high temperatures, rinsing, draining, drying, baking, steaming, spraying, cooling, filtering, pickling, screening, sorting, annealing, etc., YOU WILL WANT TO KNOW ABOUT THESE BELTS. WRITE US TODAY.

The Cambridge Single Balanced Belt. U.S. Patent 2,013,581



\*  
**THE CAMBRIDGE WIRE CLOTH CO.**  
Cambridge, Maryland  
NEW YORK • BOSTON • BALTIMORE • PITTSBURGH • DETROIT • CHICAGO

\* Above is installation showing the Cambridge Single Balanced Belt conveying metal parts thru an annealing process.

The Cambridge Double Balanced Belt, U.S. Patent 1,947,357



# Automatic Clutch and Transmission

## Successfully Applied to Motor Coaches

**L**AST fall, the motor coach companies of New York and Chicago each put into operation a fleet of 100 new double-deck passenger coaches. Chicago Motor Coach Co. also added a number of single-deck coaches to its fleet.

These units are interesting from the mechanical standpoint in that they mark the first major application of an automatic clutch and transmission. This device, long the goal of automotive engineers, has been in the course of development for years, and the fact that its trial use has been sufficiently successful to prompt its employment in the severe service experienced in motor coach operation is significant. Its application to passenger cars is regarded as a likely development in future automotive design.

This clutch and transmission is known as the Mono-Drive and its inventor is Oscar H. Banker. Patents are controlled by the New Products Corp., 1322 South Wabash avenue, Chicago, which has licensed General Motors Corp. for use of the equipment on buses and trucks. Similar rights have been granted Borg-Warner Corp. in the passenger car and light delivery truck fields and the Pullman-Standard Car Mfg. Co. for rail cars. The Railplane, light-weight rail car built by Pullman several years ago, employs a Mono-Drive.

### Features Are Unique

Borg-Warner Corp. for the past few years has been manufacturing an over-drive which is somewhat similar to the Mono-Drive except that it provides only for an automatic shift to a fourth gear and is not operative at the slower speeds.

Other types of transmissions in use during recent years either are only semi-automatic in their operation or else give the operator no control over the speed at which he desires to shift gears. In the latter case, first gear is manipulated manually and the transmission automatically changes from second to high at a fixed speed. With the Mono-Drive the driver makes the shift from low to second and from second to high at the speed he chooses. The automatic feature of the latter transmission therefore is developed only to the extent that it does not eliminate the driver's control over its operation.

The Mono-Drive eliminates manual operation of the clutch and gear shifting mechanism. With the motor idling, the driver merely depresses the accelerator and the vehicle

moves forward in low gear. To shift into second, the accelerator is lifted and second gear is automatically engaged. The same operation is repeated to go into high. Braking is orthodox, and when the bus slows down below 10 miles an hour, it automatically returns to second gear. Below 5 miles an hour first gear is engaged. When the vehicle is brought to a full stop, the clutch operates automatically and permits the engine to idle, though the transmission is in low gear.

### Reverse and Neutral Provided

To shift into reverse gear a direction lever is employed. This lever also may be moved to a neutral position which allows the engine to be speeded while the vehicle is at rest. For ordinary driving, whether stopped or in motion, the direction lever need not be touched after being placed in the forward position.

On occasions when it is desirable to overcome the automatic feature of the transmission and return from high to second gear—as in accelerating to pass a slow vehicle or in using the motor as a brake down a steep grade—another control is available to the operator. This is an air valve, controlled through a button on the floor board to the left of the driver, which when depressed places the transmission in second gear. When the operator removes his foot from the air button and accelerates the vehicle, high gear again is engaged.

For passenger cars, the transmission is designed to remain in high gear upon deceleration until speed has dropped below 6 miles an hour, when first gear is engaged.

The fully automatic clutch of this drive consists, in principle, of two internal shoes, which, through centrifugal force, make contact with the clutch drum. The drum is part of the transmission assembly. Through design of governor weights, the clutch starts to engage at a predetermined engine speed.

There is a brief slip period as the

engine speed is increased, thereby providing smooth acceleration of the vehicle. At 10 miles an hour the clutch becomes fully engaged and remains in this position during subsequent gear shifting until the vehicle again is brought to crawling speed or a definite stop. Disengagement of the clutch, when decelerating the engine, is instantaneous, since operation of pressure springs on each shoe delays the release and eliminates slippage and wear. The fact that slippage occurs only when the vehicle is starting in low gear prevents heat generation and prolongs the life of the clutch. Experimental operations have shown a marked lengthening in clutch life as well as freedom from necessary adjustments compared with conventional equipment.

The transmission is the three-speed planetary type. The planetary housing is held stationary in low and second gears by a reaction clutch instead of by conventional brake shoes. This reaction clutch permits the entire planetary system to revolve in the direction of engine rotation when the transmission is in direct drive.

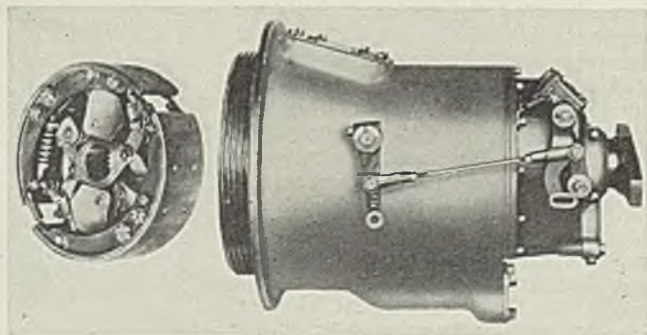
When the vehicle is accelerating in first gear, centrifugal weights in the second speed clutch throw out and move the driven jaw of the second speed clutch ahead. Upon release of the accelerator, the clutch jaws become fully engaged since the main clutch drum decelerates to a point where the speeds of the driving and driven jaws are synchronized. The transmission then is in second gear.

### Operating Principles

In shifting from second to third speed, the vehicle drives the planetary housing in the direction of the engine rotations as the engine decelerates. As the housing turns, high-speed centrifugal weights, which are mounted thereon, throw out. This moves the high-speed sliding clutch backward and engages a high-speed dog clutch when speeds of both members become synchronized. This places the transmission in high gear.

The air valve, previously referred to, controls a diaphragm on the transmission, which in turn, through  
(Please turn to Page 98)

**I**LLUSTRATED  
Here are Mono-  
Drive automatic  
clutch (left) and  
transmission  
(right)





# WHICH GRAIN SIZE?

(Concluded from Page 50)

the decomposition takes place at about 200-300 degrees Fahr. or lower. This means that the steel must be cooled so rapidly that no austenitic decomposition takes place until these temperatures are reached. The rate at which the steel must be cooled to fulfill the foregoing condition is called the critical cooling rate.

It has been shown that the rate of austenite decomposition is a direct function of the grain surface for any given cooling rate, the larger the grain surface, that is, the smaller the grain size, the more rapid the decomposition. Therefore, the critical cooling rate is greater for fine grained than for coarse grained steels. If the critical cooling rate at any point is reached or exceeded, grain size will have no effect upon the actual hardness values, the values then being determined entirely by the composition of the steel.

Penetration of hardness in a quenched piece may be judged by fracture and observation and by magnetic methods, or by direct hardness readings on a cross section of the hardened piece. Excellent standards can be set up for any of these tests as, for example, the Shepherd P-F ratings. In the present work, to obtain as accurate an evaluation as possible for hardness penetration, it was decided to use hardness readings on six radii of the cross section of a hardened 1-inch round.

## Hardness Readings Plotted

These hardness readings when plotted against distance from the surface give the familiar curve for hardness penetration as shown in Fig. 5. The upper horizontal dotted line of this area represents the maximum hardness found on the hardness penetration curve. The lower horizontal dotted line, called the base hardness, is obtained for each steel from Fig. 6, which shows core and maximum hardness plotted against hardness factor. This figure was obtained by plotting the core hardness for fine grained steels and the maximum hardness for all steels studied against a hardness factor as follows:

$$3000 C + 800 Mn + 500 Si + 4000 P = \text{Hardness Factor}$$

where the elements are expressed in per cent. The reason for choosing this "base hardness" is that it is the average minimum core hardness obtainable for a 1-inch round under the heat treatment chosen, namely; a 1550 degrees Fahr. water

quench followed by a 500 degree draw.

The relative hardness penetration, hereafter called the "per cent hardened," is taken as the shaded area under the hardness penetration curve, divided by the total area bounded by the heavy dotted lines on Fig. 5.

In considering the hardenability of steels which are coarse grained through the method of deoxidation rather than heat treatment, it must be remembered that the "base hardness" chosen in this work is a function of composition alone. Changes in core hardness due to grain size are automatically taken into account in calculating "per cent hardened" when the base hardness is calculated from the chemical composition.

The grain surface in which we are interested here is that which is formed at the heat treating temperature and not that shown by the McQuaid-Ehn test. This is particularly true of coarse and mixed grained steels in that test. To determine the effect of grain size on hardness penetration, a series of carbon steels was heated to different temperatures to obtain variations in austenitic grain size, were then furnace cooled to 1500 degrees Fahr., then water quenched and drawn for 1 hour at 500 degrees. Separate samples of each steel were heated simultaneously and were air cooled to determine the austenitic grain size at the time of quench. From the austenitic grain size, determined by counting, the square inches of grain surface were calcu-

lated and plotted against the per cent hardened for each sample, the per cent hardened being determined as illustrated in Fig. 5.

Fig. 7 shows the relationship between per cent hardened and square inches of grain surface. The straight line relationship between per cent hardened and grain surface, over the entire range of steel analysis given in Table VI, shows definitely that hardness penetration is a function of grain surface alone.

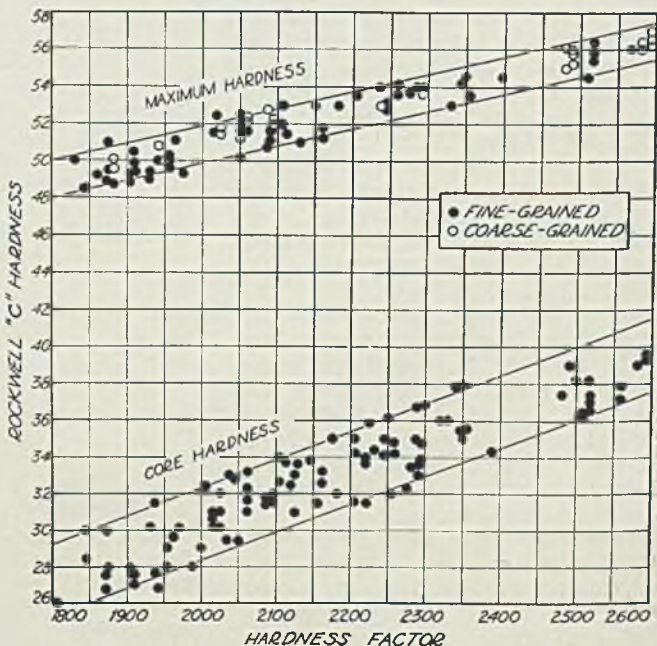
As shown in Fig. 6, a 0.60 per cent carbon steel has a higher base hardness and maximum hardness than a 0.30 per cent carbon steel, and the base hardness and maximum hardness increase regularly with increase in percentage of hardening elements. If chemical composition within the range studied directly affected hardness penetration, the steels shown in Table VI would give points falling on different lines on Fig. 7 instead of falling on a single line as they do. In other words, a change in chemical composition, within the range of analysis studied, simply raises or lowers the level of actual hardness values in the piece, without changing the type of penetration curve.

## Grain Surface a Factor

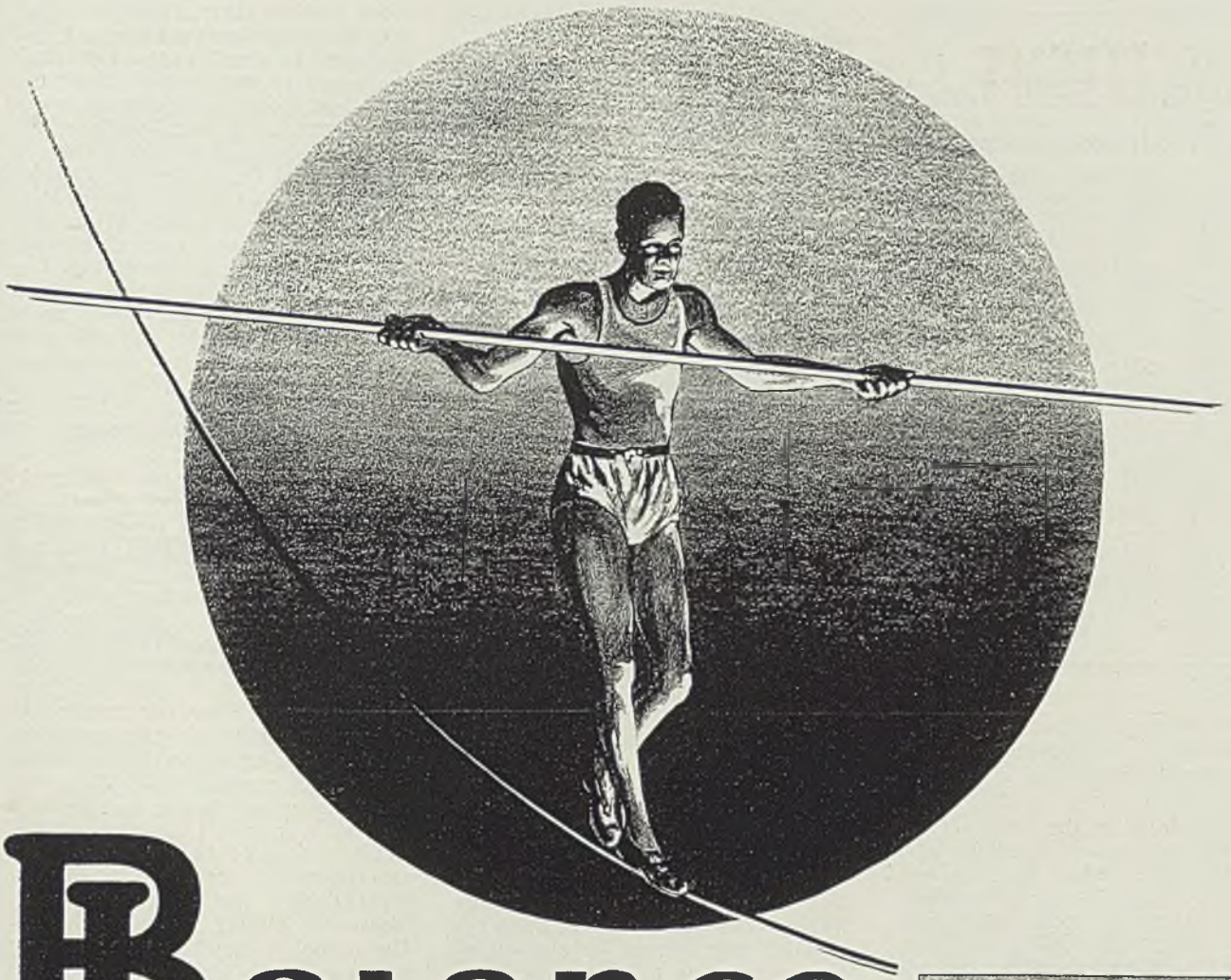
In general, fine grained steels are considered to be shallow hardening and coarse grained steels deep-hardening. Fig. 7 shows that the depth of hardness penetration for a given analysis of steel is directly proportional to the grain surface involved. This in turn is a function of the grain size at the heat treating temperature. Having determined this grain size, the actual percent hardened may be easily determined by calculating the grain surface and referring directly to Fig. 7.

All this discussion refers to the

FIG. 6—Effect of increasing hardness factor on the maximum hardness and core hardness of 1-inch round bars, quenched from 1550 degrees Fahr. and drawn at 500 degrees Fahr.







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Table VI

## Analysis of Steels Tested For Hardness Penetration

Steel No.	Per Cent				
	Carbon	Manganese	Phosphorus	Sulfur	Silicon
A-98	0.49	0.74	0.016	0.032	0.22
A-99	0.38	0.75	0.027	0.031	0.20
B-13	0.41	0.78	0.020	0.034	0.23
B-66	0.37	0.70	0.026	0.029	0.21
B-72	0.38	0.78	0.018	0.040	0.21
B-87	0.57	0.77	0.017	0.032	0.23
C-13	0.37	0.74	0.015	0.030	0.20
C-15	0.44	0.72	0.017	0.033	0.19
C-23	0.46	0.73	0.035	0.035	0.20
C-29	0.58	0.71	0.024	0.033	0.17
C-31	0.39	0.71	0.018	0.034	0.20
C-37	0.61	0.76	0.017	0.028	0.21
C-38	0.57	0.74	0.014	0.030	0.24
C-61	0.45	0.73	0.014	0.024	0.19
C-68	0.45	0.71	0.020	0.032	0.19
C-86	0.59	0.79	0.020	0.030	0.21
C-91	0.55	0.54	0.017	0.035	0.21
D-12	0.44	0.68	0.015	0.030	0.20
D-13	0.48	0.76	0.019	0.036	0.23
D-15	0.38	0.75	0.017	0.033	0.19
D-23	0.48	0.84	0.017	0.040	0.22
D-30	0.35	0.68	0.034	0.038	0.18
D-32	0.46	0.74	0.022	0.026	0.20
D-33	0.44	0.74	0.015	0.035	0.18
D-47	0.58	0.74	0.018	0.032	0.22
D-50	0.43	0.71	0.016	0.040	0.26

range of analyses shown in Table VI. The effect of alloying elements on hardness penetration is not covered in this paper.

It was stated in the previous section that the surface hardness of a quenched steel would be independent of the grain size and dependent only on chemical composition, provided the critical cooling rate was reached or exceeded during quenching.

If the critical cooling rate is not reached, grain size becomes most important in determining surface hardness. The critical cooling rate for full hardness may not be reached due to

- (a) Intentionally slower cooling rate.
- (b) The desired cooling rate is faster than the critical rate, but
  - (1) Gas films on the surface of the steel may retard the rate of heat transfer to such an extent that the critical cooling rate is not reached; and/or
  - (2) If the scale does not break freely on quenching, the insulating effect of residual scale may act to retard the cooling rate.

### To Avoid Soft Spots

No matter how the cooling rate is retarded the hardening reaction will behave in the same manner as just indicated for hardness penetration, that is, the reaction will be a direct function of grain surface, and soft spots will occur where the critical cooling rate has not been reached. The hardness of the soft spots will depend on the analysis and grain size of the steel and on

the effectiveness of the insulating spot of scale or gas.

The best method of avoiding soft spots is to be sure that the heating prior to quenching is carried out in such a manner that excessive scale formation is avoided, and to eliminate tenacious gas bubbles on the surface by proper agitation of the pieces or of the liquid quenching medium. In studying soft spots after quenching, a series of tests was made on fine grained heats of S. A. E. 1045 steel in the form of 1-inch round bars, one set of bars heated in air, a duplicate set in a controlled neutral atmosphere. In the second or controlled atmosphere series, only an extremely light scale was formed on the pieces, whereas in the normally heated pieces the usual type of scale was present.

Twenty Rockwell readings per inch of length were taken on each bar, and the percentage of soft spots as determined by these readings is as follows:

Atmosphere	Per cent of Rockwell readings showing soft spots	Total number of readings
Oxidizing .....	8.6	3,210
Neutral .....	0.97	2,585

The extreme importance of atmosphere control for reliable results in surface hardness can be seen from this tabulation.

Experiments now in progress indicate that the type of steel may have a very definite effect upon the type of scale formed by a given atmosphere, thus affecting the manner in which the scale breaks away from the piece on quenching. This, therefore, affects the uniformity of surface hardness of the heat treated piece.

If the furnace atmosphere is oxidizing, or if the piece is improperly quenched, a coarse grained steel, Type A, Fig. 2, is apt, because of a lower critical cooling rate, to give

more uniform surface hardness than mixed and fine grained steels, Types B, C, and D, Fig. 2, unless the latter are made in such a way that the scale has a tendency to break away cleanly from the metal surface during the quenching operation. If scaling can be controlled closely, the desired surface hardness can be obtained on steel of any grain size, provided that the critical cooling rate is exceeded in quenching. Under these conditions a fine grained steel, a mixed grain steel, or a coarse grained steel all will give equally good results on surface hardness.

### Conclusions Summarized

To summarize the effect of grain size on hardenability, it can be stated that hardness penetration is a direct function of the grain surface of the steel when this grain surface is designated as that present in the steel at the time of quenching. Steels of types B and C, Fig. 2, will give the same hardness penetration as steel D, Fig. 2, if quenched from 1550 degrees Fahr. or lower. At higher quenching temperatures, steel D will be more shallow hardening than steels B or C, the penetration hardness being, as indicated in Fig. 7, a direct function of the grain surface of the steel. Changing the chemical composition of the steel within the range shown in Table VI, simply raises or lowers the actual hardness values at any given point on the diameter of the piece, without changing the relative penetration of hardness.

When the critical cooling rate is reached or exceeded, surface hardness is independent of grain size (or grain surface), but if for any reason the critical cooling rate is not reached, it is a direct function of grain surface, just as is the case for hardness penetration. The most

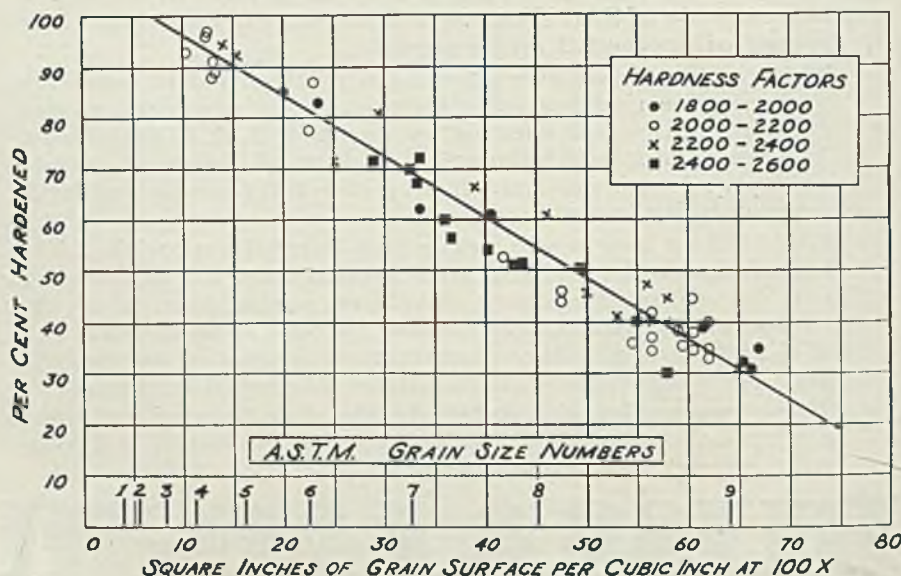


Fig. 7—Effect of grain surface area on the per cent hardened



common cause of soft spots is insulation of the surface by gas or scale films, which decrease the cooling rate to the point at which grain surface becomes a controlling factor in hardenability. Again in this instance the grain surface at the temperature of treatment is the important factor in determining the actual hardness and depth of the soft spots.

If steel is judged solely by a test carried out at temperatures and times different from those used in the heat treating operation, the interpretation of the observed grain size and, therefore, grain surface, may well be extremely misleading and the hardenability of the steel

will not correspond to the observed grain size. Any of the methods described by Bain and Vilella will satisfactorily determine the austenitic grain size as it exists at any temperature of treatment.

Finally, it is evident from the foregoing that grain surface at the temperature of treatment is the essential factor in determining type of response to heat treatment. As the McQuaid-Ehn test gives no information as to actual grain size (grain surface) at any temperature other than 1700 degrees Fahr. it should be obvious that its general use is not warranted in predicting the behavior of steels in heat treating operations.

continuous system using squeeze machines and making small pipe fittings. Sand employed is a semisynthetic with approximately 70 per cent sharp sand with artificial bond, and 30 per cent natural bonded sand. To maintain a system, sand batches of new sand, reclaimed sand, sea coal and bond are mullled at least 4 minutes in a muller. These additions are added to the return sand just before it enters the bucket elevator on its way to the vibrating screen. The routine is such that new additions are fed through the entire duration of the shift. The speaker stated that this type of sand permits the permeability, moisture, and green and dry strengths to be maintained easily and eliminates disposal of excess sand, and that it furthermore improves the surface of the castings produced.

Harry Lee, Tennessee Coal, Iron & Railroad Co., Birmingham, described the sand and equipment used in the steel foundry of that company. The greatest proportion of silica sand is obtained on the property of the company. This sand is 85 per cent silica. Because of fineness, the company has developed a blend which contains 50 per cent of this sand, 25 per cent building sand having 98 per cent silica, and 25 per cent reclaimed foundry sand. Sand is stored in a hopper having a capacity of 500 tons. Two muller type mixers are used for making facing and core sand. Part of the molds in this foundry are made on machines and the remainder, which includes the larger castings, are made on the floor. All molds are skin dried.

#### Advocates Dust Control

D. M. Avey, secretary, American Foundrymen's association, Chicago, spoke upon the various activities of the safety and hygiene section of the association, especially as they pertain to the silicosis problem. He pointed out that the cost for proper protection and suppression equipment need not be excessive. Dust should be controlled at its source. At the present time, education in connection with the silicosis problem is a necessity.

Dust counts should be used only as bench marks, Mr. Avey stated. If they are to be established as tentative standards, the industry should be given the opportunity of needing them before they are even mentioned in the codes. The speaker reviewed the second national silicosis conference held recently in Washington, and touched upon the most important aspects of the engineering report presented. He also presented information on the insurance phases of the silicosis problem and described the work the association has done in connection with insurance matters.

## Discuss Foundry Problems At Birmingham Conference

SAND conditioning and control, safety and hygiene, mechanical equipment, design and layout of foundries and industrial lighting were major topics discussed at the fifth joint foundry practice meeting held in Birmingham, Ala., Feb. 25-26, under sponsorship of the Birmingham district chapter of the American Foundrymen's association and the Birmingham section of the American Society of Mechanical Engineers. Attendance exceeded 400.

Presenting a paper on reclaiming, conditioning and handling sand, L. B. Knight Jr., National Engineering Co., Chicago, considered permeability, bond, moisture, strength and inert fines, and dealt with the limit to which they should be controlled. Only recently, he pointed out, has work been undertaken with inert fines.

#### Must Remove Inert Fines

Each time metal is cast in sand, a certain amount of clay or bond is dehydrated, or partially dehydrated, some of the sea coal burned to ash and some of the silica grains fractured. This fine material is inert, has no bonding quality, and decreases permeability and causes rough, dirty castings with excessive burning on of the sand. Methods by which the inert fines may be removed and controlled, were discussed, as well as results obtained by mulling.

Equipment alone does not make the necessary savings in sand control work, Mr. Knight said. It is the proper use of the equipment, as applied to the particular problem, which justifies the capital expenditures for modern, up-to-date sand

conditioning, reclamation and control machines.

Four papers dealt with sand handling in local foundries. W. Lee Roueche, McWane Cast Iron Pipe Co., Birmingham, stated that the foundryman may expect his sand handling equipment to have ample capacity, provide proper separation of the sands, give continuity of operation, and develop minimum operating expense. The following suggestions were made to the mechanical engineer about to design a sand handling system: Determine the characteristics of sand to be handled; determine the hourly capacity needed; use totally enclosed motors of sufficient power; use antifriction bearings wherever possible; totally enclose gear reducers; pitch chutes for tempered sand not less than 60 degrees; design elevators properly; and provide ample bypassing facilities for recirculating sand.

J. A. Woody, American Cast Iron Pipe Co., Birmingham, discussed distribution and control of sand for centrifugally cast pipe. Describing the sand system, he stated that sand travels a distance of approximately 460 feet from the shakeout to the ramming station. The entire system is operated by seven men. Considerable time was required to perfect the mixture and conditioning of sand that would stand the abuse of centrifugal casting. He stated that the machinery and method now in use to enable the company to control the sand and make a good casting with remarkably low loss.

W. W. Hairston, Stockham Pipe Fittings Co., Birmingham, discussed some aspects of sand control for a





# PROGRESS IN STEELMAKING

## Insulating Panel for Open Hearths Afford High Salvage of Brick

BY S. M. JENKINS  
Armstrong Cork Products Co., New York

INSULATION of open-hearth furnaces above the floor has been simplified by the development of suitable brick and of methods of installation. The accompanying illustration shows the method employed for using 2500-degree high-temperature insulating brick  $1\frac{1}{2}$ , 2,  $2\frac{1}{2}$ , 3 and  $4\frac{1}{2}$  inches thick of the Armstrong type. The insulating panels with steel plate backing and angle iron sides are made for installation between the top of the pan and the bottom edge of the

channel iron used for holding the skewback. These panels are held tightly against the silica brick by steel wedges driven through holes in the buckstays.

Endwall construction includes insulated panels, three wide and two or three high. They are held in place by the same method employed for the sidewalls with the exception that a small angle iron support welded to the steel panel and protruding out sufficiently far affords a support for the wedges which

hold the panels to the walls. This makes it possible to remove a panel in the endwall without disturbing any of the surrounding panels. All endwall panels are kept clear of the burners.

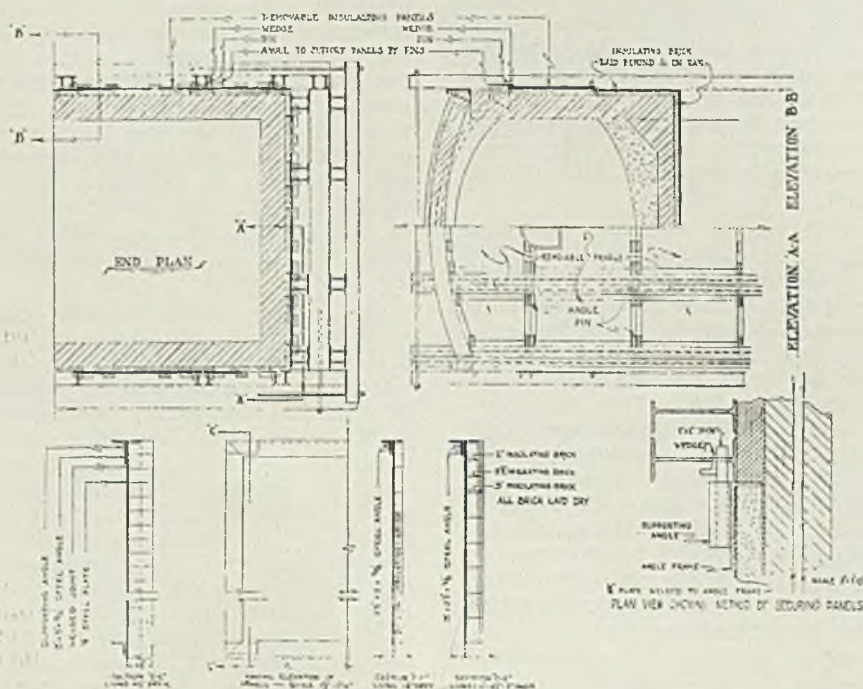
On old open-hearth furnaces the insulated panels can be installed between the buckstays and thus serve as a backing to the present silica brick wall. This, however, does not constitute a complete insulated job, but instead, really holds the heat in the silica brick walls. This results in increasing the temperature on the exterior surface a few hundred degrees Fahr. as well as subjecting the buckstays and steel binding equipment to much higher temperatures.

### Rebuilding Is Recommended

The most efficient job involves the rebuilding the furnace above the floor, making the interior furnace walls of silica brick,  $13\frac{1}{2}$  inches thick, and laying a  $2\frac{1}{2}$ -inch course of insulating brick on edge in front of the buckstays between the top of the pan and the underneath edge of the channel holding the skewback. The panel of the proper thickness installed between the insulated buckstays forms a uniform insulated wall. This  $2\frac{1}{2}$  inches of insulating brick in front of the buckstays is carried on down against the side of the pan to the bottom and a  $2\frac{1}{2}$ -inch paving of insulating brick covers the entire bottom of the pan.

