

STEEL

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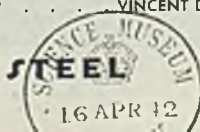
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As the Editor Views the News

PERSONS identified with industry as employes, stockholders or executives are concerned with the activities of congress in revising taxes. To date the work of the house ways and means committee is disappointing. Its 249-page tax bill (p. 37) falls far short of expectations voiced by the President in his tax message of March 3. At that time he outlined a plan for taxing corporation surpluses and stated: "Such a revision of our corporate taxes would effect great simplification in tax procedure, in corporate accounting, and in the understanding of the whole subject by the citizens of the nation. It would constitute distinct progress in tax reform."

In view of the complicated, confusing bill which the house committee has produced, the President's use of the words "simplification" and "understanding" seems ludicrous. To figure taxes under the proposed bill requires a study of numerous cumbersome percentage tables. In some cases the resultant rate must be carried out to the eighth decimal point. As far as understanding is concerned, it is difficult to believe that the man in the street can understand the bill, especially when it is generally conceded in Washington that only two or three members of the house committee who drafted the bill know what it means.

Industrialists find much to applaud in the minority report of the house ways and means committee, which criticizes the bill severely. The minority claims that the bill will threaten the security of business, employment and investments; discourage business rehabilitation and expansion; hamper the growth of small corporations; place a penalty on prudence and a bounty on improvidence; cause untold confusion; etc. In brief, the bill reeks of prejudiced authorship

and represents the thinking of the "quacks, academic non-producers and theoretical tinkers" referred to by Tom M. Girdler (p. 26) in his address to members of the American Zinc institute last Monday. Republic's chairman drew a fine line of demarcation between legitimate, necessary restriction, restraint and taxation of industry by government and unwarranted, political meddling, interference and persecution. We are receiving far too much of the latter from the present administration.

The water level of two temperamental lakes, Michigan and Huron, and the clearance in the St. Clair bottleneck mean more to the iron and steel industry than is generally realized. It has been calculated that a loss of one foot of draft (p. 36) in an average year means a loss of \$8,000,000 to lake shippers. Unusually low water in the past year accentuates the importance of control in this greatest of inland waterways.

After devoting many years to increasing the accuracy of gears, gearmakers now are engaged in solving the problem of noise. That quietness in gears was one of the major topics (p. 53) discussed at the twentieth annual convention of the American Gear Makers association reflects a significant trend in design.

While the past week witnessed a few jittery moments in Wall Street, industry maintained a high rate of activity. Outstanding in the current reports was the estimate that automobile assemblies (p. 33) totaled 120,519 units. This is the highest weekly output since the last week of July, 1929. Steelworks operations eased slightly during the week (p. 28), dropping a point to 69.5 per cent of capacity. Activity in the metalworking industries, as measured by STEEL's index (p. 40), advanced in the week ending April 18 to 103, the highest peak since the first week of May, 1930. Continued brisk inquiry and demand from the capital goods interests, particularly the railroads (p. 89) provide strong support to the current rate of industrial activity.

E. R. Shaner

Metal Trades Group Urges Closer Employe Relationship

ONE of the most comprehensive studies of employer-employe relationship ever undertaken in the metalworking industries was outlined at the thirty-eighth annual convention of the National Metal Trades association, Waldorf Astoria hotel, New York, April 22-23.

The study was undertaken since the last annual meeting by an especially appointed committee, which recommended a line of action which was given general approval by the membership. The work in this direction was described by various leaders as the most important now confronting industry.

The opening session was given over largely to addresses by the various members of this special committee, with H. W. Johnson, committee chairman and vice president and works manager of the De Laval Steam Turbine Co., Trenton, N. J., first stating the problem, as conceived by the committee, of effective co-operation between employer and employe.

Bulletins to Be Issued

He stressed the importance of general co-operation to the industry, to employers and employes alike, and gave his listeners some insight into the lines along which the committee has been working when he mentioned a series of nine bulletins, the first of which will soon be sent to association members.

While employer-employe relationship came in for principal discussion, other subjects, including taxes and various other phases of legislation affecting business, received important consideration. The annual dinner, held on the evening of April 22, was featured by an address entitled "The State of the Union", by Merle Thorpe, editor, *The Nation's Business*, New York. Attendance was perhaps the best in several years.

The first of the bulletins on employer-employe relationship will have to do with a general analysis of the problem, another with management-employe contacts, and still another with the wage incentive question. Another will cover a preliminary study of the training of superintendents,

Elect Strawbridge President

CHARLES H. STRAWBRIDGE, of the Goodman Mfg. Co., Chicago, was elected vice president of the National Metal Trades association for the ensuing year. Other officers elected were: First vice president, N. W. Pickering, Farrel-Birmingham Co. Inc., Ansonia, Conn.; second vice president, A. H. Timmerman, Wagner Electric Corp., St. Louis; treasurer, Harold C. Smith, Illinois Tool Works, Chicago. Councilors for two years: Alexander Sellers, William Sellers & Co. Inc., Philadelphia; R. W. Gillispie, the Jeffrey Mfg. Co., Columbus, O.; George A. Seyler, the Lunkenheimer Co., Cincinnati; Harold S. Falk, the Falk Corp., Milwaukee; D. F. O'Brien, the A. P. Smith Mfg. Co., East Orange, N. J., and Louis Ruthenburg, Servel Inc., Evansville, Ind.

foremen and shop men. Pension plans, a program for the stability of employment, and general welfare problems will also be covered in these bulletins.

Howard Dunbar, committee member and manager of the grinding machine division of the Norton Co., Worcester, Mass., outlined a plan suggested by the committee for the establishment of regional organizations and then smaller community



Charles H. Strawbridge

groups in order to conduct further study of the problem and place the findings in practical operation.

Mr. Dunbar declared that too much emphasis could not be placed on community interest in this work, and stressed the importance of special attention to the training of foremen, as the speaker regarded them as the only direct link between management and employes.

J. S. Knolson, chairman of the board, Stewart-Warner Corp., Chicago, and a member of the committee, asserted that the plan for greater co-operation as it ultimately develops must offer mutual advantages, and warned employers to be fully prepared to give as well as take. He said that the relationship of the management to its employes was even more important in his opinion than the relationship of the company to its customers, and that fully as much, if not more, training should be spent on "key" shop men as on salesmen and other outside representatives.

Louis Ruthenburg, president, Servel Inc., Evansville, Ind., also a member of the committee, pointed out that the first aim of successful enterprise is efficiency and that the main factor in obtaining this efficiency is industrial co-operation. He cited some case examples of what can be done toward effecting satisfactory relationship.

Alexander Sellers, head of William Sellers & Co. Inc., Philadelphia, and retiring president, declared that work in employer-employe relationship was the most vitally useful task to which the association could devote its energies.

Discuss Labor Legislation

Other papers bearing on the personnel problem included one by M. Albert Linton, president, Provident Mutual Life Insurance Co., Philadelphia, entitled "The Federal Old Age Security Program and Some of Its Consequences," and one by George A. Seyler, works manager, Lunkenheimer Co., Cincinnati, entitled "The Need for Skilled Help and How to Meet It".

In the President's annual address, Mr. Sellers outlined certain pending legislation which, if enacted and upheld by the courts, would materially hamper industry in its efforts toward recovery and thus indirectly, as well as directly, increase the number of unemployed. He spoke particularly of the 30-hour week and of the Healey-Walsh bills, which he declared would give the federal government vast control over industrial relations in industry. Mr. Sellers added further that, judging from the President's recent remarks in Baltimore, it was obvious that he believes in legislation to control minimum rates, maximum hours, and the life span of employment of citizens. He reviewed

certain recent developments in connection with the national labor relations act, and remarked that the elimination of NRA has been a distinct aid to recovery.

He warned that because of continued labor agitations throughout the country employers cannot give too much attention to their employe problems. He attributed the fact that there are as many unemployed today as a year ago, despite a material expansion in business, to "the ill considered fallacious policies" of the federal administration, particularly with respect to labor. The results of these policies have been artificially high wages, extravagant costs, throttled consumption, he said.

"Unless industry can secure relief from an ever-growing orgy of attempted control, the end," he said, "must be a marked diminution in the rate of increase in national wealth and resulting lowering of the standard of living."

A peek into the future—1950—was offered by J. H. Van Deventer, editor, *The Iron Age*, New York, who explained that such prophecy as he was about to make was not without its hazards. However, allowing for certain variables and "ifs", the speaker described some developments in the line of progress in the metalworking industry which he believed could be reasonably anticipated.

Future Developments

In the production of steel from the open-hearth on, many changes are in the offing, he said. Continuous mills have in recent years contributed much to the making of better steel, more quickly, and more cheaply. However, he said, more radical methods of producing rolled products are in progress, namely, by the direct conversion of molten metal into sheets, bars, and tubing.

Developments in the process of extrusion portend, Mr. Van Deventer said, some remarkable forward steps. He spoke of developments in alloy steels and of the part they would likely play in the future. Competition between metals and materials, such as ferrous and nonferrous, stampings and forgings, plastics and die castings, he believed would be less severe in 1950 and more intelligent.

Welding he regarded as an infant art, with tremendous developments in sight for 1950. Metal finishing is also due for much further expansion by that time. He touched on likely improvements in machinery, adding that competition between different types of machine tools would probably be less 14 years from now.

These and many other matters engaged the speculation of the speaker. As to the question of unemployment in 1950, he thought research, as in the case of all other phases of ad-

vancement, would supply the answer. Two kinds of research, he said, will decide whether the dole and made work must be a perpetual American institution or merely a depression palliative. One is technical, and the other economical. All in all, he thought 1950 would be a better time to live.

What the machine has done to mankind was a question which Dr. James S. Thomas, president of Clarkson College of Technology, Potsdam, N. Y., endeavored to answer. His conclusions were that it has increased employment, decreased costs and increased quality.

The machine, he stated, has steadily increased the wages of labor, with real wages (purchasing power in terms of goods) more than doubled between 1900 and 1935. He refuted the charge that the machine has caused overproduction, and asserted that it was not invented primarily as a "labor saver".

A study of patents in the patent office, Washington, reveals, he said, that 84 per cent of the machines listed there are "labor serving", creators of new jobs based upon the growing wants of men, and that only 16 per cent of them are "labor saving".

Discussing the old age security program and some of its consequences, Mr. Linton stated that the anticipated large excess of income over outgo, resulting from the self-sufficiency principle, is the most dangerous feature of the program, and may have consequences quite different from that planned by the framers of the social security act.

Discussing the legal aspects of re-

cent legislation regulating business, F. H. Wood, attorney, Cravath, de Gersdorff, Swaine & Wood, New York, analyzed the factors involved in the national industrial recovery law and in the Supreme Court decision invalidating that act. There is every reason to expect that the Guffey and Wagner relations acts also will be invalidated eventually on the ground that they are unconstitutional.

He feared, however, that in the fairly long period which is bound to elapse before the decision of the Supreme Court with reference to the Wagner act, the objects of that act will have been accomplished; in other words, under the act organized labor is increasing its dominance in the relations between employers and employes.

Price Fixing Dangerous

Recalling that a good many manufacturers were much pleased with the NRA features which permitted them to sell at fixed prices under codes, Mr. Wood warned that if the power of regulating business in this manner should pass into the hands of the federal government, the government would have unrestricted control over industry. This would include the power to set up regulations by which industry would be bound in its relations with employes. He urged that industry oppose with all its power any attempt to establish any such power for the federal government, and he warned that any acceptance of federal power in modified form would quickly be followed by enlargements in such exertion of power.

Steel the Modern Colossus



This view of the Golden Gate bridge across the entrance to San Francisco bay looks north toward the Marin hills. In the foreground workmen are placing ricket frames in position. The foot bridge is 18 feet wide and nearly 8000 feet long

Republic May Foreclose Newton

FATE of the Newton Steel Co., with plants at Monroe, Mich., and Newton Falls, O., was in the balance last week as Republic Steel Corp., Cleveland, owner of all Newton bonds and a majority of Newton's common and preferred stock, announced it was contemplating foreclosure proceedings.

Minority stockholders, seeking to avoid such action, were proposing that Newton build or acquire fabricating plants and other manufacturing equipment which could utilize the output of the Newton mills and thus

mitigate the market conditions which, including the competition of new continuous strip mills and declines in the price of sheets, have operated against Newton.

In 1935 Newton lost \$827,139, and in 1934, \$1,034,036. It is now in default on its \$3,866,000 first mortgage 7 per cent bonds, all of which are owned by Republic, and in addition on last Dec. 31 it owed Republic \$1,799,822 on open account.

Republic's majority interest in the common and preferred was acquired through its absorption of the Corrigan, McKinney Steel Co. The announcement that Republic contemplated foreclosure proceedings was made by Donald B. Gillies, vice president of Republic, former president of Corrigan-McKinney, and now

president of Newton, at the annual meeting of stockholders of Newton in Cleveland, Wednesday. Directors of Newton elected at the meeting were R. J. Wysor, C. M. White, N. J. Clarke, Donald B. Gillies, W. W. Hancock, E. G. Resch, R. T. Wilson.

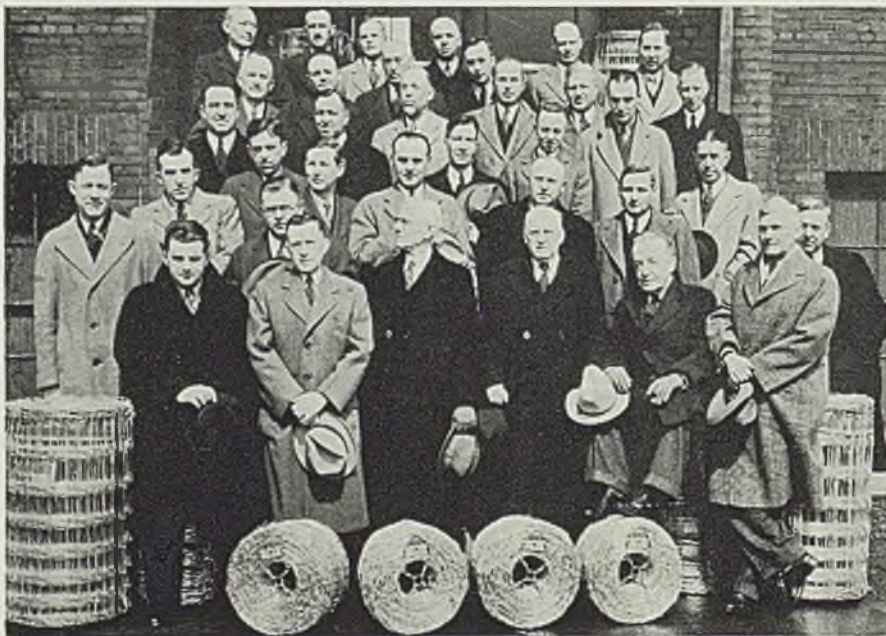
Personnel Changes in Steel Corp. Merger Come Slowly

Ever since the brief statement from United States Steel Corp. headquarters in New York on April 7 that "the facilities of American Sheet & Tin Plate Co. were to be merged with those of the Carnegie-Illinois Steel Corp." there has been no official follow-up in the way of subsequent official announcements.

This is because the Corporation headquarters chose to make their announcement at a time when details had hardly been preliminarily settled. The announcement was timed to dispel considerable rumor among employes and outsiders concerning such an amalgamation by these two important subsidiaries.

Since that time committees have been set up in the sales, operating and other departments of the two companies at their Pittsburgh headquarters, which are comprised of existing department personnel of both companies. These committees have been meeting frequently and have attacked the problem of co-ordination by working out department detail problems first, preferring to name personnel changes at a later date. It may be 60 to 90 days before personnel appointments are made.

When Bethlehem Formally Opened Its New Bethanized Wire Mill



METALLURGISTS and editors of business papers, including metalworking and agriculture, attending the opening of the Bethlehem Steel Co.'s new mill for the manufacture of Bethanized wire and fence at Johnstown, Pa., April 16. Reading from left to right, those pictured above are: Bottom row: W. H. Zipf, *American Fruit Growers*; T. L. Wheeler, *Indiana Farmers Guide*; H. E. Smith, *Consulting Materials Engineer*; Harry Hesselbein, *Johnstown Tribune*; B. M. Shepherd, *Southern Planter*; Prof. R. U. Blasingame, Pennsylvania State College.

Second row from the bottom: A. S. Wing, *Country Home*; S. L. Althouse, *Poultry Item*; (slightly above row) Hugh Thompson, *Poultry Tribune*; (below Mr. Thompson), R. D. Logee, *Anchor Post Fence Co.*; Chester Gordon *Bell Laboratories*; (in light overcoat) Floyd Keepers, *Prairie Farmer*; (in dark overcoat, collar not visible), N. N. Beeler, *Cappers Farmer*; Kirk Fox, *Successful Farming*; (above and to the left of Mr. Fox), F. F. Farnsworth, *Bell Laboratories*; (behind bale of wire), H. C. McWilliams, *Cambria County Agricultural Extension Agent*.

Third row from bottom: W. J. Gomber, *Wall Street Journal*; (in dark overcoat), E. L. Shaner, *STEEL*; E. R. McIntyre, *Wisconsin Agriculturalist*; R. R. Hannas, *American Poultry Journal*; T. H. Gerken, *The Iron Age*.

Fourth row from bottom: C. L. Reifsnider, *Farm Machinery and Equipment News*; H. L. Cosline, *American Agriculturalist*; (in light suit), Prof. H. W. Riley, Cornell university; M. G. Kirkpatrick, *Farm Journal*; Sidney Jenkins, *Farm Journal*; M. C. Gilpin, *Pennsylvania Farmer*.

Between fourth row and top row: F. A. Briggs, *Farm and Ranch*; Roland C. Hartman, *Everybody's Poultry Journal*.

Top row: J. H. Conway, *American Cotton Grower*; J. D. Tomkins, *New York Herald-Tribune*; Arnold Nicholson, *Country Gentleman*; A. E. Knowlton, *Electrical World*; Prof. E. L. Moffitt, Pennsylvania State College; C. L. Warwick, secretary-treasurer, American Society for Testing Materials.

Inland Buying Milcor

Inland Steel Co., Chicago, is negotiating for the purchase of the Milcor Steel Co., with plants at Milwaukee and Canton, O., and warehouses in several other cities. This will give Inland another important outlet for sheets for fabricating into building and other products. The merger is expected to be completed shortly.

Form Materials Council

Word has been received in Washington of the filing in Sioux City, Iowa, last week of articles of incorporation of the newly-organized Raw Materials National council, to have headquarters in Washington.

The purpose of the council, as already stated in these columns, is to get congress to repeal the reciprocal trade agreement act of 1934 or to have the courts invalidate this act.

The council is being backed by farm interests in the Middle West and by raw materials interests, including manganese, lumber, etc.

Coating of Steel Products

Chief Topic at Zinc Meeting

MAJOR attention was focused on zinc-coating of steel products at the eighteenth annual convention of the American Zinc Institute Inc., at St. Louis, April 20-21.

One entire session of the two-day meeting was devoted to discussions of galvanizing practice and problems, and the interest of the steel industry in the subject was shown by the attendance of production representatives from virtually all leading steel producing companies.

The general tenor of the convention was one of optimism. The impression obtained from informal conversations with representatives of the zinc and consuming industries as well as from the addresses and reports was that business has made substantial improvement since the 1935 meeting and that further gains are likely this year.

Throughout the meeting the fact was stressed by Institute members that the statistical position of their industry has improved. Stocks of metal have been reduced and consumption has increased. Considerable attention was centered upon the Institute's campaign for better galvanizing which is being promoted vigorously.

Promote Quality Campaign

Most galvanized sheet producers have been licensed to use the Institute's "Seal of Quality" which guarantees that no less than two ounces of zinc be used per square foot and the Institute is promoting the use of sheets bearing this seal among jobbers in the farm areas and among farmers themselves. K. J. T. Ekblaw, advertising manager of the Institute, declared at the meeting that everyone of the 6,000,000 farmers in this country is a potential consumer of galvanized sheets, that farm areas accounted for the bulk consumption of the 194,000 tons of galvanized sheets produced last year and which took 42.3 per cent of the zinc used.

Howard I. Young, president of the American Zinc, Lead & Smelting Co., St. Louis, declared at the opening of the convention that the zinc industry was in the best position in years. This note of optimism found support in the report of E. V. Gent, secretary of the organization, in which he pointed out that consumption is increasing, stocks are at a minimum and prices are well above depression lows.

Seven prepared addresses on gal-

vanizing were presented at the session devoted to that subject. T. M. Gregory, president of the American Hot Dip Galvanizers association, Pittsburgh, told the convention of the potentialities of the market for galvanized products and emphasized the need for trade promotion.

"Zinc is unquestionably the best protective coating for iron and steel against corrosion," he said, "and since it is zinc which resists attack by the elements, the life of the material coated depends entirely on the method of applying the coating and the quantity of the coating applied."

Large Users of Slab Metal

He declared the "hot dip process" the best method for applying zinc coatings to iron and steel. He pointed out there are about 80 concerns in this country specializing in the art of coating iron and steel products by the hot dip process, known as job galvanizers. These firms will galvanize 400,000 tons of steel in a normal year and 95 per cent of the products will be coated with from 2 to 2½ ounces of zinc per square foot of surface. These galvanizers, he said, will consume in the process of handling this tonnage of steel about 24,000 tons of slab zinc.

Mr. Gregory also pointed out that there are approximately 200 classified items galvanized by the job galvanizers and the tonnage of the items galvanized represents only about 20 per cent of the total tonnage of these items manufactured.

Speaking on "The Treatment of Galvanized Sheets for Painting," J. L. Schueler, superintendent, steel and wire division, Continental Steel Corp., Kokomo, Ind., said zinc is probably the best of the economically

available coatings for steel which affords resistance toward atmospheric corrosion conditions (refer also to page 52).

Other addresses at the galvanizing session were: "Some Studies in Microstructure of Zinc Coatings," by W. E. Buck, research metallurgist, Granite City Steel Co., Granite City, Ill.; "Testing for Adherence of Galvanized Coatings," by B. P. Finkbone, galvanizing consultant, American Rolling Mill Co., Middletown, O.; "Inhibitors in Pickling," by P. R. Russell, steel service division, the Grasse Chemical Co., Cleveland; "Alloys in the Zinc Bath," by G. A. Brayton, superintendent, galvanizing division, Newport Rolling Mill Co., Newport, Ky.; and "Sweating of Sheets in Transit and Storage," by G. C. Bartells, field engineer, American Zinc Institute.

When the convention opened April 20 delegates were welcomed to St. Louis by T. N. Dysart, president of the St. Louis chamber of commerce. John A. Robinson, president of the Tri-State Zinc and Lead Ore Producers association, responded, following which Ernest V. Gent, secretary of the institute, presented his report on the work being done by the organization. In this report he was assisted by K. J. T. Ekblaw, G. C. Bartells and Charles Mathews.

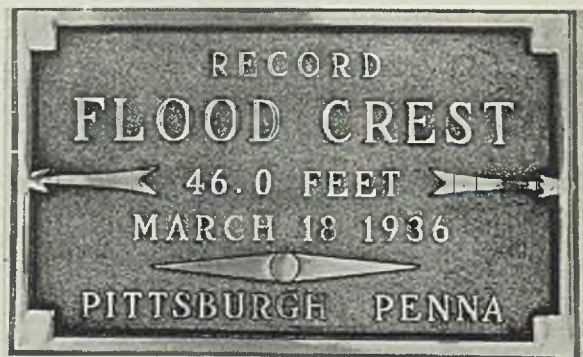
Reviews Legislative Picture

Julian D. Conover, secretary of the American Mining Congress spoke at the Monday morning session on the "Legislative Developments Affecting Zinc," which address was followed by the presentation of various committee reports.

The afternoon session April 20 was devoted to the election of officers, a talking moving picture, "The Granite City Steel Co. Plant in Operation," an address, "Air Hygiene Foundation of America—Its Organization and Objectives," by H. B. Meller, managing director; another address "The Zinc Market," by C. S. J. Trench, president, C. S. Trench & Co., New York, and a third "Modern Research Meth-

Marking the Mt. Ararats of the Pittsburgh District

He who runs may read from this art bronze plaque, being marketed by the A. W. Cadman Mfg. Co., Pittsburgh, of the extent of the recent flood in Pittsburgh. The flood stage shown is not the final figure



ods," by Clyde E. Williams, director, Battelle Memorial institute, Columbus, O.

Tom M. Girdler, chairman and president of the Republic Steel Corp., Cleveland, was the guest speaker at the annual dinner and smoker held Monday evening. Mr. Girdler told the delegates American industry today is staging a comeback which should go far unless blocked by unsound legislation based on the "theories of academic nonproducers."

Features of the two-day convention included a general exhibit of galvanized products in the meeting rooms and an inspection trip through the works of the Granite City Steel Co.

A comprehensive review of the zinc industry was circulated at the meeting. This contained reports on "The European and World Zinc Situation," by O. W. Roskill, industrial consultant, London, England; "Mining in the Rocky Mountain Region," by J. O. Elton, manager, International Smelting & Refining Co., Salt Lake City; "Mining in the Eastern Region," by Russell B. Paul, assistant general manager of mines, the New Jersey Zinc Co., New York; "Mining in the Mississippi Valley Region," by M. D. Harbaugh, secretary, Tri-State Zinc and Lead Ore Producers association; "Retort Smelting Operations," by Robert Ammon, chief metallurgist, American Zinc Co. of Illinois; and "Electrolytic Smelting Operations," by C. R. Ince, assistant sales manager, St. Joseph Lead Co., New York.

Zinc Purity Improved

In his report Mr. Ince pointed out that electrolytic zinc production in 1935 reflected the general improvement which took place in the industry during the year. Figures for the period showed an increase of 55 per cent in production which he attributed in part to the purity of the metal produced by the electrolytic process and a fuller appreciation on the part of zinc consumers of the benefits to be derived from the use of purer metal. He emphasized that the increase in purity of the base metal has greatly improved the physical properties of zinc die-castings and opened up many new fields of use. He estimated that the die-casting industry consumed 55,000 tons of high grade zinc last year, an increase of 23,000 tons or 75 per cent over the year preceding.

Officers of the institute were re-elected as follows: President, Howard I. Young, president of the American Zinc, Lead & Smelting Co., St. Louis; vice presidents, C. Merrill Chapin Jr., St. Joseph Lead Co., New York; J. A. Robinson, Commerce Mining & Royalty Co., Miami, Okla., and J. O. Elton, International Smelting Co., Salt Lake City. Ernest V. Gent was re-elected secretary.

Girdler Urges "Let Live" Policy for Business; Optimistic for Long Pull

Addressing the convention of the American Zinc institute in St. Louis last week, Tom M. Girdler, chairman-president of the Republic Steel Corp., Cleveland, referred to the close bond between the zinc and the steel industries, lauded the Institute's offer to set up a technical committee on hot dipped galvanizing, then launched into a searching analysis of political conditions confronting industry, part of which follows:

GREAT depressions always give rise to fantastic economic ideas and theories, and the depression of the 1930's has been particularly prolific in that respect. We have had a great outcropping of quacks, academic non-producers, and theoretical tinkers. They all advocate some sort of a rearrangement of our economic system. We have politicians who do the same thing, but there is nothing theoretical about them. They too are practical men—in fact too practical—not in the sense of knowing, or caring, anything about business, but in the sense that they are prepared to risk everything to win an election.

The bureaucratic theorists, who now presume to supervise American business have never produced the things and goods demanded by American consumers. They cannot, they never have, produced anything. All they do is to tell us how to stop producing. All they do is to tell us to do less than we are doing already.

In all this confusion of economic theories and ill-considered legislation there is one underlying idea upon which the theorists are in complete agreement. They have all directed their attack upon business, upon so-called "big" business. They seek to saddle business with an ever increasing degree of bureaucratic control and interference. We see it in many of the measures which have been brought forward in the present session of congress. It is behind the plan to tax the undistributed income of corporations and to prevent them from setting up adequate reserves; it is behind the anti-chain store bill and the Wheeler anti-basing point bill and numerous others of the same character.

The fundamental fallacy underlying this whole philosophy lies in the effort to make a distinction between industry, or so-called "big" business and the public. The new advisers would paint the industrialist as one

kind of an American, and the public as another kind.

Now, you know, and I know, that a corporation, large or small, is not a separate and distinct entity; it does not live in a vacuum. It is made up of investors, of employes and of management—in a word, it is made up of the American people.

Furthermore if a corporation is to be successful it must have the good will and the patronage of the public. An industrial company has only one justification for existence, and that is to make available to consumers those products which represent the necessities, the comforts and the luxuries of life and to bring them within the purchasing power of a great many people.

For this reason measures which would injure or impair the efficiency of corporations engaged in the legitimate business of producing or distributing commodities for public consumption, are really directed against millions of investors and many more millions of workers as well as the consuming public.

No Distinction Among Citizens

The new non-producing advisers, who get their social ideas from Russia or Italy, do not understand that even our largest corporations are simply aggregations of ordinary human beings, whether they be workers, investors or management. They are American citizens with all the rights of American citizens.

Now, when I am in the steel business, I am an industrialist, but when I buy a suit of clothes, I am of the public. When you produce zinc, you are industrialists, and when you buy an automobile, you are of the public. When we both pay for this dinner, we are of the public, and the great exploiter is the owner of this hotel. All of which is a lot of nonsense. In the United States, fortunately, we cannot, and do not, make class distinctions. We are of the people, of the American people.

Most people perhaps do not realize that many of the measures against "big" business which have been proposed are not only antagonistic to the efficient production of goods, but some of them, if ever enacted, would raise the price to the consumer and therefore lower the American standard of living. For example, the anti-chain store bill, which would have the effect of depriving consumers of this country of the advantage of efficient distribution, could have no other effect but to increase the price

of the food on the average man's table.

The Wheeler anti-basing point bill, on the other hand, would disturb prices in the steel and allied industries by creating confusion and outlawing a convenient method of quoting prices in satisfactory use for many years. It is a curious fact that whereas this bill appears to be designed to hurt "big" business, the chief sufferers would be the smaller companies, for the larger ones could more easily adjust themselves by virtue of their scattered plant locations.

Many of the developments which have come to pass have placed a new and serious responsibility upon the managers of industry. We have the obligation not only to direct the enterprise by which we are employed to the best of our ability, but we have the further obligation to defend the property of our stockholders and the jobs and wages of our employes against measures which would undermine industry and crush enterprise. We cannot dodge this responsibility and obligation if we are to fulfill our duty.

Facts Must Be Demonstrated

The only antidote I know to the poison which has been fed to the minds of the public is to get before the public the facts about our business to correct some of the distortions and to get the picture of the accomplishments and aims of industry back into a proper balance. I know that it is not easy for a fact to catch up with a mis-statement but we must have faith in the common sense of the average American citizen, and in his ability to comprehend and to act on the things that are in his own best interests. I firmly believe that he does not want to have anything take place which will, in any way, endanger the American standard of living.

Certainly it is an obligation of management to call the attention of its stockholders to the rapidly increasing burden of taxation. The investors in corporations are directly affected by measures or proposals which will add to the direct or indirect tax load of the company in which he has put his savings.

Obviously, unfair or discriminatory taxes on industry can best be prevented or removed when legislators are shown that there is public opposition to such taxes. Vote-seeking legislators, who put excessive burdens upon industry on the theory that industry has few votes, must be made to realize that when they penalize the corporation, they penalize thousands of stockholders and wage earners.

The plan to tax corporation surpluses is a case in point. This idea seems to have caused great excitement among the politicians. They want to tax corporation reserves out of existence. Some inkling of the real

character of this proposal is to be seen in the fact that it has received the wholehearted endorsement of the Communist party in America.

What would have happened in this country if corporations had possessed no reserves at the start of the depression? I can speak with intimate knowledge only of the steel industry. The existence of reserves enabled the steel industry to carry on through the depression, to maintain its plants, spend large sums in relief and to sustain a loss over a four-year period of more than \$285,000,000.

What would industries which have suffered huge losses in the recent floods have done if they had had no reserves with which to build and recoup? Therefore, I believe it is of the utmost importance that industry not



Tom Girdler

He sees housing as big new market opening up for steel

only be allowed to build up surplus reserves but be encouraged to do so to the extent dictated by prudent principles of management.

The question of reserves is one of the factors in the price of commodities. It seems to be extremely difficult to make a non-producer understand that a fair price does not mean excessive profits. A fair price should include:

1. A fair wage for labor.
2. A fair return to the investor.
3. An adequate reserve for the future to take care of necessary expansion and possible calamities and depression.

Although many factors in the cost of steel are fixed at high levels, there has been no stability for prices. That is a truth which is little understood. There is a widely circulated fiction that competition does not exist in the steel industry, and that prices are artificially maintained at high and rigid levels. If there is anyone

who really believes there is no competition in the steel industry, I should like to have him spend a day or two on the firing line of the steel markets.

Statements that there have been no reductions in steel prices are equally without foundation. The facts are that average prices of steel products declined 40 per cent between 1923 and 1933 and the recovery since then has been less than for general commodities.

Let me cite the example of automobile sheets, one of the most widely used of all steel products. In 1923, the price stood at \$100 a ton and this dropped to \$45 a ton in 1933. It is now back to a little over \$50 a ton. Not only has the price of this product been cut in half but the quality has been enormously improved. In fact, the progressive stepping up in the quality of automobile sheets and of alloy steels has done much to make the modern motor car possible.

The steel industry realizes that its very existence depends on its ability to increase the efficiency of its productive processes, and progressively to increase the value received by the users of steel. This is the record of the steel industry but curiously enough in the face of the facts accessible to all the opinion appears to persist in certain places that the industry is opposed to the principle of mass production, that it clings to a policy of holding down production in order to maintain prices at artificially high levels. That is utterly ridiculous.

Vast Steel Needs Seen

The outlook for the steel industry is particularly bright if the natural forces of recovery now underway are permitted to operate. The industry has developed many new products and new uses for steel. Following the long years of depression during which construction and all of the capital goods industries have been at a standstill vast needs have accumulated. The ordinary wear and tear upon equipment has taken its toll, but even more important is the tremendous toll of obsolescence. This applies to residential and industrial buildings, to plant facilities and equipment and to the railroads.

Already there has been a beginning of the rehabilitation and it is sufficient to indicate the great demands that are to be placed upon the steel industry and many others, if the movement is allowed to take its course. And it must be allowed, if the country is not to suffer.

Many of the new markets for steel are of great promise. One of these is building, where a great new market is indicated for the steel industry in residential construction. I do not feel that the time is ripe for and broad demand for all-steel prefabricated houses. Rather, the big market lies in an increased use of

steel in the building of houses of modern design which will utilize steel as a material for frames and in all the forms and places it is of proven superiority.

Last year the industry received its greatest impetus from the automobile industry. Reports from the automobile trade indicate that 1936 will be even better than was 1935, and the industry already has swung into an impressive stride. But, in addition, there is improvement also in the heavier steel products. The railroads are making larger purchases and there is encouraging activity in many of the durable goods lines.

Gentlemen, a new day is dawning for the metal industries. I am an optimist. I see a million uses for metals and I see before us a great prosperity. But we and our investors and our workers cannot be prosperous when our chance to do a productive job well and honestly is constantly being hampered by misconceived and unfortunately motivated legislation. If they would only give us a chance, there is much we could do to bring real recovery to the United States.

Production

STEELMAKING eased off 1 point last week to 69½ per cent, when losses of 2 points at Pittsburgh, 1 point at Youngstown, 5 points at Cleveland and 3 points at New England more than offset gains of 5 points at Buffalo, 8 points at Wheeling, 4 points at Cincinnati, and ½ point in eastern Pennsylvania. Chicago, Birmingham, and Detroit maintained steady operations. Further details follow:

Youngstown—Dipped 1 point last week to 79 per cent, and tentative schedules indicate a continuance of this rate at this week's start. Youngstown Sheet & Tube Co. is preparing two additional open hearths at its Brier Hill works, and it is indicated there will be an upturn in output soon.

Cleveland-Lorain—Down 5 points to 79½ per cent last week, as Republic Steel Corp. took off two open hearths to operate 12. Otis Steel Co. continued with 8 and National Tube Co., Lorain, 11. Republic is expected to resume with these two furnaces this week, due to a special order.

Pittsburgh—Off 2 points to 63 per cent last week as the average of steel ingot production in this district showed evidences of leveling off at above the 60 per cent mark for at least this week. The leading interest closed last week at 64-65 per cent, and the leading independent averaged 60-61 per cent.

Thirty-five out of 60 blast furnaces are now producing iron. In some cases, blast furnace operators are

Steelmaking Operations

Percentage of Open-Hearth Ingot Capacity Engaged in Leading Districts

	Week ended		Same week	
	Apr. 25	Change	1935	1934
Pittsburgh	63	- 2	37	46
Chicago	70½	None	52	59
Eastern Pa.....	44	+ ½	29	41½
Youngstown....	79	- 1	56	58
Wheeling	92	+ 8	76	79
Cleveland	79½	- 5	57	80
Buffalo	70	+ 5	34	68
Birmingham...	69	None	51½	52
New England 75	- 3	25	89	
Detroit	100	None	82	94
Cincinnati	84	+ 4	†	†
Average.....	69½	- 1	46	57

†Not reported.

resuming with stacks on blast so that the last possible production can be gained before stacks are blown out for needed relining. Carnegie-Illinois has 16 out of 32 on; Jones & Laughlin, 8 of 11; National Tube, 3 of 4; Bethlehem at Johnstown, Pa., 5 of 7, and American Steel & Wire, Pittsburgh Crucible Steel, and Pittsburgh Steel, each 1 of 2.

Wheeling—Up 8 points last week to 92 per cent, the four district open-hearth plants accounting for a total of 34 out of 37 open-hearth furnaces in production.

Detroit—Unchanged at 100 per cent through last week, as all 17 open-hearth furnaces continued in production.

Chicago—Unchanged at 70½ per cent. One of the leading interests increased its operating average, while another took off one open hearth. The strongest general demand for finished steel since 1929 is reported by producers. Twenty-four of the districts 41 blast furnaces continue active.

Cincinnati—Gained 4 points last week, to 84 per cent, this rate to be continued this week. Only four of the 24 open hearths are inactive.

Birmingham—Steady at 69 per cent last week with 15 open-hearth furnaces active. Fabricators and other consumers of steel report prospects bright for several weeks to come.

Central eastern seaboard—Up ½ point to 44 per cent, with drops at some points slightly more than offset by advances at others. Immediate outlook is for little change, although new finished steel bookings continue to lag.

Buffalo—Increased 5 points to 70 per cent last week, with 25 open hearths producing. Operations are expected to hold at this level this week. Delay in getting additional open hearths ready for production is responsible for failure to pass even this high mark of three years. When navigation opens shipments will be

heavy, and producers look for heavy production during the next four to six weeks.

St. Louis—With 17 out of 25 open hearths active in this district, the ingot rate is estimated at 68 per cent.

Denver—Colorado Fuel & Iron Co. operated at 94 per cent last week, with 15 out of 16 open hearths melting.

New England—Down 3 points to 75 per cent, with an increase to 85 per cent indicated for this week.

CANADA MAKES MORE STEEL

Production of steel ingots and castings in Canada in 1935 was 935,679 long tons, as against 757,782 in 1934, according to the dominion bureau of statistics, department of trade and commerce. Income from sales was \$4,189,000, compared with \$3,228,000.

SHEET ACTIVITY UP IN MARCH

Daily average sheet sales, production, and shipments reported by the National Association of Flat Rolled Steel Manufacturers, Pittsburgh, gained in March over February, as did totals for the month.

