

# STEEL

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## As the Editor Views the News

**F**RESH demand for industrial products, which a week ago appeared to be slowing down moderately, has taken a new spurt. New purchasing by the railroads and automobile builders and partsmakers is largely responsible for pushing the rate of steelworks operations up to 70.5 per cent of capacity. If today's volume of steel ingot output were calculated on the basis of capacity existing during 1928-29 (p. 67) it would represent a rate of 80 per cent. That the industry anticipates a sustained volume of business is indicated by the fact that seven blast furnaces were lighted last week—more than in all of March.

All will agree that the present scale of industrial activity is gratifying in many respects, yet it falls short of the statement President Roosevelt made to the youth of America last Monday evening. He said "You and I know now, that while the total production of America is about back to the high point before the depression. . . ." The President seems to be taking unusual liberties with the facts. Most of the generally accepted indices of business show that production still has a long way to go to match predepression highs. And federal policies present serious obstacles to further gains.

### Business Is Not That Good

The report that Japanese interests are offering iron, steel and nonferrous products for sale on the Pacific coast (p. 86), coupled with the recent testimony of Paul Mackall, Bethlehem vice president, to the effect that Japan soon will cease to import steel (STEEL, March 30, p. 14), has helped to revive interest in tariff policies. It seems almost futile to try to reconcile the views of those who argue tariff matters from the standpoint of abstract theory and those who

actually suffer from the results of existing tariff policies. The former usually scoff at the insignificant tonnage of foreign steel consumed in this country. The latter fear the demoralizing effect on domestic prices more than they are concerned over the volume of steel involved. It would help if the theorists were better informed on the practical aspects of the problem.

Successful industrial management is one that is flexible enough to meet changing economic conditions. Executives who performed miracles in conserving assets during the darkest days of the depression (p. 27), today are faced with entirely different conditions, which in most cases call for more positive and more aggressive action. The need for greater emphasis on this change of policy was reflected in the recent conference (p. 56) of the American Management association. The topics discussed—such as "rebuilding the working force," "rekindling incentives" and "revitalizing the supervisory force"—indicate the type of problem which confronts management today. It is almost impossible to underestimate the importance of rebuilding morale and of developing a healthy *esprit de corps* among the personnel of every company.

### Rekindling and Revitalizing

Last week this writer inspected in detail a number of plants which recently had been inundated. Unless one can actually see the tons of silt and mud that have been removed, the thousands of motors that have been reconditioned, the miles of pipe line that have been rebuilt or repaired and the other evidences of superhuman effort, he cannot appreciate what has been going on during the past few weeks in the flooded areas. From highest executive to humble laborer, everyone pitched in to fight off "ole man river." To maintain that spirit of unity of purpose (but not necessarily its intensity) in normal times, is an ever present challenge to management.

E. L. Shaner

# Hughes Resigns; Carnegie-Illinois Adjustments Coming

**R**ESIGNATION of I. Lamont Hughes as executive vice president and director of Carnegie-Illinois Steel Corp. and as president and director of its underlying companies, marks a further shifting of personnel in the executive ranks of the United States Steel Corp. His resignation effective April 30, was announced Friday.

Naturally, it will take some time to complete the consolidation of all departments, so in the interim business will be conducted in the usual way in all district sales offices and various branches of the general offices of both companies.

"The unification of these two companies will give us a greater diversification of products, and consolidation of the operating and commercial departments, with the co-operation of manufacturing facilities, will put the corporation in a position to serve you better in every respect,"—stated a joint letter of Carnegie-Illinois Steel Corp. and American Sheet & Tin Plate Co. issued last week to customers and friends over the signature of C. V. McKaig, vice president and general manager of sales for Carnegie and F. C. Harper, holding the same position with American Sheet & Tin Plate Co.

## Speculate Over Details

Accordingly, no details were forthcoming on personnel changes as they will result from this unification, (STEEL, April 13, pp. 14, 15) this subject being one of considerable interest and speculation. As matters now stand, only the Detroit district offices of these two companies are unified, this having been in effect since August, 1935.

Last week Ford, Bacon & Davis Inc., industrial engineers located at Pittsburgh and other United States Steel Corp. points, continued their surveys. As will be recalled, this firm was engaged by the Steel corporation last August to recommend changes in its corporate setup as affecting the manufacturing subsidiaries. Presumably the merger of American Sheet & Tin Plate Co. with Carnegie-Illinois Steel Corp. is an outgrowth of their primary findings.

Mr. Hughes' retirement takes from the Steel corporation an executive who, like so many of its officers,

came up through the ranks to a position of authority. Mr. Hughes entered the engineering department of the Carnegie Steel Co. in 1897 and in 1901 was made head of the engineering department of the Union Steel Co., Donora, Pa. In 1905 he was made master mechanic of the Carnegie bar mills in the Youngs-



I. Lamont Hughes

town district and in 1906 became assistant superintendent of that group and soon afterward superintendent. In 1916 he was placed in charge of the Ojibway, Ont., plant of the Canadian Steel Co. but the war preventing consummation of plans for that company he returned to Pittsburgh and was made general superintendent of ordnance operations at Neville Island, Pittsburgh, for the government. In 1918 he was elected president of the Lorain Steel Co., Johnstown, Pa. and Jan. 1, 1920, made general superintendent of all Carnegie operations in the Youngstown district. January, 1925, saw him a vice president of the Carnegie Steel Co. and April, 1928, a vice president of the United States Steel Corp. In August, 1930, he became president of Carnegie Steel Co. and on its consolidation with Illinois Steel Co. late in 1935 he was made executive vice president.

## May Sell Ojibway Plant

United States Steel Corp. is negotiating for the sale of Canadian Steel

Corp. Ltd., one of its Canadian subsidiaries, with a plant at Ojibway, Ont., a suburb of Windsor, Ont., opposite Detroit. R. S. Rider, who was vice president of the Canadian company, appears as the buyer and is believed to be acting for others.

The Ojibway plant includes a tin plate, galvanized sheet and wire works. Two blast furnace jackets were erected but the stacks were not completed. The plant was started soon after formation of the company in 1913, when Canadian tariffs were unfavorable. Changes in import duties and other considerations brought about modification of plans for the Ojibway plant and it has been inactive for several years.

## Christen Wire Galvanizing Mill

**E**DITORS of industrial and agricultural publications, professors of engineering and agricultural schools and farm experts together with numerous executives of the Bethlehem Steel Co. participated at a convocation at Johnstown, Thursday, April 16, to celebrate the formal opening of the company's new facilities for making Bethanized wire at its Cambria plant.

In inspecting mines, open-hearth furnaces, mills and other departments the visitors were afforded an unusual opportunity to witness the remarkable recovery from flood conditions which has taken place in the last few weeks. The inspection trip terminated in the rod and wire mill, where the new Bethanizing unit was examined in detail.

## Electro galvanizing Process

The Bethanizing process, described in the Dec. 24, 1934, issue of STEEL, represents a distinct departure from the orthodox method of galvanizing wire. In the new Cambria unit, raw material consisting of a roasted zinc concentrate is treated to form zinc sulphate. This solution goes into two plating cells, each 110 feet long and taking 40,000 amperes at normal load. Twelve wires travel in each cell. The electroplating operation produces a shiny crystalline surface, and the wire, after plating, is drawn through special dies which polish and densify the zinc coating.

Preceding the inspection trip, the convocation party met at the Bethlehem office building where John C. Long, manager of publications, Bethlehem Steel Co., introduced L. R. Custer, general manager of the Cambria plant, who welcomed the visitors. C. H. H. Weikel, manager, commercial research and industrial development, Bethlehem Steel Co., explained some

of the important points of interest to be observed during the inspection trip.

Following lunch at the Old Country club, four addresses pertaining to the Bethanizing process were presented at a session at which Mr. Weikel presided. U. C. Tainton, electrometallurgist, Baltimore, spoke on "Basic Theory of the New Bethanizing Process." L. H. Winkler, metallurgist, Bethlehem Steel Co., discussed "The Application and Utility of Bethanized Wire." The remainder of the program was devoted to the discussion of agricultural uses of wire.

Following the afternoon session the guests were taken by automobile to the Quemahoning Dam about 14 miles from Johnstown. This dam which erroneously had been reported to have gone out at the height of the recent flood, actually withstood every test of the crisis without any signs of weakness. No seepage was observed at any time. The dam is about 950 feet long and has a spillway 250 feet long. The dam is about 93 feet high and about 710 feet wide at the base. The lake behind the dam, about 900 acres in extent, furnishes water through a 5 foot, 6 inch diameter steel pipe to the Cambria works.

## Meetings

**A**MERICAN Steel Warehouse association, 442 Terminal tower, Cleveland, of which Walter S. Dox-

sey is executive secretary, has scheduled its twenty-seventh annual convention at the Edgewater Beach hotel, Chicago, June 10-12. Addresses by outstanding executives of the steel industry, in addition to discussions of steel warehouse problems, will feature this year's program. The third day of the convention will be devoted to inspection trips to steel plants and steel warehouses in the Chicago district.

### ELECTRIC METAL MAKERS WILL HOLD MEETING IN CANTON

Electric Metal Workers Guild announces its annual meeting to be held at Hotel Onesto, Canton, O., June 5-6. Technical sessions are now being arranged and a full attendance of the membership is expected. J. H. Chivers, 1051 Woodberry road, New Kensington, Pa., is secretary-treasurer of the organization.

### FOUNDRYMEN TO ELECT

Pittsburgh Foundrymen's association will be addressed at its regular meeting at Fort Pitt hotel, April 20, by J. C. Pendleton, superintendent of foundry and pattern shop for the Newport News Shipbuilding & Dry Dock Co., Newport News, Va. He will speak on steel and nonferrous alloy castings. Officers have been nominated as follows for election at this meeting: President, W. H. White, Pittsburgh Rolls Corp.; vice president, H. M. Wilson, Taylor-Wilson Mfg. Co.; secretary-treasurer, C. H. Paul, Mackintosh-Hemphill Co.

## Steel a Thing of Beauty



*Grimy surroundings are touched with the wizardry of true, natural art when an open-hearth steel furnace is tapped. The molten steel is flowing into the large ladle at the left, while the slag overflows into the smaller ladle or thimble at the right*

## Labor

**P**RESIDENT ROOSEVELT'S statement in his recent relief appropriation message that "at least more than 5,000,000 more people were at work in December, 1935, than in March, 1933," is confirmed by the current estimates of the National Industrial Conference board, New York, which show an increase of 5,413,000 in number at work.

The board points out, however, that this increase in employment has not as yet contributed materially to the solution of the relief problem. The President's estimate of 5,300,000 relief cases would indicate that approximately 18,890,000 persons, or 14.8 per cent of the total population, are receiving relief in some form.

The solution of the unemployment problem, according to the board, must be sought not in increased output and employment in manufacturing alone, but chiefly by an increase in activity in other fields. Manufacturing industry in January, 1936, was giving employment to approximately 8,892,000 persons, or 400,000 more than in January, 1935, and 937,000 more than in January, 1934.

### Difficult To Boost Rates

The board also points out that, so far as manufacturing is concerned, any reduction in hours of work, with the purpose of increasing employment, would probably involve at least some reduction in weekly earnings, since a further increase in hourly rates would not be possible in most industries under present conditions. In January, 1936, labor cost per man-hour, in manufacturing was 9 per cent above the 1929 level.

### J & L CASE TO NEW ORLEANS

Because of the crowded docket in the third federal appeals court at Philadelphia and because Jones & Laughlin Steel Corp. has a plant at New Orleans which is within jurisdiction of the fifth district court, the national labor relations board last week filed an enforcement order at New Orleans to restrain Jones & Laughlin Steel Corp. from alleged unfair labor practices. The court was asked to compel J. & L. to cease interference with union activities of its employees and to reinstate ten employees which the labor board said had been discharged for union activities at the Aliquippa, Pa., plant. A hearing on the board's petition is likely to be held in June.

At the Carnegie-Illinois Steel Corp.'s headquarters in Pittsburgh last week, B. F. Fairless, president of the corporation, had a lengthy conference with John J. Mullen of Clairton, Pa., who makes representation of a large

following of steel mill employes and who has been agitating for wage increases, union recognition and a 40-hour week, among other matters.

No announcement was made as a result of the conference, and Mr. Mullen himself said no specific demand for any of his platform planks were made. Rather, he said he was more interested at present in learning the procedure for instituting demands.

Officials of the Associated Industries of New York plan to carry their fight against unemployment insurance to the United States Supreme Court, it was announced at Buffalo by Maxwell S. Wheeler, head of this group of employers. The organization contends constitutional rights are being taken from corporations forced to pay 3 per cent of their wage payrolls, under the state law upheld last week by state court of appeals.

#### LABOR BOARD ORDERS ELECTION

National labor relations board Friday directed that as part of the investigation ordered by it to ascertain representatives for the purpose of collective bargaining with the Crucible Steel Co. of America, Pittsburgh, that an election by secret ballot be conducted within ten days after the company has produced its list of employes in accordance with a subpoena issued by the board April 16. The election is to determine whether the employes of the Spaulding & Jennings Works, Jersey City, N. J., desire to be represented by the works council or by the Strip Steel and Wire Workers union.

### Sheet & Tube Denies Holding Company Status

Youngstown Sheet & Tube Co., Youngstown Corp., and Continental Supply Co. have jointly filed an application with the federal securities and exchange commission for an order declaring them not to be holding companies and exempting them from provisions of the public utility holding company act of 1935.

The application states that the Youngstown Sheet & Tube Co. owns all of the stock of the Youngstown Corp., which owns all of the stock of the Continental Supply Co.

The application also states that the Youngstown Sheet & Tube Co. is primarily engaged in the business of the manufacture and sale of iron and steel products; the Youngstown Corp. is a holding corporation of securities of other corporations; and that the Continental Supply Co. is primarily engaged in the business of selling the products of the Youngstown Sheet & Tube Co. It is pointed out that none of the applicants controls, either directly or indirectly, a public utility or a holding company.

# Worker-Company Relations Plan Stands Test of Depression and Recovery

FOR the past decade, the American Cast Iron Pipe Co., Birmingham, Ala., has been operated under the Eagan plan of industrial democracy, a plan having for its purpose the improvement of worker-management relations. How this plan has functioned and how its measures have stood the test of the depression and of the recovery days proved an interesting story as related by C. D. Barr, vice president of the company, in addressing a dinner session at the production divisions conference of the American Management association in Cleveland, April 16.

A highlight of the conference program, Mr. Barr's address commanded enthusiastic acclaim from the 200 association members and guests who attended the dinner. Charles J. Stillwell, vice president, Warner & Swasey Co., Cleveland, presided at the dinner.

The Eagan plan was established under the will of John Joseph Eagan,

from \$600 after six months service to \$1500 per man of ten years' service.

By doing construction improve-work during depressions, unemployment is diminished. An endeavor is made to provide a minimum of four days work per week to each regular employe.

Other activities include a home purchase plan, a fund for emergency loans or donations, bath houses, Y. M. C. A. building, a 24-hour restaurant, co-operative store, Mutual Benefit association, training and shop instruction, and a full athletic program.

Medical service for all employes and their dependents is furnished. This requires a staff as follows: Three regular physicians, four specialists, four nurses, two secretaries, a medical director and a dentist. This department operates on an approximate budget of \$65,000 per year.

#### Employes Guard Safety

Twenty-two captains under a safety director, wearing uniforms, and safety badges, furnished by the company, watch for all unsafe conditions in the plant and unsafe practices by the men. Each captain has a committee of five with him in his department to help carry on the work. They are responsible for the safety of the plant and see that all men know and understand the safety rules of the shop.

These men attend regular safety classes on company time once per week, to keep up to the minute on all problems of safety in the plant. Goggles for eye protection and safety shoes and leggings are furnished by the company at one-half price.

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Reports of sessions of the American Management association's production divisions conference will be found on pages 56, 58 and 60 of this issue of STEEL.

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former president and owner of the American Cast Iron Pipe Co., who died in 1924. It includes many of the policies recognized and pursued by progressive companies for improvement of employer-employee relations.

Mr. Eagan's will provided for joint ownership and operation of the company by the management and workers. The board of management—consisting of company officials—and the board of operatives—elected by employes—form the trustees of the entire common (voting) stock. They elect the board of directors which administers the company's affairs as does any board of directors.

The company has an employes' savings plan. Interest at 6 per cent is paid quarterly. There is provision for the purchase of preferred stock by employes. This stock pays 8 per cent and employes can borrow on it up to 75 per cent. Employes with service records can buy stock upon a downward sliding scale commensurate with the service record. Employes own outright or have under contract \$400,000 worth of stock.

All employes share in a group life insurance plan. The amount ranges

### Republic Completing Niles Steel Products Purchase

Republic Steel Corp. is completing details of purchase of the Niles Steel Products Co. Plan of purchase has been worked out with the company's stockholders, bondholders and creditors.

The Niles company manufactures pressed steel parts and metal containers. Its plant represents an original investment of approximately \$1,000,000. Present management is to be continued.

Future plans include improvement and expansion of plant and an aggressive sales and merchandising program.

# Britain, at Capacity in Steel, Leads World Recovery

BY VINCENT DELPORT,  
European Representative, STEEL

*WITH Great Britain unable to meet domestic demand for steel and adding to her productive capacity and with conditions improving substantially on the Continent, recovery from the subnormal conditions of the past few years is more distinctly marked than in any previous quarter. Mr. Delport's survey indicates a better basis for expectation of continued gains and the corner seems definitely turned*

IMPROVEMENT in trade and industrial conditions has been noticeable during first quarter in most countries of Europe. The critical disturbance in the international political situation early in March brought about a slight setback, especially in countries more directly affected by the event, but if prevailing hopes that the situation will be straightened out materialize, one is justified in expecting that economic conditions will continue on an upward trend.

Increasing activities everywhere bring about a greater demand for finished and semifinished products, which in turn calls for a greater volume of raw materials, more employment and an intensification of exchanges. To summarize the situation, the economic crisis which has hung over industry and trade for the

past five or six years appears to have spent itself and the natural reaction has set in. Stocks must be renewed, new machinery must be installed and productive plant must be increased.

As stated in previous reviews, Great Britain started before other European countries on the road to economic revival. Since the application of drastic remedies in September, 1931, when the pound went off the gold standard, this country has never looked back. Following a period of retrenchment from 1931 to early 1933, and with the added support of tariffs, the trend of business has been almost consistently upward and a peak appears to have been reached. If no major disturbances occur in the international field, there is ample reason to believe that the present peak will be passed soon.

## Steel Leads In Recovery

Of the major industries, iron and steel has, perhaps, made the most remarkable recovery. In all steel-producing countries output is higher now than a year ago and further expansion is probable. During first quarter British steelworks have been producing at an average monthly rate of about 930,000 tons, or 11,000,000 tons per year: in other words, British steelworks are operating almost to capacity. They are

taxing the country's resources in coke and steelmaking iron, with the result that blast furnaces can not make sufficient iron for the foundries.

The present rate of production of raw steel is insufficient to meet requirements of British steel mills, with the result that the quota of imported Continental steel has been increased. For semifinished steel alone the import quota has been raised, in two installments, from the original 21,000 tons a month to 65,000 tons, until April 30. It is almost certain that this increased quota will be continued into the summer.

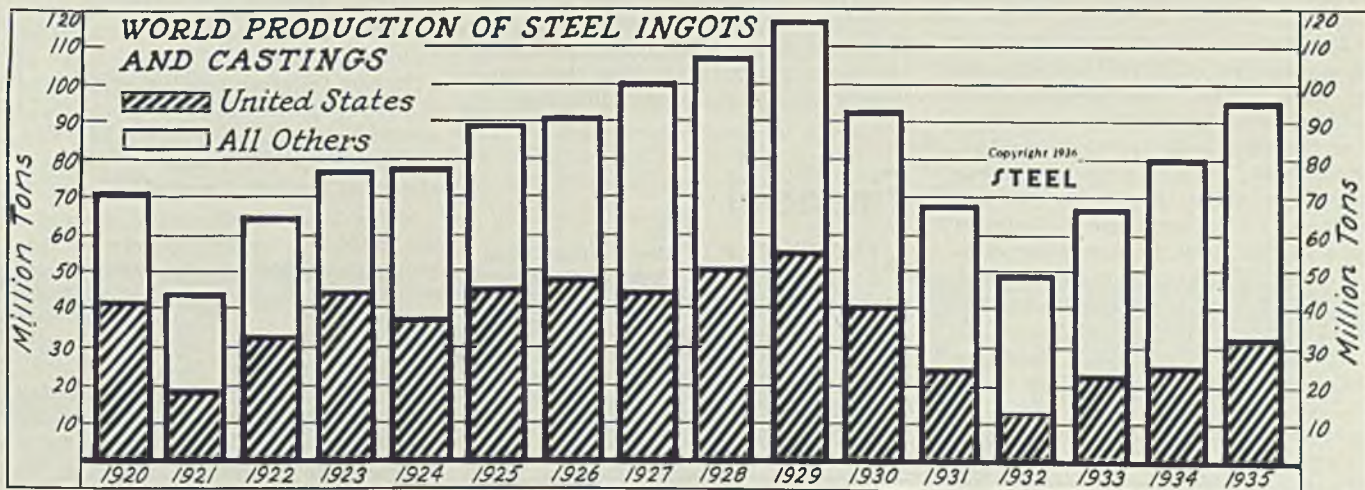
The price of semifinished and finished steel in Great Britain has been increased, and quite recently also, by arrangement with the steel cartel, the price of imported Continental steel for the British market has been raised.

## All Outlets Show Hunger

All branches covered by the steel industry are actively making up for a long period of retrenchment: thus, building, engineering, road-making, the railroads, the automobile industry, and even shipbuilders, are all making calls upon the steel-producing capacity of the country. Release of the *QUEEN MARY* from her fitting dock at Clydebank March 24 gives, perhaps, the most vivid illustration of Britain's approach to prosperity. Almost at the same time it was definitely announced that a sister ship, of greater tonnage and speed, would be built.

In the automobile industry, the financial results of the past year for three of the manufacturers of the more popular makes have been disclosed and show a considerable increase of earnings, the profits in one case being more than double those of the previous year (£1,194,369,

United States' Proportion of World Steel Production Rising, but Still Below 1930



The United States before 1930 produced about half the world tonnage of steel ingots and castings. Since then it has lagged and made only about one third the world's total. In 1935 it showed an increase over 1934 and stood at 35 per cent

compared with £543,972). The balance sheets of these companies are strong, and ample provision is made for further expansion. Other manufacturers of automobiles are also planning, or have actually started on, plant extension.

The large increase in the country's defense forces that has been decided upon, in the form of ships, airplanes, artillery and ammunition, results in a further call upon the resources of the steelworks. It can be estimated that not far short of one million tons of steel products of all descriptions may be required for this program.

In view of these developments, it is not surprising that new steelworks have been built and existing plant has been extended. A new bar and rod mill and a new cogging mill are being erected at David Colville's works in Scotland, and the slabbing mill at Motherwell is now operated on three shifts instead of two, thus increasing output 50 per cent. The new iron and steel works of British (Guest, Keen, Baldwin's) Iron & Steel Co. Ltd., at Cardiff, will have an annual capacity of 500,000 tons of pig iron and 400,000 tons of steel ingots.

The most spectacular addition to British steel capacity is the new works of Stewarts & Lloyds Ltd., at Corby, which are now in full operation. This is an entirely new undertaking comprising the whole range of products from iron ore to finished tubes. The works are built on the iron ore beds of Northamptonshire, which are owned by the company. The plant covers an area of about 350 acres, excluding the ore fields.

#### British Capacity Much Increased

Design and supervision during construction of the whole plant was entrusted to H. A. Brassert, of H. A. Brassert & Co. Ltd., London. Preparation of the site and excavations started in March, 1933; the first blast furnace was started May 8, 1934; the first heat of steel was obtained Dec. 27, 1934.

The coke oven plant is designed for an output of 3500 tons of coke per week. The blast furnace plant includes three units rated respectively at 300, 350 and 420 tons per day, but actually capable of producing 500,000 tons a year when in full operation. The steel plant includes three 25-ton basic bessemer converters; a fourth converter is to be added shortly. In addition are the rolling mill plant and the tube plant.

When all the additional plant recently erected in Great Britain is in full operation, the country may be producing at the rate of about 12,000,000 tons a year, a record that has never before been approached. In view of the considerable demand existing in the home market, less in-

terest is being shown in export trade, but, of course, it is not neglected, in view of the necessity of keeping a hold on regular export markets.

Taking the Continent as a whole, economic conditions appear to be improving, and steel production is increasing in practically all steel-producing countries. Even in France the trend is encouraging, despite the disturbing effect of the political situation on a very sensitive people. In that country, unfortunately, the financial situation of the state gives rise to some anxiety. The prevailing lack of confidence delays capital expenditure, money is hoarded or sent abroad and interest rates are high. Recurring rumors of a devaluation of the franc are mainly a sign of nervousness and such rumors are flatly contradicted by the government.

#### Other Countries Also Improve

Germany and Italy are producing all the steel they can, but those countries, especially the latter, are hampered by lack of supplies and by difficulty of financing imports of foreign products. In both countries the currency is maintained only by means of drastic measures and it appears difficult for such a position of financial stringency as there exists to continue indefinitely.

Conditions in the Swedish steel trade are improving, especially in regard to export business. The same may be said of Poland, where export trade to Russia is brisk. Austrian works are doing good business, partly with Italy.

The international steel entente is operating fairly smoothly and meetings are held at frequent intervals to put the finishing touches to the partnership with Great Britain on the one hand and the central European countries on the other. C.i.f. prices of cartel-controlled products have been increased in a number of markets.

If the international political situation could be definitely relieved, there are many indications that conditions in Europe would improve.

## Financial

**N**ET PROFIT of the Youngstown Sheet & Tube Co. for the first quarter of 1936 amounted to \$1,897,299, compared to a loss of \$595,770 in the first quarter of 1935, as shown by the company's consolidated income account.

Included in first quarter profit was \$381,510 of non-recurring income in the form of dividends and interest.

Bank loans amounting to \$3,000,000 as of Dec. 31, 1935 were paid

in full during the first quarter of 1936.

Cash and marketable securities as of March 31, 1936, amounted to \$9,016,602, and the ratio of current assets to current liabilities was 7.94 to 1.

Preferred dividend payable April 1, 1936, amounting to \$206,250, was paid on that date. Total preferred dividends in arrears at March 31, 1936, amounted to \$2,887,500.

#### BRING SUIT FOR RECEIVER

R. C. Huey, master commissioner, named by Federal Judge Paul Jones of Cleveland, last week received statements in a suit seeking the appointment of an operating receiver for the Cold Metal Process Co., Youngstown, O. The company, which builds Steckel mills and produces flat rolled steel, recently suffered heavy fire damage but was able to resume shortly.

#### EARNINGS STATEMENTS:

Duff-Norton Mfg. Co., Pittsburgh, reports net income of \$74,776 in 1935, compared with net of \$47,832 in 1934.

Gulf States Steel Co., Birmingham, Ala., had a net profit of \$96,929 in the first quarter, against \$30,149 in the comparable period of 1935.

Interlake Steamship Co., Cleveland, reports earnings of \$664,374 in the year ending Dec. 31, 1935, contrasted with net of \$463,128 in 1934.

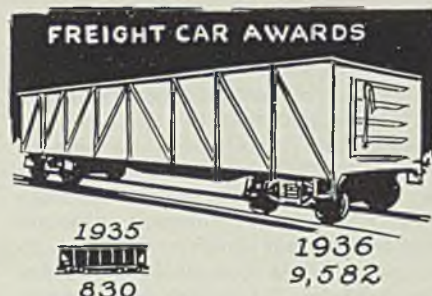
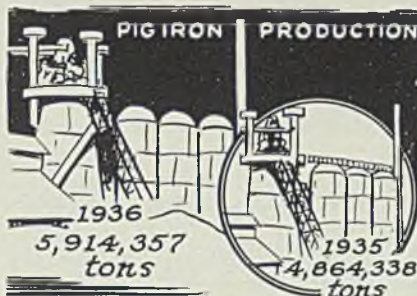
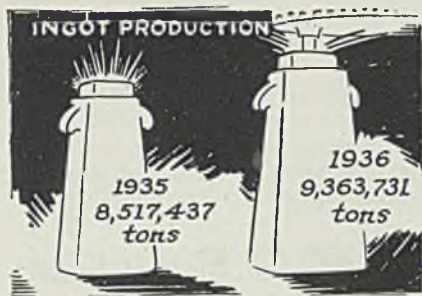
Transue & Williams Steel Forging Corp., Alliance, O., reports net profit of \$31,515 in the first quarter of this year, against \$54,623 in the same period of 1935.

McCord Radiator & Mfg. Co., Detroit, reports net profit of \$123,121 in the quarter ended March 31, after all charges, compared with profit of \$42,893 in the first quarter of 1935.

Mullins Mfg. Co., Salem, O., shows a profit of \$133,338, after taxes, depreciation, etc., in the first quarter of this year, compared with \$122,103 in the March quarter last year.

Oliver Farm Equipment Co., Chicago, in reporting 1935 loss of \$482,006, against loss of \$7,383,896 in 1934, states that a profit was earned in the first quarter of 1936. First quarter sales were 88 per cent ahead of the 1935 period.

Eaton Mfg. Co., Cleveland, showed a net profit for the first quarter of this year, after all charges including provision for federal income tax, of \$583,382 as compared to \$605,272 for the first quarter of 1935, according to the company's consolidated income account. First quarter, 1936, earnings were equivalent to approximately 83 cents per share on 696,146 shares of stock outstanding, as compared to earnings of approximately 89 cents per share on 678,743 shares outstanding for the first quarter of 1935.



# Steel Producers, Users End Best First Quarter Since 1930

**I**T WAS a great first quarter—the best first quarter, generally speaking, since 1930 for producers of iron and steel, and presumably also for consumers, since comparatively little has gone into inventory.

Take steel ingot production as the bellwether. Open-hearth furnaces and bessemer converters in the first quarter were tapped of 9,363,731 gross tons, compared with 8,517,437 tons in 1935. Better than the opening quarters of 1934, 1933, 1932 and 1931, the nearest basis of comparison is the 12,067,677 tons in 1930. The quarter's total was more than three times as great as the corresponding period of 1933; in fact, it was just a little short of being half of the production for all 1933, which was the depression low.

While the increase in steel production in the first quarter was 9.4 per cent over the comparable quarter of a year ago, in pig iron the improvement was 23 per cent, the comparison being 5,914,357 gross tons for 1936 and 4,864,338 tons for 1935. Again the quarter just ended was the best since the opening period of 1930, when 8,937,517 tons was made.

Of the consuming outlets for which statistical information for the quarter is already available, none can compare with freight car awards. In the first quarter, subject to some

slight revision for late March business, 9582 freight cars were placed on order, contrasted with only 830 in 1935. In all 1935 only 19,308 cars were placed; and in all 1934, with the benefit of the lavish hand of the government, 23,829—both of which will be easily passed by midsummer if the present rate of business is maintained. First quarter business was almost four times the total car orders for all 1933—2460.

Automobile assemblies (passenger cars and trucks for the United States only) ran almost a dead heat. With March estimated, first quarter assemblies this year were 1,083,216 and last year 1,058,245. But a year ago the first quarter benefited from the full momentum of the January shows; this year with the shows held in November, that month and December profited and doubtless drained away from the first quarter orders estimated up to 400,000 units. The quarter just ended was the best since the opening one of 1929.

In the building steel lines the improvement also was sufficiently marked to sweep aside all comparisons prior to 1930. Structural steel awards, as reported by STEEL for projects involving 100 tons or more, aggregated 289,237 tons in the first quarter, against 209,239 tons a year ago. Reinforcing bar orders also as reported by STEEL for projects of 100

tons or over mounted to 111,550 tons from 67,538 a year ago.

The comparisons in the six accompanying illustrations are for the first quarter of 1936 with the first quarter of 1935.

## Belgium's Exports Decline

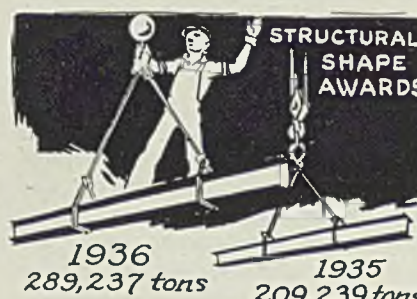
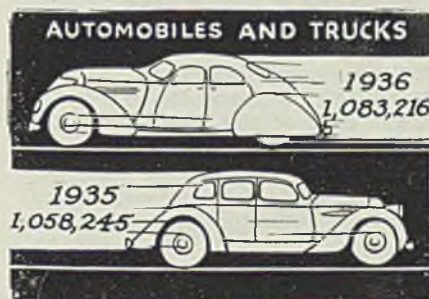
Belgian exports of heavy iron and steel products showed a decrease in 1935 when compared with shipments in the preceding year, despite general improvement in world conditions, according to a report to the department of commerce from Commercial Attache T. L. Hughes, Brussels.

Excluding scrap, total exports of iron and steel products from Belgium in the calendar year 1935 amounted to 2,937,266 metric tons as compared with 3,140,058 tons in 1934, a decline of 202,792 tons.

The shrinkage in the Belgian iron and steel export trade, it is pointed out, was mainly due to curtailed purchases in Far Eastern markets. Shipments to China totaled 162,362 tons in 1935 compared with 236,370 tons in 1934, while Japanese purchases decreased from 189,098 tons in 1934 to 101,305 tons in 1935.

## Magnesite Output Up 75%

Production of magnesite in 1935 was 177,154 net tons, compared with 100,973 tons in 1934, and almost equal to the 187,660 tons produced in 1929, according to the federal bureau of mines. Two mines were active in California and one in Washington. Imports in 1935, 26,167 tons, compared with 24,524 tons in 1934.





# Production

**S**TEEL production forged ahead 4 points last week to 70½ per cent, a new high since the first week of June, 1930, when the rate was 71 per cent. Heavier rail releases, automotive and farm implement requirements continue important props to operations. In the major steelmaking centers, Pittsburgh was up 8 points to 65 per cent; Chicago 2½ to 70½ per cent; eastern Pennsylvania 1½ to 43½ per cent, and Youngstown 4 to 80 per cent. Further details follow:

**Cleveland-Lorain**—Off 1½ points to 84½ per cent last week, with 33 open hearths active out of a total of 39. Republic Steel Corp. continues melting in 14 units, Otis Steel Co. 8, and National Tube Co., Lorain, has taken off one to operate 11.

**Youngstown**—Gained 4 points last week to 80 per cent, and will probably hold at this level at the opening of this week. Carnegie-Illinois Steel Corp. resumed melting in a fourth blast furnace at its Ohio works, and Youngstown Sheet & Tube Co. is considering lighting a stack at its Brier Hill works.

**Chicago**—Rose 2½ points to 70½ per cent, a new post-depression peak. Mills now expect to be able to maintain their output near its current rate for three to four weeks, based on present backlogs. Blast furnace schedules also have been increased through the lighting of three stacks. Twenty-four of the district's 41 furnaces now are active.

**New England**—Unchanged at 78 per cent, with expectations of an increase of 4 points to 82 per cent.

**Cincinnati**—Gained 4 points last week to 80 per cent, highest level of the year. Nineteen of 24 open hearths were active. Another unit will be added this week, raising the production level to 84 per cent.

**Birmingham**—Steady at 69 per cent, with 15 open hearths continuing active. There is no immediate outlook for any change from this level. Sheet and plate mills are working on a three-shift a day schedule.

**Buffalo**—Up 3 points to 65 per cent, with 24 open hearths active. Operations are expected to reach 70 per cent this week, dependent upon the opening of navigation.

**Central eastern seaboard**—Increased 1½ points to 43½ per cent. Increasing activity in the Harrisburg, Pa., area, following recent flood disturbances, is an important contributing factor. Operations there are scheduled this week to be well in excess of production prior to the flood, with an effort being made to catch up with work which was temporarily suspended. Still higher output is expected over the

## Steelmaking Operations

Percentage of Open-Hearth Ingot Capacity Engaged in Leading Districts

	Week ended Apr. 18	Change	Same week 1935 1934	
Pittsburgh ....	65	+ 8	36	43
Chicago .....	70½	+ 2½	50	54
Eastern Pa....	43½	+ 1½	29½	40
Youngstown...	80	+ 4	58	60
Wheeling .....	84	+ 8	76	73
Cleveland .....	84½	- 1½	62	74
Buffalo .....	65	+ 3	37	57
Birmingham...	69	None	54½	52
New England...	78	None	52	89
Detroit .....	100	None	82	94
Cincinnati ....	80	+ 4	†	†
Average.....	70½	+ 4	46	55

†Not reported.

remainder of the month, following which production may flatten out, as new business recently has been lagging.

**Pittsburgh**—Up 8 points last week to 65 per cent, bettering the weekly rate of operations for this district at any time since April, 1930. Both the leading interest and the leading independent were producing ingots last week at 65 per cent. Rates of smaller independents averaged 65-70 per cent.

A new high in blast furnaces has been recorded here, as four more furnaces were placed in blast through last week, two by Corporation subsidiaries. Thirty-three out of 60 blast furnaces are now active. Carnegie-Illinois has 15 out of 32 on; Jones & Laughlin, 8 of 11; Bethlehem, 5 of 7; National Tube, 2 of 4, and American Steel & Wire.

## 80% on 1928 Capacity

*STEELWORKS operations today would be about 80 per cent, if figured on the industry's ingot capacity of 1928 and 1929.*

*Since those years the capacity has been raised from approximately 59,000,000 gross tons to 68,200,000. Therefore, an equivalent tonnage of ingots today appears smaller, when expressed in percentage of capacity, than it would in 1928.*

*Ingots this month are being produced at an average of about 150,000 tons daily, and the steelworks rate is averaging 67 per cent.*

*In January, 1928, the industry made only 153,496 tons daily, yet the official operating rate was 81.4 per cent.*

*In May, 1929, the industry operated virtually at capacity, 99.5 per cent, and daily output was 195,302 tons.*

*Percentage comparisons with "the good old days" must take the increase in capacity into consideration.*

Pittsburgh Steel, and Pittsburgh Crucible Steel, 1 of 2 each.

**Detroit**—Steady at 100 per cent last week, as all 17 open-hearth furnaces are remaining on schedule.

**Wheeling**—Up 8 points to 84 per cent last week, as 31 out of 37 open-hearth furnaces were operating.

## J. G. Brill Co. Elects Officers

Following a meeting of the board of directors of the J. G. Brill Co., New York, Charles J. Hardy, chairman of the executive committee, announced last week that Noah A. Stancliffe had been elected a director and J. Homer Platten appointed a member of the executive committee. The board elected these officers: President, Mr. Hardy; executive vice president, Leslie E. Hess; vice presidents, Charles O. Guernsey and J. Homer Platten; secretary and treasurer, Edmund L. Oerter; assistant treasurers, Frederic W. Brill and John W. Robb; assistant secretary, Harry F. McKillip; comptroller, B. D. F. Baird; and assistant comptroller, W. J. Brophy.

## Advertising New Building Ideas Will Help Steel

Great advertising campaigns are gathering to help restore American business to normal, Bennett Chapple, vice president, American Rolling Mill Co., Middletown, O., said in a recent interview.

Chairman of an industrial committee associated with the Purdue housing research foundation, Mr. Chapple foresees intensive campaigns in the building industries, recognized by economists as one of the most prominent fields open to industry and business.

"It would not be surprising," he declared, "if more than \$100,000,000 is spent by the building industry and its allied lines this year. Their advertising will interpret for the public the constant evolution decreed by nature's laws. It must introduce and spread the gospel of new building products that have marched into our sphere in the last decade; it must continue to increase the sales of those products which already are widely known."

## Opposes F.I.T. Rates

Examiner Burton Fuller of the interstate commission, Washington, is considering evidence taken recently in the case of the Texas Steel Co., Fort Worth, Tex., against a number of railroads in Texas and Oklahoma alleging that fabrication-in-transit rates on reinforcing bars give undue preference to certain Texas and Oklahoma cities over Fort Worth. Damages of \$500,000 are claimed.

# Men of Industry

**N**ORBERT E. SMITH has been added to the sales staff of Inland Steel Co., Chicago, with headquarters in Chicago. He will cover certain territory in Indiana, Ohio, and Kentucky. Mr. Smith formerly had been associated with Joseph T. Ryerson & Son Inc. for the past 15 years, the last 7 of which were spent in the sales department at Indianapolis.

♦ ♦ ♦

George L. Erwin Jr. has been appointed assistant to P. R. Mork, vice president in charge of sales, Crane



George L. Erwin Jr.

Co., Chicago. Mr. Erwin, an engineering graduate of Cornell university formerly had been general sales manager of Kearney & Trecker Corp., Milwaukee, manufacturer of machine tools. In his newly-created position of assistant vice president, he will develop sales and market research activities.

♦ ♦ ♦

George R. Beasom, Scully Steel Products Co., Boston, has been re-elected president of the New England chapter of the American Steel Warehouse association, Cleveland. Other officers elected include: Carroll S. Harvey, Arthur C. Harvey Co., Boston, first vice president; Paul Avery, Avery & Saul Co., Boston, second vice president; J. L. Parsons, Edgar T. Ward's Sons Co., Boston, secretary-treasurer.

♦ ♦ ♦

W. G. Hassel, until recently a sales and development engineer for Amer-

ican Steel & Wire Co., at Pittsburgh, is now identified with the Pittsburgh Crucible Steel Co., Pittsburgh, in charge of sales promotion work. Mr. Hassel held numerous positions with American Steel & Wire since 1924, being first in the metallurgical laboratory, from 1926 to 1927 in charge of the heat treating department, 1927 to 1929 as a special operating representative, and from 1929 to 1932 chief metallurgist.

♦ ♦ ♦

B. F. Jones III, vice president and secretary of Jones & Laughlin Steel Corp., Pittsburgh, has been elected a director of the National Union Fire Insurance Co., Pittsburgh.

♦ ♦ ♦

Dr. D. E. Marshall, Sheffield, England, has been awarded the Andrew Carnegie gold medal for 1935 by the council of the Iron and Steel institute, London, England, for his paper on "Further Determinations of the External Heat Loss of Blast Furnaces," which was published in the journal of the Institute for 1935, volume 1.

♦ ♦ ♦

Col. F. A. Scott, Cleveland, and S. Livingston Mather, vice president of Cleveland-Cliffs Iron Co., Cleveland, have been elected to the board of directors of Youngstown Sheet & Tube Co., Youngstown, O., succeeding J. C. Argetsinger and the late John L. Severance. Mr. Mather has also been named a member of the executive committee, while Mr. Argetsinger will continue as general counsel for the company.

♦ ♦ ♦

John H. Mohr, John H. Mohr & Sons, Chicago, has been elected president of the Purchasing Agents Association of Chicago for the coming year. Other officers chosen are: First vice president, R. W. Morrill, Bowman Dairy Co.; second vice president, G. R. Zeiss, The Wahl Co.; treasurer, G. W. Simons, Darling & Co.; secretary, F. J. Heaslip, Fairbanks, Morse & Co. The board of governors consists of L. H. Schreiber, Allen B. Wrisley Co.; T. H. Tredwell, W. C. Ritchie Co.; M. T. Hartigan, Joseph T. Ryerson & Son Co.; E. W. Fitzgerald, Wepsco Steel Products Co.

♦ ♦ ♦

Muir L. Frey has been appointed to the metallurgical staff of the Republic Steel Corp., Cleveland, with headquarters at the Republic plant in Buffalo. Mr. Frey comes to Republic from John Deere Tractor Co., Waterloo, Iowa, where he held the

position of chief metallurgist for the past ten years.

Born in 1900 at Bunker Hill, Ill., he received his technical education at the University of Missouri School of Mines and Metallurgy, from which he was graduated in 1923, with the degrees of bachelor of science and master of science in metallurgy. Mr. Frey received his primary experience with the United States bureau of mines as a junior metallurgist, and later was associated with the Caterpillar Tractor Co., and Gerlinger Electric Steel Casting Co.

♦ ♦ ♦

E. R. Norris retired April 1 as assistant to general works manager, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., after 44 years of continuous service with the company.



E. R. Norris

Having acquired a vast experience in manufacturing operations in his early years with the company, he was transferred to the staff of the manager of works in 1904, and subsequently was appointed assistant works manager and director of works equipment. In 1928 he was appointed general works manager, and two years later became assistant to the vice president. He is a member of the American Society of Mechanical engineers.

♦ ♦ ♦

George W. Burrell, president and general manager, Wellman Engineering Co., Cleveland, has been elected president of the Cleveland chamber of commerce, succeeding Charles K. Arter.

Mr. Burrell began his career in a machine shop of the Cleveland Rolling Mill Co. at the age of 15. Following a course in mechanical engineering at Ohio State university for

three years, he returned to Cleveland Rolling Mill as a draftsman. After work in the mill's testing department, following a year's interlude with the Consolidated Steel & Wire Co., Rankin, Pa., he joined the late Henry Grey in Duluth, where experiments were being conducted by the Ironton Structural Steel Co. on rolling a wide flange I-beam for heavy construction. Mr. Burrell then returned to Cleveland and joined the Wellman-Seaver-Morgan Co., which later became the Wellman Engineering Co.

He is a member of the American Iron and Steel institute and the Cleveland Engineering society.

A. W. Brown, 2567 West Grand boulevard, Detroit, has been appointed sales representative in lower Michigan for American Hollow Boring Co., Erie, Pa.

J. Berry McOwen has been named representative in western and central New York for Tubular Service Corp., Brooklyn, N. Y. He formerly was connected with the Central Iron & Steel Co.

J. G. Waldron, who has been identified with the New York office of the Wheeling Steel Corp., Wheeling, W. Va., and its predecessors since 1919, has been appointed district sales representative in New York for the Newport Rolling Mill Co., Newport, Ky., with headquarters at 30 Church street.

W. B. Plummer, formerly vice president and general manager, has been appointed president of the Lubrication Corp., Chicago, a subsidiary of Standard Oil Co. of Indiana, and Bendix Aviation Corp., succeeding B. K. Brown.

G. K. Squier, formerly sales manager, has been made vice president and general manager, succeeding Mr. Plummer.

C. B. Boyne has been made manager of stainless steel tubes for the Ludlum Steel Co., Watervliet, N. Y. Although continuing to assist in the sale of other Ludlum products, Mr. Boyne's special responsibility will be the promotion and sale of the company's several lines of stainless steels. Mr. Boyne has been associated with Ludlum in various capacities since 1914, including that of assistant to the president.

J. O. Donohue and J. D. McLin have rejoined the sales staff of the New York Belting & Packing Co., Passaic, N. J., to contact and assist distributors of New York Belting & Packing mechanical rubber goods.

Mr. Donohue will make his headquarters in Baltimore, and will cover Maryland, Delaware, Washington,

eastern and northern Virginia, eastern North Carolina, and West Virginia. He represented the company in the Baltimore territory for nine years prior to 1931, and since then had been directly associated with a distributor for the company in the same district.

Mr. McLin will make his headquarters in Dallas, Texas, and will cover Nebraska, Kansas, western Missouri, Oklahoma, Texas, Arkansas and Louisiana. Mr. McLin had been connected with New York Belting & Packing for 16 years prior to his leaving in 1932 to enter another phase of the rubber industry.

## Died:

J. I. ANDREWS, 67, retired vice president in charge of sales of the American Sheet & Tin Plate Co., Pitts-



J. I. Andrews

burgh in Atlantic City, N. J., April 16.