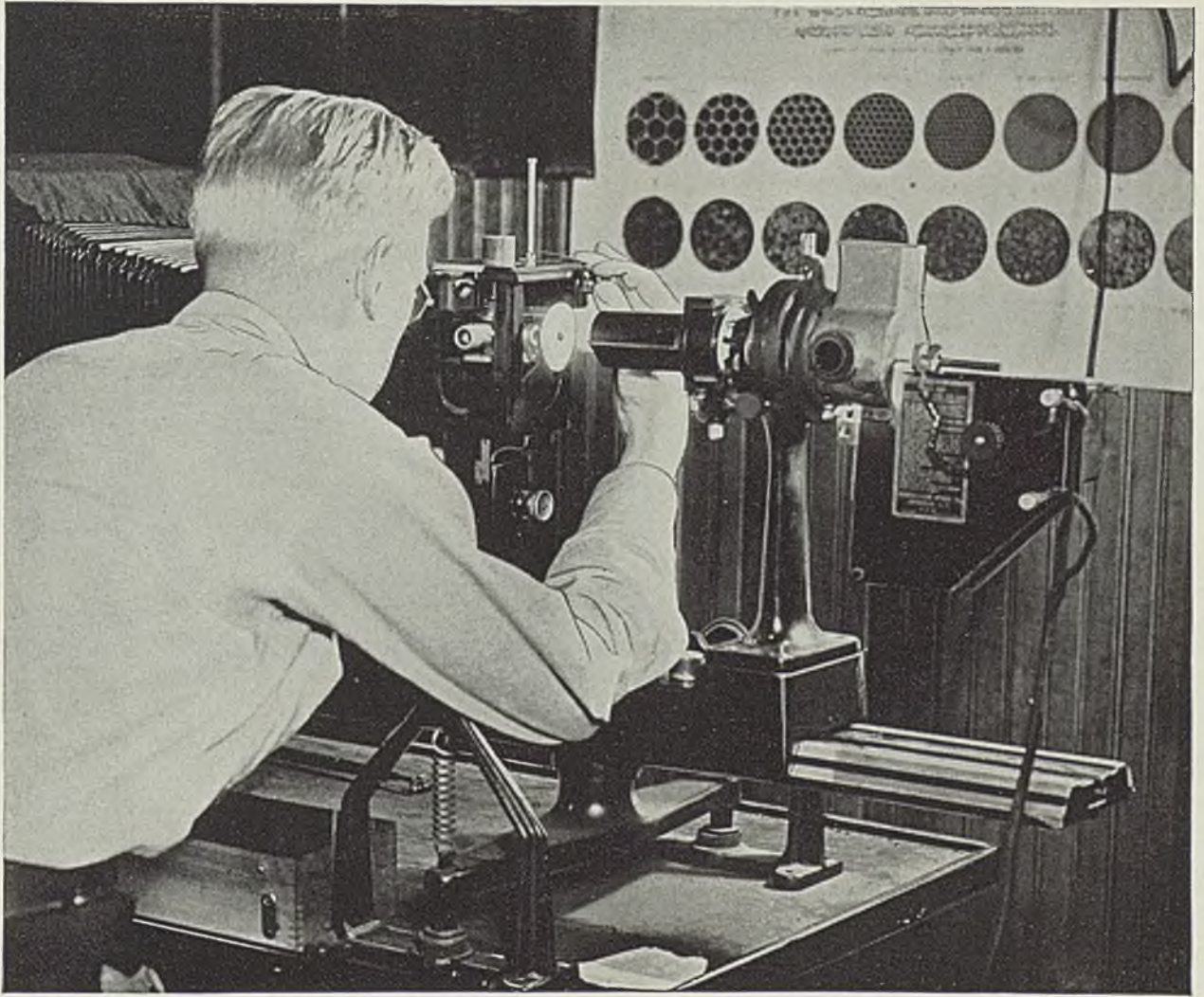
This recommended construction affords the highest efficiency. The brick, manufactured by the Armstrong Cork Products Co., Lancaster, Pa., withstands a temperature of 2900 degrees Fahr. before softening. Being of a silica base, it does not cause any fluxing in the silica brick. The steel plate back of the panel provides air-tightness.

This type of construction affords high salvage. Not only can the panels be removed in the case of repair work but the brick as well, they being laid up dry in the panels. Moreover the steel panel



Detail of method for insulating open-hearth walls above the charging floor





## SPECIFICATIONS, PLUS

When is a pipe or tube "good enough?" The Pittsburgh Steel Co. believes it is only when the pipe or tube meets tests of strength and accuracy far *beyond* the requirements of the job for which it is destined. For that reason, the various tests to which Pittsburgh Seamless is subjected, such as hydrostatic pressure, torsion, tensile strength, hardness and impact, are designed to measure a degree of perfection safely beyond standard specifications.

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gives the silica brick walls additional support between buckstays against expansion which aids materially in keeping the walls straight. The different thicknesses of panels permits a change in the thickness of insulation if the inside walls of the furnace show they are being heated to too high a temperature, or that they could stand additional insulation.

If the walls become thin toward the end of a run on the furnace, the panels can be removed and the last few heats made with uninsulated walls. Frontwalls of some furnaces are so broken up with doors that little can be accomplished with insulation except in front of the buckstays.

#### No Mortar Used

Insulated panels also help greatly in holding a furnace over shut-downs with little additional heat required to keep the temperatures up for protection of the silica brick. In other words, the panels hold the temperature of the silica brick and should decrease the spalling action.

Over the roof, as shown in the illustration, 2½ or 4½ inches of insulating brick is laid dry; it is tightened up after the furnace has been brought up to working temperature. This grouted in place will give somewhat of a secondary arch and allow the silica brick to expand and contract without cracking the insulated covering each time. This secondary arch also will stand up sufficiently long, in case the silica brick burnout beneath, to allow a charge of steel to be drawn before it caved in.

Another roof construction used successfully consists of 12 inches of silica brick followed by a 1-inch layer of silica sand and then a course of insulating brick. The silica sand tends to form a crust or seal over the silica brick arch and in the joints.

#### Develops Surface Cleaner

Anhydrous sodium orthosilicate in the form of white granules, known as "Orthosil" now is being produced in this country on a commercial basis. The material dissolved in hot water is effective in removing all types of soil usually found on steel in process except that which can be eliminated by pickling. The chemical serves as a detergent in cleaning steel preparatory to tinning, electroplating, enameling and painting. The material is a highly concentrated alkali and having unusually high conductivity for electricity, is most effective when employed in conjunction with electrolytic cleaning op-



erations. Under such conditions from 6 to 8 ounces of the granular material is recommended per gallon of water. It frequently is made more effective by the addition of a small amount of soda ash especially where only hard water is available. In case a greater emulsifying action is desired, this can be obtained by adding small quantities of various organic emulsifying agents. The material is finding wide use for cleaning steel preparatory to the application of protective coatings and for many heavy-duty detergent applications.

#### Affords Long Campaign

Steel cinder pots used at an open-hearth shop in Pennsylvania disclose an indicated life ranging from 8 to 10 years. Cracks which may develop are closed by welding. Other type pots at this plant show a life of 2 to 2½ years. Little difficulty is encountered with stickers.

#### Molds Are Oiled and Dried

All new molds received at a steel plant in Pennsylvania are given a coat of oil before being placed in storage. When placed in service they are positioned between hot molds to insure of their being dry. By this arrangement few scabs are encountered on the first ingots from these molds.

#### Lowers Maintenance Cost

A special thermotube has been made available to replace platinum thermocouples having a high maintenance cost or which will not hold their calibrations because of contamination with gases. The unit, which is similar in size to the standard thermocouple, is adapted for measuring temperatures in preheat-



ing, high-speed steel and forge furnaces. The device also is being used to measure checker brick temperatures in hot sections of checker chambers. Another of its applications is with a recorder for measuring the temperature of steel in transit through finishing stands of hot strip mills or roughing stands of rod mills. Temperature readings of the steel in process are available within a period of two seconds without interfering with production schedules. The thermotube also has been made available for measuring temperatures as low as 650 degrees Fahr. which is applicable for rolls, annealing and general heat treating.

#### Strip Rolled Under Tension

Constant tension in the cold rolling of strip steel is a late development in the cold-rolling industry and is coming into greater favor. On a mill recently installed in the Detroit district, the tension is secured by equipment which includes an idler roller located between Nos. 1 and 2 stands and one between Nos. 2 and 3 stands. Being supported resiliently, the strip in transit through the main rolls has a tendency to push the idler downward. The vertical movement of these rollers, while small, is measured electrically, the values being employed to control the speed of the first two mill motors and thus maintain a constant tension between the stands. Instruments also are provided to indicate any difference in the tension at either edge of the strip.

#### Protects Steel Surfaces

Protection of steel against high temperature water and steam contact above 175 degrees Fahr., such as the interior of water-tube boiler tubes and drums, water wall and economizer tubes, steam turbines, feed water heaters, etc. is afforded by a recently developed paint. The product is not affected by high pressures, ratings and varying feed water conditions nor will it retard heat transfer. Interior surfaces of tubes are painted with a revolving brush attached to an ordinary air-driven boiler tube cleaner. Two coats are recommended for the first application. Another grade of the paint is recommended for cold water tanks, air washers, centrifugal pumps, piping boiler fronts, stoker wind boxes, and other steel surfaces which come in contact with moisture under 125 degrees and which normally are dry and hot at temperatures not exceeding 450 degrees Fahr., or at atmospheric temperature in sheltered locations.



# GRANITE CITY STEEL PLATES



## Plate Glass Flatness

Extreme care exercised during every process, together with the efficiency of latest-type continuous mill equipment, result in the unusually uniform "plate glass flatness" of Granite City Steel Plates. Other desirable characteristics include greater strength-for-weight, finer finishes and more accurate gauges.

New equipment and new methods enable this company to provide better steel and better service to the Mississippi Valley, the West, and the Southwest.

**GALVANIZED SHEETS • STEEL SHEETS • PLATES AND TIN PLATE**



## GRANITE CITY STEEL CO.

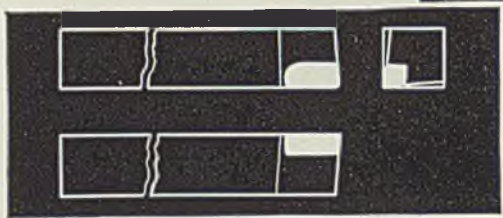
GRANITE CITY, ILLINOIS

200 Fifth Avenue, New York  
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**NOW OPERATING ONE OF THE LARGEST CONTINUOUS MILLS IN THE UNITED STATES**





Tools used in this operation, Vascoloy-Ramet, Grade A for Cast iron, style 6, Tool size  $\frac{3}{4}$ " x  $\frac{3}{4}$ " x 4". Tip size  $\frac{1}{4}$ " x  $\frac{5}{16}$ " x  $\frac{5}{8}$ " standard grind.

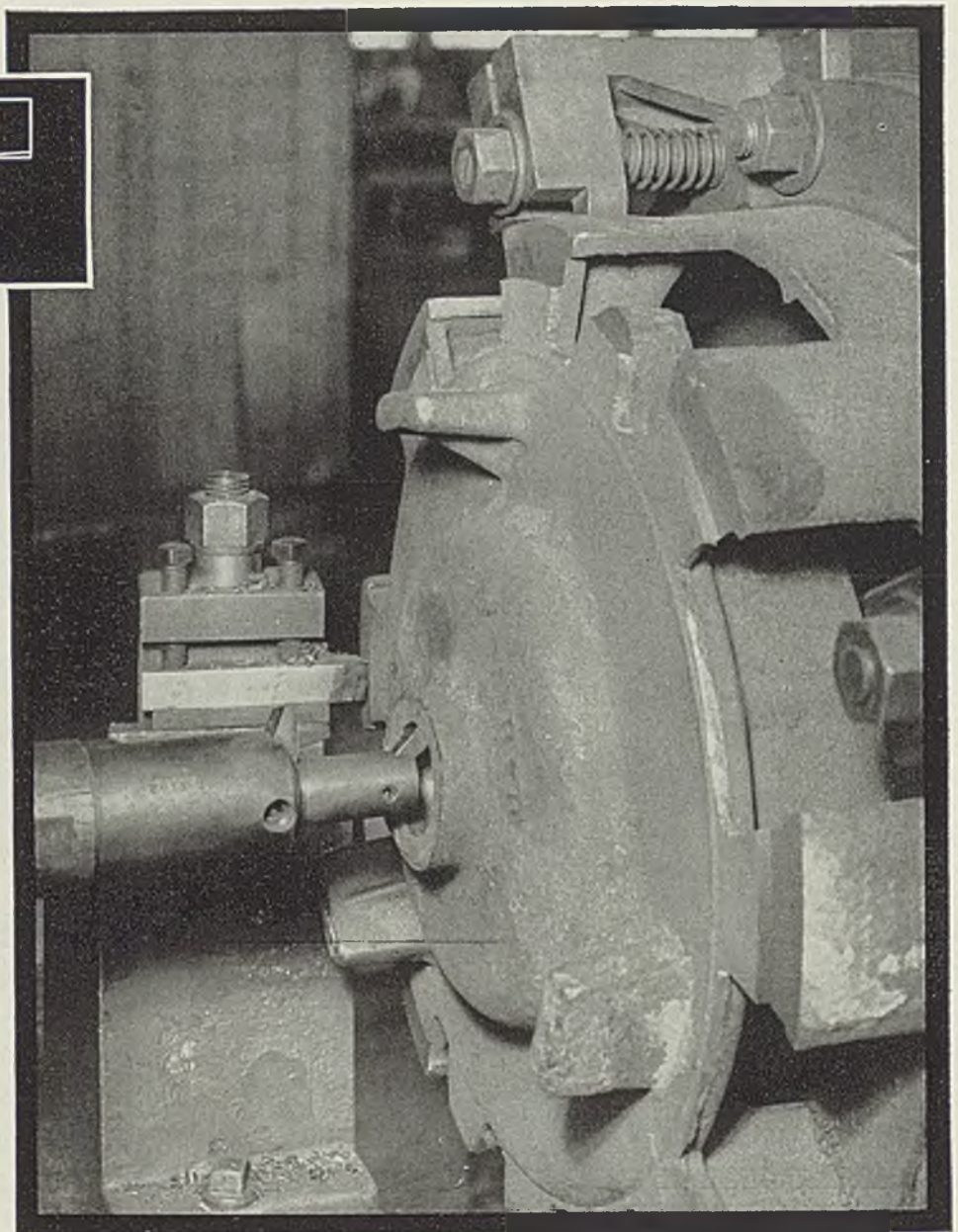
Cast iron and cast iron alloys, semi-steel, brass, bronze, aluminum and aluminum alloys, non-ferrous metals and materials, all steels from the softest to the hardest and toughest alloys—whatever the material there's a Vascoloy-Ramet grade which precisely fits the work in hand.

Produced in 17 standard grades, of different tantalum-carbide content, strength and hardness, Vascoloy-Ramet alone covers the entire range of machinable materials with a grade for every use.

This is why Vascoloy-Ramet is setting new records daily for increased pieces per grind, for faster time from floor to floor, for lowered production costs.

This is the reason for its rapidly increasing acceptance as the preferred tool material, in great industrial plants and in small shops, as well, throughout the country.

The new Vascoloy-Ramet catalog price list will be sent upon request.



Machining Motor Mounting—Material—Cast Iron—Operations  $\frac{1}{4}$ " Roughing cut, 1-32" finishing cut, facing  $17\frac{1}{8}$ " to 13" intermittent cut—Comparative results with Vascoloy-Ramet Tools, Grade A and High Speed Tools.

TOOLS	FEED	SPEED	CUTTING TIME	PIECES PER GRIND
Vascoloy-Ramet Grade A	.030"	255 F.P.M.	2 Minutes	100 (complete order)
H. S. Steel	.030"	125 F.P.M.	6 to 8 Min.	6 to 12

VANADIUM - ALLOYS STEEL CO.  
VASCOLOY - RAMET DIVISION, NORTH CHICAGO, ILL.

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- New York.....N. Y.
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# VASCOLOY - RAMET

... The TANTALUM CARBIDE TOOL MATERIAL ...



A GRADE FOR EVERY USE



# NEW EQUIPMENT

## Ground Thread Taps—

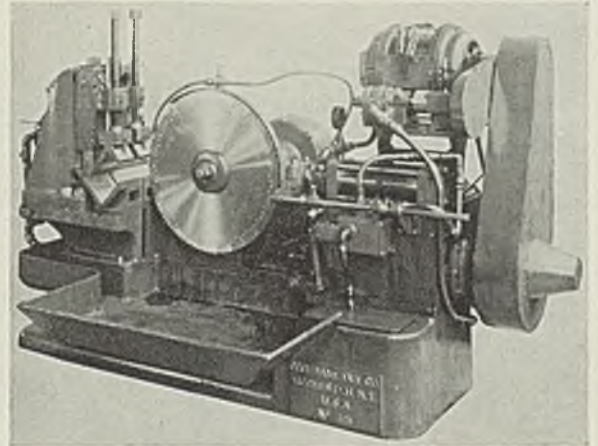
Greenfield Tap and Die Corp., Greenfield, Mass., has recently announced a new ground thread tap designed to produce better threads and give longer life on jobs where class 1 and 2 fits are required, according to the company. The new product, known as Tru-Form is an economical ground thread tapped with a lead tolerance of plus or minus 0.0005-inch in one inch of thread and wide pitch diameter tolerances for long life. Longer wear is claimed for these new taps as a result of the clean ground threads. Lead error is eliminated by these taps, according to claims, which reduces the number of rejects.



## Hydraulic Saw—

Cochrane-Bly Co., Rochester, N. Y., has recently announced a new high-speed hydraulic cold saw de-

High speed hydraulic cold saw designed for cutting nonferrous tubing and recently placed on the market by the Cochrane-Bly Co.



signed for the rapid cutting of non-ferrous tubing and bars. The machine has a four speed sliding gear transmission through hardened alloy steel gears, hardened steel worm, and phosphor bronze worm gear,

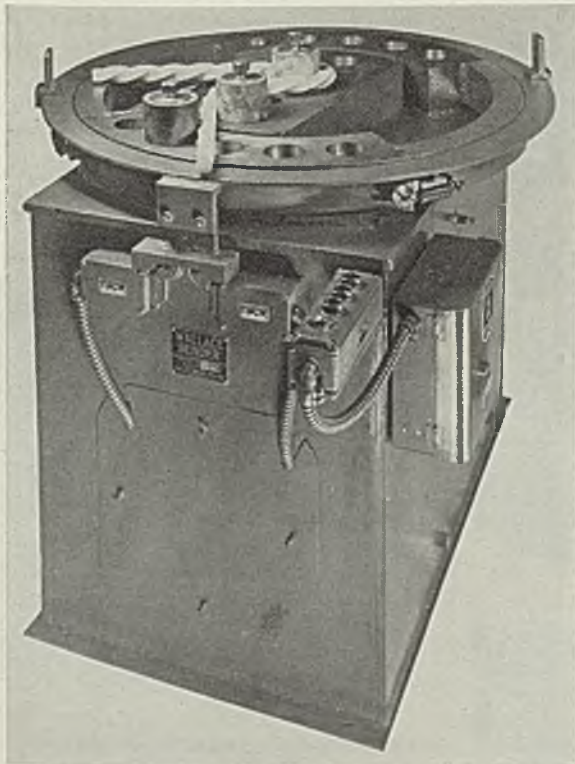
running in oil. All drive shafts, including the saw spindle, are mounted in antifriction bearings. Remote control is provided for changing the saw speeds from 235 to 600 feet cutting speed per minute, and the hydraulic feed is adjustable from 0 to 60 inches per minute. The machine has an automatic trip and rapid return of carriage and rapid forward traverse of carriage. Adjustable stops regulate the travel of the carriage to the size of tube being cut. The machine is motor driven through a multiple V-belt and has a friction clutch for stopping and starting. The capacity of the machine is tubes up to 8-inch diameter, cut in eight seconds.



## Bar Bending Machine—

Wallace Supplies Mfg. Co., Chicago, has recently introduced a new all steel electric arc welded bending machine designed to bend reinforcing bars. Forward and reverse motions are controlled by means of an automatic electric reversing type starter used in conjunction with finger tip push button stations and electric limit switches. The machine is equipped with a multi-disk type magnetic brake splined to a motor shaft extension. This brake acting on any current interruptions when used in conjunction with the

Wallace arc welded machine designed to bend reinforcing bars





above mentioned limit switches combines to produce a machine capable of accurately reproducing bends of any predetermined angle. All moving parts are enclosed within a main steel frame and protected from the rough knocks encountered in general service.

**Bearing Load Calibrator—**

Chambersburg Engineering Co., Chambersburg, Pa., has recently designed a new press to enable anti-friction bearing manufacturers to measure bearings under predetermined loads and thereby accurately

calibrate the assemblies so that the desired preload will always be obtained in service. The press consists of a framework embodying a moving-up platen under accurate pressure control, and a fixed cap carrying a spindle rotating mechanism and spindle positioning device. On the top of the press is a spindle rotating at 10 revolutions per minute which is raised and lowered by counterbalanced hand wheel and can be locked in position when test bearings are in place. A hydraulic unit exerts pressure varying from 100 to 10,000 pounds, available at any portion of a 14-inch stroke, with valving so arranged that any pre-

determined pressure may be maintained over any period of time. Gages are calibrated after fixtures are installed so that accurate determination of total pressures may be obtained. The gages are so arranged that the lower pressure is read on one gage up to 6000 pounds which shuts off when the second

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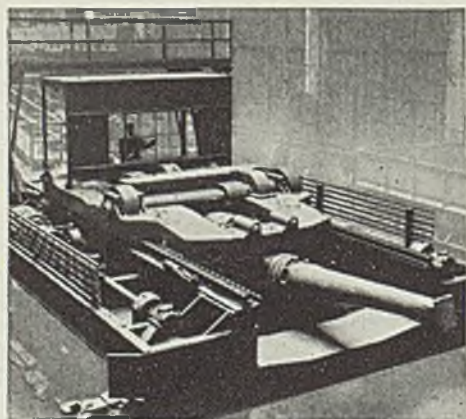
*Gas Reversing Valves.* **STEEL** *Ore Transfer Cars.*

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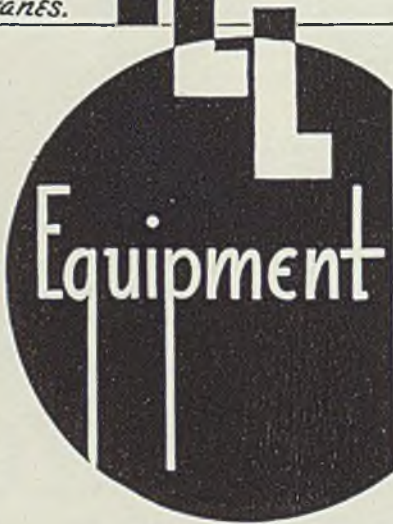
*Safety Stops for Traveling Structures.* **STEEL** *Jib Cranes.*

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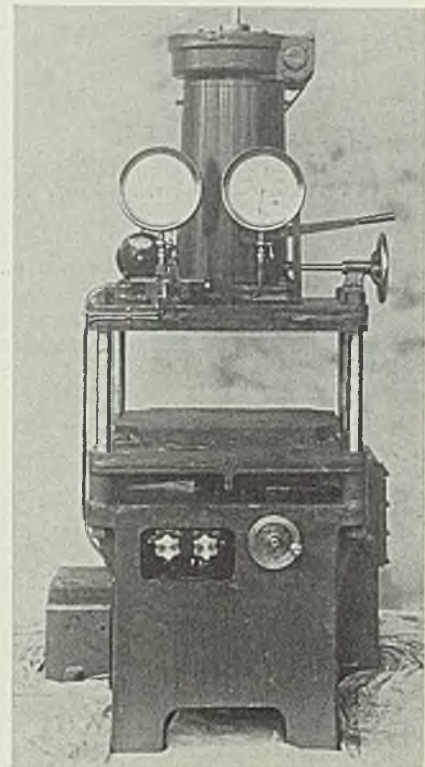
*Gantry Cranes.* **STEEL** *Special Cranes.*



Let Wellman show you the short cut to your objective in material handling.



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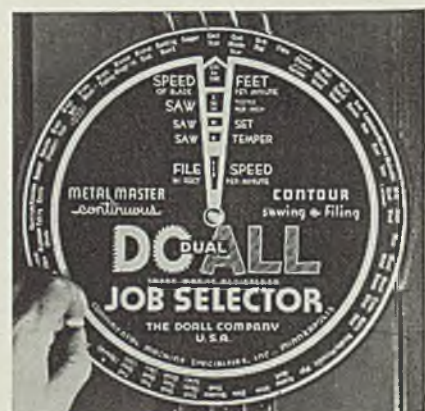


Chambersburg press designed for calibrating preloading of bearings

gage goes into play, reading up to 10,000 pounds. Vertical motion of the table is controlled by a hand wheel.

**Contour Machine—**

Continental Machine Specialties, Minneapolis, has recently placed on the market a new model to be



This dial is mounted on the saw and shows speeds and saw specifications for 48 different materials



known as the Doall contour machine. Improvements on this machine include an improved lap grinder, a new wider adjustment in the saw guide and a dial control. This new control is the major improvement incorporated in the machine. Correct speed of the saw for the material to be cut is an important factor in contour sawing. The dial is mounted on the hinged door and lists 48 different materials in alphabetical order around the rim. A setting by the operator to the ma-



Continent Doall contour saw equipped with the new speed indicating dial

terial to be sawed shows the correct sawing and filing speed, as well as the correct saw to use for each material. The saw is designated as to pitch, temper and set for each of the 48 different materials.

#### Metal Mitre Box—

Millers Falls Co., Greenfield, Mass., has recently placed on the market a metal cutting mitre box designed for cutting light structural shapes, pipe, tubing, moldings and strips used in decorative construction. The mitre box is constructed of mild steel parts,



Metal cutting mitre box designed by Millers Falls Co.

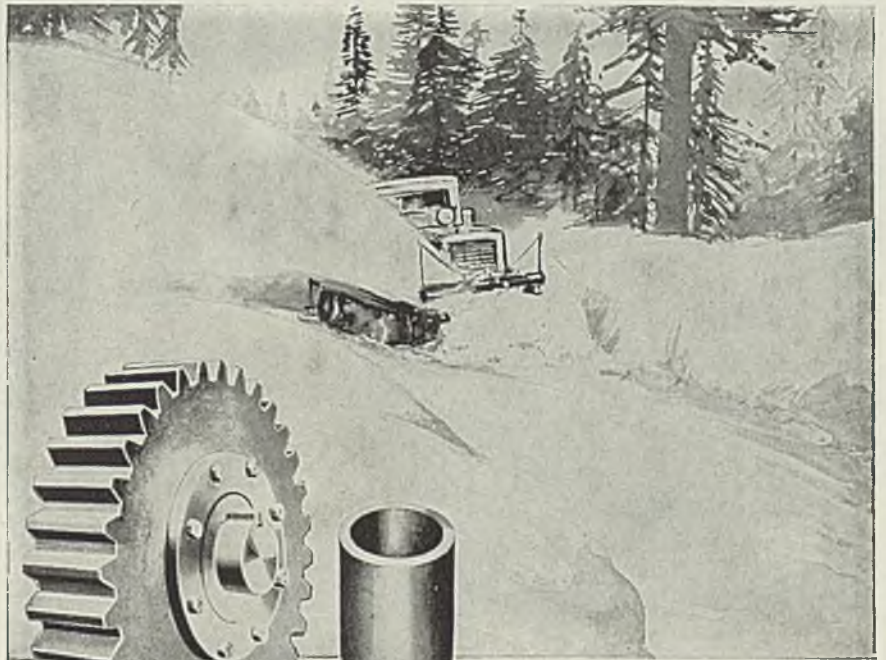
and the ball bearing saw carriage swings right or left from 90 to 45 degrees. A graduated quadrant indicates the angles. Positive automatic locks are provided at the most used angles and a powerful compression lock at all intermediate angles. Long saw guides have a removable block for letting in the saw frame, and automatic stops hold saw in an elevated position when the work is to be changed. Saw blade is made of a fine quality steel, heat treated for use on all types of metal. The blade is 22 inches long center to center of holes, 1 inch wide, and has 32 teeth per inch. Adjustable work clamps are provided,

equipped with swiveled pressure pads with a heavy leather face to prevent marring the work. Capacity at the mitre is 7½ inches, and at right angles 10½ inches.

#### Clay Washer—

Harry W. Dietert Co., Detroit, has recently placed on the market a new clay washer for washing A. F. A. clay substances from molding sand after the sand has been agitated by a washer. This washer automatically removes the clay from molding sands, eliminating the hand syphoning and saving labor, it is claimed.

## Keep Production Highways Open



## Eliminate Costly Delays with **INSUROK** GEARS and BEARINGS

**T**ODAY production failures are doubly costly and dangerous. Guard against delays—keep manufacturing equipment at its peak efficiency by installing long-lived, wear-corrosion and abuse-resisting INSUROK gears and bearings. Outwear metal many times over . . . minimize replacement costs . . . give trouble-free, uninterrupted performance . . . reduce unit production costs. Details on request

### The RICHARDSON COMPANY

Melrose Park, (Chicago) Ill.      Founded 1858      Lockland, (Cincinnati) Ohio  
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Detroit Office: 4-252 G. M. Building, Phone Madison 9386  
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Four samples may be washed at one time, wash bottles with removable bottoms being furnished. This machine is designed to enable foundries to obtain the percentage of A. F. A. clay substance contained in molding sand.

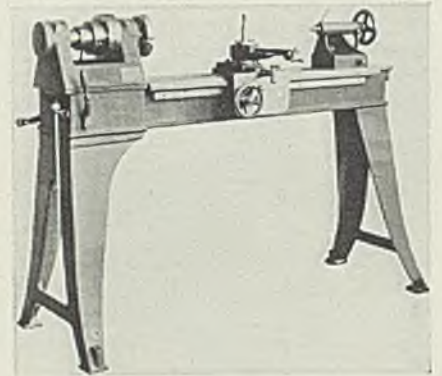
♦ ♦ ♦

**Speed Lathe—**

Oliver Machinery Co., Grand Rapids, Mich., has recently introduced a new 12-inch machine shop speed lathe. The lathe is designed to swing 12 inches in diameter over the bed and 9 1/2 inches over the carriage and

will turn pieces up to 36 inches in length between the centers of the bed which is 60 inches long. The lathe is furnished in either belt driven models with four-step pulleys, or motor-in-head models. A special tail stock is provided fitted with a quick speed lever part which may be securely clamped at any position, making the lathe available for regular turning. The spindle is equipped with two white bronze ring-oiling bearings that are adjustable to wear. The spindle is 15 inches long, 1 1/4 inches in diameter in the front bearing, 1 3/8 inches in diameter in

the rear bearing. Standard models are bored with a 5/8-inch hole through the entire length of the spindle, but larger holes are available if specified. In the back-driven model, the cone pulley has four steps, giving 700, 1195, 1920 and 2800 revolutions per minute. The smallest step is secure-



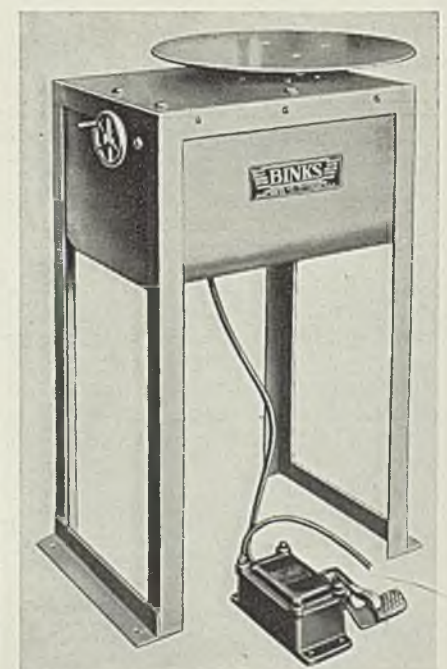
Oliver 12-inch machine shop speed lathe

ly attached to the spindle and the adjustment for end thrust is made between that and the next larger step.