Sales and shipments, both daily average and total for the month, exceeded those of January also, while production in January was slightly higher than in March. Sales in March were at a daily average of 8123 net tons, compared with 4767 tons in February; production was 6704 net tons in March, 6598 tons in February; shipments averaged 6763 net tons in March, 6058 tons in February. Totals for March were: Sales 251,818 net tons, production 207,820 net tons, shipments 209,673 net tons.

Total sheet capacity in the United States for March was approximately 500,000 net tons, and capacity on which the association's figures are based was 304,000 net tons.

Organize To Cut Insurance

New York state members of the Institute of Scrap Iron and Steel have organized to operate in the nature of a separate insurance company in an effort to reduce the basic state rate for compensation for scrap iron dealers, which is now \$26 per \$100 of payroll. Michael V. Bonomo, of Schiavone-Bonomo Corp., New York, is chairman of the board of directors of the group.

EXTENDS REPUBLIC DRAWBACK

A treasury department decision issued some time ago authorizing drawback allowance on steel products manufactured by the Republic Steel Corp., Cleveland, at several plants, has now been extended to cover the operations of its Cleveland plants.

Men of Industry

WILLIAM McBRIDE has been appointed vice president in charge of sales of Pittsburgh Steel Foundry Corp., Glassport, Pa. He has had many years' experience in the steel business, and was the organizer and principal owner of Fort Pitt Spring & Mfg. Co., McKees Rocks, Pa., until 1928 when he sold out. He was graduated with a degree in civil engineering from Rensselaer Polytechnic institute in the class of 1899. He will maintain his offices in the Union National Bank building, Pittsburgh.

Reese James has been appointed Detroit sales manager for the National Alloy Steel Co., Pittsburgh.

E. H. Jessop, formerly associated with Morse Chain Co., Ithaca, N. Y., has been placed in charge of Morse Chain sales of the Tranter Mfg. Co., Pittsburgh, which carries a complete stock of Morse industrial products.

Harry Hardwicke, who has been associated with the tool steel industry in the Chicago district for the past 21 years, has been appointed district sales manager of the Latrobe Electric Steel Co., Chicago, succeeding the late Louis E. Gutzzeit.

George E. Olmstead, who has been operating as a manufacturer's agent in Connecticut, has joined the staff of the Morse Chain Co., Ithaca, N. Y. He will continue to cover Connecticut, and will be located in New Haven, Conn.

William H. Lake, who has been sales manager for Follansbee Bros. Co., Pittsburgh, has retired. He has been succeeded by Harry Vogelsong, who came up into the sales department through various mill capacities in the Follansbee company for a number of years.

Joseph F. Sweeney has been appointed special representative for Federated Metals Corp., New York, to handle nickel scrap, nickel alloys and nickel residues. His prior connections include International Nickel Co., Allegheny Steel Co., Michiana Products Corp., H. Boker & Co., and Cosmo Metal Alloys Corp.

George A. Gunn has opened an office at 444 Market street, San Francisco, as a casting and forging broker. His first connection with the steel industry was with the old Union Iron Works, San Francisco, in 1901. From 1907 to 1914 he was sales manager for the Columbia Steel Co., Portland, Oreg., and then became

sales manager in 1914 for the Best Steel Casting Co., Oakland, Calif., which was merged with other foundries in southern and northern California several years ago under the present name of General Metals Corp.

Harry J. Kicherer has been appointed works manager of the American Hoist & Derrick Co., St. Paul. He formerly was associated with the Caterpillar Tractor Co., Peoria, Ill., and previous to that was with the Russell Grader Co. before it was absorbed by Caterpillar. Mr. Kicherer has had 20 years of practical experience in the



Harry J. Kicherer

manufacturing of construction equipment road machinery and other mechanical products. He is a member and past chairman of the Northwest chapter of the American Society for Metals.

F. J. Frey, one of the founders of Geuder, Paeschke & Frey Co., Milwaukee, a pioneer metal stamping organization, has been elected to the newly-created office of chairman of the board.

Charles Paeschke Jr., formerly vice president and secretary has been elected president; Frank Frey Jr., executive vice president and treasurer; Henry V. Millmann, vice president in charge of production; Carl H. Voss, vice president in charge of sales; John F. Harmon, secretary, and A. J. Chamberlain, manager, steel package division.

Hugh Morrow has been re-elected president of Sloss-Sheffield Steel & Iron Co., Birmingham, Ala. Other officers elected include: Ben Davis, vice

president and general manager; Russell Hunt, vice president in charge of sales; Vernon M. Brown, assistant secretary and treasurer; Charles J. Farrell, assistant secretary and treasurer (New York), and H. A. Lovejoy auditor.

Mr. Davis, formerly general manager, went with Sloss-Sheffield five years ago from West Virginia as superintendent of mines.

Mr. Hunt, formerly manager of sales, went with the company in 1898 as office boy and worked his way up.

T. F. Patton has been appointed resident counsel for the Republic Steel Corp., Cleveland. A graduate from the college of law of Ohio State university in 1926, he has had a wide experience in legal matters relating to the steel industry.

A. J. Gentholt, who for the past six years has been in Republic's legal department, has been appointed assistant resident counsel with enlarged duties.

L. P. Niessen has been made advertising manager of Cutler-Hammer Inc., Milwaukee. He will have charge of all advertising and sales promotional activity covering the complete line of motor control and electrical apparatus which the company manufactures.

After completing a course in engineering, Mr. Niessen attended Marquette university, and later gained extensive experience in the company's products in the sales department and various manufacturing departments. Prior to his appointment he served for some time as assistant advertising manager.

Frank G. Steinebach, managing editor of *The Foundry*, Cleveland, has been nominated for chairman of the Northeastern Ohio Chapter of the American Foundrymen's association; B. G. Parker, president, Youngstown Foundry & Machine Co., Youngstown, O., vice chairman, and Russell F. Lincoln, assistant sales manager, machine division, Osborn Mfg. Co., Cleveland, secretary-treasurer. The following have been nominated as directors for three years: Walton L. Woody, retiring chairman; Homer Britton, Cleveland Co-operative Stove Co., Cleveland, and E. F. Hess, metallurgical engineer, Ohio Injector Co., Wadsworth, O. J. Ward Henry, Electro Alloys Co., Elyria, O., has been nominated director for one year.

Walter H. White, Pittsburgh Rolls Corp., was nominated to be president of the Pittsburgh Foundrymen's association for 1936-37 at the association's April meeting held at the William Penn hotel, Pittsburgh, April 20.

H. M. Wilson, Taylor-Wilson Mfg. Co., McKees Rocks, Pa., was placed

in nomination for the vice presidency, and C. H. Paul, Mackintosh-Hemphill Co., Pittsburgh, was nominated to be secretary and treasurer.

A. M. Ondreyco, Meehanite Metals Corp.; H. P. Spilker, Sterrit-Thomas Foundry Co., O. Nadolny, Duquesne Pattern & Bronze Co.; R. H. Stone, Vesuvius Crucible Co.; and T. A. Reynolds, McConway & Torley Corp., all of Pittsburgh, were placed in nomination for the executive committee for the 1936-37 season and will also be elected at the May meeting. Mr. Ondreyco is the present president of the association, and Mr. White the vice president, while Mr. Paul continues in the office of secretary and treasurer.

John M. Lessells, prominent consulting mechanical engineer of Swarthmore, Pa., has been appointed an associate professor of mechanical engineering at the Massachusetts Institute of Technology, Cambridge, Mass. He will be occupied with teaching and research in the field of engineering materials.

Mr. Lessells is editor of the *Journal of Applied Mechanics* published by the American Society of Mechanical Engineers. Besides his activity as a member of this society, he is a member of the American Iron and Steel institute, American Society for Testing Materials, and the Institution of Mechanical Engineers of Great Britain.

Phil W. Frieder, Philip W. Frieder Co., Cleveland, chairman of the public relations committee of the Institute of Scrap Iron and Steel Inc., New York, has named the following to his committee:

Joel Claster, Luria Bros. & Co. Inc., Philadelphia; W. J. Ross, Hyman-Michaels Co., Chicago; Henry S. Grant, Grant Iron & Metal Co., Detroit; Samuel N. Summer, Joseph Schonthal Co., Columbus, O.; Charles Dreifus, Charles Dreifus Co., Pittsburgh; Darwin S. Luntz, Luntz Iron & Steel Co., Canton, O.; Ben G. Kaplan, M. S. Kaplan Co., Chicago; Carl Briggs, Briggs & Turivas, Blue Island, Ill.; David J. Joseph, David J. Joseph Co., Cincinnati; L. J. Borinstein, care of A. Borinstein, Indianapolis; Herman D. Moskowitz, Schiavone-Bonomo Corp., New York; Edward L. Solomon, Max Solomon Co., Pittsburgh.

Ben G. Kaplan, M. S. Kaplan Co., Chicago, chairman of the chapter welfare committee of the Institute of Scrap Iron and Steel Inc., New York, has appointed the following to his committee:

David Borowsky, of Jacob Borowsky, Fitchburg, Mass.; Walter Bregman, Price Iron & Steel Co., Chicago; H. Moskowitz, Moskowitz Bros., Cincinnati; J. Vasek, Max Friedman Co.,

Cleveland; John E. Farrell, Buffalo; H. Goldman, Riverside Scrap Iron & Metal Co., Detroit; B. H. Rubine, Hudson Iron & Metal Co., Bayonne, N. J.; A. Bernstein, Interboro Scrap Iron & Steel Co., Brooklyn, N. Y.; George Stout, Luria Bros. & Co. Inc., Philadelphia; Phil Scheibner, Associated Iron & Metal Co., Oakland, Calif.; J. E. Jacobson, Luria Bros. & Co. Inc., Pittsburgh; Fred S. Fuld, Harry Benjamin Equipment Co., St. Louis; P. Jaffe, Jaffe-Wohl Iron & Metal Co., Birmingham, Ala.

Ray H. McMaster, formerly representative in Pittsburgh for the Logan Iron & Steel Co., Philadelphia, is now affiliated with the Sauereisen Cements Co., Sharpsburg, Pa., maker of indus-



Ray H. McMaster

trial cements for pickling tank lining and other uses, as a sales engineer.

C. Tiesenga has been elected a director of Holland Furnace Co., Holland, Mich., succeeding Thomas H. Marsilje.

F. B. Schwartz, 1019 Washington avenue, South, Minneapolis, has been appointed by the Pennsylvania Pump & Compressor Co., Easton, Pa., to represent it in Minnesota and western Wisconsin.

J. Leonard Replogle has been elected president of the Pennsylvania Society of New York. In this office he succeeds Charles M. Schwab, chairman of Bethlehem Steel Co., Bethlehem, Pa., who declined reelection after having served as president for 17 years.

Benjamin F. Fairless, president, Carnegie-Illinois Steel Corp., Pitts-

burgh, will be honored at a dinner by the Duquesne Business Men's association, Duquesne, Pa., April 30. Among guests who have also accepted are Arthur H. Young and Ralph J. Watson, both vice presidents of United States Steel Corp., New York, and Edward R. Stettinius Jr., chairman of the finance committee of the corporation.

J. D. Darby has been relieved of duties as assistant to vice president of the Alan Wood Steel Co., Conshohocken, Pa., and has been made general superintendent of the company's steelworks blast furnaces and the coke oven plant of Rainey Wood Coke Co., Swedeland, Pa., subsidiary of Alan Wood. No successor to Mr. Darby in the sales department has yet been named.

American Steel Warehouse association, Terminal tower, Cleveland, of which Walter S. Doxsey is executive secretary, announces the election of officers by the following chapters:

Connecticut chapter: President, R. B. Shearer, C. S. Mersick & Co., New Haven Conn.; vice president, H. L. Stone, Hunter & Havens Inc., Bridgeport, Conn.; secretary-treasurer, G. S. Brousse, C. S. Mersick & Co. New Haven, Conn.

Central States chapter: President, A. Y. Sawyer, Joseph T. Ryerson & Son Inc., Chicago; vice presidents, W. J. Holliday, W. J. Holliday & Co., Hammond, Ind., and A. C. Cox, A. M. Castle & Co., Chicago; treasurer, E. G. Fisher, National Steel Co., Chicago; secretary, Carl Channon, Great Lakes Supply Corp., Chicago.

Northern Ohio chapter: President, Fred S. Doran, Joseph T. Ryerson & Son Inc., Cleveland; vice president, H. H. Kuhn, Hardware & Supply Co., Akron, O.; secretary, Roy Stofer, Paterson-Leitch Co., Cleveland.

New York chapter: President, Walter S. Ganong, Edgar T. Ward's Sons Co., Newark, N. J.; vice presidents, P. F. Benedict, Faitout Iron & Steel Co., Newark, N. J., and Lester Brion, Peter A. Frasse & Co. Inc., New York; secretary-treasurer, Charles Kramer, Scully Steel Products Co., Newark, N. J.

Cincinnati chapter: President, L. E. Denman, C. R. Talbott Co., Cincinnati; vice presidents, J. W. Herr, Cincinnati Steel Products Co., Cincinnati, and T. J. O'Laughlin, Springfield Hardware Co., Springfield, O.; Treasurer, G. E. Mayer, Jones & Laughlin Steel Corp., Cincinnati; secretary, D. L. McCubbin, Joseph T. Ryerson & Son Inc., Cincinnati.

Northern California chapter: President, Howard M. Tayler, Tayler & Spotswood Co., San Francisco; vice presidents, George R. Borrmann, George R. Borrmann Steel Co., Oakland, Calif., and E. Breidenbach Jr., Ducommun Metals & Supply Co., San Francisco; secretary, R. D. Cortelyou, San Francisco.

Died:

ELLWOOD T. ICKES, 59, in charge of metallurgical activities, Columbia Steel & Shafting Co., Carnegie, Pa., at Pittsburgh, April 17. Shortly after graduating from the University of Pennsylvania he became metallurgical engineer in the Pittsburgh district for Carnegie Steel Co. In 1916 he was made engineer in charge of tests at the Coatesville, Pa., plant of the Midvale Steel & Ordnance Co., and in 1917 became identified with the Columbia Steel & Shafting Co. in charge of all metallurgical activities. He was a director of the Columbia company, and a member of the Society Automotive Engineers, and American Society for Testing Materials.

William Curl Sr., 81, retired superintendent, United Engineering & Foundry Co., at Youngstown, O., April 17.

Stanley F. Booth, 83, treasurer, Moore Steam Turbine Co., Wellsville, N. Y., and one of its founders, in that city, April 19.

James E. Schall, 77, for many years general manager of the New Haven Iron & Steel Works, Fair Haven, Conn., at West Haven, Conn., April 4.

B. E. Cremerius, 56, assistant treasurer, Fairbanks, Morse & Co., Chicago, in that city, April 17. He had been associated with the company for more than 40 years.

Ernest Blume, 77, for 25 years purchasing agent of the Lidgerwood Mfg. Co., New York, manufacturer of hoists, in Brooklyn, N. Y., April 18. He was a native of Germany and came to this country at the age of 7.

William G. Griffith, 85, for many years connected with the National Malleable & Steel Casting Co., at St. Petersburg, Fla., April 14. His earlier service with the company was at Cleveland, and then for 25 years and up to his retirement he was superintendent of the plant at Indianapolis.

J. Howard Martin, 66, general sales manager, Ellwood City Forge Co., Ellwood City, Pa., at Pittsburgh, April 17. He was formerly associated with the Crucible Steel Co. of America, and later organized the American Die, Forge & Foundry Co., which later was consolidated with Mackintosh-Hemphill Co.

Walter D. Douthitt, 55, nationally-known expert on heavy steel roll

equipment and at the time of his death general superintendent of Pittsburgh Rolls Corp., Pittsburgh, at Pittsburgh, April 22. He began his career with the former Garrison Foundry Co., South Side, Pittsburgh, and subsequently was employed by Mesta Machine Co.

Julius Katelman, 62, owner, Council Bluffs Junk Co., Council Bluffs, Iowa, in that city, April 17.

Edward C. Peter, 61, president, American Ironing Machine Co., Algonquin, Ill., in that city, April 12.

P. L. Bryant, 55, president, Construction Machinery Co., Waterloo, Iowa, manufacturer of concrete mixers and other construction machinery, in that city recently.

Samuel Stockton White Jr., 81, dental supplies manufacturer, in Philadelphia, April 15. For 60 years he had been associated with the S. S. White Dental Mfg. Co., Philadelphia, founded in 1844 by his father.

Silas B. Mason, 65, president, Mason-Hanger Construction Co., New York, one of the companies identified with the building of the Fort Peck, Mont., and Grand Coulee dams, at Grand Coulee, Wash., April 14.

Thomas Spencer, 80, for the past 18 years consulting engineer for the Prest-O-Lite Storage Battery Corp., Indianapolis, in that city, April 16. He was an associate of the late Thomas A. Edison in the latter's early study of electricity.

Joseph Denny Sargent, 75, for many years an official and director of the Sargent Hardware Co., New Haven, Conn., in Hurley, N. Y., April 8. He was born in New Britain, Conn., the son of the founder of the Sargent hardware manufacturing business, which moved the plant to New Haven from New Britain in 1864.

Robert R. McKechnie, 73, mechanical engineer, in Cleveland, April 18. For many years he had been identified with the Variety Iron Works, Cleveland, and while with that firm designed and produced for the Thew Shovel Co. the first full-swing tractor steam shovel in this country. He was a member of the American Society of Mechanical Engineers.

Samuel H. Lott, 54, for the past ten years associate professor, Stevens Institute of Technology, Hoboken, N. J., in Woodcliff, N. J., April 10. Professor Lott was well known in technical engineering circles for his work in perfecting a mechanical en-

gineer's scale. He was a member of the American Society of Mechanical Engineers.

Albin Hermann Beyer, 55, professor of civil engineering, Columbia university, New York, in Woodhaven, Queens, N. Y., April 19. For the past 10 years Prof. Beyer was director of the civil engineering testing laboratories at Columbia, where he also was in charge of structural work in the civil engineering department. He was a member of the American Society of Civil Engineers, the American Society for Testing Materials, and the American Concrete Institute.

Sees Mechanization Cutting Steel Labor in Half

The steel industry is mechanizing on a basis that will "throw half of its employes out of work in the next few years," Heber Blankenhorn, research expert for the national labor relations board, testified Thursday in Washington before the senate committee on labor, which is empowered by a resolution by Senator LaFollette, of Wisconsin, to investigate reports that steel producers spy on their labor.

"I warn you that there is basic trouble enough looming in steel changes to cause widespread grievance," declared Mr. Blankenhorn. "I refer to the fact that the steel industry, through rapid modernization of plants and mechanization of processes, in the next few years will throw out of the industry half of its employes."

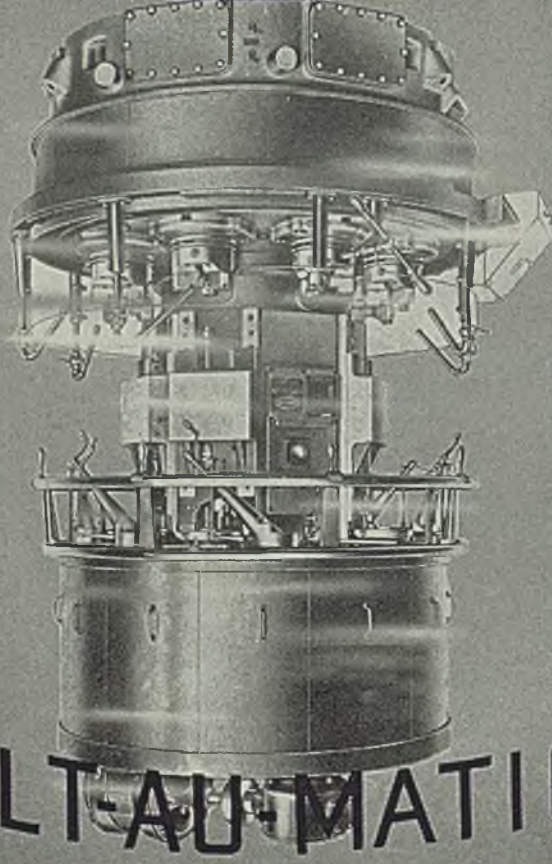
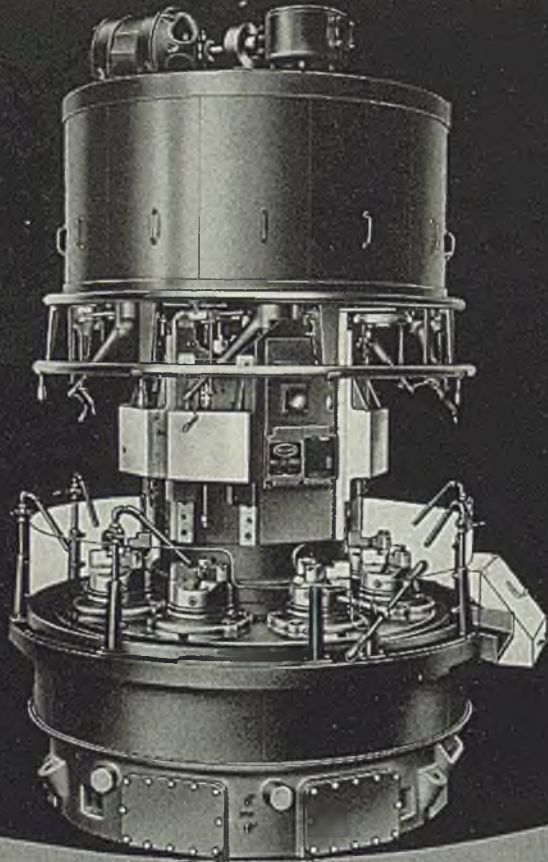
Rebuilds Open Hearths

Youngstown Sheet & Tube Co. is rebuilding two more open hearth steel furnaces in its Brier Hill (Youngstown) works. This will raise the number of available open hearths in the Brier Hill works to eight. A blast furnace also is being rebuilt at the same plant, and all these units will go into production just as soon as "business justifies it," say company officials.

Judge Bridge Contest May 13

The jury of nationally-known engineers and architects selected by the American Institute of Steel Construction, New York, to judge the 88 designs submitted in its eighth annual students' bridge design competition, will make its final decision May 13. The subject of the competitive design is a steel highway bridge having a span of 300 feet with 30-foot minimum vertical clearance over a river.

REFLECTIONS



Reflections, many times, determine Progressive steps of the future.

Reflections on Performance of equipment purchased in the past help to determine replacement or purchase of New Equipment for expansion.

Reflections on the Efficiency and Economy of Bullard Mult - Au - Matics have lead to replacements with the more Modern Mult - Au - Matics.

There's a reason. Ask Bullard Engineers for Cost Saving Data on your Jobs.

Reflections are a stimulus to Advancement, and Profit may be derived therefrom.

Reflections, many times, reveal trying problems which, when solved, result in Improved Methods of manufacturing.

On this premise, Bullard Mult - Au - Matics for years have taken their place in plants having both average and mass production volume.

Reflect on what Mult-Au-Matics are doing for others.

MULT-AU-MATICS

REFLECT

"Time Saved is Money Earned".

Are there still Jobs in your plant where Cost Reduction would solve a problem?

Let Bullard Engineering Surveys and Type "D" Mult-Au-Matics assist in your campaign for Cost Reductions.

THE BULLARD COMPANY

Mirrors of

Motor-dom

DETROIT

BY LAST week, close observers of the automobile industry were just about ready to put their money on the line that 1937 cars will write finis to the present conventional-type clutch and transmission.

Automatic transmission, plus an application of the overdrive principle to the entire gear range, is the coming substitute. It will be as startling a change as four-wheel brakes or self-starting, but unlike a few departures in the interim will be well-merited and motivated not necessarily by the thought of a change for the sake of a change.

For many years motor car makers have been on the alert for mechanical improvements that boil down to satisfying one brief creed: To make more economical transportation and to make it comfortable.

Comfort may come first, but take your choice. Scan all of the body and motor refinements of the last decade, and it's true that they center on an easy ride at the lowest cost.

Shiftless Comfort

Automatic transmission will not make the automobile of next year cheaper for its owner to run, but it will be a big step toward comfort. Ever since the horse and buggy's successor has resigned itself to a standard tread and a standard frame width, it has constantly had the problem of making the body interior roomier.

Witness the narrow running boards of today, many scarcely more than strips, or witness Chrysler's plans for 1937 to cut door thicknesses in half, and you see the trend toward making seats wider.

The coming automatic transmission, which is simply a glorified gadget in exterior appearance and fits pretty much out of the way on the steering post, therefore will clean up front seating and make the industry's claims of "three to the front seat" more valid.

Furthermore, in its contribution to comfort the driver should not be overlooked. It takes but a flick of

the finger, so Hudson stresses, to shift gears with its device. Certainly, the driver's right arm won't have to circulate in as wide an arc.

To nine out of ten drivers of today, this new device will be pretty much of a novelty. True, Hudson for the past two years has had it as optional equipment and it has gone over well, especially with women drivers. Reo also has its self-shifter. Not to forget that as long ago as 1913 automatic transmission's basic idea appeared in a few of the old-timers.

Tests Are Satisfactory

But, it will remain for 1937 and 1938, according to the way the wind now blows, for the industry at large to swing over from what the public has always taken for granted as conventional, the beginner's bugbear, and the source of much knee discomfort to that middle front-seat passenger.

General Motors and Chrysler, more so than Ford or any of the independents (of course, barring Hudson), have done more to date in testing this new type transmission in their engineering laboratories and on the proving ground.

Detroit has learned that the conclusions the General Motors high command has reached to date are considerably more satisfactory than the ultimate findings Chrysler has sifted.

In brief, General Motors' findings have been this: There is no question of the improvement to body roominess that automatic shifting would give. It looks like something the public would take to heartily, and certainly will be an A-1 talking point.

Secondly, there is no question of its mechanical feasibility, nor of dependability in performance. These two points have been tried and proved.

There is, though, some question of costs, and that in any industry today, even if it netted millions in 1935, as the automobile industry did,

always provokes a second thought.

General Motors wants to see the way clear to costs being on a practical basis and it will want to have production facilities definitely tuned up to meet the change. The principal departure from today's type of transmission lies in more exacting manufacturing precision.

For steel, the change will mean a swing to different specifications without any appreciable loss or gain in total tonnage. Cold-drawn steel with a close tolerance will be used in greater volume; obviously the abandonment of the gear-shifting lever will rule out a certain tonnage of tubing.

Borg-Warner Corp., a principal manufacturer of automobile clutches and transmissions, and the maker of Hudson's transmission refinement, is mentioned widely as the patentee of what is termed "Mono-Drive," which is automatic gear-shifting plus overdrive and which seems to be in line for widespread 1937 application.

Speed Determines Gear Ratio

This development, so reports have it, will not require the driver to depress the clutch pedal during acceleration or deceleration. Lifting the foot off the accelerator will cause an automatic shifting of gears. Automatically, speed of the car will determine what gear is to be used.

The application of overdrive has some novelty, for Hudson's automatic shifting has not had this added feature. Chrysler has been making much of overdrive, but this is for the fourth speed only, taking effect at travel around 40 to 45 miles per hour. The Borg-Warner device will utilize overdrive in more than one speed.

That's the brief outline of the way things stand so far. Borg-Warner itself has had its hands tied on this development because of alleged patent difficulties with a Chicago firm which has claimed rights.

On good authority, it was report-

Mirrors of Motordom

ed last week that Borg and this Chicago firm, the New Products Corp. owning the Banker patents, had reached a settlement. Borg then announced it had been licensed to make the automatic transmission overdrive under the Banker patents.

Presumably, this opens the way for Borg to dicker with General Motors, Chrysler or any other car maker for the right to use the application, just as Borg already licenses Chrysler, DeSoto, and some Studebaker, Graham and Nash models to use the overdrive it makes.

Because, as mentioned in a preceding paragraph, General Motors thinks the manufacturing precision angle of the new device precludes swinging over 100 per cent to its application at first, only Olds has been approved by G. M. for use of automatic transmission in 1937.

At this point, some authority in Detroit brings up a moot point: Will Olds be the only General Motors line to use this feature to the exclusion of all others in the family? If such comes to pass, it may indicate a marked change in policy.

Heretofore any major mechanical change, such as the recent knee action or turret top, has been applied uniformly down the line, making no one General Motors car the exception. Either Olds is just the first one to have automatic transmission plans approved for 1937 and the rest ultimately will follow, or else General Motors is going to let each car have its distinctive features less restricted in 1937.

What Will Others Do?

Chrysler, as before related, is lukewarm on automatic transmission, but perhaps because it has its own variation of the idea to offer ultimately. Of Ford, on this subject, the automotive industry is not sure. Certainly the policy at the Rouge has been never to be an outstanding licensee of engineering developments from the outside; rather, to keep apace of developments by using the product of its own engineering laboratories.

On 1937 models, nonetheless, Ford is diverting considerable attention. It came to light last week that Ford's planning and maintenance departments—sizable and integral divisions—are now just entering their busy season. On direct authority, the schedule calls for a busy 90 days ahead for these two divisions of the Ford company.

Like every other car maker, Ford will make some changes for 1937,

but none appears likely to center in the motor of the present V-8 series. It is presumed that the popularity of the Lincoln-Zephyr may mean some of its body lines will be kept in mind by Ford designers for the 1937 V-8. Treatment of the rear panels of the Zephyr and their characteristic slope may be employed on the Ford; at least there is considerable report in Detroit to this effect.

Details are as yet unsettled, at least from the standpoint of any large retooling or new die programs at Dearborn. Considerable retooling is progressing at all times at Ford, although it has been mostly in the nature of single-tool purchases recently. The machinery trade has been given to understand by purchasing officials at Ford that machine tool replacements in the near future there are to be largely for replacement, against a broad long-term policy of manufacturing existing parts for the V-8 more economically.

Last week's assembly of 120,519 units, an increase of about 1000 over the preceding week, insures that April assemblies will top 500,000 units, perhaps reaching 515,000. This will make April the best month for all time excepting March, April, May and June of 1929.

During this bonanza period of 1929 the top month saw 621,910 cars and trucks turned out, and if the current month reaches 515,000 units it will be approximately 83 per cent of the

all-time high. The record production for any one week was 140,000 in each of the second and third weeks of April, 1929, and the first week of May of that year—which indicates how strong the present production situation is.

Last week General Motors dropped 49,950 units off its assembly lines, according to Cram's Reports, an increase of about 300 over the preceding week. Ford and Lincoln held at 30,560, Chrysler at 26,300 was up about 250. Evidently such independent manufacturers as Hudson-Terraplane, Packard, Nash, Studebaker and Graham improved relatively more than the big three last week.

Current weekly production statistics are as follows: Chevrolet 33,000, Ford 30,000, Plymouth 13,700, Dodge 9000, Olds 6300, Pontiac 4900, Buick 4500, Hudson-Terraplane 3500, Studebaker 2200, Nash-Lafayette 2000, Packard 1850, Chrysler 1700, DeSoto 1400, Willys 900, Graham 700, Cadillac-LaSalle 600, Lincoln 550, Reo 500, Auburn 150, Pierce-Arrow 30.

Used Cars Are Moving

Last week Chevrolet headquarters announced that its dealers' used car sales for the first six months of the current model year will reach a total of more than 900,000 units . . . L. A. Young Spring & Wire Corp., Detroit, has purchased a new plant at Los Angeles, designed particularly to handle cushion spring business for automobile assembly plants in that district, but it will also make coat hangers, bed springs, and other company products . . . Important inquiries have begun to appear on hub caps for practically all of the 1937 models; most of them are larger in diameter than in 1936 . . . An important low-priced car manufacturer is strongly favoring the installation of its hand brake on the dash next year . . . Ternstedt Mfg. Co. has inquiries out among the machine tool trade which indicate a large retooling program and possible manufacture of additional automotive hardware items . . . With Ford now out with two convertible jobs and others in the industry pushing this model hard, Chrysler has retained Murray Corp. of America designers to work out convertible designs for it . . . Detroit understands that Dodge's excellent first-quarter showing has been an outstanding cause for Chrysler Corp's. high earnings in the first three months.

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	424,571
3 mo.	724,356	1,058,245	1,082,787
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	.....

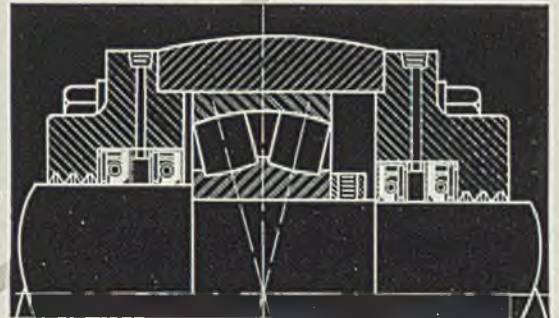
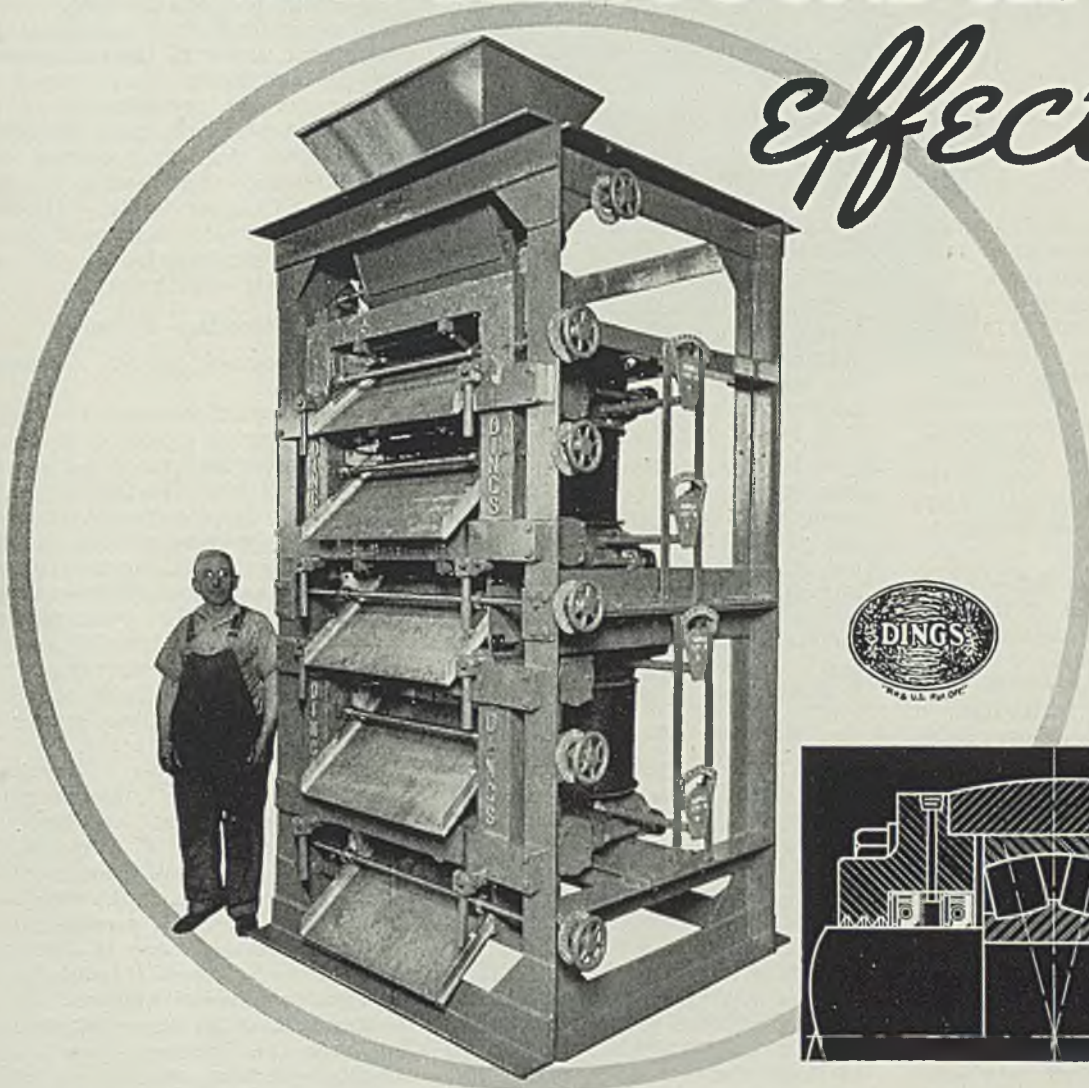
*Estimated.

Estimated by Cram's Reports

Week ended:	
April 4	108,426
April 11	112,818
April 18	119,834
April 25	120,519

NO OTHER TYPE OF BEARING SEAL HAS BEEN FOUND AS

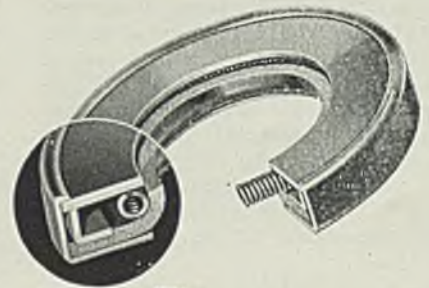
effective



● Each of the bearings in the Dings Magnetic Separator is protected by Chicago Rawhide "Perfect" Oil Retainers in order to guard them against dust and to keep lubricant in the housings. Dings Magnetic Separator Company's experience has shown that this type of construction is the only one which has given full satisfaction under the severe operating conditions under which such equipment must serve.

The Separator illustrated is used to separate ilmenite from sand.

If your equipment is called on to serve under critical dust or moisture conditions investigate the remarkable performance of the "Perfect" Oil Retainer. Chicago Rawhide Engineers will gladly make suggestions.



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53 Years Manufacturing Quality Mechanical Leather Goods Exclusively

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CLEVELAND

BOSTON

PITTSBURGH

NEW YORK
CINCINNATI

April 27, 1936

STEEL

35

Great Lakes Levels Mean Dollars to Steel Industry

BY F. W. TREZISE

Professor of Engineering, Lawrence College,
Appleton, Wis.

THE value of iron ore deposits in the Lake Superior district must be credited in large measure to transportation facilities of the Great Lakes, a system of waterways without equal as highways of commerce. As the price of steel is a barometer of financial weather, so the volume of transportation of ore from the upper lake ports is an indicator of business conditions, not only in the vast mining and industrial centers of the Great Lakes area, but of the entire country.

It has been the Great Lakes which have made the mining of iron ore in the Lake Superior region profitable. If these ore tonnages were to be shipped entirely by rail to Lake Erie ports and to Pittsburgh, it would mean that foreign ores could be used more profitably, with a consequent rise in the price of steel.

The absence of the entire waterway would have a dire effect; so in a measure, variations in the levels of the lakes must be reckoned with. For vessels bound to Lake Erie, the Lake St. Clair channel forms the "bottle-neck," so far as draft is concerned.

Huron Level Not Controlled

It has been said that if Perry had decided to take his fleet into Lake Huron after the battle of Lake Erie in 1812, he would have found it necessary to float the ships in 4 feet of water in the St. Clair river. These original channels have been deepened and are being maintained at a recommended draft of 20 feet, based upon levels of Lakes Michigan and Huron at 780—approximately, depending upon the season of the year—above sea level.

Because of the practically uncontrolled levels of Lake Huron, save for the diversions at Chicago, the levels of the connecting courses to Lake Erie are depending upon the stage of Huron. The Straits of Mackinac are so wide and deep, that the levels of Michigan and Huron vary little, as shown by the self-registering gages at Harbor Beach and Milwaukee.