He began his business career with the Illinois Steel Co. shortly before the turn of the century. Excepting for a brief period when he was affiliated with the Swift Packing Co., Louisville, Ky., he had since been continuously identified with the steel industry. In 1900 he became associated with the American Sheet Steel Co., and in 1901 with American Sheet & Tin Plate. During the war he served as a member of the war industries board.

Charles D. Jenks, president of the Chicago-Cleveland Car Roofing Co., Chicago, in San Francisco, April 14.

David J. Hurley, 61, founder and president of David Hurley & Sons, Newark, N. J., steel forgers, in that city, April 9. He was born in Scot-

land and came to this country at the age of 23. He entered the steel business, and seven years later founded his own company.

William E. Evans, 80, retired vice president of Armstrong Cork Co., Lancaster, Pa., at Pittsburgh, April 15.

Frank J. Coyle, 49, purchasing agent, Union Metal Mfg. Co., Canton, O., in that city April 9.

William H. McCreary, 48, steel buyer, Packard Motor Car Co., Detroit, at Detroit, April 12.

Charles G. Challinor, 34, representative at Pittsburgh, Palmer-Bee Co., Detroit, at Uniontown, Pa., April 13.

Frederick J. Runser, 52, former president of the Cuyahoga Machine & Tool Co., Cleveland, in Cleveland, April 12.

Fred E. Ditzendanner, 53, a partner in the Greenwich Machine & Tool Co., New York, in East Orange, N. J., April 8.

Elmer E. Melick, 74, retired firebrick broker and manufacturer, Swarthmore, Pa., in Worcester, Mass., April 9.

Harry U. Hart, vice president and chief engineer, Canadian Westinghouse Co. Ltd., Hamilton, Ont., in Hamilton, March 15.

Preston L. Ethridge, 63, for the past 25 years superintendent of mines for the Woodward Iron Co., Birmingham, Ala., in Memphis, Tenn., April 2.

Frank L. O. Wadsworth, 69, consulting engineer in Pittsburgh, and at one time associated with the Miller Non-Corrosive Metal Co., at Pittsburgh, April 11.

Edgar J. Reilly, 50, vice president and secretary, Standard Boiler & Plate Iron Co., Niles, O., in Youngstown, O., April 16. He formerly was director in charge of sales for W. B. Pollock Co., Youngstown, O., organizing the Standard company in February, 1929.

Walter A. Moore, 55, district sales manager, Haynes Stellite Co., Cleveland, subsidiary of Union Carbide & Carbon Corp., New York, in Cleveland, April 9. He joined Haynes Stellite in 1923, and became district manager in 1926. He formerly had been connected with Foote-Burt Co., Cleveland, as production manager, with F. B. Stearns Co. as tool supervisor, and with the Ohmer Fare Register Co., Dayton, O., working on raw materials.

# Mirrors of

# Motordom

DETROIT

**S**OMEHOW, it is difficult to understand—why automobile models have to be changed while assemblies are being reeled off at a 500,000-per-month clip.

This, however, is the dilemma the motor industry finds itself in today. While it is going strong on 1936 lines, it is also thinking in terms of what to bring out for 1937.

Accordingly, they say, there is an open breach between many a sales and planning department in the motor plants. The sales crew wants to drain the present market to the last drop; across the hall, the planning division wants to get things going on new models.

Last week the former said that April not only would be a 500,000-car month, but in their opinion something like 400,000 to 450,000 models will be produced in both May and June. Presumably, July and August also can be counted on for a nice slice of this booming market.

But, steeped in the tradition of change—even changing a good thing for the sake of a change—the boys who bend over blueprints out here say: "The fall will be here soon. To follow the usual custom, we must start to retool and rearrange manufacturing facilities."

## Keep the Cars Rolling

They tell a story in Detroit right to the point: Directors of a certain large automobile company here recently approved \$1,200,000 for new machine tools, a new body paint spraying system, and general rearrangement of existing plants.

The planning division got hold of the program, but before it could lift a finger sales executives of the same company heard of it. Their reaction was vehement, and it ran something like this: "No one is going into the assembly line now and tie up production, not even a division of our own concern."

Accordingly, the \$1,200,000 will not be appropriated until August, for that was the basis of an interdepartment settlement. In the meantime,

about all this planning department can do is to broadcast a flood of inquiries for the machinery and equipment it will eventually buy.

So the outward and apparent keynote of Detroit's major industry today is—don't tamper with a good thing. That the industry this spring has struck a bonanza, few here will deny. March retail sales were actually some 360,000 cars, leaving no inordinately high stocks in the field.

Furthermore, Detroiters are as sure that May and June will average automobile production better than 100,000 cars weekly as they are that their pet Tigers will repeat with another baseball pennant.

## Carmakers Eye Bonus

True, Detroit generally and easily runs to exuberance, but there is more evidence, aside from low field stocks of new cars, to support the first half of 1936 as a fast pacemaker.

Conceding the country's latent demand for new cars, the overdue replacement factor on many existing cars, and many other long-pull reasons in the industry's favor, must be added the nearing effects of a \$2,000,000,000 war veterans' bonus.

Apparently few realize what potency that sum will have. Even if the veterans use 40 per cent to pay off old debts, this will leave 60 per cent, or \$1,200,000,000 to be spent immediately, or before fall.

Then if new automobile purchases take only a modest 10 per cent of this total, or \$120,000,000, that would be enough for something like 150,000 new cars. For July and August, that's an impressive figure.

Since few cars will be bought outright, the 150,000-car total can be marked up considerably. In other words, many bonuses will be used only for down payments. This is an important factor.

So it may be like waving a red flag to mention model changes to motordom's brass hats today, yet

true to policy each week brings more details on model changes for 1937.

There is no lack of inquiry today in Detroit for new machinery, tools, dies and parts. The industries dependent on this business are saying more money will be spent on changes this year than in the last four or five.

Chrysler made news last week when it came out with blueprints, asking estimates on 1937 stamping work for the DeSoto and Chrysler lines. No large body panel work was included, but inquiries cover frame, running board and small parts work for the Airflow and Airstream models. Dodge and Plymouth stampings for 1937 will, of course, be retained within divisions of Chrysler Corp. itself.

Chrysler is planning an innovation in doors for all of its subsidiary models next year. The problem of giving wider seating room without changing body width or wheel tread has long been a bugaboo of the industry. Chrysler now seems to have a solution.

## To Reduce Door Thickness

The plan is to narrow the thickness of the doors by about 2 inches apiece, thus adding 4 inches to the interior width. Chrysler thinks it can be accomplished, that it can build its window operating sprocket in that thickness, and not sacrifice stability.

Of course, Chrysler will not change from an all-steel door construction, and believes it can cut down a door to about 2 to 2½-inch thickness and still have a basic double steel wall properly insulated.

Chevrolet and Pontiac are to be converts to the all-steel door also. Based on certain difficulties they have been having at the Pontiac plant on wood fitting, the present door panel backing in the form of wood strips will be dropped for 1937.

Such a change will open up a siz-

# Mirrors of Motordom

able market for hot-rolled sheets, for the plan is to make the doors with a complete double thickness of steel, rather than the present reinforced method with narrow wood and steel ribs to the outer body-stock shell.

But to return to Chrysler and its changes. This company is conceded to be a hot tip among equipment people, especially for the East Jefferson division. An extensive rearrangement of machinery there, and purchase of new machine tools is planned.

Chrysler also will have a big die program this year, and presumably much of it will be spread around outside of its own Dodge shop. One thing that makes it seem sure Chrysler will spend money this year is that eleven millions in net, returned from 1935 operations. Earnings for General Motors and Ford also assure a healthy 1937 spending program.

From all reliable indicators, Chrysler will stand on its present type motors for Plymouth, Dodge, DeSoto and Chrysler. No important block changes are contemplated; rather, are revisions more plentifully in store for sheet metal.

## Die Castings Popular

It's also a safe bet that die-cast radiator shells will hold their own or better their position with Chrysler next year. Since they were put on many of the models this year there has been a pronounced increment in dressier appearance and car saleability, despite the moderately higher cost over sheet metal grilles.

Chrysler executives are definite in their praise of die castings. They also like stainless steel more at Chrysler; you can look for more of it per model next year.

Virtually all of the Buick and Olds die work for 1937 has been placed, a shop outside of Detroit having the large share—that is, of the work that Fisher Body is not doing. It always has been the custom to place fender dies, for example, on the outside.

Fisher itself is re-placing a few orders for body dies, at least one Detroit shop benefiting. The sum total is only a minor percentage of what is about to come. Ford and Hudson have been absent from the new die market. Both doubtless fall in that group that sizes up the next three to four months as heavy sellers on the 1936 lines.

Behind the scenes, General Motors is gathering more diemaking facili-

ties to itself. The Grand Rapids program is one example, so is the re-opening of the Brown-Lipe-Chapin division in Syracuse. Last Thursday General Motors took bids for equipping still another large die division, but would not name the location to interested parties.

The Brown-Lipe-Chapin plant has been making lamps, hub caps and bumper guards. Now it is adding a die division, and also will take on screw machine parts, die castings and some stampings. It's the first time that Syracuse division has been open in five years.

Nearby, in the same town, some announcement effecting the old Franklin plant is expected. Detroit would like to know more about what will come to pass there, since two prominent Detroiters closed on an option to buy the works, ostensibly for car manufacturing.

Speaking of Olds, it is a definite assurance that this fast stepper of General Motors will go to an automatic transmission next year. Some variation of the Borg-Warner device will be used. Hudson, the only car using the device that eliminates gear shifting, has recently been boosting the slogan—"Flick your finger. . . . gears shift!"

Olds will also dress up its body considerably, and a liberal use of stainless parts is promised. This division of General Motors, having made some 55,000 jobs in the first quarter,

seems to be drawing farther away from sister Pontiac. Olds has a 25,000-car schedule for April and again was working six days last week.

Since Packard won't call its small six by any name, Detroit has come to dub it the "115" because it is 5 inches shorter than the 120 wheelbase, and as everyone knows the 120 has stood for 120 inches of wheelbase, and later as 120 horsepower.

At any rate, the latest developments on the 115 have seen contracts placed for the radiator shell—practically identical with the 120—and virtual promise that Packard itself will make the fenders.

Last week Chevrolet was nosing out Ford at 31,000 to 29,000 assemblies, respectively. Next came Plymouth accounting for 12,500, followed by Dodge at 9000.

Olds was next with 6500, then Pontiac at 5000, and Buick with 3900, after which the first "independent" cuts in, Hudson with 3550, for the week. Nash and Studebaker were scheduled at 2000 each. Packard 1900, and Chrysler and DeSoto each totaled 1500 to 1600 jobs. The others were under 1000 jobs weekly.

## Production Pickups

Contrary to reports that the Chevrolet transmission division in Toledo, O., has been almost closed since the strike there a year ago, this plant has been employing 1400 men and averaging a four-day week for the last four months. . . . Confident of sizable stamping orders for 1937 models, City Auto Stamping Co., Toledo, has prepared plans for an addition to its assembly facilities. The addition will reach the contract stage if the orders come through, especially one particular negotiation. . . . Japan produced more window glass last year than the United States, Belgium or any other country. Japanese glassmakers get as much pay in 15 to 16 hours as the American glassmaker gets in an hour. . . . Though Hupp's Detroit plant is idle, the Fostoria, O., plant has just been incorporated as the Atlas Mfg. Co., though still remaining a Hupp subsidiary. . . . Hercules Motor Co.'s new plant at Muskegon, Mich., has taken a contract to rough machine castings for Campbell, Wyant & Cannon Foundry Co. . . . Packard Electric Co., Warren, O., a General Motors subsidiary, is adding 50,000 square feet of manufacturing space, spending \$200,000, 25 per cent for equipment.

## Automobile Production

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

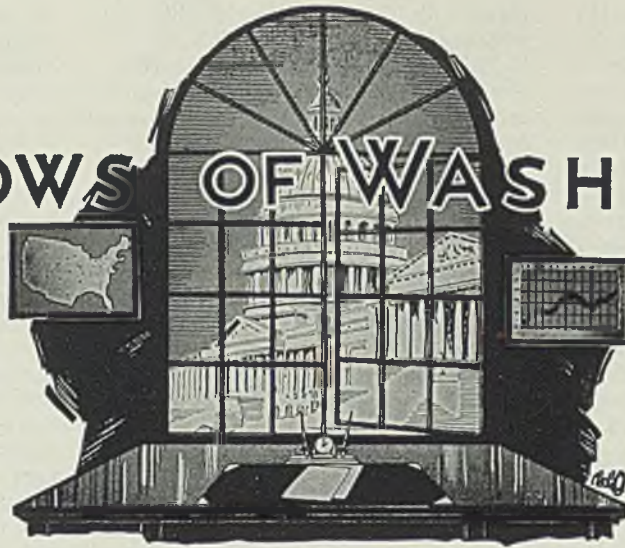
	1934	1935	1936
Jan. ....	155,666	292,785	367,252
Feb. ....	230,256	335,667	290,964
Mar. ....	338,434	429,793	*425,000
3 mo. ....	724,356	1,058,245	1,083,216
Apr. ....	352,975	477,691	.....
May ....	330,455	364,662	.....
June ....	306,477	361,248	.....
July ....	264,933	336,985	.....
Aug. ....	234,811	239,994	.....
Sept. ....	170,007	89,804	.....
Oct. ....	131,991	275,024	.....
Nov. ....	83,482	398,039	.....
Dec. ....	153,624	407,804	.....
Year .....	2,753,111	4,009,496	.....

\*Estimated.

Estimated by Cram's Reports

Week ended:	
March 21 .....	95,223
March 28 .....	98,415
April 4 .....	108,426
April 11 .....	112,818
April 18 .....	119,834

# WINDOWS OF WASHINGTON



## WASHINGTON

**T**HE industrial breathing spell is over; that is, if there ever was any breathing spell. At least that is the way Washington is interpreting the speech made in Baltimore last week by the chief executive.

It could not even be said that he made a veiled threat at industry when he notified the business men of the country for a second time that unless they took more men back into the factories and the shops that the government would have to do something about it. Again the head of NRA reared itself—but that is unthinkable.

"Because the practices of employment definitely affect the problem of unemployment," said Mr. Roosevelt, "the government must give and will give consideration to such subjects as the length of the working week, the stability of employment on an annual basis, and the payment of at least adequate minimum wages. A government doing that is a government that is working actively at the answers to your problem."

### Age Limits Suggested

The President indicated in his talk that it might be necessary to limit the ages of working and he suggested from 18 to 65 years, on the basis that boys and girls should stay in schools and colleges up to 18, and that after 65 a person should be entitled to enjoy his old age. This, with reduction in the hours of work, would help a lot, he told the young democrats attending the meeting.

"You and I know now," he continued, "that while the total production of America is about back to the high point before the depression, only a little over 80 per cent as many human beings are engaged in turning out that production. It does not matter very greatly what the cause of this is. It may be greater efficiency; it may be the development of

new machinery; it may be a variety of other causes. We cannot legislate against greater efficiency, nor can we legislate against the use of new tools—nor would we if we could. But the fact remains. And that fact requires an answer.

"Our working population increases every year, both because of population increase and because more and more women are working for wages. That is as it should be. But when we face your problems these increases raise the question as to whether it is not possible and right to limit active working ages at both ends."

### TRADE COMMISSION MAY OBTAIN SOME INFORMATION

Federal trade commission officials refuse even to guess now just when their report will be made to the President on the alleged collusive bidding by steel corporations for public projects—which investigation he asked for some months ago.

There is no question that the Wheeler anti-basing point hearings have delayed the completion of this report because the commission's experts who had been working on the report were in attendance at all of the hearings before the Wheeler committee.

Also, there have been vague rumors here, which it is impossible to confirm, to the effect that certain of the steel companies refused to open their books to the trade commission investigators. The behind-the-scenes story is to the effect that the commissioners even suggested that they might have to go into court to get an order against the firms refusing to open their books. As this is written, however, the story goes that some kind of a compromise has been reached with the chances that the commission may get all or part of what it is after.

Of course, this investigation comes

along just at the time when Secretary Ickes is again making a lot of fuss about identical bids by several companies for large quantities of cement, and in this case, too—so the charge goes—the bids are the same down to several decimal points. Senator Wheeler has issued a warning to the cement companies.

### Delay NRA Steel Report

As a definite conclusion has not yet been reached, there is considerable speculation here as to whether the NRA steel report will ever be completed.

This is one of the reports that Dr. Leon C. Marshall, chief of the new division of the department of commerce, which has taken over the work of the NRA, is anxious to finish. On the other hand, personnel is limited and all of the principals who worked on the steel report are now out of the organization.

Certain of the industrial members of the old NRA promised Walter Tower, of the Steel institute, and other leaders in the industry that before the report was made public they would be given an opportunity to go over it and make recommendations. In the case of several of these industry reports which have been made public so far the industry's suggestions were printed along with the report, and in several cases they took the "curse" off the report itself.

Rumor has it that the steel industry report is not so "hot" at best. A good sample of this was made public when STEEL printed an exclusive summary of the preliminary steel report some weeks ago, since which time practically no work has been done on the report.

### TAX BILL IS SHAPING UP IN LINE WITH ROOSEVELT IDEAS

House ways and means committee members, charged with the origination of all tax measures, seem to

have had a harder time writing the new tax bill than they have had for many a day. This undoubtedly is because the majority of members not only are not enthusiastic about a new tax measure, but are definitely opposed to it. Having to write a new bill at this inopportune time, however, they want to make it as inoffensive as possible to the public.

Indications are that the bill will be ready for discussion by the house this week. As a general rule the house writes the original revenue bill, but it is rewritten by the senate, and generally passes more like the senate rewrite than the house bill.

There is a general prediction here, despite violent opposition to the processing taxes requested by the President, that the bill will become law much like he asked for, no matter how house leaders feel about it.

Now that the President is back on the job here again the leaders on the hill do not take too much for granted. It is well enough to talk against certain Presidential proposals when Mr. Roosevelt was fishing on the high seas, but different when he is watching you.

#### Roper or Berry

There is considerable speculation going on in government corridors these days as to who shall be greatest with the Chief Executive—Secretary of Commerce Roper or Major George L. Berry, co-ordinator for industrial co-operation.

This time it is in connection with re-employment of the thousands out of jobs. A speech to be made by Mr. Roper to the annual convention of the chamber of commerce of the United States on re-employment by industry has been widely publicized and is looked forward to as representing the attitude of the administration.

On the other hand, the executive order which recreated Major Berry as co-ordinator specifically points out that one of his duties, and apparently the main one, is to get men back to work through industry.

This leads to a conflict of ideas, because Major Berry is certainly not thinking along the lines that the cabinet member is. Therefore, curiosity probably will not be satisfied until the latter part of the month when Mr. Roper makes his talk.

#### Buys From Farthest Point

Because 20 bidders offered identical bids for supplying insulated cable for the Boulder dam power house, Secretary of Interior Ickes approved the bid of the company farthest from Boulder dam. This is in line with the policy he announced at the recent anti-basing point hearings when he told the Wheeler committee that in cases of this kind he made

awards in that manner to give the railroads all the haul possible.

The Simplex Wire & Cable Co., Boston, the successful bidder, submitted a bid of \$111,208.75, offering identical discounts of \$556.04, and other identical credits. These were sufficient in each instance to make the delivered price \$104,484.31.

In making the award Secretary Ickes said: "I would like to reject all of these bids, but to do so would entail readvertisement of bids and long delay. . . . And, even if I had thrown out the identical bids there would be no assurance that upon readvertisement the same thing would not happen again. . . . I therefore accepted the bid of the company farthest away, with a desire that additional employment would be opened by transporting the material involved to the site."

#### LABOR RELATIONS BOARD SIDE-STEPS UNION DISSENSION

A precedent was established last week by the national labor relations board when that board, in a decision rendered in the case of the Aluminum Co. of America and the Aluminum Workers Union, decided that it would not take any part in union dissension.

In this case there was a question as to who represented the employes, the aluminum workers union or the national council of aluminum workers.

"It is preferable," says the board in its decision, "that the board should not interfere with the internal affairs of labor organizations. Self-organization of employes implies a policy of self-government. The role that organizations of employes eventually must play in the structure established by congress through that act is a large and vital one."

A senate subcommittee on labor last week continued to hear witnesses in connection with the collective bargaining resolution of Senator LaFollette, of Wisconsin, in which the accusation of spies and the supplying of arms and ammunition in the steel industry were discussed.

J. P. Harris, a steel worker of Portsmouth, O., told the committee of the arming of industrial plants in connection with possible conflict with labor. He testified that he knew that the Wheeling Steel Corp. at Portsmouth was "arming."

Heber Blankenhorn, employe of the national labor relations board, testified that the Weirton Steel Co. made an effort to keep its purchase of firearms secret, and presented what he said were the shipping orders.

A letter also was presented to the committee from the Federal Laboratories to the attorney general asking for the attitude of the department

of justice relative to the shipping machine guns to the Republic Steel Corp., Tennessee Coal, Iron & Railroad Co., Gulf States Steel Co., and several others.

The same witness testified that is "generally rumored" that the Ford Motor Co. "is shot through" with labor spies.

#### NO ACTION ON FADDIS BILL

Still pending before the house committee on military affairs is the Faddis bill introduced Feb. 7 authorizing the secretary of war to purchase manganese, chrome, and tungsten ore and pig tin in sufficient quantities to provide the national reserve in event of a national emergency. These ores and tin are among the essentials of steelmaking whose sources of supply are largely outside continental United States. An effort will be made by the author of the bill to get a hearing before congress adjourns, but final action at this session seems unlikely.

#### HULL CLAMPS LID ON TIN PLATE SCRAP EXPORTS

Secretary of State Hull has issued an order declaring a ten-week export embargo, effective April 16, on tin plate scrap under the new law.

It may be remembered that wide discretionary powers were granted to the President in the new law—which authority he delegated to the munitions control board of which Secretary Hull is chairman. After April 15, according to the law, no scrap tin plate exports were to be allowed except through government license, but the secretary has gone the law one better for this six weeks period and forbidden any exports, whether by license or not. This is supposed here to be in the nature of an experiment.

In the forms that have to be filled out for licenses to export the applicant is required to state the specific purpose for which the material is required and the reason he wishes to export it "rather than to sell it in the United States."

Following is the order of the secretary, including a definition of tin plate scrap:

(1) For the purpose of the act the term "tin-plate scrap" is construed provisionally, to mean tin-plate clip-pings, cuttings, stampings, trimmings, skeleton sheets, and all other miscellaneous pieces of discarded tin plate which result from (1) the manufacture of tin plate, or (2) the manufacture of tin-bearing articles from tin plate. As thus defined, the term "tin-plate scrap" does not include tin-plate waste, tin-plate circles, tin-plate strips, tin-plate cobbles, and tin-plate scroll shear butts, when packed separately and sold as such, and when not intermingled with tin-plate scrap.

(2) No export licenses for tin-plate scrap will be issued between April 15 and July 1, 1936.

(3) Blank forms of application for export licenses similar to that printed below will be furnished by the secretary of state on request.

## Defensive Policy Is Poorly Suited to Needs of 1936

A RECENT luncheon table discussion among a number of manufacturers developed an important feature of successful management that probably has not received sufficient attention in the past few years.

In a party of four, the burden of conversation was carried largely by two executives, each a president of a company of moderate size in the metalworking industry. One had started the discussion by reviewing—rather boastfully, it seemed—the manner in which he had gone through the depression without serious financial embarrassment. This recital had prompted the other to relate his experience, which had not been as fortunate. He had fallen into financial difficulties, but somehow had weathered the storm. From this point, the conversation drifted into an airing of opinions as to what policies of administration are most effective in the present stage of recovery.

To the two listeners it appeared that there was a distinct difference in the viewpoints of the two men. The first speaker, whom we will call the president of Company A, undoubtedly was an adept at conserving assets in a dull period. His boast that he had pulled his company through the storm without having to go to the banks for assistance was known to be true. His friends had marveled at the way in which he had met the challenge of adversity.

### Conservative Policies, Which Were Fully Justified in 1932, Are Unwise Today

The case of the second man, the president of Company B, had been quite the opposite. He had been slow to trim his sales. He had exhausted his reserves long before the depression ran its course. Through fortunate connections and by virtue of good performance in the past, he was able to command outside financial assistance, which, however, was won at the embarrassment of permitting outsiders to sit in his board. The first signs of reviving business arrived just in time to save him from serious difficulties.

Both companies, after emerging from the immediate effects of the depression, have enjoyed about 18 months of fairly good business. However, Company A, which weathered the storm much better than Company B, today is lagging

behind in point of progress toward recovery.

The reason for this was clearly evident from the conversation of the two on the most appropriate policies for combating current problems. The president of Company A gave the impression that he still is playing a conservative hand. He has expanded cautiously, but in the main his policies are negative or defensive. He has made few changes in personnel, has purchased new equipment sparingly, and has done little to add new punch or aggressiveness to the business-getting side of the business. He is making a little money, has resumed dividends on a limited scale, and is building up a modest cash balance for working capital and reserves.

On the other hand, the president of Company B has pursued an aggressive, positive policy. His most drastic action has been in the revamping of personnel. From top to bottom he has shifted men and jobs so that almost every executive now is in a new environment or is in a better job. He has disposed of some deadwood and has injected some new blood into the organization. He has added new equipment, but not extravagantly. His principle motive seems to be that of introducing a new spirit of pep into the personnel. As a result of this policy, the morale of the institution has been improved noticeably. The change has been reflected in the renewed vigor and aggressiveness of the sales department. In spite of its initial handicap of debt, Company B is making about one-third more money, proportionately, than Company A.

### Refreshing of Personnel, Aggressiveness, Are Desirable Objectives in Recovery Period

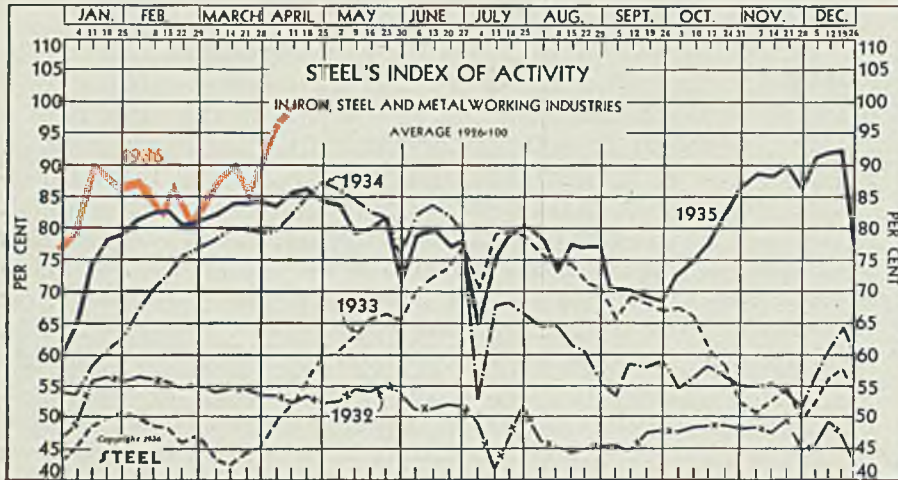
It would be unwise to generalize too freely from the experience of these two presidents. For many companies the conservative course is the better. However, it will be safe to state that a change of pace is just as desirable in industrial management as in pitching big league baseball. Observation of numerous companies leads one to suspect that in too many instances executives who were masters at the art of conserving assets during the depression do not fully appreciate the necessity of different tactics today.

Recovery has progressed to the point where business is available in fair volume. Aggressive companies are reaping their just share. Those whose executives persist in clinging to the get-by policies of 1932 are losing out.

We recommend that presidents who are complaining about the state of business ask themselves whether they appreciate the significance of change of pace in management.



# THE BUSINESS TREND



STEEL'S index of activity in the iron, steel and metalworking industries gained 3.1 points to 99.9 in the week ending April 11:

Week ending	1936	1935	1934	1933
Feb. 8	83.8	82.7	70.7	48.7
Feb. 15	85.9	82.8	72.4	48.3
Feb. 22	81.8	80.5	75.5	46.0
Feb. 29	83.4	81.1	76.8	47.4
Mar. 7	87.7	82.0	78.6	43.4
Mar. 14	89.7	84.0	79.9	42.7
Mar. 21	86.0	84.0	79.7	44.6
Mar. 28	91.2	84.3	79.3	45.2
Apr. 4	96.8†	83.4	79.6	49.1
Apr. 11	99.9*	85.9	82.2	52.6

†Revised. \*Preliminary.

The index charted above is based upon freight car loadings, electric power output, automobile assemblies (estimated by Cram's Reports) and the steelworks operating rate (estimated by STEEL). Average for 1926 equals 100, weighted as follows: Steel rate 40, and car loadings, power output and auto assemblies each 20.

## Index of Industrial Activity Hits New Recovery High

NOW that business indices are soaring to new recovery high points, attention is being directed to the staying or holding powers of the present surge in activity. Some signs of a let-up in fresh demand indicate that a spring peak may be near at hand. However the volume of business in sight seems to be sufficient to insure activity at near or only moderately below the present rate through May.

All four factors in STEEL'S index advanced in the week ending April 11. Revenue freight car loadings were up by more than 25,000 cars from the previous week. Electric power output registered another moderate advance to, 1,933,-610,000 kilowatt-hours, which probably repre-

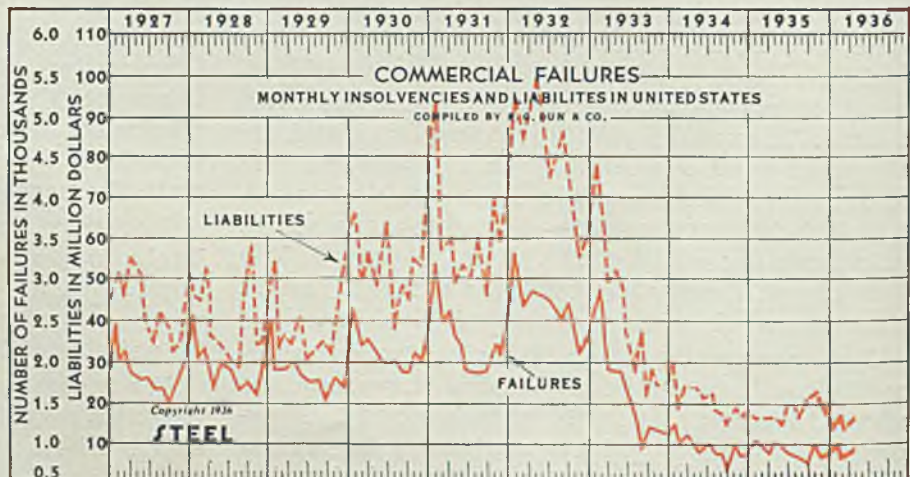
sents a complete recovery from the interrupted service of the flood period.

Automobile assemblies increased from 108,-426 to 112,818 units weekly. This is the highest weekly output recorded since August, 1929. Steelworks operations gained 3 points to 66.5 per cent of capacity. This is the highest rate since June, 1930.

As a result of these gains, STEEL'S index now stands at 99.9. To exceed this figure it is necessary to go back to the week ending May 24, 1930, when the index stood at 102.3.

Of course comparisons of this and many other business indices covering a span of five or six years or more are subject to adjustments due to changed conditions. It should be remembered that car loadings are not a reliable gage of freight movement owing to the increase of truck shipments in recent years. Also, the steelworks operating rate is a percentage which applies to a capacity which changes (usually an increase) every year.

	Failures, Number		Liabilities, Dollars (000 omitted)	
	1936	1935	1936	1935
Jan.	1,077	1,184	\$18,104	\$18,823
Feb.	856	1,005	14,089	18,737
Mar.	946	976	16,271	18,522
Apr.	1,115	.....	18,063	.....
May	1,027	.....	15,669	.....
June	961	.....	20,463	.....
July	931	.....	20,446	.....
Aug.	910	.....	17,845	.....
Sept.	806	.....	21,837	.....
Oct.	1,097	.....	22,243	.....
Nov.	927	.....	20,023	.....
Dec.	940	.....	17,442	.....



### Machine Tool Index Registers Fourth Consecutive Gain

	1936	1935	1934	1933
Jan. ....	102.6	61.3	56.5	18.3
Feb. ....	107.1	61.5	58.2	15.2
March ....	109.4	60.3	50.9	11.1
April ....	60.3	48.5	8.3	
May ....	67.1	46.8	10.6	
June ....	76.7	42.6	15.5	
July ....	94.7	38.6	22.4	
Aug. ....	112.2	37.1	27.9	
Sept. ....	108.5	37.4	30.9	
Oct. ....	102.9	40.5	33.3	
Nov. ....	93.8	44.2	38.0	
Dec. ....	99.9	54.1	51.0	

### Daily Ingot Production Highest Since 1930

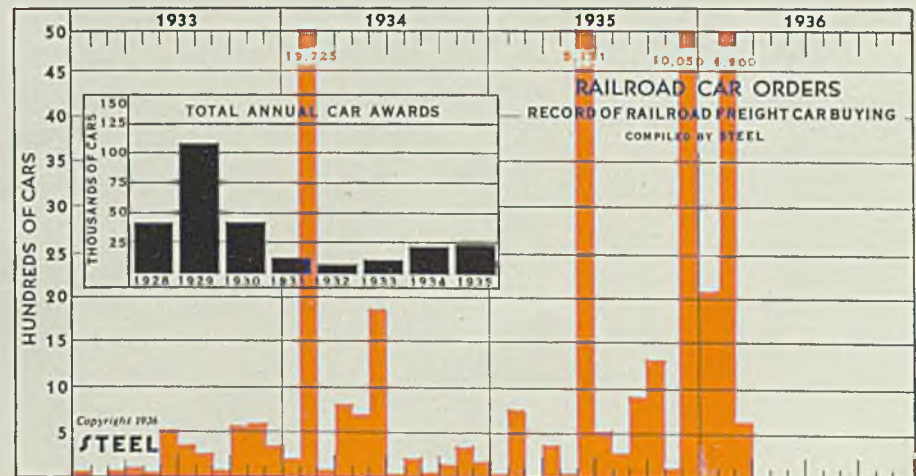
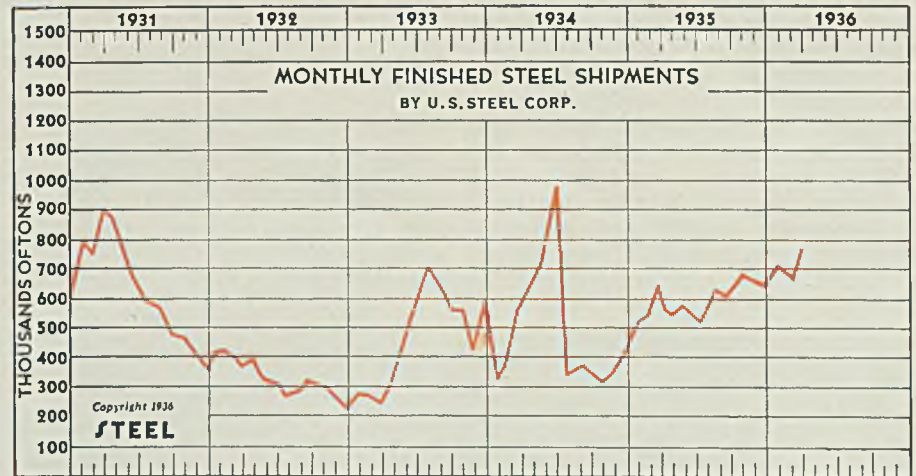
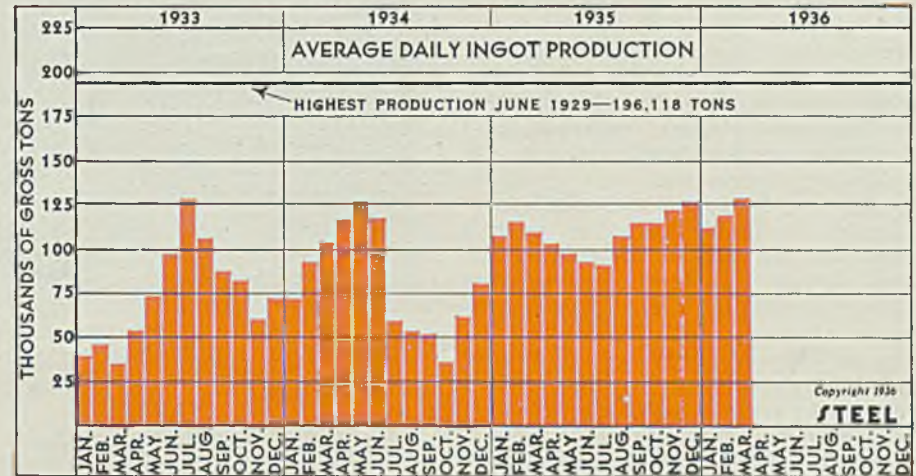
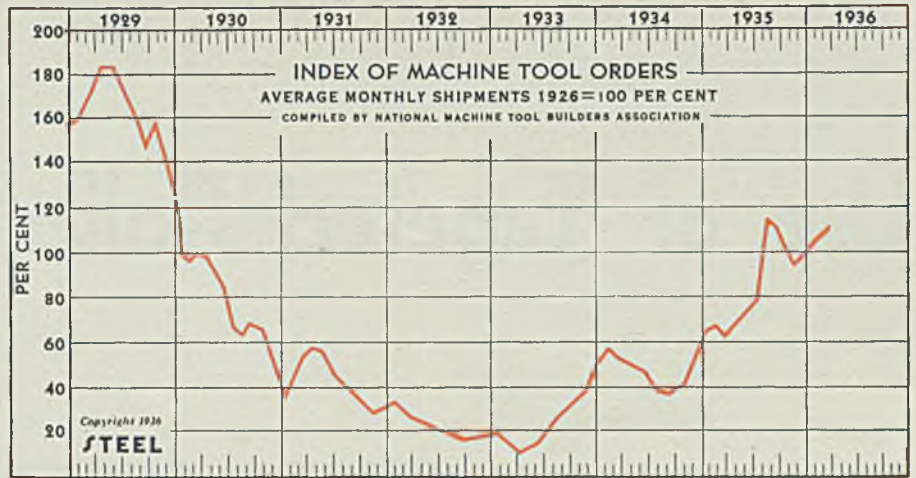
	Gross Tons		
	1936	1935	1934
Jan. ....	112,942	106,353	73,968
Feb. ....	118,712	155,740	92,164
March ....	128,711	110,313	103,646
April ....	101,558	117,443	
May ....	97,624	125,907	
June ....	89,236	117,672	
July ....	87,316	59,578	
Aug. ....	108,123	51,161	
Sept. ....	113,193	50,759	
Oct. ....	116,545	54,885	
Nov. ....	121,279	61,947	
Dec. ....	123,272	78,570	

### Finished Steel Shipments Show Sharp Gain

	Gross Tons		
	1936	1935	1934
Jan. ....	721,414	534,055	331,777
Feb. ....	676,315	583,137	385,500
March ....	783,552	668,056	588,209
April ....	591,728	643,009	
May ....	598,915	745,063	
June ....	578,108	985,337	
July ....	547,794	369,938	
Aug. ....	624,497	378,023	
Sept. ....	614,933	370,306	
Oct. ....	686,741	343,962	
Nov. ....	681,820	366,119	
Dec. ....	661,515	418,630	

### Freight Car Building Down Sharply In March

	1936	1935	1934	1933
Jan. ....	2,050	24	152	3
Feb. ....	6,900	806	19,725	0
March ....	632	0	30	5
April ....	350	800	50	
May ....	2	717	8	
June ....	5,151	1,835	500	
July ....	500	19	306	
Aug. ....	200	105	202	
Sept. ....	875	7	23	
Oct. ....	1,250	75	514	
Nov. ....	100	254	533	
Dec. ....	10,050	110	316	



# Use of Tapered Roller Bearings in

**E**FFICIENT transmission of power from one revolving shaft to another is one of the most important requirements of modern machinery. To accomplish this, various appliances are used. Gears or gear reduction units play an important, if not the most important, part.

Electric motors and other prime movers would lose much of their usefulness if suitable reduction units were not available. It is equally important, however, that desired variations in speed be obtained in a minimum of space and with minimum loss of power. Manufacturers of gears have realized this important point and have developed a great variety of gear reduction units to meet practically all power transmission needs.

In designing such gear reduction units, a number of fundamental requirements must be satisfied: 1. Simplicity of design; 2. maximum gear ratio in minimum space; 3. maximum life; 4. minimum power loss.

With the intense competition in the speed reducer field, it has become necessary to check all designs carefully and keep initial cost to a minimum. This has been especially

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*THE accompanying article constitutes a paper presented before the twentieth annual meeting of the American Gear Manufacturers association in Philadelphia this week. The author, S. M. Weckstein, is assistant chief engineer, Timken Roller Bearing Co., Canton, O. Mr. Weckstein was graduated from Stevens Institute of Technology with the degree of M.E. In 1923 he joined the industrial engineering department of the Timken company, making a study of the design and application of bearings in industrial equipment. Since 1927 he has been in charge of the combined industrial engineering and rolling mill divisions.*

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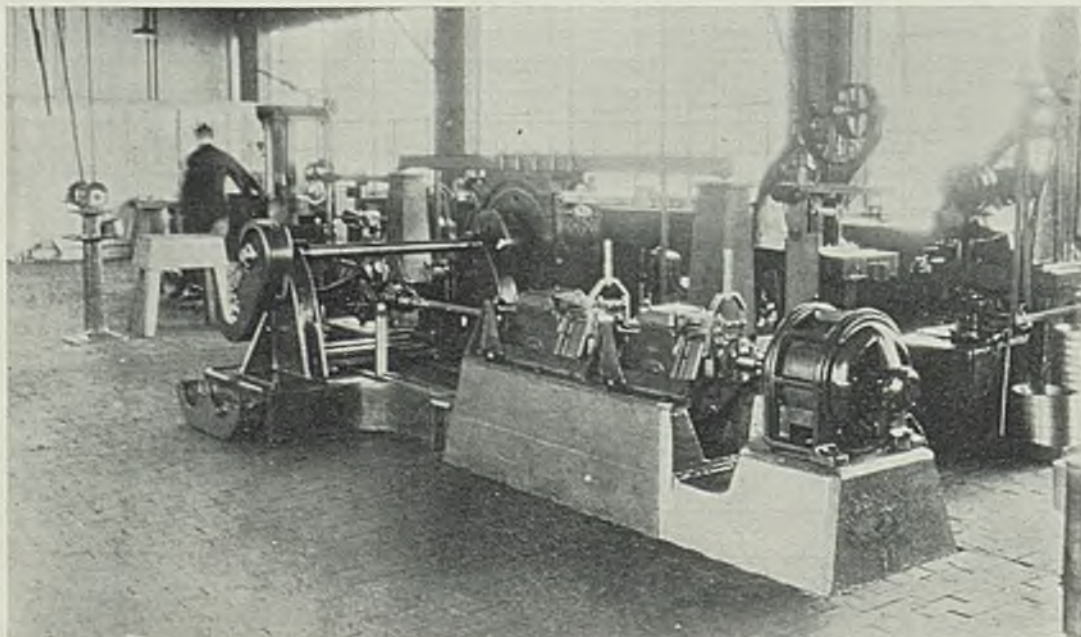
true in the case of small reducers and geared motors. To accomplish this, full advantage is being taken of the developments in metallurgy and heat treatment of gears and shafts. Antifriction bearings have played an important part in permitting compact

designs which lend themselves readily to reduced manufacturing costs.

To obtain maximum gear ratios in a minimum space, close attention is being paid to the type of gears which are used. Combinations of spur gears, single and double-helical gears, bevel gears, worm gears and planetary gearing are carefully checked to give desired results at minimum cost. Capacity and design of the gears themselves is not the only problem. It is very important that design and rigidity of supporting members be checked carefully. Here again the antifriction bearing plays an important part. By the use of such bearings, design of the case is simplified and strengthened, giving a more compact and at the same time a more rigid unit.

With the new standards set up by the A.G.M.A., gears can be selected to give a maximum life under known operating conditions. The same is true of antifriction bearings designed to operate for a given life under specified load conditions.

Progress made in the art of gear cutting and heat treating has increased considerably the efficiency of gear reduction units. By addi-



*FIG. 1—General view of deflection test machine for automobile rear axles. Taking a rear axle as a unit, the machine determines movements of the drive gears and deflections in all parts of the differential carrier*

# Gear Reduction Units

BY S. M. WECKSTEIN  
Timken Roller Bearing Co.

tion of antifriction bearings, power losses have been reduced to a minimum.

Probably the most important advantage to be obtained from use of roller bearings is accuracy of alignment of the gears, which is maintained indefinitely, providing the bearings have been selected properly. Many of the troubles encountered in the past have been due to inaccurate gear cutting, faulty alignment or a combination of both. Even if the gears were accurately cut, uneven wear in the plain bearings caused misalignment with consequent rapid gear wear. Assurance of constant alignment of the gears has led to adoption of roller bearings in all sizes of units. Some of the manufacturers of large gear reduction units have found that if the gears are mounted on roller bearings a short shop test will show up the most minor inaccuracies in the gears. In the case of plain bearing equipped drives, these inaccuracies may not show up until the unit is in the field. Use of roller bearings, therefore, is a guarantee to the buyer that he is getting a good drive.

Lubrication is much simpler with roller bearings than with plain bearings. The same oil can be used on both the gears and bearings. If the oil is good enough for the gears, it is satisfactory for the bearings. This means that the design of the unit is simplified greatly. It is admitted by all gear reducer manufacturers that where compactness of design and simplicity of lubrication is required an antifriction bearing should be used.

As far as general efficiency is concerned, there is little difference between the plain bearing and roller bearing, while the unit is running. There is a vast difference in starting. The roller bearing unit requires about one-eighth of the starting torque required for a plain bearing unit. This is important in the case of units in operation where temperatures are not constant and where frequent starting and stopping is required.

The following illustrations will

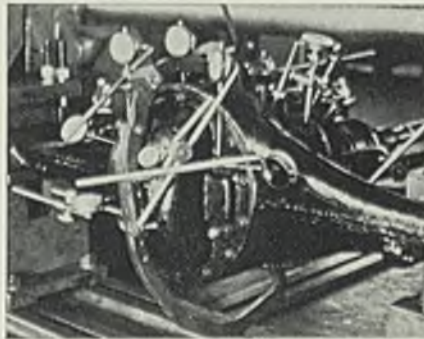


Fig. 2—Method of applying indicators to axle, front view

show the application of tapered roller bearings to the three principal types of commercial gear reduction units which provide a choice of:

1. Parallel drives:
  - a. Spur gears.
  - b. Single-helical gears.
  - c. Double-helical gears.
2. Straight line drives, using planetary and nonplanetary units.
3. Right-angle drives:
  - a. Straight bevel, spiral bevel, and hypoid.
  - b. Worm gears.

## Parallel Drives

Design of a single reduction spur or single helical unit is shown in Fig. 4. A single-row tapered roller bearing is used at each end of the shaft. The cone or inner race is pressed against a shoulder on the shaft. No nuts are required to hold it in position. The cup or outer race is pressed in a carrier. If desired, the cup may be mounted directly in the split case. At one end, the cup carrier or end cap is bolted tight to the case. At the opposite end, shims are used to set up the bearings with the desired running clearance. These shims also serve to take care of any inaccuracies in machining which may have cropped up. In other words, any slight differences in fits of the inner or outer races, differences in distance between shaft shoulders, counterbore in carriers or length of end cap pilots are compensated for

by the use of shims. On the other hand, if so desired, shims can be eliminated by the use of very close tolerances on all machined parts and the use of bearings selected to close overall widths. It should be remembered that tapered roller bearings require adjustment no sooner than other types of bearings require replacement.