♦ ♦ ♦

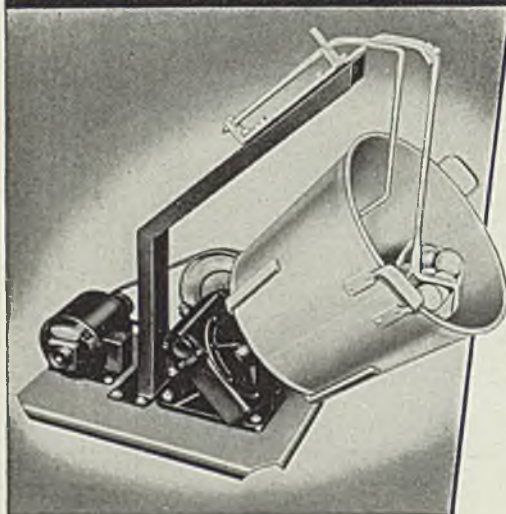
**Spray Finishing Turntable—**

Binks Mfg. Co., Chicago, has recently introduced a new turntable for air or electric operation designed to be used in spray finishing. The article to be finished is placed on the turntable and is revolved in front of the operator, control of the turntable being by means of a foot pedal. Of the air models, the turntable can be set at any desired



Binks air or electric operated turntable for use in spray finishing

# UDYLITE HANDIPLATER



The Handiplater may be used with any plating solution common to barrel plating operations. It may also be used for acid tumbling, sawdust drying, etc.

**The Ideal  
Inexpensive  
Unit  
for Plating  
Small  
Loads**

For the occasional handful or for actual production plating of very small parts, the Handiplater is the ideal unit. The capacity of the steel, rubber-lined, plating cylinder ranges from a handful up to 1/2 peck of work. The Handiplater operates with a few gallons of plating solution dipped from the regular still or barrel plating tank.

Plating cylinder and anode-cathode assembly are readily detachable, making loading and unloading a simple operation. The detachable cylinder also makes possible the use of a variety of plating solutions with one machine.

The Handiplater is portable, takes up little space. It operates efficiently and is a most sturdy outfit from the fabricated steel base to the steel, rubber-lined, plating cylinder.

Write for descriptive bulletin.

## THE UDYLITE COMPANY

1651 E. Grand Blvd., Detroit, Mich.

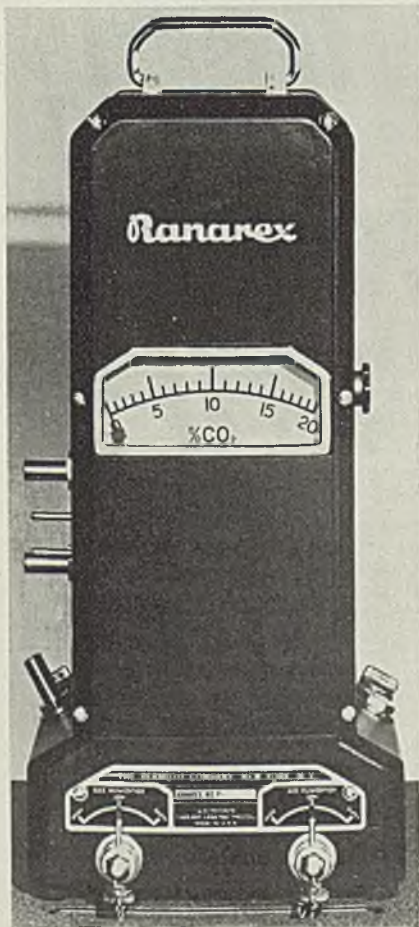
New York 30 E. 42nd Street Chicago 1943 Walnut Street Cleveland 3756 Carnegie Ave. San Francisco 114 Sansome Street



speed; on the electric model the speed is regulated by a variable speed pulley. The motor itself is totally enclosed to protect it from paint and dirt. The revolving disk may be furnished round or square from 8 to 24 inches in diameter. The standard height of the turntable is 30 inches, but may be made higher or lower as specified.

◆ ◆ ◆  
**Gas Analyzer—**

Permutit Co., New York, announces a portable line of Ranarex instruments for determining the carbon dioxide content of flue gases in boilers, furnaces and also for determining the air-fuel ratio in the exhaust gases of internal combustion engines, in order to permit adjustment of the air-fuel ratio for maximum efficiency and best performance. This instrument determines the carbon dioxide content by a mechanical principle based on the fact that the specific weight of exhaust of flue gases varies with changes in air-fuel ratio or carbon dioxide content. The scale on the indicator is calibrated in terms of carbon dioxide. The instrument may also be furnished with scales reading in terms of specific gravity for



Ranarex gas analyzer determines the amount of carbon dioxide present in flue or exhaust gases

use in gas tanks or natural gas fields. For use with internal combustion engines, a vacuum or combined vacuum and pressure gage is fed into the instrument to permit measurement of the pressure in the intake manifold. The device can be furnished to operate either on lighting circuits or standard 6-volt automobile batteries.

◆ ◆ ◆  
**Slow Speed Drills—**

Skilsaw Inc., Chicago, has recently announced two additions to its line of ball bearing electric drills. These new ¼ and ½-inch slow-speed, high

torque Skilsaw drills have been developed particularly for drilling in steels of high nickel content such as Monel and Allegheny metals, and stainless steel. The slow speed of these new tools lengthens the life of twist drills, eliminating the need for frequent sharpening, it is claimed by the company. The drills are furnished with one-hand grips which makes possible work in close quarters. Both models are available in speeds of 350, 450, 600 and 750 revolutions per minute. Their slow speed makes them adaptable to wood boring. Smoothness of operation is assured by ball bearings on armature and spindle, while aluminum alloy

# THOMAS

## FABRICATING MACHINERY

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Structural Shops • Shipyards  
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**THOMAS SPACING MACHINE CO.**  
**PITTSBURGH, PA.**



bodies give strength, durability, and light weight.

• • •

#### Fan—

Emerson Electric Mfg. Co., St. Louis, has recently announced a new 12-inch oscillator fan on an adjustable floor stand. This unit is equipped with a capacitor type motor with no brushes or mechanical starting device. The blades are formed from sheet aluminum and are designed for maximum air delivery and quietness of operation. The air delivery is 1100 cubic feet per min-

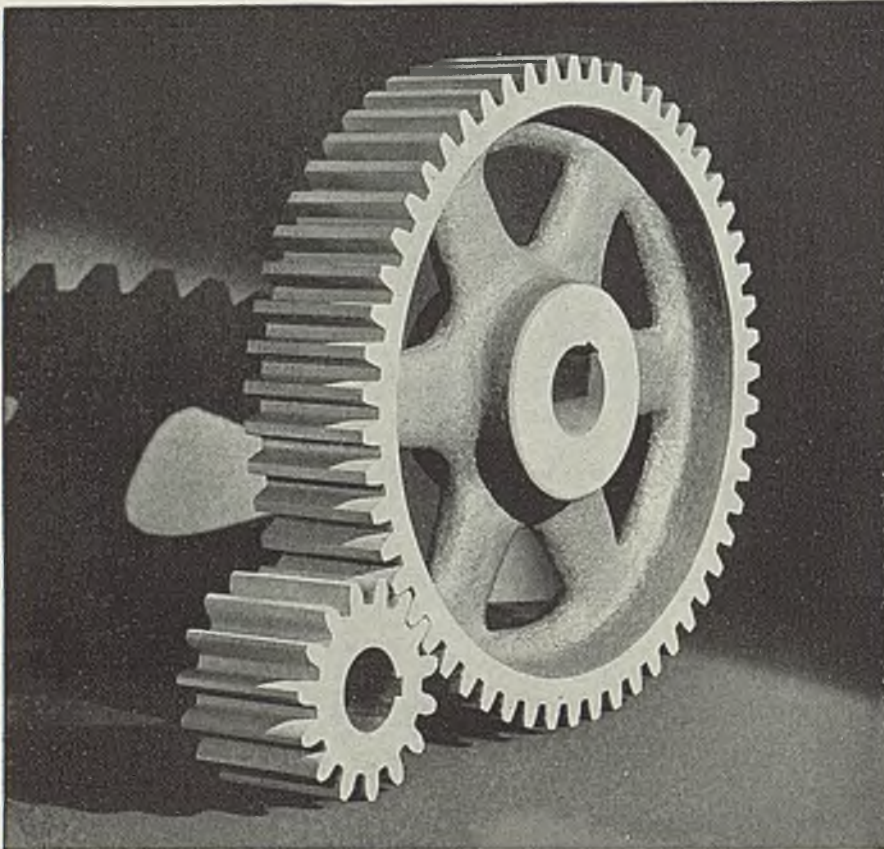
ute on high speed. Floor stand is adjustable from 3 feet 3 inches to 4 feet 9 inches from the floor to the center of the fan and has a special type three-speed sliding switch on the base.

• • •

#### Milling Machine—

Miller & Crowningshield, Greenfield, Mass., is presenting a new enclosed V-Belt drive hand miller with reversing switch and motor in the base. The motor is mounted in the base on an adjustable plate and can be easily taken out through a hole

cast in the base. It has a four-speed V-belt pulley running to a jackshaft giving a range of speed from 80 to 730, and there is a 10-inch steel pulley driven from a 5-inch pulley. These are standard pulleys and can be changed to other speeds if desirable. Jackshafts and spindles are mounted on roller bearings running in a reservoir of oil. Spindle is driven by two V-belts on a pulley running directly over the rear bearing. All V-belts are of the Cog type and have an independent adjustment with take-up available.



## "Spurred" for the HARDEST TASKS

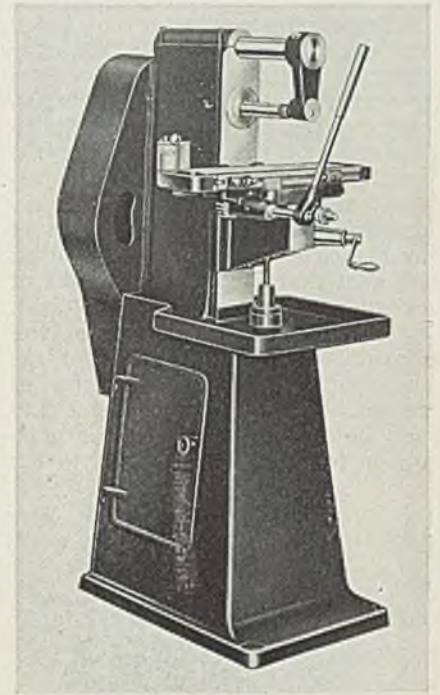
● From an ounce to 20,000 pounds . . . all Horsburgh & Scott gears, whether spur or any other kind in industrial use, are of the rugged "husky" type . . . built to endure. A half century of experience, unceasing vigilance in the selection of materials and painstaking care in design and manufacture, make Horsburgh & Scott gears the finest in the world. You'll find proof in their trial.

*A helpful 448 page Gear Book awaits your request.*

## THE HORSBURGH & SCOTT CO.

GEARS AND SPEED REDUCERS

5112 HAMILTON AVENUE, CLEVELAND, OHIO U. S. A.



Miller & Crowningshield present this new enclosed V-belt driven hand miller

Motors can be furnished in different types to fit requirements. The reversing switch is conveniently located for the operator.

• • •

#### Lift Truck—

Arcade Mfg. Co., Freeport, Ill., is now manufacturing a universal model lift truck supplied with rubber tired wheels. This truck is de-



Arcade universal lift truck is provided with five stages of lift for ease in raising heavy appliances



signed for lifting and moving all appliances with a leg height from 4¼ to 17 inches. Five stages, with elevations of 2¾ to 4½ inches, are provided. To load the truck, the operator pushes the handle bars forward, which puts the platform in a lowered position, and the truck is then pushed under the appliance. The operator, by pulling the handle toward him, raises the load, the lock bar on the handle flies over the same end, dropping into position and locking the handles over the frame. To lower the load this lock bar is released.

material will not feed itself by the action of the cutter, it is claimed, and no further finishing is required.

#### Concrete Bucket—

Dravo Corp., Pittsburgh, has constructed a new type of all-welded cylindrical concrete bucket, particularly designed for convenience in operation in close forms and for handling low slump concrete. Buckets are made in two, three and four yard capacities and are of the bottom

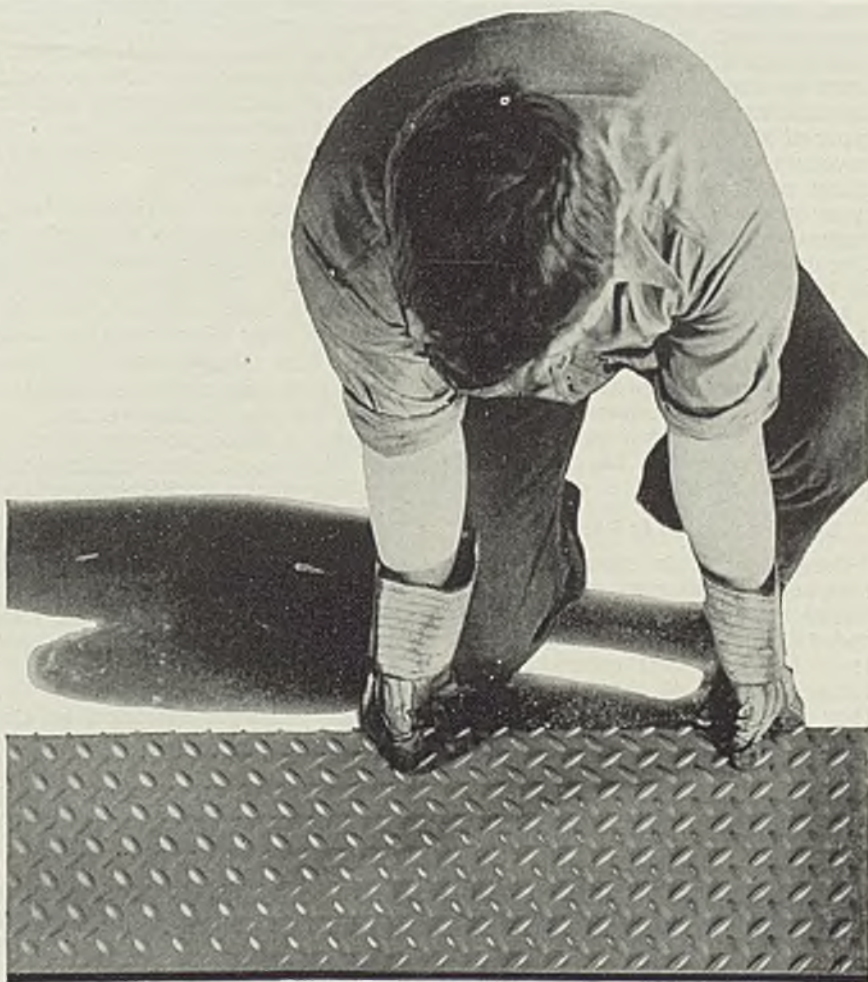
dump controllable type. These devices have no projecting levers and are operated entirely by a hand wheel set into the outer shell of the bucket. Since the controls are set into the buckets, there is an added measure of safety to workmen operating the buckets. The control gates may be closed easily when only part of the concrete has been poured. Mechanism is protected by shields where it might become clogged with concrete, and lubrication is the only attention required, according to company claims.

#### Laboratory Heater—

Precision Scientific Co., 1750 North Springfield avenue, Chicago, has recently announced a new laboratory heater, which is adjustable from 0 to 750 watts for mild or intense heating. Throughout the full range of heat control the variation is virtually stepless, running up the scale in increments of less than one volt. This is accomplished through an auto-transformer instead of the conventional rheostat. The heater is supplied with any one of nine different tops. Heating elements are of durable nickel chromium coils, easily replaceable; internal wiring is suited to withstand corrosive action of laboratory atmosphere. Leads are asbestos covered, heat terminals are Monel metal with Monel metal screws and nuts, while leads from terminals to auto-transformer are Monel metal wire.

#### High Speed Shear—

Libert Machine Co., Green Bay, Wis., has recently completed a new high speed shear for irregular shapes. The machine has been constructed primarily to cut 12 gage stainless steel or alloys of similar type. The shear is made with an all steel frame of welded construction of ¾ and ¾-inch plate. Throat depth is 60 inches, and the machine will maintain the same cutting speed as a standard shear. Hand control is provided to permit inside cutting without starting holes. Ma-



## INLAND 4-WAY FLOOR PLATE Will Make It Safe

THERE are danger spots in every plant, which either cause accidents or slow the movement of men and materials. In either case Inland 4-Way Floor Plate soon pays for itself. Easily and quickly installed, it provides equal protection against slipping in all directions; it drains and cleans easily and withstands hard wear. An illustrated folder showing a wide variety of uses will be sent on request.

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# INLAND STEEL CO.

General Offices: 38 South Dearborn Street, Chicago, Illinois • Offices in: Detroit—Kansas City—Milwaukee—St. Louis—St. Paul



Libert high speed shear designed for use with irregular shapes



# Molybdenum-Tungsten High Speed Steel

## Finding Wide Acceptance in Industry

(Concluded from Page 68)

which have been correctly hardened and quenched. Properly hardened and tempered molybdenum-tungsten tools may be expected to be slightly harder than those made of other high speed steel, it is stated. In general, it will be found that the heat treatment is slightly different from other high speed steels, but no more difficult.

It will be observed that the sparks from the steel as it is being ground are different from those of the older types of high speed steel. The sparks have a bright orange color, and many of them end with a broad spear point. In this way, molybdenum-tungsten steels may be distinguished easily either from carbon or 18 per cent tungsten steels.

It has been stated that the molybdenum steels lose molybdenum due to volatilization at high temperatures, but, according to Mr. Emmons, careful experiment has shown that if there is any loss it is so light as to be unimportant in commercial production of the steel or tools.

### Decarburization Is Controllable

Sometimes it is stated that the molybdenum-tungsten steels decarburize more rapidly than other high speed steels when being heat treated. It is believed by those who have made a study of the matter that they do decarburize slightly more easily than the 18-4-1 type of steel, but less easily than the types containing cobalt. Methods of controlling decarburization are so well known that it can be entirely prevented even on the cobalt steels.

Millions of tools have been made of molybdenum-tungsten steels without a trace of decarburization, it is claimed. Therefore, it is believed that this difficulty has been exaggerated greatly. In fact, the steels now are being produced regularly with less decarburized bark than was customary with high tungsten steels three years ago.

That the molybdenum-tungsten type of steel is not uniform and that tools made from it are sometimes good and sometimes bad for no apparent reason is a criticism sometimes heard. Several years experience indicates that when properly handled, they are neither more nor less variable than tools made from other kinds of steel.

In the cobalt high speed steels, molybdenum-tungsten steel with 5 per cent cobalt is giving excellent service on many operations where cobalt steels are advantageous. In

the 5 per cent cobalt grade, it is claimed that molybdenum-tungsten shows approximately 40 per cent saving in material over 18 per cent tungsten steel.

An interesting variation of molybdenum-tungsten has been developed for use in hot dies for such operations as extruding and coining steel parts. The composition is about as follows: Carbon, 0.40; chromium, 3.50; molybdenum, 5.75; tungsten, 1.00; and vanadium, 0.75 per cent. It is hardened at about 2240 degrees Fahr. When tempered at about 1100 degrees Fahr., it has a Rockwell hardness of about C56.

This grade of molybdenum-tungsten steel has shown excellent resistance to washing, heat checking and sinking. On several production tests, it is said to have shown superiority over dies made of well-known high tungsten hot die steels.

The following tool steel manufacturers in the United States are licensed to make molybdenum-tungsten high speed steels under their own brand names: Bethlehem Steel Co., Bethlehem, Pa., "BMT"; Braeburn Alloy Steel Corp., Braeburn, Pa., "Mo-Cut"; Carpenter Steel Co., Reading, Pa., "Carpenter-Moly"; Crucible Steel Co. of America, New York, "Rex T-Mo"; Halcomb Steel Co., Syracuse, N. Y., "Rex T-Mo"; Jessop Steel Co., Washington, Pa., "Mogul"; Latrobe Electric Steel Co., Latrobe, Pa., "Tatmo"; Ludlum Steel Co., Watervliet, N. Y., "LMW"; Universal-Cyclops Steel Corp., Bridgeville, Pa., "Mo-Tung"; and Vulcan Crucible Steel Co., Aliquippa, Pa., "Vul-Mo."

Other licensees are Canadian Atlas Steels Ltd., Welland, Ont., "Mohican"; and Deutsche Edelstahlwerke A. G., Krefeld, Germany.

## Automatic Transmission Is Applied to Motor Coaches

(Concluded from Page 79)

leverage and shoes, disengages the high-speed jaw clutches at any high speed. This simultaneously applies the band brakes upon the planetary housing and locks the transmission in second gear, where it remains until the driver removes his foot from the air valve.

Quietness of operation is characteristic of the transmission. This condition is in spite of the fact that spur gears, rather than spiral gears, are employed and is due to the method of mounting and locating the re-

lationship of the teeth in the planetary units and sun gears. While the number of parts is slightly larger than those of the conventional transmission, the difference in manufacturing cost is sufficiently small to make the unit adaptable to vehicles in all price ranges. Being comparable in over-all dimensions, the Mono-Drive may be used as replacement for any standard three-speed transmission.

## Report Deals with Dusts And Fumes in Industry

American Standards association, 29 West Thirty-ninth street, New York, has just released a report on fundamentals relating to design and operation of exhaust systems which has a direct bearing upon the problem of occupational disease prevention. This report was presented at the recent national conference on silicosis in Washington by the engineering committee.

While the occupational disease problem is partly a medical one, the matter of minimizing exposure to poisonous dusts, gases, and fumes, is purely an engineering problem and includes the important matter of installing exhaust equipment that will carry off the toxic dusts and gases present in certain industrial processes such as rock drilling and spray painting. Different types of dusts and gases require different treatment.

It is these basic engineering principles that the committee deals with in its report. Today many state regulations demand that employers provide "adequate" ventilation, but what is "adequate?" Some laws and codes require a definite amount of static suction as an index of exhaust system efficiency, but there are other engineering principles involved. What are the minimum air velocities required to capture dust arising from certain grinding wheel processes or the fumes from electroplating?

To what extent is air cleaning practical to prevent recontamination of plant air from the outside, or to permit recirculation of air discharged from the exhaust system in the plant? What pressure losses can an engineer expect from the various types of elbows and branches common to exhaust piping? The report goes deeply into the question of plant layout, exhaust hood design, air velocities, methods of measuring static suction, etc. It also considers the matter of exhaust system piping.

This is the first step in developing a set of separate standard specifications for exhaust hood designs and air velocities for each distinct process or industry in which the occupational disease hazard is present.



# MATERIALS HANDLING



## Centralized Handling Is Plan in Automobile Plant

(Concluded from Page 56)

mon carrier, the industrial locomotive has proved to be a virtual necessity.

When one studies the flow of materials into the Buick plant, and is informed that millions of dollars are expended each month for various materials and parts, such as frames, bodies, radios, hydraulic brakes, fender lamps, head and tail lamps, radiators, shock absorbers and miscellaneous parts, he gets a broader picture of the importance of the automobile industry to all business. Furthermore, to watch the stream of commerce flowing into and out of the vast plant brings a greater appreciation of the reason why Buick has set materials handling apart as a major department of its operations. The various buildings spread out over an area of approximately 1½ square miles.

### Deliver Large Quantities

Something of the enormity of the task of handling may be imagined by a glance at a record taken by the watchman service on a recent day. Accurate check of all incoming commercial vehicles entering the plant gates showed a tabulation of 3820 trucks delivering materials and parts. Of course, some of these stopped at more than one receiving point, but even conceding that each incoming truck made two stops, and that consequently each was tabulated twice during a day, it is readily apparent that an average of 1910 trucks bringing in materials each day is a tremendous undertaking. Yet this represents only a portion of the total of materials to be handled because to this must be added those received in carload lots. It is estimated that approximately 1500 carloads of such materials arrive at the plant each month, an average of more than 50 a day.

In addition to the newly added equipment, there is utilized in the plant a long list of almost every variety of lifting and conveying devices. One of the overhead conveyors is shown in Fig. 7. Of electric industrial trucks alone, approximately 150 are used. Fig. 1 shows one of these trucks, a fork type handling

strapped packs of sheet steel. Standard skids, tote pans and boxes, gas-powered tractors and many special items of equipment are also part of the system of materials handling.

Maintenance of the rolling stock has been carefully detailed. A special department has been set aside to see that the newly standardized floor trucks and trailers are kept in first class condition at all times. Local departments have been allotted to maintenance of electric trucks.

In general, to quote the words of Supervisor Rogers, the results of the first stage of standardization of materials handling equipment have been: "Less breakdowns and less hazards in handling."

The public sometimes gains erroneous impressions concerning accident frequency in industrial plants, particularly automotive plants which are highly mechanized. A good example of misleading information was a feature article published recently in the Sunday magazine supplement of one of the prominent American newspapers. This article, purported to have been written by a male nurse having seen service in an automobile plant, described serious accidents as an

every-day occurrence. The impression was created that plant walls are literally covered with blood of workmen maimed by mechanical handling equipment.

Conditions in the Buick plant are in general similar to those in all automobile plants, therefore, an insight into actual conditions can be obtained by checking the records of this company's safety division. The accident rate is low and satisfactory progress is being made in reducing it further.

### Conveyors Are Safe

Replying to a question as to how many serious accidents are attributable to conveyors, a qualified spokesman stated that in approximately three years only one employe had been badly injured by a conveyor. In this instance, the workman was putting dressing on a belt and in some manner his hand was drawn into the transmission machinery. Few serious injuries, it was said, occur in connection with conveyor equipment.

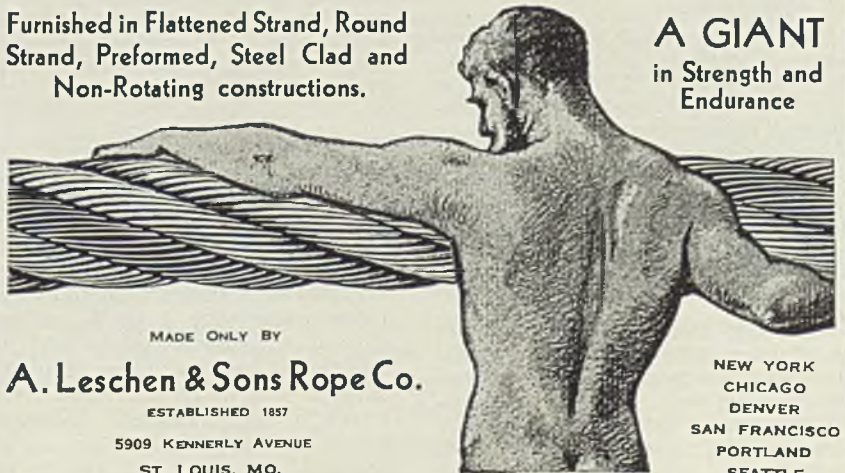
As to safety practices generally in the Buick plant, it is pertinent that the frequency of accidents during all 1936 was only 6.43, as compared to 8.12 for 1935, while the severity of the accidents was 1.21, as compared to 1.31 the previous year. The safety department had set forth as its goal for 1936 the figures of 6.00 for frequency and 0.90 for severity, so that the goal was missed by only a fraction in each instance. The frequency figure is arrived at by determining the number of accidents for every 1,000,000 hours of work, while the severity figure indicates the number of days lost per 1000 hours of work.

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# RECENT PUBLICATIONS OF MANUFACTURERS

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

**Koppers Products**—Koppers Products Co., Pittsburgh. Booklet listing its associated companies and the products they produce.

**Sand Testing**—Harry W. Dietert Co., 9330 Roselawn avenue, Detroit. Folder illustrating and describing its various sand testing devices.

**Arc Welder**—Lincoln Electric Co., Cleveland. Bulletin No. 318, describing its shield-arc SAE welder, engine-driven model, type S-6005.

**Toncan Iron**—Republic Steel Corp., Cleveland. Folder No. 20M, describing development of copper molybdenum iron and its application in the form of sheets, plates and pipe.

**Electric Devices**—Bull Dog Electric Products Co., Detroit. A condensed catalog on controlling and distributing apparatus for electric light and power.

**Electric Power Connectors**—Delta-Star Electric Co., 2400 Fulton street, Chicago. New price list, No. 38-2, covering solderless electric power connectors.

**Z-Metals**—Arcade Malleable Iron Co., Worcester, Mass. Folder describing physical characteristics of Z-metals and illustrating castings made from it.

**Fire Alarm System**—Gamewell Co., Newton Upper Falls, Mass. Booklet describing its modern fire alarm system for volunteer fire departments and industrial plants.

**Hydraulic Presses**—Hannifin Mfg. Co., 621 South Kolmar avenue, Chicago. Bulletin No. 40, describing hydraulic presses, standard and special types, for modern manufacturing operations.

**Water Control and Flow Measurement**—S. Morgan Smith Co., York, Pa. Bulletin No. 132 describing a method of measuring the flow of water and illustrating its many types of water power machinery.

**Graphic Wattmeter Tests**—Esterline-Angus Co., Indianapolis. Folder illustrating practical instances where in the application of wattmeter load tests have proved a saving of time and money.

**Steel-Belt Conveyor**—Acme Steel Co., Chicago. Folder describing new features and advantages of the Acme flat-top steel belt. The belt is flexible and can be drawn over small or large pulleys. Booklet dealing with the subject of bracing carload freight whether of uniform or mixed lad-

ings. The methods and practical value of creating units of great mass and weight for the reduction of damage are described and illustrated.

**Movable Floor for Truck Bodies**—Easton Car & Construction Co., Easton, Pa. Bulletin No. 102, describing a unique development in truck body design, a movable floor which simplifies loading and unloading.

**Automatic Temperature Control**—Automatic Temperature Control Co. Inc., 34 East Logan street, Philadelphia. Bulletin No. G-12, illustrating its current-input controller to give close regulation to electrically heated devices, such as furnaces, ovens and platens.

**Water Meters**—Worthington-Garnon Meter Co., Harrison, N. J. Bulletin No. M-975-B34, describing three and four-inch, heavy-duty disk-type water meters; available with registers indicating gallons, cubic feet, or metric measure and arranged for either circular or straight reading.

**Watt-hour Demand Meters**—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Catalog describing application and operation of types RW and RW-2 watt-hour demand meters, indicating demand registers and list prices in combination with various types of meters; outline dimension and wiring diagrams for each combination are also included.

**Round-Chart Potentiometer**—Bristol Co., Waterbury, Conn. Bulletin No. 482, announcing a new recording round-chart potentiometer known as the pyromaster, including drilling dimensions, chart lists, and other engineering data pertaining to the pyrometer in the following forms: Pyrometer, tachometer, resistance thermometer, millivoltmeter and milliammeter.

## Columbium Raises Thermal Stability of Still Tubes

Addition of columbium to oil still tubes containing 4 to 6 per cent chromium, approximately 0.50 molybdenum and not more than 0.10 carbon, not only increases creep strength and oxidation resistance but has a favorable effect on the thermal stability of the tubes. Samples of 4 to 6 per cent chrom-

ium tubes containing approximately 0.50 molybdenum, 0.06 to 0.08 carbon and 0.50 to 0.60 columbium recently were subjected to a wide variety of heating cycles that tubes might receive, either by accident or design, during fabrication or in actual service. An outstanding characteristic of these columbium bearing steels when subsequently tested at either room temperature or at 40 degrees below zero Cent. was that the impact strength had not been impaired.