Since the construction of the regulating works at Sault Ste. Marie in 1920, the level of Superior has been a law unto itself, the stage being set and controlled within limits deter-

mined by an international committee for the commerce plying between Duluth and the Soo.

Directly, then, those factors which determine the levels of Michigan and Huron have a profound effect upon the transport of iron ore to lower lake ports, not only those on Lake Erie but of Michigan as well.

It is only necessary to present a few figures to show the tremendous economic value of maintenance of a sufficiently high water level to make use of the maximum available draft of vessels. Various authorities have estimated the effects of low water but the unusually low reaches of the past year have accentuated reference to the matter.

Seriously Affects Revenue

The Lake Carriers' association report for 1934 lists 819 ships, which, loaded to a depth of 19 feet draft have a carrying capacity of 4,457,410 tons gross. It has been estimated, upon authority of those who have studied the problem, that the reduction of draft by 0.1 of a foot results in a loss of revenue of \$44.50 for the average vessel. Assuming that the average net tonnage hauled per year is 100,000,000 tons, (page 43, Lake Carriers' 1934 report) the shipment of this amount would require about 23 trips per year for each of these average vessels. Now 819 vessels, making 23 trips with a loss of \$44.50 per trip would result in a total loss of \$837,350 for the entire fleet for one-tenth of a foot in draft.

This would indicate a loss for each foot of draft lost in an average year, of well over \$8,000,000. Under normal traffic and business conditions is it small wonder that Michigan-Huron levels are of great concern to those interested in lake commerce, particularly bulk shippers of ore, coal and grains?

To illustrate the variation in draft allowances permitted by the Lake Carriers association, a table taken from the 1934 report, covering the period 1910-1934, shows for the St. Mary's river a minimum of 17 feet, 8.6 inches average in 1934, and a maximum of 20 feet 6.2 inches in 1929. For Lake St. Clair, the minimum was 17 feet 8.6 inches in 1934,

and maximum 20 feet 6.7 inches in 1917.

It will be interesting to determine the reasons for such variations in the draft allowances due to levels of Michigan and Huron.

Precipitation—Without doubt the changes in precipitation on the drainage area must be considered the dominant factor in the maintenance of the lake levels. To an extent the change in the precipitation on the Lake Superior area must be recognized since the larger outflow over the Stoney gates at the Soo will contribute to higher levels. Also, because of backwater reaction, although slight, the precipitation on the Lake Erie basin is contributory.

Secondary Factors

Other causes might be noted, briefly:

New channel sections in outlets, created either by erosion or dredging; deforestation; land tilt, due apparently to recoil from the ice age; evaporation. No definite records are available but it may be pointed out that in September, 1871, the negative water yield, due almost entirely to evaporation, was 125,700 cubic feet per second, an incomprehensible amount. The mean annual evaporation from Michigan-Huron has been estimated by the United States lake survey office to be about 27 inches.

Still other causes: Transitory, such as barometric pressure variations, tides, winds, ice jams. A seich formed by a variation in barometric pressure occurred in Lake Superior during the past summer. In May, 1925, a seich caused the water to rise 4 feet in 6 minutes and to drop 5 feet 4 inches below normal level, near Alpena.

Diversions, the largest of which is through the drainage canal of the sanitary district of Chicago, which diversion will be lessened to 1500 cubic feet per second by Supreme Court order in 1939, as compared with over 10,000, a peak in 1928.

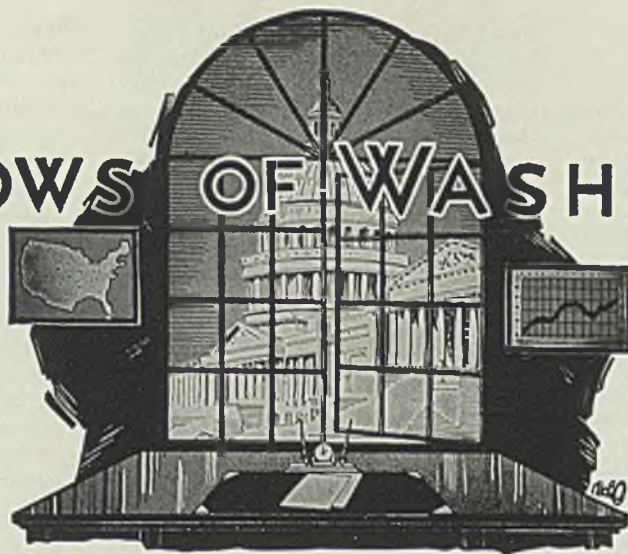
Regulation or artificial control of levels may be secured by means of submerged dams or regulating gates.

Unlike Lake Superior, the most marvelous and awe inspiring body of fresh water on the globe, Lakes Michigan and Huron are temperamental. Their behavior has a tremendous bearing upon the economic security of thousands depending upon a livelihood in the mining industry of the Lake Superior region, and the industrial steel centers of Detroit, Pittsburgh, and the near-Chicago areas.

BRITISH FOUNDRYMEN TO MEET

Institute of British Foundrymen will hold its thirty-third annual conference in Glasgow, Scotland, June 9-12. The program will consist of technical sessions, plant visitations and the annual banquet.

WINDOWS OF WASHINGTON



WASHINGTON

IT WAS a question of taxes, taxes everywhere last week. The ways and means committee of the house, which had been wrestling with the new revenue bill for a long time, finally gave birth to a measure. It was taken up on the floor of the house, with 16 hours allowed for discussion under a special rule, and the senate finance committee began its hearings on the measure in an effort to speed up the bill and thereby, also, adjournment of congress.

There is a very definite feeling here that it will be impossible to reach the end of the congressional road this year until early in June, and some of the older members of congress, especially in the house, believe that it might be necessary to have three-day recesses during the national conventions. This, of course, will be avoided if possible. And in the meantime, leaders of both houses are doing everything they can to wind things up before the conventions.

Tax Bill Complicated

The tax bill itself is considerably over 250 pages long, and is most complicated. So much so, that members of the house and even of the ways and means committee don't seem to know what it is all about. In connection with the taxes on surpluses held by corporations, the rates carried in the April 6 issue of STEEL, page 24, which comprised the report of the subcommittee, are those contained in the bill as it is now being discussed on the floor of the house. Incidentally, the house leaders expect to complete action on the bill this week, so that by next week it will be in the hands of the senate.

Minority members of the ways and means committee, who were not able even to get copies of the bill as soon as some of the Washington lobbyists, took some nasty cracks at the bill as it emerged from committee.

"The proposed bill", said the minority report, "is unsound in principle, will undermine business stability, and is another step toward the regimentation of all business. It is not designed to raise revenue, but is admittedly another New Deal experiment."

"The proposed scheme to tax the undistributed portion of a corporation's earnings rather than total income cannot be justified either as a revenue measure or as a desirable tax reform."

Processing Taxes Omitted

"It will discourage, and possibly prevent the accumulation of rainy day reserves, and constitutes a direct threat to the security of business, employment and investments. It will cause corporations to restrict the distribution of their existing tax paid reserves, which can only be rebuilt under penalty."

It is interesting to recall, in thinking about this new revenue measure, that house members have deliberately left out of the bill all reference to processing taxes. These were specifically asked for by the President when he applied for more taxes.

It is known that the President will be most insistent on this point and it is a matter of much speculation as to whether the Democratic leaders of the house will hold out on this point if the senate puts these processing taxes in the bill in the upper house. The objection by members of the house, of course, is purely political, and they have their weather eye on the coming elections and how these taxes might affect them in their own congressional districts.

It is claimed by the ways and means committee that the bill as drawn by the committee will yield \$814,000,000 the first year.

The bill, of course, is aimed at the wealth-sharing objective of forcing corporate surpluses into dividend dis-

tribution, and has as its keynote a graduated tax on corporate earnings, in relation to the volume of current profits withheld from dividends. This displaces entirely the present 12½ to 15 per cent corporate income tax.

In order that little of the distributed profits can escape the tax mill, the normal 4 per cent income tax is made applicable for the first time to dividends received by shareholders.

A preferred rate schedule ranging from 1 to 29.5 per cent would be applied to the so-called small corporations earning \$10,000 or less, while corporations in the higher earnings brackets would pay between 4 and 42.5 per cent.

Alternative intermediate schedules are provided for companies having adjusted net incomes of between \$10,000 and \$40,000. Here a formula would be applied, designed to give companies in this group some degree of the relief afforded those in the lower earnings brackets.

DOUBT IF ANTI-BASING POINT ISSUE WILL CARRY

A meeting of 50 members of the house was held last week to discuss the chances of getting some action at this session of congress on the Patman-Robinson price discrimination bill.

A number of committees were appointed among the interested congressmen, including one to contact the White House to endeavor to get the backing of the President for this bill. He has never expressed himself on this measure.

This bill, it will be recalled by the steel industry, is the one which carries a basing point provision, having been taken bodily from the Utterback bill, which is identical with the Wheeler anti-basing point bill in the senate.

When this bill was first reported out of the house judiciary committee leaders of the steel industry showed

considerable concern, but that seems to have been entirely dissipated if appearances count for anything.

This is due either to the fact that the industry has been informed that the Robinson-Patman bill will never pass congress with the basing point provision, or some thought on the part of those in the industry who have been watching the bill that it cannot pass at this session.

There is no question but that interested members of the lower house will make every effort to get some action on this anti chain store bill. However, it is a foregone conclusion that the Patman bill will never pass the senate as it stands today. In the senate it is the Robinson bill—introduced by the majority leader from Arkansas—and the senate bill does not carry the basing point provisions of the house bill. It is reported, however, that Mr. Patman is very much for the anti-basing point provisions and that he will fight for that provision being left in at least as it passes the house.

Money is still standing at 50-50 as to whether this bill can become law at this session. It seems hardly possible, however, that the basing point provisions will stand up, at least in both houses, even if the bill does come up for final action.

SEES SURCHARGE UNCERTAINTY A DRAG ON ORE MOVEMENT

W. L. Tinker, secretary of the Lake Superior Iron Ore association, Cleveland, appearing last week before the interstate commerce commission in connection with the closing arguments relative to the freight surcharge case, asked that the carriers be required to file promptly tariffs canceling the surcharge, effective as of April 1 if possible, and in any event before May 1. It will be recalled that the present rates are effective until June 30 unless otherwise directed by the commission.

"If the surcharges are allowed to remain until June 30," said Mr. Tinker, "which is well along into the shipping season, the season's movement of ore will be disrupted and only a relatively small emergency tonnage will move in the earlier half of the season pending reduction in the rates."

Dealing with the so-called division of the surcharge with the eastern carriers, Mr. Tinker told the commission that his association has full statistics which shows that on the average "over the last 7 years, only approximately 50 per cent of the ore carrying this surcharge in the Lake Superior district moved ex lake to interior furnaces and involved this division. The percentage for 1935 was 52.25 per cent. This association is not in a position to make, and cannot afford to go to the expense of making, a careful analytical study of the financial needs of the many rail-

roads involved in this ex lake traffic. It does, however, question the practical efficiency and the legal reasonableness of burdening all of the upper lake traffic for the primary benefit of carriers who do not need the funds, in order to obtain an incidental benefit for a scattered group of eastern carriers, regardless of their financial needs."

Discussing the surcharges generally, Mr. Tinker stated that "we strenuously object to the increase in the rates on iron ore from Lake Superior district mines to upper lake ports by the continuance of the emergency surcharge in any form. Without any increase, they are too high. Following the war increases, they have been reduced far less than any rates on iron ore or any similar commodities, and so far as I know, any rates on any commodities. They now stand, on an average (without surcharges) over 70 per cent above the rates being charged in 1915."

Mr. Tinker stated that "we have, for a number of years, been gradually losing entirely the markets for iron ore east of the Allegheny mountains. This is manifestly due in large part to the high freight rates which, except for the war years, correspond very definitely with the periods of loss of shipments to these eastern markets."

In concluding his statement Mr. Tinker said that "if the commission finds, as we believe it must on this record, that there is no legal or equitable justification for continuing the exaction of the emergency charge under the facts shown on this record, then I would urge you most strongly to give immediate consideration to our application for the immediate cancellation of the charge on iron ore."

WILL BUSINESS PRESS FOR BIGGER COMMERCE BUDGET?

There was a time—not so many years ago—when the business interests of the country used to come to the rescue of the department of commerce when it could not get sufficient appropriations from congress, but those days have apparently gone by the boards.

As this is written, the department is having a tough time trying to keep congress from cutting its appropriations under what they have been during the present fiscal year. This applies particularly to those branches of the department dealing especially with foreign and domestic commerce and coming directly under the bureau of foreign and domestic commerce, from which bureau the business interests of the country get their main service—if they want it.

As the bill passed the house, that body of the congress cut the appropriations for that bureau more than \$100,000 under what the budget bu-

reau thought they should have been. Part of this has been put back in the bill by the senate appropriations committee, but the bill yet has to pass the senate and then go to conference.

As the bill stands today—if it should pass as the senate committee suggests—the bureau of foreign and domestic commerce will have just about as much to go on during the next fiscal year as it has had this year, in spite of business pickup both here and abroad. This means, among other things, that the department will not be able to expand its foreign service to be helpful for American business and industry.

INSTITUTE OFFICIALS ACTIVE IN PROMOTING HOUSING

Plans have just been completed here to co-ordinate the activities of some 100,000 members of trade associations to stimulate the construction of more than 250,000 homes throughout the country this year.

The program is being sponsored by the so-called national housing advisory council. Members of the executive committee of the council include V. G. Iden, of the American Institute of Steel Construction, and Harry A. Tuke, of the Concrete Reinforcing Steel institute.

The program is being projected with the following purposes in mind: (1) to unify the building industry for selling a nation-wide market; (2) to encourage and develop the most effective selling and advertising activities on the part of all members of the building industry in order to insure that a substantial share of the buyers' dollars shall be spent for housing or for products related to housing; (3) through co-operation with members of the building industry to do everything possible to insure that the machinery now available in the form of existing governmental agencies and business associations and their established channels or production shall operate smoothly and efficiently to sell the housing market; and (4) to advise and co-operate with the federal housing administration and other agencies whose concern is with a long-range, privately-financed home-building program.

EASTMAN TERM UNCERTAIN

There is some uneasiness in quarters which are supplying material to the railroads of the country in connection with the expiring of the term of office of the co-ordinator of railroads, Mr. Eastman.

His term expires on June 1 and up to this time nothing has been done to have his time extended. Mr. Eastman feels, it is understood, that the term should be extended for a period of five years and the President is said also to feel this way.

Accounting on Unemployment and Relief Is Overdue

REITERATION by politicians that industrial production has gained far more than employment and that the machine has ousted millions of workers from jobs has become so frequent as to be monotonous. Worse than that, the statements usually are so exaggerated or biased that the public is in danger of being deceived in regard to a very important problem in the economic life of the nation.

The favorite formula for deception is to cite an index of industrial production to show the extent of recovery in physical output of goods and then to refer to an index of general employment, indicating a lesser degree of recovery in jobs. The point can be made more impressive by stating that unemployment still ranges between 11,000,000 and 12,500,000 and by declaring dogmatically that the whole mess can be cleared up if "industry" will shorten hours without reducing wages. In other words, the politicians usually try to give the idea that private industry is responsible for unemployment—that the present unemployment is due to the failure of industry to hire back the people it dismissed during the depression.

Burden of Relieving Unemployment Should Not Be Thrust Upon Shoulders of Industry Alone

Probably not more than one out of ten congressmen in Washington has any reasonable idea of the amount of employment normally available in industry. Most of them think that the great majority of persons now without jobs once were employed by industry. They fail to realize that under normal conditions only about one-sixth of the jobs are in industry. As reported on this page in the Feb. 3, 1936, issue, the government figures show that normally 40,000,000 jobs are in agriculture, public and personal service, wholesale and retail trade, transportation and communication, etc. Only 8,000,000 normal jobs are in the manufacturing industries.

Yet in spite of these facts, many politicians and at times President Roosevelt have inferred that the re-employment of the 11,000,000 to 12,500,000 allegedly jobless persons is "up to industry." Probably in the eyes of politicians it is good strategy to attempt to make private industry the scapegoat of the unemployment mess. That point is not vitally important.

But it is essential that this nation get down to brass tacks on unemployment, because that

problem is closely allied to relief. It is a national disgrace that billions of dollars are being spent for work-making projects and for relief on the basis of pure guesswork and political patronage instead of on the basis of exact knowledge of the unemployment and relief situations.

Time and again it has been suggested that exact figures on unemployment be obtained by a careful census. The administration has dodged this issue consistently, first on one flimsy pretext and then on another. Meanwhile the department of labor, American Federation of Labor, National Industrial Conference board and other agencies issue estimates of unemployment, which doubtless are as reliable as can be expected under the methods employed, but fall short of indicating the true situation.

Do Unemployment Estimates Make Allowance For Duplication and Other Discrepancies?

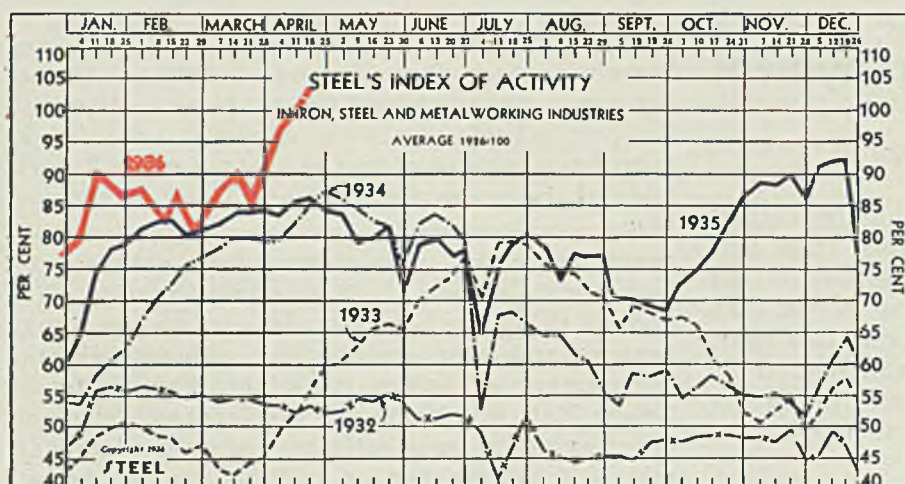
For instance, do these figures take into account the accumulative effect of the loss of a single job. Consider a family of five, consisting of Mr. and Mrs. Smith, their son John aged 16, and two minor children. If Mr. Smith lost his job in 1932, it is likely that the son John quit school to look for a job and it is possible that Mrs. Smith applied somewhere for employment. Do the current unemployment figures include one or three members of the Smith family?

Again there is a farm boy living near Washington, Pa., for instance. He has a small car, and when times were hard he drove into Pittsburgh and applied for a job. The next day he registered as unemployed at Wheeling and at Steubenville. Later he repeated at Aliquippa, McKees Rocks and Coraopolis. Do the records show that one farm boy is jobless, or that six industrial workers in six communities in three states are out of jobs?

Lewis Douglas, former director of the budget, once suggested that the American Red Cross take over the job of administering federal relief. This proposal was sidestepped neatly by the politicians for obvious reasons. Had it been adopted, millions of dollars would have been saved, hundreds of thousands of cases of deception would have been exposed and corrected and much factual information regarding relief and unemployment would have been tabulated.

Actual, legitimate unemployment probably is nearer 5,000,000 or 6,000,000 than 11,000,000 to 12,500,000. The necessary cost of relief is perhaps a third or a quarter of the amount being spent. The American public, and particularly private industry—which is in the dual role of scapegoat and financial angel—are entitled to an accounting.

THE BUSINESS TREND



STEEL'S index of activity in the iron, steel and metalworking industries gained 3.4 points to 103.0 in the week ending April 18:

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	99.6†	85.4	82.2	52.6
Apr. 18	103.0*	86.3	85.0	55.8

†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.

High Rate of Activity Is Strongly Maintained

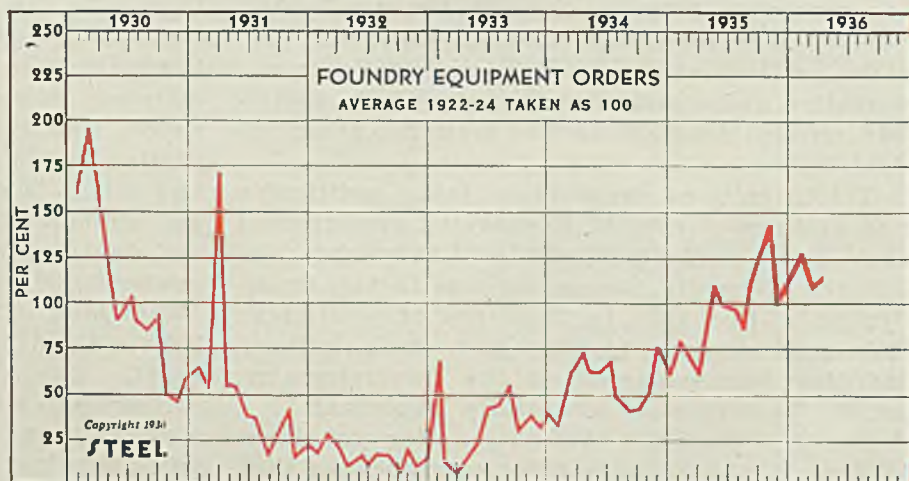
IN SPITE of all of the wailing in some quarters as to the alleged discrepancy between recovery in production and recovery in employment, the curves of the two have much in common.

Output in many branches of the metalworking industry now is at the highest level since about the middle of 1930. The March report of the National Metal Trades association shows that the index of employment in metalworking establishments stands at 81.4, and this is the highest rate since "late in 1930." Incidentally, the index has increased in nine consecutive months.

STEEL'S index of activity in the metalworking industries for the week ending April 18 stands at 103, a gain from 99.6 in the previous week. This is the highest peak since the second week of May, 1930. The jump of 3.4 points was caused by a sharp spurt in steelworks operations, from 66.5 to 70.5 per cent of capacity, and a considerable increase in automobile assemblies from 112,818 to 119,834 weekly. Revenue car loadings gained slightly and electric power output eased a trifle.

Looking back over the record of industrial activity since the beginning of 1936, one is surprised to note that the trend has fluctuated more violently and more frequently than in the corresponding period of any recent year. In the first four months of every year from 1929 to 1935 inclusive, the curve of activity was smooth, with practically no sharp reversals in trend. In sharp contrast, the curve of 1936 has five peaks

	Per Cent			
	1936	1935	1934	1933
Jan.	127.0	86.6	37.2	68.4
Feb.	110.4	75.7	65.8	16.1
March	115.0	69.4	75.4	9.8
April		113.2	67.9	19.4
May		100.7	66.5	25.6
June		100.2	70.4	45.5
July		94.0	50.7	48.8
Aug.		113.0	43.1	56.3
Sept.		128.5	46.4	34.9
Oct.		140.0	55.3	42.5
Nov.		100.4	80.4	36.6
Dec.		118.1	66.9	43.8



in less than four months. There have been eight reversals of trend in that brief period.

Part of this sawtooth tracing of the trend can be attributed to the weather in January and February and to the floods in March. Important decisions of the supreme court may have exerted a minor influence. But in the main, the most reasonable explanation of the course of activity is that the forces of recovery were working steadily since about the first of October, 1935, and that the deviations from a steady upward curve have been caused by holiday interruptions,

Where Business Stands

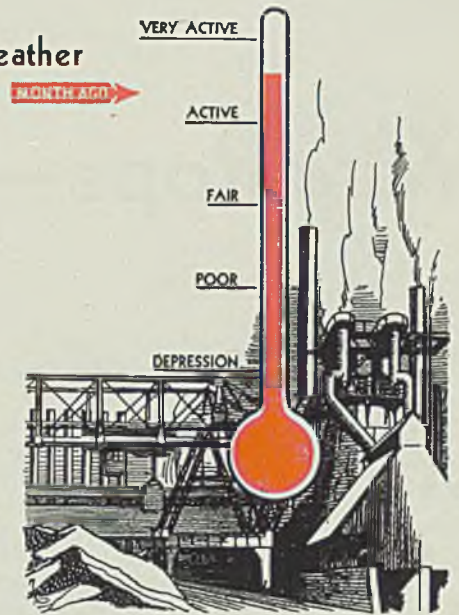
Monthly Averages, 1935=100

	March, 1936	Feb., 1936	March, 1935
Steel Ingot Output	119.8	110.5	102.6
Pig Iron Output	114.4	109.9	99.0
Freight Movement	99.8	103.4	99.5
Building Construction .....	.....	99.5	75.7
Automobile Output	124.8	86.1	129.6
Wholesale Prices .....	.....	99.3	96.7

as in November and December, and by other short-term obstacles, as extreme weather, floods and other influences since the year-end. The possibility of a year of slight fluctuations, which was hinted in this column several months ago, already has been exploded.

Collections of internal revenue by the federal government for March indicate the striking im-

Industrial Weather



TREND:

Upward

provement in business during the past year. Corporation income taxes for March, 1936, totaled \$171,557,502 compared with \$139,776,550 for March, 1935—a gain of \$31,780,952 or 22.7 per cent. Excess profits taxes were \$2,692,477 compared with \$711,054.

Earnings statements for the first quarter of 1936 will show gains in profits for many companies in the metalworking industries, but in some cases the earnings will not seem commensurate with volume because the business was taken at low prices.

The Barometer of Business

Industrial Indicators

	March, 1936	Feb., 1936	March, 1935
Pig iron output (daily average, tons)	66,004	63,411	57,120
Machine tool index	109.4	107.1	60.3
Finished steel shipments.....	783,552	676,315	668,056
Ingot output (daily average, tons)	128,711	118,712	110,313
Dodge building awards in 37 states (sq. ft.).....	.....	20,856,700	15,873,100
Automobile output.....	*435,000	304,232	451,768
Coal output, tons.....	.....	41,290,000	38,848,000
Business failures; number	946	856	976
Business failures; liabilities	\$16,271,000	\$14,089,000	\$18,522,840
Cement production, barrels .....	.....	3,454,000	4,299,000
Cotton consumption, bales	549,000	517,000	481,135
Car loadings (weekly average)	604,746	627,024	602,922

*Estimated.

Financial Indicators

	March, 1936	Feb., 1936	March, 1935
25 Industrial stocks	\$202.99	\$198.47	\$139.34
25 Rail stocks	\$38.50	\$38.67	\$22.73
40 Bonds	\$87.88	\$87.95	\$80.58
Bank clearings (000 omitted) .....	.....	\$20,923,647	\$22,564,491
Commercial paper rate (New York, per cent).....	¾	¾	1
*Commercial loans (000 omitted)	\$8,204,000	\$7,959,000	\$7,609,000
Federal Reserve ratio, per cent.....	78.2	78.2	72.5
†Railroad earnings	\$33,594,718	\$35,874,738	\$26,296,411
Stock sales, New York stock exchange	51,025,148	60,871,262	15,849,017
Bond sales, par value	\$285,429,900	\$373,004,100	\$311,534,900

*Leading member banks Federal Reserve System.
†February, January and February respectively.

Foreign Trade

	March, 1936	Feb., 1936	March, 1935
Exports	\$195,336,000	\$182,630,000	\$185,001,000
Imports	\$200,295,000	\$192,821,000	\$177,279,000
Gold exports .....	.....	.....	\$540,000
Gold imports	\$7,795,000	\$7,002,000	\$13,543,000

Commodity Prices

	March, 1936	Feb., 1936	March, 1935
STEEL'S composite average of 25 iron and steel prices	\$33.20	\$33.48	\$32.46
Bradstreet's index .....	.....	\$9.92	\$9.66
Wheat, cash (bushel)	\$1.14	\$1.15	\$1.10
Corn, cash (bushel)	80c	83c	97c
Petroleum, crude (barrel).....	.....	\$1.08	90c

Wire Rope—Its Design, Construction

MOVING of materials by flexible rope connections dates back to antiquity. Over the succeeding centuries it is safe to say that the art of rope-making had a direct influence upon the development of mechanics. During this period, up to the early part of the nineteenth century, however, this development was restricted to a type of rope which today we term cordage—a product composed essentially of twisted vegetable fibers.

About 1822 there was a radical development in rope-making when a suspension bridge of wire was erected in Geneva. In this installation, however, the wire rope consisted of parallel strands bound together with wire and other coverings which were wrapped around in spiral form to keep the strands in place.

Rope structure of this nature has marked rigidity

and maximum strength, but is subject to decided limitations as to flexibility. Hence the later development of the formed rope of twisted wire strands, which began in England about 1837. This eliminated the necessity for retaining wrappings, for when fibers or wire strands are twisted together in a rope they are held together by mutual friction when tension or strain is applied.

Later the advantages of the hemp core were developed, with the result that today nearly all wire rope is laid up or wound around such a core. A center of this nature furnishes a more pliable rope and a product which possesses better wearing qualities, especially where short bends or extreme flexing are desirable. Where conditions which may lead to deformation, or extreme heats are to be experienced, however, a metallic center often is substituted.

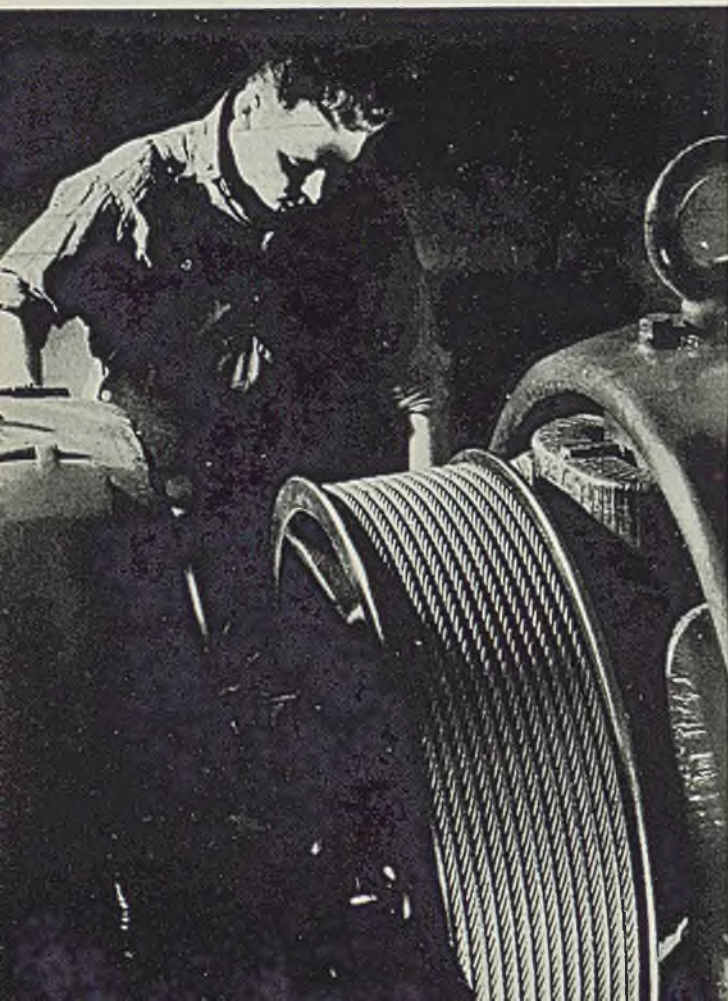
In wire rope technology, the term *lay* has to do with the structure or type of winding. The two most prevalent types are the regular lay and Lang lay. When the wires composing the strands and the strands surrounding the core are laid up in opposite directions, the rope is of regular lay construction. The regular lay is widely used for an extensive variety of operations, such as are met with in coal hoists, derricks, cargo falls and other types of hoists; it is also adaptable to power shovels, dragline scrapers and other intensive service which reduces the life of the rope. When the strands of wire and rope are laid up in the same direction, the term Lang lay is applied. This provides a rope which is more readily untwisted, but a product which is somewhat more flexible than regular lay rope; also, because of the position of the wires in the strand, it will normally withstand fatiguing action better. Lang lay ropes are widely used in mining operations.

Classifications of Wire Rope

There is also what is known as the right and left lay. The right lay might be conveniently likened to a right hand screw of long pitch; the left hand being similar to a left hand screw. The field of usefulness of this type of rope is limited principally to elevators, and places where the tendency of the left lay rope to untwist in one direction is offset by the tendency of a right lay rope to untwist in the other. Finally there is a type of construction known as alternate right and left lay rope. In a rope of this type, half of the strands are made of the regular lay and half of the Lang lay.

Three sizes of wire construction predominate today—the Warrington, Seale and filler wire; the latter being known also as modified Seale or spacer Seale.

In the Warrington construction there are six wires to the inner layer and 12 to the outer, all wound around a wire center. The main wires of the inner layer are of one



and Lubrication

Illustrations courtesy John A. Roebeling's Sons Co.

diameter; those of the outer layer being of two diameters laid alternately; see A in sketch on page 45.

Seale construction calls for each strand having a wire center with nine wires each to the inner and outer layers. All the main wires of each layer are of the same diameter, as shown in B of the sketch.

The filler wire or modified Seale type of construction requires a wire center for each strand, with six wires to the inner layer and 12 to the outer. In turn, six filler wires of smaller diameter are located between these layers. As in the Seale construction, the main wires of each layer are of uniform diameter, respectively (C in sketch).

In constructing machinery for the utilization of wire rope it will be found most economical to design the drums and sheaves of as large diameter as practicable, for research and practical tests have indicated that the wear on rope surfaces increases with decreasing diameters. It has also been proved that wear increases with speed and hence it is considered advantageous to increase the load within an allowable safety factor rather than the velocity. In operation the overlapping of wire ropes on drums should be avoided wherever possible.

Special Lubricating Problems Presented

To facilitate proper rope running it has been found good practice to provide the winding drums with grooves of smooth surfaces, excellent results being obtained with grooves of slightly larger diameter than that of the rope. On the other hand, if the grooves are considerably larger than the rope diameter the effect will be deleterious due to lack of support for the ropes. When the drums are sufficiently large to permit the use of the coarse ropes, these will prove more durable than the finer, more flexible ones.

In the manufacture of wire rope the hemp core, which is the most prevalent type of core used today, is usually received at the mill in a treated condition to insure against deterioration and bacterial reaction. Normally, a compound of degreas plus petrolatum is used followed by treatment with pine tar or copper oleate.

Lubrication in the wire rope mill starts with the stranding of the original wires, when they are treated with a suitable protective lubricant as they are led through the forming die in the process of twisting. Later these strands

THOUGH wire rope is a commodity in everyday use, comparatively little has been published on the history and technical aspects of the material. The accompanying article, reproduced by permission of The Texas Co., New York, presents a comprehensive insight into the development of wire rope, and examines the matter of its lubrication in detail. The discussion appeared in more extended form in a recent issue of Lubrication, published by The Texas Co.

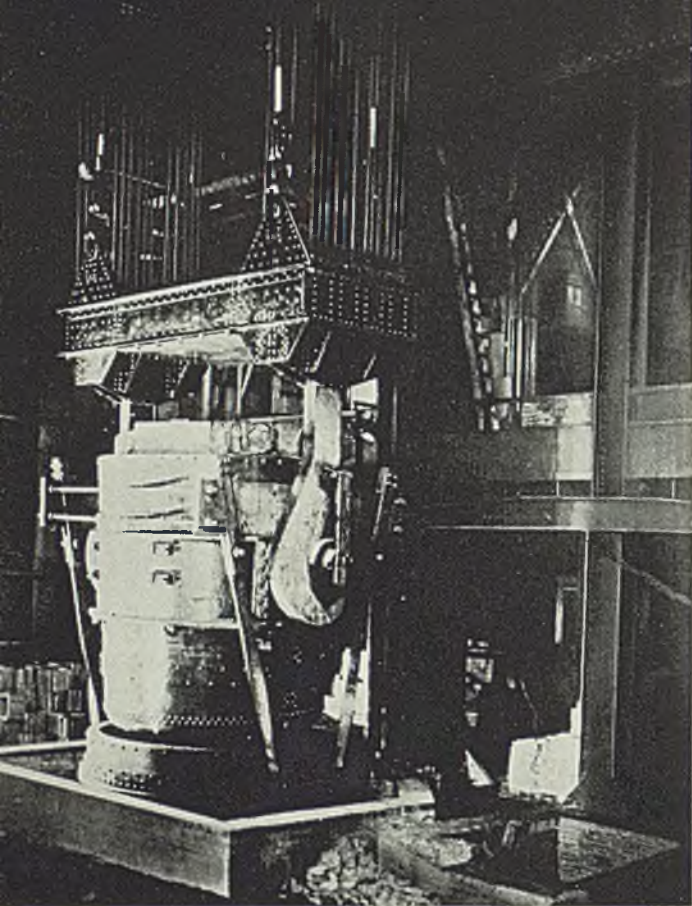


are again lubricated in a similar manner along with the core in the actual process of laying up the rope.

The wire rope industry has carried on intensive studies to determine the lubricant best adapted to this service, to the end that a special type of petroleum compound is now widely used. This type of lubricant has been found to be especially adapted to preservation of the core. In addition, it not only serves to lubricate the strands of the hemp, but also enables the hemp core to serve as a storage reservoir for the lubricant during the entire life of the rope, thereby more effectively to protect the innermost steel strands against wear and rusting. This is especially helpful where the rope must be flexed at a comparatively sharp angle.

Later, in the process of laying the steel strands around this hemp core, these strands are in turn treated with the same type of lubricant. The method used for this purpose is known as strand-stuffing in the wire rope industry. It involves application of the compound in heated condition to the individual wires and core at a focal point just before the wires enter the die to form the completed strand.

Research has indicated that the type of lubricant to be used for this purpose must be specially prepared to meet the constructional conditions in the wire rope mill. One of the most important problems which has confronted the petroleum industry in the design of a lubricant of this type has been the development of a lubricant which will absolutely resist dripping at higher temperatures, which may at times approximate 130 degrees Fahr., and



Courtesy John A. Roebling's Sons Co.

also in cold localities will not lead to cracking. It is important, of course, that any lubricant which is used in the laying up of the rope must possess the maximum of lubricating ability with extreme adhesiveness and cohesiveness, and should not contain any water such as contained in some types of grease. Furthermore, while it must not crack, it still must dry to a sufficient degree on the exterior surface of the rope in order that it will not collect dust or dirt in storage, nor lead to difficulties in subsequent handling. The above applies to wire rope which requires complete lubrication of the structure in the course of manufacture.

Varied Lubrication Required

There are, of course, certain types of rope for distinctive service which only require lubrication of the hemp core. Others in turn call for lubrication of the core and only part of the innermost strands, the exterior surface of the rope being bright and free from lubricant. This applies to some types of galvanized wire rope and rope which in subsequent service will not be flexed to any extent, such as guy ropes.

Initial lubrication of the hemp core, however, is not permanent. Unless protected by subsequent external lubrication, the initial charge of lubricant which has been applied to the inner structure will be squeezed out. After this has occurred it is questionable whether it can ever be renewed; hence lubri-

cation of a rope in service should be begun almost immediately it is subjected to load.

Upon the application of load various stresses are set up in each individual wire of the rope. It must, therefore, be appreciated that a wire rope is a machine requiring lubrication for its frictional surfaces just as effectively as any other power transmitting apparatus. The lubricating problem encountered in this machine is rendered still more complex by the fact that practically every unit of surface of wire rope is sub-

jected to frictional wear in its operation.