Lubrication of the bearings is obtained from splash of the oil used on the gears. Standard leather or composition closures are used to seal the bearings at the high and low-speed shaft extensions.

The double-reduction spur or single-helical gear unit shown in Fig. 5 shows the same bearing mounting as just described. An interesting outstanding feature is the provision made to improve the closure at the shaft extension ends. Here the cup carriers are properly machined to catch the oil, as it works towards the closure, and drain it back into the case.

There has been considerable discussion as to whether herringbone gears should be locked in position endwise or whether they should be permitted to float. Experience of a number of manufacturers of herringbone gear reducers, as well as our own experience, has definitely proved that if the gears are accurately cut they will operate satisfactorily when locked. Since tapered roller bearings are being used satisfactorily in both designs, we shall show the various applications which have proved themselves in service.

Fig. 6 shows a typical single-reduction herringbone gear unit. The mounting in general is the same as for the spur or single-helical units. The only exception is that shims are recommended at each cup carrier or end cap. By shifting shims from one side to the other both the gears and the bearings can be set up properly.

A double-reduction herringbone gear unit with all the gears locked is shown in Fig. 7. The high-speed shaft pinions and intermediate shaft gears are single helical opposed. The intermediate shaft pinion and low-speed gear are double helical. This arrangement is used to obtain a bal-

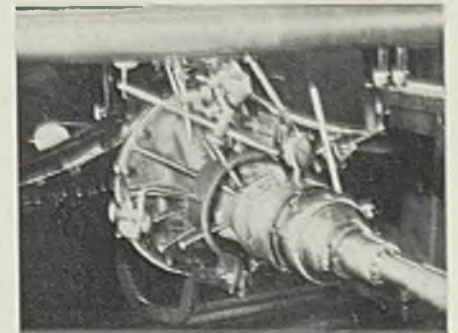


Fig. 3—Method of applying indicators to axle, rear view

anced design. Except for the fact that shims are used at both ends, the bearing mounting and lubrication is the same as in the case of the spur gear or single helical units.

Use of floating bearings in herringbone gear units is shown in Figs. 8 and 9. Fig. 8 shows a single reduction unit. Two row nonadjustable bearings are used in all positions. The bearings on the high-speed shaft and at the blind end of the low-speed shaft are floating. The extension end bearing on the low-speed shaft is clamped against a shoulder in the case by means of the end cap. All of the bearings are press fitted on the shafts and held against endwise movement either by means of an end plate bolted to the shaft or by means of a spacer ring shrunk on the shaft. The outer races of the bearings are mounted with a loose fit in the gear case so that they can move endwise to take care of the float of the gears, as well as possible expansions and inaccuracies in machining.

Lubrication of the bearings is obtained by splash from the gears. The case is designed with a dam in the lower half so that a level is always maintained within the bearings. All excess oil overflows into the case. It will be noted that the outer races of the bearings are all grooved and drilled in the center. This provision is made to allow for a direct feed of oil to each bearing in cases where a circulating oil system is desirable.

Fig. 9 shows a double-reduction unit using herringbone gears on all shafts. One of the bearings on the low-speed shaft is fixed in the case. All the other bearings are permitted to float. The details of the mounting and lubrication are the same as for the single reduction unit shown in Fig. 8.

#### Straight Line Drives

Application of tapered roller bearings to straight-line drives follows closely the designs already discussed. Figs. 10 and 11 show two typical units. In Fig. 10 standard single-row tapered bearings are used. The cups are all shown in cup carriers, but may be mounted directly in the case if it is so desired. Shims are used to adjust the bearings. This design may be used regardless of the type of gears used.

Another design of unit is shown in Fig. 11. In this unit two methods of mounting the bearings are shown. On the input and output shafts the bearings are mounted indirect while on the planetary shafts the direct mounting is used.

The indirect design is used because of the overhung gear load and possible overhung load at the extension end on both the input and output shafts. By mounting the bearings in this way, maximum rigidity

is obtained in the shortest space. Bearing setup is obtained by means of the nuts at the outer bearing. These nuts are properly locked with the tongued lock washer. The machining of the castings has been greatly simplified by the use of the "flanged cup." All shoulders in the case are eliminated thus reducing machining costs. At the same time positive alignment of the bearings and consequently of the gears is assured by the permissible straight boring of the end bells. The closures may be piloted on the flanges of the cups.

On the planetary shafts the direct mounting is used. Here again "flanged cups" are used. Bearing setup is obtained by holding close tolerances on the shafts and case or if desired by the use of thin shims between the case and flange on the cup.

Lubrication is obtained by splash from the gears. Troughs are provided in the case to catch the splash, to convey it through the bearings and return it to the case. Standard closures are used on the shaft extensions.

#### Mill Drives and Pinions

Before entering on the discussion of right-angle drives, it will be interesting to observe the designs used on heavy-duty drives such as are commonly used in rolling mills.

A combination gear drive and pinion stand is shown in Figs. 12 and 13. Herringbone gears are used on all shafts. All shafts are floating with exception of the shaft which carries the upper mill pinion. In the center position of this shaft, the bearing is rigidly fixed to the gear case. The same lubricant is used on the gears and the bearings. This particular unit has been in service for over six years without signs of any trouble.

It will be noted in this design, and in some of the previous designs, that double-row nonadjustable bearings are used. These bearings are supplied either with spacers between the cones or with the cones butted together. In either case, the bearings are set at the factory with the desired amount of running clearance. This design was adopted for heavy-duty applications after a long period of experimentation on rolling mill bearings operating under loads in excess of 1,000,000 pounds per bearing. Our observations showed that where bearings were properly selected for the loads which were imposed on them, they ran for over four years without requiring attention. When these bearings were inspected, some could not be readjusted while others had worn only a very slight amount and were put back in service after they were readjusted by regrinding the spacers. With the light-

er loads encountered in the drives, as compared to the mills themselves, the nonadjustable design has proved itself entirely satisfactory.

A large steel mill reel drive is shown in Fig. 14. Here again herringbone gears are used. One shaft is fixed while the others are floating. In this design the bearing adjacent to the reel drum is fixed. Because of the construction of the case, this bearing is lubricated separately, while the other bearings are lubricated by means of a circulating oil system which brings the oil to the bearings and permits it to overflow into the case. The same oil is used on gears and bearings.

A typical herringbone gear pinion stand is shown in Fig. 15. One of the pinions is fixed by means of the bearing shown in the upper left-hand position. The other pinion is permitted to float. Oil from the same source of supply is conducted to the bearings and pinions. Dams are provided at each bearing so that an oil level is maintained in the bearings at all times.

In those cases where it is impossible to use the same lubricant on both bearings and pinions, the design shown in Fig. 16 has been used. Here the bearing is completely enclosed and may be lubricated either with oil or grease. The bearing may be held on the pinion neck by the threaded arrangement shown or by means of any one of the schemes shown in the previous figures.

#### Right Angle Drives—Bevel Gears

Straight bevel, spiral bevel, hypoid and worm gear units are now being extensively used in right-angle drives. Because of the thrust loading encountered, the tapered roller bearing lends itself ideally to the design, since the bearing will handle radial loads, thrust loads and combined loads.

A typical single-reduction bevel gear unit is shown in Fig. 17. The pinion shaft and bearings are mounted in a housing which is bolted onto the main case. Adjustment of the bevel pinion is obtained by means of shims between housing flange and case. The bearings are mounted indirect so as to obtain the most rigid type of mounting. Thrust from the bevel pinion is taken on the bearing adjacent to the pinion so that the life of the pinion is reduced to a minimum. In this connection, it is very important when designing the unit to determine whether straight or spiral bevels are to be used. It must also be determined whether the unit will always operate in one direction or whether it will be reversible. The direction of thrust on the pinion shaft may vary with the direction of rotation and the bearings must be so selected as to carry the thrust load equally well on either bearing. By

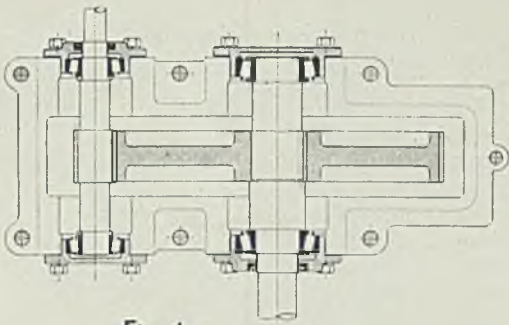


Fig. 4

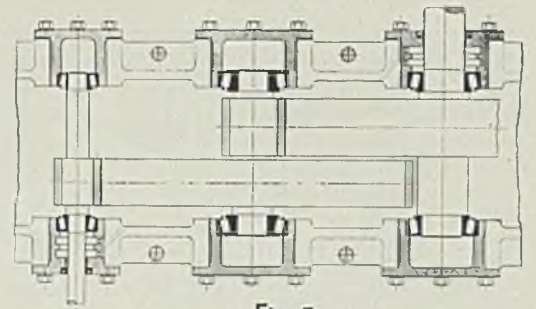


Fig. 5

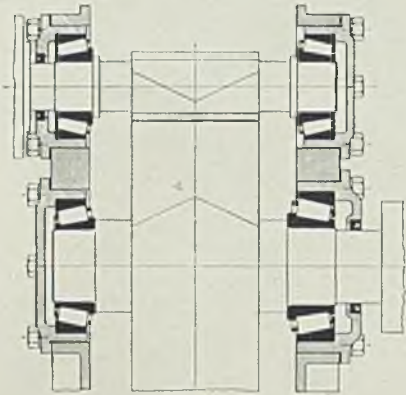


Fig. 6

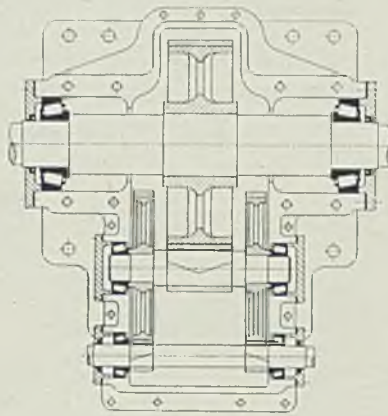


Fig. 7

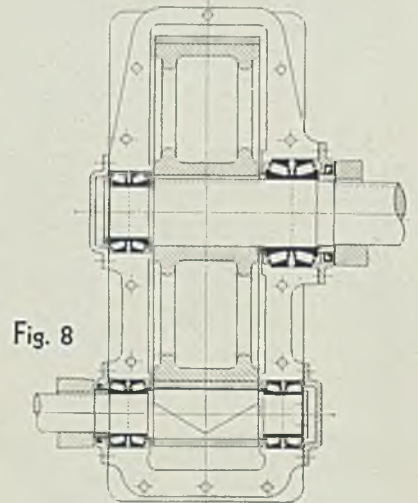


Fig. 8

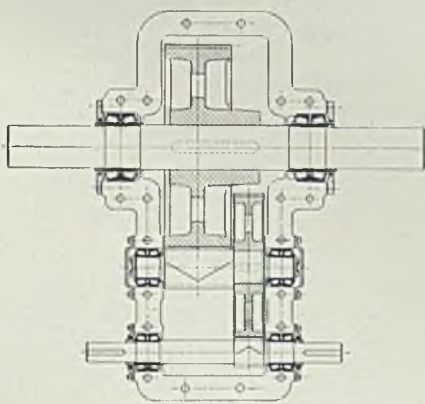


Fig. 9

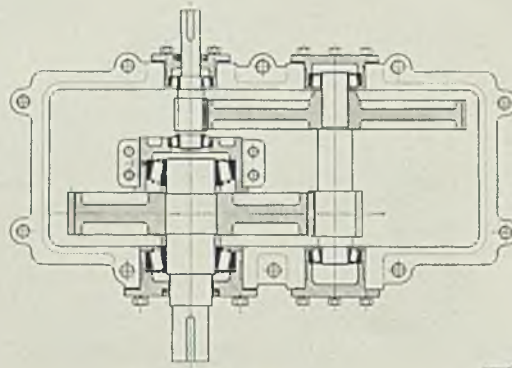


Fig. 10

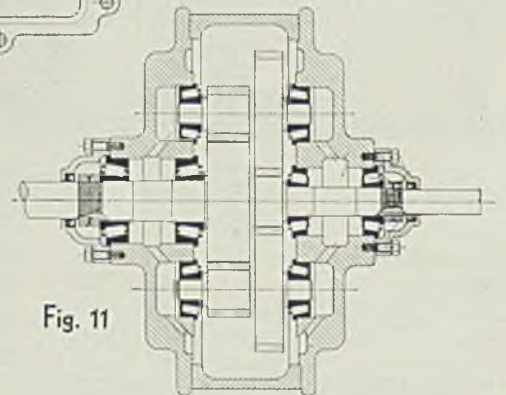


Fig. 11

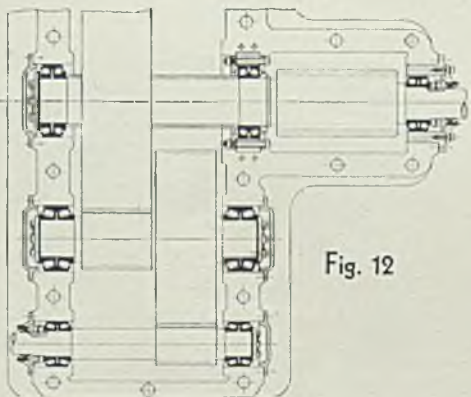


Fig. 12

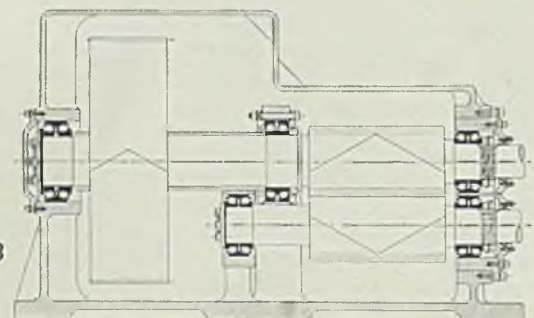


Fig. 13

Fig. 4—Single-reduction spur or single-helical gear unit. Fig. 5—Double-reduction spur or single-helical gear unit. Fig. 6—Single-reduction herringbone gear unit. Fig. 7—Double-reduction herringbone gear unit. Fig. 8—Single-reduction herringbone gear unit. Fig. 9—Double-reduction herringbone gear unit. Fig. 10—Straight-line drive. Fig. 11—Straight-line drive. Fig. 12—Combination drive and pinion stand. Fig. 13—Combination drive and pinion stand

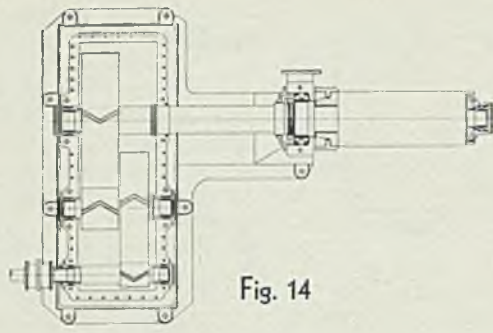


Fig. 14

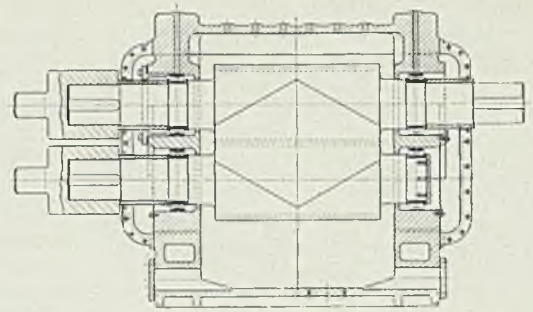


Fig. 15

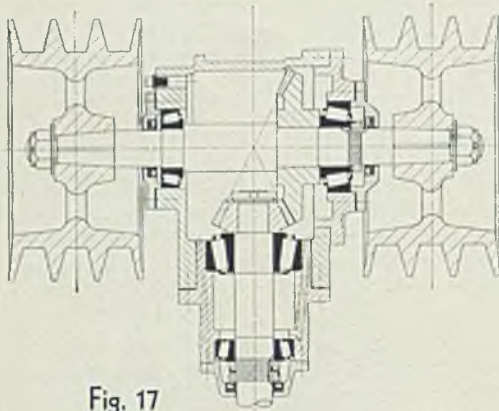


Fig. 17

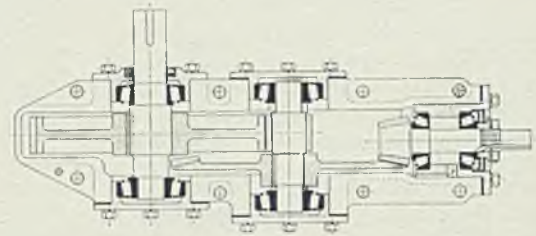


Fig. 18

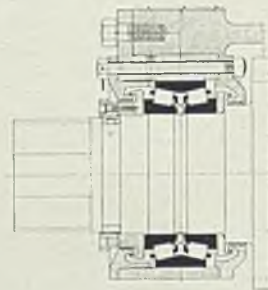


Fig. 16

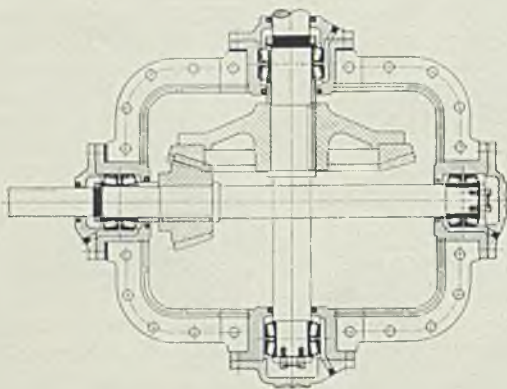


Fig. 19

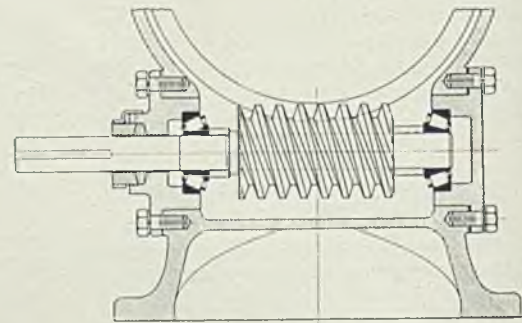


Fig. 20

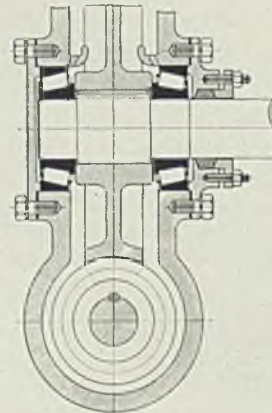


Fig. 23

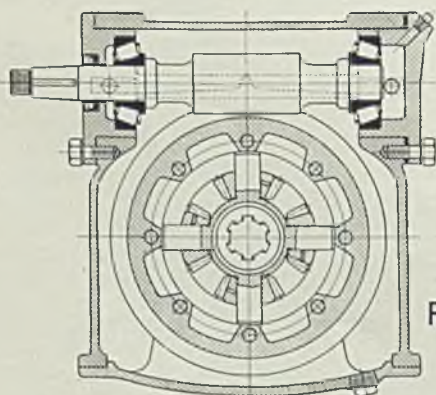


Fig. 21

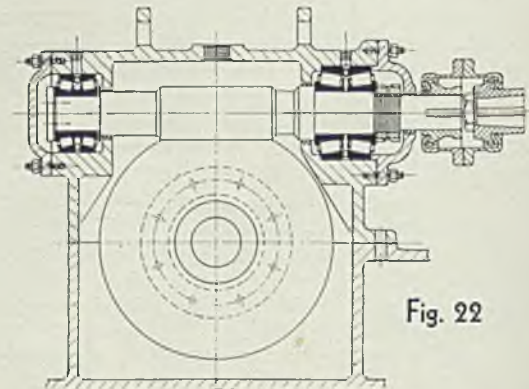


Fig. 22

Fig. 14—Rolling mill reel drive. Fig. 15—Herringbone gear pinion stand. Fig. 16—Herringbone gear pinion stand bearing mounting. Fig. 17—Single-reduction right-angle drive. Fig. 18—Double-reduction right-angle drive. Fig. 19—Hypoid gear drive. Fig. 20—Worm shaft mounting. Fig. 21—Worm shaft mounting. Fig. 22—Worm shaft mounting. Fig. 23—Worm wheel shaft mounting

varying the angle of the tapered roller bearing to work with various angles of gears, considerable improvement in operating conditions are obtained.

The pinion shaft bearings are lubricated from the splash of the gears. To assure that the rear bearing will receive its share of the lubricant, a hole is cored in the housing to catch the splash and carry oil to the rear bearing. Another hole is cored near the bottom so that excess oil may be drained back to the case.

On the gear shaft the bearings are mounted direct. Shims are used at each bearing to provide for bearing adjustment and bevel gear setup.

Double-reduction right-angle drives are obtained by a combination of spur, helical and bevel gears. A typical design is shown in Fig. 18. This layout combines all the details previously described.

Hypoid gears are being used more extensively in various industries. This is especially true in the automotive industry and in paper mills. Either single or double bearings may be used depending on the requirements of the particular design. A typical paper mill drive is shown in Fig. 19. In this particular case, it was desired to lubricate the gears and bearings separately, consequently all the bearings are shown enclosed in cartridges. On each shaft one bearing is fixed while the other is permitted to float to take care of expansion and inaccuracies in machining. Shims are provided at the fixed bearing cartridge to provide for gear adjustment. The fixed bearing is capable of carrying the radial load as well as the thrust load regardless of the direction of thrust.

### Worm Gears

The load on the worm shaft bearings due to the operation of the worm is primary thrust. There is, however, some radial load due to the separating force on the gears, due to the tangential force and also possibly due to overhung driving loads. Therefore, this is another application where use of the tapered roller bearing is ideal.

The worm shaft applications should be divided into two classes.

1. Small units operating at high speeds with a spread between worm shaft bearings not in excess of 12 inches and larger units operating at low speeds with spreads over 12 inches.

2. All sizes of units operating at various speeds with large spreads between bearings.

For the first class a single bearing mounting, as shown in Figs. 20 and 21, is recommended. Fig. 20 shows an underslung worm where the bearings dip in the oil. Fig. 21 shows a worm mounted on top of the worm wheel. Here the gear case

is arranged with a trough to catch the oil splash and conduct it to each bearing. In both designs the bearings are mounted direct and shims are used for adjustment of the bearings. The bearings may be mounted direct in the housing, without cup carriers, if the diameter of the worm is such that it will pass through the bore provided by the outside diameter of the bearing, or if the case is split on the worm shaft center line. The single bearing mounting is satisfactory because the difference in expansion between the worm shaft and case is not appreciable.

For the second class of worm shaft mountings where the expansion difference is large a double bear-

resultant loads. Single-row tapered roller bearings permit of a simple inexpensive mounting as shown in Fig. 23. The bearings are mounted direct in the case or may be mounted in cup carriers. Adjustments of the worm wheel and bearings are made by means of shims. Troughs are provided to catch the oil splash and convey it to the bearings.

The foregoing illustrations have clearly indicated the simplicity of design and the ease of applying tapered roller bearings in various types of units. The ability of the bearings to maintain positive gear alignment, to give long life and to insure against power loss is proved by the large number of units using these bearings

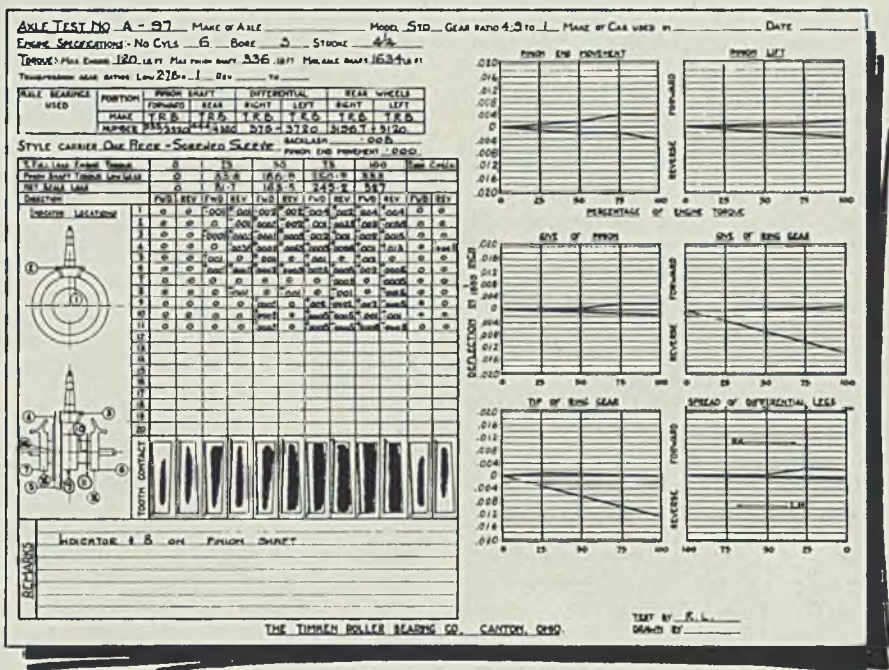


Fig. 24—Standard chart used for recording results of rear axle tests

ing at each end is required. This design is shown in Fig. 22. Either the blind end or extension end bearing may be fixed while the other is permitted to float. The fixed bearing takes thrust loads in either direction. In this particular illustration, the worm shaft is above the wheel. Since it is used on a crane drive, it was preferred to use grease on the bearings. The bearings, therefore are sealed off from the rest of the case. In the case of an underslung worm, the same bearing arrangement could be used but the bearings would not be lubricated separately.

The worm wheel shaft bearings also are subjected to considerable thrust load in addition to the separating force on the gears and the couple load due to the tendency to tip the wheel. The spread of the bearings has considerable effect on the size of bearing selected to take care of the

in various industries and under varying operating conditions. It is advisable to stress again the importance of proper design and the rigidity of the gear and bearing supporting members. This can be illustrated best by the various tests made in the design of rear axles for automobiles.

Noise is a paramount factor in all rear axles and usually is the signal that something is wrong with the mounting. Successful operation of the axle depends very largely upon the carrier in which the gears are mounted. Design of the conventional carrier which is mounted in a banjo-type axle housing is such that considerable study must be given to the provision of proper ribs and distribution of metal to provide maximum rigidity. Maintenance of the gears on their proper cone centers is of utmost importance. Shifting of these centers due to distortion in the carrier or deflection of the shafts will



of course seriously affect the gears. Machining of the carrier also is of great importance. The relation of the pinion housing bore to the crossbore must be held to the closest possible limits. Pinion bore and crossbore must be in the same plane and also square with each other.

To provide for distortion in the carrier under loads some manufacturers hold the machining tolerance to the low side so that the pinion bore will be below the crossbore 0.001 or 0.002-inch. Other deviations sometimes are made in machining gears and carriers to correct for deflections under load. Perfect rigidity of parts would help but because of strict weight limitations this is impossible. The pedestals, with bolted-on caps, which support the differential bearing, have a very decided influence on the operation of the gears. It is a rather difficult problem to brace these pedestals properly to prevent excessive deflection under load. Much can be accomplished in this respect, however, although a large number of carriers show a decided weakness at this point. Use of green castings should be avoided, as permanent distortion may result from their use.

With good gears and rigid and well-machined carriers, still another factor of major importance must be considered. The bearings upon which pinion and differential are mounted play an important part in the movement of the gears under load. To a certain extent these movements can be controlled by an initial setup of the bearings. In the tapered roller bearing assembly, clearances are established by the manufacturer of the axle. Under loads, the magnitude and nature of the gear movements will be controlled largely by the type of bearing on which they are mounted. In the tapered roller bearing advantage is taken of the fact that the bearing can be preloaded easily by manufacturers of the axle to reduce the gear movements to a minimum.

### The Deflection Test

The deflection test is made for the purpose of determining movements of the drive gears and deflections of all parts of the differential carrier. This test is of great importance in checking new carrier designs or determining the source of trouble in existing carriers. Deflections or deformations in the carrier can be located definitely and the necessary steps for correction usually are evident. Our company has a machine on which these tests are made by practically every automobile company. A second test usually is made after the recommended corrections have been made to check the improvement which has resulted.

The deflection testing machine

shown in Fig. 1 originally was designed at the Gleason Works and consists of a heavy dynamometer of special design to take the rear axle as a unit. Large spur gears are fitted to the ends of the axle shaft. These gears mesh with another set of gears on a cross shaft on which a large brake drum is mounted. A prony brake, constructed to measure torque in both directions of rotation is mounted on the brake drum and scales are provided to measure accurately the torque transmitted to the axle.

Our equipment is driven by means of a 20-horsepower alternating-current motor running at 1200 revolutions per minute. Speed reduction is handled by means of two large seven-speed transmissions providing a maximum reduction of 100 to 1. The speeds at which the test usually is

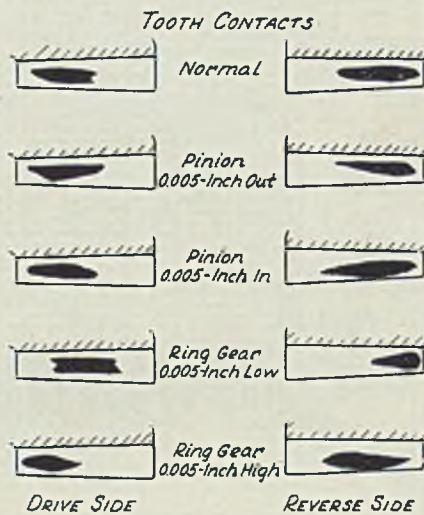


Fig. 25—Sketch showing effect of 0.005-inch movement of pinion and ring gear on tooth contacts

made are 12 revolutions per minute in the forward direction and 13 revolutions per minute in reverse, although a large combination of speeds can be obtained up to 2000 revolutions per minute. Motor, transmission and dynamometer are sufficiently strong to make breakdown tests on the average passenger car axle.

One of the most important points in connection with running a deflection test is the proper mounting and location of indicators. Figs. 2 and 3 illustrate the method in which the indicators are supported in the Timken test. A yoke is secured to the pinion housing by means of a number of set screws. Extensions from the yoke are placed over and around the axle center and located on the ring gear, pinion, pedestals, etc. In this manner all deflections as registered on the indicators are related to the pinion housing bore.

For ease and accuracy in interpret-

ing the results of these deflection tests a special form has been devised which gives a complete record of all test data. Such a form is shown in Fig. 24. It should be noted that tests are run at zero, 25, 50, 75 and 100 per cent of full engine torque in low gear. In this manner, we can compare a small axle with a large one. Rechecks are made to make sure that indicators all return to the zero point and if they do not an investigation is made to determine whether the failure to return to zero is due to a permanent set in some member. A careful record of the tooth contact under all load conditions is made. It is interesting to note how this tooth contact changes in a manner corresponding to the deflections found. Six curves usually are drawn to illustrate graphically the results of the test: (1) Pinion end movement; (2) pinion lift; (3) give of pinion to or away from ring gear; (4) give of ring gear; (5) tip of ring gear; and (6) spread of differential legs or pedestals.

### Selecting Correct Bearings

As previously pointed out, movement of the pinion is controlled to a large extent by the type of bearing upon which it is mounted. Selection of proper bearings and correct initial set-up of the bearings will do much toward keeping end movement at a minimum. Steep-angle tapered roller bearings reduce the pinion end movement but increase the lift and give. The best combination usually is to be found with bearings of around 25 to 30-degree cup angle. Some pinion mountings can be improved by a steep angle bearing in the forward position and a medium bearing in the rear.

The importance of holding gears at their proper cone setting is well recognized. It is obvious, therefore, that whatever type of bearing is used every care must be taken to see that it serves to hold the pinion with maximum rigidity. Fig. 25 illustrates the effect of displacing the pinion vertically 0.005-inch. The tooth contact has shifted considerably from its original position. This displacement of contact surface between the gear teeth probably would go to a heel contact with danger of tooth breakage under very heavy loads.

It should be remembered that the shaft on which the bearings are mounted also plays an important part in maintaining the rigidity of the unit. Sharp undercuts should be avoided and liberal fillets should be used. Stepping of the shaft should be eliminated as far as possible. With the tapered roller bearing this elimination is made possible because of the wide selection of bearing bores within a given outside diameter of the bearing.



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*plus . . .*

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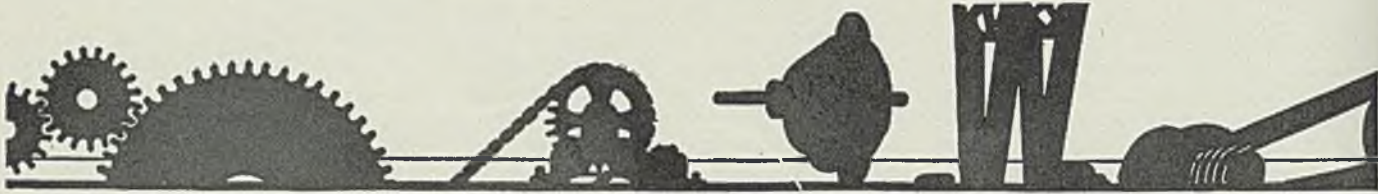
**WEST LEECHBURG  
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GENERAL OFFICES

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PITTSBURGH, PA.

# Power Drives



## Special Belts

**T**HE best belt for any job is the one which will transmit power most effectively under the particular requirements of that drive. Power requirements are so varied and so exacting that the day is past when any type of belt will serve all purposes equally well. When designing a belt drive consider economy, life, freedom from trouble, and driving ability, according to the service requirements.

On many light drives low-priced belts are not only economical but entirely satisfactory. Such belts may require additional takeups because of stretch but, on the whole, operate satisfactorily. The trouble comes, however, from considering severe service drives as ordinary light-duty drives. On heavy-duty work such belts are not satisfactory because of the excessive stretch with resultant high maintenance cost, short life and numerous interruptions to production.

As the severity of the load increases, higher grades of belt are necessary, even to the special tannages or, in many cases, the special types of built-up belts combining the characteristics of strength and friction surface of two types of belts.

### Pulleys Important Factor

Consideration of belt problems is inseparable from pulley widths and diameters. On many pieces of equipment it is impossible to increase either pulley widths or diameters and therefore some type of special belt of increased transmitting capacity is the only practical belting solution. For example, where a two-ply belt is not sufficient a three-ply belt may be too stiff for the small pulley. The next choice then lies between special tannages, which are more flexible and have better friction surface (grip) or transmitting capacity, or the combination belts which are virtually two types of belt fastened together. The driving side is usually of special tannage leather to give high gripping or transmitting capacity and is fastened to a backing of different material to provide strength and in some cases freedom

from stretch. Several types of these belts, each with special features and advantages, according to the manufacturers, are available.

These advantages should be studied and the belt selected with careful consideration of the service requirements. In such cases it is well to give complete details of the drive and all operating conditions to the belt manufacturer for his recommendations. Another alternative is to turn the problem over to a consulting engineer experienced in power transmission.

## Spacing Hangers

**I**T HAS been said that much transmission trouble is the result of following rules of thumb. One of these rules or practices is arbitrarily to set a standard spacing for lineshaft hanger bearings. Also, it is poor economy to place the bearings too far apart in an effort to reduce the number of bearings.

The inexperienced transmission engineer seldom appreciates the fact that bending or deflection has more serious affect upon satisfactory operation of a lineshaft than does torsion or twisting moment. The common practice is to space hanger bearings 8 or 10 feet and assume that everything else is O.K.

Bearings, however, should be placed where they take the load. A hanger always should be placed close to the main drive pulley and generally a hanger on each side of this pulley is better practice.

The amount and effect of deflection due to improper spacing is well illustrated in conditions found on a recent plant inspection. A flange shaft coupling was located over an aisle about midway between hangers and with no pulleys driving down to any machines between these same hangers. The weave of the flange coupling was pronounced and easily observed. Much of this weave was due to the deflection of the shaft between the adjacent pairs of hangers, although an unbalanced flange coupling might have increased the amount of weave.

This condition had no doubt existed for a number of years as the in-

stallation was over 10 years old. Absence of bearing trouble was due to the use of self-aligning antifriction bearings. Although this type of bearing reduced the friction and wear in the bearing the power loss due to the continuous bending and straightening of the shaft was a material and wasteful part of the power load. A few extra bearings and proper spacing according to the load to reduce the bending pays for itself in decreased power consumption.

♦ ♦ ♦

## Low-Pressure Lubrication

**D**EVELOPMENT of pressure lubrication equipment and methods has been one of the major improvements in the field of bearing lubrication. Originally designed for servicing the automobile, the advantages of pressure lubrication in assuring the positive introduction of the lubricant to the bearing and the exclusion of dust and dirt were quickly recognized and adapted to industry by individual plant engineers on their own initiative. Today, industry is a large user of such equipment in a much wider variety of applications than possible on the automobile.

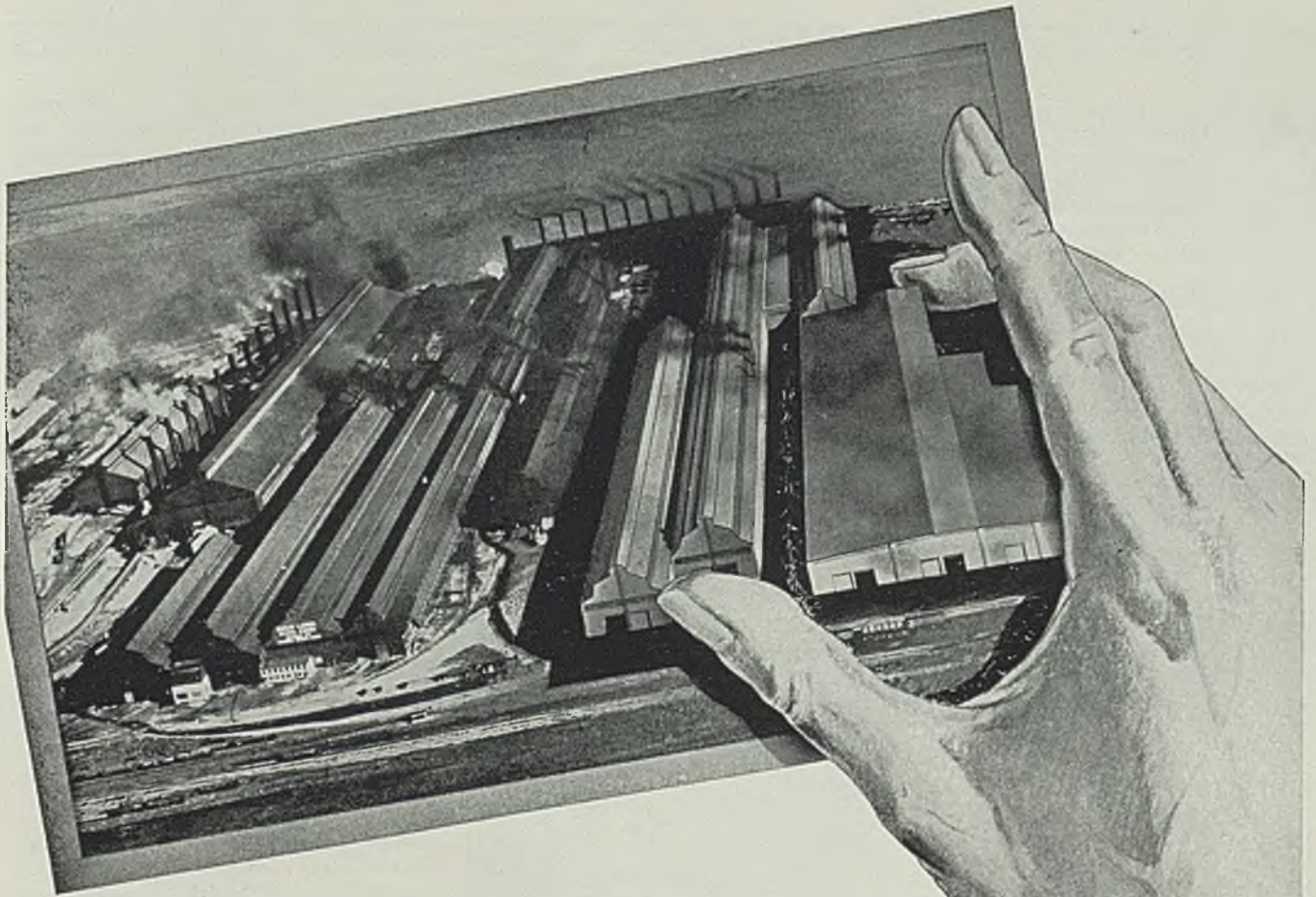
Certain types of ball and roller bearings operating at relatively high speeds do not require high pressure to fill and operate better when the bearing is only partially filled with lubricant. In such cases overfilling by improperly trained operators is likely to cause heating and may destroy the seal or retainer.

To prevent building up excessive overpressures in such bearings a low-pressure grease gun is now available which has a maximum discharge pressure of 2½ ounces per square inch. The nozzle provides for relief of back pressure, thus preventing overfilling, it is stated. The gun has a capacity of 1 pound of grease.

♦ ♦ ♦

Wherever oilers must "nurse" bearings it is usually an economy to replace the bearings. However, first determine whether the lubricant, the servicing, or the bearing is responsible or the trouble will repeat itself.

# You asked for it!



WIDER and wider steel sheets, to meet increasingly exacting specifications, are being demanded by many industries. To satisfy present needs and anticipate future requirements, Great Lakes Steel Corporation has built a new 96'' continuous sheet mill—the largest of its kind ever constructed. This great mill produces flat rolled steel of the finest quality, both hot and cold finished, up to 90'' in width and to  $\frac{5}{16}$ '' gauge.

Whatever your requirements as to analysis, physicals, finish, width and gauge, you will find Great Lakes Steel a satisfying source of supply.

*Products: Hot Rolled Strip . . . Carbon Steel Bars . . . Spring Steel . . . Billets . . . Cold Rolled Sheets . . . Pickled Sheets . . . Black Sheets . . . Michigan Metal for Vitreous Enameling*



## GREAT LAKES STEEL

*Division of National Steel Corporation*

G R E A T L A K E S S T E E L C O R P O R A T I O N , D E T R O I T , M I C H I G A N

April 20, 1936

**STEEL**

# Improved Cabinet Design Reduces Enamel Chipping

By CHARLES S. PEARCE\*

**A** NEW idea in construction of products to be finished in porcelain enamel recently has been presented to the refrigerator trade — a cabinet for mechanical refrigerators, the parts of which are welded together and enameled as a single piece. A leading refrigerator manufacturer is now producing these cabinets at a rate of 500 per day.

The one-piece or shell-type refrigerator cabinet has many advantages. The principal one is cost. For the average size model it can be produced at a saving of from 20 to 30 per cent over the frame-type cabinet. In the mass production industry such advantages in cost are important factors in the success of a product.

In the matter of design, the problems of the one-piece cabinet were peculiar to the use of enamel. First, was the support of the refrigerating unit in such a manner that it would not throw undue stress on the enameled parts during operation or shipping. Then there was the design and fit of the top to be considered, which was required to harmonize with the lines of the balance of the cabinet. This factor was greatly accentuated by the advent of streamlined cabinets in the field at this time.

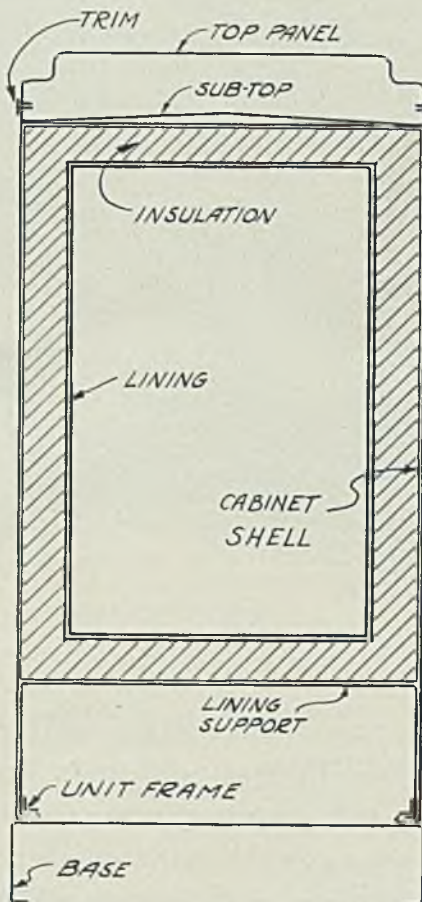
## Construction Problems Arise

The next problem was the distribution of the weight of the parts of the cabinet itself so that undue stress would not be concentrated at weak points such as the bottom front corners, or the hardware holes. Finally, the fitting of the door so that it would seal without heat leakage was determined to be a problem of major importance.

The construction of such a series of cabinets presented a number of problems in fabrication. The matter of welding was most important, since up to this time all welding on parts to be enameled had been done with gas. If the shell type of cabinet was to be produced at an appreciable saving in cost, spot welding was necessary. Warping in enameling furnaces has defeated many good ideas in the way of new design. Shells had to be supported in such a way that they would not warp, or so that the warping would be thrown to points where it did not matter. No one had

yet attempted to use light-gage sheet for such pieces without some support.

The conventional methods of cleaning required some changes, since many pockets were left in



Shell-type cabinet with lining support and finish top in place

these shells which could not be cleaned properly, and cleaning was of vital importance if light weight coatings of enamel were to be used. Finally, no one had yet enameled the outside of such a piece. Of course, tank manufacturers had enameled much larger pieces, but the standards of inspection on refrigerator parts had been pushed to such a point in recent years that it was considered practically impossible to handle such a large piece through a continuous furnace without some imperfection that would make it unacceptable to the trade.

As construction problems seemed

to be the most difficult to solve, work was started on all questionable points, the most important problem being considered the proper distribution of weight. In the early models a shelf was spot welded to the sides of the shell under the food compartment. This method of supporting the liner did not prove satisfactory due to certain enameling difficulties, and the metal finishing necessary to remove weld marks greatly increased the cost. To correct this condition, an inverted pan with sides the full depth of the machine compartment was formed and welded in the bottom of the shell. This pan made the shelf to support the food compartment and the insulation, and carried the weight of the interior parts down to the base. No weight was thrown directly on the side panels. Incidentally, this construction reduced the metal finishing cost so much that it was adopted for all cabinet construction on both the lacquered and the porcelain enameled models.