## Firebrick Manufacturer Effects Improvements

Eureka Fire Brick Works, Pittsburgh, manufacturer of refractories and specializing in special shapes and ingot mold hot tops for alloy steels, has effected a number of important improvements at its properties at Mt. Braddock, Fayette county, Pennsylvania. It has developed a method of mechanically transferring pugged clay from the pug machine to an automatic weighing machine discharging directly into a large seggar press, speeding up and improving production. The company is developing a new entry to its flint clay mines; this will open a large acreage of clay, get behind a bad fault cutting across the present seam, give better drainage and permit mine cars to be dropped directly into the slope gravity. A new motor driven dry pan has been installed. In carrying out its repair and maintenance work the company is substituting alloy steels for mild steel when advantageous. It now is considering installation of a new de-airing, motor driven, variable speed pug and auger machine and an electrically controlled cutting table.

## New Fireproof Ledger Safe

A new steel product placed in production by Diebold Safe & Lock Co., Canton, O., is a fireproof ledger safe with a new feature. Records are placed in trays that can be lifted up above the top of the safe. These trays may be slid or revolved so that the records may be consulted and handled with greatest convenience. Although fitted with lock susceptible to approximately 1,000,000 changes of combinations to prevent thefts, the safe is not regarded as fully burglar-resistive for the reason that it does not have solid steel walls. Its body is of 18-gage full finished sheets with all joints electrically welded. Space between the inside and outside walls is filled with a highly effective fire resistive insulating material. The safe is fitted with a counterbalanced top door.



# Production Rises as Buyers Seek Delivery

## Operating Rate 87;

## Higher Prices Meet

## Little Resistance

**S**TEADILY increasing activity marks the steel industry as makers use every effort to increase output in response to mounting demand from consumers. Higher prices have no effect on demand and delivery is the only factor regarded as important by buyers.

Little unsold tonnage is available for delivery before the first of May and some deliveries are now offered as far away as September, though most capacity now available would bring June and July shipment.

Prices are rising steadily. Following the general advance in finished steel and pig iron, warehouses are marking up their quotations, cast iron pipe is higher and scrap is going beyond all expectations. Various adjustments are being made to bring specialties into line with the more standard products.

Steelmakers have been able to bring additional capacity into activity with the result that the percentage has been increased one point to 87 per cent. Pittsburgh rose one point to 89, Youngstown one point to 85, Cincinnati four points to 68, Chicago 1½ points to 82½ and Eastern Pennsylvania half a point to 57½. Cleveland went down 1½ points to 78 and Detroit lost five points to 95. No changes were made at Buffalo at 90 per cent, Birmingham at 77, New England at 97, Wheeling at 96 and St. Louis at 82.

Lake Superior iron ore prices have been established at 45 cents per ton above the figures that have been quoted unchanged for eight years. This will cover an increase of 10 cents per ton in the vessel carrying rate and heavier taxes and labor costs of mining companies. Expectation is for movement of tonnage this year close to the best record of the past.

Ferromanganese has been advanced \$1 per ton, effective March 15 on spot business and April 1 on contracts. Other manganese materials are raised proportionately. This reflects higher prices of manganese ore and increasing ocean rates.

Automotive production last week dropped to 101,684 units, a loss of about 25,000 from the preceding week. This is almost exactly the shrinkage in Chrysler output, resulting from strikes in its plants. Stop orders for practically all Chrysler steel shipments have failed to have effect on steel production as mills divert to other consumers.

Prices on steel from warehouse are being increased.

### MARKET IN TABLOID

**DEMAND** . . . . . Exceeds production, deliveries receding.

**PRICES** . . . . . No resistance to higher level; warehouses advance.

**PRODUCTION** . . Operations gain one point to 87 per cent.

**SHIPMENTS** . . . Steady, with consumers pressing.

in some items as much as \$10 to \$12 per ton. This is to cover the recent advances in mill prices and also to readjust the differential over mill prices to compensate for various added expenses which have accumulated over several years. These include larger capital investment, higher labor costs and similar items.

Because desire to avail themselves of price protections ending with the close of January drove railroads to place all the cars possible that month, February car purchases were much reduced, totaling 4972, compared with 17,806 in January. For two months car purchases totaled 22,778, the largest number for these months since 1929, when 29,140 were bought. The peak was in 1924 when 49,500 cars were bought in January and February.

Shipments of finished steel by the United States Steel Corp. in February were at the weekly rate of 283,431 tons, compared with a corresponding rate of 269,748 tons in January. Total shipments were 1,133,724 tons in February, compared with 676,315 tons in February, 1936.

Steel and iron imports into the United States in January were 40,642 tons, a slight decline from 42,775 tons in January, 1936, and a gain over 38,514 tons in December, 1936. Steel scrap imports declined from 14,070 tons in December to 2421 tons in January, possibly a reflection of heavier shipments from Canada to Great Britain.

Steel production in Great Britain in February was at a rate that would have established a new alltime record had the month been of normal length.

STEEL'S iron and steel price composite has advanced 52 cents to \$39.99, buoyed by the increase on pig iron, cast iron pipe and scrap, all based on the pig iron change. The finished steel composite is unchanged at \$60.70. Scrap composite has advanced 79 cents to \$20.91, largely on higher prices for steelmaking grades.



# COMPOSITE MARKET AVERAGES

	Mar. 13	Mar. 6	Feb. 27	One Month Ago Feb., 1937	Three Months Ago Dec., 1936	One Year Ago Mar., 1936	Five Years Ago Mar., 1932
Iron and Steel . . . .	\$39.99	\$39.47	\$36.95	\$36.74	\$35.15	\$33.20	\$29.28
Finished Steel . . . .	60.70	60.70	56.30	55.92	53.90	52.32	47.09
Steelworks Scrap . . .	20.91	20.12	19.66	19.19	16.92	14.48	7.89

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel, hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

## A COMPARISON OF PRICES

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

Finished Material	March 13,	Feb.	Dec.	Mar.	Pig Iron	March 13,	Feb.	Dec.	March
	1937	1937	1936	1936		1937	1937	1936	1936
Steel bars, Pittsburgh . . . . .	2.45c	2.20c	2.05c	1.85c	Bessemer, del. Pittsburgh . . . . .	\$25.26	22.30	21.8132	20.8132
Steel bars, Chicago . . . . .	2.50	2.25	2.10	1.90	Basic, Valley . . . . .	23.50	20.50	20.00	19.00
Steel bars, Philadelphia . . . . .	2.74	2.49	2.36	2.16	Basic, eastern del. East Pa. . . . .	25.26	22.46	21.8132	20.8132
Iron bars, Terre Haute, Ind. . . . .	2.35	2.10	1.95	1.75	No. 2 fdy., del. Pittsburgh . . . . .	25.21	22.21	21.3132	20.3132
Shapes, Pittsburgh . . . . .	2.25	2.05	1.90	1.80	No. 2 fdy., Chicago . . . . .	24.00	21.00	20.50	19.50
Shapes, Philadelphia . . . . .	2.45 1/2	2.25 1/2	2.11 1/2	2.01 1/2	Southern No. 2, Birmingham . . . . .	20.38	17.63	16.88	15.50
Shapes, Chicago . . . . .	2.30	2.10	1.95	1.85	Southern No. 2, del. Cincinnati . . . . .	23.69	20.94	20.44	20.2007
Tank plates, Pittsburgh . . . . .	2.25	2.05	1.90	1.80	No. 2X eastern, del. Phila. . . . .	26.135	23.385	22.6882	20.6882
Tank plates, Philadelphia . . . . .	2.43 1/2	2.23 1/2	2.09	1.99	Malleable, Valley . . . . .	24.00	21.00	20.50	19.50
Tank plates, Chicago . . . . .	2.30	2.10	1.95	1.85	Malleable, Chicago . . . . .	24.00	21.00	20.50	19.50
Sheets, No. 10, hot rolled, Pitts. . . . .	2.40	2.15	2.10	1.85	Lake Sup., charcoal, del. Chicago . . . . .	29.54	26.54	26.2528	25.2528
Sheets, No. 24, hot ann., Pitts. . . . .	3.15	2.80	2.75	2.40	Gray forge, del. Pittsburgh . . . . .	24.17	21.17	20.6741	19.6741
Sheets, No. 24, galv., Pitts. . . . .	3.80	3.40	3.35	3.10	Ferromanganese, del. Pittsburgh . . . . .	84.79	84.79	82.65	80.13
Sheets, No. 10, hot rolled, Gary . . . . .	2.50	2.25	2.25	1.95					
Sheets, No. 24, hot anneal, Gary . . . . .	3.25	2.90	2.90	2.50					
Sheets, No. 24, galvan., Gary . . . . .	3.90	3.50	3.50	3.20					
Plain wire, Pittsburgh . . . . .	2.90	2.60	2.60	2.30					
Tin plate, per base box, Pitts. . . . .	\$4.85	\$4.85	\$5.25	\$5.25					
Wire nails, Pittsburgh . . . . .	2.50	2.25	2.20	2.15					

### Semifinished Material

Sheet bars, open-hearth, Youngs. . . . .	\$37.00	\$34.00	\$32.50	\$28.50
Sheet bars, open-hearth, Pitts. . . . .	37.00	34.00	32.50	28.50
Billets, open-hearth, Pittsburgh . . . . .	37.00	34.00	32.50	28.40
Wire rods, No. 5 to 3/4-inch, Pitts. . . . .	47.00	43.00	40.75	40.00

# Steel, Iron, Raw Material, Fuel and Metals Prices

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

### Sheet Steel

Prices Subject to Quantity Extras and Deductions (Except Galvanized)

Hot Rolled No. 10, 24-48 in.	
Pittsburgh . . . . .	2.40c
Gary . . . . .	2.50c
Chicago, delivered . . . . .	2.53c
Detroit, del. . . . .	2.60c
New York, del. . . . .	2.73c
Philadelphia, del. . . . .	2.69c
Birmingham . . . . .	2.55c
St. Louis, del. . . . .	2.735c
Pacific ports, f.o.b. cars, dock . . . . .	2.95c
Hot Rolled Annealed No. 24	
Pittsburgh . . . . .	3.15c
Gary . . . . .	3.25c
Chicago, delivered . . . . .	3.28c
Detroit, delivered . . . . .	3.35c
New York, del. . . . .	3.48c
Philadelphia, del. . . . .	3.44c
Birmingham . . . . .	3.30c
St. Louis, del. . . . .	3.485c
Pacific ports, f.o.b. cars, dock . . . . .	3.80c
Galvanized No. 24	
Pittsburgh . . . . .	3.80c
Gary . . . . .	3.90c
Chicago, delivered . . . . .	3.93c
Philadelphia, del. . . . .	4.09c
New York, delivered . . . . .	4.13c
Birmingham . . . . .	3.95c
St. Louis, del. . . . .	4.135c
Pacific ports, f.o.b. cars, dock . . . . .	4.40c

Tin Mill Black No. 28	
Pittsburgh . . . . .	3.30c
Gary . . . . .	3.40c
St. Louis, delivered . . . . .	3.635c

Cold Rolled No. 10	
Pittsburgh . . . . .	3.10c
Gary . . . . .	3.20c
Detroit, delivered . . . . .	3.30c
Philadelphia, del. . . . .	3.39c
New York, del. . . . .	3.43c
Pacific ports, f.o.b. cars, dock . . . . .	3.70c
St. Louis . . . . .	3.485c
Cold Rolled No. 20	
Pittsburgh . . . . .	3.55c
Gary . . . . .	3.65c
Detroit, delivered . . . . .	3.75c
Philadelphia, Pa. . . . .	3.84c
New York, del. . . . .	3.88c
St. Louis . . . . .	3.885c

Enameling Sheets	
Pittsburgh, No. 10 . . . . .	2.90c
Pittsburgh, No. 20 . . . . .	3.50c
Gary, No. 10 . . . . .	3.00c
Gary, No. 20 . . . . .	3.60c
St. Louis, No. 10 . . . . .	3.235c
St. Louis, No. 20 . . . . .	3.835c

Tin and Terne Plate	
Gary base, 10 cents higher.	
Tin plate, coke base (box) Pittsburgh . . . . .	\$4.85
Do., waste-waste . . . . .	2.75c
Do., strips . . . . .	2.50c
Long ternes, No. 24 unassorted, Pitts. . . . .	4.10c
Do., Gary . . . . .	4.20c

### Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.	
Chrome-Nickel	
No. 302 No. 304	
Bars . . . . .	23.00 24.00
Plates . . . . .	26.00 28.00
Sheets . . . . .	33.00 35.00
Hot strip . . . . .	20.75 22.75
Cold strip . . . . .	27.00 29.00

Straight Chromes			
No. 410	No. 430	No. 442	No. 446
Bars . . . . .	17.50	18.00	21.50 26.50
Plates . . . . .	20.50	21.00	24.50 29.50
Sheets . . . . .	25.50	28.00	31.50 35.50
Hot strip . . . . .	16.25	16.75	22.25 27.25
Cold stp. . . . .	21.00	21.50	27.50 35.50

### Steel Plate

Pittsburgh . . . . .	2.25c
New York, del. . . . .	2.53c
Philadelphia, del. . . . .	2.43 1/2 c
Boston, delivered . . . . .	2.65c
Buffalo, delivered . . . . .	2.50c
Chicago or Gary . . . . .	2.30c
Cleveland, del. . . . .	2.44 1/2 c
Birmingham . . . . .	2.40c
Coatesville, base . . . . .	2.35c
Sparrows Pt., base . . . . .	2.35c
Pacific ports, f.o.b. cars, dock . . . . .	2.80c
St. Louis, delivered . . . . .	2.53c

### Structural Shapes

Pittsburgh . . . . .	2.25c
Philadelphia, del. . . . .	2.45 1/2 c
New York, del. . . . .	2.50 1/2 c
Boston, delivered . . . . .	2.63 1/2 c
Bethlehem . . . . .	2.35c
Chicago . . . . .	2.30c
Cleveland, del. . . . .	2.45c
Buffalo . . . . .	2.35c
Gulf Ports . . . . .	2.65c
Birmingham . . . . .	2.40c
Pacific ports, f.o.b. cars, dock . . . . .	2.80c

### Bars

Soft Steel (Base, 3 to 25 tons)	
Pittsburgh . . . . .	2.45c
Chicago or Gary . . . . .	2.50c
Duluth . . . . .	2.60c
Birmingham . . . . .	2.60c
Cleveland . . . . .	2.50c
Buffalo . . . . .	2.55c
Detroit, delivered . . . . .	2.60c
Pacific ports, f.o.b. cars, dock . . . . .	3.00c
Philadelphia, del. . . . .	2.74c
Boston, delivered . . . . .	2.85c
New York, del. . . . .	2.78c
Pitts., forg. qual. . . . .	2.80c

Rail Steel To Manufacturing Trade	
Pittsburgh . . . . .	2.30c
Chicago or Gary . . . . .	2.35c
Moline, Ill. . . . .	2.35c
Cleveland . . . . .	2.35c
Buffalo . . . . .	2.20c



**Iron**

Terre Haute, Ind. ....	2.35c
Chicago .....	2.40c
Philadelphia .....	2.39c
Pittsburgh, refined ...	2.75-7.50c

**Reinforcing**

New billet, straight lengths, quoted by distributors	
Pittsburgh .....	2.55c
Chicago, Gary, Buffalo	
Cleve., Birm., Young...	2.60c
Gulf ports .....	2.65c
Pacific coast ports f.o.b.	
car docks .....	2.95c
Philadelphia, del. ....	2.54c
Rail steel, straight lengths, quoted by distributors	
Pittsburgh .....	2.40c
Chicago, Buffalo, Cleveland, Birm., Young...	2.45c
Gulf ports .....	2.80c

**Wire Products**

Prices apply to straight or mixed carloads; less carloads \$4 higher; less carloads fencing \$5 over base column  
 Base Pitts.-Cleve. 100 lb. keg.  
 Standard wire nails .. \$2.75  
 Cement coated nails .. \$2.75  
 (Per pound)

Polished staples .....	3.45c
Galv. fence staples .....	3.70c
Barbed wire, galv. ....	3.40c
Annealed fence wire .....	3.20c
Galv. fence wire .....	3.60c
Woven wire fencing (base column, c. l.) ..	\$74.00
Single loop bale ties, base column .....	63.00

**To Manufacturing Trade**

Plain wire, 6-9 ga. ....	2.90c
Anderson, Ind. (merchant products only) and Chicago up \$1; Duluth and Worcester up \$2; Birmingham up \$3.	
Spring wire, Pitts. or Cleveland .....	3.50c
Do., Chicago up \$1, Worc. \$2.	

**Cold-Finished Carbon Bars and Shafting**

Pittsburgh .....	2.90c
Chicago .....	2.95c
Gary, Ind. ....	2.95c
Detroit .....	2.95c
Cleveland .....	2.95c
Buffalo .....	3.00c

Subject to quantity deductions and extras. List dated Aug. 26, 1935; revised Oct. 1, 1936.

**Alloy Steel Bars (Hot)**

(Base, 3 to 25 tons)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem .....	3.00c
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Alloy	Alloy	
S.A.E. Diff.	S.A.E. Diff.	
2000 .....	0.35 3100 .....	0.70
2100 .....	0.75 3200 .....	1.35
2300 .....	1.55 3300 .....	3.80
2500 .....	2.25 3400 .....	3.20
4100 0.15 to 0.25 Mo. ....	0.55	
4600 0.20 to 0.30 Mo. 150-2.00 Nl. ....	1.10	
5100 0.80-1.10 Cr. ....	0.45	
5100 Cr. spring .....	0.15	
6100 bars .....	1.20	
6100 spring .....	0.85	
Cr. Nl. Van. ....	1.50	
Carbon Van. ....	0.85	
9200 spring flats .....	0.15	
9200 spring rounds, squares	0.40	

**Piling**

Pittsburgh .....	2.60c
Chicago, Buffalo .....	2.70

**Strip and Hoops**

(Base, hot rolled, 25-1 ton)  
 (Base, cold-rolled, 25-3 tons)  
 Hot strip to 23½-in.

Pittsburgh .....	2.40c
Chicago or Gary .....	2.50c
Birmingham base .....	2.55c
Detroit, del. ....	2.60c
Philadelphia, del. ....	2.69c
New York, del. ....	2.73c
Cooperage hoop, Pittsburgh .....	2.40c
Chicago .....	2.50c
Cold strip, 0.25 carbon and under, Pittsburgh, Cleveland .....	3.20c
Detroit, del. ....	3.40c
Worcester, Mass. ....	3.40c
Carbon	
0.26-0.50 ..	3.20c 3.40c
0.51-0.75 ..	4.45c 4.65c
0.76-1.00 ..	6.30c 6.50c
Over 1.00 ..	8.50c 8.70c

**Rails, Track Material**

(Gross Tons)

Standard rails, mill. ....	\$42.50
Relay rails, Pittsburgh, 20-100 lbs. ....	25.50-28.00
Light rails, billet qual. Pittsburgh, Chicago ..	\$43.00
Do., rerolling quality ..	42.00
Angle bars, billet, Gary, Pittsburgh, So. Chicago	2.80c
Do., axle steel .....	3.35c
Spikes, R. R. base .....	3.15c
Track bolts, base .....	4.35c
Tie plates, base .....	\$46.00
Base, light rails 25 to 40 lbs.; 50 to 60 lbs., inclusive up \$2; 16 and 20 lbs. up \$1; 12 lbs. up \$2; 8 and 10 lbs., up \$5. Base railroad spikes 200 kegs or more; base tie plates 20 tons.	

**Bolts and Nuts**

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

**Carriage and Machine**

½ x 6 and smaller .....	65-5 off
Do. larger .....	60-10 off
Tire bolts .....	50 off

**Plow Bolts**

All sizes .....	65-5 off
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**Stove Bolts**

In packages with nuts attached 72½ off; in packages with nuts separate 72½-5 off; in bulk 81½ off on 15,000 of 3-inch and shorter, or 5000 over 3-inch.

Step bolts .....	60 off
Elevator bolts .....	50-10-5 off

**Nuts**

S. A. E. semifinished hex. ½ to ¾-inch .....	60-20 off
Do., ½ to 1-inch .....	60-15 off
Do., over 1-inch .....	60-12½ off

**Hexagon Cap Screws**

Milled .....	50-10 off
Upset, 1-in., smaller .....	60 off

**Square Head Set Screws**

Upset, 1-in., smaller .....	75 off
Headless set screws .....	75 off

**Rivets, Wrought Washers**

Structural, Pittsburgh, Cleveland .....	3.60c
Structural, Chicago .....	3.70c
⅜-inch and smaller Pitts., Chi., Cleve. ....	70 off
Wrought washers, Pitts., Chi., Phila. to jobbers and large nut, bolt mfrs. ....	\$5.75 off

**Cut Nails**

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

**Pipe and Tubing**

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

**Welded Iron, Steel Pipe**

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads, Gary, Ind., 2 points less. Chicago, del. 2½ less. Wrought pipe, Pittsburgh.

<b>Butt Weld Steel</b>		
In.	Blk.	Galv.
¼ and ¾ .....	55	38½
½ .....	59½	49½
¾ .....	62½	53
1-3 .....	64½	55½
<b>Iron</b>		
½ .....	27	10½
¾ .....	32	16
1-1½ .....	35	21
2 .....	38½	23
<b>Lap Weld Steel</b>		
2 .....	57	47½
2½-3 .....	60	50½
3½-6 .....	62	52½
7 and 8 .....	61	50½
9 and 10 .....	60½	50½
<b>Iron</b>		
2 .....	32½	18
2½-3½ .....	33½	20½
4-8 .....	35½	24
<b>Line Pipe Steel</b>		
¾, butt weld .....	51	
¾ and ¾, butt weld .....	54	
¾, butt weld .....	58½	
¾, butt weld .....	61½	
1 to 3, butt weld .....	63½	
2, lap weld .....	56	
2½ to 3, lap weld .....	59	
3½ to 6, lap weld .....	61	
7 and 8, lap weld .....	60	
<b>Iron</b>		
¾-1½ inch, black and galv. take 4 pts. over; 2½-6-inch 2 pts. over discounts for same sizes, standard pipe lists, 8-12-inch, no extra.		

<b>Boiler Tubes</b>			
C. L. Discounts, f.o.b. Pitts.			
<b>Lap Weld Charcoal</b>			
<b>Steel Iron</b>			
2-2½ .....	33	1½ .....	8
2½-2¾ .....	40	2-2¾ .....	13
3 .....	47	2½-2¾ .....	16
3½-3¾ .....	50	3 .....	17
4 .....	52	3¾-3¾ .....	18
4½-5 .....	42	4 .....	20
		4½ .....	21

In lots of a carload or more, above discounts subject to preferential of two 5% and one 7½% discount on steel and 10% on charcoal iron.  
 Lapwelded steel: 200 to 9999 pounds, ten points under base, one 5% and one 7½%. Under 2000 pounds 15 points under base, one 5% and one 7½%.  
 Charcoal iron: 10,000 pounds to carloads, base less 5%; under 10,000 lbs., 2 pts. under base.

**Seamless Boiler Tubes**  
 Under date of May 15 in lots of 40,000 pounds or more for cold-drawn boiler tubes and in lots of 40,000 pounds or feet or more for hot-finished boiler tubes, revised prices are quoted for 55 cold-drawn boiler tube sizes ranging from ¼ to 6-inch outside diameter in 30 wall thicknesses, decimal equivalent from 0.035 to 1.000, on a dollars and cents basis per 100 feet and

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

**Seamless Tubing**

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

**Cast Iron Water Pipe**

<b>Class B Pipe—Per Net Ton</b>	
6-in. & over, Birm. ....	\$46.00-47.00
4-in., Birmingham .....	49.00-50.00
4-in., Chicago .....	57.00-58.00
6 to 24-in., Chicago. ....	54.00-55.00
6-in. & over, east fdy. ....	50.00
Do., 4-in. ....	53.00
Class A pipe \$3 over Class B Stnd. fits., Birm. base. ....	\$100.00

**Semifinished Steel**

<b>Billets and Blooms</b>	
4 x 4-inch base; gross ton	
Pitts., Chi., Cleve., Buffalo and Young. ....	\$37.00
Philadelphia .....	42.30
Duluth .....	39.00

<b>Forging Billets</b>	
6 x 6 to 9 x 9-in., base	
Pitts., Chicago, Buffalo. ....	43.00
Forging, Duluth .....	45.00

<b>Sheet Bars</b>	
Pitts., Cleve., Young. ....	
<b>Sparrows Point</b>	
37.00	

<b>Slabs</b>	
Pitts., Chicago, Cleveland, Youngstown .....	37.00

<b>Wire Rods</b>	
No. 5 to ½-inch incl. ....	
Pitts., Cleve., No. 5 to ½-inch incl. ....	47.00
Do., over ½ to ¾-inch incl. ....	52.00
Chicago up \$1; Worcester up \$2.	

<b>Skelp</b>	
Pitts., Chi., Young., Buff., Coatesville, Sparrows Pt. ....	2.10c

**Coke**

<b>Price Per Net Ton</b>	
<b>Beehive Ovens</b>	
Connellsville, fur. ....	\$4.10-4.25
Connellsville, fdry. ....	4.50-4.75
Connell. prem. fdry. ....	5.58
New River fdry. ....	6.00
Wise county fdry. ....	4.45-5.00
Wise county fur. ....	4.00-4.50

<b>By-Product Foundry</b>	
Newark, N. J., del. ....	10.17-10.60
Chi., ov., outside del. ....	9.50
Chicago, del. ....	10.25
New England, del. ....	12.00
St. Louis, del. ....	10.50-11.00
Birmingham, ovens .....	6.50
Indianapolis, del. ....	9.65
Cincinnati, del. ....	9.75
Cleveland, del. ....	10.30
Buffalo, del. ....	10.50
Detroit, del. ....	10.70
Philadelphia, del. ....	9.85

**Coke By-Products**

<b>Spot. gal. Producers' Plants</b>	
Pure and 90% benzol. ....	16.00c
Toluol .....	30.00c
Solvent naphtha .....	30.00c
Industrial xylol .....	30.00c
Per lb. f.o.b. Frankford	
Phenol (200 lb. drums) ..	15.00c
Do., (450 lbs.) .....	14.00c
Eastern Plants, per lb.	
Naphthalene flakes and balls, in bbls., to jobbers .....	7.25c
Per 100-lbs. Atlantic seaboard Sulphate of ammonia. ....	\$1.35
†Western prices, ¼-cent up.	



## Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry ls 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25; 50c diff. for each 0.25 below 1.75. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	\$25.00	\$25.50	\$23.50	\$26.00
Birdsboro, Pa.	25.00	25.50	24.50	26.00
Birmingham, Ala.†	20.38	.....	19.38	24.50
Buffalo	24.00	24.50	23.00	25.00
Chicago	24.00	24.00	23.50	24.50
Cleveland	24.00	24.00	23.50	24.50
Detroit	24.00	24.00	23.50	24.50
Duluth	24.50	24.50	.....	25.00
Eric, Pa.	24.00	24.50	23.50	25.00
Everett, Mass.	25.75	26.25	25.25	26.75
Hamilton, O.	24.00	24.00	23.50	.....
Jackson, O.	24.00	24.00	.....	.....
Neville Island, Pa.	24.00	24.00	23.50	24.50
Provo, Utah	21.00	.....	.....	.....
Sharpsville, Pa.	24.00	24.00	23.50	24.50
Sparrows Point, Md.	25.00	.....	24.50	.....
Swedeland, Pa.	25.00	25.50	24.50	26.00
Toledo, O.	24.00	24.00	23.50	24.50
Youngstown, O.	24.00	24.00	23.50	24.50

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

### Delivered from Basing Points:

Akron, O., from Cleveland	25.26	25.26	24.76	25.76
Baltimore from Birmingham	25.58	.....	24.46	.....
Boston from Birmingham	26.37	.....	25.87	.....
Boston from Everett, Mass.	26.25	26.75	25.75	27.25
Boston from Buffalo	26.25	26.75	25.75	27.25
Brooklyn, N. Y., from Bethlehem	27.27	27.77	.....	.....
Brooklyn, N. Y., from Bmghm.	27.05	.....	.....	.....
Canton, O., from Cleveland	25.26	25.26	25.76	25.76
Chicago from Birmingham	24.22	.....	24.10	.....
Cincinnati from Hamilton, O.	24.07	25.01	24.51	.....
Cincinnati from Birmingham	23.69	.....	22.69	.....
Cleveland from Birmingham	24.12	.....	23.62	.....
Mansfield, O., from Toledo, O.	25.76	25.76	25.26	25.26
Milwaukee from Chicago	25.00	25.00	24.50	25.00
Muskegon, Mich., from Chicago, Toledo or Detroit	26.90	26.90	26.40	27.40
Newark, N. J., from Birmingham	26.01	.....	.....	.....
Newark, N. J., from Bethlehem	26.39	26.89	.....	.....
Philadelphia from Birmingham	25.38	.....	25.26	.....
Philadelphia from Swedeland, Pa.	25.76	26.26	25.26	.....
Pittsburgh district from Neville Island	} Neville, base plus 63c, 76c, and \$1.13 switch'g charges			
Saginaw, Mich., from Detroit	26.25	26.25	25.75	25.75
St. Louis, northern	24.50	24.50	24.00	.....

No. 2 Fdry.	Malleable	Basic	Bessemer
St. Louis from Birmingham	\$24.12	.....	23.82
St. Paul from Duluth	25.94	25.94	.....
†Over 0.70 phos.	.....	.....	26.44

### Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Standish, N. Y., \$28.50, Phila. base, standard and copper bearing, \$29.63.

Gray Forge	Charcoal
Valley furnace	\$23.50
Pitts. dist. fur.	23.50
Lake Superior fur.	\$26.50
do., del. Chicago	29.54
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	Chester, Pa., and Baltimore bases (bags)
<b>Fire Clay Brick</b>	Domestic dead-burned grains, net ton f.o.b. \$45.00
<i>Super Quality</i>	Chester, Pa., and Baltimore bases (bags) 42.00
Pa., Mo., Ky.	58.90
<i>First Quality</i>	Domestic dead-burned gr. net ton f.o.b. 24.00
Pa., Ill., Md., Mo., Ky.	\$45.60
Alabama, Georgia	\$38.00-45.00
<i>Second Quality</i>	
Pa., Ill., Ky., Md., Mo.	40.85
Georgia, Alabama	36.10
<i>Ohio</i>	
First quality	\$40.85
Intermediary	38.00
Second quality	29.45
<b>Malleable Bung Brick</b>	
All bases	54.15
<b>Silica Brick</b>	
Pennsylvania	\$45.60
Joliet, E. Chicago	54.15
Birmingham, Ala.	45.60
<b>Ladle Brick</b>	
(Pa., O., W. Va., Mo.)	
Dry press	\$25.00
Wire cut	23.00
<b>Magnesite</b>	
Imported dead-burned grains, net ton f.o.b.	
	Base Brick
	Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.
	Chrome brick \$47.00
	Chem. bonded chrome.. 47.00
	Magnesite brick 67.00
	Chem. bonded magnesite 57.00

## Fluorspar, 85-5

Washed gravel, duty paid, tide, net ton	\$23.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	\$18.00
Do., for barge	\$18.50

## Ferroalloys

Dollars, except Ferrochrome	
Ferromanganese, 78-82%, tidewater, duty paid..	\$95.00
Do., Baltimore, base..	95.00
Do., del. Pittsburgh..	99.79
Spiegeleisen, 19-20% dom.	
Palmerston, Pa., spot.	30.00
Do., New Orleans	30.00
Ferrosilicon, 50% freight allowed, c. l.	69.50
Do., less carload	77.00
Do., 75 per cent.	126-130.00
Spot, \$5 a ton higher.	
Silicomane, 2½ carbon..	89.00
2% carbon, 94.00; 1%, 104.00	
Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb. del.	10.50
Ferrotungsten, stand., lb. con. del. (L.C.L.)	1.40-1.45
Ferrevanadium, 35 to 40% lb., cont.	2.70-2.90
Ferrotitanium, c. l., prod. plant, frt. all., net ton	137.50
Spot, 1 ton, frt. allow., lb.	7.00
Do., under 1 ton, lb.	7.75-8.25
Ferrophosphorus, per ton, c. l., 17-19% Rockdale, Tenn., basis, 18%, \$3 unitage	58.50
Ferrophosphorus, electrolytic, per ton c. l., 23-26% f.o.b. Anniston, Ala., 24% \$3 unitage..	75.00
Ferromolybdenum, stand. 55-65%, lb.	0.95
Molybdate, lb. cont.	0.80
†Carloads. Quant. diff. apply	

## Nonferrous

### METAL PRICES OF THE WEEK

Spot unless otherwise specified. Cents per pound

Copper				Straits Tin		Lead		Zinc		Alumi- Antimony		Nickel	
Electro, del.	Lake, del.	Casting, Midwest	refinery	Spot	Futures	Lead N. Y.	Lead East St. L.	St. L.	99%	Spot, N. Y.	Cath. odes	99%	odes
Mar. 6	15.00	15.12½	15.75	59.00	58.80	7.00	6.85	7.00	*20.00	16.75	35.00	7.50	*20.00
Mar. 8	16.25	16.37½	16.00	59.87½	59.65	7.25	7.10	7.50	*20.00	16.75	35.00	7.50	*20.00
Mar. 9	16.25	16.37½	16.00	63.37½	63.15	7.50	7.35	7.50	*20.00	17.00	35.00	7.50	*20.00
Mar. 10	16.25	16.37½	16.25	66.25	65.25	7.75	7.60	7.50	*20.00	17.00	35.00	7.50	*20.00
Mar. 11	16.25	16.37½	16.25	64.75	64.25	7.75	7.60	7.50	*20.00	17.00	35.00	7.50	*20.00
Mar. 12	16.25	16.37½	16.75	66.25	65.12½	7.75	7.60	7.50	*20.00	17.00	35.00	7.50	*20.00

\*Nominal range 20.00 to 21.00.