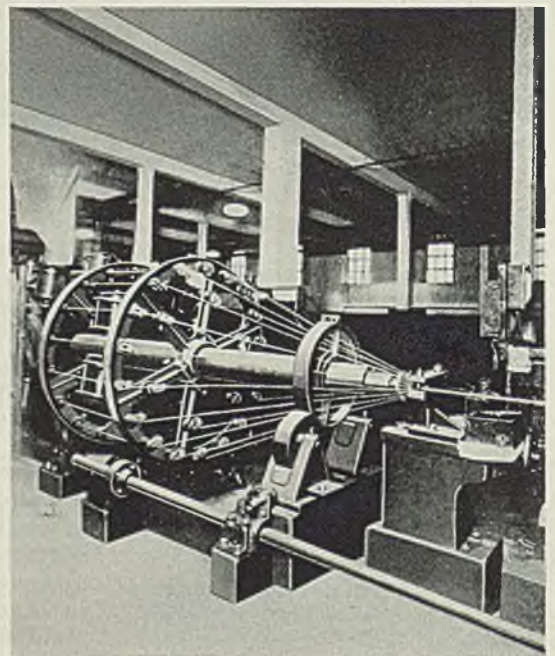
One of the first questions a manufacturer of wire rope asks, if confronted with a complaint that his rope is not giving satisfactory service, involves the manner of lubrication. Assuming that the proper materials have been employed in the manufacture of a rope, that careful supervision has resulted in dependable manufacture, and predicating careful judgment on the part of the rope user in his selection of sheaves and drums, placement of rigging, etc., the service a rope will give varies directly with the lubrication it receives. Unquestionably a wire rope will wear in service, but if it receives applications of a suitable lubricant, as its needs demand, it will not deteriorate with age.

Core Preparation Important

Wire rope manufacturers have long been cognizant of the necessity for the proper preparation of wire rope cores, the object of which has been two-fold—to render the rope more flexible and to furnish a reservoir for rope lubricant. They have approached this objective by saturating the hemp centers. When this procedure was first attempted, however, due to lack of experience, materials were sometimes used which were not only poor lubricants but which were actually damaging to the fibers, especially when high in acid content. Some grades of tar were found to be especially objectionable in this regard. Graphite preparations also were deemed inadequate due to their tendency to flake at low temperatures and crack when subjected to stress, thus providing a path for penetration of moisture and acids around the strands; hence the

WIRE rope naturally will wear in such heavy-duty service as on steel mill ladle cranes, but careful lubrication will prolong its useful life

THIS wire rope layer in the plant of the American Steel & Wire Co. is twisting a cable about a hemp center which passes through the center of the main shaft



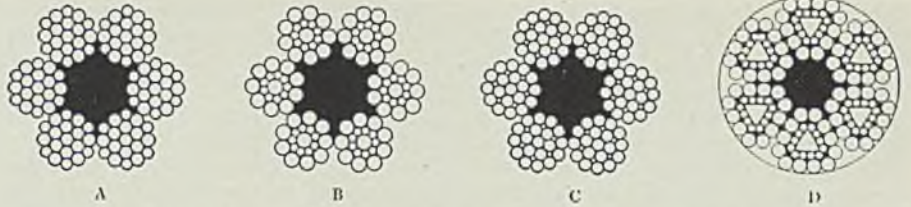
trend of research towards petroleum products.

The lubrication of wire ropes was formerly accomplished by means of surface application of variously compounded materials. The term "shield" was adopted at about the same time. In these days it was considered unreasonable to expect a protective coating to lubricate or a lubricant to act as an effective shield, so two products were generally used. The materials marketed as shields for exterior lubrication sometimes consisted of mixtures of graphite and oil, oftentimes with the addition of such substances as talc, tar and pitch to increase the viscosity or body. Products of this nature furnished merely temporary protection at the surface for they cracked, balled-up and flew off at high operating speeds; besides, the fillers would often tend to choke up the external interstices and prevent the lubricating component from penetrating and reaching the points of internal wear.

Instead, a wire rope dressing



Courtesy John A. Roebling's Sons Co.



Warrington type cable construction at A, Seale type at B, modified Seale type at C courtesy Hazard Wire Rope Co. and American Cable Co. Inc.; and at D the flattened strand type, courtesy A. Leschen & Sons Rope Co.

or other companion cables, but may also present a distinct hazard. Any wire rope in such condition is just that much weaker and less capable of handling the imposed loads.

The matter of friction between the strands of a wire rope is essentially the same as friction between a bearing and shaft. Overheating and abnormal wear will practically always result, to reduce the load carrying capacity and increase the amount of power consumed in operation. This can be overcome only by the proper application of a suitably prepared

under actual operating conditions is of outstanding importance.

4. It must be free from acids, salts of acids or water.

5. It must be impervious to water and remain unaffected by acids or acid-laden fumes, or water surcharged with chemical impurities, generally encountered in the form of acids or salts.

6. It must be able to penetrate and form a lubricating film or coating on each individual wire.

7. There must be no chemical decomposition or mechanical separation of the lubricant even under the most severe conditions.

According to the operating temperatures that may be involved, and the possibility of the presence of an excess of water, the viscosity of a wire rope lubricant should range around 1000 seconds Saybolt at 210 degrees Fahr., or somewhat lower. In warm climates, adjacent to ovens, furnaces and the like where there might be possibility of such a product thinning down to the extent of dripping off to perhaps result in lack of lubrication, it will be advisable to use a lubricant of approximately 1000 seconds viscosity, of course, in accordance with the temperature prevalent.

Application Method Important

On the other hand, under relatively cold conditions as might be involved adjacent to the Great Lakes, in Canada or the Northwest, it would be advisable to use a somewhat thinner product, again in accordance with the range of operating temperatures involved.

An important detail in the lubrication of wire ropes is the application of the lubricant. Various methods have been employed and in adopting any one method or combination of methods the particular mode chosen must be dictated by the specific problem encountered. On inclined and horizontal ropes where operating speeds permit, operators often pour the lubricant on the rope, the excess being caught in a pail which serves the double purpose of container and overflow vessel.

Under favorable conditions it has also been found excellent practice to paint the lubricant on with a brush, catching the surplus, as before, in a pail. Good results in other types of service have been obtained by

SHOWING the effect of kink in a wire rope. Top view is a rope badly kinked; below it a rope failure due to excessive kinking

wire rope compound, which will be capable of not only penetrating to the innermost strands and core of the rope, but also sufficiently adhesive and viscous to resist being prematurely squeezed out or washed off by rain.

Those properties which must be possessed by a wire rope lubricant if it is to function effectively can best be outlined as follows:

1. It must not harden, flake off under exposure, nor adhere so tenaciously to the outside wires as to result in the formation of a hollow shell through which harmful fluids might circulate.

2. It must not tend to cake, gum or ball up, especially if contaminated with excessive dust, dirt or metallic particles.

3. It must be resistant to the thinning-down effects of high temperatures. This, of course, directly involves the viscosity or relative fluidity of the product. In fact, viscosity of such lubricants is the essential characteristic involved in purchasing. It should not, however, be assumed as being the chief guide as to the actual suitability of a wire rope lubricant; the ability of the latter to function, penetrate and stick

should form a protective film not only over the external surface but for each individual strand and wire, even penetrating through to the center. This penetration is particularly important in the case of a wire centered rope where the steel strands which replace the usual hemp fiber are likely to be exposed to corrosive conditions. Steel centers are often used where excessive strain is anticipated, where intense heat is to be expected or as an aid in keeping the rope in shape when subjected to crushing conditions. It is important to remember, however, that should the steel center nick the interior strands the strength of the rope may be materially decreased. Obviously, failure of such a center would probably mean failure of the rope.

The ultimate efficiency of operation of materials handling or elevating equipment is, to a large extent, therefore, dependent upon the condition of the cables or wire ropes. A rope with one or two broken strands due to rusting or wear traceable to improper lubrication, may not only cause a tie-up of the entire machine if such strands interfere with the operation of sheaves,

providing each rope with a trough through which the rope is compelled to pass by making it run under a wheel mounted on the trough. Still another device consists of a barrel fitted with steam coils, to insure proper heating of the product, and a valve and short piping arrangement for furnishing a continuous drip flow of lubricant onto the rope, suitable means being provided, where necessary, for wiping the cable and conserving the excess applied.

Probably the most economical means of relubrication, however, is to use a form of split box of wood or metal, according to the angle of the rope in question. Such a box can be readily built in the average plant, with suitable provision for rendering it sufficiently tight to prevent the lubricant from leaking out even when reduced in viscosity by heating. The slow passage of the rope through such a bath of heated compound will insure that not only will the surface be coated, but also that the requisite penetration takes

place to the inner strands. Further working of the rope over the sheaves before the lubricant has time to cool entirely, will tend to aid in bringing about the maximum of penetration.

As a general rule wire rope lubricants, by virtue of their viscosity and comparatively heavy body, must be applied in heated condition. To merely attempt to daub or paint a rope with such a product at normal temperatures would be relatively impossible. Even though the surface might be more or less coated, the possibility of penetration occurring to any extent would be remote. The latter is the secret of effective wire rope lubrication where the one lubricant must both lubricate the interior structure and coat the surface as a protection against entry of foreign matter. The amount of wear occurring between the exterior of such a rope and the sheaves is not as marked as that which occurs between adjacent strands when the rope is flexed or bent as in passing over sheaves, or hoisting drums.

apprentice works 40 hours a week; textbooks and material are supplied by the company. The results of his shop work must pass regular inspection and are used in production. The supervisor of apprentice training has four assistants who act as instructors.

Apprentice graduates have advanced in this company during the years, obtaining foremanships and higher positions in purchasing, production and engineering. The present factory manager of the tractor division is a graduate of the apprentice school.

Six New Oils Introduced

As a move toward simplification, six new oils are being introduced by the Standard Oil Co. of Indiana, Chicago. "Stanol" is the name given to these lubricants. The company states that these six products will do the work of some 24 present types of industrial oils.

Qualities which are claimed for these oils include high stability, demulsibility, low carbon-forming tendency, good viscosity index, and low pour test. Many special oils now being produced by the company will be replaced economically by these new products, it is asserted.

Synthetic Rubber Bulletin

Those interested in the progress of synthetic rubber will find valuable information in a new publication to be known as *Thiokol Facts*. This leaflet, which will be published every other month, is available free upon request. It is published and distributed by the Thiokol Corp., Yardville, N. J.

Apprentice Training Program Pays Dividends to Far-Sighted Manufacturer

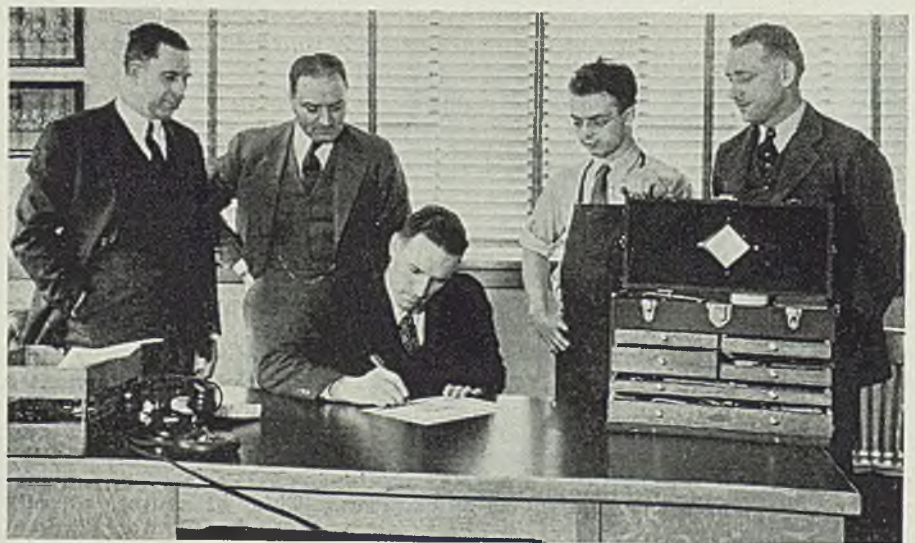
RAPIDLY growing shortage of skilled craftsmen in many industries has caused far-seeing manufacturers to focus attention upon the problem of training young men to take the places of older skilled artisans upon retirement, and to fill the increased demands for these men created by improving business conditions. The visible supply of skilled craftsmen in many lines has dwindled alarmingly, creating a high wage scale for the fortunate workers, but a distressing situation for the manufacturers, many of whom are unable to obtain a sufficient number for their requirements.

The neglect of the apprentice system is responsible to a large degree for the present situation, and the few manufacturers who continued to train apprentices through the depression now have a considerable advantage over those who did not.

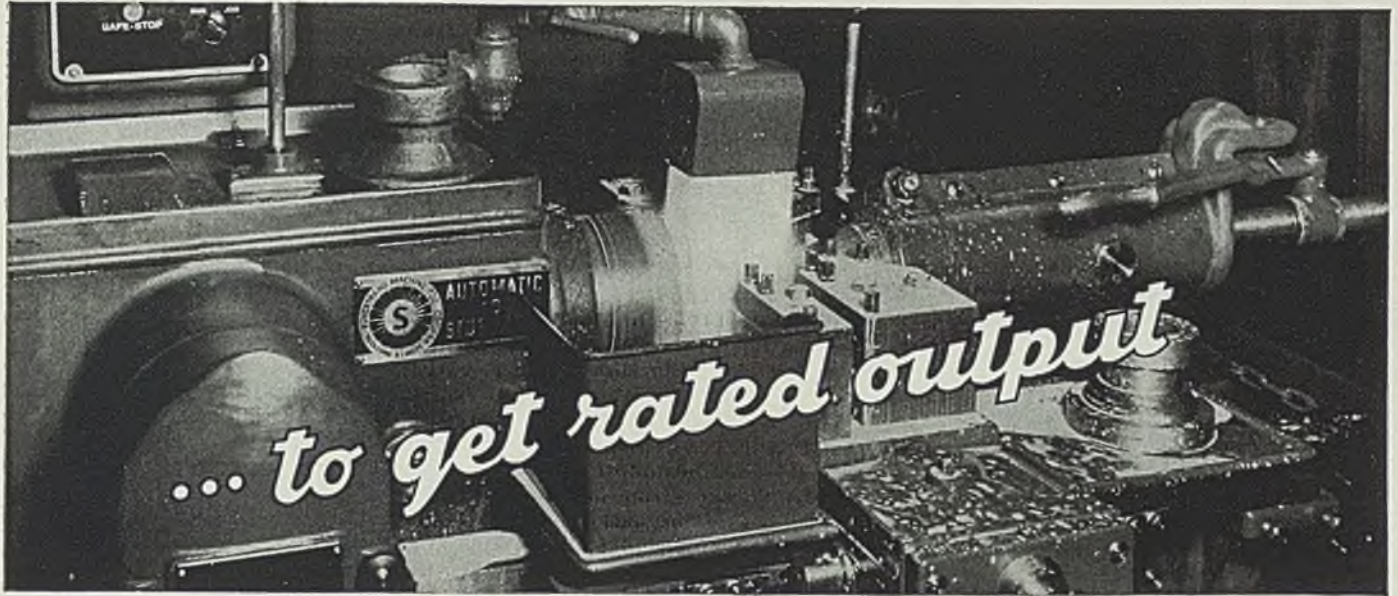
A typical apprentice school has been maintained by the Caterpillar Tractor Co., Peoria, Ill. Apprentice classes today number 310 young men. The minimum age limit for acceptance is 16, and high school graduates are preferred. All applicants must pass an entrance examination. Students are divided into four general classes: Machine shop, patternmaking, foundry, and engineers who have graduated from accredited technical schools.

All apprentices are paid wages on

a graded scale. At the end of a 6-month probationary period the apprentice is given his first set of tools. At the end of his first two years he is given a second set of tools, both sets valued at \$100. Both sets become his property, a gift of the company, when he is graduated. The



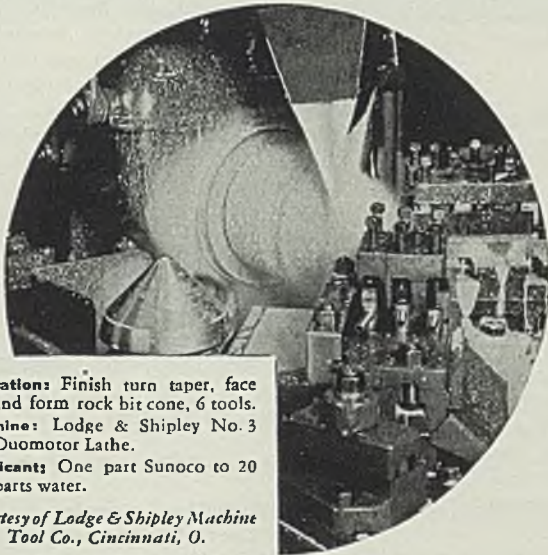
Presenting a graduating apprentice with a certificate and set of tools at the Caterpillar Tractor Co. plant. Left to right: T. J. Connor, vice president in charge of manufacture; M. Rogers, general factory manager; James Munro, factory manager, tractor division; Alvie C. Rice, graduating apprentice; K. P. Crowell, supervisor of apprentice training



Courtesy of Sundstrand Machine Tool Co.

FLOOD TOOLS AND WORK

with **SUNOCO**



Operation: Finish turn taper, face and form rock bit cone, 6 tools.

Machine: Lodge & Shipley No. 3 Duomotor Lathe.

Lubricant: One part Sunoco to 20 parts water.

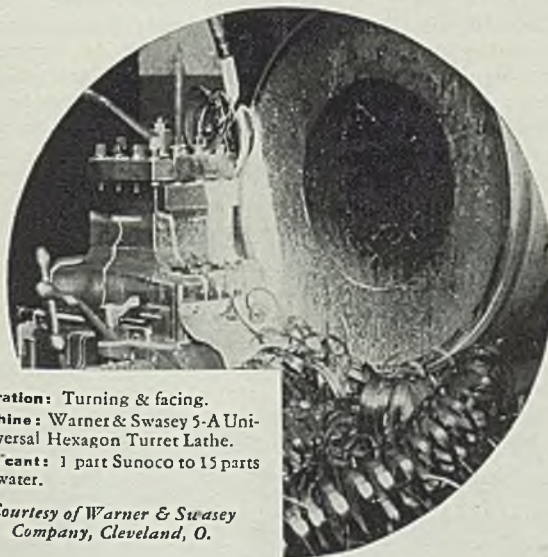
Courtesy of Lodge & Shipley Machine Tool Co., Cincinnati, O.

Although the modern lathe meets all the requirements for high-speed turning, the production of quality work at rated output depends on the performance of turning tools. They must take heavy, clean cuts at high surface speeds with long runs between tool resharpenings,—and that calls for an efficient cutting lubricant.

With Sunoco, turning tools retain their cutting edges, chips will not seize, cuts are clean and accurate. To prolong tool life, increase machine hours and get rated output, *flood the tools and work with Sunoco.*

FREE—A Handbook of Modern Machine Tool Practices

Send for a copy of "Cutting and Grinding Facts". It contains a wealth of information with illustrations on 46 modern machine tool operations.



Operation: Turning & facing.

Machine: Warner & Swasey 5-A Universal Hexagon Turret Lathe.

Lubricant: 1 part Sunoco to 15 parts water.

Courtesy of Warner & Swasey Company, Cleveland, O.

SUNOCO

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British Sun Oil Company, Ltd., London, England

Surface Treatment and Finishing



Selection, Application and Use of Finishes for Metals

III—The Organic Coatings

BY ORGANIC coatings are meant those finishing materials, usually applied as liquids, an appreciable part of which remains on the surface as a protective and decorative finish. These coatings are labeled as organic not only to distinguish them from the metallic coatings but also because the vehicles or fluids in which the pigments are dispersed consist principally of organic materials.

The restrictions which exist in the use of the metallic coatings, where only a few materials are available and where even these can be applied only under limiting conditions, do not exist in the case of the organic coatings. Since the organic coatings are mixtures of a large number of raw materials, almost any desired appearance can be obtained on any metal.

Applications Unlimited

Furthermore, the possible methods of application do not limit the organic finishes to small parts or to parts of regular shape and, if desirable, the finish can be applied easily and economically after assembly or erection. With the organic coatings, assemblies of different metals or of metals and other materials can be finished easily to a uniform appearance. In general, the organic finishes might be called "assembly finishes," as contrasted with the metallic coatings, the surface conversion treatments or the vitreous enamel coatings, all of which require application equipment of a type which restricts their use to individual parts or at best to relatively small assemblies.

Although brush application is widely used for the slower drying paints and probably will always be popular for structural work, the

PREVIOUS installments of this short primer on metal finishing appeared in the March 16, March 30 and April 13 issues of STEEL.

usual shop methods of application are spraying, dipping and roller coating. The spray method of application provides an easy and rapid means of applying a uniform organic coating. This method is suitable for full automatic operation with the parts moving on conveyors past suitably positioned fixed or moving spray guns and when operated in this fashion the method is economical, since the parts do not have to be handled individually while spraying. The objections to spraying are the initial and operating cost of the ventilating hoods required and the waste of finishing material.

Spraying is as universal a method of application as brushing in that practically any organic finishing material can be handled in a spray gun. The usual spray gun employs compressed air to atomize the paint and by adjusting the viscosity of the material being sprayed, the air pressure and type and setting of nozzle, a wide latitude of control with respect to degree of atomization and width and shape of spray can be obtained.

New Spray Gun Developed

A new type of spray gun has recently been made commercially available in which atomization is accomplished mechanically by the rapidly rotating blades of an electrically driven impeller. This type of spray application is becoming popular for structural work since its only requirement is an electrical supply. As the paint is mechanically atomized, no thinner additions are neces-

sary. This not only saves the cost of the thinner but also makes it possible to spray indoors without the use of exhaust hoods in many cases. The efficient use of this type of spray apparatus requires a higher degree of training and skill on the part of the operator than is necessary with the air spray type.

Dipping application is cheaper than spraying in that the wastage of finishing material is practically zero and also because the parts are usually handled in bulk on racks as contrasted with the individual handling often necessary when using spray application. The use of dip application limits one somewhat in his choice of finishing materials, in that finishing materials which skin over while standing and materials like aluminum paints which usually deteriorate if not freshly mixed are unsuitable for dipping. A careful control of the consistency of the dipping material with respect to the withdrawal speed produces satisfactory finishes on some products although the appearance perfection is usually less than if the same finish were applied by spray.

Use of Rollers Increasing

Roller coating of paints and lacquers is becoming increasingly popular as the importance of prefinished sheets and strips increases. The application of organic coatings by roller is economical but is limited, of course, to relatively flat sheets or strips. The inside and outside organic coatings on tin cans have been produced for years by roller coating. Examples of articles made from prefinished sheets are shown in the accompanying illustration.

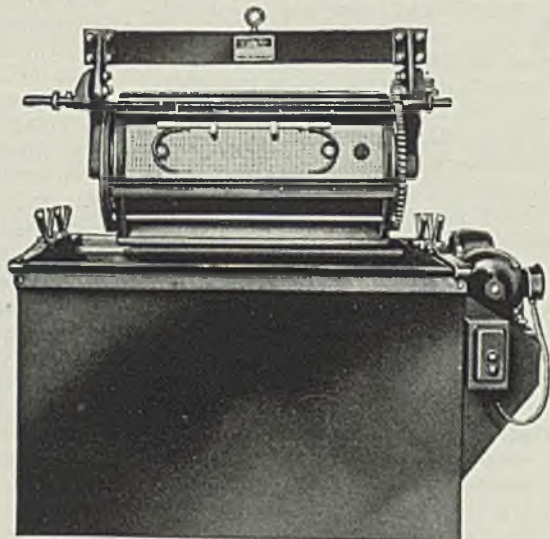
Special application methods often are used for specific items. For instance, it is possible to coat small parts such as machine screws in bulk by putting the cleaned parts and the proper amount of finishing material in a closed tumbling barrel. If only sufficient finishing material is used barely to cover the batch of parts being finished, they can be removed from the barrel after tumbling and dried on trays with relatively few finish defects. Such a process will not, of course, produce parts with a

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From the standpoints of high plating efficiency and durability to withstand the knocks of continuous operation, these are outstanding plating barrels. ■ The Udylite Plating Barrel is a high production barrel, capable of turning out load after load of well plated work for 24 hours each day. This unit is unquestionably the sturdiest and most efficient barrel plating unit built. ■ For the occasional handful or for production plating of very small parts, the Handiplater is the ideal unit. Compact, easily operated, efficient—this small outfit is an indispensable asset to any plating plant. ■ A request from you will bring complete details and prices on either or both of these outstanding plating barrels.

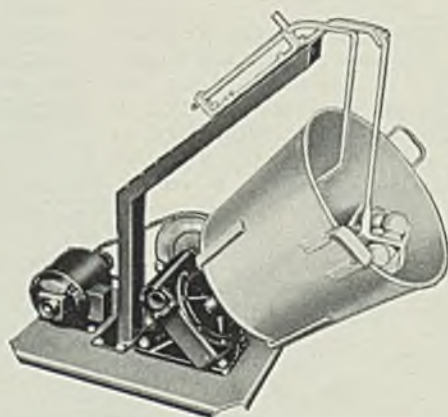
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Made of the strongest possible combination of materials—special shock-resistant rubber and steel—this plating barrel is built to last. All steel members are anodically charged; efficient insulation completely prevents "treeing." Construction combines great strength with high plating efficiency. The Udylite Barrel is made in a variety of sizes and types depending on the production desired.

HANDIPLATER



This small, inexpensive plater operates with a few gallons of solution taken from the regular still or barrel plating tank. Cylinder, which is detachable, has capacity ranging from a handful up to one-half peck. A sturdy, efficient unit from the rubber-lined steel cylinder to the fabricated steel base, the Handiplater represents an investment low in cost—high in utility value.

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high grade appearance, but it is suitable for many purposes.

A HARD and fast set of definitions of organic finishing materials is difficult in that variations in formulation often cause the overlapping of classes to such an extent that some finishing materials fall in more than one class. There are no universally recognized definitions but, for present purposes, the materials to be discussed are defined as follows:

Paint is an organic finishing material consisting essentially of opaque or semi-opaque pigment or pigments dispersed in one or more drying oils.

Varnish is a clear vehicle consisting essentially of drying oils and resins which have been heat treated together. The resins may be natural products or synthetic.

Enamel is a pigmented varnish.

Lacquer is a clear organic finishing material consisting essentially of a solution of cellulose ester or ether (usually nitrocellulose), resins and plasticizers. The resins may be natural products or synthetic.

Lacquer enamel is a pigmented lacquer.

Miscellaneous: Various resin solutions such as shellac or asphalt solutions.

Paints

IN GENERAL, paints are the softer type of organic finishes and consist principally of vegetable drying oils and pigments with the addition of driers and thinners. Paints dry, or harden, principally by the oxidation of the drying oils which is accelerated in most cases by the addition of

metallic soap driers. The principal drying oil used in paints is linseed oil, obtained by crushing flax seed and available either raw, boiled or otherwise processed. A number of substitutes are in use such as soya bean oil, perilla oil, fish oil and the like. Considerable development work is being actively carried on to obtain linseed oil substitutes of suitable properties by either using new oils or processing other oils.

The selection of pigments used in paints and other organic finishing materials depends on the purpose for which the paints are to be used. The pigments used consist principally of finely divided metallic oxides or salts of lead, zinc, titanium, iron, cadmium and the like, as well as some of the metals themselves in granular or flake form. Zinc is used in granular form in the zinc dust-zinc oxide paints used for protective purposes. Metallic pigments in flake form, called bronzing powders, employ numerous alloys to produce various colors of powders. Aside from the decorative powders such as gold, silver, brass and bronze of various shades, the most widely used are the aluminum powders.

The aluminum bronze powders are made by stamping from suitable aluminum alloys, using stearic acid as a lubricant. The flaky particles of such powders orient themselves in many types of vehicles so that the flat surfaces are essentially parallel to the surface being finished. This property which is known as "leafing," produces a laminated structure of over-lapping metallic flakes and dried vehicle. This structure of coating is useful due to its heat and light reflecting ability, its improved moisture resistance and the protection of a large part of the binder

in the coating from the deteriorating influence of light. The aluminum powders are available dry or in paste form and are usually employed in the proportion of from 1½ to 2 pounds of metal per gallon of vehicle.

Unless stabilizing agents are used, aluminum paints or enamels do not retain their leafing characteristics long and the usual custom is therefore to mix the powder or paste with the vehicle immediately before use. The use of stabilizing agents has been successful, however, and ready mixed paints of this type are now available.

For finishing iron and steel parts, perhaps the most important class of work involves painting primarily intended for rust inhibition on structural work. Paints are widely used for this purpose and the usual finish system comprises one or two coats of rust inhibiting primer followed by one or more top coats to obtain the final appearance desired.

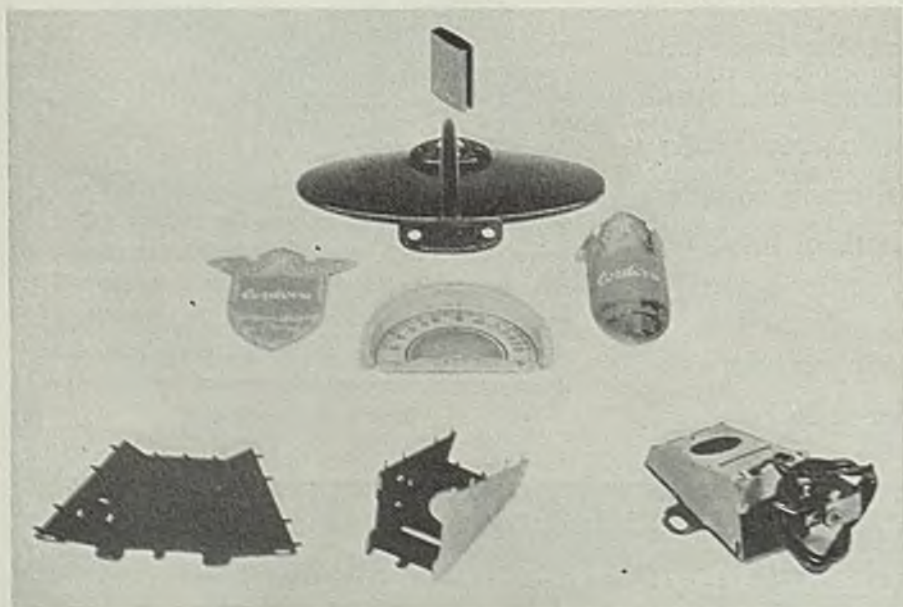
Flexible Coating Necessary

Since the corrosion protection afforded to the base metal depends on the continued presence of an unbroken paint film as well as on the pigments used, it is important that the system selected produce a flexible coating which retains its flexibility as long as possible in order to prevent early failures due to cracking, checking or flaking resulting from a too rapid embrittling rate of the system used. Failures will occur for other reasons also but it is well to keep in mind that the problem of protection is not adequately solved by pigment selection alone but is also largely dependent on providing a reasonably permanent means of keeping the pigment in an unbroken paint film which remains firmly anchored to the base metal for a long period of time.

In the rust inhibiting class of primers, the paints are known by the names of the pigments used. The more widely used materials of this type are the red lead paints, the basic lead chromate paints, the iron oxide paints and the zinc dust paints.

A large proportion of the steel structures in this country are primed with red lead paints. Structural finishing demands the most corrosion resistance obtainable at reasonable cost and the selection of red lead paint is based on observed durability on actual structures over a period of years. Although claims are made that basic lead chromate paints and zinc dust-zinc oxide paints provide more corrosion resistance, structural engineers are loath to adopt the relatively new products until their advantages have been clearly demonstrated on a number of structures.

Red lead paint usually is prepared by the user from linseed oil and red lead in paste form. The best practice up to the present has been to



Flexibility of modern lacquers is illustrated by these parts which were all manufactured from prefinished sheets



Quality carbon or alloy steels to satisfy any automotive manufacturer. Accuracy that speeds up assembly. Stamina that makes for safety on the highway. Output to meet the needs of any production schedule.

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April 27, 1936

STEEL

51

use about 30 pounds of red lead to one gallon of linseed oil. Although driers are used widely so that the red lead paints will set or dry more quickly, the use of driers definitely decreases the useful life of the paint film and therefore should be reduced to the smallest amount possible.

The quality, that is, the durability of a red lead paint depends on the quality of the materials used and the relative proportions of lead and oil. Since red lead is obtained by further oxidation of litharge, various grades are available, those containing the highest percentage of red lead being the best. In addition, the properties of paint films produced with red lead, as with all other pigments, will be influenced by particle size and shape, refractive index and ultra violet absorption rate (if used without top coat).

The basic lead chromate and zinc dust-zinc oxide paints are gradually increasing in importance as corrosion resistant structural primers although they are somewhat higher in cost than red lead primers. It is claimed that the basic lead chromate paints protect iron from corrosion due to the presence of chromate ions in the paint which tend to prevent oxidation of iron in the presence of an electrolyte, while zinc dust paints retard the corrosion of iron due to the presence of metallic zinc as in the case of galvanized coatings. Zinc dust-zinc oxide paints are particularly in favor as primers over galvanized structures where poor adherence is commonly experienced when other paints are used.

Iron Oxide Primers Widely Used

A less expensive and widely used primer for metal work is made, using iron oxide and linseed oil as the principal ingredients. The iron oxide paints produce harder films than red lead, zinc dust or lead chromate paints but do not afford as much corrosion protection. Iron oxide primers are used on steel freight cars and other places where the hardness of coating is a factor as well as corrosion resistance. Baked iron oxide primers are used rather extensively on products which are subsequently to be lacquered or finished with a baked top coat, and produce satisfactory coatings for such purposes.

The vast number of top coat paints available for use over primers prohibits even the broadest generalization as to their relative effectiveness. The color desired usually determines to a great extent the pigments used and a wide range of durability is available with the same pigments in many cases depending on the oils used, percentage of pigments, presence of extenders, amount of driers and other factors. The only safe rule is to test the complete system in each case, using the top coat and primer

as a unit for whatever durability studies are made.

Varnishes

VARNISHES are not widely used directly on steel, their properties making them more useful as clear protective coatings over other base coatings, particularly on railroad cars and over signs. Baked varnishes are used for finishing metal bottle caps, the inside of tinned food containers and over the lithographed decorations on the exterior of cans.

A varnish differs from paint not only in that it contains resin but also in that the resin and oil are usually heat treated together. Up to a few years ago, the resins used were natural products, such gums as Kauri, Copal, Dammar, Rosin and others being the available materials. The gums were "cooked" with linseed and chinawood (tung) oils and driers, after which thinners were added to produce varnish. More recently the use of synthetic resins has become common with attendant improvements in the durability and drying time of varnishes.

Synthetic Resins More Uniform

The synthetic resins may be of the phenolic type (produced from phenol and formaldehyde), of the alkyd type (produced from glycerine and phthalic acid), or of other types produced by condensation or polymerization reactions. Variations in processing, in addition to the blending of resins and forming the resins in the presence of drying oils, permit the production of an almost unlimited number of synthetic resins with a wide range of properties as contrasted with the relatively few natural resins available.

Since the synthetic resins are made from well-controlled raw materials, and since the processes of manufacture can be controlled closely, it is possible to obtain uniform resins—much more uniform than the natural resins whose formation depends on natural conditions and which are often contaminated due to local customs of collection and refining.

The use of synthetic resins in varnishes has resulted in a reduction in drying time to 3 - 4 hours from 24 - 72 hours, with the new materials becoming dust-free in many cases in a few minutes as compared with several hours for the natural resin varnishes. The synthetic varnishes show a marked improvement in quality over the natural resin products and possess the additional advantage that they are easily toughened by heating after application. Hard and tough coatings can be easily obtained by baking only a short time at relatively low temperatures.

(The balance of Part III on Organic Finishes of this series will appear in an early issue.)

Preparation of Galvanized Sheets for Paint Discussed

Methods of preparing galvanized sheets for painting were presented in a paper read before the eighteenth annual meeting of the American Zinc Institute, at St. Louis, April 21, by J. L. Schueler, superintendent, steel and wire division, Continental Steel Corp., Kokomo, Ind. It was brought out that while paints, varnishes, lacquers and other coatings will adhere to cleaned, matte-surfaced, non-spangled galvanized sheet, it will not adhere to the ordinary smooth, greasy-feeling spangled sheet unless the surface has been prepared by artificial means or by aging.

Current methods of preparing galvanized surfaces to receive paint were covered with comments on their relative merits, after which the entire picture was summed up as follows:

1. Wherever possible allow the sheet to age or "weather" before applying the paint.

2. If this cannot be done, then mechanical etching, such as sand-blasting, should be used.

3. If a chemical etchant must be used, care should be taken that its action is not too strong. Use of acids should be avoided, since it is not necessary. A neutral solution of copper sulphate or antimony chloride is better than an acid solution and just as effective.

4. The zinc surface must be clean and free from foreign material before paint is applied.

5. A wet, or moist, zinc surface should not be painted if the best life from the paint is desired.

Equipped To Undertake Physical Research Work

To provide facilities for solving unusual industrial problems through the tools and techniques of modern physics is the purpose of the recently organized Physicists Research Co., 337 South Main street, Ann Arbor, Mich. The organization was established by Ernest J. Abbott, who resigned from the staff of the University of Michigan as research physicist. From 1925 to 1935 he worked full time on research and development problems for industrial concerns.

Practical problems resisting ordinary attempts at solution exist in large numbers but experience has proved they can be solved economically through use of proper methods. In many cases, it is necessary to resort to special methods and instruments for measuring hitherto unmeasured quantities. The new company maintains a staff and equipment capable of handling these unusual problems.

ELIMINATION of gear noises, the importance of cost accounting, and the extent to which industry now is dominated by politics, formed the principal subjects of discussion at the twentieth annual meeting of the American Gear Manufacturers association, in Philadelphia, April 20-21. Other high spots of this meeting, the best attended in the association's history, were the outlining of sales planning methods, an analysis of the use of tapered roller bearings in gear reduction units, the application of welding to the fabrication of gears and gear cases and the presentation of complete data covering the size and horsepower of gears of different materials.

E. S. Sawtelle, vice president and general manager, Tool Steel Gear & Pinion Co., Cincinnati, was elected president of the association for the coming year, and H. H. Kerr, president, Boston Gear Works Inc., North Quincy, Mass. J. H. Jackson, Pittsburgh Gear & Machine Co., Pittsburgh, was re-elected treasurer and J. C. McQuiston, Penn Lincoln hotel, Wilkensburg, Pa., continues as manager-secretary.

New directors to serve for a 3-year period are H. H. Fowler, Foote Bros. Gear & Machine Co., Chicago; J. H. Flagg, Watson-Flagg Machine Co., Paterson, N. J.; Charles Goedke, Ganschow Gear Co., Chicago; and W. G. Jones, president, W. A. Jones Foundry & Machine Co., Chicago.

A. A. Ross, General Electric Co., West Lynn, Mass., retiring president, recommended that the association hereafter dispense with its semi-annual or fall meeting and that regional, one-day meetings be held instead in Boston, Philadelphia, Buffalo and Chicago. In the event the recommendation is accepted, he urged that the spring meeting be extended from two to three days. He also recommended the association renew its membership in the American Standards association and the United States chamber of commerce.

ON THE subject of gear cost estimating, G. Russell Holbrook, Charles E. Crofoot Gear Corp., South Easton, Mass., declared that lack of knowledge as to true costs is the principal cause of wide divergences in gear prices that occasionally come to light. He urged universal adoption by gear makers of a uniform cost accounting system such as recommended by the association. Under such a system can be effected the proper allocation of burden charges in setting up normal machine hour rates which permit estimates based on a true cost picture. "An estimate based on accurate costs plus a reasonable profit," said Mr. Holbrook, "results in building up of the price level to our mutual advantage, admitting, of course, the

A.G.M.A. Marks Two



Decades of Service to Field

necessity for competent management."