## Base Designed for Strength

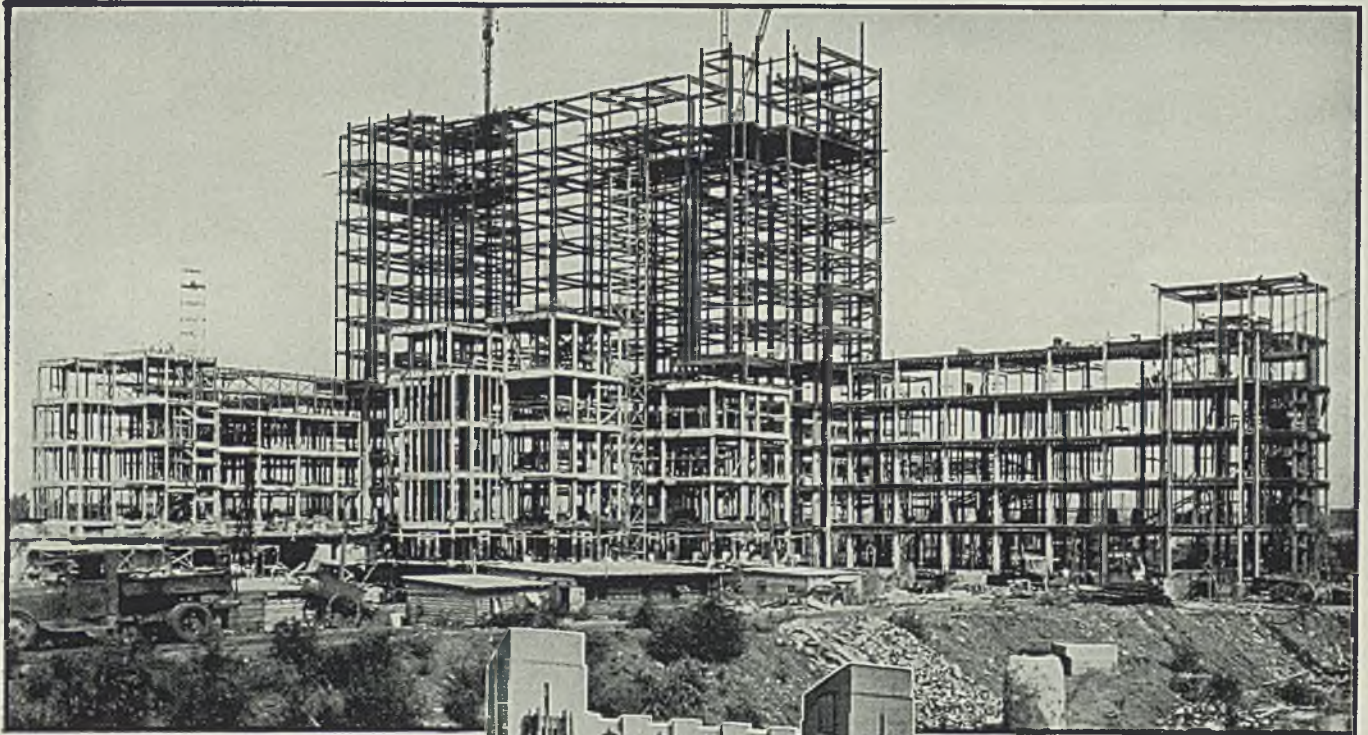
With the weight of the interior parts carried to the bottom, it became necessary to design a base which would properly support the cabinet and the unit. At first a flange was turned on the bottom ends of the side panels and the support spot welded in place. This construction proved to be too weak. It was found necessary to form a flange on the bottom of the lining support and put a return flange on the ends of the side panels. When these three thicknesses of metal were spot welded they formed a rigid angle in which an angle iron frame could be laid to support the unit (see accompanying illustration). Finally, the entire assembly was mounted on a base with fiber gaskets and bolts.

After the base problems were solved the top was redesigned. At first it was attached to the shell and the assembly enameled as one piece. This method was abandoned in favor of a loose finish top and a structural subtop. After enameling, the finish top was attached to the shell. The subtop was designed not only to strengthen the shell but to act as the supporting unit during the enameling process. It was first designed to be attached to the front and side panel assembly with the flange turned down, but later it was reformed to have the flange turned up. This permitted the subtop to be forced into the shell and spot welded onto the flange.

Later it was discovered that the burning tools in the enameling operation were punching the subtop. It was necessary to place reinforcements over the points where the tools touched. These reinforcements were designed also to hold the

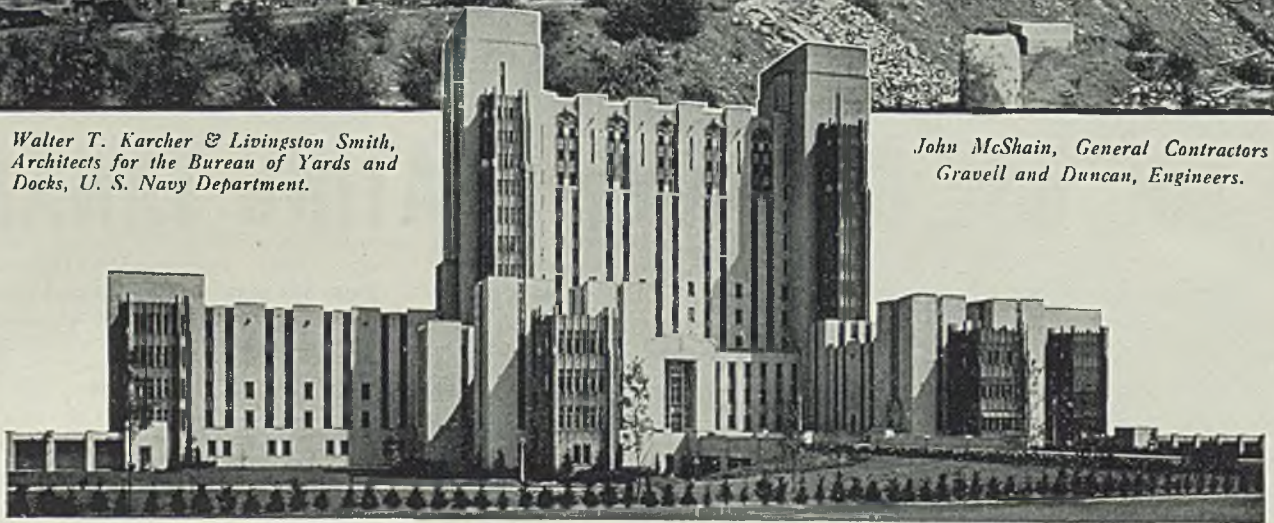
\*Member of design committee. Porcelain Enamel Institute.

# UNITED STATES NAVAL HOSPITAL at Philadelphia, Pa.



*Walter T. Karcher & Livingston Smith,  
Architects for the Bureau of Yards and  
Docks, U. S. Navy Department.*

*John McShain, General Contractors  
Gravell and Duncan, Engineers.*



A GROUP of buildings architecturally imposing in the vertical lines as stressed by the solids and voids of the design and further emphasized in the vertical treatment of the window openings. All structural steelwork was fabricated by American Bridge Company from rolled structural shapes sup-

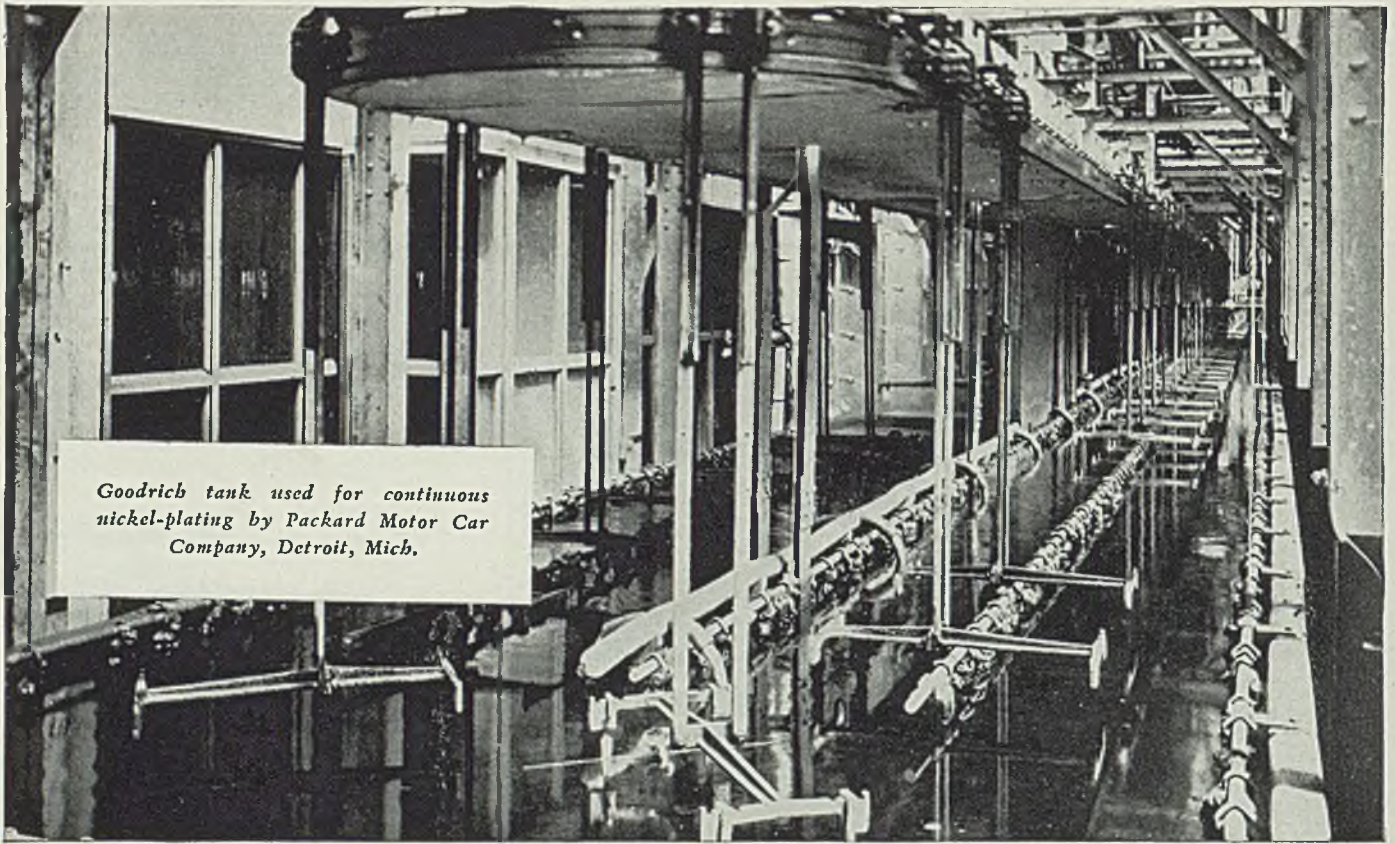
plied by Carnegie-Illinois Steel Corp. American Bridge Company's facilities for fabrication and erection, backed by service organized to cope with any demand, are available in any requirement for structural steel . . . buildings, bridges, barges, towers or steel construction for any purpose whatever.

AMERICAN BRIDGE COMPANY, Pittsburgh  
• CARNEGIE-ILLINOIS STEEL CORPORATION,  
Pittsburgh and Chicago. • TENNESSEE  
COAL, IRON & RAILROAD COMPANY,  
Birmingham.

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



## UNITED STATES STEEL



Goodrich tank used for continuous nickel-plating by Packard Motor Car Company, Detroit, Mich.

# PUDDLES AND PATCHES ARE OUT IF YOU USE GOODRICH PLATING TANKS

A puddle means a leak and a leak means a patch. Put them all together and you have T-R-O-U-B-L-E. Leaking plating tanks are an old story to industry, but there is a new story about a tank that won't leak and, what's more, won't contaminate plating solutions.

Goodrich tanks are Triflex lined—three linings in one—a layer of hard rubber cushioned between two layers of soft rubber, and fitted with expansion joints to prevent the rubber from buckling or cracking. By the exclusive Goodrich Vulcalock Process this lining is bonded to the metal tank with an adhesion of 500 to

700 lbs. per sq. in. Pure gum rubber or special compounds designed to fit the process, are used, preventing contamination of plating solutions. It is not necessary to compromise the compound in order to secure adhesion.

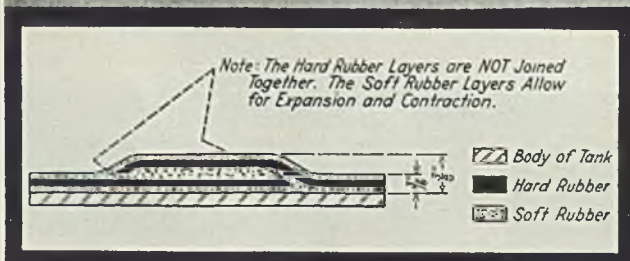
Freedom from leaks means increased production plus savings in labor, acid and electricity. A Goodrich expert will be glad to confer with you, without obligation, regarding your installation. Write The B. F. Goodrich Company, Mechanical Rubber Goods Division, Akron, Ohio. (In Canada: Canadian Goodrich Co., Ltd., Kitchener, Ont.)

## Goodrich



# Plating Tanks

ALL products problems IN RUBBER



cabinet in place in the shipping crate. With the final solution of the subtop design, it was possible to use either an overhanging finish top with a roll edge, or a flush top mounted with a polished band. The latter method finally was adopted due to the necessity of the so-called streamline design.

Considerable trouble was experienced in the early models with chipping at the corners of the door opening. At first a flat reinforcement was spot welded to the face at this point, but later it was found necessary to make a special corner angle with a formed flange. This angle was placed against the flange of the door opening and spot welded in place. Then the corner was gas welded to form a continuous flange around the door opening.

When the design was completed, some trouble was experienced with the drainage of the pickling solutions. This problem was solved by the liberal use of holes at unexposed points. These holes were filled with rubber plugs after the enamel was applied, insuring a moistureproof shell which could be sealed against breathing.

#### Jig for Enameling

While the changes in fabrication were being worked out, certain developments were taking place in the methods of enameling. The basic idea of suspension from the top end of the shell was retained, but the use of hooks through holes was abandoned in favor of a jig. This jig was designed to support the entire assembly under the subtop and well out toward the corners. It was constructed in the form of an "X" with a hook in the center. The subtop had reinforcements attached so that the ends of the jig would not punch through. This method proved to be a great improvement over the use of hooks and now forms the basis of a new method of supporting enameled parts during the firing operation.

As soon as the burning methods were worked out, other problems were few. Ground coats could not be dipped as is the practice with most panels, but could be sprayed as easily as the white coats. The assembly could be hung in a continuous spray booth the same as it could be hung in a continuous furnace. All enamel coats were sprayed in continuous booths feeding directly into continuous dryers. This reduced handling to a minimum. At the end of the dryer the shells were transferred to a continuous furnace. With three continuous furnaces it was possible to put these shells through all operations in a straight line without any back tracking. No banks were necessary between the furnaces.

Inspection and color matching

were done on a conveyor as the finished case was moving toward the assembly department. Assembly was completed in much the same manner as in the case of the shell-type painted cabinets. The insulation and the lining were pushed through the door opening and the breaker strips inserted. The unit was placed in the machine compartment and the cooling coil installed in the cabinet. Finally the door was hung. After the unit was tested, the finish top was fitted and removed to be packed in a separate carton for shipping. The cabinet was packed by the floating method in a self supporting crate, and the weight of the unit was relieved by supporting it on the crate base.

Several thousand of these models have been placed in service in various parts of the country. The shipping problem has proved simple and chipping has been reduced to a low level. In fact, service complaints on these models are reported lower than on the conventional frame and panel models, and may even run lower than for painted cabinets.

## Safety and Hygiene Will Be Convention Topic

Progress in the medical, legislative and engineering aspects of safety and hygiene in the foundry will be discussed at a special conference during the fortieth annual convention of the American Foundrymen's association in Detroit, May 4-9. This conference, arranged under auspices of the safety and hygiene section of the association, is scheduled for Friday afternoon, May 8, at Convention hall.

Report of A. F. A. committee on safety and hygiene codes will be made by James R. Allan, International Harvester Co., Chicago, chairman. Addresses will be presented as follows: "Discussion of Medical Aspects," by Dr. R. R. Jones, past assistant surgeon, United States public health service, Washington; and "Discussion of Legislative Aspects," by Voyta Wra-betz, chairman, industrial commission of Wisconsin. An open forum will be conducted by Dr. J. A. Britten, chief surgeon, International Harvester Co., Chicago.

## Welded Steel Belt



**H**ERE is said to be the first welded steel belt ever made. It was manufactured by O. J. Loughheed & Son Inc., Portland, Oreg., and shipped recently to an industrial concern in Boston. The manufacturer is not permitted to divulge the identity of the buyer or the purpose of the belt, further than to say it is not for power transmission or material conveying purposes. It is safe to say that it must be a part of some heavy equipment, perhaps a lifting member, since it has a total capacity or pull of 600,000 pounds. The material is tempered, high-carbon steel, Rockwell hardness approximately 44; width 80 inches; length (circumference) 51 feet; thickness 0.072-inch. The belt was made of five strips of steel gas welded edge to edge, the welds being forged while still red hot by peening with a small pneumatic hammer as the work progressed. After the welding was done, the belt was placed on rack rolls and finished by hand, all "tight" and "open" spots being worked out with hammers. The Loughheed company for several years has been doing practically the same type of work on large bandsaws used in Pacific Northwest sawmills. When these saws are "fled" until too narrow to work on the pulleys without the teeth coming in contact with the latter, they are rebuilt by welding a strip of steel to the plain edge of the band, bringing it up to the original width



# Surface Treatment and Finishing



## Recent Developments Open Path to Wider Use of Bright Zinc Plating

BY M. B. DIGGIN

Hanson-Van Winkle-Munning Co., Matawan, N.J.

IN VIEW of the present comparative scarcity of cadmium metal and its high cost for ordinary electroplating uses, there has been a recent widespread change to electrodeposited zinc for the protection of steel and iron exposed to outdoor corrosion.

Although the price of cadmium always has been considerably higher than that of zinc, the former has been used extensively in the past for the various reasons discussed below. In the light of present knowledge some of the advantages previously ascribed to cadmium apparently have been overestimated.

### Results of Research Reported

Until recently, for instance, it has been generally assumed that cadmium coatings of a certain thickness offered a greater measure of protection against corrosion of steel than an equal thickness of zinc. This conception probably arose through the lack of carefully conducted outdoor exposure tests and the misleading interpretation of accelerated corrosion tests in terms of an outdoor exposure.

In a research paper of the national bureau of standards<sup>1</sup> the results of work during the past three years upon exposure tests and accelerated tests on zinc and cadmium plated steel are discussed. These tests have been conducted with the co-operation of the American Electroplaters society and the American Society for Testing Materials and supplement work reported in 1934 on nickel and

<sup>1</sup>"The Corrosion Protective Value of Zinc and Cadmium on Steel," by William Blum, Paul W. C. Strausser and Abner Brenner, *Journal of Research*, March, 1936, national bureau of standards, Washington.

chromium coatings<sup>2</sup>. These tests have shown that, in general, cadmium falls more rapidly. If coatings of equal weight per unit area were exposed, the cadmium panels would compare even less favorably with zinc, the density of cadmium being about 20 per cent greater than zinc.

Almost from the beginning of commercial cadmium plating, processes were available which produced brilliant deposits. These bright coatings were such an improvement over the usual dull gray lusterless zinc deposits that manufacturers were quick to adopt cadmium. An article was found to be much more salable with a silvery bright cadmium finish than the dull gray finish then obtainable with

<sup>2</sup>"Accelerated Tests of Nickel and Chromium Plating on Steel," by Paul W. C. Strausser, Abner Brenner and William Blum, research paper 724 (1934), national bureau of standards, Washington.

zinc. With the advent of bright zinc deposits this objection to zinc has been minimized and today there are several processes on the market which produce zinc coatings that compare favorably with bright cadmium.

The throwing power of ordinary zinc cyanide solutions has in many cases been lower than that of bright cadmium solutions and this characteristic has made the use of cadmium preferable on deeply recessed articles. However, some bright zinc solutions equal in throwing power a good bright cadmium solution.

### Cadmium Easily Applied

Another factor which made the use of cadmium solutions more attractive than zinc was the ease of operation and control of solutions. The essential constituents of a cadmium solution are the metal, free cyanide and the brightening addition agent. The caustic or sodium hydroxide content that is originally present does not have to be considered and the sodium carbonate that is formed is not troublesome until its concentration reaches 10 or 15 ounces per gallon. The concentration of metal and free cyanide can vary considerably in a cadmium solution without seriously affecting the character of the deposits, the anode corrosion, or the solution efficiency.

The control of zinc solutions has

## Thicknesses of Cadmium and Bright Zinc Deposited in Given Time

CADMIUM*	Current density, amperes per square foot				
	10	15 (optimum)	20	25	30
Minutes			Inches		
5.....	0.00008	0.00012	0.00015	0.00019	0.00023
10.....	0.00015	0.00023	0.00031	0.00039	0.00046
15.....	0.00023	0.00035	0.00046	0.00058	0.00070
20.....	0.00031	0.00046	0.00062	0.00077	0.00093
30.....	0.00046	0.00070	0.00093	0.00116	0.00139
BRIGHT ZINC†	Current density, amperes per square foot				
	40	45 (optimum)	50	55	60
Minutes			Inches		
5.....	0.00021	0.00023	0.00026	0.00028	0.00031
10.....	0.00041	0.00046	0.00052	0.00057	0.00062
15.....	0.00062	0.00070	0.00077	0.00085	0.00093
20.....	0.00083	0.00093	0.00103	0.00114	0.00124
30.....	0.00124	0.00139	0.00155	0.00170	0.00186

\*Figured on cathode efficiency of 90 per cent.

†Figured on cathode efficiency of 85 per cent.

# INDUSTRY IS UNCOVERING

Countless *Chromium Plating* Opportunities  
for Product Improvement and Cost Reduction



**W**HEN commercial chromium plating was first introduced its use was largely confined to bright parts for non-tarnishing, decorative purposes. Today its uses are legion...and rapidly growing.

Chromium plating is now used with great success on a wide variety of machine tools and other machinery to prevent corrosion and to reduce wear on moving parts. It is employed to maintain the accuracy of precision gauging devices...to increase the life of cutting tools...to salvage worn and under-size parts...to improve the appearance of metal products. The few applications shown below are merely representative.

Are you taking advantage of these chromium plating opportunities? Are you profiting through the economies and improvements they make possible? We would welcome an opportunity to help you check up...and to tell you about our Licensing Arrangement which makes available the chromium plating process and a valuable engineering service.

## United Chromium

INCORPORATED

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Detroit • Waterbury  
San Francisco

Chromium plating water pump shafts prevents galling, eliminates corrosion



Various kind of dies are now regularly chromium plated to reduce wear



Tool life is greatly increased by chromium plating



Chromium plate gives metal greater eye-appeal and du



been simplified by the development of short and accurate analytical methods<sup>1</sup> which make it possible for zinc baths to be controlled as easily as cadmium and the constituents of the baths maintained in proper balance at all times. In the better bright zinc solutions there can be as wide a variation in the concentration of its constituents as in cadmium solutions, without objectionable results.

#### Operating Difficulties Reduced

In operating cadmium solutions no trouble is usually experienced with unfavorable anode characteristics. The anode efficiency is high, the solutions, if properly balanced, remain constant in metal and the anodes remain clean and do not liberate insolubles in the solution. With ordinary zinc anodes in a cyanide zinc solution, on the other hand, the anode efficiency tends to be much greater than the cathode efficiency causing the solution to build up rapidly in metal despite drag-out and other losses. In addition to this the anodes are soluble in the solution when the current is not passing, thus further increasing the metal concentration. After some time it will be necessary to discard a portion of the solution and metal will be lost in the portion discarded.

Sludge is formed on ordinary zinc anodes which creates polarization and makes it necessary to use higher voltages to maintain a certain current density in the work. The sludge becomes detached and causes spots and often pinholes and inclusions in the deposit, thus decreasing the protective value of the coating. As the sludge increases in the solution it finally becomes necessary to shut down the tank and clean out the sludge with a consequent loss of time and metal.

A special alloy anode<sup>2</sup> has been developed which eliminates these objectionable features of zinc anodes. This anode, it is claimed, corrodes in a cyanide zinc solution even better than a good cadmium anode in a well balanced cadmium solution.

To approach cadmium with regard to ease of application, a bright zinc plating process should have the following characteristics. It should produce uniformly bright deposits, which are not a function of the sub-

sequent bright dip. The latter process should be required only to remove film and render the surface less susceptible to staining. The solutions should be as stable as ordinary cyanide plating solutions, and should have a reasonably wide range of operating conditions such as concentration, temperature, and current density.

The solution should be insensitive to small amounts of impurities that are likely to enter the tank through salts, the tank, anode rods and other sources, and should be capable of control by simple methods of analysis. The anode and cathode efficiencies should be balanced to prevent rapid changes of metal content, and the permissible cathode current should be high so that a substantial deposit can be obtained in a short plating time. No insoluble materials should be formed from the electrolysis of the solution or from corrosion of the anodes. Finally, the deposits must be free from porosity and brittleness, firmly adherent, and should afford as good if not better protection against corrosion as ordinary zinc deposits of the same thickness. A bright zinc plating process which is claimed to fulfill these requirements is now available.

#### Current Density Increased

The plating bath of this new bright zinc process operates at a current density of 40 to 60 amperes with a tank voltage of 3 to 4. The solution is operated at 75 to 110 degrees Fahr. and the volume should be so adjusted that not more than 2.5 amperes is passed for each gallon of solution. Special anodes are required which produce no sludge during electrolysis, and which may be left in the solution without polarizing. The anode area should be approximately 50 per cent greater than the cathode surface; anode-cathode spacing varies from 7 to 12 inches depending on the amount of recessing in the work.

It is recommended that unlined steel tanks be used for the solutions in this process. Tanks made from other materials or with rubber linings will not give satisfactory service. Because of the high current densities used, racks should be made from copper or brass. Large exposed rack area must be avoided, and the newly developed synthetic rubberlike compounds are recommended for covering the plating racks. Comparative rates of plating between bright cadmium and the bright zinc process are shown in the table appearing on Page 44.

The bright zinc process referred to here is that developed by the Hanson-Van Winkle-Munning Co. under the trade name Mazic. Detailed specifications covering the process are available from the company.

## Synthetic Vehicles Aid Zinc Paints

ZINC dust paints have been known to industry for many years but the difficulty incident to their use gradually caused a falling off in their popularity, despite excellent protective properties.

Prior to the development of synthetic vehicles, it was found that the acids present in the natural vehicles used reacted with the zinc dust and the hydrogen evolved would burst the cans in storage. The new synthetic vehicles not only have reduced this hazard but also have produced a harder film which does not flow as readily as the natural vehicles.

#### Some Precautions Necessary

The zinc dust settles rapidly in the cans and the paint must be stirred constantly when in use. This difficulty, most likely, never will be overcome, and when the paint is stored in stockrooms, the cans should be inverted daily to keep the pigment from caking. This is good practice with any heavily pigmented paint.

Zinc dust paints have a corrosion resistance about on a par with a good basic lead chromate primer. This paint cannot be used where acid conditions exist because the zinc dust, as mentioned, is susceptible to acid. The paint film is plastic and cuts in it can be molded shut with the fingers. This plastic quality is sometimes a disadvantage in that the film can be gouged out and bruised easily. Zinc dust paints have excellent covering power and, peculiarly enough, adhere well to galvanized or sheet zinc surfaces.

This type of paint has been used successfully on steel subject to sea water submersion, as well as on structural steel and fresh water installations.

## Prefinished Sheets Are Protected for Fabrication

Use of prefinished sheets with a high polish has necessitated many precautions on the part of manufacturers to prevent marring and scratching during fabrication, shipment, warehousing and stockroom handling. Various lubrication methods have been tried with more or less disappointing results.

The American Nickeloid Co., Peru, Ill. has brought forth what appears to be a promising solution of the problem. Their prefinished sheets

<sup>1</sup> "Simple Methods of Analyzing Plating Solutions," published by the Hanson-Van Winkle-Munning Co., Matawan, N. J.

<sup>2</sup> "A Further Study of Cyanide Zinc Plating Baths Using Al-Hg-Zn Anodes," by A. K. Graham, Electrochemical society, Preprint 67-12. "Anodes for Zinc Plating," by George B. Hogaboom and A. K. Graham, *Transactions of the Electrochemical society*, Vol. LXII, 1932. "A Further Study of Anodes for Zinc Plating," by A. K. Graham, G. B. Hogaboom Jr. and L. E. Graham, *Metal Industry*, June, 1933.

are now furnished with a protective paper coating which is left on the sheet during the stamping and forming operations. After fabrication the paper can be peeled off and the part wiped clean with a soft dry cloth which suffices to remove all traces of the adhesive gum.

The special covering is available on any of the company's prefinished metals in sheets or coils, with the exception of crimped metals.

## Synthetic Enamel Resists Cigarette Burns and Alcohol

A new high gloss baking enamel, Roxyn 12B, recently developed by the Roxalin Flexible Lacquer Co., Elizabeth, N. J., is reported to have withstood the heat of constantly burning cigarettes without any discoloration or softening. Special high-temperature resistant pigments are used in this product to prevent discoloration. Bright reds and greens, which would normally discolor, are available.

It is also claimed that when this enamel was applied on a coaster and then immersed in straight alcohol for one hour no failure of the finish occurred. The material can be applied by spraying or dipping and bakes for one hour at 300 degrees Fahr.

## Electrodeposited Coatings Measured Mechanically

An ingenious method of measuring the thickness of electroplated coatings rapidly by mechanical means has been published by the national bureau of standards, Washington. This method measures the thickness at specific spots and makes it easier to follow recently adopted specifications requiring a minimum thickness on significant parts of plated surfaces. Former specifications required only an average thickness.

In this method a coating on a curved surface is just cut through with a flat file, or that on a flat surface is cut through with a grinding wheel of known radius, and the thickness of coating can be computed from the

$$\text{equation } T = \frac{C^2}{8R} \text{ where } T \text{ is the}$$

thickness;  $C$  is the chord, that is, the width of the cut; and  $R$  is the radius of the curved surface or the grinding wheel.

When this method is applied to plane surfaces, they are tilted slightly, so that a tapering cut is produced when the surface is passed under the grinding wheel in a direction parallel to its axis. The chord is then measured just at the point where the base metal is exposed. Measurements of in-

dividual layers in multiple coatings are especially facilitated by this method.

A relatively coarse grained wheel, about 90-grain, is used for testing deposits on soft-base metals, such as copper, brass and zinc-base die castings. A 120-grain wheel gives sharper cuts on steel. The width of the cut is measured with a lens and scale.

This method was found to be accurate to about 10 per cent when tests were made on coatings not less than 0.002-inch thick. The tested specimens can ordinarily be salvaged by stripping, polishing and replating. A more complete account of this work will be found in RP866 in the February issue of the *Journal of Research*, national bureau of standards.

## Color, Finish Combinations Produce Striking Effect

An interesting example of how various colors and types of finishes can be combined to produce a striking effect is illustrated in the new General Electric and Hotpoint electric washers.

The G. E. model has a white-lacquered tub; a round white-lacquered steel skirt, decorated with a cadmium plated band, extends from the bottom of the tub to within 3 inches of the floor. The tub cover is finished in white lacquer with a red lifting knob. The wringer has a white finish to match the washer and the pump controls and decalcomania are red.

The Hotpoint model also has a white-lacquered tub and steel skirt with a cadmium plated band. This model has an additional green base trim. The tub cover is finished in white, but has no lifting knob. The wringer finish is aluminum.

## Metal Protective Coatings Successful in Field

During the past eight years three metal protective paints have been developed and marketed by the Carpenter-Morton Co., Boston. These paints have stood service tests in the field for a sufficient length of time for the manufacturer to announce them as follows:

*Carmotite galvanized iron paint.* It is claimed that this paint adheres well to galvanized iron and other outdoor metal surfaces even under extreme temperature changes. It dries to a dull finish and is available only in dark colors because of the dark gray pigment used.

*Combatit,* a rust primer, made from zinc chromate and synthetic varnish vehicle. This paint has been used successfully on the water gates of power

dams. It is available only in a neutral gray color; any other finish material may be applied over it.

*Black structural paint,* a graphite paint which is different from the ordinary type in that it contains a large content of lead, which, it is claimed, produces a more durable and hard drying film. It has been used successfully on outdoor structural work and freight cars.

## Enamel Reflectance Values Calibrated and Standardized

The National bureau of standards, Washington, recently submitted a test procedure, which includes a method of measuring of reflectance of enamel, to the Porcelain Enamel institute. The procedure, adopted by the institute as a tentative standard, specifies a method of analyzing reflectance data to obtain the two fundamental reflectance constants of enamels, and a basis for classifying commercial enamel frits according to their reflectance characteristics.

The bureau has prepared enameled plaques, in sets of ten calibrated areas, which have been sent to laboratories which have co-operated in the tests on reflectance standards. The use of these standards, covering a range of reflectance from 50 to 87 per cent, constitutes a major step toward standardization of enameling practice. The bureau will calibrate plaques, for those who desire them, upon the payment of a fee.

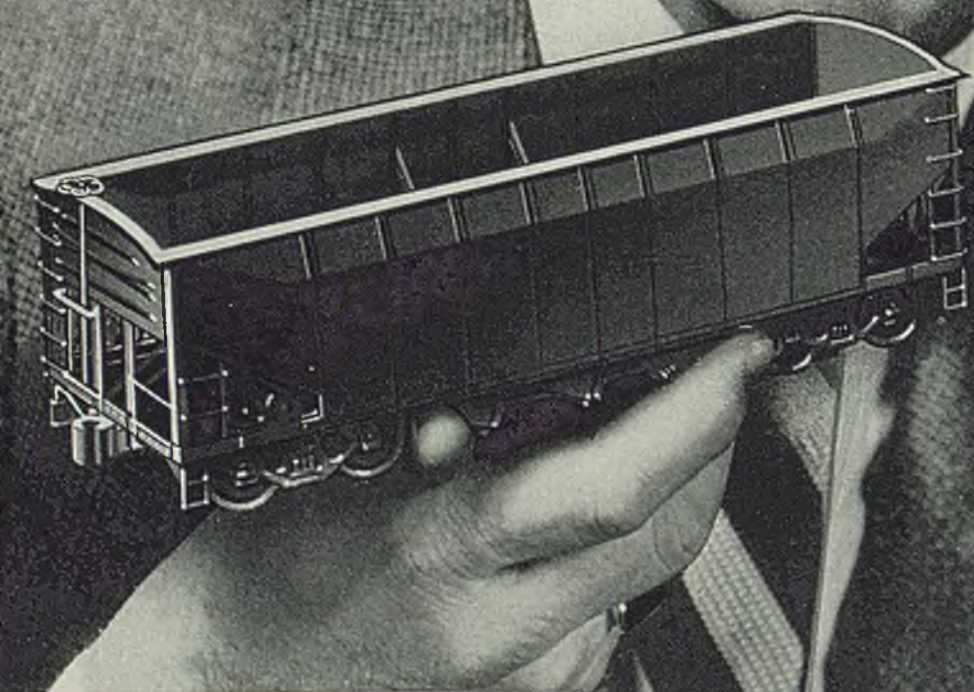
## Porcelain Enameling Unit To Burn 6 x 12-Foot Sheets

To meet a potential demand for unusually large porcelain enameled sheets, the Ingram-Richardson Mfg. Co., Beaver Falls, Pa., has placed a contract with General Electric Co., Schenectady, N. Y., through the latter's Pittsburgh office, for a specially designed electric enameling furnace to be ready for operation the first week in February. It is designed to burn porcelain enameled sheets up to 72 inches x 12 feet, both single and double faced. Cost of the completed furnace will be approximately \$40,000. With this equipment the company will be able to produce large porcelain enameled signs and sheets for use in building construction.

## Chute Parts Rustproofed

A well-known maker of air chutes, or parachutes, whose equipment has been standard for the United States air service since 1919, cadmium plates all metal parts, such as buckles, snaps and fittings, to safeguard them against rust and corrosion.

# Dead



Engineers have known for a long time that with better steels they could design lighter equipment and obtain better load ratios. Now these steels are here. Read the facts on the opposite page.

# Weight

*is costing you gentlemen  
millions of dollars*

THE president of an important railroad recently stated that if the dead weight of freight and passenger cars were reduced one-fourth, the savings—on the basis of 1934 traffic—at only one mill per ton mile would amount to one hundred million dollars per year.

An impossible goal? Not any longer. Freight equipment is now in service which shows an even greater weight reduction—with no loss of strength. This saving is made possible by Cor-Ten and USS High Tensile Steels.

Through the use of these superior steels and the lighter construction they make

possible, a new era of more economical operation is opening up. Fundamental improvements can now be made in the equipment you build or schedule for heavy repairs. Pay load capacity can be substantially increased; maintenance costs reduced.

Write us for advice on the machining and fabrication of these new, low cost alloy steels and for facts about the part they are playing in the modernization of railroad equipment.

Address Railroad Research Bureau, United States Steel Corporation Subsidiaries, Frick Annex, Pittsburgh, Pa.

AMERICAN SHEET AND TIN PLATE COMPANY, *Pittsburgh*, . . . AMERICAN STEEL & WIRE COMPANY, *Chicago*  
CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago* . . . TENNESSEE COAL, IRON & RAILROAD  
COMPANY, *Birmingham* . . . COLUMBIA STEEL COMPANY, *San Francisco* . . . NATIONAL TUBE COMPANY,  
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STEEL PRODUCTS COMPANY, *New York, Export Distributors*



UNITED STATES STEEL

# Methods and Materials



## Large Hydraulic Presses Embody New Features of Design and Operation

**T**HREE large hydraulic presses, incorporating interesting features of construction, have been built recently by the Baldwin-Southwark Corp., Philadelphia. These presses were designed to provide rapid operation and maximum efficiency.

The largest of these presses, a 1300-ton double-acting unit, shown in Fig. 1, is being installed in the plant of the Aluminum Cooking Utensil Co., New Kensington, Pa., and will be used for deep drawing and forming large kettles and other cooking utensils from aluminum sheet. An unusual feature is that the die descends at high speed until it contacts the blank, at which point it automatically slows down until the drawing has started when it again speeds up and the operation is completed under high speed. This man-

ner of operation is said to be effective in preventing scoring or marring of the highly polished aluminum.

Overall height of the press is 35 feet; it has a "daylight" of 86 inches, and clearance between the columns, right to left, is 84 inches. Two double-acting pushdown cylinders for draw work, and a main cylinder for the maximum setting tonnage are located in the inner slide. This slide exerts a maximum pressure of 1000 tons and has a 50-inch stroke. Attached to this inner slide is a mechanical stripping mechanism operated by the up-motion of the slide.

The outer slide, with 25-inch stroke, has two screw stops which can be adjusted so that any required pressure can be applied on the clamping ring of the die. It has a maximum capacity of 320 tons. The press

is fully automatic and by adjusting a simple lever it can be changed from double to single acting. If desired, the bottom platen can be fitted with cushion cylinders. A 285-gallon rotary-piston type hydraulic pump and its driving motor are mounted on the top platen. The filling tank which gives rapid filling of the main cylinder is on top of the cylinder itself. Hence, the press is completely self-contained.

The 500-ton moving-down type of press, shown in Fig. 2, is especially suited for pressing parts from hot steel, although it can be adapted readily to forging, forming, and operations of a similar nature. Fifteen strokes a minute are obtainable from this new machine, which is entirely self-contained, the motor-driven rotary piston pump as well as the necessary oil tanks being mounted on the top platen.

Stroke of the moving platen can be adjusted and set to any predetermined distance within its range. Likewise, it can be set to stop and return automatically when a specified pressure has been attained under

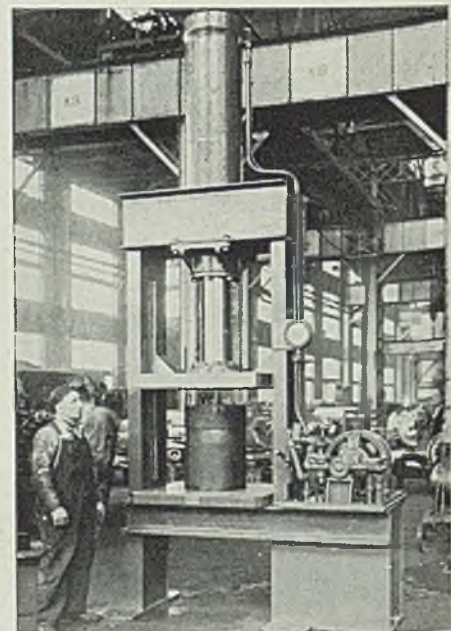
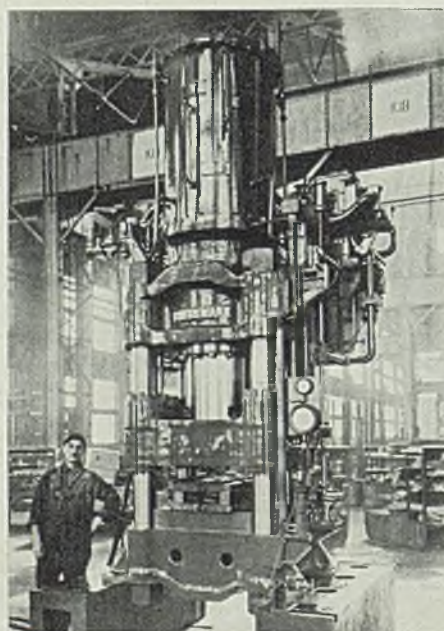
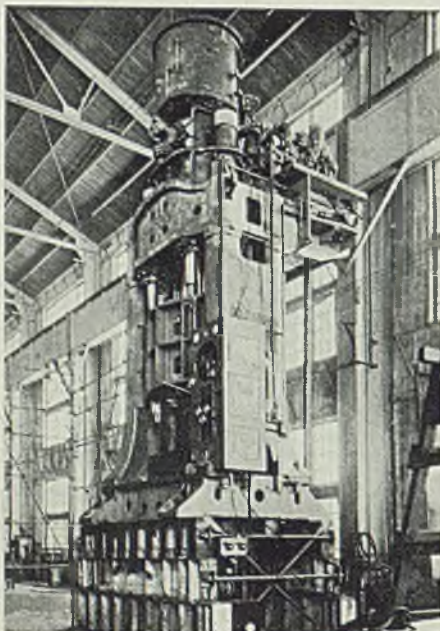
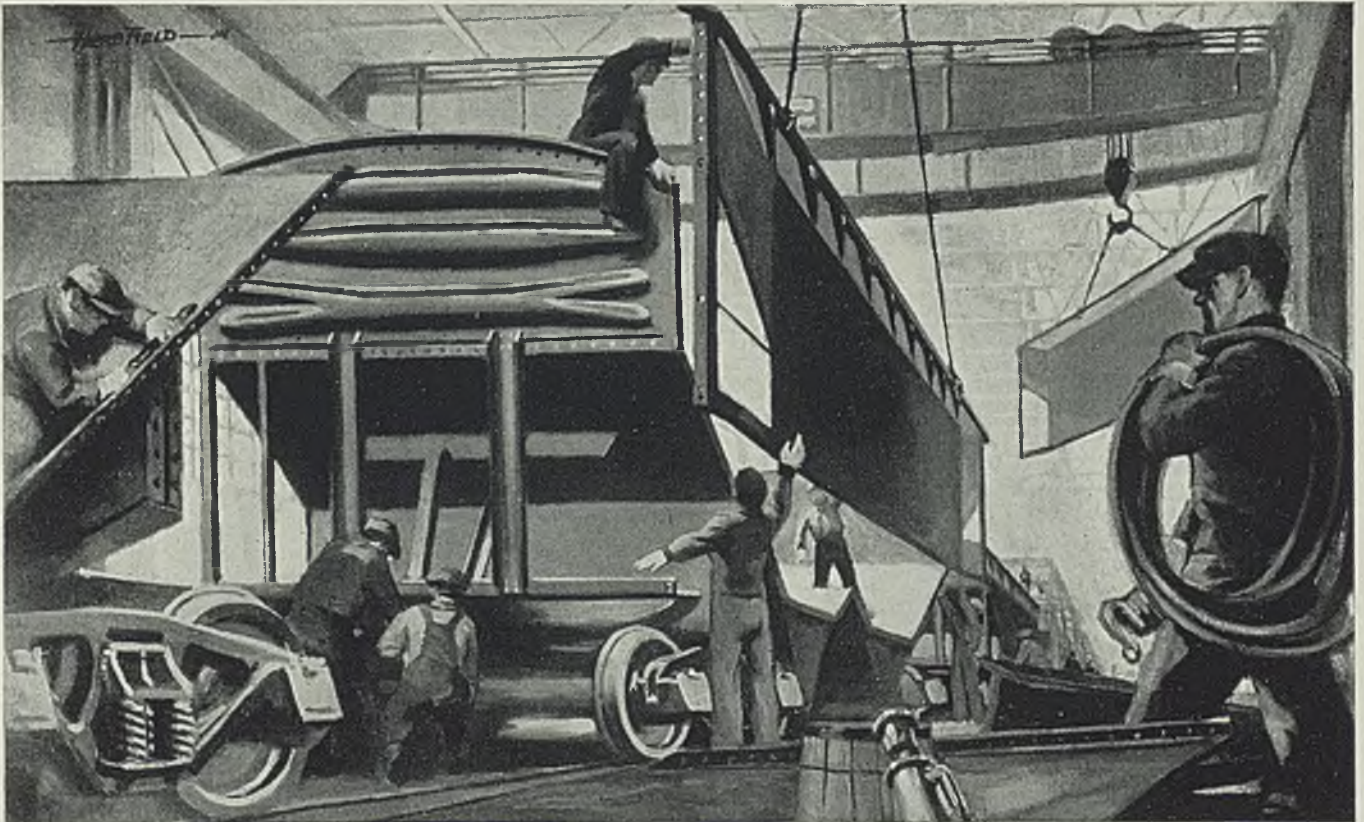


Fig. 1 (Left)—1300-ton double-acting press for deep drawing and forming aluminum cooking utensils. Fig. 2 (Center)—500-ton moving-down type press for hot pressing, forging, forming and similar operations. Fig. 3 (Right)—75-ton moving-down type press for miscellaneous and experimental operations as well as production work



## The New High-Strength Alloy

# .. INLAND HI-STEEL

## Banishes Useless Weight

**THE MILL and  
THE MEN ...  
that's INLAND**

Inland Steel Company is one of the largest producers in the country; its range of products is broad and comprehensive. • Inland Men are well known for their seasoned experience—their skill and operating team work. • Each Inland Mill is recognized as typifying the most recent achievements of modern engineering—embracing every new improvement for producing quality steel. • Both Mills and Men are at your service.

### Principal Products

SHEETS	STRIP	TIN PLATE
PLATES	STRUCTURALS	PILING
RAILS	TRACK ACCESSORIES	
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On any piece of mobile, heavy equipment, carrying around useless weight costs much more than its elimination with Inland's new alloy—Hi-Steel (High in Strength, High in Corrosion Resistance). • HI-Steel has twice the strength of carbon steel—drastically reducing dead weight. Its chemical analysis and the methods used, assure a high degree of uniformity. It is readily welded, cut, formed, and otherwise fabricated. • HI-Steel resists corrosion and lasts many times longer than ordinary steel.

Users secure long life at low cost, and without sacrificing the strength and stamina of steel.

• The railroads, car builders, manufacturers of trucks, excavators, and other heavy equipment are already turning to this new, modern alloy steel for lighter, faster, more efficient products.

• Inland's experienced metallurgists are eager to help you determine how HI-Steel can reduce the weight and increase the strength of the products you make. Bulletin No. 10 will be mailed on request.

# INLAND STEEL CO.

General Offices: 38 South Dearborn Street, Chicago, Illinois



the die, or a predetermined height above the bottom die has been reached. For die setting, a manual valve control on the pull-back cylinders permits a delicate and accurate regulation of the platen movement, making possible careful and accurate alignment of dies.

Located on top of the main cylinder is its filling tank, while under the pump and motor is the leakage tank. The tanks are equipped with gage glasses and the filling tank has a coil for circulation of cold water which holds the oil at a normal temperature. Forged steel is used in the columns of the press, which are shrunk in. Plates, cylinder, and other main parts are cast steel, while the ram is of close-grained cast iron.

Innumerable operations which are of daily occurrence in both large and small shops can be performed by the 75-ton moving down press shown in Fig. 3. Forcing bushings in or out, bending, straightening, pressing, and forming of small parts are all within the scope of this machine. The unit

can be employed in experimental work such as making briquets, recovering liquid content from various materials by pressure, and, when occasion demands, it can be adapted to production operations.