### MILL PRODUCTS

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 16.25c, Conn. copper

<b>Sheets</b>	
*Yellow brass (high)	21.25
*Copper, hot rolled	23.87½
*Lead, cut to jobbers	11.25
*Zinc, 100-lb. base	12.50-13.00
<b>Tubes</b>	
*High yellow brass	24.00
*Seamless copper	24.62½
<b>Rods</b>	
*High yellow brass	17.62½
*Copper, hot rolled	20.62½
<b>Anodes</b>	
*Copper, untrimmed	21.12½
<b>Wire</b>	
*Yellow brass (high)	21.50

### OLD METALS

Deal. buying prices, cents lb.	
<b>No. 1 Composition Red Brass</b>	
*New York	12.00-12.12½
*Cleveland	12.50-12.75
*Chicago	11.50-12.00
*St. Louis	11.00-11.50
<b>Heavy Copper and Wire</b>	
*New York, No. 1	14.87½-15.00
*Chicago, No. 1	13.50-14.00
*Cleveland, No. 1	13.50-14.00
*St. Louis, No. 1	13.00-13.50
<b>Composition Brass Bearings</b>	
*New York	10.87½-11.00
<b>Light Copper</b>	
*New York	12.25-12.37½
*Chicago	11.50-12.00
*Cleveland	11.75-12.00
*St. Louis	11.00-11.50

### Light Brass

*Chicago	8.00- 8.25
*Cleveland	7.00- 7.25
*St. Louis	7.50- 8.00
<b>Lead</b>	
*New York	6.50-6.62½
*Cleveland	6.50- 6.75
*Chicago	6.12½-6.37½
*St. Louis	5.75- 6.00
<b>Zinc</b>	
*New York	4.00-4.12½
*St. Louis	4.25- 4.50
*Cleveland	4.00- 4.25
<b>Aluminum</b>	
*Bearings, Cleveland	10.75-11.00
*Mixed, cast, Cleve.	14.25-14.50
Mixed, cast, St. L.	13.50-14.00
*Clips, soft, Cleve.	15.75-16.00
<b>SECONDARY METALS</b>	
*Brass, ingot 85-5-5-5, lcl	17.50
Stand. No. 12 alum.	17.75-18.25



# Warehouse Iron and Steel Prices

Cents per pound for delivery within metropolitan districts of cities specified

## STEEL BARS

Baltimore	3.85c
Boston ††	4.05c
Buffalo	3.10c
Chattanooga	3.71c
Chicago (j)	3.85c
Cincinnati	3.55c
Cleveland	3.25c
Detroit	3.93½c
Houston	3.10c
Los Angeles	4.00c
Milwaukee	3.96c-4.11c
New Orleans	3.70c
New York† (d)	4.12c
Pitts. (h)	3.80c
Philadelphia	4.00c
Portland	4.00c
San Francisco	3.85c
Seattle	4.10c
St. Louis	3.59c
St. Paul	4.10c-4.25c
Tulsa	3.35c

## IRON BARS

Portland	3.50c
Chattanooga	3.71c
Baltimore*	3.10c
Cincinnati	3.55c
New York† (d)	3.65c
Philadelphia	4.00c
St. Louis	3.59c
Tulsa	3.35c

## REINFORCING BARS

Buffalo	2.60c
Chattanooga	3.71c
Cleveland (c)	2.25c
Cincinnati	3.40c
Houston	3.25c
Los Angeles, c.l.	2.45c
New Orleans*	2.84c
Pitts., plain (h)	3.55c
Pitts., twisted squares (h)	3.85c
San Francisco	2.72½c
Seattle	3.86c
St. Louis	3.49c
Tulsa	3.25c
Young	2.30c-2.60c

## SHAPES

Baltimore	3.85c
Boston††	3.92c
Buffalo	3.35c
Chattanooga	3.81c
Chicago	3.75c
Cincinnati	3.65c
Cleveland	3.56c
Detroit	3.95c
Houston	3.10c
Los Angeles	4.00c
Milwaukee	3.86c
New Orleans	3.80c
New York† (d)	3.97c
Philadelphia	3.90c
Pittsburgh (h)	3.70c
Portland (l)	3.85c
San Francisco	3.75c
Seattle (l)	4.05c
St. Louis	3.69c
St. Paul	4.00c
Tulsa	3.60c

## PLATES

Baltimore	3.80c
Boston††	3.93c
Buffalo	3.47c
Chattanooga	3.81c
Chicago	3.75c
Cincinnati	3.65c
Cleveland, ¼-in. and over	3.56c
Detroit	3.95c
Detroit, ⅝-in.	4.15c
Houston	3.10c
Los Angeles	4.00c
Milwaukee	3.86c
New Orleans	3.80c
New York† (d)	4.00c
Philadelphia	3.90c

Phila. floor	4.95c
Pittsburgh (h)	3.70c
Portland	3.85c
San Francisco	3.75c
Seattle	4.05c
St. Louis	3.69c
St. Paul	4.00c
Tulsa	3.60c

## NO. 10 BLUE

Baltimore	3.80c
Boston (g)	4.00c
Buffalo	3.72c
Chattanooga	3.66c
Chicago	3.85c
Cincinnati	3.50c
Cleveland	3.46c
Det. 8-10 ga.	3.93½c
Houston	3.45c
Los Angeles	4.15c
Milwaukee	3.96c
New Orleans	3.85c
New York† (d)	4.07c
Portland	3.95c
Philadelphia	4.00c
Pittsburgh (h)	3.75c
San Francisco	3.95c
Seattle	4.10c
St. Louis	3.84c
St. Paul	3.85c
Tulsa	3.80c

## NO. 24 BLACK

Baltimore*†	4.50c
Boston (g)	4.75c
Buffalo	3.35c
Chattanooga*	3.56c
Chicago	4.50c-5.15c
Cincinnati	4.05c
Cleveland	4.31c
Detroit	4.68½c
Los Angeles	4.35c
Milwaukee	4.76c
New York† (d)	4.82c
Philadelphia	4.65c
Pitts.* (h)	4.75c
Portland	4.65c
Seattle	4.85c
San Francisco	4.65c
St. Louis	4.49c
Tulsa	4.85c

## NO. 24 GALV. SHEETS

Baltimore*†	4.70c
Buffalo	4.10c
Boston (g)	5.30c
Chattanooga*	4.16c
Chicago (h) 5.10c-5.75c	
Cincinnati	4.65c
Cleveland	4.91c
Detroit	5.40c
Houston	4.50c
Los Angeles	4.60c
Milwaukee	5.36c
New Orleans*	4.09c
New York† (d)	5.47c
Philadelphia	5.30c
Pitts.* (h)	5.40c
Portland	5.35c
San Francisco	5.25c
Seattle	5.35c
St. Louis	5.05c
Tulsa	5.20c

## BANDS

Baltimore	3.85c
Boston††	4.25c
Buffalo	3.52c
Chattanooga	3.91c
Cincinnati	3.75c
Cleveland	3.66c
Chicago	4.10c
Detroit, ⅝-in. and lighter	3.68½c
Houston	3.35c
Los Angeles	4.30c
Milwaukee	4.21c
New Orleans	4.25c
New York† (d)	4.32c

Philadelphia	4.10c
Pittsburgh (h)	4.00c
Portland	4.60c
San Francisco	4.45c
Seattle	4.60c
St. Louis	3.84c
St. Paul	4.35c
Tulsa	3.55c

## HOOPS

Baltimore	4.10c
Boston††	5.25c
Buffalo	3.52c
Chicago	4.10c
Cincinnati	3.75c
Detroit, No. 14 and lighter	3.68½c
Los Angeles	6.25c
Milwaukee	4.21c
New York† (d)	4.32c
Philadelphia	4.35c
Pittsburgh (h)	4.50c
Portland	5.95c
San Francisco	6.50c
Seattle	5.95c
St. Louis	3.84c
St. Paul	4.35c

## COLD FIN. STEEL

Baltimore (c)	4.50c
Boston*	4.65c
Buffalo (h)	3.70c
Chattanooga*	4.51c
Chicago (h)	4.30c
Cincinnati	4.15c
Cleveland (h)	3.95c
Detroit	4.30c
Los Ang. (f) (d)	6.35c
Milwaukee	4.41c
New Orleans	4.75c

New York† (d)	4.57c
Philadelphia	4.53c
Pittsburgh	4.15c
Portland (f) (d)	5.35c
San Fran. (f) (d)	6.30c
Seattle (f) (d)	5.35c
St. Louis	4.19c
St. Paul	4.55c
Tulsa	4.80c

## COLD ROLLED STRIP

Boston	3.845c
Buffalo	3.39c
Chicago	3.87c
Cleveland (b)	3.00c
Cleveland (b)	3.20c
Detroit	3.43c
New York† (d)	3.92c
St. Louis	3.61c

## TOOL STEELS

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

Base	
High speed	62c
High carbon, high chrome	41c
Oil hardening	22c
Special tool	24c
Extra tool	18½c
Regular tool	15c

Uniform extras apply.

## BOLTS AND NUTS

(100 pounds or over)

Discount	
Chicago (a)	65
Cleveland	70
Detroit	70-10
Milwaukee	65

New Orleans	70-10
Pittsburgh	65-5

(a) Under 100 lbs., 60 off.

(b) Plus straightening, cutting and quantity differentials; (c) Plus mill, size and quantity extras; (d) Quantity base; (e) New mill classf. (f) Rounds only; (g) 50 bundles or over; (h) Outside delivery, 10c less; (i) Under 3 in.; (j) Shapes other than rounds, flats, fllet angles, 0.15c higher.

On plates, shapes, bars, hot strip and blue annealed quantity extras and discounts as follows: Under 100 lbs., add \$1.50; 100 to 399 lbs., add 50c; 400 to 3999 lbs., base; 4000 to 9999 lbs., deduct 10c; over 10,000 lbs., deduct 15c. At Cleveland, under 400 lbs., add 50c, with \$1 minimum invoice.

†Domestic steel; \*Plus quantity extras; \*\*One to 9 bundles; ††50 or more bundles; ‡New extras apply; †††Base 10,000 lbs., extras on less.

## Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, March 11

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

Description	British gross tons U. K. ports		Continental Channel or North Sea ports, metric tons	
	£ s d	£ s d	Quoted in dollars at current value	**Quoted in gold pounds sterling £ s d
<b>PIG IRON</b>				
Foundry, 2.50-3.00 Silicon	\$19.15	3 18 6*	\$22.50	2 15 0
Basic bessemer	19.15	3 18 6*	14.31	1 15 0
Hematite, Phos. .03-.05	21.35	4 7 6		
<b>SEMIFINISHED STEEL</b>				
Billets	\$30.50	6 5 0	\$24.54	3 0 0
Wire rods, No. 5 gage	46.97	9 12 6	49.09	6 0 0
<b>FINISHED STEEL</b>				
Standard rails	\$41.48	8 10 0	\$49.09	6 0 0
Merchant bars	2.07c	9 10 0	1.85c	5 0 0
Structural shapes	1.99c	9 2 6	1.80c	4 17 6
Plates, ½ in. or 5 mm.	2.22c	10 3 9	2.02c to 2.07c	5 9 6 to 5 12 0
Sheets, black, 24 gage or 0.5 mm.	2.83c	13 0 0	2.87c	7 15 0
Sheets, gal., 24 gage, corr.	3.43c	15 15 0	3.61c	9 15 0
Bands and strips	2.18c	10 0 0	2.22c	6 0 0
Plain wire, base	2.29c	10 10 0	2.50c	6 15 0
Galvanized wire, base	2.73c	12 10 0	2.91c	7 17 6
Wire nails, base	2.62c	12 0 0	2.40c	6 10 0
Tin plate, box 108 lbs.	\$ 5.00	1 0 6		

British ferromanganese \$80 delivered Atlantic seaboard, duty-paid.

## Domestic Prices at Works or Furnace—Last Reported

Description	£ s d		French Francs		Belgian Francs		Reich Marks	
	£ s d	£ s d	French Francs	Belgian Francs	Reich Marks	Reich Marks	Reich Marks	
Fdy. pig iron, Si. 2.5	\$19.76	4 1 0 (a)	\$18.32	400	\$22.24	660	\$25.34	63
Basic bessemer pig iron	20.13	4 2 6 (a)	12.60	275	14.66	435	27.96	(b) 69.50
Furnace coke	5.11	1 3 0	5.82	127	5.73	170	7.64	19
Billets	30.50	6 5 0	27.02	590	21.57	640	38.82	96.50
Standard rails	1.80c	8 5 0	1.64c	780	1.73c	1,150	2.40c	132
Merchant bars	2.07c	9 10 0	1.68c	800	1.16c	775	2.00c	110
Structural shapes	1.99c	9 3 0	1.64c	780	1.16c	775	1.95c	107
Plates, ½ in. or 5 mm.	2.14c	9 16 9	2.12c	1,010	1.43c	950	2.31c	127
Sheets, black, 24 gage	2.62c	12 0 0	2.84c	1,350†	1.83c	1,220†	2.62c	144†
Sheets, galv., corr., 24 ga. or 0.5 mm.	3.05c	14 0 0	4.41c	2,100	2.85c	1,900	6.73c	370
Plain wire	2.51c	11 10 0	2.77c	1,320	2.03c	1,350	3.15c	173
Bands and strips	2.23c	10 5 0	1.92c	915	1.43c	950	2.31c	127

\*Basic. †British ship-plates. Continental, bridge plates, \$24 ga. ½ to 3 mm. basic price. British quotations are for basic open-hearth steel. Continent usually for basic-bessemer steel. † del. Middlesbrough. b hematite. ††Close annealed. \*\*Gold pound sterling carries a premium of 67.76 per cent over paper sterling.



# Iron and Steel Scrap Prices

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

### HEAVY MELTING STEEL

Birmingham†	13.50-14.50
Bos. dock, No. 1, exp.	16.50-17.00
N. Eng. del. No. 1.	16.00-16.50
Buffalo, No. 1	19.00-20.00
Buffalo, No. 2	17.50-18.50
Chicago, No. 1	20.50-21.00
Cleveland, No. 1	19.50-20.00
Cleveland, No. 2	18.00-18.50
Detroit, No. 1	17.50-18.00
Eastern Pa., No. 1.	19.00-20.00
Eastern Pa., No. 2.	18.50
Federal, Ill.	15.25-15.75
Granite City, R. R.	17.50-18.00
Granite City, No. 2.	15.25-15.75
New York, No. 1.	16.50-17.00
N. Y. dock, No. 1 exp.	16.50-17.00
Pitts., No. 1 (R. R.)	23.75-24.25
Pitts., No. 1 (dlr.)	23.25-23.75
Pittsburgh, No. 2	20.50-21.00
St. Louis, R. R.	17.50-18.00
St. Louis, No. 2	15.25-15.75
Toronto, dlrs. No. 1.	9.75-10.50
Toronto, No. 2	8.75- 9.50
Valleys, No. 1	21.50-22.00

### COMPRESSED SHEETS

Buffalo, dealers	17.50-18.00
Chicago, factory	19.00-19.50
Chicago, dealer	18.00-18.50
Cleveland	19.00-19.50
Detroit	18.00-18.50
E. Pa., new mat.	19.00
E. Pa., old mat.	17.50
Pittsburgh	23.25-23.75
St. Louis	16.00-16.50
Valleys	21.50-22.00

### BUNDLED SHEETS

Buffalo	14.50-15.00
Cincinnati, del.	14.00-14.50
Cleveland	14.50-15.00
Pittsburgh	21.00-21.50
St. Louis	13.50-14.00
Toronto, dealers	6.00

### SHEET CLIPPINGS, LOOSE

Chicago	14.00-14.50
Cincinnati	13.00-13.50
Detroit	13.75-14.25
St. Louis	13.00-13.50

### STEEL RAILS, SHORT

Birmingham	17.00-18.00
Buffalo	23.00-24.00
Chicago (3 ft.)	23.00-23.50
Chicago (2 ft.)	24.00-24.50
Cincinnati, del.	21.50-22.00
Detroit	24.00-24.50
Pitts., open-hearth,	
3 ft. and less	26.00-26.50
St. Louis, 2 ft. & less	19.50-20.00

### STEEL RAILS, SCRAP

Boston district	†15.75-16.00
Buffalo	20.00-21.00
Chicago	20.50-21.00
Pittsburgh	23.75-24.25
St. Louis	19.00-19.50
Toronto, dealers	9.00

### STOVE PLATE

Birmingham	9.50-10.00
Boston district	†11.00-11.50
Buffalo	14.75-15.25
Chicago	12.00-12.50
Cincinnati, dealers	12.25-12.75
Detroit, net	12.00-12.25
Eastern Pa.	15.50
New York, fdry.	11.75-12.25
St. Louis	11.75-12.25
Toronto, deal'rs, net	7.50- 8.00

### SPRINGS

Buffalo	22.50-23.50
Chicago, leaf	22.00-22.50
Chicago, coil	24.50-25.00
Eastern Pa.	25.00
Pittsburgh	26.25-26.75
St. Louis	20.50-21.00

### ANGLE BARS—STEEL

Buffalo	14.50-15.00
Chicago	23.00-23.50
St. Louis	19.50-20.00

### RAILROAD SPECIALTIES

Chicago	22.00-22.50
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### LOW PHOSPHORUS

Buffalo, billet and bloom crops	22.00-22.50
Cleveland, billet, bloom crops	23.50-24.00
Eastern Pa., crops	26.00-26.50
Pittsburgh, billet, bloom crops	27.00-27.50
Pittsburgh, sheet bar crops	26.50-27.00

### FROGS, SWITCHES

Chicago	20.50-21.00
St. Louis, cut	19.00-19.50

### SHOVELING STEEL

Chicago	20.50-21.00
Federal, Ill.	15.25-15.75
Granite City, Ill.	15.25-15.75
Toronto, dealers	7.50

### RAILROAD WROUGHT

Birmingham	12.00-14.00
Boston district	†10.00-10.25
Buffalo, No. 1	17.50-18.50
Buffalo, No. 2	19.00-20.00
Chicago, No. 1, net	18.50-19.00
Chicago, No. 2	20.50-21.00
Cincinnati, No. 2	18.00-18.50
Eastern Pa.	20.50-21.00
St. Louis, No. 1	15.00-15.50
St. Louis, No. 2	17.50-18.00
Toronto, No. 1 dlr.	8.00

### SPECIFICATION PIPE

Eastern Pa.	17.50-18.00
New York	12.50-13.00

### BUSHELING

Buffalo, No. 1	17.50-18.00
Chicago, No. 1	18.50-19.00
Cincin., No. 1, deal.	12.25-12.75
Cincinnati, No. 2	10.00-10.50
Cleveland, No. 2	13.50-14.00
Detroit, No. 1 new	16.50-17.00
Valleys, new, No. 1.	20.50-21.00
Toronto, dealers	7.00

### MACHINE TURNINGS

Birmingham	7.00- 8.00
Buffalo	12.00-12.50
Chicago	11.00-11.50
Cincinnati, dealers	11.50-12.00
Cleveland	13.00-13.50
Detroit	13.00-13.50
Eastern Pa.	13.50-14.00
New York	†9.00- 9.50
Pittsburgh	16.00-16.50
St. Louis	10.00-10.50
Toronto, dealers	6.25- 7.00
Valleys	15.00-15.50

### BORINGS AND TURNINGS

Boston district	†8.25- 8.50
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Buffalo	12.25-12.75
Cincinnati, dealers	11.50-12.00
Cleveland	13.50-14.00
Detroit	12.50-13.00
Eastern Pa.	12.00-12.50
New York	†7.00- 7.50
Pittsburgh	14.50-15.00
Toronto, dealers	6.25

### CAST IRON BORINGS

Birmingham	7.00- 7.50
Boston dist. chem.	†9.50- 9.75
Boston dist. for mills	†8.25- 8.50
Buffalo	12.50-13.00
Chicago, dealers	11.00-11.50
Cincinnati, dealers	11.50-12.00
Cleveland	13.50-14.00
Detroit	12.50-13.00
E. Pa., chemical	13.00-13.50
New York	†8.00- 8.50
St. Louis	9.00- 9.50
Toronto, dealers	6.75

### PIPE AND FLUES

Cincinnati, dealers	11.50-12.00
Chicago, net	14.00-14.50

### RAILROAD GRATE BARS

Buffalo	15.00-15.50
Chicago, net	13.50-14.00
Cincinnati	12.25-12.75
Eastern Pa.	15.00-15.50
New York	†11.00-11.50
St. Louis	12.50-13.00

### FORGE FLASHINGS

Boston district	†12.25-12.75
Buffalo	17.50-18.00
Cleveland	18.50-19.00
Detroit	16.00-16.50
Pittsburgh	19.50-20.00

### FORGE SCRAP

Boston district	†6.50- 7.00
Chicago, heavy	22.50-23.00
Eastern Pa.	17.50-18.00

### ARCH BARS, TRANSOMS

St. Louis	19.00-19.50
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### AXLE TURNINGS

Boston district	†10.00-10.50
Buffalo	15.00-15.50
Chicago, elec. fur.	20.50-21.00
Eastern Pa.	18.50-19.50
St. Louis	12.50-13.00
Toronto	6.25

### STEEL CAR AXLES

Birmingham	18.00-20.00
Buffalo	20.50-21.50
Boston district	†20.00-21.00
Chicago, net	23.50-24.00
Eastern Pa.	27.00
St. Louis	22.00-22.50

### SHAFTING

Boston district	†18.75-19.00
Eastern Pa.	24.00-24.50
New York	†19.50-20.00
St. Louis	15.00-15.50

### CAR WHEELS

Birmingham	16.00-17.00
Boston dist. iron	†13.00-13.50
Buffalo, iron	18.50-19.00
Buffalo, steel	21.50-22.50
Chicago, iron	20.00-20.50
Chicago, rolled steel	22.00-22.50

Cincinnati, iron	18.50-19.50
Eastern Pa., iron	19.00
Eastern Pa., steel	25.00
Pittsburgh, iron	19.50-20.00
Pittsburgh, steel	26.25-26.75
St. Louis, iron	18.00-18.50
St. Louis, steel	20.50-21.00

### NO. 1 CAST SCRAP

Birmingham	13.00-14.00
Bos. dist. No. 1 mach.	†14.00-14.25
N. Eng., del. No. 2	15.00
N. Eng., del. textile	16.50
Buffalo, cupola	17.00-18.00
Buffalo, mach.	18.50-19.50
Chicago, agrl. net	18.50-14.00
Chicago, auto	15.00-15.50
Chicago, mach. net	17.00-17.50
Chicago, rail'r'd net	15.50-16.00
Cinci., mach. cup.	17.50-18.00
Cleveland, mach.	19.00-19.50
Eastern Pa., cupola	20.00-20.50
E. Pa., mixed yard	16.00-16.50
Pittsburgh, cupola	19.50-20.00
San Francisco, del.	13.50-14.00
Seattle	11.00-12.00
St. Louis, No. 1	14.00-14.50
St. L., No. 1, mach.	15.50-16.00
Toronto, No. 1, mach., net	19.50-11.00

### HEAVY CAST

Boston dist. break	†13.75-14.00
New England, del.	†15.50-15.75
Buffalo, break	15.00-15.50
Cleveland, break	14.50-15.00
Detroit, No. 1 mach. net	13.50-14.00
Detroit, break	13.50-14.00
Detroit, auto net	15.50-16.00
Eastern Pa.	19.00-19.50
New York, break	†15.00-15.50
Pittsburgh	17.50-18.00

### MALLEABLE

Birmingham, R. R.	15.00-15.50
New England, del.	18.75
Buffalo	19.50-20.00
Chicago, R. R.	22.50-23.00
Cinci., agrl. del.	16.50-17.00
Cleveland, rail.	21.00-21.50
Detroit, auto, net	17.50-18.00
Eastern Pa., R. R.	18.50-19.00
Pittsburgh, rail	20.50-21.00
St. Louis, R. R.	18.00-18.50

### RAILS FOR ROLLING

5 feet and over	
Birmingham	16.50-17.50
Boston	†16.50-17.00
Buffalo	21.50-22.00
Chicago	21.50-22.00
Eastern Pa.	20.00-20.50
New York	†17.00-17.50
St. Louis	18.50-19.00

### LOCOMOTIVE TIRES

Chicago (cut)	22.00-22.50
St. Louis, No. 1	20.00-20.50

### LOW PHOS. PUNCHINGS

Buffalo	21.50-22.50
Chicago	23.00-23.50
Eastern Pa.	26.00-27.00
Pittsburgh (heavy)	24.75-25.25
Pittsburgh (light)	24.00-24.50

## Iron Ore

Lake Superior Ore	
Gross ton, 51½%	
Lower Lake Ports	
Old range bessemer	\$5.25
Mesabi nonbess.	4.95
High phosphorus	4.85
Mesabi bessemer	5.10
Old range nonbess.	5.10
Eastern Local Ore	
Cents, unit, del. E. Pa.	
Foundry and basic	
56.63% con.	9.00-10.00
Cop.-free low phos.	
58-60%	nominal
Foreign Ore	
Cents per unit, f.a.s. Atlantic ports	
Foreign manganiferous ore, 45.55%	

iron, 6-10% man.	*16.00
No. Afr. low phos.	*16.00
Swedish low phos.	nominal
Spanish No. Africa basic, 50 to 60%	*15.50
Tungsten, spot sh. ton unit, duty pd.	\$15.85-16.00
N. F., fdy., 55%	7.00
Chrome ore, 48% gross ton, c.i.f.	22.00-22.50
*Nominal asking price.	

## Manganese Ore

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



## Bars

Bar Prices, Page 104

**Pittsburgh** — Specifications for hot-rolled bars are heavy at the advanced prices. Mills were out of the market about ten days previous to the announcement and price protection has been difficult to obtain because producers' higher costs start March 16. Deliveries are well extended, with pressure coming from all sources. Hot-rolled carbon bars are quoted 2.45c, Pittsburgh, and hot-rolled alloy steel bars, 3.00c, Pittsburgh.

**Cleveland**—While there has been a slight easing in new business since prices were advanced, the reaction was not as noticeable as anticipated. Auto partsmakers, farm and roadmaking equipment manufacturers continue to specify well in advance, as a means of protection against further tightening on deliveries. Some consumers, finding that their requirements have exceeded expectations, have been forced to re-enter the market. The alloy bar market is particularly active, resulting from the exceptional demand of machine tool builders. Advanced prices on both alloy and commercial steel bars are firm, buyers at present are most concerned over delivery.

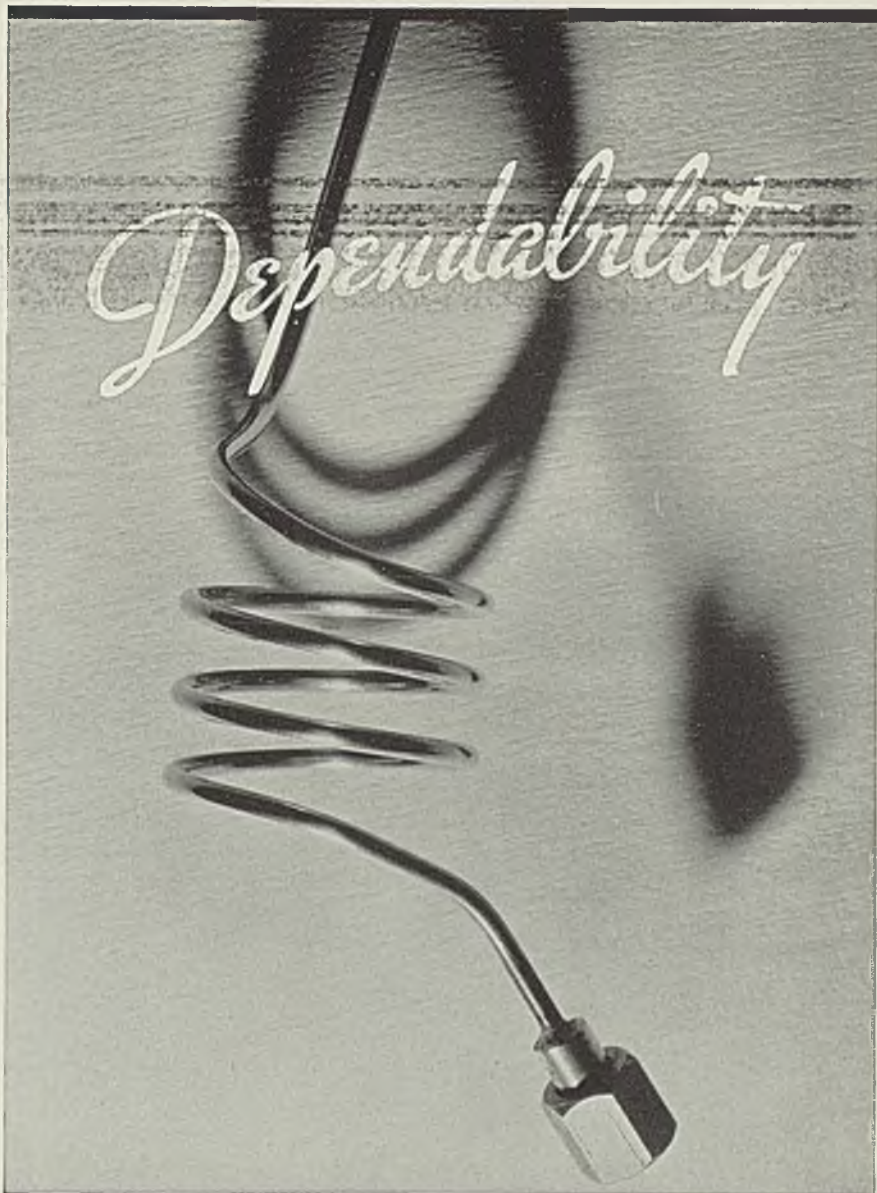
**Chicago**—While new business in bars has been affected slightly by higher prices, mill backlogs remain heavy and pressure for delivery has not lessened. Some suspensions of shipments have resulted from automotive strikes but total deliveries continue at their recent brisk rate. Farm implement and tractor manufacturers continue heavy schedules.

**Philadelphia** — In commercial bars, shipments are now well exceeding new orders, it is said. This situation also prevails in cold-drawn bars, which were advanced \$7 a ton recently, with little actually being booked at the moment at the new prices.

**Detroit**—Establishment of Detroit as a basing point on cold-rolled carbon bars marks changes in the pricing of this commodity in the Detroit and Michigan area. Rotary Electric Steel Co. (Michigan) is a producer of cold-rolled bars in this district.