In addition to the all around advantages of conducting a uniform cost accounting system, said H. N. Mathias, chairman of the association's committee on uniform cost accounting, such systems are particularly essential in executing contracts under the Vinson act. In such cases it is advisable that highly detailed cost records be kept, and in a very systematic, permanent way. In view of the opportunities for claims, and for delays in settling them, Mr. Mathias estimated that many contractors working under the Vinson

act will be forced to show their cost records to auditors five to ten years after the contracts have been completed.

Replying to questions, Mr. Mathias declared that cost accounting is just as feasible and essential for the smaller as for the larger companies. The small company, as a rule, need not break up its cost into as many classifications as the large interest. In both cases, however, accurate knowledge of costs is essential to arrive at correct selling prices.

Visits with many members of the association, said A. A. Ross, General Electric Co., West Lynn, Mass., retiring president, have convinced him that it is highly unwise to characterize as a "chiseler" any gear manufacturer who may happen to quote a considerably lower selling price than competitors. Some of the gear producers, through special equipment and fixtures, and the use of ingenuity, are able to achieve costs which permit them to underbid competitors on the basis of actual production costs.

George L. Markland Jr., chairman, Philadelphia Gear Works, Philadelphia, expressed his opposition to a policy followed by some gear makers. By this policy, the gear makers include in the cost of gears the cutters, hobs and other tools required in their production, and the tools become the property of the gear buyer and, in many cases, are removed by him after the order has been completed. Mr. Markland expressed himself in favor of a policy whereby the gear maker keeps the tools. "The method by which we produce the gears," he said, "is our secret."

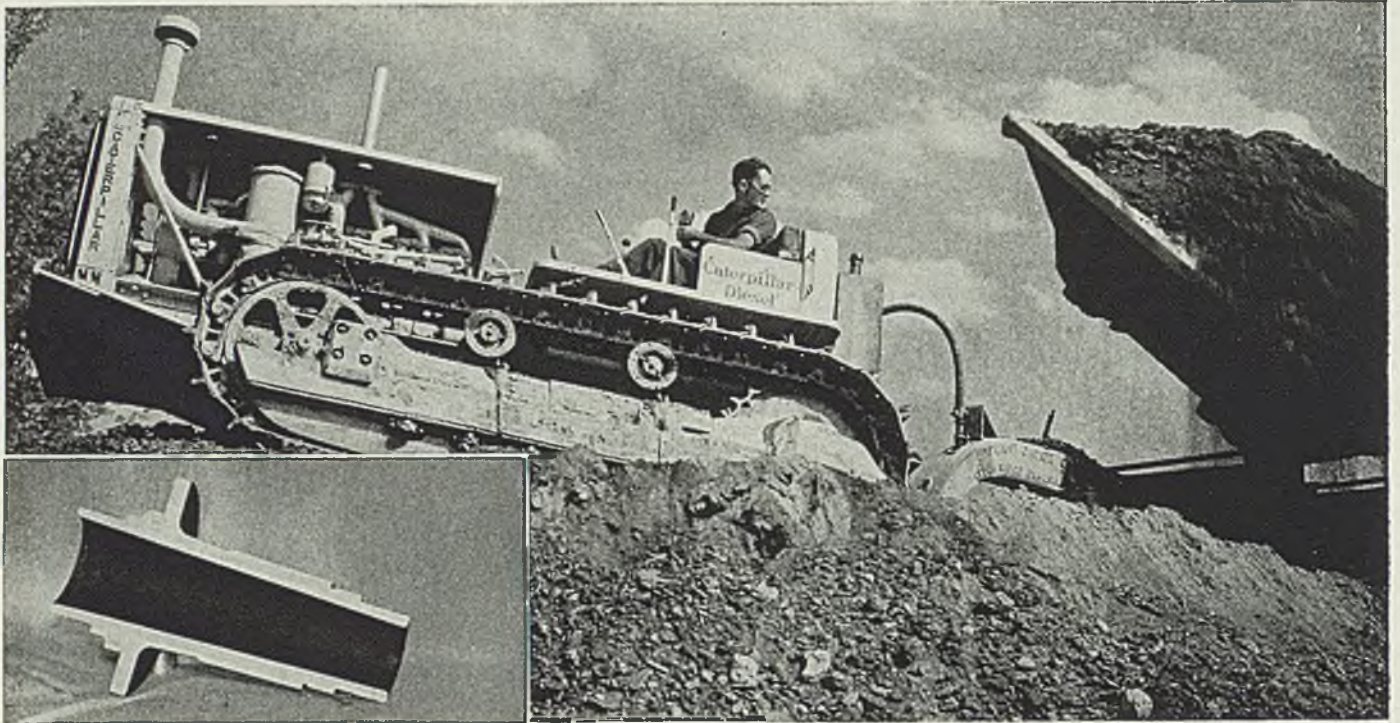


E. S. Sawtelle

Newly elected president, American Gear Manufacturers association. He is vice president and general manager, Tool Steel Gear & Pinion Co., Cincinnati. A native of Anaconda, Mont., he was educated in Cincinnati, graduating from the University of Cincinnati in 1907. Soon afterward he became connected with the Tool Steel Gear & Pinion Co. and assumed his present responsibilities in the company in 1931. Mr. Sawtelle also is president, Sawbrook Steel Castings Co., Cincinnati. He takes part in civic affairs in Cincinnati and at present is a captain in the community chest drive in that city. He is a member of numerous trade associations

INDUSTRY is so vitally affected by present-day legislation and political thinking, said John W. O'Leary, president, Machinery and Allied Products Institute, Chicago, that it is essential for industry to do something about the matter. Legislators attempt to please the voters, so that it is necessary to educate voters in general to the fact that when industry suffers the man on the street suf-

"NORMALLOY" in the "Caterpillar" Tractor



The well-known "Caterpillar" Tractor asks no favors. In all types of heavy duty service . . . over ground that is almost impassable . . . you'll find it performing with 100% satisfaction.

Playing no small part in the dependability and day-in and day-out performance of the "Caterpillar" Tractor is the "Normalloy" steel used in steering clutch shafts and flanges, sprocket and gear hubs and other vital parts which must combine high physical properties with good machining qualities. "Normalloy" was selected because it meets all these requirements in the normalized condition, and eliminates the critical quenching operation necessary for other steels.

If you are not familiar with this manganese-chromium-vanadium analysis, it may be interesting to note

the minimum physical properties of "Normalloy" after normalizing at a maximum temperature of 1650°F.:

Tensile Strength	..... lb. per sq. in.	110,000
Yield Point	..... lb. per sq. in.	70,000
Elongation in 2"	.....	15%
Reduction in Area	.....	40%
Brinell Hardness (as impression diameter)		
	2½" round or square —	4.1 mm. Max.
	¼" round or square —	3.7 mm. Max.

(A maximum difference of .3 mm. from center to outside edge)

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fers. Mr. O'Leary described some of the activities of his institute in educating legislators and the public to basic economic facts.

H. H. Kerr, president, Boston Gear Works Inc., North Quincy, Mass., spoke about the necessity of educating employes on the problems of management and on the factors involved in conducting an industrial enterprise on lines which are satisfactory from the standpoint of the employe as well as that of the management and stockholders. It was revealed that a number of companies have in existence arrangements for giving correct information to employes. One such plan, described by E. S. Sawtelle, vice president, Tool Steel Gear & Pinion Co., Cincinnati, has produced good results. It provides for a class in industrial economics in which the employes and management of this company get together and exchange views on mutual problems.

Gear Noises Analyzed

An unusual paper on gear noises was submitted by W. E. Sykes, Farrell-Birmingham Inc., Buffalo. This paper, to be abstracted in an early issue of STEEL, analyzed all possible causes of gear noises. It was referred to in discussion as a valuable guide to gear manufacturers and users confronted with noise problems; it set forth the various factors that should be checked in getting at the cause or causes of the noise.

In discussion, J. H. Flagg said that bearing noises frequently are mistaken for gear noises; the location of the noise easily can be detected by utilizing a stethoscope. W. A. Barr said that complete solution of the noise problem will depend on the development of control for some of the factors that now cannot be controlled; one of these factors, for instance, is the warpage that occurs during heat treatment.

A noteworthy paper on the subject of eliminating noise in gears operated at high speeds was submitted by Ira Short, Westinghouse Electric & Mfg. Co., South Philadelphia, Pa. This was devoted to a discussion of marine gearing. In large part, the paper was a description of the special equipment and methods used at this plant in checking hobs and machinery and in detecting inaccuracies in gears.

Not so long ago, said S. M. Ransome, Barber-Colman Co., Rockford, Ill., users of hobs and hobbing machinery demanded production. Later they demanded accuracy. Today they demand quietness and this is by far the most difficult of the three requirements. Mr. Ransome's talk was devoted to the design and maintenance of hobs and hobbing machinery and he set forth many different practical hints for getting longer hob life and greater accuracy

in the cutting of gears. For instance, it is better and cheaper to buy hobs which are somewhat larger rather than somewhat smaller than the requirements. It also is advisable to distribute wear over the entire cutting surfaces of a hob; in that way many hob users can cut their hob expense in two.

SALES plans were discussed by Frederick B. Heitkamp, American Type Founders Corp., Elizabeth, N. J. There is a trend toward having two sales managers, he said, both reporting to the president's office; one of them analyzes markets, has charge of promotional work and furnishes the information which is used by the sales organization in dealing with customers, while the other has charge of the actual selling. There is an increasing trend toward the application of sales budgets which report expected sales and which fix the expected expense in making these sales.

Mr. Heitkamp urged that salesmen be judged from the standpoint of their capacity. He warned that a critical or nagging attitude in regard to small matters is to be avoided. It is essential that salesmen be equipped with full information and sales tools. They should be paid reasonable salaries and receive a bonus. The company should help them to save money out of their income.

It always is advisable in a sales plan to arrange to get more sales leads and inquiries, said Mr. Heitkamp. He emphasized the present strong trend toward more extensive advertising in trade and business publications. He said he personally looks for a flattening out in business in the third quarter and says that any company having a sales plan will get more business, should such a recession develop, than one without a sound plan.

Gear Capacity Chart Shown

A notable paper, by G. E. Katzenmeyer, National-Erie Corp., Erie, Pa., detailed a standard procedure in determining the size and horsepower capacities of gears of different materials. It set forth formulas and was accompanied by a number of simple tables and charts which may be used by the designer. The work thus set up by Mr. Katzenmeyer permits comparisons of the various materials, tooth forms, pitches and types of gearing without resorting to complicated mathematical equations.

"Use of Tapered Roller Bearings in Gear Reduction Units" was the title of a comprehensive paper presented by S. M. Weckstein, Timken Roller Bearing Co., Canton, O. This was published in full in STEEL for April 20. It discussed in great detail bearing mountings in such units.

"Welded Gears and Gear Cases"

was the title of a paper presented by Everett Chapman, Lukenweld Inc., Coatesville, Pa. The author declared that savings in weight and in the cost of making patterns was not the principal reason why welded steel construction is being used more extensively in the manufacture of gears and gear cases. The principal reason is that the welding process enables the designer to use a more homogeneous material, permits him to distribute weight as he desires and makes it possible for him to get finally a jointless structure.

All troubles in welding start on the drawing board, said Mr. Chapman in discussing the design principles which must be followed in order to get successful welded structures. He particularly warned of the bad effects which result when a butt joint is welded on only one side; such joints also should be chipped and welded at the back. Because of this requirement it is inadvisable to use welded joints in box sections unless the inside of the joints is accessible. He explained the possibilities, through cutting holes in box sections, for making it possible to get at the joints from the inside.

VARIOUS committees submitted reports. From the helical gear committee the association received a recommendation that Article 1, Section 7, Rating of Pumping Machines, be changed to read as follows: "Bearing bolt stresses must not exceed 10,000 pounds per square inch in tension for common bolts and studs or 15,000 pounds per square inch for heat treated bolts or studs when carrying maximum crank load. Foundation bolt stresses shall not exceed 5000 pounds per square inch." Incorporation, in Curve sheet No. 1 of this Rating for Pumping Machines, of curves to cover higher hardness materials, it was decided, needs further attention before any action is taken.

The nomenclature committee reported a proposed recommended practice for chain and sprocket nomenclature, which now is complete excepting for a few slight changes which will be made prior to the fall meeting. On gear dynamics nomenclature, the committee reported that it has under way a program to determine what functions, such as load, pressure and force, are basic. After determining the basic functions, the committee will define them and then set up the nomenclature.

When the nonmetallic committee, headed by W. R. Moyer, reported that its work had been completed, M. T. Schumb recommended that the committee study and report on current design in producing nonmetallic bevel gears which will wear well in service. The committee agreed to undertake such a study. It was indi-

(Please turn to Page 73)

Methods and Materials



Bulk Sugar Kept Uncontaminated In Stainless Steel Freight Car

A NEW type of box car, with interior constructed largely of stainless steel, for use in the sugar industry, has just been announced by the General American Tank Car Co., Chicago. It is distinctive in design and has a number of advantages over the conventional-type freight car, chief of which is its ability to carry double the usual capacity load, or approximately 80,000 pounds.

The lining of the vertical sides, as well as that of the roof, is of a zinc alloy. The hopper is fabricated of stainless steel produced by the Allegheny Steel Co., Brackenridge, Pa. It is so constructed that the lining is not depended upon for structural strength. The bottom is composed of

four hoppers in the shape of inverted pyramids. Eight separate hatches in the roof of the car provide for quick, easy loading. Each hatch is carefully insulated by means of rubber gaskets and the hole covered with a rubber-gasketed hatch to keep out all foreign material which would come in contact with the sugar while in transit.

Use of the new type car effects material savings in both time and labor. Unloading time, including coupling and uncoupling, is fifteen minutes, in the course of which time the car is emptied into a holding tank of the same stainless steel construction. The former-type car called for manual unloading of the sugar bags, first hoisting them, dumping

them individually, and finally sifting carefully to catch all lint or other materials which have been carried into the chute while unloading.

The interior surface of the stainless hopper coming in contact with the sugar is polished to mirror-like smoothness, eliminating caking and assuring rapid, easy flow of the sugar during the course of unloading. In addition the stainless steel hopper prevents a metallic or foreign taste being imparted to the sugar. The metal is cleaned easily, thereby reducing maintenance and depreciation costs materially.

Five new cars of similar construction are now in process of building.

Welded Pipe in Ship Shows Worth

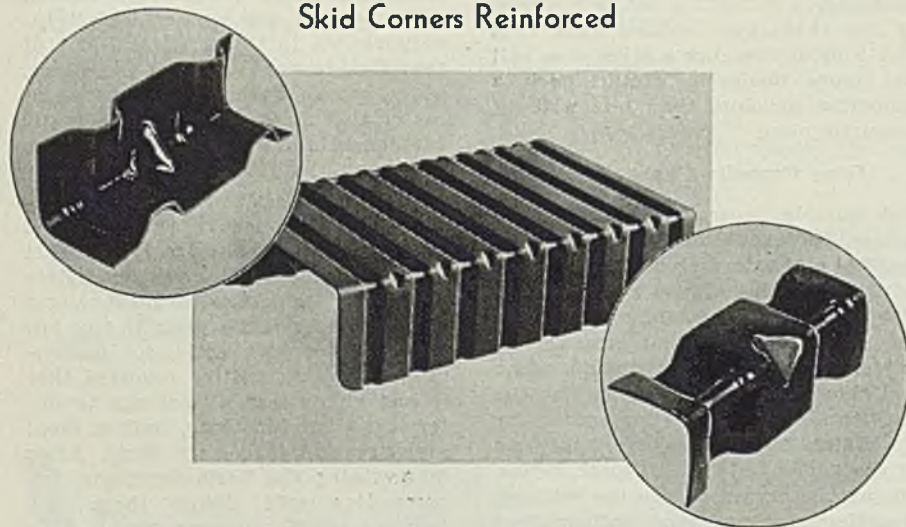
WHEN the steamship *DIXIE* was driven on French Reef off the coast of Florida last September by a storm of hurricane force, her oxy-acetylene welded piping was subjected to unforeseen stresses. Placed in service in January, 1928, the *DIXIE* was the first American ship to use high-pressure, superheated steam, as well as the first to use welded piping, according to *Oxy-Acetylene Tips* published by the Linde Air Products Co., New York.

The welded high-pressure piping had already given nearly eight years of trouble-free service when it was called upon to resist the terrific stresses imposed as the ship was pounded on the reef day after day. Some idea of the magnitude of these stresses is indicated by the fact that the boilers and turbines were pushed up nearly a foot above their normal positions.

After having been on the reef for 17 days, the vessel was finally floated off and brought to New York in tow. Here inspection showed that the piping had remained intact; every weld had held. As part of the extensive reconditioning operations, the high pressure piping was again given a most critical inspection. It was not found necessary to replace a single weld.

Main steam piping is 8-inches di-

Skid Corners Reinforced



THIS all-steel skid platform fabricated from one piece of low-carbon open-hearth steel has been developed by the Truscon Steel Co., Youngstown, O. Reinforcement has been accomplished by means of deep integral rib construction in the plane surfaces and a new type of tubular corner. This new type of corner is formed with a minimum of distortion of the metal and is responsible for much of the strength of the platform. In tests the legs have been bent back and forth with a sledge hammer and then practically flattened under pressure with the result, it is claimed, that only a few small scale cracks were developed. The gage of steel used is controlled entirely by the customers demands

Where appearance is
a sales point for the
finished product...



to

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GALVANNEALED
SHEETS

● For articles on which paint, enamel, Duco or lacquer finishes are used...for uses where the protective zinc coating must stand up under severe fabricating conditions...for uses where abrasion or high temperatures must be withstood, without chipping, flaking, loosening or fusing of the zinc coating...you can safely place your trust in YOUNGSTOWN GALVANNEALED SHEETS.

● The zinc coating of Youngstown Galvannealed Sheets is actually fused to the base metal by a patented heat-treating process. No preparatory chemical treatment, priming or weathering is required before applying the surface finish.

THE YOUNGSTOWN SHEET AND TUBE CO.

Manufacturers of Carbon and Alloy Steels

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Tubular Products; Sheets; Plates; Tin Plate; Bars; Rods; Wire; Nails; Conduit;
Unions; Tie Plates and Spikes.

597

furnished in all standard widths,
lengths and gauges.



ameter. All piping, flanges and valves were made to withstand 1400 pounds per square inch test pressure. All of the auxiliary piping and machinery was designed to take full boiler pressure so as to provide against possible admission of high-pressure steam.

All joints in the high-pressure piping systems are of special design. Long hub high-pressure flanges were threaded back from the face for a distance equal to the flange thickness exclusive of the hub. The ends of the pipe were threaded to correspond and in addition were machined to give a tight fit in the flange hub. The end of the flange hub was then oxyacetylene welded to the outer wall of the pipe.

The high-pressure systems include piping for: Steam or hot oil, designed for 400 pounds working pressure and 750 degrees Fahr. total temperature; feed lines (nonshock hydraulic), designed for 500 pounds working pressure and 450 degrees Fahr. total temperature; and air or gas, designed for 750 pounds working pressure and 100 degrees Fahr. total temperature.

Stresses Balanced Alloys In Russian Address

Importance of balanced alloys in chromium and manganese steels was

stressed by Dr. A. B. Kinzel, chief metallurgist Union Carbide & Carbon Research Laboratories Inc., Long Island City, N. Y., in a lecture which he delivered before the Society for Science and Culture in Moscow, Russia, during a recent visit to that country. Balanced alloy steels were defined as those which contain alloying elements and carbon so proportioned that the optimum combination of desired properties is obtained.

The first part of the address centered on low-alloy structural steels that are immediately usable in the as-rolled condition. Plain carbon steels, it was pointed out, are sometimes unsatisfactory for structural uses, because such steels do not always have the desired physical properties without heat-treatment, which is impracticable with many large structural shapes. Balanced chromium and manganese steels modified by the presence of silicon, such as the Cromansil type of steel, were shown to be most suitable for structural applications.

The remainder of the talk was devoted largely to balanced high chromium-manganese stainless steels. These metals were said to be similar in corrosion resistance to ordinary chromium-nickel stainless steels, and to be equally satisfactory for many purposes. Modifying elements such as copper or nickel appear to influ-

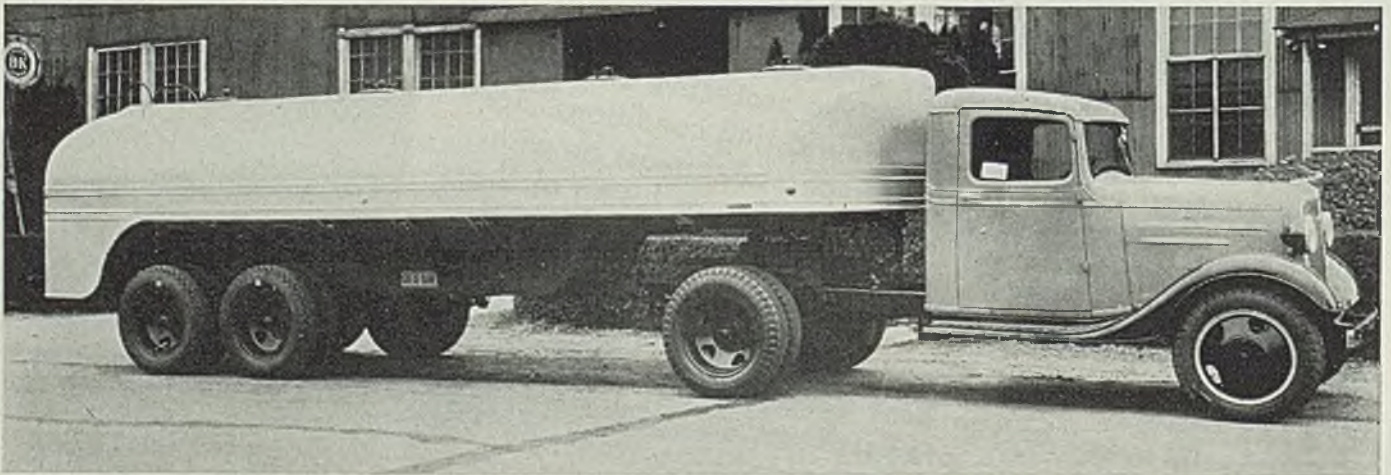
ence the corrosion-resistant properties favorably.

Pure Iron Studies Released By Bureau of Standards

One of the metallurgical researches in progress at the national bureau of standards, Washington, is the determination of the fundamental properties of elemental iron. The important role of the metal, iron, and its alloys in modern industrial life necessitates the acquiring and compiling of adequate and accurate data on the subject. All the available information on the preparation and properties of the purest available forms of iron have been summarized in a paper by John G. Thompson and Harold E. Cleaves, entitled "A Summary of Information on the Preparation and Properties of Pure Iron." This paper has been published by the national bureau of standards as Research Paper RP860.

The bureau is pursuing this work in three stages, (1) the evaluation of existing data, representing the combined efforts in the past of numerous investigators working under a great variety of conditions, by a critical review of the existing scattered information in the technical literature, (2) the preparation in the laboratory of metallic iron of definitely known purity and perhaps of higher purity than has been available heretofore, and (3)

Truck Tank Made Lighter with High-Tensile Steel



NEW copper-nickel steels are helping truck manufacturers meet the demand for tank trucks, vans and other delivery equipment capable of efficient, low-cost operation. Their high tensile strength and impact resistance are winning widespread adoption of these alloys by truck builders.

Youngstown Sheet & Tube Co., Youngstown, O., reports a growing use of Yoloy, its new nickel-copper steel, in the manufacture of trucks, trailers and other equipment where reduction in weight, without sacrifice of strength

and wearing qualities, is important. The company states that the superior welding qualities and formability of this special alloy have caused its introduction into truck chassis at many points. Use for truck tanks makes possible reductions as great as 25 to 50 per cent in the gage of sheet, and the resulting decrease in weight is reflected in reduced operating costs.

The accompanying illustration shows a 3250-gallon, 4-compartment, drop-frame, oval-section Weld-Bilt trailer tank made of Yoloy. The tank is

mounted on a special tandem-axle Great Dane trailer. Use of the copper-nickel steel reduced the weight of the tank by approximately 750 pounds. Trailer and tank were manufactured by the Steel Products Co. Inc., Savannah, Ga.

The copper-nickel steel acts as a deterrent to wear on truck bodies caused by oxidation, corrosion and the abrasive, scouring action of gravel, coal and other solid materials. This steel has great rigidity and is not readily deformed by shocks.



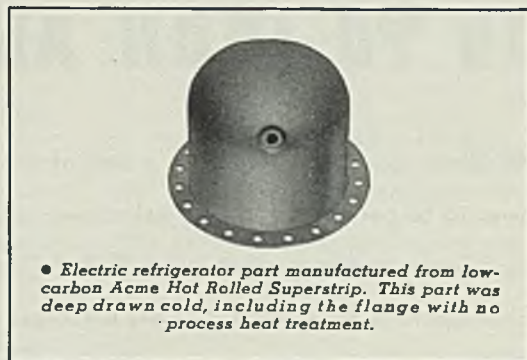
Countless Products are Made Better and More Economically with "Product-ized" Strip Steel

● "Product-ized" strip steel means Acme Superstrip. The reason is that Acme Superstrip is produced each time to meet the specific needs of the specific product.

Some products require a particularly fine surface—in others, deep or difficult drawing is the problem. Often it is a combination of several requirements.

So well has Acme Superstrip met the needs of important manufacturers in many different fields that the preference for this "product-ized" strip steel is mounting steadily.

Let us send you a copy of the booklet, "Batting 'Em Out," describing many interesting uses of Acme Superstrip. ACME STEEL COMPANY, General Offices, Chicago. *Branches and Sales Offices in Principal Cities.*



● Electric refrigerator part manufactured from low-carbon Acme Hot Rolled Superstrip. This part was deep drawn cold, including the flange with no process heat treatment.



● Automobile bumper guard—made from cold rolled Acme Superstrip. This is a deep draw with a fold at the sides. The finish of the completed part must be suitable for chrome plating.

Acme Superstrip
 HOT ROLLED • COLD ROLLED  GALVANIZED • STAINLESS

ACME STEEL COMPANY, 2826 Archer Ave., Chicago
 Send me a copy of the booklet "Batting 'Em Out."

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 Firm.....
 Street.....
 City..... State.....



HOT GALVANIZING IS TO IRON AND STEEL

● When you are depending on a shell of zinc to guard the life of steel—it pays to be particular . . . On a galvanizing job, the insignia of this association is your guarantee that it is a "hot dip" job and that the high association standards for workmanship and thickness of coating have been strictly maintained . . . It is a sure sign of longer service and greater sales appeal . . . Look for this insignia and **know** that you have the most economically practical armor against the constant and costly attacks of corrosion . . . **Hot Dip Galvanizing.** Why take a chance when it costs you nothing extra to play safe? ● Our research department, headed by an international authority on zinc coatings, is at your service. ● American Hot Dip Galvanizers Association Incorporated . . . American Bank Building . . . Pittsburgh, Pa.

IF IT CARRIES THIS SEAL IT'S A JOB WELL DONE



BUY FROM THESE QUALIFIED MEMBERS

- Acme Steel & Malleable Iron Works
Buffalo, N. Y.
- Acme Galvanizing, Inc., Milwaukee, Wis.
- American Tinning & Galvanizing Co.
Erie, Pa.
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- The Chain Products Co., Cleveland, Ohio
- Diamond Expansion Bolt Company, Inc.
Garwood, N. J.
- Enterprise Galvanizing Co., Philadelphia, Pa.
- Thomas Gregory Galvanizing Works
Maspeth, N. Y.
- Hanlon-Gregory Galvanizing Company
Pittsburgh, Pa.
- Joslyn Mfg. & Supply Co., Chicago, Ill.
- L. O. Koven & Brother, Inc.
Jersey City, N. J.
- Lehigh Structural Steel Co., Allentown, Pa.
- Missouri Rolling Mill Corp., St. Louis, Mo.
- The National Telephone Supply Co.
Cleveland, Ohio
- Penn Galvanizing Co., Philadelphia, Pa.
- Riverside Foundry & Galvanizing Co.
Kalamazoo, Mich.
- Standard Galvanizing Co., Chicago, Ill.
- Wilcox, Crittenden & Company, Inc.
Middletown, Conn.
- The Witt Cornice Co., Cincinnati, Ohio



the determination of properties of this metal to supplement present available information (see STEEL, Dec. 30, p. 39).

The first stage of the project has been completed and the available information from the technical literature is summarized in the above mentioned paper. The preparation of high-purity iron is now in progress in the laboratory. The determination of its properties will follow. These phases of the project will be described in subsequent papers.

New Lightweight Stainless Steel Trains Described

Emphasizing the need for reserve power in railroad locomotives, Edward G. Budd, president of the Edward G. Budd Mfg. Co., Philadelphia, spoke before a joint meeting of the Cleveland Engineering society and the Cleveland section of the American Society of Mechanical Engineers, April 21. Reserve power is needed to maintain a constant speed on level and grade track alike, Mr. Budd said, and not necessarily to make possible high speeds.

A proper ratio between weight and power is the key to the solution, according to Mr. Budd. Constant safe speeds are then possible and extreme speeds neither necessary nor desirable. The Budd company has successfully used 18-8 stainless steel in the construction of railway equipment which has an economical and effective weight-power ratio. The shot-weld process was developed to make fabrication possible. Mr. Budd discounted the effects of streamlining, saying that although a factor at high speeds, it was of minor importance to the railroads.

Refractory Developments Shown in Two Pamphlets

Available for distribution to the industry are two pamphlets recently released by E. J. Lavino & Co., 1528 Walnut street, Philadelphia. Both were written by G. E. Seil, Ph. D., technical director of the company. The first, *Refractories From a Metallurgical Viewpoint*, is the report of a study made by Dr. Seil on the effects of secondary components of refractories on the finished bricks, with the object of developing a refractory suitable for the needs of modern metallurgical practice. The results emphasize the need for extreme care in handling and in laying the bricks. The second, *Petrography and Heat Treatment of Chromite Refractories*, deals with the various compounds found to be present in chromite ores; the properties of these different components; and the ways in which these compounds affect the finished product.

Welding, etc. . . .



by Robert E. Kinkead

Old Fashioned

IT SEEMS far-fetched and old fashioned to suggest that things are working themselves out to some sort of a solution in our economic life, but it seems to be true. Investors have not shown any undue haste in supplying capital to manufacturing industry for new equipment and that fact is responsible for substantial movement in the direction of sound recovery.

Capital may be had for the manufacture of anything for which there is a proved want at a price people can afford to pay and on which adequate profits may be earned. Capital also may be had for machinery and equipment which will permit the reduction in selling price of any product for which there is an established and predictable market and still yield a profit. Industry goes back to work in earnest along technical lines when that is the only way it can obtain capital.

Over two years ago, James A. Farrell said that within two years there would not be enough technical talent to staff American industry. Only recently, Henry Ford said that the great rewards in the future would come to men who can devise the machines required by our economic structure.

Anyone who has tried to gather together an organization of high-grade technical talent in recent months has been impressed with the fact that industry has gone about the job of doing a better job for less money and that technical talent is already working at top speed. Industry is going back to work for profits and that is the best evidence in the world of sound recovery.

Lawyers

WELDING men who have been called on to testify as expert witnesses in litigation see a fairly accurate picture of the moral standards of the legal profession. The really brilliant lawyers who win

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.

oftener than they lose are not only honest with themselves but with their clients. The acuteness and keenness of the legal mind which has been forged out by years of court battles is marvelous to behold. It is a privilege to witness such a mind in action.

The technical expert who has had experience can separate the peashooter minds from the howitzers in about 5 minutes of conversation about the case. The big minds relentlessly pursue a line of questioning to find out what the technical expert believes to be the facts in the case and why he believes as he does. The slippery legal minds begin by asking the technical expert as to whether he can testify under oath that such and such are the facts.

We have seen famous lawyers who could have been equally famous engineers at the same time.

Sparks and Flashes

A quick, easy way to get into trouble in the application of abrasion-resisting weld metal is to use it on a highly stressed member where the soft metal may reach its yield point long before the high-tensile weld metal. Under these conditions, the abrasion-resisting weld metal will crack and shell off.

* * *

Welding an air-hardening metal fairly hot has cured many troubles. Air-hardening metals are particularly sensitive to the rate at which they cool. While it might be expected that a preheat temperature of 1000-1100 degrees Fahr. would be required, due to this sensitivity, entirely successful results are usually obtained by preheating to 300-400 degrees Fahr.

Power Drives



Problems in Transmitting Power to Machinery Aired at Conference

POWER and power problems are due to receive thorough analysis and investigation, if the interest shown last week by enthusiastic visitors to the Seventh Midwest Power exposition and the Sixth Midwest Power engineering conference at Chicago is any criterion. A considerable number of exhibitors at the exposition devoted space to power transmission equipment and associated services.

Associated with the power exhibition, which was held at the International Amphitheater, 21 mid-western organizations of national and local engineering societies, representing a total membership of over 25,000, co-operated in an instructive four-day session of the Midwest Power Engineering conference at the Palmer House. One session was devoted to a thorough discussion of "Power Transmission to Machinery" in a series of three papers by engineers active in this field.

The chairman, C. C. Miller, president, Dodge Mfg. Co., Mishawaka, Ind., emphasized the importance of a thorough study of power requirements for machine drives. There is no single solution to this problem of power drives; the best solution depends upon the particular machines and requirements of the plant. The three papers read illustrate some of the modernized applications of power transmission to machinery as applied to particular cases, together with the technical considerations involved.

Modern Group Drive and Its Economy

WR. CLENDENNING, regional engineer, Power Transmission council and Mechanical Power Engineering associates, gave a thorough and careful analysis of the zone of usefulness and use of power transmission equipment, and the economic importance of scientific and accurate

practice of engineering in that zone. Numerous applications were illustrated by slides and films.

This discussion included a study of the basic units of the group drive in its modern variations; a study of the basic economic problem presented by the various methods of driving machinery by motors or prime movers, divided into items of cost both scientifically predictable, and unpredictable with exact accuracy; a method of approximate prediction of cost factors, by means of laboratory and other records, and including such items as maintenance, power factor and power consumption; a comparison of costs of driving machinery by various possible systems of drive, including the individually applied motor, the old style long lineshaft system and the modern group drive.

Mr. Clendenning discussed not only the transmission cost problems under full production of all machines but also gave a careful economic analysis of costs as they would exist with only 25 per cent of the equipment power load in actual operation, such as might exist in slack seasons or in depressions. An interesting feature shown was a method of preparing an earnings statement derived from the proper use of modern group drives.

Mr. Clendenning emphasized the point that modernization does not necessarily mean 100 per cent grouping but rather a study to determine what should be grouped for economy and what might be more advantageously individually driven.

Load Acceleration and Overload Release

WILLIAM STANIAR, mechanical power engineer, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., gave the conclusions of an extensive research into one of the most difficult and little understood drive problems—starting requirements. The

driving of present-day industrial equipment has created two major mechanical transmission requirements: The gradual acceleration of heavy inertia loads, and the instantaneous release of the driven equipment, in the event of a serious overload, from the power source. If such requirements exist, and they are not considered during the design or installation of the drive, breakdown, premature wear and excessive maintenance will result.

The force required to translate a body from a state of rest to one of motion depends upon the factors of weight and mass and the rate of acceleration. The force necessary to set a body into motion is termed "accelerating force" and the twist required to start and bring machinery to full rotating speed is termed "accelerating torque," commonly known as "starting torque." Starting torque must be applied gradually to avoid possible destruction of the mechanism involved.

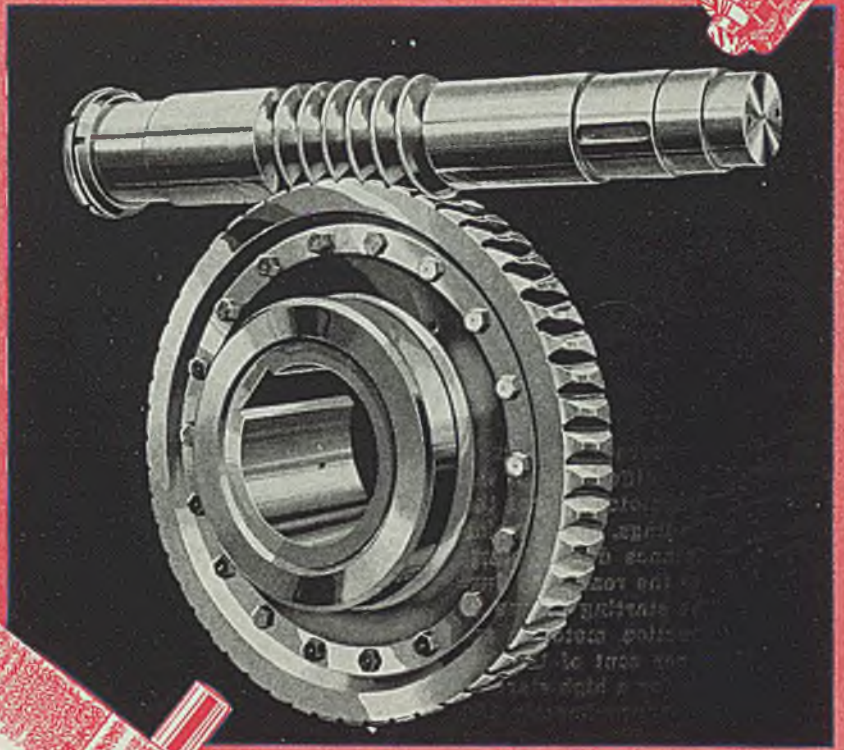
Torque Must Be Considered

The underlying principle of torque must be understood and given consideration in the design of modern mechanical power installations, otherwise high maintenance costs and power loss result. Torque varies inversely with the speed of rotation, therefore when direct connecting high speed to low speed through reduction mechanisms, it follows that torque is greatest at the slow speed end and the problem of power estimation for slowly revolving loads resolves itself into one of calculating the torque at the driven shaft.

In group driving, starting torque is not acute, since it can be overcome by either tight and loose pulleys or friction clutches. Direct connecting a motor to a load, particularly where high velocity ratios are involved, necessitates methods of the rigid system of transmission. Mechanical slip is absent, therefore the motor is required to reach full speed under the applied torque of the driven apparatus.

Starting torque, when severe, sets up destructive strains in both the electrical and mechanical equipment, unless relieved by suitable devices.

Philadelphia Worm Gears



unsurpassed for Accuracy

The Worm Gear Set illustrated is being used in screw-down service requiring 3,500,000 lbs. pressure. Gears for such service MUST be good!

SEVERAL important efficiency and service features are embodied in every worm and gear made by the Philadelphia Gear Works. Most of them concern the tooth specifications. These are developed to produce high power transmission efficiency and heavy load carrying capacity.

Philadelphia Worm Gear Sets operate with maximum rolling action and a minimum sliding action.

To achieve this objective, great care is exercised in every detail of manufacture. Beginning with the materials which, generally, are a high quality chill cast nickel bronze for the gear and a high alloy steel worm carefully carburized to give proper depth and hardness of case, every step is closely supervised by master gear makers.

The ultimate in precision and accuracy is accomplished by the final machine grinding of the worm threads and accurate generation of the gear teeth. This positively insures correct tooth form and a smooth bearing surface.

Engineers and production men requiring high quality, great accuracy and high power output efficiency for their worm gear units instinctively specify—PHILADELPHIA.

PHILADELPHIA GEAR WORKS

Main Office and Plant
Eite Avenue and G Street, Philadelphia, Pa.