Movement of the ram is controlled by a single valve lever, which starts and stops the machine, holds the ram in any desired position and regulates the speed. Welded structural steel is used for the press frame; platens are of heavy steel. The bottom platen has a hole in its center under the ram for forcing out pieces. Cast steel is used in the cylinder, the ram is of cast iron. The ram is double acting, eliminating the necessity for pull-back or auxiliary cylinders for returning the main ram.

Hydraulic pressure is furnished by a rotary, motor-driven hydraulic pump mounted on the end of the bed. Directly below the pump is the oil tank. A gage in view of the operator shows the pressure attained and overloading is prevented by a safety valve.

nickel or copper-lead, or both, for part of their product.

Complications in the situation are apparent, continued the speaker. Before we became afflicted with the 80 to 100-mile-per-hour speed complex, tin-base babbitt met very generally the varying conditions under which main and connecting rod bearings had to operate. Because of greater plasticity, bearings of this kind do not require as accurate machining and alignment as bearings made from the recent substitute alloys and can be satisfactorily installed with less running clearance.

There are three well defined cadmium base compositions. One contains about 1 1/4 per cent nickel, another around 2 per cent silver plus 1/4 per cent copper and the third about 3/4 to 1 per cent silver and 3/4 to 1 1/2 per cent copper. A little zinc may be introduced from the fluxing compounds.

#### Advantages of New Alloys

These different alloys behave approximately the same in bearing service. They do not permit assembling with as close running clearance as the old alloys. The copper-lead bearings containing 35 to 40 per cent lead operate satisfactorily under higher duty than either the tin-base babbitt or the cadmium-base alloys, but many conditions must be met to insure proper working and prevent undue wear of the bearings and journal. Because of the relatively low plasticity, they require a larger running clearance and necessitate a great deal of precision work in machining the crankcase and connecting rod. In the airplane engine, where performance bears a different relationship to cost, this material occupies a commanding position. In ad-

## Trend to Higher Engine Speeds Spurs Search for Improved Bearing Metals

**P**RESENT tendency toward power, speed and rise in temperature at the frictional surfaces in engine and transmission machinery has outrun the competence of ordinary bearing metals. This was the assertion of C. H. Mathewson, professor of metallurgy, Yale university, New Haven, Conn., in a paper, "The Heavier Nonferrous Metals in Transportation," presented before the symposium on metals in new transportation conducted by the American Institute of Mining and Metallurgical Engineers during its annual meeting held in New York early this year.

According to the speaker, babbitt softens and the new nickel or silver combinations utilizing a cadmium matrix, as also the new copper, high-lead alloys, tend to disintegrate from corrosion or stress-corrosion effect. Improvements in the refining, by solvent extraction, of certain crude oils have for the moment furnished some embarrassment.

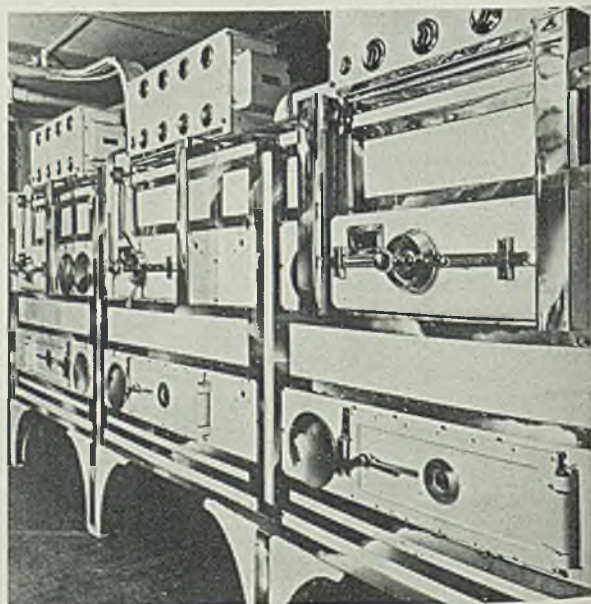
Engine builders now are showing a disposition to alter their designs so as to lower the temperature of the lubricating oil, by extending, for example, the water jackets to the bottoms of the cylinders, deepening the oil pan and introducing operating modifications such as the over-drive.

Opinion is encountered that the

percentage of failures in tin bearings is increasing each year and the time can be foreseen when tin must be abandoned, in spite of temporary or partial relief through modifications of design. As a result, there is much experimentation with other bearings and some manufacturers, while using tin-base alloy for their principal production, are accepting cadmium-

### Stainless Steel Sails Seven Seas

**N**EARLY 15 tons of stainless steel was used in construction of ranges, grills, bakers' ovens and other kitchen and pantry equipment of the new Cunard - White Star superliner, QUEEN MARY. The appearance of these bake ovens is representative of a p p o i n t m e n t s throughout the catering plant, which will serve 2100 passengers and 1400 officers and crew. Photo Courtesy Electro Metallurgical Co., New York



dition to its normal advantage in high-duty service, the high lead content permits longer operation without freeze up under emergency conditions.

To evaluate these different elements and secure definite improvement, stated Prof. Mathewson, there must be developed appropriate tests, for tin-base babbitt modified to give best combination of composition, structure and resistance to stress in the service temperature zone, and for the other types of metal now in the picture. Little seems to have been done, at least openly, in testing these alloys systematically at elevated temperatures. Probably some form of fatigue-impact, stress-oil-corrosion test, to link the region of safe and easy operation, from about 248 to 284 degrees Fahr. with the trouble region, around 392 degrees Fahr. is required.

#### Questions Unanswered

The tin-base alloys must be founded on the antimony-solid solution as no other element dissolves at all freely in solid tin, but 1 per cent cadmium, also soluble, is known to decrease greatly the deformation of such base compositions under pounding at 302 degrees Fahr. There remain for incorporation in these mixtures, besides the familiar copper and lead, many other metals whose function would lie in the direction of changing the nature of the stiffening compounds distributed in the matrix. A stabilized matrix that would not precipitate or dissolve any component in the desired temperature range and a better combination of stiffening structure elements might result from such studies.

There is also the belief that the resistance of tin babbitts to corro-

sion by the oil impurities is greatly reduced at the higher temperatures so that even the development of better strength properties in the old style alloys might leave them quite in a class with cadmium or copper base alloys with respect to breakdown under corrosion-fatigue under extreme conditions. Questions of this sort must be definitely answered.

Besides the new materials mentioned, the improved lead-base alloys, hardened by alkali and alkaline earth metals, require attention. At present, these materials, which carry their useful strength properties well beyond the softening zone of tin-base babbitt, but invite suspicion in the matter of corrosion resistance, are used extensively only in the railway field, where many of the new diesel engines are thus equipped.

What the outcome of a full exami-

nation of these materials may be cannot be predicted, Prof. Mathewson said in conclusion. One might advance the opinion that cadmium-base alloys, whatever their proven advantages, are not likely to reach any dominant position in this field simply because the cadmium supply is limited and closely controlled. The opinion might be advanced that copper-lead installations will prove too expensive and that modified tin-base babbitts, in connection with adaptation of design, will dominate the situation for many years to come.

A factor is that, apart from the composition itself, much less material is used under modern conditions because it now is applied only as a thin layer on a steel back; the weight of babbitt per engine has decreased in recent years to about 25 per cent of that formerly used.

## Engineering Foundation Seeks Funds To Continue Alloys of Iron Research

BY FRANK T. SISCO  
Editor, Iron Alloys Committee

**A**T LEAST four years more, it is now estimated, will be required to complete the work of the Alloys of Iron Research, unless by increase of staff the preparation of manuscripts can be expedited. To accomplish this, the Engineering Foundation, New York, under whose direction the research is being conducted, must be assured soon of sub-

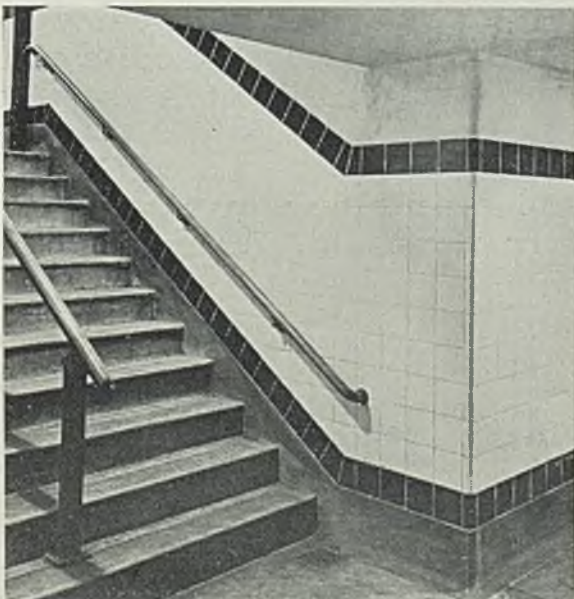
stantial increase of financial co-operation.

Growing volume of research and increasing use of special steels and irons, for which the Iron Alloys committee's own work is partly responsible, are accelerating additions to the literature and thus to the committee's task. Consequently, the job is much larger than it was in 1930, when the committee established its editorial office in New York and secured the valuable collaboration of Batelle Memorial institute, Columbus, O.

To supplement the Foundation's contributions of services and money, \$150,000 should be subscribed by industry. Consumers as well as producers should contribute, for the books resulting from the research will make possible substantial savings of money and time by them in addition to improvements in their products. Especially to the automotive industry and the railroads is the Alloys of Iron Research important and timely. As beneficiaries the electrical and machine tool industries are almost equally indebted.

The research is doing a great service for user and producer alike. To all producers of ferrous metals—not even excluding blast furnace operators and foundrymen—the results of the research are valuable. As the requirements for the use of special steels and cast irons become more exacting and their consumption in-

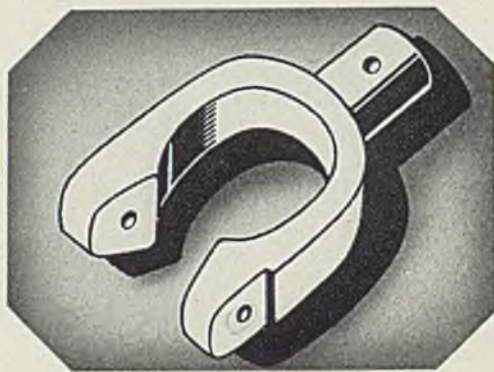
### Steel Tile Decorates Subway



*PORCELAIN enameled steel tile, finished in a black and white color scheme, is a feature of the Haymarket Square pedestrian tunnel at Boston. The Wolverine Porcelain Enameling Co., Detroit, which enameled and installed the tile, used Toncan iron enameling stock as a base, supplied by Republic Steel Corp., Cleveland*

**HOT**  $3\frac{1}{2}^c$  each **COLD**  $1\frac{3}{4}^c$  each

*Manville Cold Processing  
Modernizes Clevis-Making*



**W**HO would have thought that a clevis could be developed *cold* from round wire in forms? By the older drop - forge process this particular clevis was costing  $3\frac{1}{2}^c$ . Manville perfected a cold-forged method on heading machines which would make the article for  $1\frac{3}{4}^c$ .

It would be a mistake to think that all small parts now made from bar stock on drop forges can be made by cold-processing. But it would be an even greater mistake not to ask the question pertaining to each small part you make! Because, where wire in coils can be used, the saving is often amazing—and the product is usually superior.

Manville Cold-Processing Machinery is leading the way to modern cost-cutting and product-improvement in the field. Why not put *your* problem up to Manville engineers?

## MANVILLE MACHINES

E. J. Manville Machine Company, Waterbury, Conn.  
CLEVELAND OFFICE: 1209 SWETLAND BUILDING

creases in tonnage, blast furnace and foundry products can hardly escape such critical examination as has not hitherto been directed at them.

Blast furnace operators and foundrymen should now be conducting researches into the metallurgical characteristics of their raw materials and products. They, as well as the manufacturers and users of alloy steels, will find some of the books of the Alloys of Iron Research great savers of time and money in developing this newer field of investigation. Therefore, blast furnace and foundry owners should subscribe to hasten completion of the critical survey of the world's research.

With publication in May of its monograph on the constitution of iron-carbon alloys, Alloys of Iron Research will have completed seven of its scheduled eighteen or twenty books. The six monographs already published and referred to frequently in STEEL have been enthusiastically received by metallurgists and others throughout the world who make and use steel and cast iron.

In preparation for publication early this fall is the volume on properties of iron-carbon alloys, and for publication early in 1937 is the monograph on iron-chromium alloys. Other books in active preparation include monographs on iron-nickel alloys, iron-manganese alloys, iron-vanadium alloys, and cast iron.

#### International Activities

Besides the seven completed books, the Iron Alloys committee in the six years of its labors has not only explored the world-wide field of literature but also has organized an international co-operation, without which its task of critically reviewing and summarizing the world research on special steels and cast iron could not be accomplished. Only through the Engineering Foundation, with its world-wide ramifications and its sponsorship by the national engineering societies, could the committee assemble and hold the varied collaboration of leading metallurgists, industries, educational institutions, bureaus of the government, and technical societies of all the large steel producing nations.

In connection with the refinancing to complete the work, the Engineering Foundation has available for distribution to interested companies and individuals progress report No. 4 and a brief prospectus of plans for carrying on the research and the benefits to be expected by producers of steel and cast iron. For technical men or executives there is available also a collection of detailed excerpts from critical reviews of the published monographs by American and foreign technical journals. Copies of these may be had upon request to the Engineering Foundation, 29 West Thirty-ninth street, New York.

## Welding, etc. . . .



by Robert E. Kinkead

### New Knowledge

INGENIOUS laboratory setup by L. J. Larson of the A. O. Smith Corp. permitted him to explore with great precision the manner in which metal passes from an arc welding electrode to the arc crater. By running copper strips through the arc, he collected the metal globules for later examination and classification as to size.

Bruce David, noted radio engineer, carried out a similar investigation by purely electrical means. As shown by Larson, there are instants of short circuit due to the size of the globule passing through the arc. The duration of the short circuit appears to be a function of the size of the globule. Working with covered welding rod, David connected a circuit across the arc having in it a suitable condenser, a rectifier, and the actuating coil of a sensitive relay. With proper frequency filters, any particular arc condition could be used to hold the relay in the contact position, thus permitting the selection of a "normal operating condition."

As further disclosed by Larson and by previous oscillograms, at high currents on coated welding rod, the globules become small and large in number. David, in this case, steps up into the radio frequency range in order to select a predetermined frequency range by suitably arranged electrical circuits.

The metallic welding arc is a curious phenomenon. Much is known about how it behaves; little is known about why it behaves as it does.

### Uniformity Is Passing

TROUBLES in welding arising from the recent rapid expansion in the use of alloy steel are likely to increase rather than decrease. Indications are becoming increasingly pronounced that the near future will find large tonnages of steel made of two or more alloys.

The clad metal idea is not new but it is penetrating the field of application and use of steel with great

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

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rapidity at the present time. The vision of ordinary steel clad with virtually a noble metal such as the chromium and chromium-nickel alloys is a forecast of widespread use since what man can imagine, he can do.

But, as clad materials have become commercial, the vision has broadened. If nature "abhorreth a vacuum," she likewise despises uniformity. There are few metal parts or structures which have even approximately the same service requirements throughout their volume. Yet designers have been constrained to choose one metal which meets certain needs and compromises broadly with others. Thus in metal pipes the corrosion on the inside is usually the result of corrosive agents which are different from those operating on the outside.

With uniform metal, the designer must compromise. In mechanically loaded structures where stress concentrations govern the weight of metal if it is of uniform physical properties, the designer's compromise appears as queer and ungainly lumps.

The vision of a composite metal structure with each part of a composition best adapted to the service requirements is attainable by welding or experience born of welding practice. The fact that achievement involves more difficult welding problems is incidental. The attainment of more logical and harmonious design which costs less in the end will justify the cost of great efforts in this direction.

\* \* \*

*Steel producers spend millions of dollars to keep from making steel plates "laminated." Eminent engineers now find that pressure vessels in some cases behave better if the structure is deliberately laminated.*

# Management Conference

## Looks at Today's Problems

### Of Manufacturing Executives

**S**EVEN problems typical of those faced by most companies were given free discussion at the annual production conference of the American Management association held at Hotel Statler, Cleveland, April 16-17. More than 300 attended this conference, which was arranged by the job order production and mass production divisions of the association.

The seven problems were stated as follows: Rebuilding the working force; revamping equipment and plant layout; restoring effective production control; rekindling incentives; revitalizing the supervisory force; intensifying quality control; and keeping a tight rein on costs. Two speakers presented papers on each of these problems. Abstracts of their remarks follow:

#### Rebuilding the Working Force

*C. J. Freund, dean, college of engineering, University of Detroit, Detroit.*

**A**PPRENTICESHIP in the Detroit industries is emphatically a community enterprise. Employers are free to train boys according to their needs but certain basic features are common to all plants and corporations. For instance: Apprenticeship courses are three and one-half or four years long, depending upon previous education of the apprentice; schedules of operations are laid out in advance for the entire course, and are given to the apprentices; apprentices receive related instruction either within the plant or in the public schools; apprentices are paid a minimum starting rate of 35 cents per hour, and receive an increase of 5 cents per hour every six months; each employer designates a supervisor or official to have charge of

apprentices in his plant; the program in each plant is operated in cooperation with the committee on apprenticeship training of the Employers' Association of Detroit.

In most plants the foremen teach the apprentices the actual operations but the plant supervisors are responsible for the effective instruction of the apprentices, and in a number of shops they hold meetings of foremen to discuss and improve the teaching techniques. The foremen report the progress of the apprentices at regular intervals, and the progress is recorded.

Most apprentices attend school one half day per week and they are paid for school time. A limited number attend the Wilbur Wright Vocational High School on a co-operative basis and spend two weeks alternately in industry and in the school. The Committee on Apprenticeship has formulated and published courses of instruction but these are by no means compulsory; each employer is free to prescribe whatever instruction he thinks his apprentices should have. As a matter of fact, though, the great majority of employers have had no experience in education and are glad enough to adopt whatever plan the committee and the school authorities may suggest.

*Everard Stubbs, factory manager, Fellows Gear Shaper Co., Springfield, Vt.*

**T**HE problem that many of us now face is to train for industry as rapidly as possible men who will not only be more skillful than those of the passing order, but men who will be more adaptable and quicker to understand new mechanisms to machine a variety of parts with simpler equipment and to change over fre-

quently for smaller quantities than in the past. At first this task seems difficult, but most of our boys are well versed in handling fairly complicated mechanisms before entering our plants, and the tempo of modern life has fitted them for rapid training.

We cannot train a flexible versatile working force unless we insist that every capable and ambitious man is transferred from any job which has become to him routine work, for we must stimulate his thinking and improve his skill by new experiences. We should pick the courageous and capable workers and improve their courage and capabilities by giving them work which will keep them on their toes and find for them the joy of achievement.

Adaptable, quick-thinking men can be readily trained, providing our employment office carefully selects men of capacity and changes them frequently from one job to another within our own plants. Management should recognize that every man on the payroll is receiving training of some kind or another—good, bad or indifferent.

When new workers are hired, we should be less interested in experience than in character, energy, native intelligence, loyalty and team work. It is relatively easy to supply efficient training for a man of this type and a little time will give him experience. We must admit that we are partially responsible for some of the economic fallacies which are believed in by so many of our citizens, and advocated and practiced by our government today. Have we not in the past attempted to buy the favor of our working forces by various paternalistic schemes which seemed to give them something for nothing?

#### Revamping Equipment and Layout

*F. J. Van Poppelen, industrial engineer, Remington Arms Co. Inc., Bridgeport, Conn.*

**B**EFORE any actual planning of equipment arrangement was considered, an exhaustive review of manufacturing methods had to be undertaken. Floor space and layout depend on equipment and equipment depends on methods.

With the aid of process charts we asked ourselves these questions with respect to each part and operation: 1. What are the functions of this part?; 2. What are the quality requirements?; 3. Is this part made of the right material?; 4. Is this design correct?; 5. Why do we perform these operations?; 6. Can we eliminate this operation?; 7. Can this operation be combined with some other?; 8. Can we change the sequence



*Your*

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of operations?; 9. Can the operation be simplified?

We have three reasons for making equipment expenditures. They are safety, quality and reduction in manufacturing cost. Our permanent program of eliminating safety hazards operates sometimes irrespective of cost. The factor of quality is more closely linked to economics. Any new process or mechanism which contributes toward increased quality of our product has a good chance to be adopted. At the present time new equipment must pay for itself in two to three years. However, there is no definite period to be applied against each case since the factors contributing to any particular case are variable.

*Ralph F. Cohn, factory manager and secretary, Reynolds Wire Co., Dixon, Ill.*

**I**F A SURVEY of present costs with the old equipment compared with estimated costs using the new equipment show that only moderate savings may be expected, an element of judgment is required to supplement the figures and determine whether to replace the units. To be more reasonably sure that our record of purchases of equipment will also be a record of economy and progress, I apply this rule: If the equipment will not repay in operating savings 20 per cent of its cost each year, don't buy it. Look for some other solution to the problem.

Unexpected changes in methods of processing have a way of making new equipment look like a herd of white elephants. To help minimize losses due to changes in process, I keep in mind a second rule: Buy the most profitable unit available and so make it easy to change the layout whenever necessary.

Buy two little machines in place of one big one; the usual mistake is in the direction of bigness. If the large machine has to be shut down for repairs, production of the product ceases, while with two or more smaller units repairs can usually be accomplished during periods where the full capacity of all units is not required.

## Restoring Effective Production Control

*H. B. Maynard, president, Methods Engineering Council Inc., Pittsburgh.*

**A**NSWER to the production control problem lies in the education of the men who are to run it, and this education must go far deeper than the mere teaching of the workings of a particular system.

Any production control system must be built on the foundation of a knowledge of the time required to do the

work. Operation time is the basis for planning and scheduling as much as it is for wage incentive plans and costs, and yet it is the exception rather than the rule to find a planner who makes use of time values established by the time-study department as the basis for planning.

Some planners rely on judgment based on past experience; others have certain estimated standards, such as three days for this kind of a part or a week for that. Still others go to the foreman and ask him how long it will take him to do the work, and he in turn gives an estimate which may or may not be correct.

Any procedure of this sort cannot give accurate results any more than accurate results are obtained when piece rates are set by guess or estimate. In order to obtain scientific production control, the system must be based on accurate time data. For this reason, it is essential that the production department have a thorough grounding in the same subjects that the methods engineer studies. Since proper planning and scheduling must be based upon time, the production personnel should be trained to consider the jobs which they are scheduling as a series of definite elemental operations, each of which requires a certain amount of time.

When the time required for every step followed by a given job is known, the planner next endeavors to set up a schedule which can be met. This requires a knowledge of such factors as machine capacities, unscheduled time available, and the like.

Finally, such factors as rush service jobs, absence, breakdowns, and repairs must be considered, so that the schedule when set up can be met in the face of all but the most unusual interruptions.

## Rekindling Incentives

*I. H. Freeman, supervisor of industrial relations, General Electric Co., Fort Wayne, Ind.*

**C**AREFUL evaluation of the ability, duties and personality of the foreman is an important step in rekindling incentives. The foreman must have high standards, both technically and personally, and should be responsible for just the number of operators he can supervise effectively. One leading industrialist believes that an average not to exceed 25 workers to one salaried supervisor is about the maximum for effective supervision.

It is an axiom that no incentive plan is one bit better than the standards established. The standards of the incentive plan are established on the judgment as to the activity of the operator or operators under observation. Even under most favorable conditions the operator con-

sciously or uncsciously will try to get the best allowance possible. The time-study engineer, on the other hand, is trying to detect any false motions on the part of the operator. The process often becomes a game of outsmarting the other fellow.

Since no incentive system is better than the standards and since it is a proved fact that motion study does develop positive standards, another step in rekindling incentives is by means of motion study.

Any incentive plan should have as its objective a reduction in cost accompanied by increased earnings to the worker. These considerations have been the foundation of incentive plans in the past and will continue to be the basis of successful plans in the future.

To accomplish these results, standards must be established with a greater degree of accuracy than in the past and earnings must reflect the employes' contribution more accurately.

Fundamentally today's incentive system should be based on an accurate knowledge of what constitutes a good day's work on each job plus an accurate knowledge of what constitutes a good day's pay on that job.

## Revitalizing the Supervisory Force

*Albert Sobey, director, General Motors institute, Flint, Mich.*

**I**N CONSIDERING how revitalization of the supervisory force may be accomplished, it is important to recognize that the problem is not simple. The members of the supervisory force have been affected seriously by the forces and events of the past six years, not only as individuals but also as a group. In the meantime, the supervisory problems of industry have been becoming more complex in character. These are individual factors which should enter into any adequate consideration of a revitalization program.

An analysis of the problem reveals further that the real objectives sought cannot be achieved by revitalizing the supervisory force alone—regardless of how good a job is done. There are organization-wide factors involved which must be considered.

An individual supervisor is a member of a team. The success with which he, as an individual, functions is determined only in part by his own efforts and ability. It is influenced to an important degree by the functioning and teamwork of the other men of the executive team, from top to bottom.

Further, the real objective of revitalization of the supervisory force is to increase the effectiveness and success of the organization itself, and the success of any industrial organization is dependent upon uniformity

# SINCE 1850



Sault Ste Marie, Michigan in 1850. There being no canal, all freight was portaged by means of cart and horse.

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of knowledge and understanding, with resultant uniform, effective functioning on the part of every executive in the organization.

How this may be done is illustrated by experience in the General Motors executive training program, through which the executive and supervisory training of the General Motors Corp. is centralized. In this program, supervisory training is recognized as a dual job. It involves the training of the individual, with proper consideration for, and emphasis upon, his background, experience and other similar factors. It also provides for proper consideration of the organization factors involved, through the way in which the program is organized and directed.

*Winthrop P. Stevens, factory assistant superintendent, F. C. Huyck & Sons, Albany, N. Y.*

**S**UPERVISORS have a major responsibility in the current return to normal business volume. Upon them falls the task of working out the plans of management. It is essential that supervisors possess: (1) Sound minds and bodies; (2) organizing ability; (3) open minds; (4) knowledge of their jobs; and (5) ability to organize.

To most supervisors, their job is their sole life interest, which can be quickened and held by interesting summaries that give a broad view of accomplishments. The busier we are, the more these meetings are needed.

The value of properly educating these men to company policies is as essential as the education of the buying public to the worth of your product. The story of advertising and the advertising budget, the job of selling and the importance of uniform quality in meeting sales resistance, the logic behind proper diversification of product, the value of selling only an identified product—discussions or presentations of such a nature broaden the scope of the supervisor's knowledge and interest, strengthen his loyalty and give him new purpose in improving his daily performance.

Key man incentives play a major part in the consummation of a successful plan. An essentially successful plan must have certain features:

1. It must be understandable to the supervisors, and simple in computation.
2. It should be a group plan to insure teamwork.
3. It should be based on savings effected in directly controllable expense.
4. It should allow a flexibility in the size of shares from the pool to supervisors for greater responsibility or better performance.
5. It should, of course, be remuneratively attractive, considerably

better in its return than bonus paid to factory workers.

## Intensifying Quality Control

*J. Carlton Ward Jr., assistant general manager, Pratt & Whitney Aircraft, Division of United Aircraft Mfg. Corp., East Hartford, Conn.*

**T**O MAKE quality standards effective, they should be set by those individuals who are most qualified to know the requirements to be met by the given part. This individual obviously is the designer. Thus, quality standards should be established by the engineering department which is, in turn, responsible also for the inspection of the product, the construction of the prototype engines and its ability to meet the expected performance requirements.

Thus, the quality manager and the chief inspector report to the chief engineer and is divorced completely from factory management. The engineering department must furnish the manufacturing personnel with complete standards of quality both dimensional and finish. Likewise, they select the chemical and physical specifications for the materials used.

In general, quality standards are reviewed and revised each time a general revision is made to the design. The chief metallurgist in conjunction with the chief engineer consider and review, from time to time, the specifications for all materials and the method of testing them. A production executive is charged with the duty of reviewing at all times suggestions from the shop, recommendations which he himself originates and of presenting these for consideration to the engineering department.

The three important considerations in maintaining and expanding the inspection force are: 1. Selection of men of mature age and experience; 2. Selection of men experienced in the processes whose product they are to inspect; and 3, that the inspectors receive a thorough explanation and full instructions concerning the peculiar and vital necessity for maintaining the quality requirements established by the designing engineers, including functioning of the procedure set up for governing and insuring these standards.

## Keeping a Tight Rein on Costs

*Frank Klein, director of budgets, Worthington Pump & Machinery Corp., Harrison, N. J.*

**T**HERE are four good reasons why comparisons with past costs and expenses are no longer acceptable as a measure of control: (1) There is no definite assurance that past operations were on an efficient basis; (2) volumes above or below those of the past makes comparisons difficult; (3) differing economic conditions, with

corresponding changes in price levels also distort comparisons; (4) changes in equipment and methods further accentuate the unreliability of comparisons with the past.

Sound cost control involves four steps:

1. Simplification of routines, and of so-called "paper work" need not be obtained at the sacrifice of any cost control function. In fact, the more direct action made possible through simplification and curtailment frequently increases the effectiveness of the control.

2. A searching review, department by department, of every activity and expense, with consideration of its need under the present conditions, insures the elimination of all unnecessary costs.

3. Establishment of a budget for the minimum necessary costs of operating a department.

4. A yearly revision of each department's budget gives effect to the changes in wage, material, and other costs, while the various capacities provided in the budget compensate for changing volumes of production.

*R. A. McCarty, manager, generator division, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.*

**A**BOUT two years ago, the Westinghouse management decentralized the responsibility for operating results, and, in effect, broke up the parent company into a number of operating divisions. Each division includes headquarters sales, order service, engineering, and manufacturing departments. The executive head of each division is responsible for complete operations, and, therefore, for the expense and profits of the lines of products handled by his division.

A "tight rein on costs" is held by means of budgetary control of all operations. Each major group is budgeted and the summation of all group budgets finally results in an overall profit budget for the division.

Indirect manufacturing expense (overhead) is budgeted as a variable depending on the volume of productive labor allowed hours. The overall manufacturing budget is made up from 12 sectional budgets, for which the general foreman of the manufacturing departments are held responsible, one overall controllable expense budget under the immediate supervision of the superintendent and one so-called uncontrollable expense budget. The latter includes such fixed items as insurance, taxes, depreciation, etc.

To improve our overall cost control in the manufacturing department, we have created a cost control group. This group is made up of two mechanical engineers, a cost analyst, and the time study supervisor—all technically trained and experienced in manufacturing cost problems.

# Research Activities of Mellon Institute

## Reach Quarter-Century Mark

**T**WENTY-FIVE years ago the foundations for what has grown into the Mellon Institute for Industrial Research were laid by Andrew W. Mellon and Richard B. Mellon. Since 1911 the Institute has had 1085 industrial fellowships on 268 different subjects of technology, on which 935 scientists and engineers have been employed. Over 500 new or improved processes and products and nearly 2000 contributions to the literature of pure and applied science have resulted from these researches.

From 1911 to 1936, 363 fellows and 414 fellowship assistants, having completed their services in the institution, entered the fields of manufacturing, commerce and education. These accomplishments have formed a valuable contribution to industry and education in this country.

In the 1935-36 annual report of the Institute to the trustees a number of noteworthy advances made through industrial research are cited, among which are the following:

### *Metal Bonding*

"A co-operative program of research and development established in 1935 by the American Rolling Mill Co., Middletown, O., and the multiple fellowship on protected metals of the H. H. Robertson Co., Pittsburgh, has made possible the extension of the metal-bonding process to the manufacture of protected galvanized 'Armco' iron and steel culverts. In this process asbestos fabric is attached permanently to galvanized iron by means of the zinc coating. This asbestos layer is impregnated with asphalt to make it impervious to moisture, and an asphalt paving is then superimposed on the saturated asbestos layer, the asbestos forming a permanent bond between the steel and the paving. Such treatment results in the formation of a serviceable metal culvert protected by successive layers of zinc, impregnated asbestos, and asphalt paving, all bound to the iron base by the zinc adhesive.

### *Heat Insulation*

"Manufacturers of prefabricated houses as well as hotel, theater and restaurant operators will be interested in some studies made in insulating materials used in the low-

temperature field by the fellowship of the Philip Carey Co. Most of the published data on the conductivities of low-temperature materials relate to but one temperature; and since the conductivity of many insulations varies considerably with temperature, it is essential that the conductivity be determined over the range of temperatures to which the material is to be applied. The results of this research indicate that the conductivity of some low-temperature insulations is increased by more than 50 per cent for an increase in temperature of only 100 degrees Fahr.

"The fellowship has also carried on

**H**OW carefully organized fundamental research, through a system of industrial fellowships, assists industry in the development and promotion of new materials and new products is graphically told in the accompanying abstract of the annual report of the director, E. R. Weidlein, to trustees of Mellon Institute of Industrial Research, Pittsburgh.

studies in the high-temperature field. Within the last two years the fellowship has measured the emissivities of refractories of a number of different colors and has concluded that, contrary to general belief, the emissivity of light colored refractories decreases rapidly with increase in the temperature, the decrease starting at a temperature of about 400 degrees Fahr. These results will be of interest to metallurgists and of particular concern to electric furnace operators, to whom the cost of

energy is a highly important factor.

### *Refractories*

"A fellowship donated by the Carborundum Co., has developed a series of refractories to which has been given the generic name 'Monofrax.' These refractories are produced by melting selected raw materials in an electric furnace and casting the molten material in much the same manner as metal. The production of a refractory by this procedure gives a dense, crystalline structure possessing a high degree of stability, without the use of the bond that is characteristic of the ordinary refractory. The usual refractory generally fails because of surface attack by combined chemical and physical processes and because of penetration of the pores and consequent destruction of the less inert bond, thus dislodging pieces of refractory even before they are dissolved. A cast refractory of this new type not only eliminates the latter cause of failure but also presents a minimal area for attack because it has an impervious surface.

### *Research on Steel*

"The fellowship of the Pittsburgh Steel Co., Pittsburgh, which was established in 1927 for research on steel and wire products, has been carrying on several diversified and broad investigations. Papers have been developed for use on paper-backed building fabrics; bright annealing processes for wire have been perfected, including a coating for protection against rust; several wire-drawing lubricants have been developed, and the effects of cold drawing on various physical properties of wire have been developed.

"In addition to this basic work, a specification department has been installed which defines all details of processing procedure for each and every wire requirement of the customer. This procedure makes the scientific data obtained from fundamental researches easily applicable to production and provides customers with the advantage of scientific control and uniformity so necessary for their needs. For manufacturers' wire, properties such as tensile strength, hardness, elongation, bend test and finish are all of importance.

(Please turn to Page 94)

# Progress in Steelmaking



## Prevents Rail Breakage

A normalizing process for steel rails, by which rails will have greater ductility and resistance to impact and wear, has been developed by a metallurgist of a Chicago district steel company. The invention, it is claimed, will eliminate railroad accidents caused by rails breaking as a result of internal defects. Under the new process, rails while cooling are subjected to a thermal treatment which effects a refined grain structure in the steel

and eliminates fissures and ruptures which sometimes occur in ordinary cooling processes. Commercial production of the normalized rails will start in a few months.

## New Process Is Developed

Ordinary steel is made resistant to corrosion, it is claimed, by a new process developed by a chemical engineer of a seamless steel tube company in the Chicago district. The process, per-

fecting after five years of research, is similar to case hardening except that the steel is impregnated with silicon instead of carbon and not reinforced with a surface coating. Specimens so processed and boiled in a bath of nitric acid showed no traces of corrosion, although the galvanized iron tank holding the acid bath had to be replaced in ten days.

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## Six Money-Saving Ideas

On blooming and plate mills and the first stand of bar and billet mills where a large amount of scale is removed from the steel equipped with laminated fabric bearings, well-fitted guards should be provided over the necks of the bottom rolls on account of the large amount of scale removed from the steel at this stage of reduction. The guards should fit closely against the end of the roll body and have the water spray pipes mounted on the inside, so that the flow of water will tend to wash the flying scale out of the bearing rather than into it.

inch, according to the practice followed at a Pittsburgh district plant.

Wire drawn from rods that have been normalized is found to be more plastic and ductile than wire drawn from ordinary hot rolled rods, according to tests conducted at an Ohio wire mill. Minor defects, therefore, do not open up in the cold heading of normalized wire as readily as on wire drawn directly from green rods.

Testing billets for seams is accomplished effectively and cheaply at some plants by cutting a slug off the end, heating it to rolling temperature and then mashing it endwise under a forging hammer. Any seams present in the steel will be apprehended by this treatment.

Straight or step ladders of light construction and made to fold so that they can be carried conveniently from one department in the steel plant or factory to another by oilers, cleaners, or repairmen, greatly simplify maintenance work. Straight ladders now are made to fold into a round pole and step ladders into a bundle which can be carried with ease.

Where the flange wear of flat-tread wheels on overhead traveling cranes is caused by misalignment of the runway, good results are obtained by loosening the rail clamps along one runway so as to permit the rail to shift sidewise about  $\frac{1}{2}$ -

## Improves Melting Qualities

New type pigs have been designed by an Ohio ironmaker primarily to give improved melting qualities in foundry practice. The new pigs, while of customary length, are of much smaller cross sectional area and weigh only about 40 pounds per pig. Bringing the weight of the pig closer to the weight average of sprue, scrap and other constituents affords a larger degree of uniformity in melting. Through the exposure of more surface per unit of weight the rate

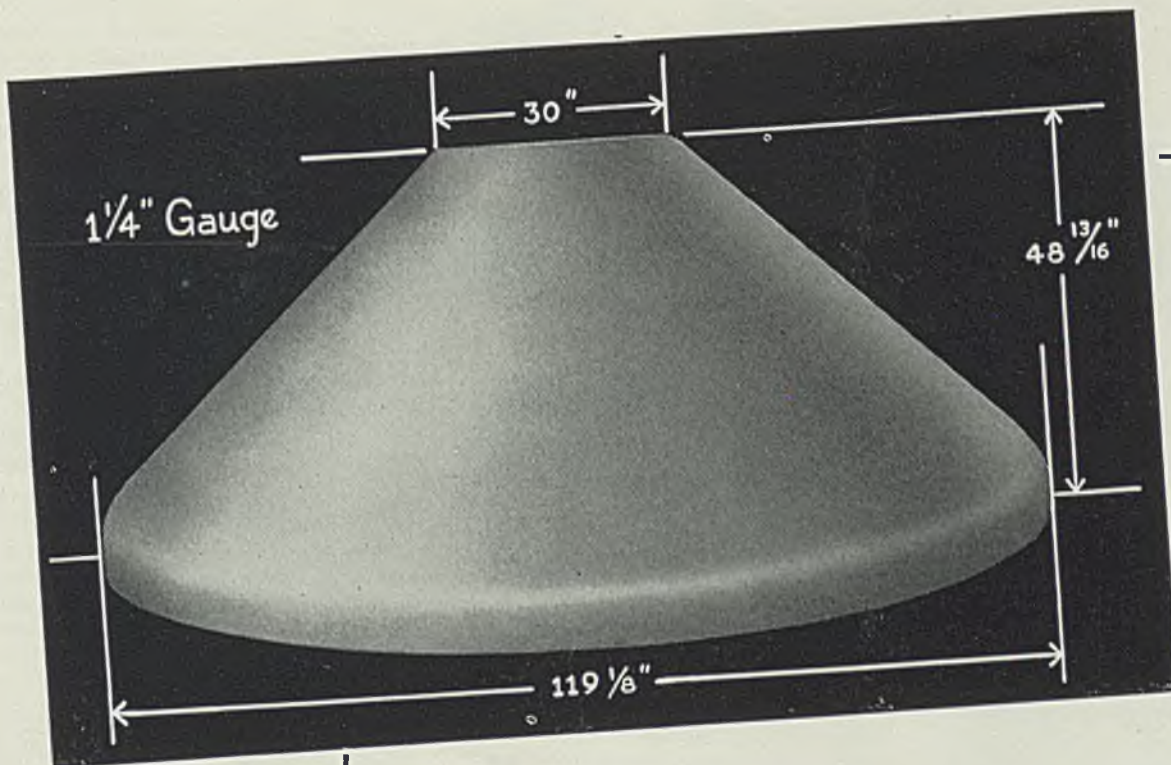
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If you desire further information on any idea, announcement, lead or suggestion presented, please write us. Perhaps you know of an idea or "shop wrinkle" that has effected a reduction in operating costs at your plant. If so, won't you send it along?

The Editors

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of melting also is increased. The new type pig has nearly  $1\frac{1}{2}$  times as much surface per pound of metal exposed as in the case of standard shaped pigs. This results, according to actual practice, in a substantial reduction in the melting time with a consequent increase in production per hour. The final process employed in the manufacture of this new type of pig iron is conducive to a higher degree of grain control and with this a more refined grain structure than was possible.



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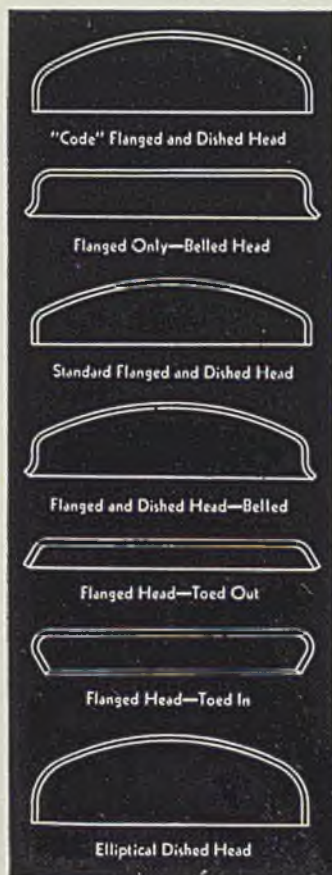
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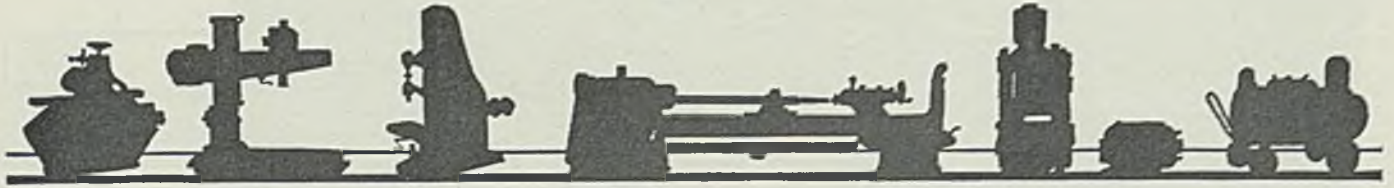
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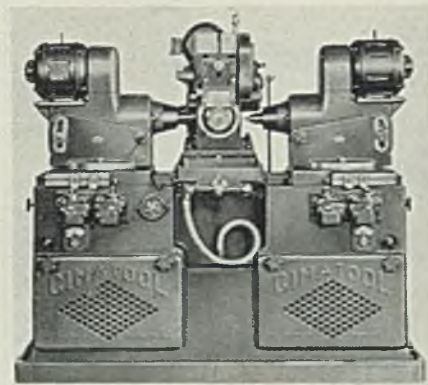
**WORTH STEEL COMPANY · CLAYMONT · DEL.**

# New Equipment



## Gear Chamfering Machine—

Cimatool Co., East Third at June street, Dayton, O., is introducing a hydraulically-operated duplex gear chamfering machine, shown herewith. It chamfers and burrs all external gears up to 13 inches in diameter, and output of as high as 300 gears per hour has been achieved on some operations. Two teeth can be chamfered simultaneously. A completely new, heavier workhead provides continuous rotating index-

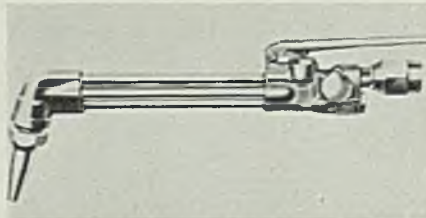


*Cimatool Peerless duplex gear chamfering machine*

ing action, timed with a forward and backward motion produced by a cam so developed that the resulting rotation and longitudinal movement presents the teeth to the cutter in the necessary fashion to give the shape chamfer desired. Rapid clamping of the work is provided by hydraulic action. Adjustment is by ballcrank handle with graduated dial for convenience in set-up. For unloading and loading, the cutter spindles move back out of cutting position by hydraulic controls.

## Gas Cutting Attachment—

Linde Air Products Co., 30 East Forty-second street, New York, is announcing a new oxyacetylene cutting attachment designated type CW-22. This unit, shown herewith, incorporates features of design that permit it to handle light sheet metal as well as all but the heaviest work at speeds and efficiency equal to the full size cutting blowpipe. It op-

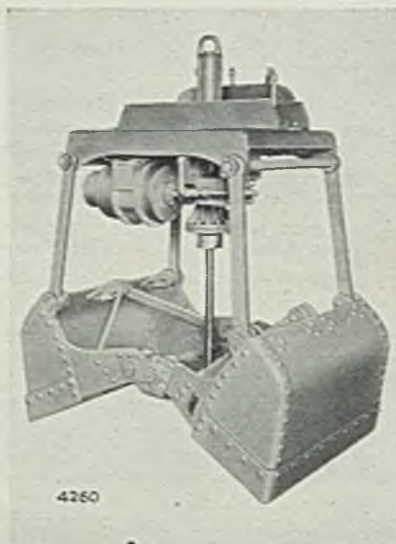


*Oxweld type CW-22 oxyacetylene cutting attachment*

erates on low pressure or medium pressure acetylene and can be used on either the type W-17 or W-22 welding blowpipe handle, thereby greatly extending the utility of these two blowpipes.

## Electro-Hydraulic Bucket—

Hayward Co., 50 Church street, New York, recently brought out an electro-hydraulic clamshell bucket operated by means of a motor-driven fluid pump controlling a hydraulic ram. The unit, shown herewith, can be hooked to a crane, electric hoist or ordinary derrick. Opening and closing are accomplished by an electric motor, controlled from the operator's cab. No closing line or winding drum is required. Self-contained, of moderate weight and consuming little headroom, the bucket is recom-

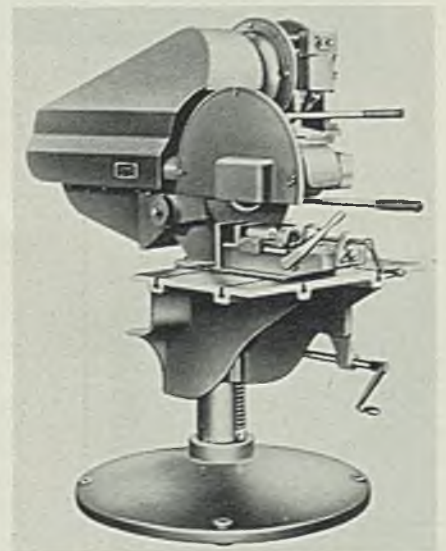


*Hayward electro-hydraulic clamshell bucket is self-contained*

mended for power and industrial plants in digging and rehandling coal, ashes, ore, coke, slag and other materials.

## Transmission Belt—

New York Belting & Packing Co., 1 Market street, Passaic, N. J., is announcing a new transmission belt designed for light or fractional horsepower drives, small machine or ma-



*Bethlehem Abrasive cutoff machine*

chine tool drives, auxiliary drives in machines, etc. It also is adapted for use as shaping or forming belts in machines processing materials where its functions are similar to special light conveyors. Extra plies and narrow construction enable it to withstand machine overloads and to avoid fastener trouble.