Base price is 2.95c, Detroit. On carload shipments from the mill into the Detroit district a switching charge of 2½c per 100 pounds applies on carlots of 50,000 pounds or over. On less-carloads up to 12,500 pounds the charge is 10 cents per 100 pounds, and on lots from 12,500 to 50,000 pounds the charge is \$12.50 for the lot.

**Seattle**—Little new business has been taken since the first of the year



# Bundyweld Tubing

**B**UNDYWELD Tubing is double-walled tubing, rolled from copper-coated strip steel. Electric furnaces braze Bundyweld into an absolutely dependable solid structure—copper finished on both inside and outside surfaces. Quotations will be gladly furnished on your blue print or sample.

## BUNDY TUBING CO.

DETROIT, MICHIGAN



but local mills are still rolling orders placed before the recent advance in prices. Effective March 6, in line with the general increase, merchant bars were raised from 2.75c to 3.00c mill prices. The effect of this rapid rise in cost is problematical.

### Tin Plate

Tin Plate Prices, Page 104

**Pittsburgh**—With large backlogs, tin plate producers continue operating at close to 100 per cent of ca-

capacity and expect no letup in the near future, although the situation may be eased slightly because the threat of labor trouble in the steel industry is considered not so serious as before March 1. Tin plate is currently quoted \$4.85 per base box, Pittsburgh.\*

**New York**—An advance in tin plate prices is still regarded as likely. Although with most leading consumers covered by contracts until Oct. 1 the benefits of such an increase would be little felt by producers for some time, it is pointed out.

## Plates

Plate Prices, Page 104

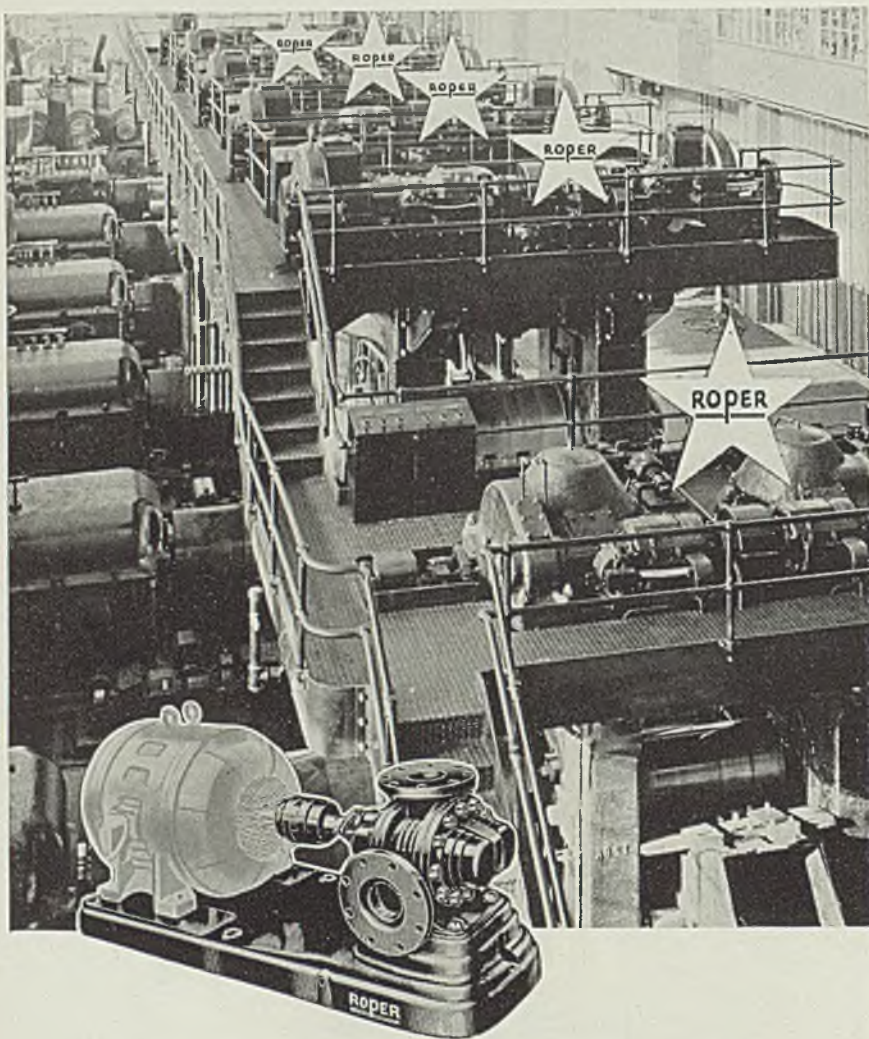
**Philadelphia** — Buying is tapering, following recent heavy orders before the \$4 advance. Eastern producers generally are now booked farther ahead than in many months. Much interest is being centered on bids now being submitted for the steamer to be built for the United States Lines, requiring probably a minimum of 16,000 tons of hull steel. As this work will extend over a long period, a substantial premium in excess of current market prices will probably be quoted, it is said. Bids on the construction of this liner are scheduled to be closed April 1. Baldwin Locomotive Works, Eddystone, it is said, was able to get protections in before the recent price advance on approximately 450 tons of plates for 11 locomotives booked for the Northern Pacific and one of its subsidiaries. The current market on plates is now 2.35c, Coatesville, or 2.435c, delivered, Philadelphia.

**Pittsburgh** — Plate deliveries range around ten weeks and sellers are under strong pressure. Railroad equipment makers especially have been actively specifying. The largest barge contract here in the last six weeks has been taken by American Bridge Co. and involves 1500 tons for six deck barges 196 x 34 feet, for Barrett Lines Inc., Cincinnati. Plates are quoted 2.25c, Pittsburgh, an advance of \$4 a ton.

**Cleveland**—Plate mills have unusually heavy backlogs, in some cases extended eight weeks. Shipments against contracts are heavy, but still little improvement has been noted in deliveries. Miscellaneous requirements are active but by far the largest tonnage is consumed by the railroad and freight car builders. New business has let up slightly, but this was expected. The advance of \$4 has met little opposition as most buyers are much more concerned with deliveries.

**Chicago**—Little change has developed in plate demand as a consequence of the advance of \$4 a ton. Heavy shipments continue to railroads and freight car builders, and mill backlogs show little recession. Heavy deliveries for railroad use appear assured at least to the end of this half while the outlook for additional railroad equipment buying is favorable.

**New York**—Plate buying still is brisk and with protection on some identified structures expiring by the end of March further heavy bookings are anticipated. Completion of the maritime commission personnel is expected to expedite ship-



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Wherever you go these days in steel making circles, you run into Roper installations. The stars here indicate Roper Pumps used for lubricating screwdowns. The pinion gears at left are also lubricated under pressure by Roper Pumps.

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building in the long run. An inquiry of the week involves one to three passenger-cargo vessels for Panama Railway Steamship Co., bids, April 6. Each will require 4500 tons of hull steel. New bids may be asked on two passenger-cargo vessels for the American-South African Steamship Co., bids taken a year ago not having been acted on.

**Birmingham, Ala.**—Production of plates continues heavy with tank-makers, shipbuilders and other consumers taking steady volume.

**San Francisco**—The mill price on plates, Pacific ports, f.o.b. cars, dock, has been raised \$4 a ton from 2.60c to 2.80c, effective March 6. A number of interests have been endeavoring to cover under former prices and protection has been given in many instances. General Petroleum Corp., Los Angeles, has placed two 134,000-barrel steel tanks, calling for 1000 tons, with Consolidated Steel Corp.

**Seattle**—Price advances effective March 6 increased plates \$4 a ton. The week's largest award, 2188 tons, was taken by the Pacific Car & Foundry Co., involved in a contract for 500 box cars for the Northern Pacific. Spokane will receive bids April 1 for two miles of 30-inch steel water mains, estimated at \$48,000. Western Pipe & Steel Co., San Francisco, is low bidder for a 100,000-gallon steel tank at Friant dam. Shipyards are busy and are using considerable plate in repair work.

### Contracts Placed

- 1500 tons, six deck barges, 196 x 34 feet, for Barrett Lines Inc., Cincinnati, to American Bridge Co., Pittsburgh.
- 1000 tons, two 134,000-barrel tanks, General Petroleum Corp., Los Angeles, to Consolidated Steel Corp., Los Angeles.
- 750 tons, vegetable oil tanks, Port Newark, N. J., to Hammond Iron Works, Warren, Pa.
- 600 tons, tanks for Tidewater Associated Oil Co., Avon, Calif., to Western Pipe & Steel Co., San Francisco.
- 265 tons, caissons, Atchafalaya river bridge, Louisiana, to Darby Corp., Kansas City, Mo.
- 150 tons, 18-inch welded steel pipe, metropolitan water district, Los Angeles, to Emsco Derrick & Equipment Co., Los Angeles.
- 100 tons, or more, 300,000-gallon tank, United States construction quartermaster, Sacramento, Calif., to Pittsburgh-Des Moines Steel Co., Pittsburgh.
- 100 tons, or more, lightship, lighthouse bureau, Washington, to Rice Bros., East Boothbay, Me.

### Ferroalloys

Ferroalloy Prices, Page 106

Ferrotungsten in less than carlots has been advanced 5 cents a pound, with lots of 5000 pounds and over now holding at \$1.40 a pound and lots of less than 5000 pounds at 1.45c. No carlot price is being quoted at this time.

## Sheets

Sheet Prices, Page 104

**Pittsburgh**—Demand for sheets is still good and new tonnage has been received at the higher prices. Deliveries are still as far extended as 20 weeks in certain grades. Mills again began receiving stop orders from automotive manufacturers as a result of the new outbreak of strikes in the Michigan plants, but no fears such

as accompanied the suspension of General Motors last January were felt here this time. Backlogs are so large that sheet production will not be affected immediately and the situation may react somewhat to the advantage of other consumers. The new prices carry with them adjustments in gage extras on hot-rolled annealed, cold-rolled No. 20 gage, and vitrenamel, changes all being on the lighter gages, and a reduction in the pickling extras on hot-rolled sheets. In electrical sheets the pres-

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**COLD FINISHED**  
**STEELS**

**LOGICAL** because Wyckoff Cold Drawn Steels enable you to reduce machining operations and thus cut dollars from production costs and add them to profits. It is the one kind of steel that meets the most exacting standards as to accuracy of size and shape . . . uniformity of cross section . . . straightness and smooth finished surface—a refined steel that combines precise physical and chemical analyses.

In addition to the standard Wyckoff Rounds, Squares and Hexagons, we have a most complete line of special shapes including w-i-d-e Flats up to 12" x 2".

**WYCKOFF DRAWN STEEL CO.**  
General Offices: First National Bank Building, Pittsburgh, Pa.  
Mills at Ambridge, Pa. and Chicago, Ill.  
*Manufacturers of Carbon and Alloy Steels*  
Turned and Polished Shafting      Turned and Ground Shafting  
Wide Flats up to 12" x 2"



ent price of 24 gage, which is now base, represents an advance of \$6 a ton over what 24 gage commanded in the first quarter. Thus, field grade, Pittsburgh, is now 3.35c under the new setup; armature is 3.70c; transformer, 6.30c.

**Cleveland** — Higher prices have had little effect in retarding new business, as most consumers are still primarily concerned with deliveries. On some grades of coated sheets a few mills are already out of the market for second quarter and accept business only for deliv-

ery at mills' convenience and prevailing price. Demand for hot-rolled material has grown to such proportions that most producers are having difficulty in supplying the heavy requirements of their finishing mills.

**Chicago**—The Chrysler and Hudson strikes have brought some suspensions in sheet shipments but this has failed to affect the total movement in view of the deferred situation in deliveries. Mill backlogs continue heavy and new orders cannot be shipped until well into second quarter. New business has moder-

ated slightly following recent price advances.

**New York**—Sheet demand still is heavy with consumers freely paying the new prices in an effort to get on rolling schedules as early as possible. An extreme instance is offering by one mill of September delivery on cold-finished sheets, although deliveries on this grade are still available for late May and June. Carrier Corp., Newark, N. J., is an active buyer of galvanized sheets from 18 to 24 gage. In addition to work in air conditioning in the capitol at Washington this company has taken a number of similar installations of considerable size.

**Philadelphia**—Notwithstanding recent sharp advances, sheet demand continues active, with consumers still endeavoring to obtain as favorable a shipping schedule as possible. Deliveries, however, are far extended in practically all cases. Virtually nothing is available for April delivery and in some cases deliveries are extending over into July. Approximately 450 tons of stainless steel, including somewhat under 200 tons of sheets, is understood to have been recently put under protection by the Edward G. Budd Mfg. Co. for 52 streamlined coaches for the Atchison, Topeka & Santa Fe. The Budd company has held up steel tonnage for work on Chrysler and Dodge cars, due to strikes in Detroit.

**Youngstown, O.**—Sheet mills continue under pressure for all grades of sheets. Consumers seemingly are not deterred by higher prices and merely desire earliest possible delivery.

**Cincinnati**—Buying of sheets at the new prices exceeds stated capacity, with deliveries on hot-rolled annealed and galvanized most extended. Purchase orders are being scanned in the light of prior business. Flood effects and other conditions forced carryover of a small tonnage into next quarter.

**St. Louis**—Sheet prices have been advanced \$4 to \$8 per ton, effective immediately. Users are placing substantial tonnages, subject to prices which may obtain during the second quarter. At the moment it is more of a question of deliveries than prices.

**Birmingham, Ala.**—Demand for steel sheets is heavy and mills are well sold, with prospects for continued high rate of production.

## Cold Finished

Cold Finished Prices, Page 105

**Pittsburgh**—Demand for cold-finished bars continues at a high rate, although last week's automotive strike threatened to ease the situa-



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Hotel*

# DETROIT LELAND

**800  
OUTSIDE  
ROOMS  
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\$2.50 single \$3.50 double

*Famous for Fine Foods*

Club Breakfasts—  
30c . . . 50c . . . 75c

Lunches—  
40c . . . 50c . . . 75c

Dinners—  
75c . . . \$1 . . . \$1.25

From the moment you enter our doors you will know that here you are indeed a *guest*. You will appreciate the courteous, cheerful, but *unobtrusive* service for which the Leland is noted. You will revel in the luxury you have a right to expect in a hotel that's as modern as tomorrow's motor car. You will like the superbly convenient downtown location. We hope you will accept our invitation to make the Leland your home in Detroit.

**GARAGE IN CONNECTION**

(AT CASS AND BAGLEY AVENUES)

# D E T R O I T



tion slightly. Cold-finished bars have been advanced \$7 a ton, making the price at Pittsburgh, 2.90c. A Detroit base has been established at 2.95c, which will result in a saving for Detroit and the immediate vicinity.

## Pipe

Pipe Prices, Page 105

**Pittsburgh**—Following increases of five points on black steel pipe and six points on galvanized, boiler tube makers announced a 7½ per cent increase on hot rolled and 10 per cent on cold drawn; 7½ per cent on hot finished mechanical tubing, 6 inches and under, and 15 per cent on cold drawn. Already, demand for butt weld, lap weld, and seamless at the higher prices has been good, indicating great strength of current requirements. Oil country goods, advanced \$5 a ton, are moving unusually well.

**Cleveland**—The heavy rush of orders placed by those seeking the lower prices before they are advanced April 1, have forced most mills out of the market for first quarter delivery. However, some jobbers are already quoting the advanced figures. Pipe requirements for industrial purposes continue to predominate. Cast pipe awards have been limited to relatively small tonnages, due primarily to seasonal conditions. A \$5 advance was announced March 8, effective immediately on new business, but on jobs on which bids were received before March 8, a protection period was granted until March 20.

**Chicago**—Cast pipe prices have been advanced \$5 a ton. This brings quotations to highest levels in nearly 13 years. No change has been announced in price of fittings.

**Boston**—While buying is light, cast pipe inquiry is slightly heavier. Indications are that utilities will place more tonnage during 1937 than for several years, both steel and iron pipe. The Indian Orchard, Mass., fittings foundry has booked valves and gates for Hartford, Conn., totaling close to \$60,000, cast pipe going to the Burlington, N. J., foundry. Most of the pipe for this project is steel, and as previously reported, went to the Dunkirk, N. Y., fabricator. At 3.50c per pound, delivered, city of Boston has placed 125 tons of cast pipe fittings with Franklin Foundry Co., Hyde Park district.

**New York**—Cast pipe prices are up \$5 to \$50, eastern foundry, class B, six inch and over. Inquiry is much heavier, about 9000 tons being bid. This includes 2800 tons for New York city yard stocks, 3700 tons for

Mamaroneck, N. Y., and 100 tons for Yonkers, N. Y., bids being in on the latter. Upturn in inquiry, to be followed by improved buying, comes when most foundry backlogs are low. Contractor-buyers who bid on specified projects just before the advance will be protected at old prices for limited period.

**Philadelphia**—Pipe makers have experienced a rush, as distributors seek protection. It is believed in some quarters that it will be near end of second quarter before pipe mills will feel materially benefit of

recently announced price increases, which amounted to \$10 on black pipe, \$12 on galvanized pipe and \$5 on line pipe.

**Seattle**—Demand for cast iron pipe is light with no large projects up for figures. Dealers are replenishing stocks following opening of water transportation. Waterworks supplies are moving in fair volume. Two or three pipe awards are pending, awaiting approval from Washington.

**San Francisco**—Improvement in demand for cast iron pipe is noted

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—but any "A.W." Rolled Steel Floor Plate also gives you the most economical floor covering, and the most efficient. Its first cost is low, and there is no maintenance cost. It drains quickly, is easily cleaned. It is oil proof, crack proof, heat proof.

Specify  
**A.W. ROLLED STEEL  
FLOOR PLATE**  
for Safety!

Above, "A.W." Diamondette Pattern, for safety, foot traffic and light trucking. Noiseless.

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Write for literature showing five "A.W." Floor Plate patterns to meet all needs, and giving complete engineering data.

"A.W." Rolled Steel Floor Plate can be cut to any required shape. Installation is permanent — and is made quickly, without disturbing men or production.

The three patterns are here shown half-size.

**ALAN WOOD STEEL CO.**  
CONSHOHOCKEN, PA.  
Branches: Philadelphia, New York, Boston, Detroit, Los Angeles, San Francisco, Seattle, Houston  
111 YEARS' IRON AND STEEL MAKING EXPERIENCE



and several large sized lots are now up for figures. Outstanding among these are 3500 tons of 8 and 12-inch pipe for Los Angeles, bids on which have just been opened. Awards aggregated 2210 tons and brought the total for the year to 5357 tons compared with 7147 tons for the corresponding period in 1936.

### Steel Pipe Placed

3000 tons, 6-inch seamless pipe, for 60-mile pipe line, for Barnsdall Oil Co., Tulsa, Okla., to Jones & Laughlin Steel Corp., Pittsburgh.  
2500 tons, 37 miles of 8½-inch welded

steel pipe for unnamed middle western petroleum interest, to A. O. Smith Corp., Milwaukee.  
100 tons or more, 325 lengths, 20-inch shore pipe, U. S. engineer, Galveston, Tex., to Wyatt Metal & Boiler Works, Houston, Tex., at \$29.95 per length, f.o.b. Galveston; total award \$9,733.75.

### Steel Pipe Pending

Unstated tonnage, 49,500 feet galvanized welded steel pipe and 3300 feet welded black, small sizes, Panama; Albert & Davidson Pipe Corp., Brooklyn, low; bids March 4.

### Cast Pipe Placed

400 tons, Marceline, Mo., to United

States Pipe & Foundry Co., Burlington, N. J.

377 tons, 4 to 12-inch, Magnolia Park extension, South Gate, Calif., to United States Pipe & Foundry Co., Burlington, N. J.

260 tons, 6 to 12-inch, Arcadia, Calif., to United States Pipe & Foundry Co., Burlington, N. J.

150 tons, Olean, N. Y., to United States Pipe & Foundry Co., Burlington, N. J.

134 tons, 6 to 12-inch, San Bernardino, Calif., to National Cast Iron Pipe Co., Birmingham, Ala.

### Cast Pipe Pending

2800 tons, 16-inch and under, yard stocks New York; bids March 16, department of purchase, delivery to all five boroughs.

1925 tons, 4 to 16-inch class C, Milwaukee; United States Pipe & Foundry Co., Burlington, N. J., low bidder.

1000 tons, 16-inch and under, Yonkers, N. Y.; bids in.

350 tons, 4 to 16-inch, government air depot, Sacramento, Calif.; bids March 16.

300 tons, 8-inch, procurement division, treasury department, Buffalo; March 16.

203 tons, fittings, Chicago; bids March 22.

184 tons, 4 and 6-inch, South Gate, Calif.; bids March 16.

100 tons, 6 and 8-inch, procurement division, treasury department; delivery, Long Beach, N. Y.

## Behind the Scenes with STEEL

### Don't Write—

FOR 35 cents, you may recall, you can send a 15-word "courate" telegram to any part of the United States; but you are limited on the subject matter of your telegram. It's O.K., however, to discuss (we quote from Western Union stipulations) "time of arrival, health of sender or party, state of weather, characterization of trip, time of departure, next destination or destinations, and time of arrival at destination."

For example, W. U. says this wire is acceptable: ARRIVED 7 PM ALL WELL TRIP AND WEATHER PERFECT LEAVING TOMORROW ARRIVE OMAHA SUNDAY LOVE. We question where the word "love" fits into the above regulations, but maybe it comes under "health of sender." Furthermore, who would want to arrive in Omaha on Sunday?

We tried to work out a wire which we could send home if we had arrived at Split Lip, Nevada, for instance, with only 35 cents left. It might go thusly: JUST IN FEEL LOUSY WIND NORTH-EAST BOXCAR UNCOMFORTABLE HITCHHIKING CHICAGO MIDNIGHT THERE BY SUMMER KISSES.

### Gulp

SPRING is here! We know because we saw a couple of swallows in STEEL last week. On page 7 Goodrich showed the man who "makes the belt swallow its tail" while on page 11 there was Baldwin-Southwark displaying "a pipe that swallows a river." Of course two swallows don't make a drink, but those two headlines make the reader sit up and take notice.

And speaking of advertisements, that two-page spread in four colors which Bethlehem ran on pages 8 and 9 was a crackerjack.

### Swift Couriers

A WEARY postman dropped a letter on our desk the other day, the envelope appearing to have been through several floods, dust storms and tornados. Closer inspection showed it to be a letter we had sent to a New York company Sept. 1, 1931. On the outside was stamped "Return to Sender". After 5½ years the post office department apparently gave up trying to locate the addressee and sent the thing back in despair.

If that letter could only talk,

what a story it probably could tell. Days and weeks of languishing in the bottom of a postman's sack. Months and years loitering in the dust of postal stations. Being picked up hundreds of times by postal clerks and then tossed aside as they muttered, "That thing again."

Then finally the joy of at last being sent on the homeward journey. Five and a half years on the road is a long time, especially when you're in the hands of the government. Wait until we tell Farley about this!

### Sing, Baby, Sing

THAT somewhat different song writer", W. F. Dissell, whose works include *Resurrection Blues*, *My Little Eskimo*, *Cupid's Dart*, *Rose of Monterey*, *Tarzan of the Apes* and *Chiquita* writes in to ask us if we would be interested in publishing a volume of over 100 song lyrics and other poems he has concocted.

Sounds like a good opportunity to capitalize on the lyrical tastes of our clientele but we're afraid stuff like *Resurrection Blues* and *Tarzan of the Apes* doesn't fit in very well with the current craze for swing music. What we're looking for is something like *I've Got Those Sitdown Strike*, *CIO*, *UAW*, *Collective Bargaining Blues* — *I Mean Blues*.

### Pint-Size

HANDY pocket-size reprints of H. A. E. Gibson's recent article in STEEL on the nickel-copper high-strength steels have been whipped out by the Yoloy sales department of Youngstown Sheet & Tube Co. The pages are just about half the size of those of the original article, and the booklet will make a neat addition to your technical library.

Just drop a line to Yoloy in Youngstown and we are sure a copy will be forthcoming.

### Worthy Contribution

ALL metallurgists should study carefully Doc Herty's masterful research on grain size and its relation to hardenability at different temperatures, starting on page 46 of this issue. When Herty talks, it pays to listen. Are you listenin'?

—SHRDLU

## Transportation

### Track Material Prices, Page 105

The Santa Fe has ordered 45 sleeping cars to be used in conversion of its crack train operating between Chicago and Los Angeles, into a light-weight streamline train. These cars are in addition to the 52 stainless steel cars ordered recently. New York Central and Pennsylvania railroads also have announced plans for the improvement of their Twentieth Century Limited and Broadway Limited units. Completely new equipment will be built for both roads by the Pullman-Standard Car Mfg. Co. While the market for freight cars has developed few additional orders recently, the purchase of a substantial number is understood to be under consideration.

Pennsylvania will open bids March 24 on 2300 freight cars, for construction in outside shops, it is generally believed. An even larger number of cars may be purchased.

In line with trade expectations, domestic freight car orders in February, as recently compiled, dropped sharply involving 4972 cars, against 17,806 in January. Lighter buying last month was attributable in part to the deadline Jan. 30, for protections on steel at fourth quarter prices. The total for the first two months of 22,778, compares with



8950 in the corresponding period of 1936.

	1937	1936	1935	1934
Jan.....	17,806	2,050	24	152
Feb.....	4,972	6,900	806	19,725
2 mo....	22,778	8,950	830	19,877
March....		632	0	30
April....		4,427	350	800
May.....		8,900	2	717
June.....		5,200	5,151	1,835
July.....		7,229	500	19
Aug.....		225	200	105
Sept....		1,750	875	7
Oct.....		2,210	1,250	75
Nov.....		1,550	100	254
Dec.....		23,450	10,050	110
Total..	64,643	19,308	23,829	

### Car Orders Placed

- Board of Transportation, New York, 150 subway cars on a joint bid by the American Car & Foundry Co. New York, and Pullman Standard Car Mfg. Co., Chicago; 75 cars will be built by American Car at Berwick, Pa., it is said; and 75 by the latter company in the Chicago district.
- Canadian National, 100 refrigerator cars and 200 automobile cars, to Pullman-Standard Car Mfg. Co., Chicago.
- Central Railroad of Georgia, five coaches and three express cars, to Bethlehem Steel Co., Bethlehem, Pa.
- Detroit, Toledo & Ironton, 400 box cars to the Greenville Steel Car Co., Greenville, Pa., and 350 automobile cars to the Bethlehem Steel Co., Bethlehem, Pa.
- Duluth, Missabi & Northern, 500 ore cars to the General American Transportation Co., Chicago.
- Erie, 80 milk cars to Greenville Steel Car Co., Greenville, Pa.
- Great Northern, 12 coaches to the Pullman-Standard Car Mfg. Co., Chicago.
- New York Central and Pennsylvania, complete passenger equipment for Twentieth Century Limited and Broadway Limited trains to Pullman-Standard Car Mfg. Co.
- Santa Fe, 45 streamlined sleeping cars, to Pullman-Standard Car Mfg. Co., Chicago; in addition to 52 passenger cars placed recently with Edward G. Budd Mfg. Co.
- Santa Fe, 52 streamlined coaches, to Edward G. Budd Mfg. Co., Philadelphia.
- St. Louis Southwestern, 10 coaches, to Pullman-Standard Car Mfg. Co., Chicago.

### Car Orders Pending

- Canadian National, 50 passenger cars; bids asked.
- Norfolk & Western, nine postal cars, bids asked.
- Pennsylvania, 1000 mill-end gondolas Class G-27; 1000 double door box cars, class X-32-A and 300 cement cars, Class H-30, bids opening March 24; understood these cars will be built in outside shops, also that more than the 2300 above specified may be eventually purchased.

### Locomotives Placed

- Northern Pacific, 11 locomotives to Baldwin Locomotive Works, Eddystone, Pa., and six to American Locomotive Co.

### Locomotives Pending

- Chicago Great Western, two locomotives.
- National Railways of Mexico, 10 locomotives, bids asked.
- Seaboard Air Line, ten locomotive tenders.

### Buses Booked

- American Car & Foundry Motors Co., New York: 10 for Boston Elevated Railway, Boston; 10 for Montreal Tramways Co., Montreal; 1 for Oakdale Community Garage Bus Line, Dedham, Mass.
- American Car & Foundry Motors, New

York, 30 motor coaches for Staten Island Coach Co., New York.

### Pig Iron Is Imported

Philadelphia—Approximately 1645 tons of pig iron from British India arrived here in the week ended March 6. Other importations include 149 tons of structural shapes, 74 tons of steel bars, 50 tons of steel bands and four tons of steel hoops, all from Belgium; and nine tons of manganese ore from France.

# Service!

1906  1937

QUALITY · DEPENDABILITY

## DAMASCUS MANGANESE CASTINGS

Manganese and Alloy Steel Castings One Half to One Thousand Pounds Produced in our modernly equipped foundry from electric furnace steel and heat-treated in automatically controlled gas-fired furnaces.

**The DAMASCUS STEEL CASTING CO.**  
New Brighton, Pa.  
(Pittsburgh District)

# DAMASCUS STEEL CASTINGS

(Manganese and Alloy)



## Strip

Strip Prices, Page 105

**Pittsburgh** — During the past week strip sellers received good-sized tonnages at the new prices. One producer in this district estimates that about 10 per cent of his present backlog is at the new prices. Stop orders were received from automotive manufacturers affected by strikes, but the situation is believed only temporary and not likely to have effect upon operations at present. Hot-rolled strip, Pittsburgh, is now quoted 2.40c, and cold rolled, Pittsburgh, is 3.20c. The carbon classifications of strip steel are now as follows: 0.26-0.50, Pittsburgh or Cleveland, 3.20c; 0.51-0.75, Pittsburgh or Cleveland, 4.45c; 0.76-1.00, Pittsburgh or Cleveland, 6.30c; over 1.00, Pittsburgh or Cleveland, 8.50c; Worcester, Mass., 20 cents higher in each grade.

**Cleveland**—Strip mills continue to operate close to capacity with little change expected during second quarter. Shipments this month have shown some improvement over the first two weeks of February. Most of this tonnage has gone into

immediate consumption although in some cases a few buyers have been able to rebuild stocks. Requirements from auto partsmakers and electrical equipment manufacturers are particularly active.

**Chicago**—Strip specifications continue heavy and while new business is slightly less active than before the price advance, producers are comfortably booked and are in a position to maintain brisk schedules during the next 30 to 60 days. Automotive strikes have been reflected in occasional delay on deliveries but the total movement has not been affected materially.

**Boston**—Cold strip mills will be unable to ship all first quarter tonnage before April 1 and are striving to clear books of orders taken before the advance. Some volume is being booked at 3.40c, Worcester, but new buying has generally declined. In this district covering at open prices for second quarter was not heavy. Cold strip deliveries are still six to eight weeks. Hot strip shipments are active and some users were unable to cover as heavily as desired before the \$5 advance.

**Philadelphia** — Recent sharp advances in strip forced in considerable tonnage, with little now avail-

able before May 1. Both hot and cold-rolled strip in recent weeks have been available for relatively early shipment, compared with most other light flat products.

**Youngstown, O.**—So heavy is the inflow of new strip business that considerable tonnage is being refused because of inability to roll it in specified delivery time. Little sales resistance is being encountered, buyers apparently being more interested in deliveries than in price. Some buyers are urging third quarter business upon the mills which, however, will not entertain such proposals at this time.

## Wire

Wire Prices, Page 105

**Cleveland** — Wire mills report backlogs rivaling those of 1929, particularly in some products on which deliveries extend well into May. Agricultural requirements and demand from bolt and nut and wire specialty manufacturers have aided materially in bolstering domestic demand.

**Chicago**—Shipments of wire and wire products are heavy but producers have been able to make little reduction in backlogs. Deliveries of merchant products still are rising and specifications for plain wire reflect heavy consumption. New business has been slightly less active following recent price advances though most new business placed before the upturn was stimulated principally by definite needs of consumers. Automotive requirements have been restricted somewhat.