Industrial Gears and Speed Reducers

Branch Sales and Eng. Offices
New York and Pittsburgh

Economically, it is always desirable to employ standard induction motors with "across-the-line" start. A motor started across the line comes to full speed in a few seconds provided the load is light or moderate. If the load is heavy, severe torque strains are produced, which are capable of causing gradual or immediate destruction. This condition can be remedied by certain types of motors and electric starting equipment or by mechanical devices interposed between motor and load.

Electrical Methods

The alternating-current slip-ring motor accelerates gradually under load. This feature is obtained by the use of collector rings and adjustable rheostats and to obtain a given torque at start requires as much power as when running at full speed.

The alternating-current high starting torque motor differs from the standard induction motor in that the motor has two windings, one of which controls the resistance during starting and the other the reactance during running. The starting torque of the standard induction motor is approximately 175 per cent of the full load torque, while for a high starting torque motor it is approximately 250 per cent.

The direct-current motor, exclusive of shunt-wound motors, possesses large starting torque capacity. The series motor can be used when the load is always and inseparately connected to the motor and when the constancy of speed with variations in load is not especially desired. The series motor has a rapid rise in speed at light load (small torque), that is, if the load is not connected the motor will race, leading to motor failure.

The advantage of the direct-current compound wound motor is that at starting, when the current through the armature and series field winding is large, the total field excitation is large, hence there is an increase in torque capacity. Also, it will not speed up indefinitely when released from load. A disadvantage is that its running speed decreases considerably with load increase.

The electromagnetic clutch depends upon electrical energization and can be employed for moderate starting torque service in connection with "across-the-line" start motors when interposed between motor and load.

Mechanical Methods

The alternating-current slip-ring motor is usually employed when speed acceleration under severe torque is to be controlled electrically. During recent years, mechanical methods for gradually accelerating heavy inertia loads have been per-

fectured. For direct connecting high starting torque loads, either rigidly or flexibly, it is first cost and maintenance economy to use, wherever possible, a standard "across-the-line" start induction motor connected to such a load through self actuating mechanical devices which permit gradual acceleration of load after the motor has almost reached full speed. Mechanical devices of this nature should not be confused with magnetic or purely mechanical clutches.

Self actuating mechanical mechanisms for high starting torque service are of two types. Those that serve as a coupling (combining flexibility) between motor and load and those that act integrally with belt pulleys, chain sprockets, gears, or V-rope sheaves. The former are known as high starting torque couplings and the latter as either pulley-type, sprocket-type, gear-type, or sheave-type starters. A device representative of the above types is the mechanical slip-ring starter which can be employed as a direct connection coupling, or as an integral part of a pulley, sprocket gear or sheave. By means of a slipping friction it automatically starts machinery smoothly and with uniform acceleration.

Starters of this character are designed to transmit any required torque at a specified speed. In standard designs the device is proportioned to transmit a maximum of 125 per cent of the rated horsepower of the motor. This is usually sufficient for average acceleration, but where it is desirable to reduce the time required for acceleration, the degree of overload may be increased or decreased.

Direct Drives for Machinery Applications

F E. BUTTERFIELD, electrical engineer, Commonwealth Edison Co., Chicago, emphasized the necessity of investigating "why, where, and how" to use individual drive. To the question of "why?" the engineer can find but two answers: For economy and for convenience.

To the question of "where?" there are many answers, all hinging on the desired result and depending further on the character, size, use, location and relation of the machine to others concerned in the process, as well as certain electrical and mechanical considerations, and all reflecting back to the primary consideration as to whether economy and convenience are best served by the application.

To the question of "how?" there are also many answers depending on a lesser number of factors, the principal of which are speed and torque characteristics, the duty cycle, and the mechanical design of the driven machine.

It appears that the second consid-

eration, "where?" has been the one which, in the past, has caused the most trouble due to the failure of the individual drive applied in the wrong place, or the group drive applied in the wrong place to produce economy, or the failure of one or the other to produce sufficient convenience or overcome its lack of economy.

Conditions Control Selection

In some plants it is often found that the type of work varies widely and that many of the machines are idle much of the time. In this case great care is called for in deciding on the type of drive because, while these shutdowns with direct drive will make a marked reduction in the power bill below what it would be with group drive, the wear and tear on the machine belts and parts will be reduced below the normal with the group drive. Furthermore, under some conditions it may be found that group drive will operate the plant with a connected load of only 20 to 40 per cent of what would be required with direct motor drive. Under these circumstances, the fixed charges on the direct motor drive equipment might conceivably place it in the luxury class with considerable unnecessary expense.

There have been developed within the last few years many machines and tools, the design of which has been made possible by the use of direct motor drive with the motor built into the machine; for instance, machines such as automatic drill presses in which from eight or more operations are performed on a part with a single setting. Here economy in power cost is of secondary consideration; convenience in the form of speedy production being the main objective and the result being reflected in a lower production cost. Machines of this nature find a place in production shops alongside of group driven machines working on other operations in the process, on account of the simplicity of design, ease of maintenance, and flexibility of control.

The correct application of direct drive depends to the greatest extent on judgment and study of the user's requirements. The points to be considered in coming to any decision on a drive problem hinge on the use to which the machine is put, the duty cycle of the process, the hours of use, the requirements of control and the character of the machinery. All these factors have varying importance in each individual case, and no hard and fast rules can be laid down as absolute. The engineer in planning drives should be guided by the old rule, "Always and never are two words which the engineer should always remember—never to use."



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The May (Post-Convention) Issue of **THE FOUNDRY**

No issue of **THE FOUNDRY** throughout the entire year holds more interest and permanent value to our readers than the Post-Convention—this year the May issue.

● To those who are fortunate enough to attend these great conventions and exhibits of The American Foundrymen's Association, the Post-Convention issue of **THE FOUNDRY** is an illustrated and accurate record of what they have seen and a souvenir of a pleasant week of renewing old acquaintances, making new ones and viewing the latest in foundry practice, equipment and supplies.

To those who find themselves unable to get away for "foundrymen's week," the Post-Convention issue of **THE FOUNDRY** is the Convention and even though they miss some of the "thrill of the crowd," they are just as well informed as to what happened; what's new in methods and equipment, etc., as those who are there. The reason for this is that the Post-Convention issue of **THE FOUNDRY** carries a detailed report of each session, summaries of the discussions, reports of the many active committees that are directing the technical trend of the industry, news of the daily happenings and official actions and a critical view of all that is new in foundry equipment shown at the exhibition.

As an advertising opportunity there is none more desirable. The eyes of the foundry industry of the world are focused on the A. F. A. convention and the entire foundry universe reads the Post-Convention issue with keen interest and an eager mind. Space reservations should be made at once.

● *The advertising forms of the May Post-Convention issue of **THE FOUNDRY** close on May 4th.*

THE FOUNDRY ... CLEVELAND



STEEL

April 27, 1936

Gears for Transmissions Are Hardened in Cyanide Bath

H EAT treatment of gears constituted a lively topic for discussion at the annual tri-chapter meeting of the Cincinnati, Columbus and Dayton chapters of the American Society for Metals held at the Alms hotel, Cincinnati, April 21. About 150 members of the society participated in the program which consisted of plant visitations, a luncheon, an afternoon technical session and a dinner meeting.

As the only speaker at the afternoon session, E. F. Davis, chief metallurgist, Warner Gear Co., Muncie, Ind., presented a paper on "Modern Gears" in which he dealt principally with forged steel gears used in automobile transmissions. By way of introduction, he reviewed the various types of steels used in the past and those finding most favor today, outlined the progress in gear cutting and finishing, then dealt at length upon methods of heat treating and hardening.

Cyanide Process Upheld

Rack type cutting is rapidly gaining favor as an economical and accurate method of gear cutting manufacture. Gears are cut to close limits, hardened, then the teeth are lapped to finished dimensions. The Warner plant uses the cyanide bath process for hardening almost exclusively, work going into the bath cold.

Mr. Davis exploded the fallacies that cyaniding produces noisy gears; that gears will distort if not heated slowly; that carburized gears are noisier than oil hardened gears; and that gears are noisy because they distort in the fire. Cyanide treatment is employed for two reasons: 1. To produce hard surfaces to prevent wear; and 2. to preserve the surface finish, — steel cannot oxidize in a cyanide bath because of its reducing action.

In case of gear distortion, said the speaker, look for trouble in quenching and not in heating. Gears not cut correctly will not be improved in heat treating — accurate cutting is necessary for quietness. For best results, closer control of both cutting and heat treating is required.

If gear teeth become pitted, failure will occur soon after. Inclusions in steel cause trouble in cutting and teeth containing inclusions are a source of failure. Because these in-

clusions are extremely hard, they increase cutter expense.

Gears made from stock which is cold sheared sometimes crack because of overstraining of the metal during shearing, stated Mr. Davis. Overburnishing of gears will cause the surface to separate and pit and this leads to fatigue failure.

Initiating an extensive discussion, N. F. Salkover, vice president, Queen City Steel Treating Co., Cincinnati, and chairman of the session, said he was impressed with the point that automotive gears are hardened out of cyanide while that process is not looked upon favorably for industrial gears, for example, those used in the machine tool industry.

Commenting upon this point, Mr. Davis declared that the cyanide method can be used to advantage for all gears if carbon content is not over 0.45 per cent and the gears are not too large. Automotive transmission gears are small. Machine tool gears do not have as great tooth pressure as automotive gears, but in his opinion, cyanide hardening would give them better wearing qualities. Also in machine tool and industrial gears, minimum weight is not a major factor; these gears are designed with a greater margin of strength and safety.

Alloy Steel Film Shown

Cast steel gears could be used in the automotive industry, said the speaker in answer to a question, but they are not because their cost is somewhat greater than forged gears. Nitrided gears have found little favor in this country, but foreign car builders have made some use of them — the chief objection, he pointed out, is inherent brittleness.

Scratches at the base of gear teeth are likely to result in failure of a gear by fatigue fracture. In concluding, Mr. Davis said the maximum hardness which can be cut on the rack-type gear cutter is 228 brinell.

At the close of the afternoon session, the audience witnessed the premier showing of a new 4-reel sound film, "The Manufacture of Alloy Steel," through the courtesy of the Bethlehem Steel Co., Bethlehem, Pa. Splendidly photographed, this film starts with the preparation of the open-hearth or electric furnace and carries through to final inspection and shipping of the finished

product. At the close of the film are typical uses for alloy steels.

Iron and steel production in the United States has passed out of the period of extremely rapid increase and in the future progress will be qualitative rather than quantitative. This prediction was made by R. S. Archer, metallurgist, Republic Steel Corp., Chicago, and national president, American Society for Metals, in addressing the evening dinner meeting. Dr. G. M. Enos, University of Cincinnati, presided at this session.

Mr. Archer stated that the steep curve of increase recorded by the 65-year period 1870-1935 would tend to level off sharply in the period ahead. In all probability, he said, the top point in per capita production has been passed.

Furthermore, there is nothing to justify the belief that iron and steel can be made any more cheaply than it is at present, for the economics of raw materials are pretty definitely known and production processes have reached a high degree of efficiency.

Forecasts Labor Shortage

Continuing, Mr. Archer said that future progress will be in the direction of higher quality and improved properties. Methods of utilizing and fabricating steel will be improved, however, so that the ultimate user will be able to purchase steel products at a lower cost.

History has shown, declared the speaker, that after every depression unemployed workmen find re-employment and eventually a shortage of labor occurs. He was confident that the depression just ended would prove no exception. Government can delay a depression and it can also retard recovery by unsound legislation, but it can not prevent economic laws from functioning in the long run, he stated.

Industrial plants in the Cincinnati area visited during the morning were Andrew Steel Co., Newport Rolling Mill Co., Cincinnati Milling Co., Metal Specialties Co., Remington-Rand Inc., Queen City Steel Treating Co., Crosley Radio Corp., and Proctor & Gamble Co.

The coal division of the Ohio section of the American Institute of Mining and Metallurgical Engineers participated in all portions of the program except the afternoon session when it conducted a meeting of its own. Papers presented at this session were: "What Not To Expect from a Coal Cleaning Plant," by Byron M. Bird, research engineer, Battelle Memorial institute, Columbus, O., and "Coal Cleaning and Screening in Relation to Marketing and Consumers Problems," by J. B. Morrow, preparation manager, Pittsburgh Coal Co., Pittsburgh.

Engineers Review Trends in Rolling Mill Practice at Youngstown, O., Meeting

APPPLICATION of water at high velocity has been universally accepted as the best method of removing scale during the process of rolling hot steel and this system, particularly as applied to sheet and strip steel, has resulted in higher quality, more accurate gages and better surface finish. This fact was brought out by J. E. Holveck, sales engineer, Worthington Pump & Machinery Corp., Pittsburgh, at the spring conference of the Association of Iron and Steel Electrical Engineers at the Ohio hotel, Youngstown, O., April 22-23. Over 750 attended the opening session Wednesday evening which was devoted to problems of descaling and temperature and pressure measurements.

The first consideration in a hy-

draulic descaling system, Mr. Holveck explained, is a nozzle with the proper shape of orifice which will produce a satisfactory jet, converting the selected available pressure into an efficient impinging force of sufficient magnitude to break the scale.

This impinging force, which is the result of mass and velocity, or water and pressure, first breaks the scale, after which the water, being in continuous contact with the steel, washes the loosened scale off the surface.

In the early application of water for descaling, round orifices consisting of small drilled holes in the header pipe, were used. The jet resulting from this orifice was found to produce only about 65 per cent of the impinging force of the well

designed nozzle which has little or no contraction and a small amount of friction loss. The round orifice also forms a round jet varying in density from the center to its outer periphery.

Extensive experiments have resulted in an improved nozzle which has, among other features, an elliptical orifice which not only produces a maximum impinging force, but delivers this force uniformly the full length of the jet.

Cooling Factor Considered

An important factor to be considered in descaling, he stated, is the cooling effect of the water on the steel. Cooling of the hot steel varies directly as the flow of the jet at the point of contact per inch width of the slab or strip. The increase in pressure to 1000 pounds was a natural step in descaling since this higher pressure eliminated excessive cooling in the early reduction passes.

Practically all descaling requirements have the same variable water demand characteristics. There may be a few cases where the water demand is constant but these are the exception. The variable characteristic of water demand is met with either a centrifugal or reciprocating type of pump with an accumulator. The use of an accumulator not only enables the selection of a smaller pump but also provides for a system which maintains a much more uniform pressure.

The hydro-pneumatic type of accumulator has been found most suitable for this service. It consists of a closed pressure vessel charged with two-thirds air and one-third water at 1000 pounds pressure. Having no



Authors of papers presented at the spring conference of the Association of Iron and Steel Electrical Engineers held in Youngstown, O., last week

Top row, left to right, J. E. Holveck, M. H. Mahwinney, F. Mohler, A. E. Krogh and L. J. Trostel; below, left to right, M. Stone and L. N. McDonald

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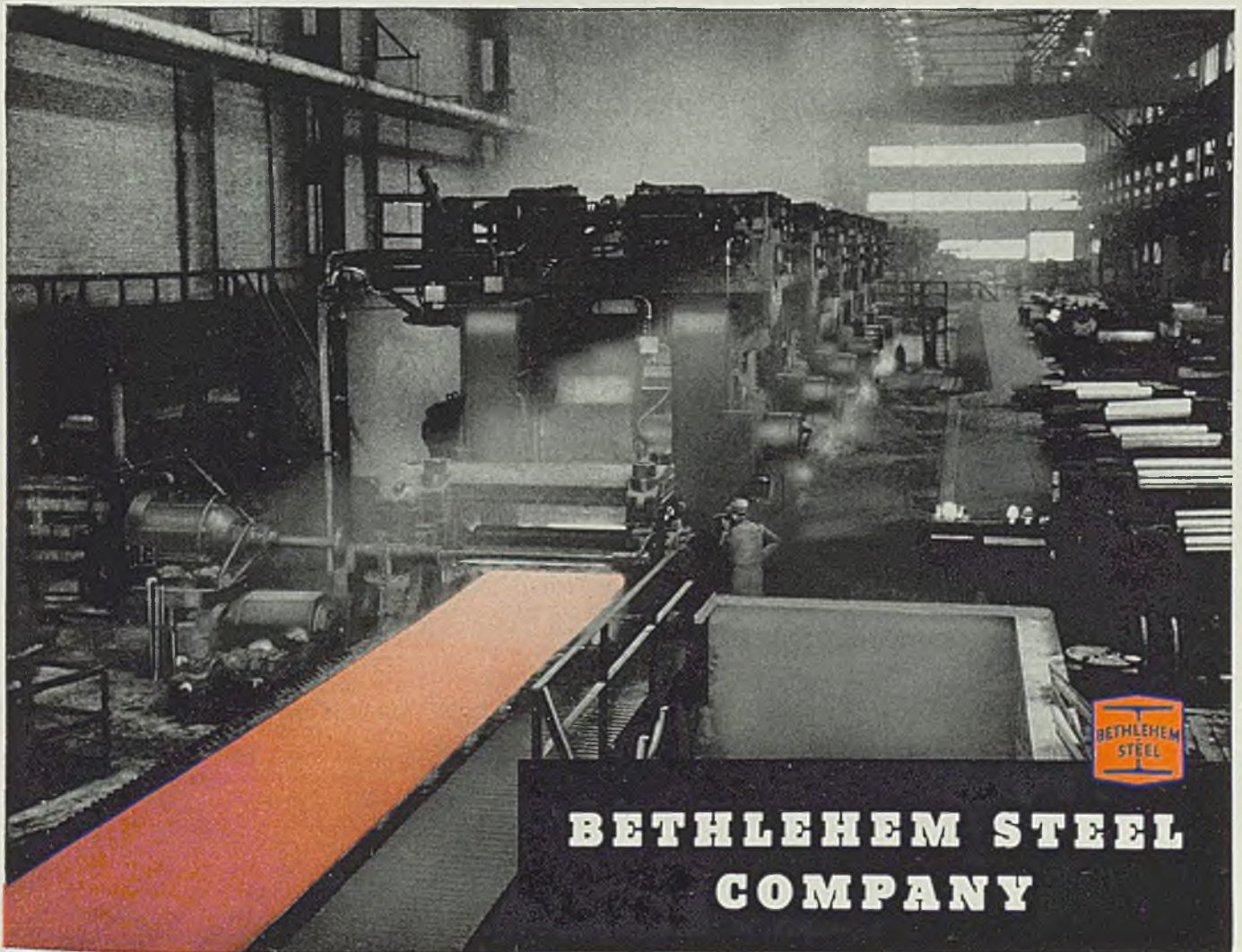
With these new facilities now swinging into production Bethlehem is in position to turn out a complete line of flat-rolled steel products, including cold-rolled sheets for automobile doors, hoods, panels and major body sections; lamp and crown-fender stock; and both hot-rolled and cold-rolled strip.

Bethlehem's rigid metallurgical control of steel making

is assurance of a uniformly high standard of physical properties. This new mill provides the equipment to meet every requirement of users in range and size of products with precise gauge control.

The new mill is at Lackawanna, N. Y., near Buffalo—a location from which quick shipment can be made to principal consuming districts.

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moving parts, there is practically no maintenance expense.

M STONE, engineering department, United Engineering & Foundry Co., Pittsburgh, in speaking on "Control and Recording of Rolling Mill Pressures," emphasized that a correct appreciation of the variables affecting the magnitude of the rolling pressure is one of the most important factors in the development of the rolling process. This, he pointed out, has manifested itself particularly in wide strip mills and for lighter gages where a proper control of such factors as protection of the bearings against overload, desirable maintenance of constant pressure during rolling, proper settings of both screws of the mill, etc., is important.

In order to make these things possible, he said, a roll pressure meter has been developed which utilizes the strain in the housing posts to indicate the magnitude of the rolling load. By the proper adaptation of an electromagnetic strain gage embedded in the housing, both remote indication and recording of rolling mill loads have been worked out to a practical success. At the present time, some dozen mills have been equipped with such apparatus.

STEEL men have long been much interested in accurately measuring the temperatures of rapidly moving hot objects such as sheets, rails, bars, billets, rods, tubes, etc. It has been evident that something like an automatic high-speed optical pyrometer would be desirable. Such a unit is now available and it is one of the most important pyrometer developments in recent years. This fact was brought out by A. E. Krogh, sales engineer, Brown Instrument Co., Philadelphia. The rapidity of this pyrometer is apparent from the fact it indicates or records to full scale the temperature of a hot body in about 1/2-second. Critical damping is inherent and the chart record shows no overshooting.

This device, called the Optimatic, employs photoelectric tubes. Mr. Krogh explained. The system consists essentially of the Optimatic proper, a power supply and the instrument or instruments. As many instruments as are desired may be connected to any Optimatic system, he pointed out, and any one instrument may, by switching means, be used with a number of systems. This permits the installation of relatively low cost indicators for the use of the operators at a number of points on the production line, and these may be used in combination with a recorder which may, at will, be cut in and out of the circuit. Hence, where it is desired to measure temperatures at a number of points along the

line, any one of the Optimatic units may be connected to a recorder or several instruments.

The Optimatic system as described by Mr. Krogh by the use of slides, employs two photocells, connected into a bridge circuit. One of the tubes is exposed to illumination from the hot object while the other is subjected to light from a balancing carbon filament lamp. For the galvanometer usually found in bridge circuits, an amplifying tube is substituted. As the illumination from the hot body varies, the resistance of the photocell exposed to this illumination will change, thus altering the current in the plate circuit of the amplifying tube. This instantaneously increases or decreases the current to the lamp which illuminates the second photocell until the two are again in equilibrium. The lamp current also passes through the instrument galvanometers, the deflections of which are calibrated in terms of temperature.

The general characteristics of the photoelectric cells are similar. The luminosity-resistance curves need not be identical, but should be parallel. The action in this bridge circuit which causes an increase of current in the amplifying circuit with an increase in light to the viewing photocell then will follow a straight line regardless of any difference in the absolute values of the curves. It is this principle which is absent in thermionic devices which use a single photoelectric tube that gives the Optimatic its stability, nullifies such variations in tube characteristics as may occur during service, and permits wide voltage fluctuations of the mill power supply without creating erroneous temperature indications.

DESIGN and operation of the new-type circular ingot heating furnaces in operation at several plants were presented at the opening session Thursday morning by M. H. Mawhinney, consultant, Salem Engineering Co., Salem, O. In tracing the development of soaking pits the speaker pointed out that little development was apparent in the long interval from the introduction of the Siemens principle, except the one-way pits with recuperators which have been popular in recent years. The development of the circular pit also departs from the Siemens regenerative principle, and introduces a number of new concepts to the science of ingot heating or "soaking," the speaker asserted.

The circular furnace is fired from the bottom around a firing ring which is larger in diameter than the charging hold of the furnace. The lining is of nonspall brick, backed up with insulating brick on bottom, sides and cover. The burners fire tangentially around the outside and

the products are vented at the center of the furnace bottom. Those furnaces built to date have been without recuperators, and without any stacks, except low chimneys to exhaust the gases at a level above a man's head.

Automatic Control Used

On all pits automatic temperature control is provided consisting of platinum thermocouple and standard pyrometer equipment. On all gas fired furnaces, ratio control is used to maintain automatically a given fuel-air ratio at all rates of firing. Burners have been of the premix type with resulting clear flame in the furnace.

The cover on these furnaces, he explained, is a refractory dome arch, carried by a self-contained crane, traveling on bloom rail tracks. Both traversing and lifting mechanisms are used to permit lowering the cover into a sand seal, and electrical interlocks are provided to avoid any accidents from improper operation of the controls.

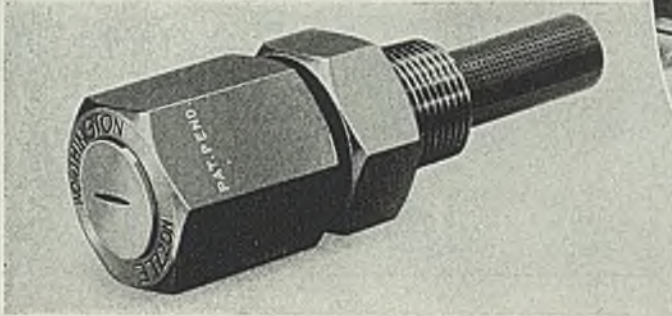
Features include sand sealing of openings, elimination of stacks, atmosphere and temperature control, all of which are standard practice in high temperature heat treating and forging furnaces common to those industries turning out a finished product to close metallurgical specifications. The adaptation of the circular form also results from the uniform heating found to be possible in heat treating furnaces of this shape, where heat circulation is vigorous and where each piece is exposed to the same heating conditions.

IN DISCUSSING the manner in which the refractories industry has organized itself to meet the needs of the steel industry for improved refractories of all types suitable for furnaces of changing design and melting and heating operations of increased severity, L. J. Trostel, chief chemist, General Refractories Co., Baltimore, mentioned that the improved refractories used by the steel industry today have not necessitated resort to new raw materials. This situation has been accomplished by drawing upon the accumulation of data on fundamental properties of the well known refractory oxides and reducing these data to a practical basis. Changes in many of the older unit operations in manufacturing have resulted, such as controlled grain sizing, more thorough incorporation of the plastic bonding materials, de-airing of both stiff mud and dry press batches, increasing the volume stability of the brick, and the application of extremely high molding presses as in the production of unburned basic brick. Increase in bulk density of the finished

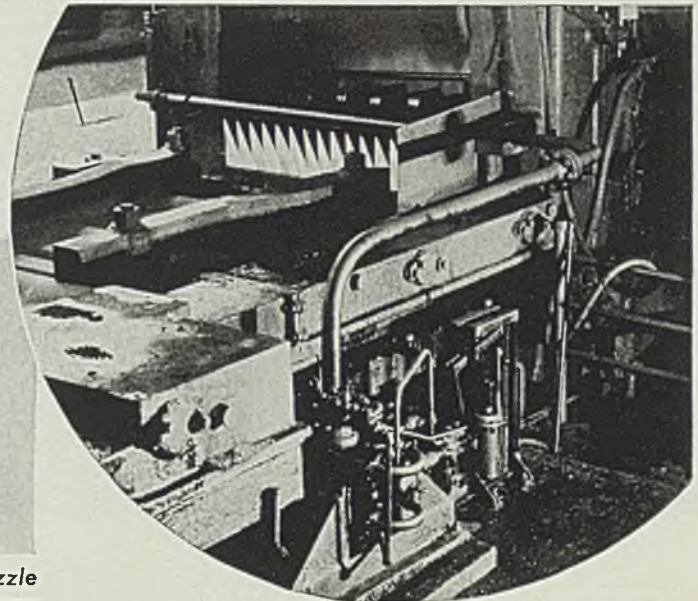
Descaling Systems

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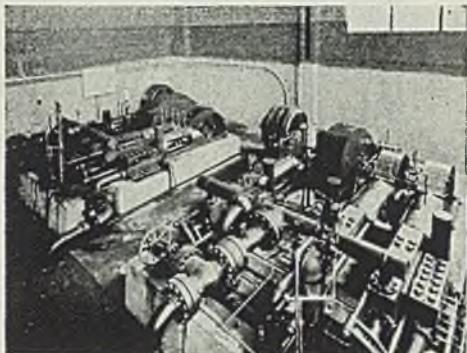
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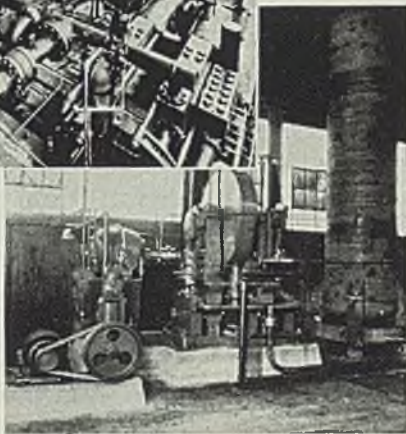
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Application of nozzles for descaling at one stand of a wide continuous strip mill



Two 5 $\frac{3}{4}$ x 18 Worthington Triplex Double-acting Power Pumps. 850 gal. per min., 1000 lb. per sq. in. pressure, serving a 72-inch continuous hot strip mill

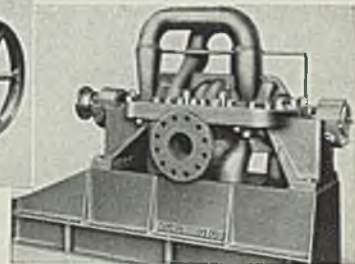


A 4 $\frac{1}{2}$ x 12 Worthington Single-acting Power Pump 150 gal. per min., 1000 lb. per sq. in. pressure, in descaling service

COMplete Worthington Descaling Systems assure uninterrupted operation. Worthington equipment includes a wide range of centrifugal and reciprocating pump units . . . air compressors of every type . . . to meet the exact requirements of any mill.



Worthington Single-tandem Two-stage Compressor for charging hydro-pneumatic accumulator



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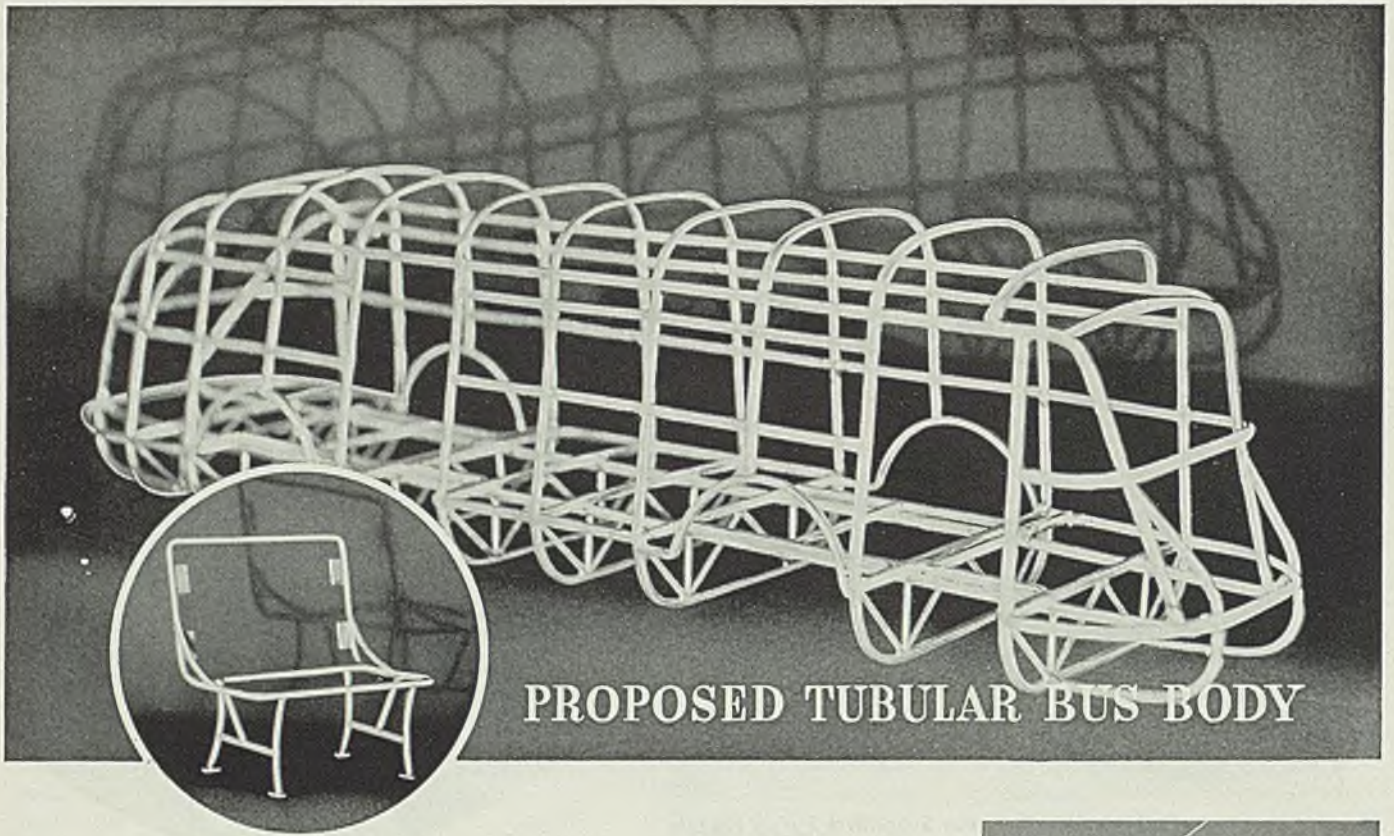
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STEEL

71



PROPOSED TUBULAR BUS BODY

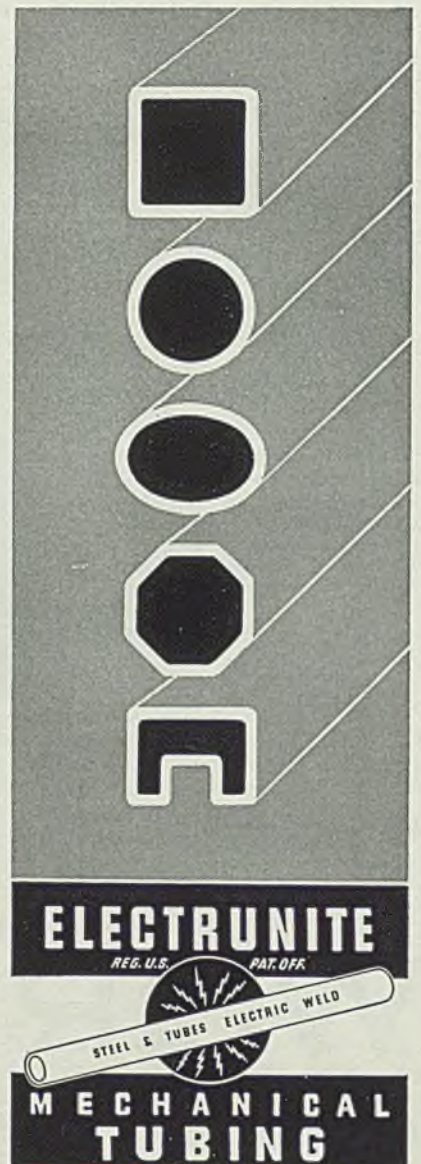
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product has been the objective of most of the processing changes.

Unburned chrome and magnesite brick in the basic class, superduty brick in the fireclay class, highly crystalline aluminum silicate refractories of the sillimanite type, as well as insulating firebrick typify the results of the revised practices of the refractories manufacturers.

Checkers for stoves have been improved by de-airing and frequent changes in design Mr. Trostel stated. The use of superduty fireclay brick offers further opportunities for improvement.

Blast furnace brick made from the Kentucky clays are considered the best from the standpoint of density and workmanship.

Requirements More Rigid

For open-hearth bottoms a high-lime magnesite is one of the new materials available. Furnace banks and tap-hole refractories require better basic materials to meet more rigid requirements of special steels and because of the high temperatures required for these steels.

In frontwall piers, backwalls, corner walls, ports, downtakes, and bulkheads, unburned chrome brick are advantageously replacing silica.

Insulation on the exterior of the open-hearth furnace above the charging floor, the speaker explained, raises the mean temperature of the refractories in use. This increases the severity of the fluxing action of the basic oxides and shrinkage.

For special grades of steel, magnesite nozzles may be advantageously used to replace clay nozzles. Increased pouring temperatures are thus possible, erosion of the nozzle is decreased and more uniform pouring results.

TENSION plays such an important part in modern cold strip rolling that some consideration of its control and the problems involved is certainly warranted. The scientific study of its effects and the perfection of its control may be the answer to many of the perplexing problems at present. Undoubtedly it will play a stellar role in the quest for higher rolling speeds, better gage accuracy and greater production of fine quality strip. This was the contention of F. Mohler, industrial engineering department, General Electric Co., Schenectady, N. Y., who spoke on "Tension Control in Cold Strip Rolling."

With the rolling of wider strips and the taking of heavier reductions, tension has become essential to maintaining a flat smooth strip. The reversing cold strip mill already has taught considerable in regard to the possibilities of tension control. This mill forms an excellent proving

ground because both front and back tension can be varied independently and over a wide range. This mill, asserted the speaker, has illustrated conclusively that much can be done in at least partially compensating for defects in roll shape, lubrication, housing stretch, etc., by properly manipulating the tensions. As a result its importance and necessity generally is accepted at present.

The usual tension reel control consists of a regulator which maintains a constant armature current by controlling the field of its driving motor and slowing it down as the coil builds up. In order to maintain constant armature current the field must be strengthened in exactly the same ratio as the radius of the coil increases. Since the torque of a motor is proportional to the product of armature current and field strength, this means that the torque increases with the radius of this coil and, therefore, constant tension is maintained.

Constant current regulators frequently are used for maintaining a "constant tension" between stands. Offhand it might appear that the same method of control as used for reels is applicable to tandem mills. However, there is a vast difference in the effectiveness of the tension control in these two cases.

Roll Measures Tension

Thus the only way tension can be maintained constant between stands is to increase the tension itself and use this measurement for operating the regulator. A device has been perfected for this purpose, and is in successful operation on the new tandem cold strip mill of the Ford Motor Co.

The device consists of an accurately ground roll, equipped with self-aligning antifriction bearings, each of which is resiliently supported by a pedestal. This preferably is mounted midway between stands and a few inches above the pass line. The strip passes over the roller and presses downward. A small pressure on the roll represents a high tension in the strip.

Any deflection of the roll operates a sensitive air gap transformer which produces a current proportional to the deflection and, therefore, the tension. This is exactly the same principle used in the extremely accurate Electrolimit continuous gage.

For wide mills a pressure detector is placed under each bearing. The sum of the currents from these two detectors represents the total tension which is indicated by an instrument calibrated directly in pounds. This sum also is used to operate the regulator directly. The difference in the currents from these two detectors indicates the difference in the tension between the two edges of the

strip by means of a zero center instrument calibrated directly in pounds.

MEMBERS and guests of the association were taken by special train to McDonald, O., Thursday afternoon where they inspected the Carnegie-Illinois Steel Corp.'s new 43-inch continuous hot strip mill. This mill, as described at the Thursday morning session by L. N. McDonald, general superintendent, Carnegie-Illinois Steel Corp., Youngstown, O., covers an area of approximately 8 acres and has been in operation since December, increasing the finished hot-rolled steel capacity of the Carnegie-Illinois Corp. plants in the Youngstown district by some 360,000 tons annually.

Several novel and unique features are incorporated in the design and operation of the plant (see STEEL, Dec. 30, p. 34) and among these Mr. McDonald cited the large amount of power applied in driving the main mill stands, permitting production of the heaviest coil per inch of width at the highest finishing speed (2000 feet per minute) ever attained on a continuous strip mill.

A.G.M.A. Marks 20 Years Of Service to Industry

(Concluded from Page 55)

cated that a report covering the metallurgy of cast-iron gears probably will be ready before the fall meeting.

The keyway committee advised that it had drafted some involute splines for industrial gears and that these will be submitted at the fall meeting. The inspection committee has undertaken certain changes and corrections in its recommended practice and these will be completed in the near future. The library committee reported a new binder for conveniently binding all recommended practices and reports of the association; these binders will be furnished to the members.

The toothform committee reported that it had completed its work. The bevel gear committee submitted revised recommended practice for computing allowable tooth loads and stresses in spiral bevel and straight bevel gears for industrial applications.

A high spot in the meeting was a dinner in honor of past presidents and "old timers" in the association. This was presided over by George L. Markland Jr.

Jones & Laughlin Steel Corp., Pittsburgh, has perfected a new type spool for barbed wire. The spool has a double-handle safety grip which, when not in use, lies flat and makes the spool easy to load and unload.