## Abrasive Cutoff Machine—

Bethlehem Foundry & Machine Co., Bethlehem, Pa., is offering an abrasive cutoff machine that is adaptable for cutting dry, various materials ranging from cold rolled steel and nonferrous metals to cinder blocks and brick. It provides both a chop-cut stroke and a draw-cut stroke, either one or a combination of both of which may be used to suit the requirements of any particular cutting

job. By this means, for example, structural angles or channels may be cut with this machine, shown on page 64, with one set-up in the vise. On the other hand, small work such as bars, strip, tube, pipe and cable may be chopped off with facility and speed. Also it will cut at any desired angle by swinging the head to the proper position with relation to the table. Exact position of the head is indicated by a graduated scale. If it is desired to cut heavy work such as castings that cannot be supported on the table, the head may be swung into position away from the table to handle the work. With a special trough for submersion of work the unit is adaptable for cutting high speed steels, plastics, glass, rubber, etc.



Pollard metal factory stools

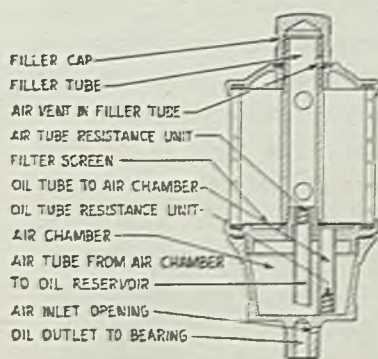
accidentally broken, the reshaping of carbide tools, and the rapid grinding of milled and brazed carbide tools.

### Metal Factory Stool—

Pollard Bros. Mfg. Co., 4443 North Knox avenue, Chicago, is placing in production a new wedge lock type of metal factory stool. The frame consists of two main members or legs, each leg being one continuous piece of angle steel notched and bent to form the rest for a wooden seat. When stretchers are riveted to the leg the rivet holes are so placed that the stretcher is pulled tightly into the corner, making a wedge lock and a three-point contact. Increased rigidity it attained in the construction of the stool, two types of which are shown herewith.

### Thermatic Oil Cup—

Alemite Corp., Chicago, is introducing a thermatic oil cup for use where a constant, slow flow of oil is desired. The device, shown herewith, operates simply by the expansion of air due to the normal in-



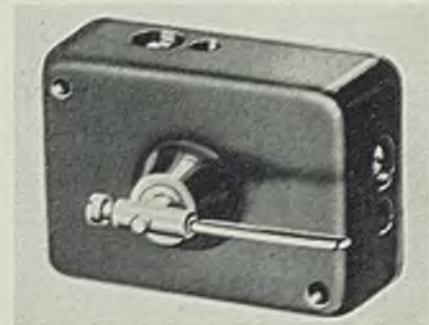
Alemite thermatic oil cup

crease in temperature of running bearings. There are no moving parts: air expansion forces the oil from the bottom of the air chamber, and that supply is replaced from the cup reservoir by gravitational action. An inlet in the base of the cup admits sufficient air to maintain pressure on the oil. The air vent in the

filler tube is so placed as to prevent dirt getting into the cup and into the lubricant.

### Pilot Switch—

Production Instrument Co., 1325 South Wabash avenue, Chicago, is announcing a type ES-9 pilot switch which operates on ½ ounce pressure. It is extremely compact (the accompanying illustration shows its actual size), is housed in a molded bakelite case and is quick-acting, providing a sensitive control of electrical circuits. This pilot switch can be furnished for a variety of uses, as it



Compact pilot switch developed by Production Instrument Co.

may be arranged for right or left-hand operation, open or closed circuit, with reciprocal or rotary motion, and with any position of the lever arm.

### Machine Lamp—

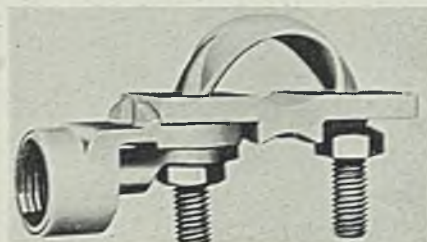
Fostoria Pressed Steel Corp., Fostoria, O., is announcing a new machine lamp designed for applications where a small size localized lighting unit is desirable. The lamp, shown herewith, follows closely the design of earlier models. Ball and socket joints are retained for maximum flexibility with sufficient rigidity to withstand the shocks and vibration of modern machine operation. A specially designed reflector, reduced in size, offers direct, glareless light with either 15 or 25 watt bulbs. Base of the lamp, drilled with ½-inch holes, may be bolted directly to the equipment, or to a special clamp that eliminates the necessity of drilling the machine for attachment.



Small machine lamp developed by Fostoria Pressed Steel Corp.

### Conduit Grounding Units—

General Electric Co., Schenectady, N. Y., has developed four new conduit grounding items: One box for fixture mounting and three grounding fittings which can be installed quickly and afford secure connections. Two of the fittings, designated



G-E type SP-825 grounding fitting

type SP-825 (shown herewith) and SP-826 and intended for ½ and ¾-inch conduit respectively, are equipped with a reversible shackle which fits three sizes of water pipe. Type SP-828 fitting has a connection that firmly grips and holds armored cable. The fixture box, type SP-5200B, provides a simple and effective method of grounding and makes possible firm mechanical and electrical connection between the box and the armor.

### Carbide Tool Grinders—

Carboloy Co. Inc., 2985 East Jefferson avenue, Detroit, is announcing two new pedestal grinders, a 6 and a 10-inch unit, designed for the grinding of cemented carbide tools. These machines, manufactured by Ex-Cell-O Aircraft & Tool Corp., Detroit, were described on page 61 of the April 13 issue of STEEL. They are suitable not only for resharpening tools dulled in ordinary use but also for rapid reconditioning of carbide tools on which the tip has been ac-

# Toughness plus

FOR *rough-and-tumble* SERVICE

**B**ETHLEHEM Omega Tool Steel brings a truly formidable combination of physical properties to bear on the tough, impact-resisting jobs of shop, mill and mine. It is right in its own element under the relentless, staccato battering of pneumatic hammers. Omega bears up under punishment that would quickly break down anything but a super-shock-resisting steel.

Omega has no equal as material for pneumatic and hand chisels, rivet sets and busters, blacksmith tools, beading tools, calking tools and punches. It is also being widely used for shear blades.

When Bethlehem Omega Tool Steel is heat-treated, a tensile strength of

340,000 pounds per square inch can be obtained in combination with an Izod value of 7 foot pounds. A slightly higher drawing temperature produces even greater toughness — an Izod value of 15 foot pounds — with but a slight reduction in tensile strength to 320,000 pounds per square inch.

Omega forges readily at a temperature of approximately 1750 deg. F. No expensive heat-treating equipment is necessary. It responds to a wider temperature range than carbon steels.

For other tool steel tasks Bethlehem makes other steels, each an equally outstanding performer in its own particular field.



**BETHLEHEM  
OMEGA  
TOOL STEEL**

**BETHLEHEM STEEL COMPANY**



# Seven Blast Furnaces Lighted; Steel Rate 70½

## Motorcar Production

## Up; Railroad Releases

## Heavier; Scrap Stronger

**F**RESH commitments for iron and steel, mainly from automobile manufacturers and railroads, have taken up some of the recent slack in new buying, with the result that steelworks operations last week advanced 4 points to 70½ per cent.

That the industry is anticipating a sustained volume of business, and endeavoring to build up pig iron and raw steel stocks, which for a long time were at low ebb, is indicated by resumption of seven blast furnaces in the week—a larger number than the net gain for all March—and preparations for relighting three more.

Figured on the basis of 1928-1929 ingot capacity, steelworks operations this month are averaging 80 per cent. Since that period approximately 9,000,000 tons have been added to capacity.

Most significant in the April steel expansion are the advances at Pittsburgh and Chicago, evidence of diversity in demand and the broadening base of recovery. The Pittsburgh rate last week moved up 8 points to 65 per cent, or 17 points above the March average, which, however, was handicapped by floods. Chicago rose 2½ points to 70½, or 8 points above March.

Youngstown district last week was up 4 points over the preceding week to 80 per cent; Wheeling 8 to 84; eastern Pennsylvania 1¼ to 43½; Cincinnati 4 to 80; Buffalo 3 to 65; while Cleveland was down 1½ to 84½, and others unchanged.

Accompanying these gains in ingot output, sheet production stepped up to 70 per cent and tin plate to 80 per cent.

Shipments on March specifications, especially sheets and strip booked prior to price advances, still are heavy and will not be completed before the end of the month. Substantial orders at the new price levels have been placed for May delivery to automobile manufacturers and miscellaneous consumers. Ford has not yet purchased its requirements.

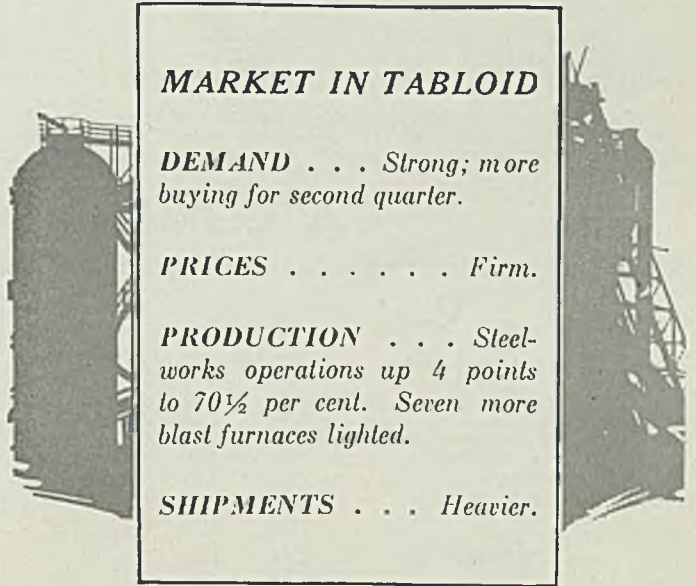
### MARKET IN TABLOID

*DEMAND . . . Strong; more buying for second quarter.*

*PRICES . . . . . Firm.*

*PRODUCTION . . . Steelworks operations up 4 points to 70½ per cent. Seven more blast furnaces lighted.*

*SHIPMENTS . . . Heavier.*



Automobile assemblies continue to mount, last week 119,800, up 7000. With all the increase in automobile production, however, the industry apparently has absorbed a lesser percentage of finished steel made so far this year than it did in 1935, 20 to 22 per cent, compared with 24 per cent. This is due to the widening scope in steel consumption.

On the other hand, the railroads are taking a larger portion than last year, and their buying program has not yet run its course. Last week they purchased 75,000 tons of rails; 3600 freight cars. The latter included 2700 refrigerator cars for the Pacific Fruit Express, requiring 35,000 tons of steel; 800 box cars for Erie; 100 phosphate cars for Seaboard Air Line. Rock Island contracted for 40,000 tons of rails; Baltimore & Ohio, 25,000 tons.

Structural shape awards in the week showed little change, at 18,991 tons. Considerable tonnage is in early prospect for eastern flood rehabilitation work.

In the lighter products, demand for wire in March and April has been close to the volume of these months in 1929.

Foundry operations are at the highest point of the year, and merchant pig iron shipments are increasing gradually as stocks accumulated last month decline. Scrap prices at Chicago have recovered from recent weakness, and the market generally is strong. Bethlehem Steel Co. purchased 25,000 tons of No. 1 steel for immediate delivery to Buffalo, at \$14.50, up \$1.

STEEL's iron and steel price composite is down 2 cents to \$33.09; the finished steel index remains \$52.20; and steel works scrap composite, \$14.37.



## COMPOSITE MARKET AVERAGES

	April 18	April 11	April 4	One Month Ago March, 1936	Three Months Ago Jan., 1936	One Year Ago April, 1935	Five Years Ago April, 1931
Iron and Steel .....	\$33.09	\$33.11	\$33.13	\$33.20	\$33.34	\$32.29	\$31.47
Finished Steel .....	52.20	52.20	52.20	52.32	53.70	54.00	49.22
Steelworks Scrap ...	14.37	14.37	14.50	14.48	13.15	10.05	10.12

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

	April 18, 1936	March 1936	Jan. 1936	April 1935		April 18, 1936	March 1936	Jan. 1936	April 1935
<b>Finished Material</b>					<b>Pig Iron</b>				
Steel bars, Pittsburgh .....	1.85c	1.85c	1.85c	1.80c	Bessemer, del. Pittsburgh .....	\$20.8132	20.8132	20.8132	19.76
Steel bars, Chicago .....	1.90	1.90	1.90	1.85	Basic, Valley .....	19.00	19.00	19.00	18.00
Steel bars, Philadelphia .....	2.16	2.16	2.16	2.09	Basic, eastern del. East. Pa. ....	20.8132	20.8132	20.8132	19.76
Iron bars, Terre Haute, Ind. ....	1.75	1.75	1.75	1.75	No. 2 fdry., del. Pittsburgh .....	20.3132	20.3132	20.3132	19.26
Shapes, Pittsburgh .....	1.80	1.80	1.80	1.80	No. 2 fdry., Chicago .....	19.50	19.50	19.50	18.50
Shapes, Philadelphia .....	2.01½	2.01½	2.01½	2.00½	Southern No. 2, Birmingham.....	15.50	15.50	15.50	14.50
Shapes, Chicago .....	1.85	1.85	1.85	1.85	Southern No. 2, del. Cincinnati...	20.2007	20.2007	20.2007	19.23
Tank plates, Pittsburgh .....	1.80	1.80	1.80	1.80	No. 2X eastern, del. Phila. ....	21.6882	20.6882	21.6882	20.63
Tank plates, Philadelphia .....	2.00	1.99	1.99	1.98½	Malleable Valley .....	19.50	19.50	19.50	18.50
Tank plates, Chicago .....	1.85	1.85	1.85	1.85	Malleable, Chicago .....	19.50	19.50	19.50	18.50
Sheets, No. 10, hot rolled, Pitts...	1.85	1.85	1.85	1.85	Lake Sup., charcoal, del. Chi.....	25.2528	25.2528	25.2528	24.15
Sheets, No. 24, hot ann., Pitts...	2.40	2.40	2.40	2.40	Ferromanganese, del. Pitts. ....	80.13	80.13	80.13	89.85
Sheets, No. 24, galv., Pitts.....	3.10	3.10	3.10	3.10	Gray forge, del. Pittsburgh.....	19.6741	18.6741	19.6741	18.63
Sheets, No. 10, hot rolled, Gary...	1.95	1.95	1.95	1.95	<b>Scrap</b>				
Sheets, No. 24, hot anneal., Gary	2.50	2.50	2.50	2.50	Heavy melting steel, Pittsburgh..	\$15.75	\$15.75	\$14.50	\$11.70
Sheets, No. 24, galvan., Gary.....	3.20	3.20	3.20	3.20	Heavy melt. steel, No. 2, east. Pa.	12.75	12.55	11.37½	9.12½
Plain wire, Pittsburgh .....	2.40	2.30	2.30	2.30	Heavy melting steel, Chicago .....	14.25	14.75	13.40	10.05
Tin plate, per base box, Pitts.....	5.25	5.25	5.25	5.25	Rails for rolling, Chicago .....	15.75	15.75	14.25	11.05
Wire nails Pitts. ....	2.10	2.15	2.40	2.60	Railroad steel specialties, Chicago	15.75	16.25	14.45	11.25

### Semifinished Material

Sheet bars, open-hearth, Youngs.	\$28.00	\$28.50	\$30.00	\$28.00
Sheet bars, open-hearth, Pitts....	28.00	28.50	30.00	28.00
Billets, open-hearth, Pittsburgh...	28.00	28.40	29.00	27.00
Wire rods, Pittsburgh .....	40.00	40.00	40.00	38.00

# Steel, Iron, Raw Material, Fuel and Metals Prices

Except when otherwise designated, prices are base, f.o.b. cars. Asterisk denotes price change this week.

Sheet Steel		Tin Mill Black No. 28		Corrosion and Heat-Resistant Alloys		Structural Shapes	
Prices Subject to Quantity Extras and Deductions		Pittsburgh .....	2.75c	Pittsburgh base, cents per lb.		Pittsburgh .....	1.80c
Hot Rolled No. 10, 24-48 in.		Gary .....	2.85c	Chrome-Nickel		Philadelphia, del. ....	2.01½c
Pittsburgh .....	1.85c	St. Louis, delivered	3.08c	No. 302 No. 304		New York, del. ....	2.06½c
Gary .....	1.95c			Bars .....		Boston, delivered....	2.20½c
Chicago, delivered..	1.98c			Plates .....		Bethlehem .....	1.90c
Detroit, del. ....	2.05c			Sheets .....		Chicago .....	1.85c
New York, del. ....	2.20c			Hot strip .....		Cleveland, del. ....	2.00c
Philadelphia, del....	2.16c			Cold strip .....		Buffalo .....	1.90c
Birmingham .....	2.00c			Straight Chromes		Gulf Ports .....	2.20c
St. Louis, del. ....	2.18c			No. No. No. No.		Birmingham .....	1.95c
Pacific ports, f.o.b. cars, dock .....	2.40c			410 430 442 446		Pacific ports, f.o.b. cars, dock .....	2.35c
Hot Rolled Annealed No. 24				17.00 18.50 21.00 26.00		<b>Bars</b>	
Pittsburgh .....	2.40c			20.00 26.00 28.00 29.00		(Base, 3 to 25 tons)	
Gary .....	2.50c			33.00 35.00 35.00		Pittsburgh .....	1.85c
Chicago, delivered....	2.53c			20.75 22.75 29.00		Chicago or Gary....	1.90c
Detroit, delivered....	2.60c			27.00 29.00 35.00		Duluth .....	2.00c
New York, del. ....	2.75c					Birmingham .....	2.00c
Philadelphia, del. ....	2.71c					Cleveland .....	1.90c
Birmingham .....	2.55c					Buffalo .....	1.95c
St. Louis, del. ....	2.72c					Detroit, delivered....	2.00c
Pacific ports, f.o.b. cars, dock .....	3.05c					Pacific ports, f.o.b. cars, dock .....	2.40c
Galvanized No. 24						Philadelphia, del....	2.16c
Pittsburgh .....	3.10c					Boston, delivered....	2.27c
Gary .....	3.20c					New York, del. ....	2.20c
Chicago, delivered..	3.23c					Pitts., forg. qual....	2.10c
Philadelphia, del. ....	3.41c					<b>Rail Steel</b>	
New York, del. ....	3.45c					To Manufacturing Trade	
Birmingham .....	3.25c					Pittsburgh .....	1.70c
St. Louis, del. ....	3.43c					Chicago or Gary .....	1.75c
Pacific ports, f.o.b. cars, dock .....	3.70c					Moline, Ill. ....	1.75c
						Cleveland .....	1.75c
						Buffalo .....	1.80c



## Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25; 50c diff. for each 0.25 below 1.75. Gross tons.

Basing Points:	No. 2 Fdry	Malle-able	Basic	Besse-mer
Bethlehem, Pa.	\$20.50	\$21.00	\$20.00	\$21.50
Birdsboro, Pa.	20.50	21.00	20.00	21.50
Birmingham, Ala., southern del.	15.50	15.50	14.50	21.00
Buffalo	19.50	20.00	18.50	20.50
Chicago	19.50	19.50	19.00	20.00
Cleveland	19.50	19.50	19.00	20.00
Detroit	19.50	19.50	19.00	20.00
Duluth	20.00	20.00	.....	20.50
Erie, Pa.	19.50	20.00	19.00	20.50
Everett, Mass.	20.50	21.00	20.00	21.50
Hamilton, O.	19.50	19.50	19.00	.....
Jackson, O.	20.25	20.25	19.75	.....
Neville Island, Pa.	19.50	19.50	19.00	20.00
Provo, Utah	17.50	.....	17.00	.....
Sharpsville, Pa.	19.50	19.50	19.00	20.00
Sparrows Point, Md.	20.50	.....	20.00	.....
Swedeland, Pa.	20.50	21.00	20.00	21.50
Toledo, O.	19.50	19.50	19.00	20.00
Youngstown, O.	19.50	19.50	19.00	20.00

### Delivered from Basing Points:

Akron, O., from Cleveland	20.76	20.76	26.26	21.26
Baltimore from Birmingham	21.08	.....	19.96	.....
Boston from Birmingham	20.62	.....	20.50	.....
Boston from Everett, Mass.	21.00	21.50	20.50	22.00
Boston from Buffalo	21.00	21.50	20.50	22.00
Brooklyn, N. Y., from Bethlehem	22.93	23.43	.....	.....
Brooklyn, N. Y., from Bmghm	22.50	.....	.....	.....
Canton, O., from Cleveland	20.76	20.76	20.26	21.26
Chicago from Birmingham	19.72	.....	19.60	.....
Cincinnati from Hamilton, O.	20.58	20.58	20.08	.....
Cincinnati from Birmingham	20.20	.....	19.20	.....
Cleveland from Birmingham	19.62	.....	19.12	.....
Indianapolis from Hamilton, O.	21.93	21.93	21.43	22.43
Mansfield, O., from Toledo, O.	21.26	21.26	20.76	21.76
Milwaukee from Chicago	20.57	20.57	20.07	21.07
Muskegon, Mich., from Chicago	.....	.....	.....	.....
Toledo or Detroit	22.60	22.60	22.10	23.10
Newark, N. J., from Birmingham	21.61	.....	.....	.....
Newark, N. J., from Bethlehem	21.99	22.49	.....	.....
Philadelphia from Birmingham	20.93	.....	20.81	.....
Philadelphia from Swedeland, Pa.	21.31	21.81	20.81	.....
Pittsburgh district from Ne-	Neville base plus 67c, 81c and ville Island } \$1.21 switching charges	.....	.....	.....
Saginaw, Mich., from Detroit		21.75	21.75	21.25

Delivered from Basing Points:	No. 2 Fdry	Malle-able	Basic	Besse-mer
St. Louis, northern	20.00	20.00	19.50	.....
St. Louis from Birmingham	19.62	.....	19.50	.....
St. Paul from Duluth	21.94	21.94	.....	22.44

†Over 0.70 phos.

### Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Standish, N. Y., \$24.00, Phila. base, standard and copper bearing, \$25.13.

Gray Forge	Charcoal	
Valley furnace	19.00 Lake Superior fur.	\$22.00
Pitts. dist. fur.	19.00 Do., del. Chicago	25.25
	Lyles, Tenn.	22.50

### Silvery†

Jackson county, O., base; 6-6.50 per cent \$22.75; 6.51-7—\$23.25; 7-7.50—\$23.75; 7.51-8—\$24.25; 8-8.50—\$24.75; 8.51-9—\$25.25; 9-9.50—\$25.75. 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	timore bases (bags)....	40.00
Fire Clay Brick	Domestic dead-burned gr. net ton f.o.b. Chewelah, Wash. (bulk)..	22.00
Super Quality	Basic Brick	
Pa., Mo., Ky.	Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.	
First Quality	Chrome brick	\$45.00
Pa., Ill., Md., Mo., Ky.	Chemically bonded chrome brick	45.00
Alabama, Ga.	Magnesite brick	65.00
Second Quality	Chemically bonded magnesite brick	55.00
Pa., Ill., Ky., Md., Mo.		
Ga., Ala.		

Ohio	Fluorspar, 85-5	
First quality	Washed gravel, duty paid, tide, net ton	\$20.50
Intermediary	Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all-rail	\$18.00
Second quality	Do., for barge	\$19.00

Malleable Bung Brick	Silica Brick	Magnesite	
All bases	Pennsylvania	Imported dead-burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases (bags)..	\$45.00
	Joliet, E. Chicago	Domestic dead-burned grains, net ton f.o.b. Chester, Pa., and Bal-	
	Birmingham, Ala.		

## Nonferrous

### METAL PRICES OF THE WEEK

Spot unless otherwise specified. Cents per pound

Copper				Straits Tin		Lead		Zinc		Aluminum		Antimony		Nickel	
Electro. del.	Lake. del.	Casting. refinery	Conn. Midwest	New York Spot	New York Futures	N. Y.	St. L.	St. L.	99%	Spot	N. Y.	Cath-odes			
Apr. 11	9.25	9.37½	8.95	47.00	46.00	4.60	4.45	4.90	*19.00	13.50	35.00				
Apr. 13	9.25	9.37½	9.25	47.00	46.00	1.60	4.45	4.90	*19.00	13.50	35.00				
Apr. 14	9.50	9.62½	9.12½	47.12½	46.00	4.60	4.45	4.90	*19.00	13.50	35.00				
Apr. 15	9.50	9.62½	9.12½	47.00	46.00	4.60	4.45	4.90	*19.00	13.50	35.00				
Apr. 16	9.50	9.62½	9.12½	46.50	45.70	4.60	4.45	4.90	*19.00	13.50	35.00				
Apr. 17	9.50	9.62½	9.12½	46.65	45.65	4.60	4.45	4.90	*19.00	13.50	35.00				

\*Nominal range 19.00 to 21.00c.

### MILL PRODUCTS

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 9.00c Conn. copper.

Sheets	
*Yellow brass (high)	14.87½
*Copper hot rolled	16.75
Lead cut to jobbers	8.25
Zinc, 100-lb. base	9.50
Tubes	
*High yellow brass	17.37½
*Seamless copper	17.50
Rods	
High yellow brass	13.12½
*Copper, hot rolled	13.75
Anodes	
*Copper untrimmed	14.25
Wire	
*Yellow brass (high)	15.37½

### OLD METALS

Deal. buying prices, cents lb.

No. 1 Composition Red Brass		Heavy Copper and Wire		Composition Brass Borings		Light Copper	
*New York	6.12½-6.25	*New York, No. 1	7.62½-7.75	*New York	5.62½-5.75	*New York	6.37½-6.50
Cleveland	6.75-7.00	Chicago, No. 1	7.12½-7.62½	Cleveland	7.00-7.25	Chicago	5.62½-6.12½
Chicago	6.12½-6.37½	St. Louis	6.00-6.50	St. Louis, No. 1	7.25-7.75	Cleveland	6.00-6.25
St. Louis	6.00-6.50					St. Louis	5.75-6.25

Light Brass	
Chicago	3.62½-3.87½
Cleveland	3.50-3.75
St. Louis	3.50-4.00

Lead	
New York	3.50-3.75
Cleveland	3.50-3.75
Chicago	3.37½-3.62½
St. Louis	3.50-4.00

Zinc	
*New York	2.75-3.00
Cleveland	2.50-2.75
St. Louis	2.50-3.00

Aluminum	
Borings, Cleveland	9.00-9.50
Mixed, cast, Cleve.	13.25-13.50
*Mixed, cast, St. L.	13.00-13.25
Clips, soft, Cleve.	15.00-15.50

### SECONDARY METALS

Brass ingot, 85-5-5-5	9.50
Stand. No. 12 alum.	17.00

## Ferroalloys

Dollars, except Ferrochrome	
Ferromanganese, 78-82% tidewater, duty paid	75.00
Do., Balti., base	75.00
Do., del. Pitts'gh	80.13
Spiegeleisen, 19-20% dom. Palmer-ton, Pa., spot	26.00
Do., New Orleans	26.00
Ferrosilicon, 50% freight all, cl.	77.50
Do., less carload	85.00
Do., 75 per cent. Spot, \$5 a ton higher.	126-130.00
Silicomane, 2½ carb.	85.00
2% carbon, 90.00; 1%, 100.00	
Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb. del.	10.00
Ferrotungsten, stand., lb. con. del.	1.30-1.40
Ferrovandium, 35 to 40% lb., cont.	2.70-2.90
Ferrotitanium, c. l., prod. plant, frt. aHow., net ton	137.50
Spot, 1 ton, frt. allow., lb.	7.00
Do., under 1 ton	7.50
Ferrophosphorus, per ton, c. l., 17-19% Rockdale, Tenn., basis, 18%, \$3 unitage	58.50
Ferrophosphorus, electrolytic, per ton c. l., 23-26% f.o.b. Anniston, Ala., 24% \$3 unitage	75.00
Ferromolybdenum, stand., 55-65% lb.	0.95
Molybdate, lb. cont.	0.80
†Carloads, Quan. diff. apply.	



# Warehouse Iron and Steel Prices

*Cents per pound for delivery within metropolitan districts of cities specified*

<b>STEEL BARS</b>	Cincinnati .... 3.25c	Buffalo ..... 3.37c	Pittsburgh(h) .. 2.95c	Seattle ..... 5.60c
Baltimore*..... 3.00c	Houston ..... 3.25c	Chattanooga... 3.56c	San Francisco .. 3.35c	St. Louis ..... 3.55c
Boston†..... 3.10c	Los Ang., cl.. 2.45c	Chicago ..... 3.20c	Seattle ..... 3.70c	St. Paul ..... 3.55c
Buffalo ..... 3.00c	New Orleans .. 3.50c	Cincinnati ..... 3.42c	St. Louis ..... 3.45c	
Chattanooga... 3.36c	Pitts., plain (h) 3.05c	Cleveland. ¼- 3.31c	St. Paul ..... 3.30c	<b>COLD FIN. STEEL</b>
Chicago (j).... 3.00c	Pitts., twisted 3.175c	in. and over .. 3.42c	Tulsa ..... 3.70c	Baltimore (c) .. 3.73c
Cincinnati .... 3.22c	squares (h) .. 2.45c	Detroit ..... 3.42c		Boston ..... 3.90c
Cleveland ..... 3.00c	San Francisco 2.45c	Detroit, ¾-in. 3.65c		Buffalo (h).... 3.55c
Detroit ..... 3.09c	Seattle ..... 2.45c	Houston ..... 3.00c	<b>NO. 24 BLACK</b>	Chattanooga* 4.13c
Houston ..... 3.00c	St. Louis ..... 3.25c	Los Angeles.. 3.60c	Baltimore*†... 3.60c	Boston (g) .... 3.95c
Los Angeles.. 3.60c	Tulsa ..... 3.25c	Milwaukee .... 3.31c	Boston (g) .... 3.25c	Buffalo ..... 3.25c
Milwaukee ..3.11c-3.26c	Young ..... 2.30c-2.60c	New Orleans .. 3.55c	Buffalo ..... 4.16c	Chattanooga.. 4.16c
New Orleans.. 3.35c		New York†(d) 3.40c	Chicago ..... 3.85c	Cleveland (h) 3.50c
New York†(d) 3.31c	<b>SHAPES</b>	Philadelphia* 2.98c	Cincinnati .... 4.02c	Detroit ..... 3.79c
Pitts. (h)....2.95c-3.10c	Baltimore*.... 3.00c	Phla. floor... 4.95c	Los Ang. (f) (d) 5.85c	Los Ang. (f) (d) 5.85c
Philadelphia* 3.03c	Boston†..... 3.19c	Pittsburgh(h) 3.15c	Milwaukee .... 3.91c	Milwaukee .... 3.61c
Portland ..... 3.50c	Buffalo ..... 3.25c	Portland ..... 3.35c	Detroit ..... 3.94c	New Orleans .. 4.30c
San Francisco 3.25c	Chattanooga.. 3.56c	San Francisco 3.25c	Los Angeles.. 4.35c	New York†(d) 3.81c
Seattle ..... 3.70c	Chicago ..... 3.20c	Seattle ..... 3.55c	Milwaukee .... 3.96c	Philadelphia.. 3.76c
St. Louis ..... 3.25c	Cincinnati .... 3.42c	St. Louis ..... 3.45c	New Orleans .. 4.50c	Pittsburgh .... 3.50c
St. Paul ..... 3.25c-3.40c	Cleveland ..... 3.31c	St. Paul ..... 3.45c	New York†(d) 3.89c	Portland (f) (d) 6.15c
Tulsa ..... 3.25c	Detroit ..... 3.42c	Tulsa ..... 3.50c	Philadelphia*† 3.60c	San Fran.(f) (d) 5.95c
	Houston ..... 3.00c		Pitts.** (h).... 3.55c	Seattle (f) (d) 6.15c
<b>IRON BARS</b>	Los Angeles.. 3.60c	<b>NO. 10 BLUE</b>	Portland ..... 4.10c	St. Louis..... 3.75c
Portland ..... 3.40c	Milwaukee .... 3.31c	Baltimore*..... 3.10c	San Francisco 4.00c	St. Paul ..... 4.02c
Chattanooga.. 3.86c	New Orleans .. 3.55c	Boston†..... 3.30c	Seattle ..... 4.40c	Tulsa ..... 4.65c
Baltimore*.... 3.05c	New York†(d) 3.37c	Buffalo ..... 3.62c	St. Louis ..... 4.10c	<b>COLD ROLLED STRIP</b>
Chicago ..... 2.75c	Philadelphia* 2.98c	Chattanooga.. 3.36c	St. Paul ..... 3.90c	Boston, 0.100-
Cincinnati .... 3.22c	Pittsburgh (h) 3.15c	Chicago ..... 3.05c	Tulsa ..... 4.75c	in., 500 lb.
New York†(d) 3.36c	Portland (l).. 3.50c	Cincinnati .... 3.22c		lots ..... 3.245c
Philadelphia* 2.93c	San Francisco 3.25c	Cleveland ..... 3.11c	<b>NO. 24 GALV. SHEETS</b>	Buffalo ..... 3.39c
St. Louis..... 3.25c	Seattle (l).... 3.70c	Det., 8-10 ga. 3.14c	Baltimore*†... 4.30c	Chicago ..... 3.27c
Tulsa ..... 3.25c	St. Louis ..... 3.45c	Houston ..... 3.35c	Buffalo ..... 4.00c	Cincinnati (b) 3.22c
	St. Paul ..... 3.45c	Los Angeles.. 3.75c	Boston (g).... 4.65c	Cleveland (b) 2.85c
<b>REINFORCING BARS</b>	Tulsa ..... 3.50c	Milwaukee .... 3.16c	Chattanooga.. 4.86c	Detroit ..... 3.13c
Buffalo ..... 2.60c	<b>PLATES</b>	New Orleans .. 3.55c	Chicago (h).. 4.55c	New York†(d) 3.36c
Chattanooga.. 3.36c	Baltimore*.... 3.00c	New York†(d) 3.31c	Cincinnati .... 4.72c	St. Louis ..... 3.45c
Chicago .....2.10c-2.60c	Boston†..... 3.21c	Portland ..... 3.35c	Cleveland ..... 4.61c	<b>TOOL STEELS</b>
Cleveland (c) 2.10c		Philadelphia* 3.08c	Detroit ..... 4.72c	(Applying on or east of

## Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, Apr. 16

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

	British gross tons U. K. ports		Continental Channel or North Sea ports, metric tons	
	£	s d	Quoted in dollars at current value	**Quoted in gold pounds sterling
<b>PIG IRON</b>				
Foundry, 2.50-3.00 Silicon	\$15.47	3 2 6	\$14.14	1 15 0
Basic bessemer.....	15.47	3 2 6*	12.13	1 10 0
Hematite, Phos. .05-.05..	17.61	3 11 0	.....	.....
<b>SEMIFINISHED STEEL</b>				
Billets.....	\$28.92	5 17 6	\$18.99	2 7 0
Wire rods, No. 5 gage....	44.39	8 19 0	36.39	4 10 0
<b>FINISHED STEEL</b>				
Standard rails.....	\$40.92	8 5 0	\$44.17	5 10 0
Merchant bars.....	1.71c	7 15 0	1.13c to 1.18c	3 2 6 to 3 5 0
Structural shapes.....	1.66c	7 10 0	1.12c	3 1 6
Plates, ½ in. or 5 mm....	1.79c	8 1 3	1.55c	4 5 0
Sheets, black, 24 gage or 0.5 mm.....	2.17c	9 15 0	2.12c	5 16 0†
Sheets, gal., 24 gage, corr.	2.60c	11 15 0	2.29c	6 5 0
Bands and strips.....	1.93c	8 15 0	1.42c	4 0 0
Plain wire, base.....	2.17c	9 15 0	1.92c	5 5 0
Galvanized wire, base....	2.53c	11 10 0	2.15c	5 17 6
Wire nails, base.....	2.62c	12 0 0	1.74c	4 15 0
Tin plate, box 108 lbs....	5 4.65	0 18 9	.....	.....

British ferromanganese \$75 delivered Atlantic seaboard, duty-paid. German ferromanganese £9 0s 0d (\$43.74) f.o.b.

## Domestic Prices at Works or Furnace—Last Reported

	£ s d	French Francs	Belgian Francs	Reich Marks
Fdy. pig iron, Si. 2.5.....	\$17.36	3 10 0(a)	\$17.13	260
Basic bessemer pig iron...	17.36	3 10 0(a)	11.62	190
Furnace coke.....	5.21	1 1 0	5.36	95
Billets.....	28.92	5 17 6	28.33	430
Standard rails.....	1.82c	8 5 0	2.01c	671
Merchant bars.....	2.00c	9 1 0	1.67c	560
Structural shapes.....	1.93c	8 15 0	1.64c	550
Plates, ½ in. or 5 mm....	2.00c	9 1 3	2.08c	700
Sheets, black.....	2.53c	11 10 0‡	1.77c	600‡
Sheets, galv., corr., 24 ga. or 0.5 mm.....	2.98c	13 10 0	2.83c	950
Plain wire.....	3.75c	9 15 0	2.68c	900
Bands and strips.....	2.16c	9 16 0	1.98c	650

\*Basic. †British ship-plates. Continental, bridge plates. ‡24 ga. 11 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 66.00 per cent over paper sterling.

<b>BANDS</b>	Baltimore*..... 3.20c
Boston†..... 3.30c	
Buffalo ..... 3.42c	
Chattanooga.. 3.61c	
Chicago ..... 3.30c	
Cincinnati .... 3.47c	
Cleveland ..... 3.36c	
Detroit, ¾-in. and lighter 3.39c	
Houston ..... 3.25c	
Los Angeles.. 4.10c	
Milwaukee .... 3.41c	
New Orleans .. 3.95c	
New York†(d) 3.56c	
Philadelphia.. 3.18c	
Pittsburgh (h) 3.20c	
Portland ..... 4.25c	
San Francisco 4.10c	
Seattle ..... 4.25c	
St. Louis ..... 3.55c	
St. Paul ..... 3.55c	
Tulsa ..... 3.45c	

<b>HOOPS</b>	Baltimore ..... 2.30c
Boston†..... 4.30c	
Buffalo ..... 3.42c	
Chicago ..... 3.30c	
Cincinnati .... 3.47c	
Det., No. 14 and lighter 3.39c	
Los Angeles.. 5.85c	
Milwaukee .... 3.41c	
New York†(d) 3.56c	
Philadelphia.. 3.43c	
Pittsburgh (h) 3.70c	
Portland ..... 5.60c	
San Francisco 6.15c	

<b>BOLTS AND NUTS</b>	(100 pounds or over)
	Discount
Chicago (a).....	70
Cleveland ..... 70	
Detroit ..... 70-10	
Milwaukee ..... 70	
Pittsburgh ..... 70	

(a) Under 100 pounds, 65 off.

(b) Plus straightening, cutting and quantity differentials; (c) Plus mill, size and quantity extras; (d) Quantity base; (e) New mill classif. (f) Rounds only; (g) 50 bundles or over; (h) Outside delivery, 10c less; (i) Under 3 in.; (j) shapes other than rounds, flats, fillet angles, 3.15c.

†Domestic steel; \*Plus quan. extras; \*\*Under 25 bundles; ††50 or more bundles; †††Base 40,000 lbs., extras on less.

Prices on heavier lines are subject to new quantity differentials; 399 lbs. and less, up 50 cts.; 400 to 999 lbs. base; 10,000 to 19,999 lbs., 15 cts. under; 20,000 to 39,999 lbs., 25 cts. under; 40,000 lbs and over, 35 cts. under base.

# Bars

Bar Prices, Page 68

**Pittsburgh**—After four to five weeks of consecutive increases in bar bookings, producers here last week reported a slight decline in specifications. However, encouraging reports for May and June automotive assemblies, as well as heavy manufacturing by farm implement makers, forecast an improving trend over the next 60 days in bar specifications, both carbon and alloy grades. The market remains quoted 1.85c, base, Pittsburgh, for merchant bars and 2.45c on alloy quality.

**Cleveland**—Mill shipments of steel bars continue to increase gradually in volume as new work opens up. Automotive builders are requiring even more than the March rate of shipments of bars, and important farm implement makers are busier in some departments requiring bars than they have been since 1928.

**Chicago**—Steel bar sales and specifications are active despite a small decrease from the rate of a few weeks ago. While automotive needs predominate, as indicated by requirements of forging plants and cold-bar finishers, heavy shipments to farm implement makers and miscellaneous bar users continue. The implement and tractor trade holds to operations which compare favorably with those of any of the past six to seven years. Bar prices are steady.

**Philadelphia**—Bar tonnage is being fairly well sustained, with little change noted over the past several weeks. Railroad buying is off, but this appears to be offset by some improvement in miscellaneous lines.

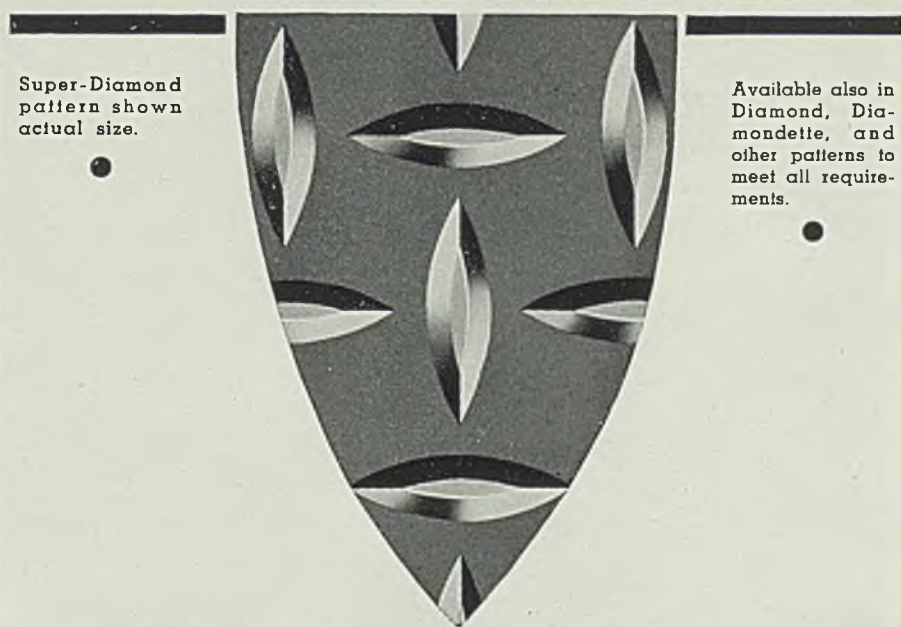
cently with a Pittsburgh plate mill for about 1000 tons of plates to construct a dredge hull for indirect export to South America. The 1.80c, Pittsburgh, base remains quotably unchanged.

**Chicago** — Small individual lots usually characterize plate orders. Railroad repair shops and freight car builders are taking moderate tonnages, and railroad equipment inquiries now pending point to heavier plate requirements for this purpose during the next few months. Industrial tank fabrication shows a moderate improvement over condi-

tions a year ago, though few orders involve large tonnages. Municipal tank purchases are more active. PWA work of this nature in the Central West during the past several weeks has involved about 50 small tanks requiring about 2000 tons of plates. Plate shipments to structural fabricators are steady.

**Cleveland** — New plate business, for the first time in several years, is appearing in such volume as to furnish substantial backing for belief in a spring revival. Some railroad boiler work is in hand and more in immediate prospect, both for re-

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—from every possible angle, under any condition. For light and heavy duty. A sanitary flooring that drains quickly, is easily kept clean. Low first cost. No maintenance cost. PERMANENT. Immediate delivery in various patterns to meet all requirements.

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Philadelphia, New York, Boston, Los Angeles, San Francisco, Seattle, Houston

110 YEARS' IRON- AND STEEL-MAKING EXPERIENCE



# Plates

Plate Prices, Page 68

**Pittsburgh**—Campbell Transportation Co. last week purchased three all-welded steel coal barges from Dravo Contracting Co., Pittsburgh, which require 450 tons of steel plates and structural shapes for construction. Each is 175 x 26 x 11 feet. At the same time, Campbell Transportation Co. leased a fleet of ten standard steel coal barges with an option of their purchase at a later date from Marietta Mfg. Co., Point Pleasant, W. Va. These barges, which have required about 1500 tons of steel, are already completed by the Marietta company. Specifications for plates from carbuilders are still a leading market support and mill backlogs are heavy. A district barge builder has entered a contract re-

pairs and for new construction. Bridge builders are figuring on flood replacement work for state projects.

New York—Miscellaneous buying of plates is slack but requirements for building freight cars recently awarded is helping the market materially.

Philadelphia — Plate tonnage is lagging, although distribution of orders is expected shortly for a tanker noted as booked by the Sun Shipbuilding Co., Chester, Pa. a few weeks ago. Railroad and building demand is light, with the latter so far having failed to come up to

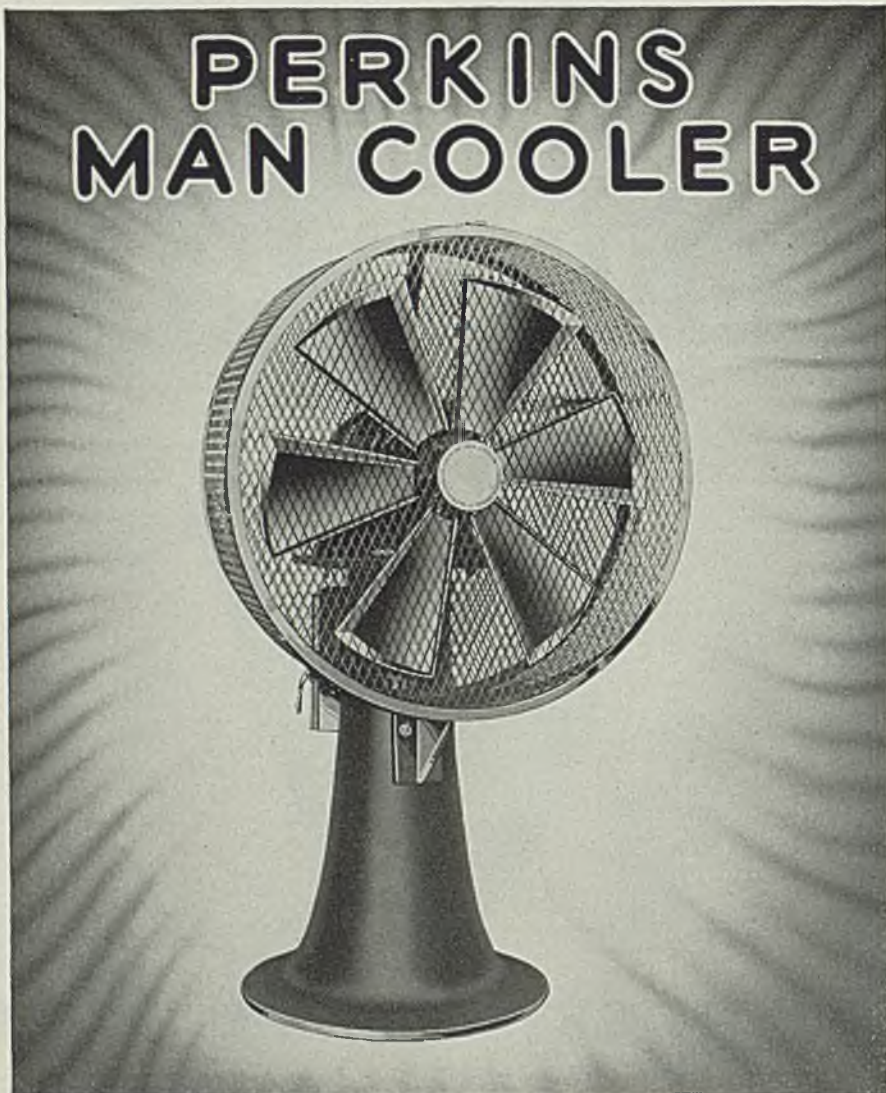
earlier trade expectation. Prices are unchanged at 1.90c, Coatesville, Pa., or 1.99½c, Philadelphia.