**Boston**—Wire buying at higher prices, 3.00c, Worcester, for plain and 3.60c, spring wire, has been light, mostly by a limited number of consumers in need of stock. Covering for second quarter at new quotations has not started in volume. Mills generally will not be able to ship all first quarter orders before the end of this month and will carry over for shipment considerable volume for April delivery despite high finishing operations. Delivery continues to be paramount with many consumers.

## Semifinished

Semifinished Prices, Page 105

The higher prices in effect March 5 on skelp, billets and blooms, sheet bars, forging billets and wire rods have had little effect upon demand for semifinished, which continues in its unusually strong position. Billets, blooms and slabs, sheet bars and forging billets are up \$3 a ton; skelp was advanced \$6 a ton. Pro-

**New 13oz.**

**WELDIT**  
MODEL W  
**WELDING TORCH**  
with *BUILT-IN Automatic GAS AVER*

**SAVES fuel—reduces welding cost—eliminates idle flame hazards.** As operator grasps handle of torch placing thumb on lever in natural position, full welding flame is instantly on. Release thumb, and automatically flame is reduced to pilot size. No re-lighting or re-adjusting flame between welds. Weighs only 13 ounces, no mechanism in handle, fuel control valves are conveniently located in front of torch handle. Actual savings will soon pay for torch.

Literature on request.

**WELDIT ACETYLENE CO.**  
642 BAGLEY AVE. DETROIT, MICH.

Test this **WELDING TORCH** *Free* FOR TWO WEEKS IN YOUR PLANT

Automatically **ON** IN USE

Automatically **OFF** NOT IN USE



ducers are under great pressure to meet demands from their own finishing mills and outside consumers.

# Shapes

Structural Shape Prices, Page 104

**New York**—Led by 8500 tons for another west side elevated highway section, structural steel tonnage placed is heavier. American Bridge Co., Pittsburgh, is low on 4000 tons for the American crossing, St. Lawrence river bridge superstructure, Canadian Bridge Co. being low on the Canadian crossing structural steel, 3000 tons.

**Philadelphia**—With protections expiring at the end of this month on work figured before the recent price advance, considerable structural work is expected to be closed before April. Policies with respect to protections on identified projects are not uniform. One large mill is allowing protections for only 30 days beyond the end of the month in which the protections sought, with specifications to be within three months beyond the end of the expiration date for acceptance.

**Pittsburgh**—Structural shape inquiries were heavy last week and included numerous large-tonnage projects. Awards were led by 2950 tons for the Ford Motor Co. tire plant, placed with Whitehead & Kales. The pending jobs include 6600 tons for various buildings for the Aluminum Co. of America and 3700 tons for the Gill-Montague bridge, Turners Falls, Mass. Shapes are quoted 2.25c, Pittsburgh.

**Cleveland**—Although deliveries have been extended still further due to the fact that most buyers are taking advantage of the price protection period, there is still room on some schedules to make deliveries this quarter. Most fabricators report that it is becoming increasingly difficult to get material. Awards last week totaled 1500 tons, by far the best week so far this year. Considerable tonnage is pending from private and public sources.

## Shape Awards Compared

	Tons
Week ended March 13.....	35,780
Week ended March 6 .....	17,597
Week ended Feb. 27 .....	22,708
This week, 1936 .....	27,762
Weekly average, 1936 .....	16,332
Weekly average, 1937.....	27,297
Weekly average, February..	22,141
Total to date, 1936 .....	250,562
Total to date, 1937.....	300,270

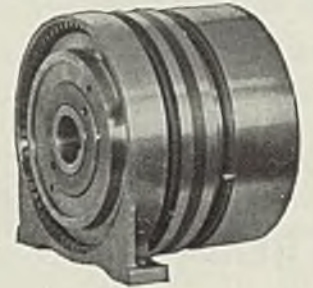
**Chicago**—Bridge work furnishes the major activity in fabricated structural steel awards. New inquiries are somewhat below average for the country, but fabricators are fairly well engaged and specifications for plain material are bolstered by heavy requirements of railroads and freight car builders.

**San Francisco**—Awards this week were the third largest of the year and totaled 7646 tons, bringing the aggregate to 41,474 tons, compared with 28,414 tons last year. Included among inquiries is approximately

1300 tons for a depot supply building, for the government air depot, Sacramento, Calif.

**Seattle**—Specifications are out for Seattle's light department transmission tower project from Nehalem to Seattle. Bids will be opened by the reclamation bureau at Fairfield, Mont., March 25 for work at the Gibson dam spillway involving 91 tons of gates and miscellaneous and 75 tons reinforcing. Alaska Road Commission has called bids at Seattle March 22 for 17 tons involved in an 80-foot span for Alaska.

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## Shape Contracts Placed

- 8500 tons, westside elevated highway, 135th-145th streets, New York, to Bethlehem Steel Corp., Bethlehem, Pa.; P. T. Cox Contracting Co., New York, general contractor.
- 2950 tons, tire plant, Ford Motor Co., Dearborn, Mich., to Whitehead & Kales Co., Detroit.
- 2400 tons, Schuylkill generating station, Philadelphia, to Lehigh Structural Steel Co., Allentown, Pa.
- 1670 tons, bridge, Potomac river, Frederick county, Maryland—Loudoun county, Virginia, to American Bridge Co., Pittsburgh; G. F. Hazelwood, Cumberland, Md., general contractor.
- 1495 tons, state bridges, Texas, to North Texas Iron & Steel Co., Ft. Worth, Tex.
- 1175 tons, plant extensions, Owen-Illinois Glass Co. at Huntington, W. Va., 900 tons the Bethlehem Steel Corp., Bethlehem, Pa., and 275 to the Belmont Iron Works, Eddystone, Pa.
- 1000 tons, additional, Federal Building, Los Angeles, to Consolidated Steel Corp., Los Angeles.
- 1000 tons, bridge, southern branch, Elizabeth river, Gilmerton, Va., to Virginia Bridge Co., Roanoke, Va.; Carpenter Construction Co., Norfolk, Va., general contractor.
- 1000 tons, power house, Sheffield, Ala., to Milwaukee Bridge Co., Milwaukee.
- 950 tons, including plates, wind tunnel, Langley Field, Virginia, to Pittsburgh-Des Moines Steel Co., Pittsburgh; Stacey Mfg. Co., Cincinnati, general contractor.
- 900 tons, addition to Museum, for New York Historical Society, Central Park West, New York, to Taylor-Ficheter Structural Steel Co., New York; through Turner Construction Co., New York.
- 870 tons, state bridges, Oklahoma, to J. B. Klein Iron Foundry Co., Oklahoma City, Okla.
- 800 tons, 12-story apartment, East Ninety-fourth street, New York, for Transboro Realty Corp., New York, to Harris Structural Steel Co., New York.
- 800 tons, crane runway, pipe storage yard, Youngstown, O., for Republic Steel Corp., Cleveland to Ingalls Iron Works, Birmingham, Ala.
- 730 tons, mill buildings, Kingsport, Tenn., to Converse Bridge & Steel Co., Chattanooga.
- 650 tons, warehouse building, Benwood, W. Va., for Wheeling Steel Corp., Wheeling, W. Va., to Ingalls Iron Works, Birmingham, Ala.
- 600 tons, building, Reynolds Tobacco Co., Winston-Salem, N. C., to Belmont Iron Works, Eddystone, Pa.
- 525 tons, bridges, All-American Canal, Calif., specification 718, to Milwaukee Bridge Co., Milwaukee; previously reported as 400 tons and awarded to Wisconsin Bridge & Iron Co., Milwaukee.
- 520 tons, bridge, Pennsylvania railroad, Colonia, N. J., to American Bridge Co., Pittsburgh, through Centaur Construction Co., New York.
- 500 tons, 12-story apartment, Cornell Apartments Corp., East Eighty-seventh street, New York, to Harris Structural Steel Co., New York.
- 450 tons, power house, Public Utility Engineering & Service Corp., San Diego, Calif., to Bethlehem Steel Corp., Los Angeles.
- 420 tons, bridge, Inota, Okla., to Patterson Steel Co., Tulsa, Okla.
- 350 tons, mill building, for Steel & Tubes Inc., Cleveland, to Austin Co., Cleveland.
- 350 tons, office and factory addition, for

- Standard Register Co., Dayton, O., to Austin Co., Cleveland; Fort Pitt Bridge Works, Pittsburgh, will furnish steel.
- 340 tons, post office, Wheeling, W. Va., to Pittsburgh-Des Moines Steel Co., Pittsburgh.
- 335 tons, state highway bridge, Sullivan county, Pennsylvania, to Phoenix Engineering Co.,
- 300 tons, state bridge, New Market, Middlesex county, New Jersey, to American Bridge Co., Pittsburgh; through Weldon Construction Co., Westfield, N. J.
- 300 tons, north tunnel, Midtown-Hudson tunnel, New York, for Port of New York authority, to American Bridge Co., Pittsburgh.
- 295 tons, building addition, Western Clock Co., Peru, Ill., to Mississippi Valley Structural Steel Co., Decatur, Ill.
- 280 tons, alterations to Dock street freight station, Philadelphia, for Pennsylvania railroad, to Belmont Iron Works, Philadelphia.
- 260 tons, state highway bridge, route 61038, Pine Grove, Pennsylvania, to Lackawanna Steel Construction Corp., Buffalo.
- 255 tons, foundations, west side elevated highway, Spring to Cedar streets, New York, to Harris Structural Steel Co., New York; Poirier & McLane Corp., general contractors.
- 250 tons, platforms and sheds, Pennsylvania station, Philadelphia, for Pennsylvania railroad, to Phoenix Bridge Co., Philadelphia.
- 240 tons, alterations to building, Russek's store, Brooklyn, N. Y., to Harris Structural Steel Co., New York.
- 235 tons, bridge 40 TR-FA 513-I, St. Louis, to Stupp Bros. Bridge & Iron Co., St. Louis.
- 225 tons, state bridge, Cedar Brook, N. J., to Phoenix Bridge Co., Phoenixville, Pa.
- 200 tons, plant building, National Adhesive Co., Chicago, to A. F. Anderson Iron Works, Chicago.
- 190 tons, brewery building, Piel Bros., Brooklyn, to Dreier Structural Steel Co., New York.
- 190 tons, store building, Salt Lake City, Utah, to Midwest Steel & Iron Co., Denver.
- 180 tons, nurses home, state hospital, Taunton, Mass., to West End Iron Works, Boston.
- 175 tons, state bridge, Souhegan river, Greenville, N. H., to Boston Bridge Works Inc., Cambridge Mass.; John Ioffala Construction Co., Dedham, Mass., general contractor.
- 135 tons, reconstruction, state bridge, New York & Long Branch railroad, route 4-N, section 10A, Elberon, N. J., to Bethlehem Steel Corp., Bethlehem, Pa.
- 135 tons, building addition, Philadelphia Carpet Co., Philadelphia, to Norris Iron & Wire Co.
- 125 tons, Loews theater, Bronx, N. Y., to Belmont Iron Works, Philadelphia; through Sol Lustbader Inc., New York.
- 110 tons, treasury department, invitation 3131, San Francisco, to Schrader Iron Works, San Francisco.
- 110 tons, building, Corning Glass Works, Corning, N. Y., to Fort Pitt Bridge Works, Pittsburgh.
- 105 tons, theatre building, Gary Ind., to Butler Steel Foundry & Iron Co., Chicago.
- 105 tons, oil tanks, Worcester, Mass., to Hammond Iron Works, Warren, Pa.
- 100 tons, sheet piling, bureau of reclamation, invitation A-42,164-A, Potholes, Calif., to Bethlehem Steel Corp., Bethlehem, Pa.
- 100 tons, steel stringer bridge, Center Bridge road, over Nashua river, Lancaster, Mass., to American Bridge Co., Pittsburgh; flood replacement project, bids Feb. 23.
- 100 tons, addition to American Forge



Co., Berkeley, Calif., to Moore Drydock Co., Oakland, Calif.  
 100 tons, treasury department, invitation 21,039, Santa Monica, Calif., to Kyle Steel Construction Co., Los Angeles.  
 100 tons, angles, Federal Prison Industries, Lewisburg, Pa., to Carnegie-Illinois Steel Corp., Pittsburgh.

## Shape Contracts Pending

7000 tons, highway bridges, St. Lawrence river, near Wells Island, New York; American Bridge Co., Pittsburgh, low on 4000 tons, superstructure, American crossing; Canadian Bridge Co., Walkerville, Ont., low on 3000 tons, superstructure, Canadian crossing; bids March 10, to Thousand Islands Bridge authority, Watertown, N. Y.; Robinson Steinman, New York, consulting engineers.  
 6600 tons, buildings, various locations in New York, Pennsylvania and Tennessee, for Aluminum Co. of America, Pittsburgh.  
 5000 tons, court house, Ninth and Market streets, Philadelphia, specifications expected in April; approximately 2000 tons of billet steel bars also required.  
 4000 tons, Queens-Midtown tunnel, New York, bids soon.  
 1600 vocational school, Brooklyn, N. Y.; bids March 22.  
 1500 tons, addition, Washington Irving high school, New York; D. M. & W. Construction Co., Brooklyn, low.  
 1200 tons, changes to Honda bridge and Moser channel bridge, Contracts H-1 and H-2, for Overseas Road and Toll Bridge District, Miami, Fla.  
 1100 tons, farmers exchange unit, Cambridge, Mass.  
 1100 tons, hockey rink, Cleveland; plans out.  
 1000 tons, manufacturing and office buildings, Fremont, O., for H. J. Heinz Co., Pittsburgh.  
 900 tons, public school 152, Queens, N. Y.; D. M. & W. Construction Co., Brooklyn, low.  
 900 tons, Pennsylvania railroad vladout, Silver Creek, N. Y., bids March 18.  
 800 tons, power house, for New York State Electric & Gas Corp., Dresden, N. Y.  
 700 tons, seven buildings, West-Vaco Chlorine Products Corp., Newark, Calif.; bids opened.  
 700 tons, extension to factory building, Albany Felt Co., Albany, N. Y.  
 500 tons, transmission towers, for Seattle's municipal light department; bids April 1.  
 500 tons, Lorain avenue bridge, Cleveland; plans out.  
 500 tons, building, for Immaculate Conception seminary, Darlington, N. J.  
 500 tons, public school No. 254, Brooklyn, N. Y.; bids March 16.  
 400 tons, Seward power plant addition, Seward, Pa., for Pennsylvania Electric Co.  
 400 tons, alterations to East river station, for Consolidated Edison Co., New York.  
 400 tons, three-span steel truss and one-span bridge, Armstrong and Westmoreland counties, Pennsylvania; Frank Kukurin, Wilmerding, Pa., low bidder at \$98,645.25, on March 5 bids.  
 300 tons, store, Benson & Rixon Co., Chicago.  
 250 tons, addition, public school 8, Staten Island, N. Y.; Globe Building Co., New York, low.  
 225 tons, addition to Calaveras Cement Co., San Andreas, Calif; bids opened.  
 200 tons, spillway gates, specification No. 726, Casper, Wyo., for United States bureau of reclamation.  
 177 tons, building, Tidewater Associated Oil Co., Avon, Calif.; bids opened.  
 175 tons, sub-station C, Pacific Gas &

Electric Co., Oakland, Calif.; bids opened.  
 165 tons, factory building, for De Vilbiss Co., Toledo, O.; bids in.  
 150 tons, 6-story apartment, San Francisco; bids opened.  
 132 tons, department store, Sharon, Pa., for Sharon Store Co., Sharon, Pa.; bids in.  
 125 tons, post office, Wausau, Wis.  
 120 tons, state bridges, Indiana.  
 117 tons, building, for Perfection Vault Co., Gallon, O.; bids in.  
 Unstated tonnage, infirmary building Camp Custer, Mich.; E. W. Sproul Construction Co., Chicago, general contractor.

vance engineering charges. Bookings picked up last week after they had been light during the preceding two weeks.

**Cleveland** — Reinforcing awards are confined to tonnages well under 100 tons, from private sources, although pending work includes considerable tonnage in conjunction with structural material for state grade crossings and other public developments. The recent advance of \$6 is expected to drive in a number of jobs seeking protection. Mills deliveries continue between two and three weeks.

**Chicago**—Despite absence of large

# Reinforcing

Reinforcing Bar Prices, Page 105

**Pittsburgh**—Because of extended deliveries and wage advances effective March 16, reinforcing bar sellers generally have been forced to refuse protection against last Friday's price advance of \$6 a ton. Rollings for jobbers extend in some instances well into May. The \$1 a ton differential has been reinstated in the Chicago and Birmingham regions, and the bending charges advanced to \$8 and \$18. It is reported that jobbers probably will ad-

## Concrete Awards Compared

	Tons
Week ended March 13.....	4,997
Week ended March 6.....	7,917
Week ended Feb. 27.....	6,993
This week, 1936.....	6,385
Weekly average, 1936.....	6,005
Weekly average, 1937.....	3,914
Weekly average, February..	3,877
Total to date, 1936.....	99,735
Total to date, 1937.....	43,057

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orders for reinforcing bars, shipments continue heavy and a fair amount of business is in prospect. Bridge work in Illinois and nearby states will be more active soon. While orders for private building are fairly numerous, small lots generally are involved. Billet steel reinforcing bars now are 2.60c, with rail steel bars 2.45c.

**Boston**—Bridge requirements are more than 1000 tons, a good part being new inquiry. A Connecticut river structure, closing March 16, takes 575 tons. Buying is light and the higher price of 2.94c, Boston, for billet bars, is not subject to much test. Reinforcing bar prices have been the one weak spot in the steel price structure.

**New York**—Contracts involving 3000 tons, including highway mesh, have been closed, mostly requirements for projects bid before the \$6 a ton advance. About 1400 tons of bars will be active soon for additional contracts, Queens-Midtown tunnel, New York. Practically all pending tonnage for New York state highways and bridges on work bid earlier in the year has been bought.

Reinforcing sellers are withdrawing protection on old specified projects March 15 and after that date will apply new prices on unplaced tonnage.

**Philadelphia**—While reinforcing bar orders have continued light, a substantial tonnage is accumulating with further work in prospect as the spring season approaches. While substantial tonnage is temporarily under protection where work was figured before recent price advance

of \$6 a ton, the market is strong, it is said, at the new levels on all new work. The current market is 2.84c, delivered Philadelphia.

**San Francisco**—All coast mills are booked well in advance and outlook is encouraging. Awards totaled 932 tons and brought the aggregate to 15,778 tons, compared with 56,578 tons for the same period a year ago.

**Seattle**—The anticipated price increase did not stimulate buying in this territory where demand has been slow for several weeks.

## Reinforcing Steel Awards

1200 tons, reinforced concrete bulkhead, Sabine Lake, opposite Port Arthur, Texas, to Concrete Engineering Co. Inc. Omaha, Nebr.; J. De Puy, San Antonio, general contractor.

700 tons, west side elevated highway, 135th-145th streets, New York, to Bethlehem Steel Corp., Bethlehem, Pa.; P. T. Cox Contracting Co., New York, general contractor.

500 tons, mesh, Morris-Oneonta highway 1302, Otsego county, New York, to Bethlehem Steel Corp., Bethlehem, Pa.; Warren Bros. Roads Co., Cambridge, Mass., general contractor.

425 tons, Sheffield Farms building, West 56th Street, New York, to Igoc Bros., Newark; White Construction Co., New York, general contractor.

420 tons, seven buildings, State farm hospital, Stockton, Calif., to Truscon Steel Co., San Francisco.

300 tons, mesh, highway, Saranac Lake—Lake Clear junction, Franklin County, New York, to Wickwire-Spencer Steel Co., New York; Louis Mayersohn, Albany, N. Y., general contractor.

200 tons, bridge, southern branch, Elizabeth river, Gilmerton, Va., to Hall-Hodges Co., Norfolk, Va.; Carpenter Construction Co., Norfolk, general contractor.

252 tons, bridge, Potomac river, Frederick

county, Maryland-Loudoun county, Virginia, to National Building Supply Co., Baltimore; G. F. Hazelwood, Cumberland, Md., general contractor.

230 tons, post office and courthouse, Peoria, Ill., to Concrete Engineering Co., Omaha, Nebr.; through Lundoff-Bleknell Co., Chicago.

200 tons, garage, Hartford, Conn., to Truscon Steel Co., Youngstown, O.; through Southern New England Construction Co., Hartford, Conn.

150 tons, factory building No. 201, for Eastman Kodak Co., Rochester, N. Y., to F. L. Hughes Co., Rochester, N. Y.

115 tons, foundations elevated highway, Spring to Cedar streets, New York, to Jones & Laughlin Steel Corp., Pittsburgh; through Poirier & McLane Corp., New York.

105 tons, W. P. A. work, army base, Boston, to Joseph T. Ryerson & Son, Inc., Boston.

100 tons, addition, Sutter hospital, Sacramento, Calif., to Truscon Steel Co., San Francisco.

## Reinforcing Steel Pending

75 tons, state bridge, Connecticut river, Gill-Montague, Mass.; bids March 16, Department of Public Works.

555 tons, Tennessee Valley Authority, for delivery at Sheffield, Ala.; bids March 11; bids also on 600 tons of rail steel reinforcing material.

500 tons, depot supply building, Government air depot, Sacramento, Calif.; bids March 25.

345 tons, substructure, bridge, Deer Isle—Sedgewick; Me., bids April 2; Robinson & Steinman, New York, Consulting engineers.

300 tons, spillway and structures, headwaters Connecticut river, Pittsburgh, N. H.; S. J. Groves & Sons, Ridgefield, N. J. low.

250 tons, cadet armory, West Point military academy, New York; bids March 16.

210 tons, bulkhead river plant, for Consolidated Edison Co., New York.

200 tons, office and printing plant, Grant and Second streets, Pittsburgh, for Pittsburgh Post-Gazette; bids soon.

162 tons, four bridges, Cheyenne and Lincoln county, Colorado; bids opened.

155 tons, highway viaduct, from 186th to 191st streets, New York; bids in.

135 tons, highway work, Otero, Valencia and Torrance county, New Mexico; bids opened.

122 tons, four bridges, Larimer county, Colorado; bids opened.

## Pig Iron

Pig Iron Prices, Page 106

**Pittsburgh**—Shipments of pig iron are at a high rate following the \$2 per ton advance last week on spot and second-quarter business. Producers have had little chance to replenish stocks. Demand from foundries, which are operating at unusually high rate, has been impressive.

**Cleveland**—Due to depleted condition of most producers' stocks and heavy demand for common grades, most foundries have been forced to

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ease up specifications, or otherwise wait a good deal longer for deliveries. Shipments so far this month have increased considerably over the similar period in February, as a result of the heavy speculative buying before the price advance.

**Chicago**—New pig iron business at advanced market of \$24, furnace, for No. 2 foundry and malleable is fairly heavy. Demand has been stimulated by buyers who previously expected to be covered by old orders through the major portion of second quarter but who have found these supplies inadequate and additional contracting necessary. Foundry operations are well sustained in all directions and March pig iron shipments are expected to be heaviest of quarter. Charcoal pig iron now is \$29.54, delivered Chicago, sharing in recent \$2 a ton advance.

**Boston**—Small volume of pig iron for second quarter delivery has been bought at new prices, \$25.75, Everett, Mass. Consumers generally are taking full first quarter commitments. Foundry melt remains high. Foreign iron, being sold in limited quantities, is bringing quoted domestic prices. A district steel works bought heavily for delivery before the end of the month and is building a large stock pile.

**New York**—Despite relative quiet since latest price advance of \$2 a ton, pig iron sellers believe allocating iron among customers will be necessary soon. Many large sellers have anticipated requirements for most of second quarter, but some recent protections may fall short of actual needs. A still tighter situation may develop this summer as some leading importers have little iron. Some trade interests estimate eastern domestic furnaces will be confronted with new demand for about 75,000 tons as result of shortage from foreign sources. Heavy inquiry is noted from England.

**Buffalo**—Buying for second quarter has become general and the trade appears to have absorbed the punch of a double price increase without serious upset. Many consumers are covering liberally for future needs. Producers claim that if sales continue at the present rate it will not be long before capacity for some special grades may be booked for the second quarter. Some producers think present purchasing may be to some extent at least either speculative or a precaution against deferred deliveries later.

**Philadelphia**—Further price advances on pig iron have tended only partially to discourage demand. Heavy buying of a week ago when consumers obtained protection on most second quarter requirements at prices \$2 under current market has slackened but substantial

amount of inquiry still exists, with some partly inspired by continued efforts to obtain tonnage at old prices. Buying over the next few weeks is expected to be comprised mostly of small consumers' orders.

**Cincinnati**—Some pig iron business is being taken at new prices, \$3 up from the January-February quotation, but all new orders are subject to furnace confirmation, to conserve supply against speculators and to protect regular customers. Same condition applies to northern and southern iron. Shipments are heavy on old orders, and many melters are protected for 60 days. Expanding melt is proving some melters underestimated needs and are in market for iron up to 1000 tons. Resistance to new prices, Northern No. 2 foundry \$24, base Hamilton, and Southern \$23.69 at Cincinnati, is non-existent.

**St. Louis**—The price of pig iron has been advanced \$2 per ton for second quarter delivery, making the St. Louis delivered price on No. 2 foundry Southern iron \$24.12 and Northern \$24.50 per ton. However, the previous advance was more of a gesture than anything else, as blast furnaces were sold up and had nothing to dispose of for late March shipment. There has been considerable inquiry for second quarter and it is

expected a sizable buying movement will ensue. Despite recent heavy shipments, foundry stocks as a whole are not large, the rate of consumption about keeping pace with deliveries.

## Scrap

Scrap Prices, Page 108

**Pittsburgh**—The price of No. 1 heavy melting steel advanced swiftly last week, with one sale of 5000 tons reported to have commanded \$23.50 per ton, highest in many years. Smaller tonnages were sold into mill consumption later in the week at slightly less than \$23, but some quarters held confidence that the market would exceed \$25 soon. Normal differentials have been badly out of line due to the gains made by heavy melting recently. Strong rumors that \$24 had been paid for ordinary No. 1 heavy melting steel caused much excitement Friday.

**Cleveland**—Shipments are going forward steadily on all available grades of iron and steel scrap and new buying is confined largely to smaller lots and specialties. Scarcity of the heavier grades still is

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apparent but sufficient is coming out from time to time to meet needs.

**Chicago**—Prices continue strong and heavy melting steel is up 50 cents on a sale at \$21. While scrap supplies are fairly heavy, material is being absorbed rapidly and higher prices are being paid in some instances. Railroad offerings have been light but occasional cars of heavy melting steel have brought better than \$21. Dealers' bids range from \$20.25 upward.

**Boston**—Scrap prices continue upward on several grades for both ex-



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port and domestic delivery. For No. 2 heavy melting steel brokers are paying \$16, dock. Cast grades are stronger for all deliveries and stove plate for a nearby foundry brought \$13.75, delivered. Material is moving through the embargo by special railroad permit in slightly accelerated volume as boats arrive, two loading close to 12,000 tons for Europe. Export shipments from Maine and Rhode Island points are steady.

**New York**—Most grades are higher for export and also domestic delivery, averaging 50 cents per ton. For No. 1 heavy melting steel \$17 is reported paid for dock delivery or on cars for domestic shipment. The latter applies to strictly railroad steel. On most heavy melting \$16.50 applies. Buying by most eastern mills is heavy and export demand continues unabated. Scrap is coming out well.

**Buffalo**—Dealers have advanced scrap still further, following recent boosts in pig iron and finished steel. Last sales of No. 1 heavy melting steel were \$19.50 and probably \$20 has been bid. However dealers are now asking \$1 over the best bid and claim they are not anxious to sell even at this figure. Cast has moved sharply forward in new transactions in which sales of No. 1 machinery are reported to have been made as high as \$19.50. Dealers have numerous contracts made at lower prices, however.

**Philadelphia**—Scrap prices generally are further advanced, with a sale of several thousand tons of No. 1 steel and also a fair tonnage of heavy breakable cast for Claymont, Del., outstanding. This is the first time this consumer has been in the market for some time. No. 1 steel is now holding at \$19 to \$20, delivered, with the inside price representing tonnage being moved from the outside district into Bethlehem, Pa., on more favorable freight rates. No. 2 steel is now holding nominally at \$18.50. No. 1 steel for export as yet has not gone higher, apparently, than \$19, dock, Port Richmond, and No. 2 steel at no higher than \$18.

**Detroit**—Suspension of operations at Chrysler and Hudson plants has tightened further the scrap situation here and steady demand from consumers is bringing much higher prices. Prices on all grades are up 50 cents to \$3 a ton, and so little are buyers concerned over price dealers find it difficult to determine at any moment just what the going price should be. Short rails, for example are up \$3 to \$24-\$24.50, but sales have been made as high as \$26. Lake movement of scrap tonnages is already under way.

**Cincinnati**—Heavy melting steel is up \$1, at \$18 to \$18.50 as dealers con-

tinue to be wary of a short position. Foundry grades took additional strength from pig iron increases. Consumers are taking material as it is offered and are adequately protected for nearby requirements, although some tonnage is being held in anticipation of still higher prices.

**St. Louis**—While the recent bulge in scrap prices has substantially increased offerings there is still an acute shortage of some grades, notably railroad steel specialties. These items, including car wheels, springs, frogs, switches and guards, scrap rails and brake shoes, have been further advanced and quotations are the highest since the boom incident to the World war.

**Birmingham, Ala.**—Strength at higher prices marks the scrap market, with heavy melting steel at \$13.50 or higher. No. 1 cast and stove plate are also in good demand. Supplies have been sufficient to meet needs.

## Warehouse

Warehouse Prices, Page 107

**Pittsburgh** — Effective last Thursday warehouses advanced bars and small shapes \$10 a ton; plates and structural shapes \$6; hot-rolled strip \$10; blue annealed sheets \$5; black sheets \$7; galvanized sheets \$8; concrete deformed bars \$6, and cold-finished bars \$7. Advances in other items are expected. Demand is brisk from most sources, with sheets especially selling well.

**Cleveland** — Warehouse distributors have advanced prices to correspond with mill schedules. The adjustment carries increases ranging between \$5 and \$10. All products were affected by the general advance with the exception of tool steels, on which new schedules are expected April 1.

**Chicago**—Price advances, ranging up to \$10 a ton, were instituted by warehouses last week. Practically all items are affected. Bars and small shapes are up \$10, with plates and shapes advanced \$6. Business continues active although some reaction from anticipatory buying done before the price increases is looked for.

**New York** — Warehouse steel prices have advanced \$3 to \$10 a ton, practically all steel products included. Floor plates are up \$11 to 5.90c. Rise in sheets, \$8 on galvanized to 5.47c; \$5 to 4.07c, No. 10 blue annealed, and \$7 to 4.82c, No. 24 black, follows an increase on these products of 25 cents per 100 pounds March 1. Demand is heavy and buying this month has been best this year. Mill deliveries, still



more extended on some steels, is an acute problem.

**Philadelphia** — Following recent advance in mill prices, distributors here last Friday put into effect increases as high as \$12. Most jobbers adopted the pricing plan on hot-rolled sheets, effective at a number of other leading centers, supplanting the former system of extras. Jobbers were deluged with demand for a week before the advance. One of the few items unchanged was Swedish bars.

**Detroit**—New warehouse price for cold-rolled bars in Detroit is 4.30c, adjusted to 4.20c for country shipment against other basing points. Suppliers look for a hot-rolled bar basing point at Detroit as a nearby development.

**Baltimore**—Effective March 11 warehouse prices were advanced \$4 to \$10 per ton on principal items. Heavy protective covering was done preceding the increase.

## Iron Ore

Iron Ore Prices, Page 108

**Cleveland**—Prices of Lake Superior iron ore have advanced for the first time in eight years. Considerable tonnage was closed last week at 45 cents a ton higher, with the result that new prices are now quoted as follows: Old range nonbessemer and Mesabi bessemer \$5.10; old range bessemer \$5.25, Mesabi nonbessemer \$4.95, and a high phosphorus ore \$4.85, delivered lower lake ports.