Progress in Steelmaking



Rejections Are Decreased

Slow pouring is followed at some English steelworks when making high-grade steel by teeming the first 10 per cent of the ingot at the normal rate, then 80 per cent at two-thirds the rate and the remaining 10 per cent as quickly as possible. Ingots poured slowly are rolled into high-grade sheets and the remaining 20 per cent used for products of less rigid specifications. A large decrease in the amount of rejections is claimed for this method. The slowly poured ingots have greater freedom from scabs, surface blowholes and cracks when either rimming or rising heats are being made.

• • •

Maintains Uniform Tension

Use of gear motors as "drag generators" on reels serving cold strip mills is a new and unusual application. Some tension is maintained in the strip as it is fed into the mill. Tension is imparted by mounting the coil on two steel cones each of which is driven through a shaft by a direct-current gear-motor. When a coil is in

place, the two motors and cones are moved toward each other until the cones are wedged in the coil firmly. The fields of the direct-current machines are excited separately, and controlled by a regulator which responds to the current output from the drag generator armatures, thereby maintaining constant tension in the strip. The power output from the drag generators is transmitted through a motor generator to the alternating-current power system.

• • •

Coating Affords Protection

Full annealing of both medium and high-carbon steels with the utmost protection against oxidation or decarburization of the surfaces now is accomplished by coating the surface with silver, according to tests recently conducted by the bureau of standards. Polished mild steel surfaces bearing finely engraved designs may be coated with a thin electrolytic deposit of silver, annealed, and the silver stripped electrolytically, leaving the steel surface in practically its initial condition. Electroplated silver also has been used to protect rather thin section, high-

carbon steel pieces during annealing with the assurance that the insolubility of silver in iron will prevent modification of the chemical composition of the steel by the penetrating of the silver.

• • •

Decreases Surface Action

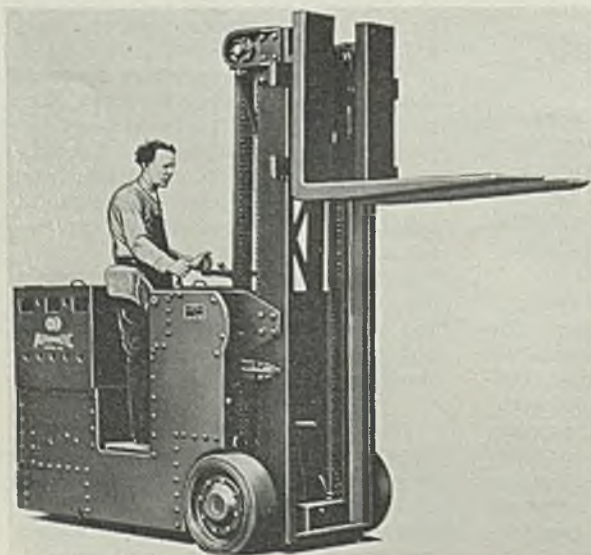
Refractory cement, which has excellent bonding properties and yet is so constituted that it will be absorbed slowly, has been announced. In applications where a coating is desirable to decrease surface action, such as flame impingement, this new product should increase the serviceability of insulating firebrick.

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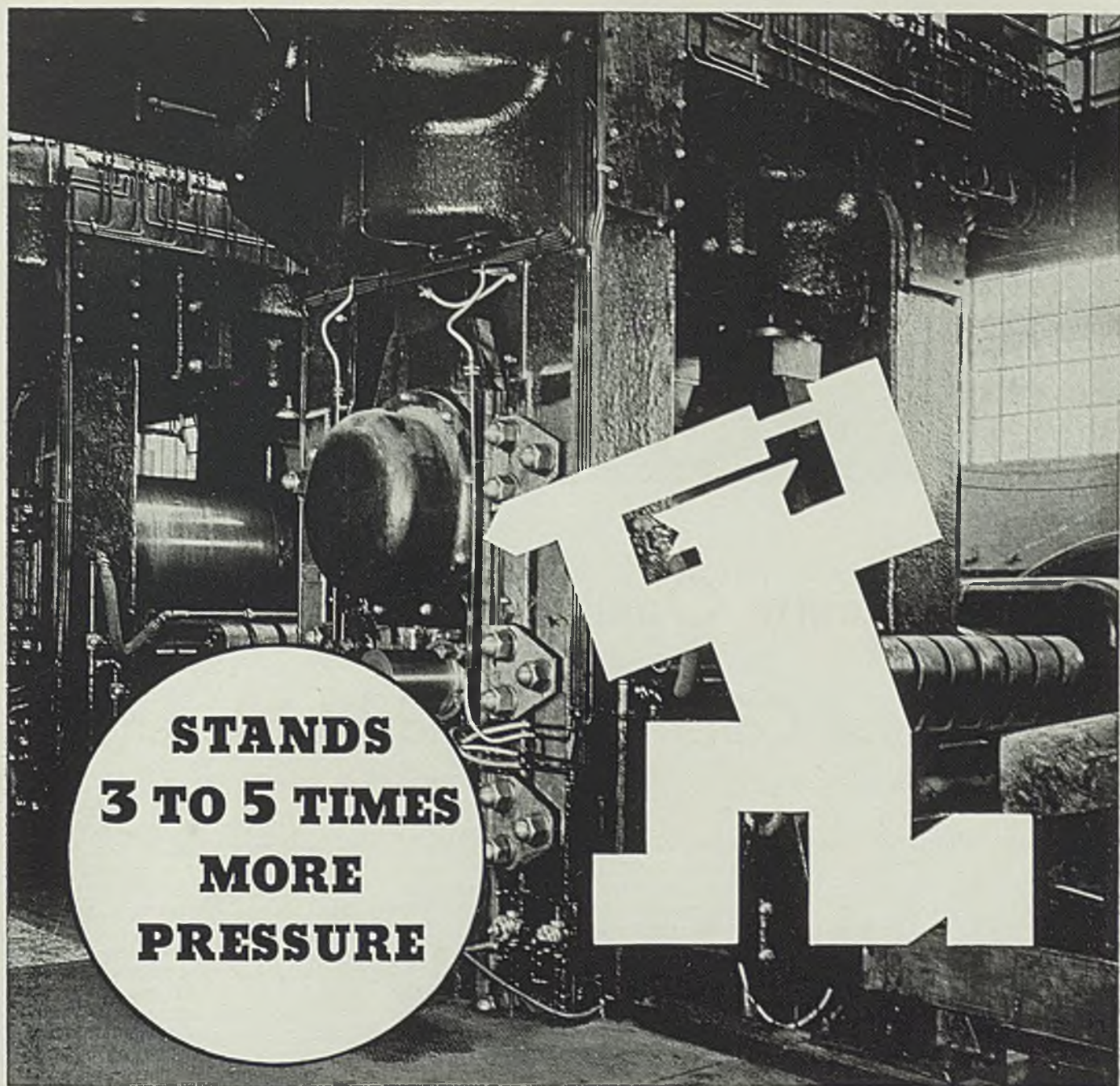
Affords Uniform Coating

Coloring all grades of iron and steel a uniform jet black including strip, sheet forgings, tempered steel and malleable castings, now can be accomplished by a recently developed process. The objects first are degreased, rinsed in water, pickled to remove the scale or rust and rinsed again.

Center Control Fork Truck Is Designed To Tier 5-Ton Loads



BUNDLED steel, tin plate, sheets and other heavy bulky types of material weighing up to 10,000 pounds and not exceeding 72 inches long are handled economically and rapidly by a newly developed heavy duty center controlled tiering fork truck. Bundles of steel are taken from the receiving platform to storage where they are stacked three or four bundles high. The unit will operate in 94-inch intersecting aisles. A new center control feature, it is claimed, gives the truck the shortest turning radius of any truck of this capacity in the industry. Greatest efficiency and tractive ability on ramps or slippery floors are afforded by reason of the front-wheel drive. The capacity of the truck, its high stacking feature and ability to negotiate narrow aisles effect an increase in storage space and minimize the number of trips per day. The unit is manufactured by the Automatic Transportation Co., Chicago



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are not subject to
cracks and bulges as a
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Open-Hearth Operators Review Progress In Furnace Construction and Maintenance

THIS year's meeting of the Open-Hearth committee of the American Institute of Mining and Metallurgical Engineers, the nineteenth conference, held at Hotel Statler, Detroit, April 16 and 17, was the best attended meeting since the inception of the group. Total registration was 255.

More questions on open-hearth furnace practice as followed in various steelmaking shops in this country were discussed at the three sessions than in previous meetings. A different procedure in presenting questions on steelmaking won wide acclaim. Each session started with the presentation of paper by an authority, introducing the main theme to be discussed from the floor.

Friday afternoon about 100 members and guests visited the open-hearth department and a portion of the foundry of the Ford Motor Co., Dearborn, Mich. In the evening an informal fellowship dinner was held at which "Mike" Grady, Pennsylvania Railroad philosopher, was the principal speaker.

Production Practice

IN DISCUSSING a shallow and deep bath for best economy in melting steels at the opening session, W. C. Buell Jr., engineer, Cleveland, classed a shallow bath as being 35

inches deep and anything greater as a deep bath. Owing to small resistance of molten metal to flow of heat, the speaker pointed out that the deep bath may be worked almost as fast as a shallower bath providing an appropriately greater heat release is secured above the bath surface. This indicates a greater unit tonnage production, a lower fuel rate per ton, but higher rebuilding and maintenance costs as to release more heat requires forcing of the firing rate.

In the speaker's opinion the deep bath is unnecessary and probably undesirable unless a furnace is to be forced for production. Considerable data, Mr. Buell asserted, support his opinion that the lowest ultimate ingot cost will be found with shallow baths.

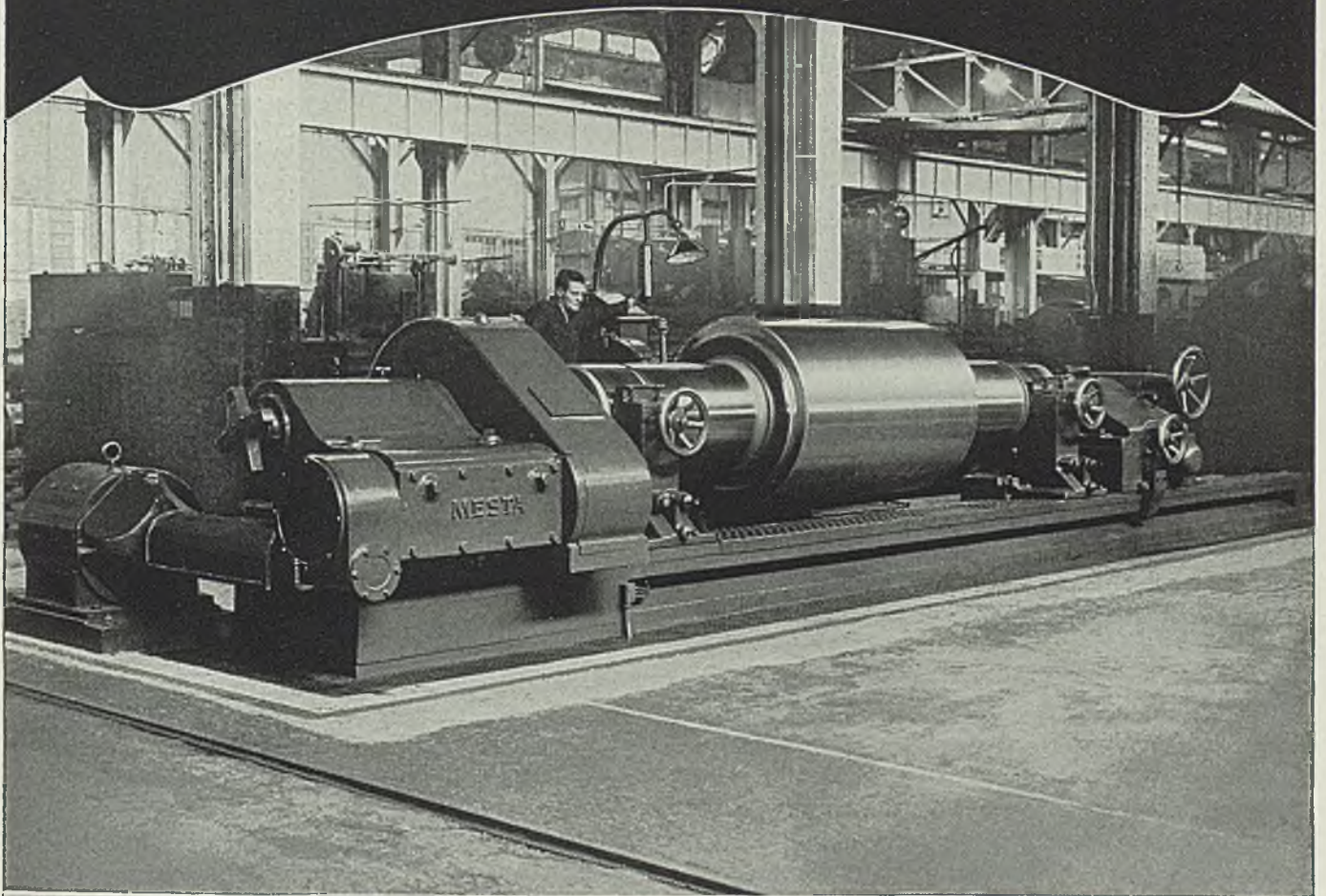
A steel plant engineer in discussing open-hearth furnace design mentioned that the size of the hearth is a factor on which the rated capacity of a furnace is based. It is customary, he pointed out, to rate furnaces on the basis of $5\frac{1}{2}$ square feet of hearth area per ton of capacity. This gives a maximum depth of bath of about 28 inches at the center of the furnace. Other dimensions of the furnace proper, he explained, largely are determined by the combustion space required and the space needed to accommodate scrap charges.

The speaker mentioned that the

uptakes must be large with low gas velocities in order to prevent excessive cutting of the end bulkheads. Slag pockets, he warned, must be large enough to reduce the velocity of the waste gases to about 1500 feet per minute so that most of the slag will be thrown out and not carried over into the regenerators. Additional size beyond this minimum requirement, the speaker explained, increases the time between periods when slag must be cut and may make it possible to increase the heats per furnace run.

A NEW development in open-hearth furnaces was brought to the attention of the open-hearth furnace group by Emil Vierow, combustion engineer, Alan Wood Steel Co., Conshohocken, Pa. By the use of slides thrown on the screen, the speaker described a combined furnace and air burner port which is provided at each end of the furnace port. The design shows auxiliary outlets provided at each end of the furnace chamber interiorly disposed to the burner ports. These auxiliary outlets, he explained, have no connection with the burner ports or their corresponding regenerators. In accordance with the new method of furnace operation, the products of combustion are conducted from the

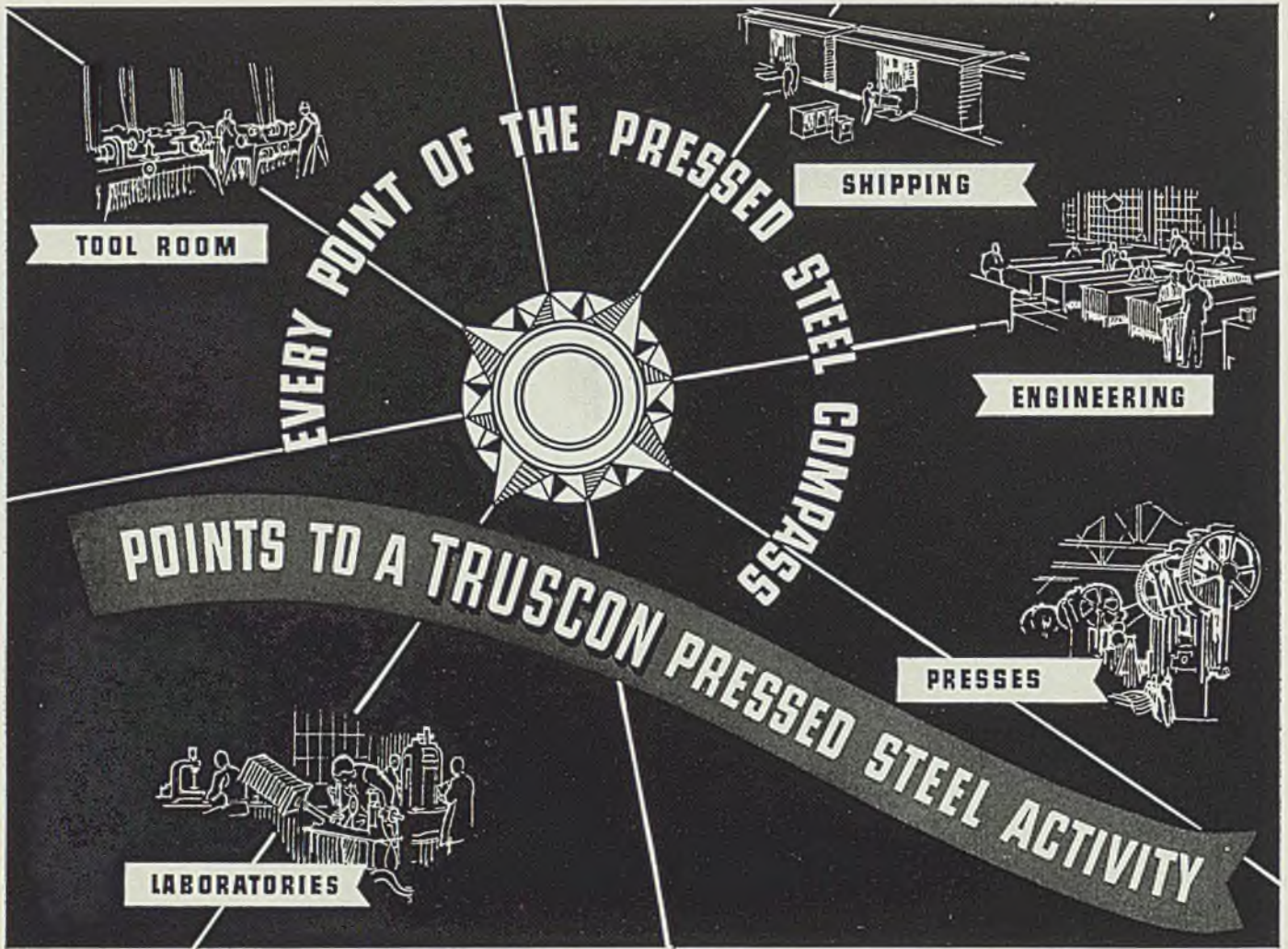
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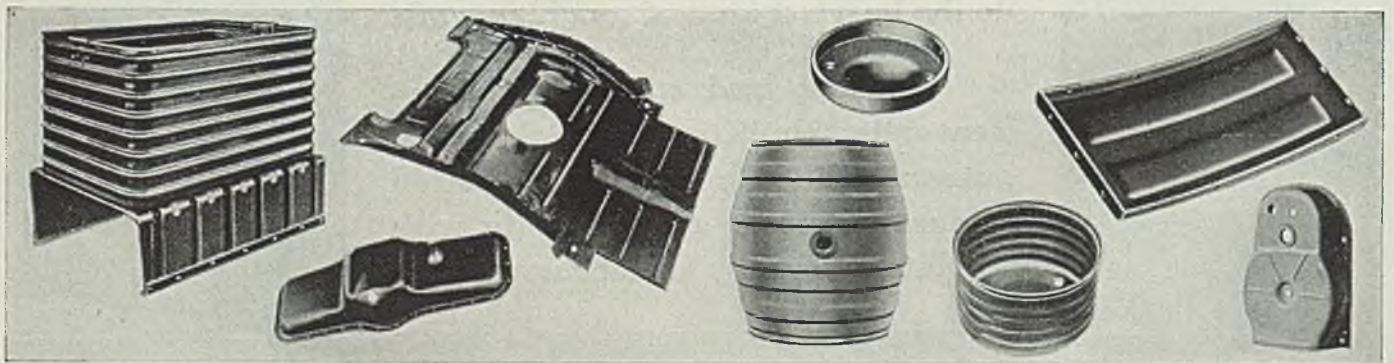
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furnace chamber through the burner ports and corresponding regenerators at a predetermined limiting rate.

The speaker pointed out that by the new construction and operation, the time of melting the furnace charge can be reduced materially if a blowpipe burner action and an increased flow of fuel and air are practically obtainable during this period. Also the working and refining period can be shortened if a better controlled flame is available.

Much More Economical

He estimated 1½ hours reduction in the time of the heat should be accomplished and that better than 20 per cent increased speed of melting should be attended by less oxidation of the charge. With the new practice, Mr. Vierow maintained, a relatively lower steam pressure can be employed for atomizing tar without sacrificing flame control because of the relatively higher air velocities available in the burner ports.

He estimated the probable performance of a 150-ton furnace of new construction and operation compared with a modern conventional practice as follows: 14 per cent increase rate of production; 1 per cent increase in the yield; 40 per cent increase in the furnace chamber life and a 50 per cent increase in the life of the downtakes, fantails and regenerators.

In discussing the Rose-type port an operator whose furnaces are so equipped pointed out that he is able to obtain longer campaigns with low fuel consumption compared with former practice. He mentioned that clogged checkers can be cleaned readily and that these ports afford control of the flame velocity and direction. He explained that this type of construction gives an open-end furnace and reduces the velocity of the waste gases and the burning out of the inpanel.

Statistics Shown

The running expense per ton of metal on one furnace was cited as 0.0397c, on another furnace 0.0461c and on a third furnace as 0.0385c. An all cold metal charge is used on 20 per cent of the alloy steels made at this plant and all hot metal charges are used on at least 40 per cent of the special steels tapped. The metallic charge includes 38 per cent metal and 62 per cent scrap. Production depends on the grade of steel being made, but the speaker pointed out that this averages from 8¾ to 11½ tons per hour. All furnaces are insulated with 4½ inches on the roofs and 1½ inches on the sidewalls. The checkers are insulated and incased in steel. All gas is preheated and no burnt lime is used excepting that necessary for shaping up the slag at the end of the heat. From 6½ to 8 per cent raw limestone is used

LOCAL sections of the Open-Hearth committee of the American Institute of Mining and Metallurgical Engineers will be formed before September in Cincinnati, St. Louis, Chicago, Pittsburgh, Philadelphia and Youngstown, O. Officers will be elected for each group. All employes of steel companies interested in steelmaking problems are invited to join the group in their respective district

depending on the grade of steel being made.

Checkerwork

GEORGE DANFORTH, Open Hearth Combustion Co., Chicago, in speaking on "Open-Hearth Checkerwork Design" pointed out that the important feature to incorporate in checkerwork design in order to gain the best overall results in the regenerator chamber are: First, total mass of brickwork for maximum heat storage; second, maximum brickwork surface should be exposed to the flow of gases so as alternately to absorb the greatest possible amount of heat from the waste gas and to heat comparatively cold incoming gases; third, passageways throughout the checkerwork, necessary for a sufficient free flow of gases, yet so arranged that the gases properly contact the exposed surface of all the brick mass provided; and fourth, reasonable cost of maintenance.

The speaker, in discussing a newly devised system of checkerwork which can be used in single or multiple pass regenerators, pointed out that rider walls are spaced unusually far apart to afford ample working space for removing flue dust when the furnace is relined. Arches 4½ inches wide and 9 inches deep are extended between the rider and chamber walls and securely locked in place by deeply notched tile which rest upon and extend well below the tops of the rider arches.

He explained that 70 per cent of the checkerwork then is laid with 9 x 4½ x 2½-inch brick having the lower corners notched 1 x 1½ inches to interlock with the brick immediately below. This construction reduces the size of the horizontal passageways between the vertical flues which are 6½ inches square. With the interlocked brick, two courses of brick are laid in to a height of 7 inches instead of 9 inches which would be necessary if the brick were not notched. This provides more brick and exposed surface.

The top 30 per cent of the checkerwork, the speaker pointed out, is

laid with standard brick 9 and 10¼ inches long by 4½ inches deep and 2½ inches thick.

Wells have been used extensively, the speaker stated. At one plant nothing was done to the checkerwork during the furnace campaign averaging over 400 heats, and at the end of the campaign it was not necessary to employ full opening of air valve or full power of the furnace stack.

The top 30 per cent of the checkerwork takes the severe service. This portion, he explained, is laid with standard shapes, purchased at or near 9-inch base price, and these brick are reclaimed. During the furnace relining period, the top 30 per cent checkerwork is removed for replacement or relaying. This gives ample headroom for the work of cleaning the surface of the structure below and wide and normal height of spaces between the rider walls makes it easy to remove flue dust.

Copper Molds and Stools

HB. KINNEAR, metallurgical engineer, Battelle Memorial institute, Columbus, O., in presenting a resume of copper molds and stools pointed out that the first copper stool to be used under ingot molds has been in service 1822 heats. It weighs 8330 pounds and has received a gross tonnage of ingots amounting to 6012 tons. From this beginning, the speaker stated, the copper stool movement grew to 425,000 pounds in 1934 with an additional 50,000 pounds of copper used in the form of inserts.

During 1935 copper used for stools has increased to 350,000 pounds, making a total of 775,000 pounds now in use for this particular purpose. During this time the use of copper for inserts has increased 350 per cent to a total of 230,000 pounds.

Fire Cracks Retarded

In testing the behavior of four new molds placed on copper stools until they had to be scrapped, it was found that they had received 181 heats or an increased life of 125 per cent. The average mold life on cast iron stools at this plant was 80 heats, the speaker asserted. Stools on which these tests were run have received up to the present 805 heats, amounting to 2656 gross ton of ingots per stool.

At some plants it has been found that fire cracking may be retarded materially by peening over the small cracks before they become harmful. At one plant this practice is followed and after 50 heats the surface is gone over and all cracks closed. At another plant the practice is to send the stools to the machine shop and plane off the top and bottom surfaces if excessive fire cracks occur, using the copper so removed as furnace

additions when melting copper-bearing steels.

Due to the rapid strides made by copper steels and copper cast irons most steel companies now making some grade of steels and irons containing copper and most users of copper stools prefer to employ their scrap stools as alloy additions and thus avoid a double conversion charge of \$12 a ton as well as double freight charge of around 70 cents to \$1 per hundredweight. The increase in mold life due to copper stools was cited by the speaker as 50 per cent.

Using these data the cast iron stool cost per ton of steel produced on it is around 5 cents. The mold cost per ton of steel, if the mold is set on an iron stool, is around 15.7c and if on a copper stool 10.4c per ton, or a saving due to 50 per cent in the mold life of 5.3c per ton of steel produced.

After the copper stool has been used for a sufficient number of heats to cancel the first cost at the cast iron stool rate of 5 cents per ton, the total saving resulting from the use of copper stools amounts to 10.3c per ton of ingot, that is, 5.3c for increased mold life and 5c for iron stool cost and after deducting 2.3c per ton as the interest charge on the stool investment, this saving stands around 8c per ton of ingots produced.

If the copper stool is used up at the plant after it is scrapped, the speaker stated that about 305 heats will be required to break even with an iron stool; if the copper is returned to the refinery 730 heats will be required to break even, without crediting anything for increased mold life.

In conclusion Mr. Kinnear said that while the practice is relatively new it is well established; the tonnage of copper used for molds and stools has increased appreciably with extensive effort. A marked increase in the mold life has resulted from this development and in the speaker's opinion the future seems promising.

Mold Maintenance

FEWER corner cracks appear on ingots cast in round fluted molds than when plain molds are used according to an open-hearth operator in discussing the merits of corrugated and plain molds. At another plant where 20 x 20-inch molds are used on 0.15 to 0.25 per cent carbon steels, corner cracks have been reduced materially by using corrugated molds. At another plant where this type mold is in service a decrease of 1 to 2 per cent in inspection cost has been obtained. While less snakes and corner cracks are obtained by the use of corrugated molds one operator pointed out that plain molds outlast corrugated molds 1½ to 1. Snakes are due to the

THE 1937 annual conference of the Open-Hearth committee will be held in Birmingham, Ala. Sessions will be held Wednesday, Thursday and Friday in April, the date to be announced later

pouring conditions and it makes little difference whether corrugated or plain molds are used, asserted another operator.

The successful coating of molds with tar depends to a large extent on the temperature of the mold. At one plant where all molds are coated with this material the exterior temperature of the molds ranges from 350 to 370 degrees Fahr. and the interior temperature 440 to 460 degrees. A representative from this plant cautioned that the tar should be changed at least every 24 hours inasmuch as the longer the tar is used the thicker the coating on the molds. The speaker pointed out that at his plant all molds are sprayed with tar which is maintained at a temperature ranging from 150 to 170 degrees.

Cinder Pots

WILLIAM JOHNSON JR., president, Steel Industries Engineering Corp., Pittsburgh, in speaking on "Steel Cinder Pots" pointed out that in the Johnson-type corrugated cinder pot (see illustration on p. 76) no attempt has been made to limit or resist the forces of expansion or contraction due to ultimate heating and cooling action. In fact, he stated, the purpose of the corrugation in the walls is to provide flexibility and permit the walls of the pot to expand and contract freely circumferentially with extreme changes in the temperature. Vertical corrugations, he explained, have inherent advantages of providing a sidewall in the pot, which in the vertical direction is structurally stronger than usually provided. Corrugated pots, he contended, give much longer life and will not develop bulges or cracks as a result of repeated and severe temperature changes.

Sidewalls, he explained, are uniform in thickness, and in the spherical bottom the thickness is increased an inch and sometimes more to take care of the erosion caused by the turbulent action of the cinder as it first flows into the pot.

In research work in connection with cinder pots, the speaker found that stresses imposed on a pot by the weight of the slag or cinder carried by it, were insignificant compared to the thermal stresses set up in the sidewalls caused by the difference in temperature between the outer and

inner surfaces of the wall of the pot. All conventional designs of cinder pots bulge inwardly after being in service for a short period of time, the speaker asserted. This inward bulging is caused by a phenomenon known as negative creep. The latter is the difference between the increase in circumferential length of a pot at its inner and outer surfaces and this increase is greater at the inner surface than at the outer, he explained.

In the corrugated pot the negative creep is compensated for by shaping the walls so that stress caused by the temperatures existing at the inner and outer surfaces of the walls of pot is reduced. This reduction is obtained by or as a result of flexibility which the corrugations give the sidewalls.

It can be demonstrated by calculation and verified by actual measurements, Mr. Johnson stated, that a cinder pot without corrugated walls and having a diameter of 100 inches in the region of the bail ring, having a temperature of 1000 degrees Fahr. at the outer surface and a temperature of 1104 degrees at the inner surface, the diameter of the pot will decrease as much as 9 inches over a period of 3000 hours where thermal stress is 10,000 pounds per square inch.

An open-hearth operator using corrugated cinder pots places the life of this type pot from 8 to 10 years, based on practice at his plant. The life of cast iron cinder pots, he pointed out, ranges from 2 to 2½ years at his plant. He suggested replacing the circular bottoms of corrugated molds with a flat bottom in order to eliminate sticker trouble.

Refractories, Insulation

THE iron and steel industry consumes about 50 per cent of current refractory sales in dollars, according to J. D. Sullivan, Battelle Memorial Institute, Columbus, O.

Perhaps one-third of the refractory bricks made go into open-hearth furnaces in this country.

In discussing the most important types of refractories going into various parts of the open-hearth furnace Mr. Sullivan pointed out that up to about 10 years ago magnesite brick were used almost exclusively in building new bottoms but today, because of the cost, they have been replaced with chrome bricks. Other major changes in open-hearth bottoms cited by the speaker include the substitution in some cases of grain chrome for hearths of grain magnesite, and insulation between the metal shell and fireclay lining.

During the past decade there has been an increase in the roof life largely because of insulation and mechanical control of combustion, Mr. Sullivan asserted. To this may be added the possible increased life



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The tendency in backwall construction, he stated, has been to replace silica brick with basic or neutral brick with a resultant great increase in the life. While perhaps a majority of frontwalls still are constructed of silica brick, he pointed out that the tendency is to change to basic or neutral brick because experience generally has shown that the life at least is doubled. Sloping walls also have increased the wall life materially.

The speaker explained that the tendency in bulkhead construction has been to replace silica brick which ordinarily give a life of around 100 heats with basic or neutral brick which usually give a life of 500 or more heats. Mechanical control of combustion and port design also have been important factors in increasing the life of refractories.

In dealing with checker chambers Mr. Sullivan brought out that the tendency during the last two or three years has been to employ super-fire-clay brick at least for the upper course. These, he pointed out, are denser, more refractory and have less tendency to spall than high-duty fireclay brick. Insulation to prevent air infiltration and to conserve heat and mechanical control of combustion has increased checker life.

There is a crying need for a good ladle brick, the speaker stated. On an average, approximately two ladle bricks are consumed per ton of steel and one of these actually dissolves in the metal and slag.

The chief recent advances in fire-clay nozzles lies in the production of nozzles of increased refractoriness without sacrificing the slight softening needed at the pouring temperature to maintain a proper seat for stoppers. Magnesite nozzles and stoppers now are used to a limited extent in teeming certain quality steels, the speaker stated in conclusion.

Insulation Practice Not Uniform

From some 30 steel ingot and steel foundry companies, which operate several 100-ton open-hearth furnaces it is evident that the application of insulation is by no means uniform as to the extent of its use on a furnace. This fact was brought out in a paper by E. F. Cone, editor, *Metal & Alloys*, New York. Many apply it only to checkers, others to checkers and other parts except the roof. Many companies use insulation on the entire furnace. From the analysis of reports submitted by Mr. Cone more benefit is obtained when insulation is extensive rather than only partial, though there are beneficial results in all cases.

Advantages of insulation which are most important center in the effect on the life of the furnace and in savings in fuel consumption, according to the report. One company

WITHIN the next year a questionnaire on fuel consumption will be mailed to all members of the committee in order to secure a basis of comparison of fuel practice

cited an increase of 30 per cent in the furnace life with insulation complete. A small steel casting company reports an increase in the life of approximately 20 per cent with the entire furnace insulated. A large plant producing ingots states that the increased life of the brickwork has been from 10 to 15 per cent with insulation complete. Another open-hearth plant reports insulation on the entire furnace has cut the cost of refractories in half. Still another company reports anywhere from no benefits to moderate increase of furnace life.

Temperature Measurement

BY MEANS of the carbon-silicon carbide thermocouple, liquid metal temperatures have been found to vary much more than was previously supposed according to Dr. G. R. Pitterer, lecturer on ferrous metallurgy, University of Pittsburgh, Pittsburgh. The most important economic discovery by means of this type thermocouple is that the life of an ingot mold is determined largely by the temperature at which the mold itself was cast.

In determining the effect of pouring temperature upon the life of ingot molds, the speaker explained that temperatures of small 20-ton ladles just before pouring into the molds were used. These temperatures vary from 2160 to 2500 degrees Fahr. The only molds which can be used for a study of this sort, the speaker stated, are those which gradually wore out in service, that is, the walls of the mold gradually became pitted to the extent that the mold had to be discarded. Molds with cracked sides and bottoms follow similar trends to the worn out molds but are more erratic because of some unusual conditions met by them in service.

Nozzle Performance Discussed

In discussing the construction and performance of nozzles one operator pointed out that in using a magnesite nozzle with a graphite head the steel poured a little hotter than is the usual practice. This, he pointed out, will give better pouring results than steel poured a little on the cool side or cool enough to leave a skull around the nozzle or bottom of the ladle. One of the most important items to remember for pouring control, the speaker emphasized, is the use of a stopper rigging that has no

lost motion. This not only effects an ideal control of the stream of metal going into the ladle but assures proper setting of the stopper.

Many open-hearth operators who employ a carbometer in their shops reported satisfactory performance. At one shop in the Pittsburgh district where this instrument is employed for determining carbon of 0.35 per cent and over, ideal results are obtained. One speaker pointed out that this instrument is more difficult to operate on acid steels than on basic steels. He pointed out also that alloys in the bath have no effect. Consensus of opinion is that this instrument checks the percentage of carbon in the steel within 2 points.

Residual Metals

IN REPORTING the results of the study of residual metals in open-hearth steel for the period February through December, 1935, inclusive, it was pointed out that 18 plants with an average capacity of 8,000,000 tons co-operated in the current period. The average of all plants by tonnage capacity, shows nickel and chromium remaining constant, a slight increase in tin, a decrease of two points in manganese, and an appreciable drop in copper. The average by plants, shows an increase of one point in manganese, a slight increase in tin, a noticeable increase in chromium, a noticeable decrease in nickel and an appreciable drop in copper.

An interesting experience with the use of antimony in a heat of steel was described by an Ohio open-hearth operator. A low-carbon heat was tapped in July, 1935, which gave off yellow fumes and had a low mold action. On account of its high critical range the steel could not be rolled. Inspection of the scrap disclosed buttons ranging from 6 to 14 inches in diameter and weakly magnetic. Two additional low-carbon heats were tapped which had the same characteristics. Quantitative tests of the heats and the cast iron showed the following results:

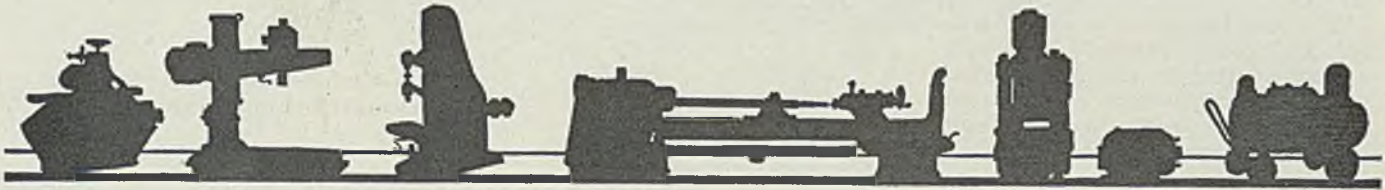
Element	STEEL		
	Heat No. 1 per cent	Heat No. 2 per cent	Heat No. 3 per cent
Sulfur	0.085	0.063	0.034
Antimony ...	0.86	0.49	0.15
Tin	0.028	0.033	.....
Arsenic	0.045	0.035	0.018

Element	CAST IRON		

Sulfur	4.65	.....	.....
Antimony ...	32.52	32.38	24.17
Tin	1.05	.....	.....
Arsenic	1.55	1.18	0.79
Lead	5.49	.....	4.05

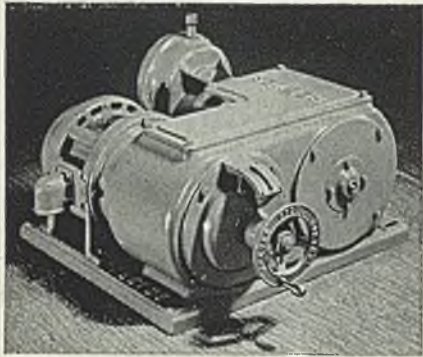
The heat containing 0.15 per cent antimony could be rolled although the surface checked badly, the other heats containing 0.49 and 0.86 per cent antimony could not be rolled into slabs or blooms because of the steel breaking up.

New Equipment



Vari-Speed Motodrive—

Reeves Pulley Co., Columbus, Ind., has developed a unit that combines in a compact, self-contained enclosure any standard make of constant speed motor, variable speed control mechanism, and (where required) speed reduction gears. Speed variation as provided by the unit, shown here-



Reeves Vari-Speed Motodrive

with, is infinite between predetermined limits. Merely by turning a convenient handwheel any desired speed within the range is made smoothly and quickly available. A dial indicator registers speeds on a scale calibrated from 1 to 6.