The New York Shipbuilding Co., Camden, N. J., is figuring on the Matson line boats which are up for bids next month.

Birmingham, Ala. — Demand for plate continues steady and production is high. Ingalls Iron Works Co., Birmingham, and Chicago Bridge & Iron Works, Chicago, have submitted low bid on a large tonnage of steel plate pipe for a Birmingham industrial water project, more than \$1,000,000 worth of steel,

the contract expected to be placed at once. All plate fabricators in Southern territory apparently are busy.

Seattle—Jobbing houses report a good turnover in light plates for tank and repair jobs, but no large tonnage. Commercial Boiler Works, Seattle, is low at \$23,871 for lengthening the lighthouse tender *Rose*, requiring 100 tons or more. Lake Washington Shipyards, Seattle, is low for construction of a tunnel stern, light draft motor-driven, wheat and bulk fuel carrier for service on the Columbia river, requiring 200 tons of plates and 100 tons of shapes.



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ENGINEERS AND MANUFACTURERS

## Contracts Placed

450 tons, three 175 x 26 x 11-foot all-welded steel coal barges, for the Campbell Transportation Co., Pittsburgh, to Dravo Contracting Co., Neville Island, Pittsburgh.

390 tons, 20-inch welded steel pipe, contract No. 106, Presidio-Sunset line, San Francisco, to Montague Pipe & Steel Co., San Francisco.

275 tons, two tanks, Sacramento, Calif., to Western Pipe & Steel Co., San Francisco.

105 tons, gates, specification 772-D. Odair, Wash., to unnamed interest.

100 tons, 20 pontoons, United States Engineers, Sacramento, Calif., divided between Pacific Coast Engineering Co., Oakland, Calif., and Western Pipe & Steel Co., San Francisco.

## Contracts Pending

2700 tons, 12 to 16-inch welded steel pipe, Sheridan, Wyo.; bids April 22; alternate bids on cast iron pipe.

250 tons, standpipe, Quincy, Mass.

## Sheets

### Sheet Prices, Page 68

Pittsburgh—A fair test of the new quantity system of quoting sheet prices occurred last week when some automotive users entered specifications for early May shipment and consequently immediate shipment. Meanwhile, automobile sheet requirements have been the heaviest in six years and have resulted in an insistent call for prompt shipment. Sheet mill operations moved up fractionally to 70 per cent of capacity average last week and promise to hold that level for at least the next two to three weeks. Pittsburgh base prices hold at 2.40c for No. 24 hot rolled, 1.85c on heavy hot rolled, 2.50c on 10 gage cold rolled, and 2.95c for 20 gage cold rolled.

Cleveland—Sheet mills in northern Ohio and throughout adjoining producing districts turning out the higher grade sheets are exceedingly busy and shipments continue at a high rate under pressure from con-

sumers. Despite some objections from a few customers, the new price differential schedule appears to be firmly established for second quarter delivery.

**Chicago**—Sheet mill operations are practically full and producers are favorably situated as regards backlogs. Most of the low-price tonnage specified last quarter has been shipped and new business is in fair volume despite previous anticipatory buying. Automotive requirements constitute a large portion of current deliveries, though consumption by miscellaneous users is holding well. Prices, while not thoroughly tested, are steady.

**New York**—While still restricted to scattered lots, new sheet tonnage is coming out in slightly better volume. Within another few weeks much of the tonnage now under contract will have been worked off, it is believed, with a resultant further increase in new tonnage. Some consumers will have worked off much of this back tonnage by the end of this month, for fabrication generally appears brisk.

**Philadelphia**—Sheet business continues to reflect substantial buying in the closing weeks of last quarter, with new orders light. Shipments continue brisk, producers aiming to work off all the low priced tonnage placed last quarter by the end of this month. In a number of cases demands for shipments are urgent. The new prices appear firm.

**Buffalo**—Sheet mills here continue to operate at 75 per cent and no slackening is looked for within four to six weeks.

**Cincinnati**—Buying of sheets is heavier, a steady increase being shown since the second quarter opened, and consumers are now inquiring about deliveries on future needs. Rolling schedules are near capacity. Prices are firm.

**St. Louis**—Producers and distributors of steel sheets report new orders slightly above current deliveries. Stove and farm implement interests continue to specify heavily, and expect to do so for a number of weeks. Demand from makers of household appliances is strong.

**Birmingham, Ala.**—Mills are well supplied with business for the time being and are operating three shifts a day. Shipments are equal to production.

## Cold Finished

Cold Finished Prices, Page 60

**Pittsburgh**—The cold-finished steel bar base of 2.10c, Pittsburgh, continues to apply unchanged on a noticeably heavy volume of specifications. An outstanding market support is from automotive parts makers

who, confident of heavy May and June assemblies, are increasing parts banks. Mid-western farm implement manufacturers are also prominent buyers.

ishment has reacted in heavier pipe mill schedule. No outstanding projects have reached the contract stage recently, but locomotive tubes, mechanical tubing and standard pipe are all in sustained demand.

**Cleveland**—Small wrought pipe demand keeps up a slightly increased volume each week in succession as new building work develops with favorable weather prevailing. Jobbers also are adding to low stocks. However, no single large tonnage inquiry is before the trade at this time.

**Chicago**—Cast pipe producers are

# Pipe

Pipe Prices, Page 60

**Pittsburgh**—Specifications for oil country goods are an outstanding market highlight. Many southwestern and Pacific coast stocks' replen-

S

PECIAL  
SEAMLESS  
SHELLS  
SHAPES

A  
N  
D

DEEP DRAWN  
TANKS,  
BOTTLES,  
ETC.

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receiving a fairly large number of small orders, principally for PWA work. Releases against PWA contracts are in fair volume and producers expect a maintenance of shipments during the next 60 days. Inquiries include no large lots. Prices are steady.

**Seattle**—New projects are developing, but no important tonnages are pending. Salem, Oreg., has called bids May 1 for the first unit of a \$1,200,000 water system improvement. United States Pipe & Foundry Co., Burlington, N. J., is low on 225 tons of 4 to 8-inch cast pipe

and accessories for King county district No. 3. Camas, Wash., will open bids April 28 for 2722 feet of 14-inch steel pipe, totaling about 140 tons.

**New York**—Current buying in cast pipe is being restricted to small lots. Pipe foundries, however, are quite busy on orders previously booked and most of them have a good backlog. New inquiries are small. Prices are unchanged.

**San Francisco**—Cast pipe awards were the largest in over a month and aggregated 984 tons. National Cast Iron Pipe Co., Birmingham, Ala.,

took the outstanding award, 498 tons of 6 and 8-inch pipe for Pasadena, Calif. Unnamed interests secured 183 tons of 4 to 12-inch pipe for Suisun, Calif., and 128 tons of 6-inch for Panama Canal, schedule 3133. Bids will be opened April 22 for 4142 tons of 16-inch pipe for Sheridan, Wyo., and alternate bids will be taken on welded steel pipe.

San Diego Consolidated Gas & Electric Co., San Diego, Calif., is planning to lay a 15-mile trunk line completely Lindenswelded from Carlsbad to Escondido, Calif. Standard pipe 2½ to 3 inches, to carry natural gas at 400-pound peak pressure, will be used. Work will start May 15.

### Cast Pipe Placed

498 tons, 6 and 8-inch, Pasadena, Calif., to National Cast Iron Pipe Co., Birmingham, Ala.  
183 tons, 4 to 12-inch, Suisun, Calif., to unnamed interest.  
128 tons, 6-inch, schedule 3133, Panama Canal, C. Z., to unnamed interest.

### Cast Pipe Pending

4142 tons, 16-inch, Sheridan, Wyo.; bids April 22. Alternate bids on welded steel pipe.  
225 tons, 4 to 8-inch, and accessories, King county district No. 3, Washington; United States Pipe & Foundry Co., Burlington, N. J., low.  
Unstated, 8-inch, Forty-first avenue, south, improvement, Seattle; bids soon.

### Steel Pipe Pending

140 tons, 14-inch, for Camas, Wash.; bids April 28.

## Transportation

Track Material Prices, Page 60

Placing of 75,050 tons of rails and 3600 freight cars the past week indicates the extent to which railroads are supporting the steel market. Estimates indicate the steel for these cars will total about 50,000 tons, including wheels and axles.

Rail tonnages are topped by the Chicago, Rock Island & Pacific with 40,000 tons, followed by Baltimore & Ohio with 25,000 tons and Seaboard Air Line with 8500 tons. Pere Marquette also contributed to the total with 1550 tons. Of the Rock Island tonnage 6000 tons were placed a week ago.

Distribution of 2700 refrigerator cars by Pacific Fruit Express was well spread among builders and those of the Erie went to three builders.

### Car Orders Placed

Erie, 800 all-steel cars; 500 box to American Car & Foundry Co., Ber-

## ATLAS GAS-ELECTRIC LOCOMOTIVES



45 Ton Locomotive especially suitable for economical interplant switching service.

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wick, Pa.; 200 furniture to Magor Car Corp., Passaic, N. J.; 100 auto to Greenville Steel Car Co., Greenville, Pa.

Pacific Fruit Express, 500 refrigerator cars each to General American Transportation Co., East Chicago, Ind.; Pullman-Standard Car Mfg. Co., Michigan City, Ind.; American Car & Foundry Co., St. Louis; Pacific Car & Foundry Co., Portland, Ore.; 700 to the Union Pacific and Southern Pacific shops; total 2700 cars.

Seaboard Air Line, 100 seventy-ton covered phosphate cars, to Pullman-Standard Car Mfg. Co., Chicago (for Bessemer, Ala., shops).

## Rail Orders Placed

Baltimore & Ohio, 25,000 tons, of which 15,600 went to the Carnegie-Illinois Steel Corp., Pittsburgh; \$400 to the Bethlehem Steel Co., Bethlehem, Pa., and 1000 to the Inland Steel Co., Chicago.

Chicago, Rock Island & Pacific, 40,000 tons, divided among Carnegie-Illinois Steel Corp., Chicago; Colorado Fuel & Iron Co., Denver, and Inland Steel Co., Chicago; includes 6000 tons previously released, as reported last week.

Pere Marquette, 1550 tons 112-pound rails, to Carnegie-Illinois Steel Corp., Pittsburgh.

Seaboard Air Line, \$500 tons; 5000 tons to Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.; 3500 tons to Bethlehem Steel Co., Bethlehem, Pa.; accessories to Tennessee company and Weir-Kilby Co., Birmingham, Ala.

## Car Orders Pending

Missouri Pacific, 1500 box cars, 500 hopper cars.

## Strip Steel

Strip Prices, Page 69

Pittsburgh—Contrary to earlier expectation, strip producers here last week booked considerably more tonnage than in the week preceding, the increase, several thousand tons, being mainly in hot-rolled. Strip users who had placed heavy orders at the expiration of first quarter are now becoming insistent for deliveries and it is likely that a thorough test of the new differential system of quoting will come before May 1. The market remains firmly quoted 2.60c, base, Pittsburgh or Cleveland, for cold-rolled and 1.85c, Pittsburgh, for hot-rolled.

Chicago—New business in hot and cold-rolled strip is fairly heavy, considering the forward buying done by consumers late last quarter. Shipments are holding fairly well, though most of the low-price material has been delivered. Automotive interests account for the largest individual shipments, but consumption by the miscellaneous trade is well sustained in most directions. Prices are reported steady on new business.

New York—A typographical error appeared in a recent list of base prices for cold-rolled high carbon

spring steel. Correct base prices follow: Carbon 0.26 to 0.50, 2.60c, Pittsburgh or Cleveland, and 2.80c, Worcester, Mass.; carbon 0.51 to 0.75, 3.45c, Pittsburgh and Cleveland, and 3.65c, Worcester; carbon 0.76 to 1.00, 4.95c, Pittsburgh and Cleveland and 5.15c, Worcester; and carbon over 1.00, 6.50c, Pittsburgh and Cleveland and 6.70c, Worcester.

Philadelphia—Narrow strip specifications are coming out fairly well, but are practically all against contracts placed at concessions in the closing weeks of last quarter. The

new price schedules are untested and unchanged.

## Semifinished

Semifinished Prices, Page 69

Pittsburgh—Bookings of semifinished steel at Pittsburgh last week showed little change in total volume from the week preceding. Sheet bars continued to predominate in buying and there was a slight increase in rerolling billet orders, but the latter was offset by some decline in forging quality billets. In general, wire rod

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# PAGE Welding WIRE

and tube round commitments are fairly good. The rerolling billet, sheet bar, bloom and slab base remains \$28, f.o.b. Pittsburgh, with forging billets quoted \$35, wire rods, \$38, \$40 and \$42, all per gross ton, and skelp, 1.80c per pound.

## Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 69

Aided by continued heavy requirements of the farm implement industry and by moderate gains in railroad orders, demand for bolts, nuts and rivets

is in better volume than a year ago. Activities of structural fabricators show only a small change, the increase in rivet consumption by this group having been less than that of other important consumers compared with the situation during the past several years. Specifications from jobbers are fairly well maintained, while moderate orders are developing from manufacturers of automotive parts. Bolt and nut prices are fairly steady. Rivet quotations are holding.

Production in the east is expanding and is about 50 per cent of capacity, compared with about 53 per

cent for the industry as a whole. Last year the rate was about 36 per cent. Baltimore & Ohio has placed 275 tons of track bolts with Bethlehem Steel Co. Seaboard Air Line has reduced its bolt requirements from 1000 to 500 kegs but has not yet made distribution.

## Wire

Wire Prices, Page 69

Pittsburgh—Heavy buying features the plain manufacturing wire and spring wire markets, but a slightly downward trend in merchant wire items resulted last week. Sales in the former products have definitely established plain wire at 2.30c, base, Pittsburgh, and spring wire at 3.05c.

Chicago—Wire business is somewhat restricted by the unusual March buying, but the decrease has been insufficient to prevent the average for the two months, estimating the balance of April, from being the most active period in six or seven years. Gains are noted for both manufacturers' wire and merchant products, with automotive needs of the former leading. Distributors of merchant products in some rural districts are maintaining only small stocks and in a few cases have found it necessary to request rush shipments. Prices remain to be tested adequately.

## Tin Plate

Tin Plate Prices, Page 68

Pittsburgh—Canmakers' releases of tin plate for working up into packers' cans are beginning to appear in more volume, supplementing a good rate of specifications for general line cans. Shipments against finished inventories of tin plate, which producers have been carrying over the winter, are now proceeding at a better pace, and the coming 60 days are calculated for operations in tin plate mills at least as strong as the present 80 per cent rate.

## Ferroalloys

Ferroalloy Prices, Page 70

New York—Another good week is reported in the movement of ferro-manganese, with shipments so far this month apparently the best this year. The outlook for the next few weeks appears encouraging. Prices are unchanged at \$75, duty paid, Atlantic and Gulf ports. Domestic spiegeleisen, 19 to 21 per cent, is also unchanged at \$26. Palmerton, Pa., on quantities up to 50 tons; and \$24 on 50 tons and over.

# Behind the Scenes with STEEL

## Copper-Bearing

THEY'VE done it again! Progress will not be denied! Time marches on! We refer to a new method for wrapping large packages which involves the use of heavy copper wire instead of twine. A package came in here the other day (from a large steel company, incidentally) securely bound with bright copper wire, with the loose ends tightly twisted together by some mechanical means.

We pulled at it, kicked it, ruined a pair of shears on it and finally gave up. The wire wouldn't budge a centimeter. Finally sent it down to the building maintenance department where an oxyacetylene blowtorch was applied with telling results.

We suggest you try tying your Christmas presents this year by this novel system. When the packages are finally opened about next April you will have had time to get far enough away to avoid difficulties.

## Print Job

IN CONNECTION with Jones & Laughlin's recent \$30,000,000 first mortgage bond offering, a total of 11,000 pounds of printing was required—prospectuses, registration statements and auditor's report. Cost of these items, along with engraving of the bonds, was reported to be \$70,000, which would almost pay our salary for a year.

## Added Touch

LETTERHEADS of Lukens Steel Co. are being dated in a somewhat different way this year. Suppose you received a letter from them dated today. It would read: April 20, 1936, of Lukens' 126th Year.

Just that little sales promotion department touch!

## Local Brevities

ONE of our undercover men in the Pittsburgh district has washed the mud off his face long enough to tell us that Ben F. Fairless, head of Carnegie-Illinois Steel, is having his offices changed from 1890 style to a modern effect with a new soundproof ceiling, walls clad with steel sheets finished to resemble wood, and other embellishments sufficient to keep a

corps of carpenters busy for about a week.

This department is having an old 1928-model inkwell done over at the moment in modern streamline style. Looks real nice!

## Spring Fever

THIS will be a big month for conventions, if advance reports are any indication. STEEL in recent weeks has announced programs of meetings to be held shortly by many technical groups. Heading the list is the American Foundrymen's association's annual pow-wow, May 4-9, in Detroit.

We hear this year's A.F.A. convention and show will be "tops." Everybody bubbling over with confidence, lots of business, plenty of festive mood and a comprehensive technical program that should interest all concerned with the casting of metals.

## Wrightiana

ONE of our itinerant correspondents forwards us a bulletin from Louisville, Ky., comprising a clipping reading as follows: "I glory in the reflection that all mechanical engineers and inventors in Christendom could never make a single hair of a horse"—Harold Bell Wright.

Speaking as one who has repeatedly turned horsehairs into live snakes, we resent the implication in the above, even though Mr. Wright did wield a mighty pen in his day. Anyway, who would want to make a hair of a horse?

## Gilt-Edge

ANNUAL report of the Republic Steel Corp. for 1935 is a handsome 36-page brochure, full of pictures, tables, charts, maps and the like. After looking over a copy we breathed a forlorn wish that we had the privilege of being a stockholder in Republic instead of in Goldfield Consolidated Mines Inc.

We Goldfield people didn't get a thing this year in the way of a report. Maybe the officers were all out looking for bonanza stakes. All we stockholders know is that our handsome certificates are quoted at 18¾ cents per share on the New York Curb. Pretty hard to build up any goodwill at that price.

—SHRDLU

# Shapes

## Structural Shape Prices, Page 68

**Pittsburgh**—Bids on May 1 are asked by the state highway department, Harrisburg, Pa., for 703 tons of fabricated structural steel in a Schuylkill county bridge, as well as 212 tons for a Tioga county bridge. American Bridge Co. has taken contracts for 525 tons for a plant building at Brooklyn, N. Y., and 500 tons for a Pennsylvania state highway bridge. Plain structural shapes remain firmly quoted 1.80c, base, Pittsburgh.

**Cleveland**—Industrial plants throughout northern Ohio are placing small-lot orders which are going into plant expansion on a more general basis than for the previous six years. Considerable light beam business for business blocks in outlying city districts is being booked by local fabricators, in addition to small county highway bridge work. Large projects are not developing rapidly but several are in prospect.

**Chicago**—Bids close this week on 2900 tons for the Randolph street viaduct, but new bids on the main section of the outer drive development, on which previous tenders were rejected, are not due until early May. Awards, while still light, are featured by 1275 tons for the new rod mill of Republic Steel Corp. and 418 tons for construction by Wisconsin Steel Works. Additional work for the latter will take about 1300 tons.

**Boston**—Awards are more active, ten projects involving a total of around 1800 tons having been placed. Other jobs are slated to get early attention. The pending list has been increased by five projected bridge and grade crossing elimination jobs aggregating approximately 700 tons. The market on plain structural shapes continues 1.90c base, Bethlehem, Pa., equivalent to 2.20½c, delivered, Boston.

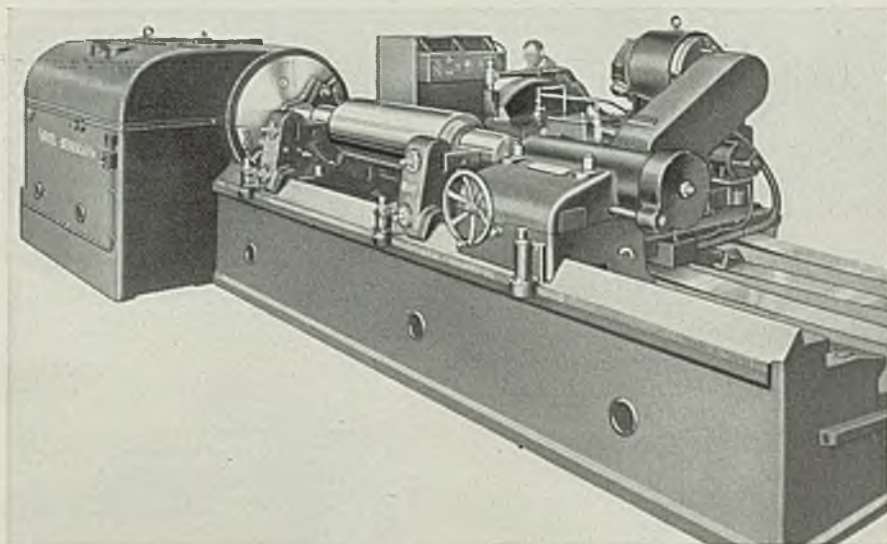
**New York**—Awards are improving in volume, the total placed being over 5000 tons. Early action is expected on a number of projects now

pending, and new projects aggregated over 2000 tons. The second section of the Sixth avenue subway, involving 6400 tons, has been indefinitely postponed. The market on plain structural shapes continues firm at 1.90c, base, Bethlehem, Pa. Erected prices are showing a tendency to advance. While one school building recently went at \$78 per net ton, erected, the prices now being quoted range from \$80 to \$85. As usual, foreign shapes continue to be offered at less than domestic shapes.

**Philadelphia**—Apart from the recently noted 5000-ton vocational

school here, bridge work features a rather sluggish market. The outstanding project is the Michigan avenue viaduct over the Baltimore & Ohio tracks in Washington. This project involves 800 tons of shapes and a sizable tonnage of reinforcing bars. Prices are steady at 1.90c, Bethlehem, Pa., or 2.01½c, Philadelphia.

**St. Louis**—A fair volume of small structural awards is noted. Mississippi Valley Structural Steel Co. was low bidder for fabrication and delivery of 950 tons of structurals for an approach to the St. Louis muni-



## HEAVY ROUGHING or FINE FINISHING

The Farrel Heavy Duty Roll Grinder does both. It is a dual-purpose machine, equally capable of taking heavy cuts in rough grinding and of applying the finest mirror surface to rolls of all types.

It is truly a *production* and *precision* machine, in which is embodied the ability to grind rolls of the accuracy and finish required by modern rolling mill practice and at the same time to give a high rate of output at minimum cost.

Our engineers will welcome the opportunity to explain the details of design which underlie the exceptional performance and operating economy of Farrel Heavy Duty Roll Grinders.

**FARREL BIRMINGHAM**  
Company, Inc.  
110 Main St., Ansonia, Conn.

## Shape Awards Compared

	Tons
Week ended April 17 .....	18,991
Week ended April 10 .....	18,507
Week ended April 3 .....	14,900
This week, 1935 .....	12,460
Weekly average, 1935 .....	17,081
Weekly average, 1935.....	20,421
Weekly average, March .....	15,069
Total to date, 1935 .....	249,696
Total to date, 1936 .....	326,735

cipal bridge. Bids for 1200 tons for bridge and highway projects for the state of Illinois were opened April 17.

**Buffalo**—Mills are operating on double turn schedules with additional tonnage coming forward at a steady rate. Rail orders are the best in three or four years for this season and are expected to move actively throughout the quarter.

**San Francisco**—Shape awards were restricted to lots of less than 100 tons and the total did not exceed 500 tons. So far this year 39,150 tons have been booked as compared with 22,746 tons in the corresponding period in 1935. Bethlehem Steel Co. is low bidder on 1000 tons for the Livestock building, San Francisco. Close to 3000 tons are required for four double hangars to be erected at Hickman field, T. H., bids April 28.

**Seattle**—Prospects for fabricators are improving as important projects come out for figures. Northwest Steel & Equipment Co., Vancouver, Wash., reports 900 tons in its shop, including two large girders for Southern Pacific railroad. The girders are 90 x 8½ feet, each weighing 39 tons, and are said to be the heaviest ever fabricated in this district.

## Shape Contracts Placed

1800 tons, public school 113, New York, to Bethlehem Steel Co., Bethlehem, Pa., through National Excavation Corp., New York.  
 1650 tons, bridge viaduct, Kansas City, Mo., to Joseph T. Ryerson & Son Inc., Chicago.  
 1275 tons, rod mill building, South Chicago, Ill., for Republic Steel Corp., to Austin Co., Cleveland.  
 1200 tons, Lorain county bridge over Black river, Lorain, O., to Mt. Ver-

non Bridge Co., Mt. Vernon, O. Bar requirements to Pollak Steel Co., Marion, O.; previously reported as having been placed with an un-stated fabricator.

1150 tons, American Radiator Co. building addition, New York, to American Bridge Co., Pittsburgh, through Post & McCord Inc., New York.

1110 tons, paper mill, Crossett Lumber Co., to Ingalls Iron Works Co., Birmingham, Ala.

645 tons, miscellaneous industrial jobs, highway projects, and logging trucks, to Northwest Steel & Equipment Co., Vancouver, Wash.

545 tons, pier shed, berth 155, Los Angeles, to Minneapolis-Moline Power & Implement Co., Minneapolis.

560 tons, state highway bridge, Jamestown, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.

545 tons, 4-story loft building, Greenpoint avenue, Brooklyn, N. Y., to American Bridge Co., Pittsburgh.

525 tons, manufacturing plant, Brooklyn, N. Y., for Leverton Mfg. Co., Brooklyn, to American Bridge Co., Pittsburgh.

525 tons, Pennsylvania state highway bridge, Clearfield, Pa., to American Bridge Co., Pittsburgh.

480 tons, grade crossing elimination, Westfield, N. J., to Bethlehem Steel Co., Bethlehem, Pa.

425 tons, state highway bridge, Cowley county, Kansas, to Kansas City Structural Steel Co., Kansas City, Mo.

420 tons, state highway bridge, Shepherd, Ill., to Clinton Bridge Works, Clinton, Iowa.

418 tons, mold yard runway, Wisconsin Steel Works, Chicago, to Worden-Allen Co., Milwaukee.

350 tons, bridges, Pelham Manor and Bayside, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.

320 tons, highway bridge, El Paso county, Colorado, to American Bridge Co., Pittsburgh.

315 tons, state highway bridge, Seattle, to Wallace Bridge & Structural Co., Seattle.

300 tons, building No. 23, Detroit, for Fisher Body Corp., to Jones &

Laughlin Steel Corp., Pittsburgh.  
 300 tons, including machinery, state bridge, Skagit county, Washington, to Pacific Car & Foundry Co., Seattle; previously reported at 250 tons.

300 tons, bridge, Turners Falls, Greenfield, Mass., to Bethlehem Steel Co., Bethlehem, Pa.

300 tons, paper mill, Hinsdale, N. H., to Bethlehem Fabricators Inc., Bethlehem, Pa.

300 tons, science hall, St. Peters college, Jersey City, N. J., to Oltmer Iron Works, Jersey City.

290 tons, Ferry street bridge, Binghamton, N. Y., to Phoenix Bridge Co., Phoenixville, Pa.

250 tons, high school, Riverhead, N. Y., to August Bellon Inc., Long Island City, N. Y.

250 tons, postoffice, Wilmington, N. C., to Bethlehem Steel Co., Bethlehem, Pa.

236 tons, Wabash railroad grade crossing, Macoupin county, Illinois, to R. C. Mahon Co., Detroit.

230 tons, New York state highway bridge, Ulster county, to American Bridge Co., Pittsburgh.

225 tons, bridge, Flathead county, Montana, to Clinton Bridge Works, Clinton, Iowa.

215 tons, grade school, Berlin, N. Y., to James McKinney & Son, Albany, N. Y.

205 tons, parcel post building, Worcester, Mass., to West End Iron Works, Cambridge, Mass.

200 tons, arch centers, bridge, Binghamton, N. Y., to Phoenix Bridge Co., Phoenixville, Pa., through James McGraw Co., Philadelphia, general contractor.

200 tons, senior high school, Peoria, Ill., to Mississippi Valley Structural Steel Co., Decatur, Ill.

170 tons, New York state highway bridge, WPGS SS26-12, Erie county, to American Bridge Co., Pittsburgh.

165 tons, coke and coal bin, to Ohio Structural Steel Co., Newton Falls, O., through Koppers Construction Co., Pittsburgh.

160 tons, assembly hall, Harlem valley hospital, Wingdale, N. Y., to Utica Structural Steel Co., Utica, N. Y.

157 tons, state hospital dormitory, Augusta, Me., to Megquier & Jones Co., Portland, Me., through F. W. Cunningham, Portland.

150 tons, store and building, Duane street, New York, to Cypress Iron Works, New York, through Henry Kaufman, New York.

130 tons, Salem, Oreg., high school, to Northwest Steel & Equipment Co., Vancouver, Wash.

125 tons, Owyhee, Oreg., bridge, to Northwest Steel & Equipment Co., Vancouver, Wash.

120 tons, academic and administrative center, reform school, Cranston, R. I., to Providence Steel & Iron Co., Providence, R. I., through O. D. Purrington & Co., Providence.

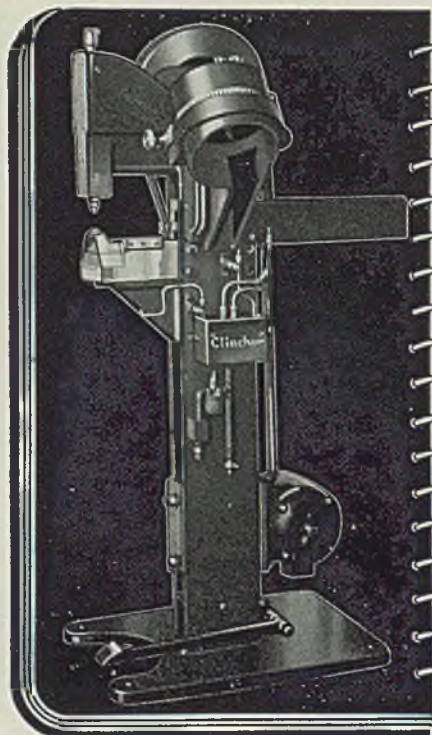
120 tons, truss material, high school, Reading, Pa., to Phoenix Bridge Co., Phoenixville, Pa.

105 tons, warehouse, Bay City, Mich., to Flint Structural Steel Co., Flint, Mich.

100 tons, plant for Pennsylvania Salt Mfg. Co., Tacoma, Wash., to Pacific Car & Foundry Co., Seattle.

100 tons, overpass, North Kingston, R. I., to Bethlehem Fabricators Inc., Bethlehem, Pa., through Seaboard Construction Co., Boston.

100 tons, school, Warwick, R. I., to Providence Steel & Iron Co., Providence, R. I.



## The "CLINCHOR"

Feeds and Sets CLINCH NUTS Automatically

A NEW TYPE of machine answering the demands for better production methods for setting Clinch Nuts.

The clinch nut, which has been automatically placed on the anvil, locates the work. The ram coming down sets the clinch nut.

May we send you a circular describing the many details so important for successful production?

### THE TOMKINS-JOHNSON CO.

611 N. Mechanic St., Jackson, Michigan  
 European Office  
 GASTONE MARBAIX, Ltd., Vincent House,  
 Vincent Square, London, S. W. 1, England

100 tons, Oak Hill school, Newton, Mass., to Groisser & Shlager Iron Works, Somerville, Mass.

## Shape Contracts Pending

12,000 tons, Marine Parkway, Brooklyn, N. Y., for Marine Parkway Authority, New York, including bridge with lift span, two viaducts, and approaches; bids to be opened in May. Also includes 3300 tons sheet steel piling, 1000 tons of reinforcing bars, 500 tons machinery, 300 tons cast steel shoes, and 100 tons hand railing.

6400 tons, Sixth avenue subway, second section, New York; indefinitely postponed.

2000 tons, nurses home, Welfare Island hospital, New York; Weinstein & Rubin, Brooklyn, N. Y., general contractor.

2000 to 3000 tons, four double hangars, Hickman Field, T. H.; bids April 28.

1500 tons, St. Luke's hospital addition, New York.

1500 tons, New York transit commission, six bridges across New York Central tracks, New York; Quinn & Meisner Inc., Corona, N. Y., general contractor.

1500 tons, Fiftieth and Sixty-third street viaduct, Kansas City, Mo.; bids in.

1400 tons, stamping plant, Chrysler Motor Corp., Detroit.

1000 tons, Livestock building, San Francisco; Bethlehem Steel Co., Bethlehem, Pa., low.

850 tons, grade separation, Detroit.

825 tons, viaduct, Albuquerque, N. Mex.

800 tons, Michigan avenue viaduct, over Baltimore & Ohio tracks, Washington; bids to be opened April 22.

703 tons, deck plate girder and deck truss underpass bridge, Gilberton and Frackville boroughs, Schuylkill county, Pennsylvania; bids to state highway department, Harrisburg, Pa., May 1. Included, 50 tons of deformed steel bars and 12 tons of plain steel bars.

700 tons, children's hospital, Castleton, N. Y.; new bids April 28.

603 tons, Santa Margarita river bridge, San Diego county, California; bids April 30.

560 tons, also 40 tons reinforcing, assembly plant for Boeing Aircraft Co., Seattle; The Austin Co., Seattle, general contractor.

502 tons, state bridge, Luzerne county, Pennsylvania; Whittaker & Diehl, Harrisburg, Pa., general contractor. 65 tons bars included.

500 tons, warehouse, Streator, Ill., for Owens-Illinois Glass Co., Toledo, O.

500 tons, building for Muskingum Fibre Products Corp., Coshocton, O.

500 tons, bridge, Imperial Valley, Calif.

450 tons, Henry Ford recreational building, Greenfield village, at Dearborn, Mich.

400 tons, school, Dunmore, Pa.; bids rejected.

400 tons, machine shop addition, Chrysler Corp., Detroit.

300 tons, high school, Ansonia, Conn.; new bids to be taken.

190 tons, addition to National Carbon Co. plant, Postoria, O.

150 tons, state highway bridge over Boston & Maine railroad, Lawrence, Mass.

150 tons, state highway grade crossing elimination, Sheffield, Mass.

150 tons, state highway grade crossing elimination, Sharon, Mass.

130 tons, bridge, Tuckahoe, N. J.

125 tons, bridge, Pinal county, Arizona; bids April 28.

110 tons, bridges, Fort Fairfield-Presque Isle, Me.

100 tons, turbine draft tubes, Coulee, Wash.; bids opened.

## Quicksilver

New York—Quicksilver prices are easy in a quiet market here, small lots of 15 to 25 flasks being quoted \$77.50 to \$78.50 a flask, down 50 cents from a week ago.

# Reinforcing

Reinforcing Bar Prices, Page 69

New York—Awards are confined to small jobs, but a large tonnage in the aggregate is involved in pending projects. The building of the second section of the Sixth avenue subway, New York, involving 350 tons, has been postponed indefinitely. In general the market on new billet bars is firmer and sellers generally are quoting 2.40c, delivered, New York, plus

# DON'T LAUGH



## THE POOR FELLOW'S TRYING!

IT'S no laughing matter if skilled machinists around *your* shop must tire themselves with back-breaking loads. And you won't laugh when you compare the fancy price you pay for back power with the lower costs and faster production you get with a P&H Zip-Lift. Here's a brand new way to cut your present handling costs.

Three Zip-Lifts serving three machine tools in this bay eliminated the need for steady crane service at a cost of \$12.00 per day. Reducing time 5 minutes per lift on an average of 60 lifts per day, they saved \$7.50 more or a total of \$19.50 per day. These 3 Zip-Lift jib cranes bought themselves in 70 days!

Find out now about this new low cost method. Write today for new folder on "Spot Handling".

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ESTABLISHED 1884  
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# ZIP-LIFT



**STOPS WASTE  
WITH "SPOT HANDLING"**

a \$2 per ton charge for trucking to the building site. However, the absence of important business prevents any real test.

**Pittsburgh**—Distributors continue to build up stocks and are providing an important backlog to mill rolling schedules. Approximately 115 tons of bars will be bid May 1 by Harrisburg, Pa., highway department, for various county jobs. Based on current transactions, the new billet steel bar market ranges 1.95c to 2.05c for carload lots.

**Chicago**—Awards are heavier, five of the larger items totaling nearly 1500 tons. Sanitary district work still is outstanding, orders having been placed for 600 tons for two sections, while 770 tons will be required for another sewer on which bids recently were opened. State bridge work accounts for 400 tons, and a local grain elevator 200 tons. Heavier orders for Illinois highway and bridge building are in prospect. Prices are relatively steady.

**Philadelphia**—While awards are negligible, several sizable tonnages are pending, including 500 tons for the proposed vocational school, 500 tons of miscellaneous state work in North Carolina, several hundred tons for road work for the state of Pennsylvania, and a fairly large tonnage for the Michigan avenue viaduct in Washington. Prices on billet steel are firmer, although there has been no real test recently.

**Cincinnati**—The necessity for water has produced considerable business in this locality. Pollak Steel

Co. received an award of 750 tons for a Covington, Ky., waterworks improvement. The West Virginia Rail Co., Huntington, W. Va., is providing 1300 tons for one item of improvement for the Cincinnati waterworks and Joseph T. Ryerson & Son Inc., Chicago, 600 tons on another item, with 90 tons pending on a third contract.

**San Francisco**—Bookings were fairly heavy and 3398 tons were placed, bringing the total for the year to 79,168 tons, compared with 38,372 tons in the same period in 1935. Among the larger lots placed were 775 tons for two tanks for Sacramento, Calif., awarded to Bethlehem Steel Co. Truscon Steel Co. took 602 tons for the Treasury department at Los Angeles.

**Seattle**—While construction is increasing, the volume is insufficient to call for important tonnages of reinforcing bars and the demand continues slow. Northwest Steel Rolling Mills, Seattle, booked 150 tons for the

Swinomish slough state bridge, Washington. Salem, Oreg., will open bids May 1 for a 10,000,000-gallon reservoir, first unit of a project requiring 140 tons of reinforcing steel and sheet copper.

## Reinforcing Steel Awards

- 775 tons, two tanks for Sacramento, Calif., to Bethlehem Steel Co., Bethlehem, Pa.
- 602 tons, schedule 8035, Treasury department, Los Angeles, to Truscon Steel Co., Los Angeles.
- 496 tons, public works building, Sacramento, Calif., to Soule Steel Co., San Francisco.
- 400 tons, state bridge, Cook county, Illinois, to Calumet Steel Co., Chicago; Michael J. McDermott & Co., Chicago, general contractor.
- 400 tons, upper Des Plaines sewer, Chicago sanitary district, to Joseph T. Ryerson & Son Inc., Chicago; Michael Pontarelli, Chicago, general contractor.
- 300 to 400 tons, several highway projects, to Laclede Steel Co., St. Louis.
- 250 tons, federal warehouse, Peoria, Ill., to Bethlehem Steel Co., Bethlehem, Pa.
- 200 tons, St. Louis Dairy Co. building, to Laclede Steel Co., St. Louis.
- 200 tons, grain elevator, Chicago, to Calumet Steel Co., Chicago.
- 200 tons, section No. 15, Chicago sanitary district, to Joseph T. Ryerson & Son Co., Chicago; A. J. Forschner Construction Co., Chicago, general contractor.
- 212 tons, shop building, George Washington high school, San Francisco, to Bethlehem Steel Co., Bethlehem, Pa.
- 171 tons, bridge at Bradley, Monterey county, California, to Concrete Engineering Co., San Francisco.
- 144 tons, bureau of reclamation, Pot-holes, Calif., to Soule Steel Co., Los Angeles.
- 125 tons, gymnasium, Placerville, Calif., to Kyle & Co., Fresno, Calif.
- 100 tons, apartment, Broadway and Buchanan streets, San Francisco, to foreign interest.
- 100 tons, bridge in Apache county, Arizona, to unnamed interest.
- 100 tons or more, factory building, Owens-Illinois Glass Co., Streator, Ill., to Bethlehem Steel Co., Bethlehem, Pa.
- 100 tons, Oak Hill school, Newton, Mass., to Barker Steel Co., Cambridge, Mass.

## Concrete Awards Compared

	Tons
Week ended April 17.....	4,875
Week ended April 10 .....	3,078
Week ended April 3 .....	6,443
This week, 1935 .....	20,495
Weekly average, 1935 .....	6,862
Weekly average, 1936 .....	7,469
Weekly average, March .....	7,980
Total to date, 1935 .....	91,379
Total to date, 1936 .....	119,503

## Reinforcing Steel Pending

- 1312 tons, Macy street subway, Los Angeles; Bent Bros., Los Angeles, low on general contract.
- 770 tons, Chicago sanitary district work; S. A. Healy Co., Chicago, general contractor.
- 500 tons, Jane Addams housing project; S. N. Nielsen Co., Chicago, low on general contract.
- 500 tons, miscellaneous state work, North Carolina; bids opened April 15.
- 420 tons, under-crossing, San Leandro, Calif.; bids April 29.
- 250 tons, Henry Ford recreational building, Greenfield village, Dearborn, Mich.
- 140 tons, water reservoir, Salem, Oreg.; bids by city council, May 1.
- 122 tons, plain and deformed steel bars, highway work in six counties, Pennsylvania; bids to state highway department, Harrisburg, Pa., May 1.
- 100 tons, contract 62, Triboro bridge, New York; Del Balso Construction

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**TOOL STEEL TUBING**  
**NON-SHRINK OIL HARDENING**  
 FOR  
 Ring Dies — Spacers — Bushings  
 Stock up to 12" O. D. 2" Wall  
 Larger sizes available  
 Complete Stocks of Ball Bearing Tubing  
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**THE BISSETT STEEL COMPANY**  
**CLEVELAND**  
 CHICAGO      CINCINNATI  
 FINE TOOL STEELS  
 TUNGSTEN CARBIDE DIES & TOOLS

Co., New York, general contractor. 100 tons, Santa Margarita river bridge, San Diego county, California; bids April 30.

100 tons, highway work, Pinal and Apache counties, Arizona; bids April 28.

Unstated tonnage, Michigan avenue viaduct, Washington; bids April 22 including approximately 800 tons of shapes.

## Pig Iron

Pig Iron Prices, Page 70

**Pittsburgh**—A slightly heavier melt is forecast for the last half of April, due to many district foundries now being able to resume schedules. However, considerable malleable casting work for the automotive trade is being filled out of foundries to the west of this district, and the local highlight is steel foundries' working against railroad orders. Prices are firm on the basis of \$19.50 for foundry, \$19 for basic and \$20 for bessemer. Carnegie-Illinois last week lighted another blast furnace at its Rankin works, and is also planning to start an additional unit at its Ohio works.

**Cleveland** — Shipments continue steady, with occasional slight increases as foundry activities expand. Auto partsmakers take the bulk of shipments, but some also is moving to miscellaneous melters. New buying is expected to develop just as rapidly as the excess tonnage placed late in March is exhausted. The market is firm.

**Chicago**—While shipments are increasing somewhat slower than had been anticipated, consumption is holding near the year's peak. New business is improving, but purchases are confined to early needs and in some cases foundries still are drawing against accumulated stocks. Automotive foundries continue rushed, while machine tool builders again are more active. Prices are firm.

**Boston**—Foundries which suffered from the floods, again are taking in iron in better volume, and on the whole, current melt is good. But consumers in general continue to have large stocks and hence there is no particular urge to contract ahead at this time. Current buying is pretty much of a hand-to-mouth character, consisting of single carload orders. Prices are firm.

**New York** — Business remains sluggish, with buying on hand-to-mouth basis. However, two merchant furnaces in the East are expected to blow in around May 1, the Mystic, Mass., furnace and the Troy, N. Y., stack. Foundry melt appears to be expanding, and one reason why current sales are not heavier in volume, is said to be the

fact that a number of consumers specified rather freely in March against contracts placed prior to the advance last November.

**Philadelphia**—New tonnage continues to lag, although the melt appears as high, if not higher than at any time this year. Much present consumption is against material shipped last month against old contracts. It is reported that a furnace will be blown in at Bethlehem, Pa., shortly.

**Buffalo**—Demand has tapered off since the beginning of the month. March had seen the largest deliveries of the year and April continued this brisk pace. Demand suddenly declined, however, especially from the general foundries. Malleable foundries dealing with the railroad trade are broadening their schedules, and radiator producers also are active. Nine blast furnaces are melting.

**Cincinnati**—More buyers are coming into the market, having exhausted stocks shipped in February and March against the lower-priced, pre-November contracts. Leadership in the heavier melt is taken by foundries on automobile parts and stoves. Furnace of the Hamilton Coke & Iron Co. will go down June 1 for rebuilding, and capacity will be moderately increased.

**St. Louis**—The market is featured by a noticeable increase in melt, heavy shipments, firm prices, and a fair volume of new orders for immediate shipment. The present rate of operations at foundries, mills and machine shops is likely to continue through June at least. This is particularly true of manufacturers of farm implements, tractors, stoves and ranges, and household appliances.

**Birmingham, Ala.**—Shipments are steady, and the 12 blast furnaces in operation are making none too much iron. Melters are buying in small lots, specifying early delivery.

## Iron Ore

Iron Ore Prices, Page 71

**Cleveland**—Fitting out of boats by the larger fleets is going forward in preparation for the opening of Great Lakes navigation, possibly within the next fortnight. Some bulk freighters will be sent out immediately after ice is off the upper lakes, since ore is needed by some consumers. Contracts are being closed by shippers steadily at the reaffirmed prices for 1936, but several important users have not as yet closed, including the Ford Motor Co. However, these remaining negotiations are expected to close shortly.

**Baltimore**—Substantial arrivals of

# FINISHES

DESIGNED FOR EFFICIENCY  
FINISHED FOR BEAUTY AND DUTY



Built by The J. G. Brill Company, Philadelphia, for the Delaware River Joint Commission, these cars embody the latest engineering developments in heavy duty interurban transit, and they are finished inside and out with Sherwin-Williams Finishes.

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iron ore are reported here. In the period from March 25 to April 8, inclusive, 95,531 tons came in, including three lots from Cruz Grande, Chile, amounting to 64,900 tons, and four other lots, totaling 30,631 tons. These latter four comprised 8251 tons from Norvik, Sweden; 6874 tons from the same port; 4006 tons from Whyalla, Australia, and 11,500 tons from Daiquiri, Cuba.

Several shipments of manganese ore arrived, comprising 9800 tons from Rio de Janeiro, Brazil, 7000 tons from Poti, Russia, 8160 tons

from Takoradi, Gold Coast, Africa, and 3600 tons from Calcutta, India.

Fifteen hundred tons of chrome ore came in from Volo, Greece. Two shipments of ferromanganese arrived, 450 tons coming in from Heroen, Norway, and 280 tons from Yokohama, Japan.

**Birmingham, Ala.**—Tennessee Coal, Iron & Railroad Co. recently brought in 5270 tons of imported manganese ore by water, using the Warrior river with its own barge service after the ore was landed at Mobile.

## Scrap

Scrap Prices, Page 71

**Pittsburgh**—Owing to heavy inbound shipments of scrap in early April, the consuming demand of most mills here has been temporarily silenced. Although no shipping embargoes have been issued, in many cases mill scrap inventories here are at the highest point this year. With this lull brokers the past week have been able to drop their buying prices and make some return against the last orders taken at \$16 for No. 1 steel. Heavy steel foundry schedules have reacted on the railroad specialties market, which is now quoted \$17.75 to \$18.25 for wheels, couplers and knuckles and \$18 to \$18.50 on springs.