This is the earliest announcement in the new season's lake ore prices since 1920, when they were named Feb. 2. Last year the first sale was on March 31.

As in the past few years producers established prices independent of the Ford Motor Co.'s inquiry of 315,000 tons.

Large tonnages of iron ore have been contracted for hauling from the head of the lakes at 10 cents above 1935, with proportionate increases from other ports. From Duluth-Superior to lower lakes this year the rate is 80 cents a ton; from Marquette to lower lakes 72 cents; from Escanaba to Lake Erie 60 cents, and from Escanaba to Chicago 48 cents. Coal rates are 5 cents a ton higher than last year.

Lake Carriers association has recommended an advance of approximately 20 per cent in the minimum wages for unlicensed men and advances for the licensed officers ranging from 10 to 15 per cent.

James C. Heintz & Co., Cleveland, manufacturer of tire service station

equipment, has placed in production a number of new products, including a light weight belt vulcanizing machine, a tire treading machine, a sectional tire molding machine, and a new machine for repairing tractor and other large tires.

## Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 105

New discounts on bolts and nuts represent price increases of about 10

per cent. Structural rivets have been marked up \$7 a ton and the discount on small rivets has been reduced five points. Demand continues active, with March shipments expected to be heavier than those of February. The outlook in the railroad market is particularly bright and farm implement and tractor manufacturers have heavy schedules in prospect for several months. Some gains also have been shown in automotive needs.

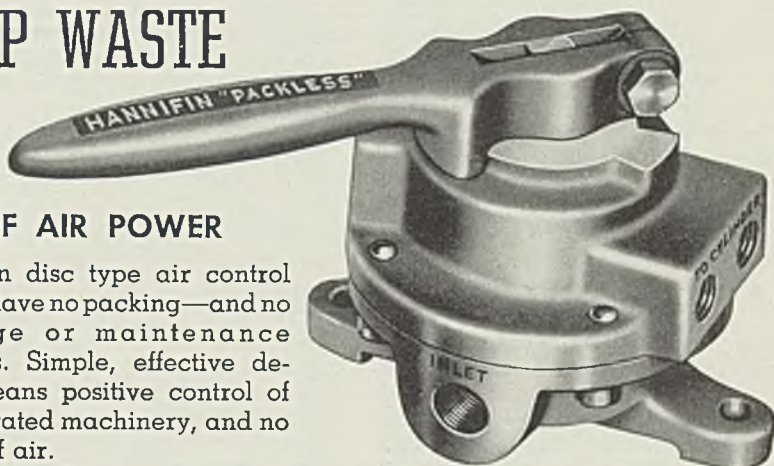
Champion Rivet Co., Cleveland,

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**KIDD DRAWN STEEL CO.**

Aliquippa, Pa.

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will issue April 1, a new extra list on large rivets, applying on quantity, type of head and size, entailing both increases and decreases.

## Steel in Europe

Foreign Steel Prices, Page 107

London—(By Cable)—Production of steel ingots and castings in Great Britain in February totaled 885,900 gross tons, a daily rate of 41,495 tons. This compares with 998,900 tons in January, a daily rate of 38,419 tons. Had February been as long as January the three extra days probably would have established a new all-time record for steel production.

Pig iron production in February totaled 603,700 tons from 115 stacks, a daily average of 21,560 tons. This compares with January production of 650,700 tons from 114 stacks, a daily average of 20,990 tons.

New business is limited by heavy commitments of steelmakers. Further price advances are expected about June 1. Exports are greatly restricted. An additional blast furnace stack has been lighted and its output already is fully absorbed for several months. Steel finishing mills are forced to curtail activity because of shortage of semifinished steel.

The Continent reports its output gradually improving, with heavy demand, but new business is still restricted.

## New Sheet Prices Lower Than in '26

New sheet steel prices recently announced for second quarter of 1937 are still lower than second quarter prices in 1926 although raw materials and labor rates are much higher, states a report issued today by W. W. Sebald, vice president of American Rolling Mill Co.

The new price for 20-gage cold-rolled auto-body sheets is \$3.55 per 100 pounds. In 1926 the same grade sold for \$4.25, and in 1929, for \$4.10. In contrast, Mr. Sebald shows that basic pig iron is now quoted to sheet producers at \$23.50 per ton, as compared with \$18.90 in April, 1926. Heavy melting scrap, recently quoted at \$22 per ton, cost only \$16.65 in 1926. These are the most important raw materials used in sheet manufacturing.

"The base selling prices on sheets, contrasted with higher costs for pig iron and scrap, tell only part of the story," Mr. Sebald said. "In 1937 practically no drawing quality extras are being charged on hot and cold-rolled sheets, whereas in 1926 and 1929, extras of 25 cents per hundred pounds were charged for deep drawing and 50 cents for extra deep drawing."

Extras for many widths have also been eliminated. As a result, the new price for 20-gage cold-rolled sheets for making front fenders of automobiles is still \$29 per ton be-

low March, 1929, prices. Extras formerly charged for extremely wide sheets have also been greatly reduced. A comparison shows 20-gage wide, deep-drawing auto-body sheets at \$45 per ton less than in the first quarter of 1929.

Higher wages have also increased sheet production costs, Mr. Sebald points out. The new wage rates, effective in a few days, including penalties for time and a half, will increase the average rates per hour 30 per cent over the average hourly rate in 1929. Taxes have also greatly increased.

## Tool Steel Up 10 to 12 Per Cent

Increase in prices of tool steels, ranging from 10 to 12 per cent, has been announced generally, to take effect April 1. While an advance was anticipated by buyers, it was not expected to reach these proportions. Previous increases have been of the order of 5 per cent and less.

Leading sellers are of the opinion this is the sharpest increase ever recorded in tool steel prices, but report no resistance on the part of buyers. As an example of the new prices, one line of high-speed steel has been marked up from 60 to 67 cents, an oil hardening steel from 22 to 24 cents.

## Metallurgical Coke

Coke Prices, Page 105

Strong domestic demand for coke during the past two weeks has proved complicating to many sellers, who had counted on diverting this tonnage elsewhere. Industrial requirements show no lessening and the 3000 beehive ovens in the Connelville, Pa., region are hard driven to keep up with the demand. Recent sales have been made at \$4.25 a ton into industrial consumption. H. C. Frick Coke Co. has leased 100 ovens at Marquette, Pa., to King Bros. Coal & Coke Co., Scottsdale, Pa., and most of them already have been fired. These ovens were rebuilt in 1930 and have been idle since 1929.

Carrier Corp., Newark, N. J., gaining a year by experimenting in the Brazil jungles during the hot months of January and February, has developed and placed in production a new portable summer air conditioning unit said to be exceptionally efficient and quiet in operation and made to sell at \$395 at the plant.



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## Nonferrous Metals

Nonferrous Metal Prices, Page 106

**New York** — Nonferrous metals soared to new highs for recent years last week. Sharp advances in copper, tin, lead and zinc were attributed partly to higher levels abroad, heavy consumer demand and limited available supplies. The London market reacted late Thursday and early Friday but recovered practically all of its losses on second call to close generally near the highs for the current movement.

**Copper**—Electrolytic advanced to 16.25c, Connecticut, on Monday with offerings at the new level tapering toward the end of the week. Export copper advanced to a high of 17.60c, c.i.f. European ports, but closed around 17.32½c. Casting copper was marked up to 16.75c, f.o.b. refinery, but supplies were limited even at that level. Rolled products, brass ingot and copper wire and cable were quoted higher. Unless the foreign market weakens, higher prices are likely here.

**Lead**—Prices advanced \$5 per ton on each of the first three days of the week, closing firm at 7.60c, East St. Louis, and 7.75c, New York, with St. Joseph Lead Co. still asking \$1 premium on the latter market. Consumer demand was well sustained at the higher levels.

**Zinc** — Prime western zinc was strong at 7.50c, East St. Louis, an advance of \$10 per ton above the previous week's close. Supplies are scarce and higher prices would result from any pressure exerted by consumers for metal.

**Tin**—Straits spot soared to a high of 66.25c, a new peak since June, 1927. The increasing of export quotas to 110 per cent of standard tonnages for the second quarter had only a temporary depressing effect on the market. Consumers came into the market for supplies following a prolonged period of only light buying.

**Antimony**—The trend was mixed with Chinese spot antimony advancing to 17.00c, duty paid New York, while American spot eased to 16.12½c, New York.

## Structural, Ornamental Metal Industry Gains

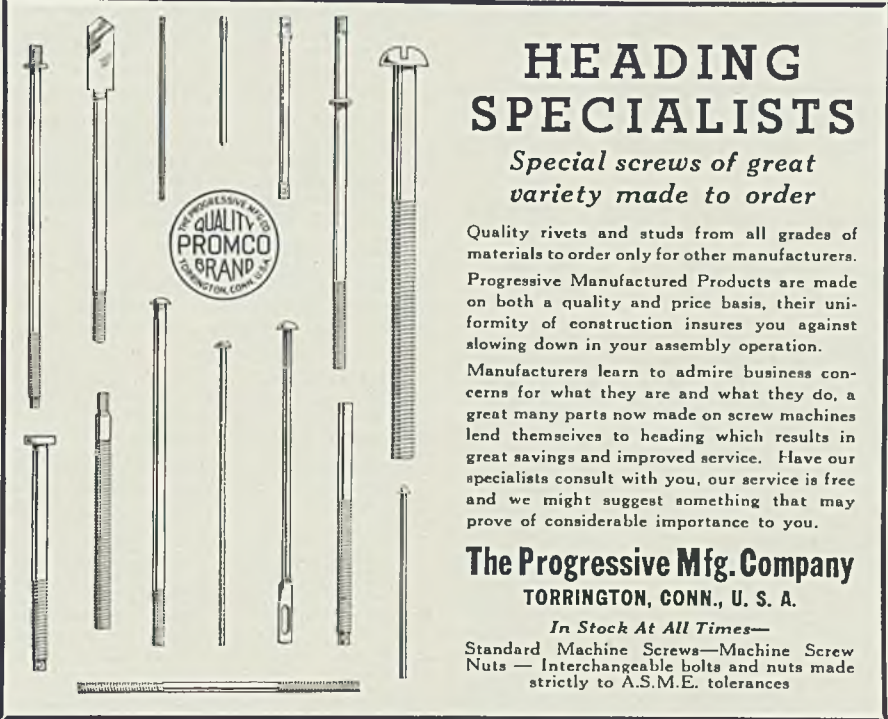
Manufacturers of structural and ornamental metal work in the United States reported substantial increases in employment and production in 1935 as compared with 1933, according to the bureau of the census.

Wage earners employed in the

industry in 1935 numbered 27,243, an increase of 27.4 per cent over 21,377 reported for 1933; their wages, \$28,225,011, exceeded the 1933 figure, \$18,624,134, by 51.6 per cent. Total value, f.o.b. factory prices, of products in 1935 was \$160,762,487, an increase of 49.4 per cent over \$107,612,309 for 1933. The chief class of products reported was fabricated structural steel, valued at \$99,929,901, of which \$50,649,793 represented steel for buildings, and \$26,612,571, steel for bridges.

## Equipment

**Chicago**—While activity in some types of machinery and plant equipment has declined moderately in last month, business holds at relatively high rate. Machine tool inquiries are heavy and March sales are expected to exceed those of February. Railroad inquiries include a small list from the Monon, with a list from the Burlington anticipated. With machine tool deliveries unimproved, inquiries generally are closed



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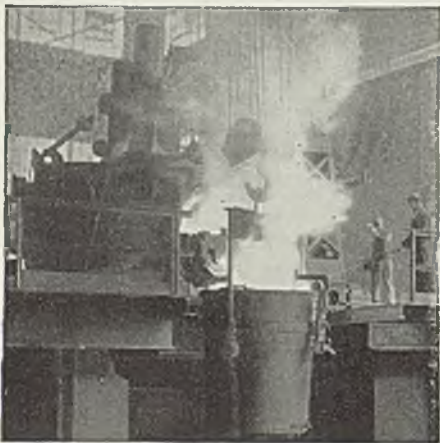
promptly. Small tool demand continues active. The city of Chicago has taken bids on a lathe and milling machine.

**Cleveland**—Machine tool and equipment inquiries and orders are slower although March business is holding at about February's level. Most inquiries are for single machines. Deliveries are no better and this, coupled with labor unrest, is believed by dealers to be retarding business.

**Seattle**—Demand for logging, lumbering and highway equipment has increased with opening of spring construction. Mining operators are



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**NATIONAL FORGE AND  
ORDNANCE COMPANY**  
IRVINE, WARREN COUNTY, PENNA.

placing orders for season's needs. Seattle light department has made following awards: 20,000 kilovolt-ampere transformer to Westinghouse Electric & Mfg. Co., Pittsburgh, \$158,148; 17 oil circuit breakers to

Pacific Electric Mfg. Co., San Francisco, \$162,164; disconnecting switches and condenser to General Electric Co., Schenectady, N. Y., \$143,911; two oil circuit breakers to Allis-Chalmers Mfg. Co., Milwaukee, \$15,372.

# Construction and Enterprise

## New York

**ALBANY, N. Y.**—C. A. Holmquist, director of division of sanitation, state department of health, State building, has recommended immediate construction of sewage treatment plants at the following cities: Gowanda, Sidney, Manchester and Amherst. Estimated total cost is \$100,000, and either PWA or WPA aid will be sought in each case.

**BATAVIA, N. Y.**—Doehler Die Casting Co. has awarded general contract for construction of a new magnesium castings building to J. E. Flierl Construction Co., 106 Kingsley street, Buffalo. Work will start around April 1.

**BROOKLYN, N. Y.**—E. B. Stimpson Co., 70 Franklin avenue, will take bids in April or later for a 2-story, 87 x 97-foot plant at 791 Kent avenue, to cost \$50,000. Architects are Almendinger & Schlendorf, 356 Fulton street.

**BUFFALO, N. Y.**—General Cable Co., 56 Clyde street, plans a \$100,000 expansion program at its plant and much new machinery will be installed.

**COHOES, N. Y.**—Village will construct a sewage disposal plant costing over \$25,000, and has applied for federal funds.

**FARMINGDALE, N. Y.**—Kirkham Engineering & Mfg. Co., care of E. W. Maher, 60 Wall street, New York, plans to alter the former plant of the Indestructo Glassworks into an aircraft manufacturing factory. Cost will be over \$50,000.

**LONG ISLAND CITY, N. Y.**—General Bronze Corp., 3410 Tenth street, plans to build a 100 x 105-foot plant addition on Thirty-fifth street near Queens boulevard at a cost of over \$40,000.

**MECHANICSVILLE, N. Y.**—City department of public works, City hall, has engaged H. W. Taylor, engineer, 9 Park place, New York, to conduct a survey of costs and feasibility of sewage disposal plant. Tentative estimate of cost is \$170,000. A. B. Collins is mayor.

**NEW YORK**—R. C. Stanhope Inc., dealer, 101 West Thirty-first street, is in the market for four 10-ton, 50-foot boom derricks.

**NEW YORK**—Cities Service Co., 60 Wall street, plans to spend \$42,000,000 during 1937 for new construction and improvements to properties. Gasoline plants will be built, refineries improved, power generating plants built and transmission lines extended.

**OLEAN, N. Y.**—City plans construction of a sewage disposal plant on the Ahrens farm in South Olean, at a cost of over \$50,000.

**PLEASANTVILLE, N. Y.**—City plans construction of a sewage disposal plant estimated to cost \$30,000. Federal financial aid has been secured.

**RIDGEWOOD, N. Y.**—I. R. Meyer Inc., 50 Court street, Brooklyn, plans construction of a 3-story factory at Flushing and Woodward avenues. Cost

is estimated at over \$300,000. J. Z. Cohen, 447 Rockaway avenue, Brooklyn, is architect.

**TONAWANDA, N. Y.**—Tonawanda Engineering Corp., Tonawanda street, plans to rebuild and re-equip its machine shop and foundry which was recently fire-damaged. Estimated cost is \$40,000, with equipment.

**WEST POINT, N. Y.**—Construction quartermaster, United States Military academy, plans construction of a sewage treatment plant costing over \$100,000 at the academy. Project will be ready for bids soon.

## Connecticut

**HARTFORD, CONN.**—Board of contract and supply of the metropolitan district will take bids soon for construction of remaining portion of sewage treatment works in South Meadows. Estimated cost is \$400,000, and R. N. Clark is city engineer.

## New Jersey

**HASBROUCK HEIGHTS, N. J.**—Bendix Aviation Corp., 105 West Adams street, Chicago, plans to install motors and controls, regulators, conveyors, transformers and accessories and other handling equipment in new 600 x 700-foot plant at Teterboro, near Hasbrouck, where 100 acres have been acquired. Automotive and aircraft apparatus will be manufactured. Total cost will be over \$2,000,000.

**PATERSON, N. J.**—Wright Aeronautical Corp., 1120 East Nineteenth street, plans construction of a 4-story, 64 x 208 plant addition costing \$300,000. Albert Kahn, New Center building, Detroit, is architect.

## Pennsylvania

**ERIE, PA.**—Bucyrus-Erie Co., West Twelfth street, will build a \$21,000 addition to its plant for manufacturing steam shovels. William R. Eisert is general superintendent.

**YOUNGSRVILLE, PA.**—Borough plans construction of a sewage disposal plant and is now making a preliminary survey. Estimated cost is \$50,000, and engineers are Hill & Hill, 24 East Main street Northeast.

## Ohio

**BARBERTON, O.**—City is taking bids due noon March 17 for construction of a waterworks pumping station and installation of pumps and appurtenances. Fred Marvin is mayor and engineers are Barstow & Lefebvre Inc., 31 North Summit street, Akron.

**BETHEL, O.**—Village plans to increase capacity of power plant by installing another diesel engine generating unit. W. F. Myers is mayor.

**BOSTON MILLS, O.**—G. T. Shipman Co., London, Ont., is taking bids for reconditioning 12 factory buildings and for installation of new conveyors, hoists



and other handling equipment. H. N. Morse, 1500 Superior avenue, Cleveland, is engineer.

CLEVELAND—Ohio Bell Telephone Co., 750 Huron road, plans to spend \$14,300,000 for construction and plant expansion throughout Ohio during 1937. Randolph Elde is president.

CLEVELAND—Rayon Machinery Corp., subsidiary of Industrial Rayon Corp., has leased part of a plant at 7275 Wentworth avenue and will manufacture and assemble rayon machinery. Hiram Rivitz is president.

CLEVELAND—Reliance Electric & Engineering Co., 1042 Ivanhoe road, has awarded general contract for a plant addition to cost \$60,000 to J. L. Hunting Co., Ninth-Chester building. Reliance manufactures electric motors.

CLEVELAND — Commercial Forging Co., W. Illingsworth, president, 3709 East Ninety-first street, plans to build two 1-story foundry additions, one 50 x 120 feet, the other 20 x 120 feet. Total cost will be around \$60,000. Architect is A. E. Rowe, 1887 Charles road.

FAIRPORT, O. — Village plans to build a complete light plant and distribution system, powered by two 200-kilowatt diesel engines with one additional engine in reserve. Cost is estimated at \$146,000. Application has been filed for PWA aid. John O. Rendrick is mayor and village engineer is Jay M. Crabbe, 89 North Park place, Painesville.

GALION, O.—J. F. Nichols, director of public service, will purchase soon two boiler feed pumps with sufficient capacity to feed a 3000-horsepower boiler to be installed at the Gallon municipal light plant.

ORWELL, O.—Village is considering construction of waterworks to cost \$48,900, and probable engineer is Ralph E. Bevis & White, 12227 Clifton boulevard, Cleveland. L. H. Behner is mayor. Maturity is dependent on PWA approval.

SPRINGFIELD, O.—Ohio Edison Co. will ask bids about March 20 for construction of a power plant addition on Mad river. Total cost including equipment, will be \$1,500,000. Harris E. Miller is local manager, W. C. Giffels, 47 East Main street, Akron, is in charge of construction, (Noted STEEL, Feb. 15).

TOLEDO, O.—Pure Oil Co., 35 East Wacker drive, Chicago, will double the capacity of its Toledo refinery at a cost of \$2,000,000. Chicago Bridge & Iron Works has contract for expanding tank capacity.

**Michigan**

DETROIT—Buhl Stamping Co. will erect a second-story addition to its plant on Scotten avenue. Smith, Hinchman & Grylls, 800 Marquette building, are architects and engineers.

ERIE, MICH.—Lake Stamping Co., recently organized, has purchased a building at the Dixie highway and Substation road in Erie and is converting it into a factory for manufacturing steel dies.

GRAND RAPIDS, MICH.—Wolverine Die Casting Co. plant was damaged by fire recently.

HIGHLAND PARK, MICH.—Local plant of the Briggs Mfg. Co. was damaged by fire recently.

MIDLAND, MICH. — Dow Chemical Co. plans improvements and additions to its plant at an estimated cost of \$1,000,000.

**Illinois**

LAKE VILLA, ILL.—City will take bids soon for a 60,000-gallon elevated steel tank and improvements to waterworks plant. Total cost will be about \$40,000. Engineer is James Anderson & Co., Lake Forest, Ill.

PARIS, ILL.—City rejected bids received Jan. 4 for construction of a waterworks plant and distribution system costing an estimated \$70,500. Bids may be asked again soon. Engineers are Warren & Van Praag, 415 Milliken building, Decatur.

RUSHVILLE, Ill.—City plans erection of a 100,000-gallon steel storage tank on tower and installation of a filtration system and diesel engine at waterworks. Estimated total cost is \$75,000, and Caldwell Engineering Co., Jacksonville, Ill., is engineer. Labor will be supplied by WPA.

**Indiana**

BEDFORD, IND. — Board of public works is taking bids for erection of a steel storage tank and engineers are Alvord, Burdick & Howson, 20 North Wacker drive, Chicago. Mayor is H. S. Murray.

EVANSVILLE, IND.—Board of public works, G. H. Bossc, chairman, will take bids soon for modernization and expansion of waterworks pumping plant. Engineers are Alvord, Burdick & Howson, 20 North Wacker drive, Chicago.

HARTFORD CITY, IND. — Board of public works plans construction of a sewage disposal plant costing \$100,000. Engineer is R. B. Moore & Co. Inc., 930 Indiana Pythian building, Indianapolis. W. H. Gardiner is mayor.

RICHMOND, IND. — Wayne Works, North Sixteenth street, J. Clemens, president, will award contract soon for construction of a 1-story, 400 x 900-foot addition, to cost about \$250,000.

**Alabama**

BIRMINGHAM, ALA. — T. M. Francis, 334 Brown-Marx building, is in the market for a water tube boiler, 300 to 350-horsepower, of approximately 200 pounds pressure.

**Delaware**

WILMINGTON, DEL. — Mentholatum Co., 1360 Niagara street, Buffalo, N. Y., plans to build a large plant at Wilmington. John W. Cowper Co., Buffalo, has general contract.

**Maryland**

BALTIMORE — Maryland Bolt & Nut Co., 1330 Smith avenue, will build a new forge shop. General contract has been given to Engineering Contracting Corp., North and Linden avenues.

CHELTENHAM, MD.—Bureau of docks and yards, Navy department, Washington, is taking bids until March 17 for a gasoline engine driven generating set and boiler equipment for the Naval radio station at Cheltenham.

**District of Columbia**

WASHINGTON—Bureau of supplies and accounts, Navy department, is taking bids until March 16 for 8000 pounds of corrosion-resisting sheet steel, schedule 97, for delivery Norfolk, Va., and for 240 steel boiler tubes, schedule 98, for delivery various coast points.

WASHINGTON—Navy department, bureau of supplies and accounts, is taking bids until March 19 for steel nails and wire, schedule 93, for delivery various coast points, and until March 26 for rough machined steel forgings, schedule 140, also for delivery various coast points.

WASHINGTON — Bureau of supplies and accounts, Navy department, is taking bids due March 16 for 2040 pounds of copper-nickel forgings, schedule 5, delivery, Washington.

**Georgia**

ATLANTA, GA.—John A. Dodd, dealer, 101 Marietta building, is in the market

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for an air compressor, up to 12,000 cubic-foot capacity, 100-pound pressure, suitable for use with motor drive or with 550-volt motor.

### Louisiana

BURRWOOD, LA. — United States engineer's Office, New Orleans, will receive bids March 23 for two 63-kilovolt-ampere, 440-volt, 3-phase, 60-cycle, alternating current full diesel generating units with switchboard.

MONROE, LA. — City is considering bond issue of \$1,500,000 for improvements to light plant, including installation of generator and two boilers.

OPELOUSAS, LA.—City will take bids soon for installation of an electrical generating unit at light plant. Engineer is Dave Hollier, Opelousas.

### South Carolina

ANDERSON, S. C. — J. P. Abney and associates, Greenwood, S. C., will spend between \$500,000 and \$1,000,000 for improvements and installation of new machinery at the Anderson Cotton Mills.

### Tennessee

NASHVILLE, TENN.—Nashville Bridge Co., post office box 239, is in the market for two hydraulic presses, 300 and 800 tons capacity.

### West Virginia

WARDENSVILLE, W. VA.—Potomac Edison Co., Hagerstown, Md., plans erection of rural transmission lines in Hardy and Hampshire counties. Estimated cost is \$172,000, which has been granted by REA.

### Virginia

WAVERLY, VA. — City plans construction of a municipal light plant and PWA has allotted \$90,000.

### Missouri

KING CITY, MO.—City plans construction of a sewage disposal plant and distribution system and will make improvements to waterworks plant and system. C. A. Haskin & Co., 517 Finance building, Kansas City, is engineer.

ST. LOUIS, MO. — Mississippi Valley Equipment Co., Chamber of Commerce building, is in the market for a diesel engine, 200-horsepower, 3-cylinder, two used Fairbanks-Morse engines, 100-horsepower and 120-horsepower, and a 200-horsepower Corliss engine.

SIKESTON, MO.—City plans to install a new diesel engine generating unit in its power plant, and present plant will be enlarged.

SPRINGFIELD, MO. — Springfield Gas & Electric Co. plans installation of a 12,500-kilowatt turbogenerating unit with accessories in its plant. Cost is estimated at \$650,000.

WINDSOR, MO.—City plans to construct a sewage disposal plant costing \$30,000. Engineer is W. B. Rollins & Co., 339 Railway Exchange building, Kansas City.

### Oklahoma

PICHER, OKLA. — Golden Rod No. 4 Mills plans to rebuild its zinc and lead ore concentrating mills which were recently badly damaged by fire. Estimated renovating cost is \$100,000.

### Texas

ARANSAS PASS, TEX. — H. H. Hil-

burn and E. Brauer plan to construct a 2-story, 1110 x 160-foot machine shop to deal especially in repairing oil well supplies, marine motors, and heavy machinery and equipment. Machinery needed immediately includes welding equipment, cold-straightening equipment, casting equipment and automatic drills. Total cost will be about \$75,000. about \$75,000.

SULPHUR SPRINGS, TEX. — City will receive bids March 20 for construction of power plant and distribution system. Architects are Flint & Broad, Burt building, Dallas, and engineer is Municipal Engineering & Finance Co., 1110 Mercantile building, Dallas. Voters have approved issuance of \$240,000 bonds.

WACO, TEX.—Tri-County Electric Co., Waco, plans erection of rural transmission lines in Raines, Hopkins, Hunt and other counties. Outdoor substations will be built. A fund of \$300,000 has been arranged through federal aid, and work will begin soon.

### Wisconsin

MILWAUKEE — Milwaukee Gas & Light Co. plans to rebuild its entire St. Paul avenue gas producer plant, which will be shut down soon. R. B. Brown is president and general manager.

MILWAUKEE — Luitink Mfg. Co., 2223 North Eighteenth street, maker of tools, dies and metal stampings, will soon award contracts for construction of a new plant at North Thirty-fourth and West Burleigh street. Estimated cost is \$50,000, including machinery to supplement present equipment. Peter H. Luitink is president.

MILWAUKEE — Milwaukee Electric Railway & Lighting Co., 231 West Michigan street, plans to spend \$3,565,000 for replacements and expansion during 1937. A new heating plant will be built at North Edison and West Wells streets at a cost of \$1,283,000, and a new boiler will be installed.

SAUKVILLE, WIS. — Glander Bros. Mfg. Co., Milwaukee, has leased shop quarters in Saukville for manufacturing wrought iron utility and ornamental products and for work in copper and brass.

SUPERIOR, WIS.—Stokely Bros. & Co., 2022 South East street, plans to install motors and controls, loaders, conveyors and other handling equipment in new canning plant at Superior. Estimated cost will be about \$200,000.

### Kansas

GOODLAND, KANS.—City plans construction of new municipal light plant and distribution system and will take bids for equipment soon. A bond issue of \$200,000 has been arranged. Engineer is E. T. Archer & Co., New England building, Kansas City, Mo.

WHITE CITY, KANS.—City plans to build a sewage disposal plant costing \$52,000 and is now awaiting PWA approval. Engineers are Paulette & Wilson, Salina, Kans.

### North Dakota

HATTON, N. DAK. — City will vote on bond issue to supply part of cost of construction of municipal waterworks system costing \$24,000. Elmer Osking is mayor.

LINTON, N. DAK. — City plans construction of a sewage disposal plant costing about \$40,000. E. H. Smith is auditor, and Dakota Engineering Co., Valley City, N. Dak., is engineer.

### Iowa

AMES, IOWA — City is considering construction of a municipal gas plant to cost \$298,000. John Prather is clerk, City Hall.

BELLE PLAINE, IOWA — City is seeking a federal grant of \$35,000 to finance construction of a sewage disposal plant. E. N. Brown is clerk, City Hall, and Green Engineering Co., Cedar Rapids, is engineer.

DAVENPORT, IOWA — Eastern Iowa Light & Power Cooperative, H. J. Strong, 1304 West Fourth street, manager, has been allotted \$27,000 by REA for erection of rural lines.

### Nebraska

IMPERIAL, NEBR.—City rejected bids received Feb. 19 for construction of a sewage disposal plant and will readvertise soon. Engineers are Black & Veatch, 4706 Broadway, Kansas City.

KEARNEY, NEBR. — Buffalo Public Power district has been allotted \$212,000 by REA for rural transmission lines.

LEXINGTON, NEBR. — Dawson County Public Power district, W. E. McKee, president, plans to erect rural transmission lines costing about \$204,000.

MINATARE, NEBR. — Voters approved a bond issue Feb. 23 to finance construction of light and power plant and distribution system costing \$46,000. W. C. Colson is mayor.

### Idaho

COEUR D'ALENE, IDAHO — City will receive bids April 5 for construction of proposed \$300,000 municipal light and power plant. Ernest C. Porter, Rocky Mountain Engineering Co., is engineer.

### Pacific Coast

FILLMORE, CALIF. — Texas Co., 929 South Broadway, Los Angeles, plans construction of a gasoline processing plant, including two cooling towers, compressor house and boiler house, several distillation units and other buildings.

LOS ANGELES — Commercial Enameling & Foundry Co. will build a new 71 x 115-foot factory at 130 Hampshire drive, Huntingdon Park.

LOS ANGELES — California Cornice Steel & Supply Co., manufacturer of sheet steel products, will erect a shop at 1600 North Spring street, to be 88 x 100 feet.

SEATTLE—Northwest Lead Co., Sixteenth and Lander streets, has allotted \$200,000 for construction of a new factory, and the project is nearly ready for bids.

SPOKANE, WASH. — City will receive bids April 1 for construction of Hoffman avenue pumping station, with motors and pumping equipment, and for two miles of 30-inch steel pipe. Total estimated cost is \$109,000.

TACOMA, WASH. — Tacoma Foundry Co., 1025 East F street, has been incorporated by D. F. Olson and associates.

### Canada

NIPIGON, ONT. — Lake Sulphide Pulp Co. Ltd., Nipigon and Toronto, will take bids soon for construction of a bleached sulphide plant estimated to cost \$6,000,000.

PORT HOPE, ONT. — Eldorado Gold Mines Ltd., 80 King street West, Toronto, will take bids soon for construction of an addition to its plant, to cost \$150,000.