**Cleveland**—Buying of iron and steel scrap continues hampered by scarcity. Both dealers and brokers continue chary of making commitments, and mills as yet have not felt the necessity of rebuilding their dwindling stocks. Shipments are going forward as usual on contracts, but belief is that negotiations with consumers may be opened up within a fortnight.

**Chicago**—Scrap shows a stronger tone following a mill purchase of heavy melting steel at \$14.50. While this remains the top of the consumers' market, dealers find scrap supplies less plentiful, and covering on previous contracts has developed a stronger situation in transactions among dealers and brokers. Shipments to consumers continue heavy and favorable prospects for maintenance of such deliveries during the next several months comprise a strengthening factor.

**Boston**—Dealers have marked down buying prices on stove plate by 25 cents a ton. Due to larger shipments by collectors the market seems to have leveled off. While present prices in general are firm, the upward movement has been halted for the moment.

**New York**—Demand for iron and steel scrap for export continues active and prices on steel scrap moved

up further during the past week. Dealers now are paying \$10 delivered at New York or Brooklyn docks for No. 1 heavy melting steel and \$9 for No. 2 or auto steel. Most of the buying by dealers for domestic consumption is in connection with old orders. Aside from one large eastern steel company new orders are scarce. An eastern Pennsylvania steel company has embargoed as it has a large number of unloaded cars on hand and has suspended production in one of its open hearth plants.

**Philadelphia**—For the second consecutive week scrap prices are without important change. Considerable scrap is moving into the Harrisburg, Pa., district, where operations are expanding sharply, following recent flood disturbances. Apart from this little new business is being booked for domestic consumers, with shipments against contracts coming out rather freely. One boat left Port Richmond recently with a partial cargo of scrap for Japan and another is expected to leave momentarily with a partial cargo—all of No. 1 steel, for another foreign destination.

**Buffalo**—Bethlehem Steel Co. has purchased 25,000 tons of No. 1 heavy melting steel for immediate shipment to its Lackawanna plant. Another sale earlier in the week involving a small tonnage, was at \$13.50. The market is strong.

**Detroit**—Heavier supplies of scrap from automobile plants have further depressed the market, and hydraulic compressed sheets, loose sheet clippings, machine shop turnings, shoveling turnings and No. 2 heavy melting steel have lost 25 to 50 cents a ton. Stocks of scrap are 50 to 75 per cent smaller than a year ago.

**Cincinnati**—Iron and steel scrap is moving in good volume on contracts but new tonnage buying is absent. Dealer activity is fair and material is freer than earlier in the year.

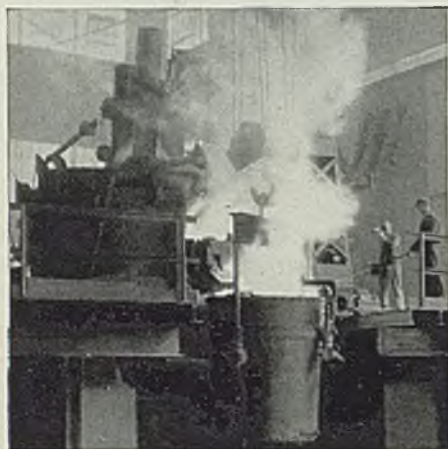
**St. Louis**—Purchasing of iron and steel scrap is in small volume. Prices have receded moderately but in the case of a number of grades there has been no actual test and quotations are largely nominal. There is considerable activity among dealers endeavoring to cover ahead of new buying, expected during the next week or ten days.

**Birmingham, Ala.**—Movement of steel and iron scrap is steady with deliveries meeting requirements. Prices are steady.

**Seattle**—Scrap is in good demand. Tidewater stocks are low. The domestic turnover is well sustained with mills buying their requirements and increased sales to foundries. Mills are paying \$10 for No. 1 and \$8 for No. 2. The former is quoted at \$10.50 for export. Japanese buyers are willing to pay export prices



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but dealers are finding it difficult to obtain ocean space. Italian interests are seeking space but longshoremen have refused to load material which they claim is to be used in warfare. Italian buyers say they have 15,000 tons under option in this area.

## Warehouse

Warehouse Prices, Page 72

**Pittsburgh**—Due to a general suspension of shipments the third week in March, April shipments will better the total March showing. Demand continues brisk, and prices are firm.

**Chicago**—Sales disclose no slackening, with business comparing favorably with previous months of this year and with the corresponding 1935 period. Prices are unchanged.

**New York**—Current business is at an appreciably higher rate than during the first three months of this year, and prospects for a continuance of this brisk buying are considered bright. Prices are unchanged. Jobbers continue to encounter considerable competition from foreign steel, which includes bars, shapes, plates and heavy gage black sheets.

**Philadelphia**—Buying is being well sustained and some leading jobbers are now of the opinion that if April business holds to the March rate they will be satisfied, notwithstanding the fact that flood replacements in the affected areas up-state have not as yet made themselves felt in the local market. Prices are unchanged.

**Detroit**—A remarkably good diversification is still apparent in sales out of warehouse. Further gains are promised for May, when large automobile tool and die programs begin. Prices are unchanged.

**Cincinnati**—Demand is steady, chiefly from industrial users. Numerous inquiries for building projects are a feature, but so far not converted into many orders. Distillery and governmental projects are dull. Prices are unchanged.

**St. Louis**—Following a fairly brisk March, warehouse interests report marked improvement in business since April 1. Products for use in rural areas are moving in greater volume. The stove industry, and manufacturers of household appliances are heavy buyers of sheets. One interest reports best sales of tool steel in more than a decade. Prices are steady.

**Seattle**—Spring buying continues active, and shows a gain over the corresponding period of 1935. Public works projects and the Puget Sound navy yard are buying miscellaneous items in numerous but small lots.

Mill buying is infrequent. Prices are firm.

## Metallurgical Coke

Coke Prices, Page 69

No quotable change has occurred the past week in beehive foundry or furnace coke. Foundry buying at Pittsburgh appears to be slightly heavier; otherwise specifications are generally unchanged.

Shipments in the Chicago district are about 20 per cent higher than a year ago and above several recent years. Cincinnati coke shipments indicate increasing foundry activity. Birmingham, Ala., suppliers find conditions unchanged and prices are steady.

## Coke By-Products

Coke By-Product Prices, Page 69

**New York**—For the second time this year the price of sulphate of ammonia has been advanced \$1 per net ton. The new quotation is \$26, in bulk, f.o.b. cars at Atlantic and Gulf ports. This makes a total advance of \$2 per net ton since the beginning of the year. Prices on all of the other coal tar products are un-

changed but firm. All of the distillates, particularly toluol, benzol and xylol, are in strong demand. The continued improvement in the automobile industry is responsible for much of the increased business.

## Nonferrous Metals

Nonferrous Metal Prices, Page 70

**New York**—Copper consumers rushed the heaviest volume of buying orders into the domestic market last week in the history of the market in order to cover needs over the summer months prior to the well-heralded advance in electrolytic to 9.50c, Connecticut. This was unquestionably the outstanding development in nonferrous metal markets.

**Copper**—All sellers advanced quotations Tuesday to the basis of 9.50c, Connecticut, for electrolytic as sales for the first 13 days of the month reached the record total of 148,288 tons. This tremendous buying wave brought the market to the highest level recorded since April 28, 1931. Base prices on copper wire and most copper and brass mill products, including scrap allowances, advanced ¼-cent also. Outlook for the market is now for light routine buying



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and steady prices over the summer months.

**Lead**—Demand held steady with much better buying during the latter part of April in sight. Prices were firm on the basis of 4.45c, East St. Louis, and 4.60c, New York, with St. Joseph lead still asking \$1 premium per ton in the East.

**Zinc**—New business was light and routine with prices holding steady at 4.90c, East St. Louis, for prime western. The statistical position of the industry continued to improve with unfilled orders on sellers' books showing a further decline.

**Tin**—Buying was dull and spotty. Prices declined on recessions in London with the close around 46.50c on Straits spot.

**Antimony**—American antimony was cut ¼-cent to 12.50c, New York, while Chinese metal was nominally unchanged at 13.50c, duty paid New York.

## Steel in Europe

Foreign Steel Prices, Page 72

**London**—(By Radio)—Easter holidays interrupted placing of new business in steel and iron in Great Britain but producers are well booked into second half. The outlook is promising for continued full production over a long period. Shipbuilding prospects on the Clyde are excellent and demand for structural and railroad material is strong. Sheet exports are improving, except for galvanized, and movement of tin plate is satisfactory.

The Continent reports market con-

ditions quiet except for brisk trade with Great Britain. Berlin finds encouraging signs of activity in export markets.

## Japanese Offering Steel Products on Pacific Coast

**San Francisco**—Jobbers and distributors on the Pacific coast note a threatened invasion by Japanese interests. Buyers have received letters from a Japanese trading concern offering iron and steel products produced by such Japanese manufacturers as the Nakayama Steel Products Co. Ltd., Yokohama and Amagasaki, Japan; the Tokio Iron Pipe Fittings Mfg. Co. Ltd., Osaka; and the Naigai Steel Works, Tokio.

Products include mild steel bars, shapes and sheets; cast iron pipe; steel pipe and fittings; bolts, nuts and rivets; wire nails, galvanized nails; wire rope; tin plate; galvanized sheets; brass and copper wire, sheet and rods; aluminum, and expanded lath.

Jobbers see the possibility of further unsettlement of their market, which for months has been disturbed by heavy importations of Belgian and German steel products.

Actually little iron and steel has come into this country recently from Japan. Imports, so far this year include only 4 tons of sheets, skelp and sawplate.

Consolidated Gas Co. of New York has changed its name to Consolidated Edison Co. of New York Inc. This change became effective March 24.

E. B. Stockmann is purchasing agent, and F. H. Walsh is assistant purchasing agent.

## Expositions Are Outlet for Steel

**S**TEEL is being used more abundantly in construction of buildings for regional expositions, with a view to making them permanent.

Sponsors of the Texas centennial exposition at Dallas, which will open its gates June 6 in anticipation of 10,000,000 visitors this summer, estimate that they have spent \$1,000,000 for steel, its transportation and fabrication. Among the most imposing structures is one for which 600 tons of fabricated shapes were awarded in January to Bethlehem Steel Co.

The Hall of State, costing \$1,000,000, is said to have \$200,000 worth of steelwork in it. The federal government erected a similar structure. In addition, there are an agricultural building, two livestock buildings, and a varied industries home, all of which have required substantial tonnages of steel.

Part of the exposition is located on the site of the state fair grounds, this fair having been a great attraction annually for the past 40 years. The permanent buildings hereafter will be used to enlarge the scope of the fair.

In Cherokee county, some four hours by automobile from Dallas, there are known to be iron ore deposits. About the turn of the century an eastern corporation planned to develop these deposits. A town, a few miles distant from Rusk, was platted; a handsome hotel erected—and the boom was on. But high transportation costs and other factors burst the bubble. The deposits were not developed. The old hotel stood as a ghostly sentinel for a quarter of a century, and finally was destroyed by fire a few years ago. The "boom" town bore the name of New Birmingham.

A similar story of the use of steel for exposition buildings is told of the San Diego, Calif., fair, the Great Lakes exposition, which will be opened at Cleveland this summer, and others of lesser importance. For the Great Lakes buildings, steel awards this spring have totaled 700 to 800 tons.

## Danes Buy More Machinery

Increasing industrial activity in Denmark during the last five years has resulted in notably stimulating the demand for all types of machin-

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ery in that market, according to a report to the commerce department from Assistant Trade Commissioner Paul S. Pearson, Copenhagen.

It is estimated that Denmark's annual consumption of industrial machinery now reaches a value of approximately 60 million crowns (\$13,200,000), of which domestic production accounts for between 60 and 70 per cent.

## Activities of Steel Users and Makers

**A**LLIS-CHALMERS MFG. CO., Milwaukee, is operating its tractor plants at Springfield, Ill., and West Allis and La Crosse, Wis., 24 hours a day. Demand for industrial as well as agricultural type units is such that the backlog of orders is growing steadily. The firm's tractor business in 1935 was the largest in its history, but farm tractor sales so far this year are well above last year, while the industrial line also shows a substantial increase.

Horace T. Potts Co., Philadelphia, has been appointed distributor for the products of the United States Gypsum Co., Chicago, maker of Shelf-X flat mesh steel, Red Top expanded metal and accessories.

Superior Mold & Iron Co., Penn. Pa., has been organized for the manufacture of ingot molds, iron castings and articles made from iron, steel, zinc, brass, copper and other metals. Officers include W. D. Hockensmith, president; Ervin A. Wolff, vice president, and C. L. Herbster, treasurer.

Republic Steel Corp., Cleveland, has appointed Equitable Equipment Co. Inc., New Orleans, distributor of its Enduro stainless steel, and York Corrugating Co., York, Pa., and Sheet Metal Mfg. Co. Inc., Stamford, Conn., distributors of its Toncan iron sheets.

Carl Schenck G.m.b.H., Darmstadt, Germany, has appointed the R. Y. Forner Co., 161 Devonshire street, Boston, as exclusive representative in United States and Canada for its line of material testing equipment, as well as dynamic balancing machines and static balancing devices for rotating bodies of every sort.

General Electric Co., Schenectady, N. Y., booked orders for the first quarter of 1936 amounting to \$59,569,879, compared with \$49,379,932 for the corresponding quarter of 1935, an increase of 21 per cent. This

was the largest quarter since the third quarter of 1931.

Round Oak Stove Co., Dowagiac, Mich., has placed an order with the Ferro Enamel Corp., Cleveland, for a new 5 x 12-foot box-type fuel fired furnace, complete with full Alundum muffle, Ferro heavy-duty double charging fork, Brown Pyrometer, and North American oil burning equipment.

C. R. Raquet, vice president, Detroit Steel Products Co., Detroit, reports sales of Fenestra steel windows in the first two months of this year increased 65 per cent over the same period in 1935. This increase is particularly noteworthy as the severely cold weather practically suspended building activities for about half of this period.

Schulte Grinding & Polishing Machine Co. Inc., Cleveland, designer and builder of automatic, electrically-controlled sheet grinding, polishing and buffing machines, has removed its office from 6400 Breakwater avenue to 3300 Riverside avenue, Southwest, Cleveland. Louis Schulte, founder of the firm, is in full control and charge.

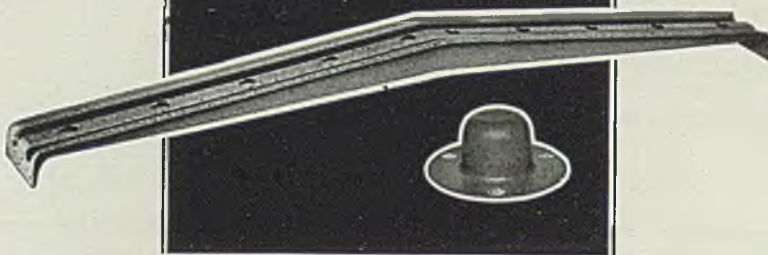
Timken Roller Bearing Co., Can-

ton, O., has booked an order from the Electro-Motive Corp., La Grange, Ill., for Timken bearings and journal boxes to equip all axles of four high-speed 1800-horsepower, and two 1200-horsepower diesel electric locomotives which it is building for the Chicago, Burlington & Quincy railroad.

The business in automatic regulation previously carried on by H. A. Brassert & Co. in the iron and steel industry, and by the American Askania Corp. in other industries, has been united and placed in the hands of a newly-organized company, known as the Askania Regulator Co., with headquarters at 1603 South Michigan avenue, Chicago. This change became effective the first week in March. All sales and manufacturing to all industries will be concentrated within the new organization.

Joslyn Mfg. & Supply Co., Chicago, has acquired the controlling interest in Pacific Iron & Steel Co., Los Angeles, structural steel manufacturer in Los Angeles. Practically no changes have been made in the personnel of the Pacific Iron & Steel Co. C. E. Bradburn is president; A. W. Lewis, vice president; C. W. Ish-

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bell, secretary, and Harry Detrick, vice president of the Joslyn Co. of California, treasurer. Construction of a new office building is planned.

## Equipment

**Chicago**—Most equipment markets show an equal or improved rate of activity compared with that of previous months this year. Machine tool sales to date disclose a moderate increase since a month ago and inquiries are appearing in sufficient volume to indicate fairly active business during the balance of this quarter. The Santa Fe railroad has closed on a portion of its recent inquiry but new lists from railroad shops are lacking. Foundry equipment demand is fairly steady, with further gains looked for after the Detroit exposition. Small tool buying reflects active metalworking operations in most industries.

**Pittsburgh**—Jones & Laughlin Steel Corp., Pittsburgh, shortly will turn over the new blooming mill at its South Side works, which has been under construction by the Mackintosh-Hemphill Co. for the past year. This was the first step in the company's improvement program, which includes the construction of a strip-sheet mill, the order having recently been placed with Mesta Machine Co.

**Seattle**—Equipment used in general industrial lines is in good demand while mining interests are also active in the market. Logging and lumber manufacturers are meeting requirements so that that volume of sales is well ahead of a year ago. A new assembly plant for the Boeing

Aircraft Co., Seattle, will require machinery and equipment. Tacoma, Wash., light department is in the market for a bulldozer.

**New York**—Prices on machine tools continue to advance. Mark-ups of the past week applied to radial drills and shears, and amount to about 10 per cent. The volume of

business continues heavy, with deliveries on some equipment moving further into the future. The principal business now before the metropolitan dealers is a \$100,000 list of tools for the Independent subway system which the New York board of transportation is expected to place without delay.

# Construction and Enterprise

## Ohio

**AKRON, O.**—Ohio Edison Co., 47 North Main street, will erect a \$100,000 service building in Springfield, O., this summer to handle expanding business.

**BRYAN, O.**—Village is planning sewage treatment plant to cost \$125,000, for which plans have been submitted by George Champe & Associates, engineer, 1025 Nicholas building, Toledo, O. Eber Payne is mayor.

**CINCINNATI**—City has permit for erection of electric pumping plant in Western Hills district, costing \$125,000 with equipment. Architect is Joseph G. Steinkamp, Mercantile Library building, Cincinnati.

**CINCINNATI**—Charles E. Lex Jr., city purchasing agent, room 143, City hall, is taking bids April 21 for centrifugal pumps, stationary rock crusher and stationary air compressor for department of public works.

**COSHOCTON, O.**—Victor Johnson, service director, has extended date for receiving bids on waterworks chlorinator from April 15 until April 23. Cost is estimated at \$1000, with allowance on old machine. (Noted STEEL April 6.)

**COLDWATER, O.**—Village plans erection of municipal electric light

plant to cost \$100,000. John H. Boeke is mayor.

**COLUMBUS, O.**—A. M. Kinney Inc., Carew Tower, Cincinnati, will require the following equipment in connection with the enlargement of the Columbus plant of the Kroger Grocery & Baking Co., 35 East Seventh street, Cincinnati: Power piping, boiler setting, pulverized fuel burning equipment, feedwater pumps, barometric condenser, coal handling equipment, and an ash conveying system. (Noted STEEL, April 6.)

**DAYTON, O.**—Contracting officer, materiel division, air corps, Wright field, will receive bids until April 28 for motor-generator set, circular 36-761; air cooled compressor, circular 36-762; and until April 29 for a tube bending machine, circular 36-766.

**DENNISON, O.**—City plans purchase of plant and equipment of Dennison Water Supply Co., property of Community Water Service Co., 100 William street, New York, and will improve and extend facilities.

**DOVER, O.**—City will take bids soon for erection of new light plant building, 55 x 100 feet, to house two boilers with coal crushers and additional equipment, one turbine, pumps, and auxiliaries, at a cost of \$41,000. Homer Keppler is service director. City hall, and Waldo Hartline is city engineer.

City is taking bids April 29 for furnishing and installing hot process water softener and heater and reciprocating air compressor at light plant. Homer Keppler is city service director. Arnold, Rosch & Hartline, engineers, New Philadelphia, O.

**ENGLEWOOD, O.**—Village taking bids due April 27 for 100,000-gallon steel water tank on 100-foot tower and for 150-gallons-per-minute turbine pump, 30-foot setting, 375-foot head. Total cost estimated at \$57,500. William A. Butz is mayor, Collins Wight, Union Trust building, Dayton, O., engineer.

**HAMILTON, O.**—City will receive bids soon on 10,000-kilowatt steam turbogenerator for its light plant. In addition, council and Russell P. Price, city manager, plan to remodel north wall of plant, total cost to be \$464,200. (Noted STEEL, April 13.)

**PAINESVILLE, O.**—City plans to include installation of a stoker and piping appurtenances in connection with its program of light plant improvement, and in addition to install a 550-horsepower boiler. Total cost \$100,000. C. S. Fullerton is city manager, K. G. Smith, city engineer. (Noted STEEL April 13.)

**PORTSMOUTH, O.**—City is planning flood defense program with WPA

(Please turn to Page 90)



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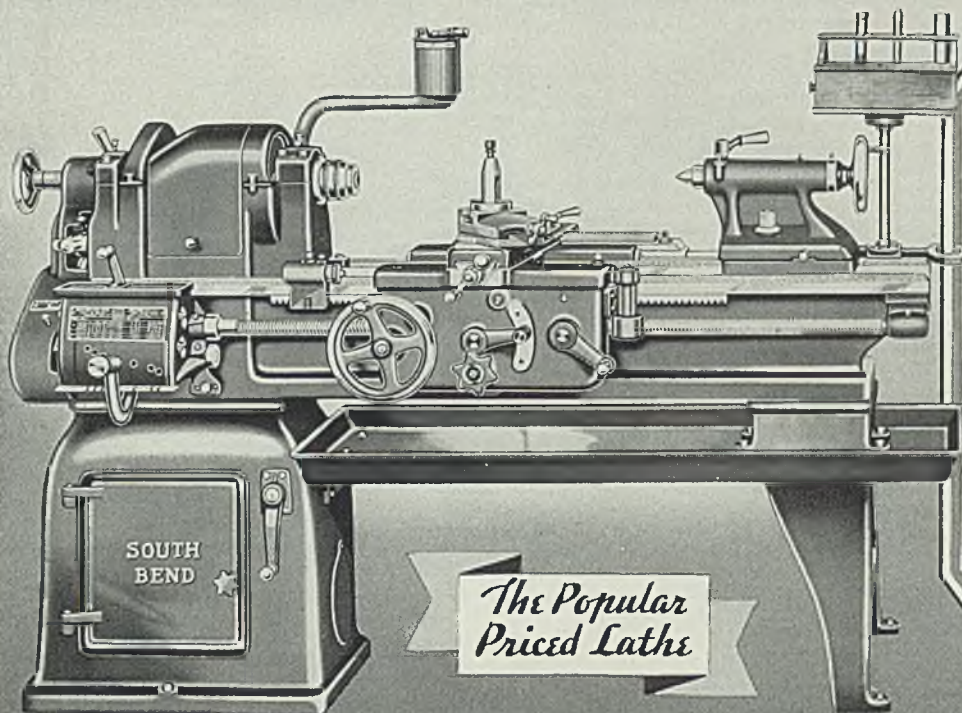
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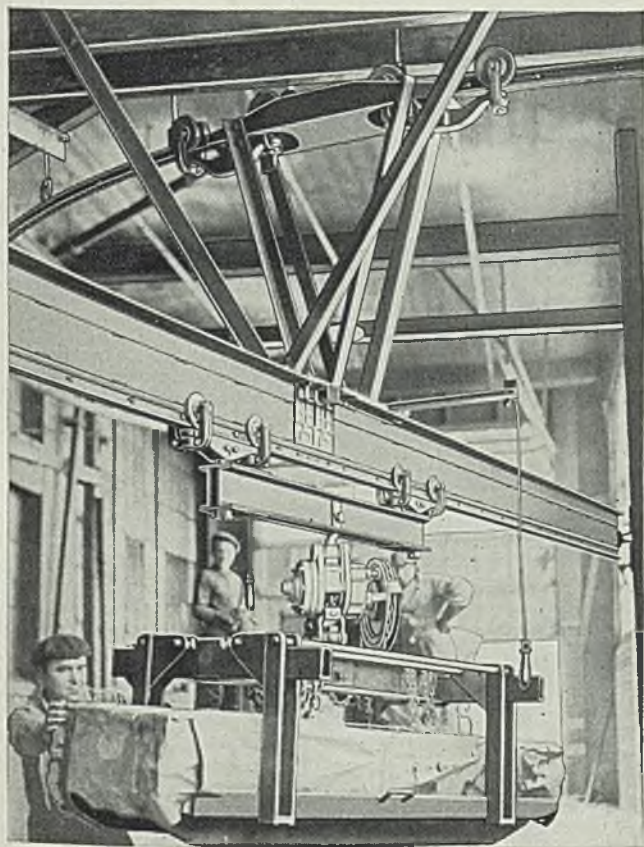
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Cleveland, Ohio

(Continued from Page 88)

aid, total to cost \$300,000. Included will be new pumping station at Eleventh and Washington streets, replacement of three old steam pumping stations, and strengthening of fill along river shore. Frank E. Sheehan is city manager, L. L. Henninger WPA director, district No. 11, Chillicothe, O.

SANDUSKY, O. — City plans \$1,000,000 municipal power plant as soon as legal delays are ended. Burns & McDonnell Engineering Co., 107 West Linwood boulevard, Kansas City, Mo., engineer.

SIDNEY, O.—City taking bids due noon April 24 for deep well turbine pump with motor and accessories. A. Query is service director. (Noted STEEL April 6.)

SPRINGFIELD, O. — International Harvester Co., 606 South Michigan avenue, Chicago, plans \$100,000 three-story, 50 x 62-foot power plant at its branch factory on Lagonda avenue, Springfield. W. H. Kruger is company engineer in charge.

TOLEDO, O. — City Auto Stamping Co., Lint avenue, has prepared plans for an addition to its plant.

### Michigan

DETROIT — Barkley-Grow Aircraft Corp. will install machinery in a factory at the city airport, 13210 French road. (Noted STEEL, April 13.)

DETROIT — Mildner & Eisen, architects, 924 Hamm building, are preparing plans for a bottling plant, two-story, 75 x 125 feet, to be built at the foot of Dubois avenue, for the Koppitz-Melchers Brewing Co.

GRAND RAPIDS, MICH. — Owen-Ames-Kimball Co., 38 Pearl street, Northwest, is in complete charge of purchasing equipment and steel for an addition to the factory of Kindel Furniture Co., 100 Garden street, Southeast. (Noted STEEL, April 13.)

GRAND RAPIDS, MICH. — Don Lakie, architect, 2180 Francis street, Southeast, is taking bids for a factory building, one-story, 90 x 100 feet, to be

built for Hodge Tool & Mfg. Co., at estimated cost of \$20,000.

### Illinois

ALTAMONT, ILL. — City will take bids soon for a \$30,000 electric light and power plant. W. V. Klitzing is mayor and W. A. Fuller, 2916 Shenandoah avenue, St. Louis, is engineer.

CHICAGO — Zenith Radio Corp., 2630 South Iron street, plans construction of plant costing over \$40,000.

CHICAGO — Hunter Co., 608 South Dearborn street, is taking bids on boilers, turbines and pumps for power plant at Diamond Braiding Mills, Chicago Heights, Ill.

CHICAGO — Dale Valve Co., 1923 West Carroll street, will soon let contract for construction of three-story, 80 x 123-foot factory at 1939 West Carroll street. Ivar Viehenaess, 5809 North Ridge avenue, is engineer.

MENDOTA, ILL. — Sampsell Stoker Corp. has been organized to manufacture mechanical stokers, by A. V. Sampsell, W. E. Michel, O. J. Ellingen and R. W. Conkey. Correspondent is H. D. Conkey & Co., Mendota, Ill.

### Indiana

AUSTIN, IND.—Austin Packing Co., I. Mogan president, will soon take bids on one-story, 100 x 200-foot meat packing plant to cost \$50,000.

GAS CITY, IND. — Owens-Illinois Glass Co. is building an addition to its plant here, for which the general contract has been given to the Austin Co., 16112 Euclid avenue, Cleveland.

HUNTINGTON, IND. — Huntington Municipal Light & Power Co. plans construction of new steam electric plant near city limits, to cost \$125,000.

INDIANAPOLIS — Indiana Bearings Inc., 229 North Capitol avenue, has been organized to manufacture and deal in bearings and automobile replacement parts, by Wallace J. Baker, M. E. Fahey, and Katherine Biser.

INDIANAPOLIS — Bate Equipment

Corp., 250 North Capitol avenue, has been organized to manufacture motor buses, trucks, machinery and motors by Harry C. Bate, H. L. Breckenridge, J. H. Shields, H. A. Kohler, Martin Bate and Ernest M. Botkin.

INDIANAPOLIS—Indianapolis Brass & Aluminum Foundry, Clay Bush president, 1410 West Morris street, was damaged recently by fire, the loss being mainly in patterns and machinery.

PETERSBURG, IND.—City plans municipal light and power plant costing \$35,000, to be financed with federal aid.

RICHMOND, IND.—Board of education, W. A. Crum president, 12 North Tenth street, will receive bids until April 23 for installation of new heating and ventilating system in Starr school, Fifteenth and North streets, including two steel boilers, air compressor and tanks. Total cost \$12,000. Architect is J. L. Hamilton, 81 Tower court, Chicago.

### Pennsylvania

EDGEWORTH, PA.—Edgeworth Water Co. will receive bids until April 23 for installation of a water softening plant in an addition to its pumping station.

FLEETWOOD, PA. — Borough plans a new \$37,000 municipal electric light plant. S. Hoch is borough secretary.

GLENFIELD, PA. — Borough will revise plans and specifications on which no bids were received April 6 for a water distribution and sewer system, and will ask new bids soon. J. W. Schneider is borough secretary and John M. Rice Grant building, Pittsburgh, engineer. (Noted STEEL, March 23.)

LOCK HAVEN, PA. — Borough plans repairs and replacement of water system and waterworks equipment, to cost \$252,000, with WPA to purchase material. R. S. Kift is borough engineer.

PITTSBURGH — Etna Forge & River Co., Commonwealth building, will rebuild its Union street forge shop, damaged March 17 by fire.

SMITHTON, PA. — S. H. Smith Smithton borough secretary, will receive bids until April 27 for water works equipment, including pumps, softening and filtration equipment and connections.

WILLIAMSPORT, PA. — Swift & Co., Fourth and Hepburn streets, Williamsport, plans construction of branch warehouse and plant, including installation of new packing machinery and equipment on property at Lycoming and Locust street. Cost estimated at \$150,000.

### New York

ALBANY, N. Y.—Armour & Co. Union Stock yards, Chicago, and 37 Spencer street, Albany, plans construction of two-story plant addition to cost \$40,000.

BROOKLYN, N. Y.—Pananello & D'Aniello, 5623 Second avenue, plans construction of scrap metal and junk plant extension to cost \$37,000.

BUFFALO — Francis Perot's Sons Malting Co., 100 Childs street, is building a three-story addition to its plant, costing about \$200,000, for which the Monarch Engineering Co., Chamber of Commerce building, has the general contract.

GENEVA, N. Y. — City will take bids

(Please turn to Page 92)

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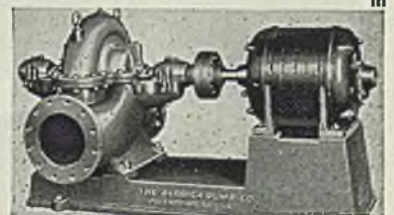
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*(Continued from Page 90)*

in about 60 days for construction of sewage disposal plant. J. W. Brennan, City hall, superintendent of public works, is in charge of plans.

**HOMER, N. Y.**—Newton Woolen Mills, C. Miller president, plans rebuilding woolen mill damaged by fire.

**IRVINGTON, N. Y.**—E. A. Matthiesen, Irvington, plans construction of 30,000-gallon steel water tank and pump house. Estimated cost over \$23,000.

**LONG ISLAND CITY, N. Y.**—American Brake Shoe & Foundry Co., 230 Park avenue, New York, will take bids soon for construction of new factory at Riverside avenue and Long Island railroad. W. A. Winters is in charge, care of owner.

**NEW YORK**—Standard Oil Co. of New Jersey, 26 Broadway, New York, is planning repairs and alterations to bulk oil storage plants in areas recently devastated by floods, including Pennsylvania, West Virginia and Connecticut.

**ROME, N. Y.**—Rome Cable Co. plans alterations and addition to factory, to cost over \$40,000.

**Connecticut**

**NORWALK, CONN.**—Norwalk General hospital plans 22 x 38-foot addition to boiler plant on Stevens street, including two new boiler units and accessories. Robert S. Schultz, 36 Euclid avenue, Maplewood, N. J., is engineer.

**STEVENSON, CONN.**—Connecticut Light & Power Co., 155 High street, Hartford, Conn., R. H. Knowlton vice president, has appropriated funds for \$200-kilowatt turbine at Stevenson power plant, and for a 25,000-kilowatt turbo-generator at Montville, Conn.

**UNIONVILLE, CONN.**—Union Electric Light & Power Co., D. C. Payne superintendent, has appropriated \$35,000 for electric power plant equipment.

**Massachusetts**

**NORTH ADAMS, MASS.**—City plans \$1,000,000 municipal light plant, and a bond issue to finance it is contemplated. W. Johnson is mayor.

**SPRINGFIELD, MASS.**—Moore Drop Forging Co., 38 Water street, is rebuilding factory recently damaged by fire and flood. New material and equipment will be required.

**Alabama**

**BIRMINGHAM, ALA.**—W. M. Smith & Co., Forty-eighth street and Fifth avenue, are in the market for an 8 to 12-foot shear for boiler plate.

**BREWTON, ALA.**—T. R. Miller Mill Co. is improving its saw mill and remodeling power plant, including installation of two Hedges-Walsh-Weidner 600-horsepower water tube boilers.

**BIRMINGHAM, ALA.**—Armour & Co., Union Stockyards, Chicago, has acquired plant of Birmingham Packing Co., at 2314 North Twenty-fourth street, and plans enlargement.

**Maryland**

**BALTIMORE**—National Wholesale Liquor Co., 410 East Pratt street, plans new distilling plant on Philadelphia road.

**Kentucky**

**LEBANON, KY.**—John A. Wathen Distillery Co., William J. Harris vice

president in charge, plans enlargement of plant, including boiler room, fermenting tubs and 85 x 102 foot warehouse, to cost over \$100,000.

**LEXINGTON, KY.**—City plans construction of new waterworks system and will apply for federal funds. Included will be a filtration and treatment plant and a complete distribution system. E. Reed Wilson, mayor.

**LOUISVILLE, KY.**—J. H. Durham, chairman sewerage commission, will take bids until April 30 for pumps and equipment, including three electric-motor-driven, vertical shaft pumps, with capacities of 30,000, 45,000 and 56,000 gallons per minute.

**Florida**

**DeLAND, FLA.**—City commissioners have approved ordinance providing for issuance of \$356,000 revenue certificates to finance construction of electric power generating and distributing system, aided by \$117,000 additional PWA grant.

**FORT PIERCE, FLA.**—Fort Pierce Growers association, W. M. Moseley manager, is taking bids on materials for \$100,000 citrus packing plant, 165 x 224 feet.

**MIAMI, FLA.**—City plans purchase of motor-driven pumps and auxiliary equipment for waterworks.

**PLANT CITY, FLA.**—Carey Citrus Products Corp. plans installation of power plant equipment in connection with proposed rebuilding of fire-damaged packing and canning plant. Cost of the work is expected to run over \$80,000. G. A. Carey is president.

**Georgia**

**ATLANTA, GA.**—Chevrolet Motor Co. plans installation of electrical equipment in new \$250,000 one-story addition. Main offices of the company are at 3044 West Grand boulevard, Detroit.

**ATLANTA, GA.**—Southern Waxed Paper Co., 840 Woodrow avenue, Southwest, plans installing power equipment at cost of \$75,000 in new addition to plant. Benjamin Lacy is general manager.

**COOLIDGE, GA.**—City plans installation of 50,000-gallon steel water tank and new pumping equipment.

**SAVANNAH, GA.**—Union Bag & Paper Co., Woolworth building, New York, will construct a \$4,000,000 pulp and paper mill here, for which the general contractor is Merritt, Chapman & Scott, 17 Battery place, New York.

**TIFTON, GA.**—Georgia Power Co. is starting work on a 150 x 150-foot electric power substation, to generate 110,000 volts.

**Louisiana**

**WINNFIELD, LA.**—Louisiana Stone & Lime Corp., Shreveport, La., is installing primary and secondary crushers, conveyors, elevators and other equipment at limestone crushing plant at Easton, La., near here.

**Mississippi**

**FANNIN, MISS.**—Know Glass & Bottle Mfg. Co. plans repairs and alterations to plant costing \$40,000.

**North Carolina**

**CHARLOTTE, N. C.**—Atlantic Ice & Bottling Co., 247 Courtland street, Northeast, Atlanta, Ga., is contemplat-

ing construction of brewery to cost \$75,000.

**ELM CITY, N. C.**—City has voted appropriation for erection of 75,000-gallon steel tank on 80-foot tower to supplement town's water supply.

**HIGH POINT, N. C.**—E. M. Knox, city manager, has applied to PWA for 45 per cent grant in connection with planned \$7,500,000 municipal hydro-electric power plant and substations. Willis G. Waldo, 502 Mills building, Washington, will be retained as engineer if grant is approved.

**RALEIGH, N. C.**—Feden Steel Co. has been incorporated by J. M. Feden and E. O. Moody.

**SHELBY, N. C.**—Council is considering construction of new municipal power plant to cost about \$225,000.

**South Carolina**

**BEAUFORT, S. C.**—General Phosphate Co., Boston, will build a \$500,000 plant here, to mine phosphate rock in coastal counties. Charles B. Boykin and S. A. Childs, Charleston, S. C., are promoters of the project.

**COLUMBIA, S. C.**—State Rural Electrification Authority, 1539 Main street, will receive bids April 27 for furnishing all materials, equipment and labor for complete construction of approximately 150 miles of distribution lines in 11 counties.

**GREENVILLE, S. C.**—Duke Power Co., W. B. Ellis Jr. manager, plans construction of substation and installation of machinery, including three 1500-kilovolt transformers.

**Tennessee**

**ALAMA, TENN.**—City will erect 100,000-gallon steel storage tank and install new water distribution system. Joseph G. Hubbard is resident engineer.

**CHATTANOOGA, TENN.**—Chattanooga Electric Power board has authorized Mayor E. Bass, City hall, to sell \$100,000 block of bonds to finance construction of proposed electric light and power distributing system.

**CHATTANOOGA, TENN.**—Peerless Woolen Mills, John L. Hutchison president, is considering \$400,000 plant improvement program, including a new weaving room and equipment. Roberts & Co., Bona Allen building, Atlanta, Ga., engineer.

**COLUMBIA, TENN.**—City has authorized \$350,000 bond issue for new municipal electric power plant and distributing system.

**KNOXVILLE, TENN.**—Swift & Co., Union Stockyards, Chicago, will erect \$100,000 butter and ice cream plant on recently-acquired site on King street near Fifth avenue. Guy Fox is local manager.

**MEMPHIS, TENN.**—International Harvester Co., 215 South Pauline street, plans \$20,000 addition to plant. D. H. Boone is branch manager.

**MEMPHIS, TENN.**—Globe Union Mfg. Co., 900 East Keefe avenue, Milwaukee, plans factory construction. Engineer is J. T. Wallace, Commercial Title building, Memphis.

**West Virginia**

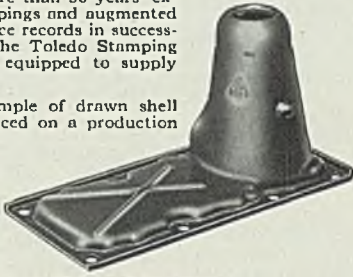
**CLARKSBURG, W. VA.**—National Can Co., 110 East Forty-second street, New York, plans \$40,000 improvements to plant.

**POWHATAN, W. VA.**—Powhatan  
*(Please turn to Page 94)*

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(Concluded from Page 92)

Coal & Coke Co. plans altering and repairing coal handling machinery and tippie at cost of \$40,000.

## Virginia

**JEWELL RIDGE, VA.**—Jewell Ridge Coal Corp. plans installing electric power equipment in connection with new tippie at coal-mining properties near here. Cost, including conveying equipment, will be over \$75,000. Allen & Garcia, 332 South Michigan avenue, Chicago, engineers.

**NORFOLK, VA.**—Henry Walker Co., machinery dealer, is looking for a horizontal tubular boiler, approximately 78 inches in diameter by 20 feet long.

**NORFOLK, VA.**—Virginia Electric & Power Co., Seventh and Franklin streets, Richmond, Va., plans extensions in power house at artificial gas plant at Norfolk, Va., including boiler installation. Total cost \$135,000.

## Missouri

**MARSHALL, MO.**—Missouri state building commission, E. M. Regan, executive secretary, State Capitol building, Jefferson City, Mo., has approved plans for extensions to steam power plant here, to include boiler units and auxiliary equipment, costing \$225,000. Charles A. Haskins, Finance building, Kansas City, Mo., is supervising plans.

**MT. VERNON, MO.**—Missouri State Building commission, E. M. Regan executive secretary, Capitol building, Jefferson City, Mo., plans construction of power plant costing \$200,000 at Missouri state sanitarium, Mt. Vernon. Engineers are Baumes & McDevitt, Railway Exchange building, St. Louis, and R. Toensfeldt, Security building, St. Louis.

**ST. JOSEPH, MO.**—St. Joseph Railway Light & Power Co. plans steam electric power plant addition, to cost \$450,000 with equipment.

## Texas

**BROWNSVILLE, TEX.**—Aransas Compress Co., Corpus Christi, Tex., plans construction of \$200,000 one-story boilerhouse in connection with new cotton compress plant at Brownsville. President is J. K. Cain.

**HOUSTON, TEX.**—Morton C. Tuttle & Co., 31 St. James avenue, Boston, has been awarded general contract for construction of a pulp mill here by the Champion Paper & Fibre Co., Hamilton, O. An electrolytic unit will cost \$500,000 and machinery and equipment is expected to cost \$2,000,000. (Noted STEEL April 6.)

**TEMPLE, TEX.**—Belfalls Light & Power Co. will call for bids in about 60 days for \$452,000 improvements to transmission system, including construction of diesel engine power plant and erection of 300 miles of rural transmission lines. William G. Morris, Bartlett, Tex., is engineer in charge. (Noted STEEL March 23.)

## Wisconsin

**DARLINGTON, WIS.**—City plans municipal power plant to cost \$200,000, and will take bids soon. Two diesel-engine generating units will be installed, and a third will be needed later. Van Vleet Engineering Co., Union Trust & Savings Bank building, Dubuque, Iowa, engineer.

**STEVENS POINT, WIS.**—Lullaby

Furniture Co., manufacturer of cradles, toys and children's furniture, has started construction of one-story saw mill, and a 40 x 100-foot factory.

**SUPERIOR, WIS.**—Union Sash & Door Co., Twelfth street and Oakes avenue, has started construction of a two-story, 45 x 105 foot factory to replace one destroyed recently by fire.

## Minnesota

**HIBBING, MINN.**—Independent school district No. 27, Hibbing, will ask for bids soon for automatic stokers and accessories for improvements to school boiler plants.

**MINNEAPOLIS**—Universal Insulation Co. has been incorporated to manufacture insulation material. Machinery and equipment are to be installed at 2821 East Hennepin avenue.

## Kansas

**GARDEN CITY, KANS.**—City plans extensions in water pumping plant, including 8000-gallon-per-minute pumping units and auxiliary equipment.

**IOLA, KANS.**—City will take bids soon for construction and equipment of municipal electric power plant and distribution system, to include substation, steam turbogenerator, and accessories. Total cost about \$225,000. Paulette & Wilson Engineering Co., National Reserve building, Topeka, Kans., engineer.

## North Dakota

**FARGO, N. DAK.**—Fargo Foundry Co., structural steel fabricator, will soon start improvements to and construction of a 50 x 70-foot addition to its foundry, cost estimated at \$40,000.

**LEHIGH, N. DAK.**—Lehigh Briquetting Co. will install new machinery and equipment in briquetting plant, including steam turbine, generating equipment, coal handling and mining equipment. Walter H. Wheeler, 802 Metropolitan Life building, Minneapolis, is consulting engineer.

## Iowa

**SHENANDOAH, IOWA**—H. Bartles, Shenandoah, has applied for franchise to construct diesel electric power plant at a cost of \$80,000.

## Nebraska

**OMAHA, NEBR.**—Fontenelle Brewing Co., has started construction of two-story, \$50,000 brewery addition, to include new machinery and conveyors and bottling equipment.

## Colorado

**DELTA, COLO.**—City has been granted \$197,000 federal loan for municipal power plant. Diesel-engine generating units are being considered. Engineers are Wood & Weber, Wilda building, Denver.

## Idaho

**JEROME, IDAHO**—W. A. Peters will spend \$400,000 over a five year period on a water project with a daily capacity of 12,000,000 gallons, and involving six pumping units. Underground water will be diverted.

## Pacific Coast

**LOS ANGELES**—Balboa Brewing Co. will build a \$200,000 bottling house at its plant on North Main street. D. W. Williams is president.

**LOS ANGELES**—Payne Furnace &

Supply Co. will build a new administration building and another story to its factory at 338 North Foothill boulevard, Beverly Hills, Calif.

**LOS ANGELES**—Hyland Stanford Co. Inc., 658 Mesquito street, plans one-story steam power plant, 67 x 79 feet, to cost \$28,000, with boilers and auxiliary equipment. Nigg Engineering Corp., Covina, Calif., engineer.

**NAPA, CALIF.**—Hedgeside Distillery is planning construction of a new distillery building, to cost \$100,000.

**PITTSBURG, CALIF.**—Shell Chemical Co. is starting construction of \$150,000 addition to its plant, including installation of machinery.

**RICHMOND, CALIF.**—California Spray Chemical Co., care of Stone & Webster, engineers, Russ building, San Francisco, plans construction of chemical spray plant, to cost over \$100,000.

**SAN FRANCISCO**—Public Utilities commission will take bids soon for construction of electric pumping station at Irvington, Calif., to cost \$50,000. Engineer is N. A. Eckart, 425 Mason street.

**SANTA BARBARA, CALIF.**—Goleta Lemon association is building a new packing plant six miles north of Santa Barbara, plant to be one-story, 120 x 300 feet.

**SUSANVILLE, CALIF.**—Lassen Lumber & Box Co. plans \$45,000 extension in mill power plant. Engineer is Hunt, Mirk & Co., 141 Second street, San Francisco.

**TORRANCE, CALIF.**—United Concrete Pipe Corp. is building a \$200,000 manufacturing plant at Arrow highway and Main street.

**SEATTLE**—Transport Motor Corp., 1519 Twelfth street, has purchased a two-story plant at Eighth and Lenora streets, and plans alterations costing \$15,000.

## Canada

**CHOATE, B. C.**—British Columbia Nickel Mines Ltd., 510 West Hastings street, Vancouver, B. C., plans construction of 500-ton nickel concentrator power plant to cost \$1,500,000. C. D. Kaeding, Toronto, Ont., is consulting metallurgist.

**GLACE BAY, N. S.**—John C. Nicholson, Dominion Coal Co. Ltd., Union street, is preparing plans for construction of new unit at Seaboard power plant, to cost \$250,000.

## Mellon Institute Reports

(Concluded from Page 56)

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