The Motodrive, as it is known, combines features of both the variable speed transmission and the vari-speed motor pulley made by the company. The drive is available in two designs—horizontal and vertical. Each is built in four sizes which take motors from $\frac{1}{4}$ to $7\frac{1}{2}$ horsepower capacities and which cover speed ratios from 2:1 through 6:1. Reduction units of helical gear type in ratios up to and including 189:1 may be incorporated in the drive.

Fuse for Use Under Oil—

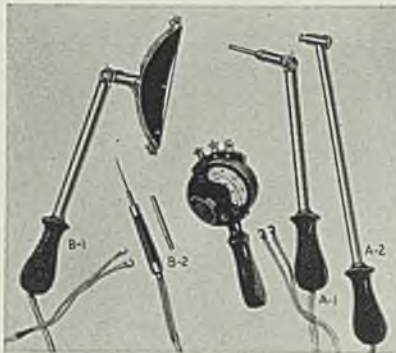
Rowan Controller Co., Baltimore, recently placed on the market a new fuse that has been especially designed for use under oil in the company's oil immersed control equipment. Air-Seal fuses, as they are known, are supplied for 250 and 600-volt operation in all standard sizes from 30 to 400 amperes. This

equipment finds wide use in hazardous and corrosive areas of chemical plants, steel mills, coke plants, etc.

♦ ♦ ♦

Pyrometers—

The Pyrometer Instrument Co., New York, has placed on the market a new set of combination surface and needle pyrometers which is unique and which will find universal application in many industries like die casting, plastic molding, rubber processing, paper, textile, electrical, metallurgical, glass, pottery and many other industries. According to the manufacturer there are few industries or shops where the new Pyro universal set cannot be used to advantage. By merely interchanging the various types of thermocouples, shown in the accompanying illustration, the instrument is transformed into four different types of surface and needle pyrometer. The new indicator is



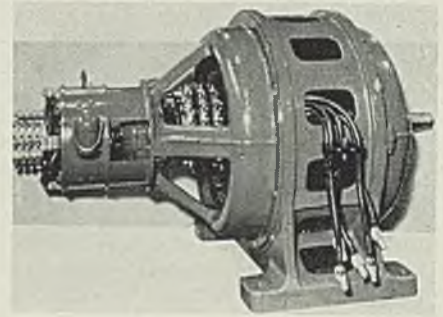
Combination surface and needle pyrometers introduced by Pyrometer Instrument Co.

equipped with Pyro patented clamping device whereby contact and reading of actual temperatures no longer have to be made simultaneously,—the indicating needle will stay fixed at the correct temperature indication.

♦ ♦ ♦

Synchronous Motor—

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., recently built what is claimed to be the largest low-inrush and high-torque, high-



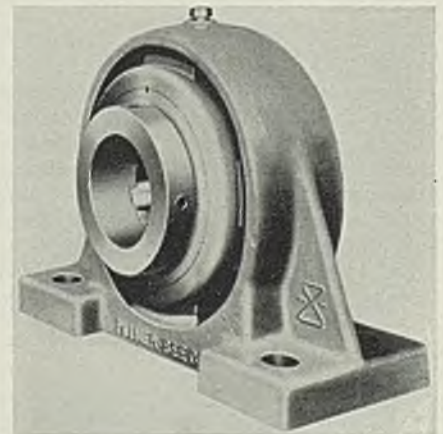
Westinghouse synchronous - induction motor rated 500 horsepower

speed synchronous motor yet built. It is of the synchronous-induction type, rated 500 horsepower, 440 volts, 3-phase, 60 cycles, 900 revolutions per minute. The unit, shown herewith, is started as a wound rotor induction motor with resistance inserted in the secondary. This resistance is cut out as the motor accelerates. When the motor is up to speed, excitation is applied through two legs of the secondary winding and the motor pulls in and runs as a synchronous motor with 80 per cent leading power factor, this assisting to correct the power factor of the line.

♦ ♦ ♦

Pillow Block—

Palmer-Bee Co., Detroit, has developed a self-aligning pillow block to simplify alignment of shafts and to take care of light or heavy shock



Palmer-Bee self-aligning pillow block

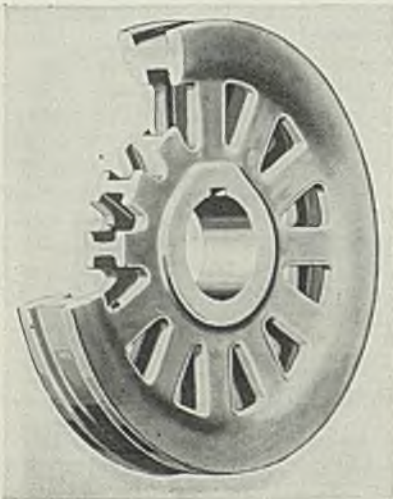
loads at either high or low speed. A feature is its ability to withstand a greater shock load than a shaft of corresponding diameter. This is attributed to its cast steel housing construction.

The bearing operates on a true ball and socket principle, inasmuch as the housing is machine finished to a spherical surface and fit that permits a free oscillating movement of about 3 degrees maximum in any direction and at the same time maintains an unbinding accurate alignment of shafts. The pillow block is mounted with a Hyatt heavy duty precision bearing in a machined finished housing made dust and dirt proof.

The block is ideal for installation in places not readily accessible to maintenance men, since lubrication is required only a few times a year. This block is available from stock in all standard shaft sizes for all types of service. Special sizes may be had on short notice.

Double Wall Crane Wheel—

American Manganese Steel Co., Chicago Heights, Ill., has developed a double wall crane wheel designed to obtain full advantage of the char-

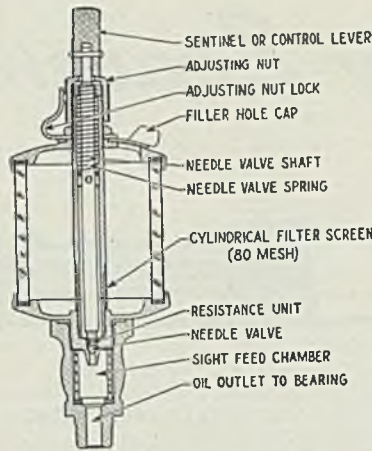


Crane wheel designed with double wall by American Manganese Steel Co.

acteristics of 13 per cent manganese steel and to eliminate the possible breakage of the web. The walls are continuous with the flanges, giving them a strong but elastic support and high resistance to side thrusts. They are integrally tied together with internal cross spokes. Metal sections are equalized.

Microflow Oil Cup—

Alemite Corp., Chicago, is introducing a Microflow oil cup that is particularly adapted to bearings

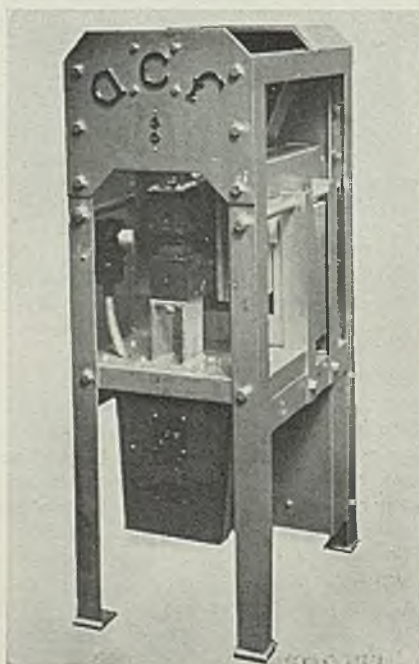


Alemite oil cup embodies device for fine adjustment of oil flow

which require a continuous flow of oil in small, adjustable quantities. This cup, shown herewith, is fitted with an entirely new device, a resistance unit, which permits a fine adjustment of oil flow and assures positive operation by preventing clogging. The large opening in the discharge valve assures an unhampered flow of oil which has been strained of foreign particles by an 80-mesh screen. The grooved cylindrical plug, through which the oil must pass to reach the valve, can be adjusted to such a degree that the flow of oil can be made extremely minute, yet constant.

Vertical Heater—

American Car & Foundry Co., 30 Church street, New York, has brought out a vertical unit for heating slugs of various sizes and dimensions. Temperature of the piece be-

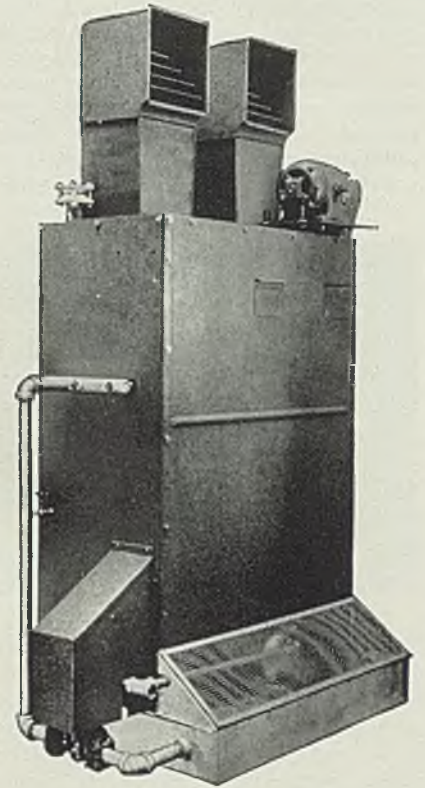


Vertical heater built by American Car & Foundry Co. for heating slugs

ing heated is controlled by an electric eye. The lower electrode is stationary, while the upper element is operated by two-way air cylinders. This heater, shown herewith, is available with one to five electrodes.

Water Economizer for Air Conditioning Systems—

York Ice Machinery Corp., York, Pa., recently brought out an economizer designed to reduce water consumption of air conditioning systems. It is a combination forced draft cool-

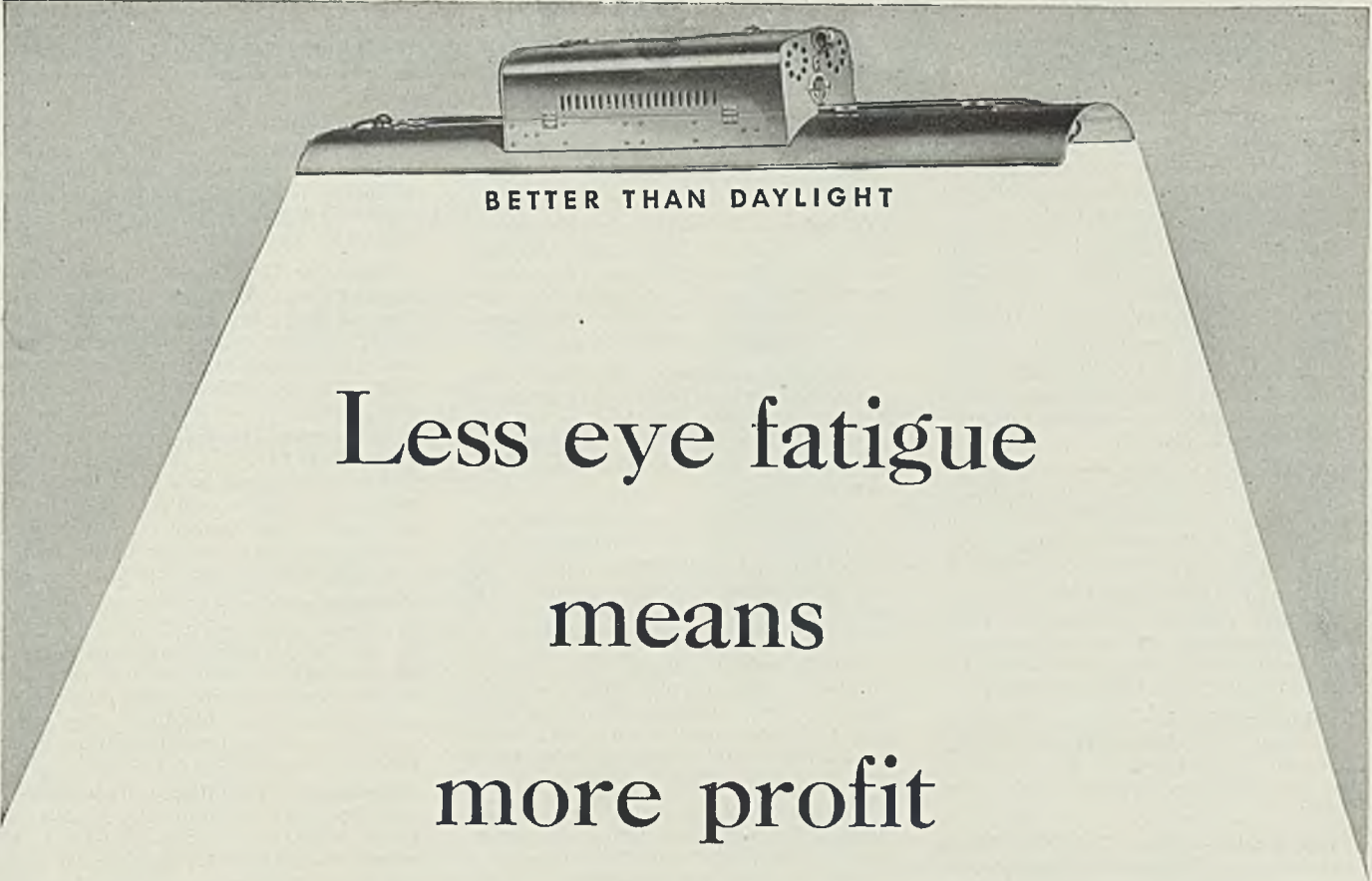


York economizer reduces water consumption of air conditioning systems

ing tower and refrigerant condenser, arranged either for indoor or outdoor installation. Continuous evaporation of water pumped over the coils is replenished automatically by a float valve. The unit, shown herewith, is built in a number of standard models with capacities of 3 to 50 tons of refrigeration.

Disconnect Switch—

Delta-Star Electric Co., Chicago, recently developed an oil immersed 15 kilovolt disconnect switch. The design provides necessary safety features, rugged construction, and flexibility in application. Being water-tight, it can be installed in wet man-holes. Because it requires no protection it is well adapted for use in steel mills and in industries where dirt, dust and explosive hazards are factors.



BETTER THAN DAYLIGHT

Less eye fatigue
means
more profit



Painstaking application to mechanical detail promotes quality production. It also demands continuous use of the eyes—a condition which under poor light tends to fatigue the eyes, with resultant errors. Industry has found the solution—Cooper-Hewitt Mercury Vapor Light.

This restful, blue-green light reveals detail so sharply and makes focusing so much easier that workers no longer lose energy in the mere physical act of "seeing." Rejects are fewer and accidents and

labor turnover are materially reduced. Even handicaps from shadows are reduced under the Cooper-Hewitt system. Troublesome glare is eliminated and many of the losses hidden in cost sheets are wiped out by this detail-revealing light.

Better light means better sight, and less eye fatigue on the part of the workers means greater profits to management. Write for complete details. Address the General Electric Vapor Lamp Company, 385 Adams Street, Hoboken, New Jersey.

**GENERAL  ELECTRIC
VAPOR LAMP COMPANY**

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COOPER-HEWITT MERCURY VAPOR LIGHT

New Trade Publications

Meehanite—Meehanite Metal Corp., Pittsburgh. Bulletin No. 6, a specification chart of recommended grades for various steel requirements.

Motors—Ohio Electric Mfg. Co., Cleveland. Bulletin telling "Why Ohio Motors Are Reliable," by graphic pictures of their construction and testing.

Refractories—Babcock & Wilcox Co., 19 Rector street, New York. Bulletin R-2-D on its insulating firebrick, with data tables and diagrams of special constructions.

Die Heads—Eastern Screw Machine Corp., New Haven, Conn. Bulletin on style DM insert chaser die heads for Browne & Sharpe automatic screw machines, illustrated and fully described.

Railroad Track Specialties—Track Specialties Co., 1775 Broadway, New York. A catalog of its various railroad specialties to improve track work, well illustrated and full descriptions.

Grinding Wheels—Chicago Wheel & Mfg. Co., 1101 West Monroe street, Chicago. A catalog of its complete line of grinding wheels, with new prices.

Lubrication—Texas Co., New York. March issue of its regular publication on this subject, devoted to power economies and results of lubrication in woolen and worsted mills.

Press—Hydraulic Press Mfg. Co., Mount Gilead, O. Current number of its magazine, devoted to application of heavy pressures to metal production, with practical suggestions.

Boiler Tubes—Babcock & Wilcox Tube Co., Beaver Falls, Pa. Bulletin T-14, fully illustrated, presenting "Seven Facts About Boiler Tubes"; explains effects of the manufacturing process on quality of boiler tubes.

Fireless Locomotive—Heisler Locomotive Works, Erie, Pa. A bulletin describing operation of its industrial locomotives, from five to 90 tons; also construction record sheets on specific special orders.

Compressors—Sullivan Machinery Co., 307 North Michigan avenue, Chicago. Bulletin 88-O on its Unitair two-stage, air-cooled, V-type air compressor, in four sizes to 400 cubic feet per minute, for any type of drive.

Combustion Meters—Hays Corp. Michigan City, Ind. Catalog RA-346 covering its line of combustion meters, with description of the instruments and engineering data on their application.

Set and Cap Screws—Holo-Krome Screw Corp., Bristol, Conn. Circular HK-166 on its socket set and cap screws, giving all dimensions of heads, bodies, screw and thread lengths, screw points, sockets and wrenches.

Saws—Pittsburgh Tool, Knife & Mfg. Co., 7502 Thomas boulevard, Pittsburgh. Catalog C, illustrating and describing its complete line of solid and inserted tooth metal-cutting circular saw blades, solid and inserted tooth wood-cutting circular saws, band

saws for wood, circular saw grinders, metal cutoff machines and other specialties.

Welding—Pennsylvania Engineering Works, New Castle, Pa. A circular illustrating application of welding in the fabrication of parts for machinery and also complete structures; illustrations tell much of the story.

Fire Extinguishers—Walter Kidde & Co. Inc., Bloomfield, N. J. Bulletin AD-481 describing its various capacities of carbon dioxide fire extinguishers for use in industrial and other plants.

Welding—Eisler Engineering Co. Inc., Newark, N. J. Reference book, No. 36W, on resistance welding by butt and seam welders; shows new types of equipment and demonstrates increasing use of resistance welding.

Truck Safety—Four Wheel Drive Auto Co., Clintonville, Wis. A bulletin, No. 180, on safety features built into the company's trucks, with color to heighten its graphic illustrations and statistical exhibits.

Motors—Reliance Electric & Engineering Co., Ivanhoe road, Cleveland. Bulletins No. 213 and 214 on type T heavy-duty motors for direct current, fully enclosed, fan-cooled, with illustrations and descriptions.

Aftercooler—Ingersoll-Rand Co., Phillipsburg, N. J. Bulletin No. 2239 on a new design of aftercooler for use on air and gas compressors of moderate capacities, of compact form for mounting in any position.

Perforated Plate—Hendrick Mfg. Co., Carbondale, Pa. A booklet on its perforated metal plate for vibrating and shaking screens, with illustrations and data on performance and advantages.

Trucks—Lewis-Shepard Co., 125 Walnut street, Watertown station, Boston; No. 302 on tin plate handling by the company's lift trucks and stackers; No. 314 on special stacker and high-lift tier trucks for handling tin plate and steel sheets.

Steam Engines—Troy Engine & Machine Co., Troy, Pa. Bulletin No. 305 on its line of steam engines of various types, with illustrations of installations indicating their wide application in industry; data tables and diagrams of engine construction are included.

Lift Trucks—Barrett-Cravens Co., 3255 West Thirtieth street, Chicago. A circular on its materials handling equipment designed specially for use with new low 3½-inch pallets for handling tin plate, strip steel and similar materials.

18-8 Steel Fabrication—Linde Air Products Co., New York. A booklet on improved fabrication of 18-8 chromium steels, including technique and materials; discussion is carried logically from properties of the steel to factors of welding operation.

Porcelain Enameling—Porcelain Enamel institute, 612 North Michigan

avenue, Chicago. A handbook on design of metal parts for porcelain enameling; compiled by the technical research division of the educational bureau of the institute.

Mine Car Bearings—Timken Roller Bearing Co., Canton, O. Enlarged edition of the mine car and mine locomotive section of its engineering journal, with mounting diagrams and tabular data for selecting bearings for any load.

Circulating Fans—Propellair Inc., Springfield, O. A bulletin on its line of circulating fans in four mountings, two speeds, with large flow of air and low power requirements; many industrial uses for better working conditions of employes.

Welding—Linde Air Products Co., 30 East Forty-second street, New York. Twelve-page illustrated booklet on oxyacetylene welding of brass and bronze; one section devoted to technique of fusion welding, the other to welding of commercial yellow brass pipe.

Materials Handling—Lewis-Shepard Co., 233 Walnut street, Watertown, Mass. A circular, No. 318, on standard and special devices for handling any product, merchandise, or materials; a miniature textbook on modern handling methods and necessary equipment.

Meehanite—Fulton Foundry & Machine Co., East Seventy-fifth and Morgan avenue, Cleveland, is distributing Bulletin No. 5 of the Meehanite Research institute, an interpretation of the structure of Meehanite; illustrated with photomicrographs of various types of cast iron.

Thermometers—Bristol Co., Watertown, Conn. Catalog No. 1250 covering its liquid-filled, vapor-tension, and gas-filled recording, indicating and controlling thermometers; information on automatic temperature controllers, electric and pneumatic type; data on industrial applications of all its instruments.

Issues Marine Bulletin

Featuring details of the M. S. TRANSOIL, reported to be the largest all-welded steel tanker afloat, the *Ingalls Marine Bulletin* recently made its first appearance. It is issued from Birmingham, Ala., and is a publication of the marine department of the Ingalls Iron Works Co., Birmingham and Mobile, Ala., and Verona, Pa.

The tanker was launched Jan. 29 of this year at the company's shipyard in Chickasaw, Ala. It is over 251 feet between perpendiculars, 258 feet overall, 43 feet molded breadth, 16 feet 8 inches in molded depth, with 1600 tons gross tonnage and 20,000-barrel capacity. It is estimated that a 15 per cent weight saving was effected by the 25 miles of welding used in construction of the ship.

Rail and Ship Needs Support Market

Automotive Output Grows; More Freight Car Inquiry Appears

NOTWITHSTANDING a recessive tendency in demand for light flat-rolled steel products, due in large part to expected lessened activity in automotive production at midyear, substantial support is being given the steel market by demand for heavier forms.

Mills have sufficient backlogs of steel rails to run them well to the middle of the year, and further tonnages are in prospect. Pending plate business makes a large total and is likely to be placed within a short time. Lining for a tunnel in the Fort Peck development in Montana, 7475 tons of plates, has reached the bidding stage, and Chicago Bridge & Iron Works submitted the low tender. Award is pending on the United States liner for which 15,000 tons of hull steel will be required, and 6000 tons of hull steel will go into the two freighters for which the Matson Navigation Co. is taking bids May 4.

Building requirements, as are evidenced by STEEL's compilation, are holding well, the past week bringing a total of 14,266 tons.

Railroads continue to support the market with large inquiries. Chesapeake & Ohio has issued an inquiry for 5400 freight cars, and Pere Marquette for 500, requiring close to 60,000 tons of rolled steel. Nickel Plate is expected to award 777 freight cars early this week. Two western roads are inquiring for 10,000 tons of rails, and Nashville, Chattanooga & St. Louis has awarded 3425 tons in addition to its former purchase.

After having touched the previous week the highest point since June, 1930, steel operations last week eased one point to 69½ per cent, due principally to slight recessions at Pittsburgh and Youngstown. The rates and changes last week are as follows: Pittsburgh, 63, down two points; Youngstown, 79, down one point; Eastern Pennsylvania, 44, up ½ point; Chicago, 70½, unchanged; Wheeling, 92, up eight points; Cleveland, 79½, down five points; Buffalo, 70, up five points; Birmingham, 69, unchanged; New England, 75, down three points; Detroit, 100, unchanged; Cincinnati, 84, up four points.

Sheetmakers are said to be considering modi-

MARKET IN TABLOID

DEMAND . . . Better for heavy than for light products.

PRICES Firm.

PRODUCTION . . . Steel-works operations off 1 point to 69½ per cent.

SHIPMENTS . . . Steady at a high level.

fication in the new plan of quantity differentials, to include galvanized sheets with hot and cold-rolled grades and also to make a change in the time clause to liberalize the provision for "shipment at one time."

Tin plate releases by canmakers are more liberal, and production has moved up to 85-90 per cent of capacity. Steel sheet sales and shipments in March not only exceeded the shorter month of February but were larger also than January.

Slight weakness has appeared in the scrap market, principally in blast furnace grades and specialties, open-hearth grades holding firmly. Large tonnages of the latter have been covered recently only at a premium over small lots.

Continued gain in automobile production brings the output for the week ended April 25 to 120,000, compared with 119,000 the preceding week.

Carnegie-Illinois Steel Corp. is lighting 192 additional by-product coke ovens at Clairton, Pa., to meet requirements for coke consumers. First bulk freighters are stirring on the Great Lakes, preliminary to what is confidently expected to be the best iron ore season since 1930.

STEEL's London cable tells of continued heavy demand for pig iron and steel for domestic needs, with export markets being neglected, March foreign trade figures show steel imports into Britain are increasing and exports decreasing.

Iron and steel composite compiled by STEEL receded 1 cent to \$33.08, while the finished steel composite is unchanged. The scrap composite is 4 cents lower at \$14.33 on a slight readjustment at Pittsburgh.

COMPOSITE MARKET AVERAGES

	April 25	April 18	April 11	One Month Ago March, 1936	Three Months Ago Jan., 1936	One Year Ago April, 1935	Five Years Ago April, 1931
Iron and Steel	\$33.08	\$33.09	\$33.11	\$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	14.33	14.37	14.37	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 25, 1936	March 1936	Jan. 1936	April 1935		April 25, 1936	March 1936	Jan. 1936	April 1935	
Finished Material										
Steel bars, Pittsburgh	1.85c	1.85c	1.85c	1.80c	Pig Iron	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	90.13	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		Scrap				
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.	12.50	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

Coke

Connellsville, furnace, ovens	\$3.50	\$3.50	\$3.50	\$3.60
Connellsville, foundry, ovens	4.25	4.10	4.00	4.60
Chicago, by-product foundry, del.	9.75	9.75	9.75	9.25

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	Plates	Boston, delivered....	2.20½c
Chicago, delivered..	1.98c	Cold Rolled No. 10		Sheets	Hot strip	Bethlehem	1.90c
Detroit, del.	2.05c	Pittsburgh	2.50c	Hot strip	Cold strip	Chicago	1.85c
New York, del.	2.20c	Gary	2.60c			Cleveland, del.	2.00c
Philadelphia, del....	2.16c	Detroit, delivered....	2.70c			Buffalo	1.90c
Birmingham	2.00c	Philadelphia, del....	2.81c			Gulf Ports	2.20c
St. Louis, del.	2.18c	New York, del.	2.85c			Birmingham	1.95c
Pacific ports, f.o.b. cars, dock	2.40c	Pacific ports, f.o.b. cars, dock	3.10c			Pacific ports, f.o.b. cars, dock	2.35c
Hot Rolled Annealed No. 24		Cold Rolled No. 20		Straight Chromes		Bars	
Pittsburgh	2.40c	Pittsburgh	2.95c	No. 410	No. 430	No. 442	No. 446
Gary	2.50c	Gary	3.05c	Bars	Plates	Sheets	Hot strip
Chicago, delivered....	2.53c	Detroit, delivered....	3.15c	Plates	Hot strip	Cold stp	
Detroit, delivered....	2.60c	Philadelphia, del....	3.26c	Sheets			
New York, del.....	2.75c	New York, del.	3.30c	Hot strip			
Philadelphia, del.	2.71c	Pacific ports, f.o.b. cars, dock	3.05c				
Birmingham	2.55c	Enameling Sheets		Steel Plates		Soft Steel	
St. Louis, del.	2.72c	Pittsburgh, No. 10..	2.35c	Pittsburgh	New York, del.	Philadelphia, del....	2.16c
Pacific ports, f.o.b. cars, dock	3.05c	Pittsburgh, No. 20..	2.95c	Philadelphia, del.	Boston, delivered....	New York, del.	2.20c
Galvanized No. 24		Gary, No. 10	2.45c	Boston, delivered....	Buffalo, delivered....	Pitts., forg. qual....	2.10c
Pittsburgh	3.10c	Gary, No. 20	3.05c	Buffalo, delivered....	Chicago or Gary....	Duluth	2.00c
Gary	3.20c			Chicago or Gary	Birmingham	Cleveland	1.90c
Chicago, delivered..	3.23c	Tin and Terne Plate		Buffalo, delivered....	Buffalo	Detroit, delivered....	2.00c
Philadelphia, del.	3.41c	Gary base, 10 cents higher.		Chicago or Gary	Cleveland	Pacific ports, f.o.b. cars, dock	2.40c
New York, del.	3.45c	Tin plate, coke base (box) Pittsburgh	\$5.25	Cleveland, del.	Buffalo	Philadelphia, del....	2.27c
Birmingham	3.25c	Do., waste-waste..	2.75c	Hot strip	Chicago or Gary	New York, del.	2.20c
St. Louis, del.	3.43c	Do., strips	2.50c	Cold stp	Pacific ports, f.o.b. cars, dock	Pitts., forg. qual....	2.10c
Pacific ports, f.o.b. cars, dock	3.70c	Long ternes, No. 24 unassorted, Pitts.	3.40c				
		Do., Gary	3.50c	Rail Steel		To Manufacturing Trade	
				Pittsburgh	1.80c	Pittsburgh	1.70c
				New York, del.	2.09c	Chicago or Gary	1.75c
				Philadelphia, del.	1.99c	Moline, Ill.	1.75c
				Boston, delivered....	2.22c	Cleveland	1.75c
				Buffalo, delivered....	2.05c	Buffalo	1.80c
				Chicago or Gary	1.35c		
				Cleveland, del.	1.99½c		
				Birmingham	1.95c		
				Coatesville, base	1.90c		
				Sparrows Pt., base	1.90c		
				Pacific ports, f.o.b. cars, dock	2.35c		
				St. Louis, delivered..	2.08c		

Iron	
Troy, N. Y.	1.70c
Terre Haute, Ind....	1.75c
Chicago	1.80c
Philadelphia	2.06c
Pittsburgh, refined..	2.75-7.50c

Reinforcing	
New billet, straight lengths, quoted by distributors.	
Pittsburgh	1.95c-2.05c
Chicago, Gary, Buffalo, Cleve., Birm., Young. ..	2.10c
Gulf ports	2.45c
Pacific coast ports f.o.b. car docks	2.45c
Philadelphia, del.....	2.11c-2.16c
Rail steel, straight lengths, quoted by distributors	
Pittsburgh	1.90c
Chicago, Buffalo, Cleveland, Birm., Young.	1.95c
Gulf ports	2.30c

Wire Products	
(Base, 3 to 25 tons)	
(Prices apply to straight or mixed carloads; less carloads \$4 higher; less carloads fencing \$5 over base column.)	
Base Pitts.-Cleve. 100 lb. keg. Stand. wire nails....	2.10c
Cement c't'd nails....	2.10c
Galv. nails, 15 gage and finer	4.10c
do. finer than 15 ga.	4.60c
(Per pound)	
Polished staples.....	2.80c
Galv. fence staples	3.05c
Barbed wire, galv....	2.60c
Annealed fence wire	2.65c
Galv. fence wire.....	3.00c
Woven wire fencing (base column, c.l.)	\$58.00
To Manufacturing Trade	
Plain wire, 6-9 ga.	2.40c
Anderson, Ind. (merchant products only) and Chicago up \$1; Duluth up \$2; Birmingham up \$3.	
Spring wire, Pitts. or Cleveland	3.05c
Do., Chicago up \$1. Worc. \$2.	

Cold-Finished Carbon Bars and Shafting	
Base, Pitts., one size, shape, grade, shipment at one time to one destination	
10,000 to 19,999 lbs.	2.10c
20,000 to 59,999 lbs.	2.05c
60,000 to 99,999 lbs.	2.00c
100,000 lbs. and over.....	1.97½c
Gary, Ind., Cleve., Chi., up 5c	
Buffalo, up 10c; Detroit, up 20c; eastern Michigan, up 25c	

Alloy Steel Bars (Hot)	
(Base, 3 to 25 tons.)	
Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem	2.45c
Alloy	
S.A.E. Diff. S.A.E. Diff.	
2000.....0.25 3100.....0.55	
2100.....0.55 3200.....1.35	
2300.....1.50 3300.....3.80	
2500.....2.25 3400.....3.20	
4100 0.15 to 0.25 Mo.	0.50
4600 0.20 to 0.30 Mo. 1.25-	
1.75 Ni.....	1.05
5100 0.80-1.10 Cr.....	0.45
5100 Cr. spring	base
6100 bars	1.20
6100 spring	0.70
Cr., Ni., Van.	1.50
Carbon Van.	0.95
9250.....carbon base plus extras	

Piling	
Pittsburgh	2.15c
Chicago, Buffalo	2.25c

Strip and Hoops	
(Base, hot rolled, 25-1 ton) (Base, cold-rolled, 25-3 tons)	
Hot strip to 23½-in.	
Pittsburgh	1.85c
Chicago or Gary..	1.95c
Birmingham base	2.00c
Detroit, del.	2.05c
Philadelphia, del..	2.16c
New York, del....	2.20c
Cooperage hoop.	
Pittsburgh	1.95c
Chicago	2.05c
Cold strip, 0.25 carbon and under,	
Pitts., Cleveland..	2.60c
Detroit, del.	2.81c
Worcester, Mass....	2.80c

Rails, Track Material	
(Gross Tons)	
Standard rails, mill	\$36.37½
Relay rails, Pitts.	
20-45 lbs.	\$28.00
45-60 lbs.	\$25.00
50-60 lbs.	\$26.00
70-75 lbs.	\$24.50
80-90 lbs.	\$26.00
100 lbs.	\$27.00
Light rails, billet qual. Pitts., Chi....	\$35.00
Do., reroll, qual..	34.00
Angle bars, billet, Gary, Ind., So. Chi.	2.55c
Do., axle steel....	2.10c
Spikes, R. R. base	2.60c
Track bolts, base....	3.60c
Tie plates, base	1.90c
Base, light rails 25 to 40 lbs.; 50 to 60 lbs. inclusive up \$2; 16 and 20 lbs., up \$1; 12 lbs. up \$2; 8 and 10 lbs., up \$5. Base railroad spikes 200 kegs or more; base tie plates 20 tons.	

Bolts and Nuts	
Pittsburgh, Cleveland, Birmingham, Chicago. Discounts to legitimate trade for all case lots, Dec. 1, 1932, lists, 10% extra for less full containers.	
Carriage and Machine	
½ x 6 and smaller....	70-10-5 off
Do. larger	70-10 off
Tire bolts	55 off
Plow Bolts	
All sizes	70-10 off
Stove Bolts	
In packages with nuts attached 72½-10 off; in packages with nuts separate 72½-10-5 off; in bulk 82½ off on 15,000 of 3-inch and shorter, or 5000 over 3-inch.	
Step bolts	65-5 off
Elevator bolts	65-5 off
Nuts	
S. A. E. semifinished hex.; ½ to ¾-inch	60-20-15 off
Do., ½ to 1-inch 60-20-15 off	
Do., over 1-inch 60-20-15 off	
Hexagon Cap Screws	
Milled	80-10-10 off
Upset, 1-in., smaller.....	85 off
Square Head Set Screws	
Upset, 1-in., smaller....	75-10 off
Headless set screws	75 off

Rivets, Wrought Washers	
Struc., c. l., Pittsburgh, Cleveland	2.90c
Struc., c. l., Chicago	3.00c
¾-in. and smaller, Pitts., Chi., Cleve.	70 and 5 off
Wrought washers, Pitts., Chi., Phila. to jobbers & large nut, bolt mfrs....	\$6.25 off

Cut Nails	
Cut nails, Pitts.; (10% discount on size extras)	\$2.75
Do. less carloads, 5 kegs or more, no discount on size extras.....	\$3.05

Do., under 5 kegs; no disc. on size extras..... \$3.20

Pipe and Tubing	
Base \$200 net ton, except on standard commercial seamless boiler tubes under 2 inches and cold drawn seamless tubing.	
Welded Iron, Steel Pipe	
Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less. Chicago, del. 2½ points less. Wrought pipe, Pittsburgh.	
Butt Weld Steel	
In.	Blk. Galv.
¼ and ¾.....	60 44½
½.....	64½ 55
¾.....	67½ 59
1-3.....	69½ 61½
Iron	
½.....	31½ 15
¾.....	36½ 20½
1-1¼.....	39½ 25½
2.....	41½ 26
Lap Weld Steel	
2.....	62 53½
2½-3.....	65 56½
3½-6.....	67 58½
7 and 8.....	66 56½
9 and 10.....	65½ 56
Iron	
2.....	37 22½
2½-3½.....	38 25
4-8.....	40 28½
Line Pipe Steel	
¾, butt weld.....	56
¾ and ¾, butt weld.....	59
¾, butt weld.....	63½
¾, butt weld.....	66½
1 to 3, butt weld.....	68½
2, lap weld.....	61
2½ to 3, lap weld.....	64
3½ to 6, lap weld.....	66
7 and 8, lap weld.....	65
Iron	
¾-1½ inch, black and galv. take 4 pts. over; 2½-6 inch 2 pts. over discounts for same sizes, standard pipe lists, 8-12-inch, no extra.	
Boiler Tubes	
C. L. Discounts, f.o.b. Pitts.	
Lap Weld Steel	
2-2¼.....	33 1¾..... 8
2½-2¾.....	40 2-2¼.....13
3.....	47 2½-2¾.....16
3½-3¾.....	50 3.....17
4.....	52 3¼-3¾.....18
4½-5.....	42 4.....20
	4½.....21

Seamless Tubing	
Cold drawn; f.o.b. mill disc.	
100 ft. or 150 lbs.	32%
15,000 ft. or 22,500 lbs.....	70%
Cast Iron Water Pipe	
Class B Pipe—Per Net Ton	
6-in. & over, Birm..	\$39.00-40.00
4-in., Birmingham..	42.00-43.00
4-in., Chicago.....	50.40-51.40
6 to 24-in. Chicago..	47.40-48.40
6-in. & over, east. fdy.	43.00
Do., 4 in.	46.00
Class A pipe \$3 over Class B Std. ftgs., Birm. base.	\$100.00
Semifinished Steel	
Billets and Blooms	
4 x 4-inch base; gross ton	
Pitts., Chi., Cleve., Buffalo & Youngstown	\$28.00
Philadelphia	34.67
Duluth	30.00
Forging Billets	
6 x 6 to 9 x 9-in., base	
Pitts., Chi., Buff....	35.00
Forging, Duluth	37.00
Sheet Bars	
Pitts., Cleve., Young, Chi., Buff., Canton, Sparrows Pt.	28.00
Slabs	
Pitts., Chi., Cleve., Young.	28.00
Wire Rods	
Pitts., Cleve., No. 4 to 5	\$38.00
Do., No. 5 to 15/32-inch	40.00
Do., over 15/32 to 47/64-inch	42.00
Chicago up \$1; Worcester up \$2	
Skelp	
Pitts., Chi., Young., Buff., Coatesville, Sparrows Point....	1.80c

Coke	
Price Per Net Ton	
Beehive Ovens	
Connellsville, fur....	\$3.50-3.66
Connellsville, fdry....	4.25-4.35
Connell. prem. fdry.	5.35-5.50
New River fdry.....	6.00
Wise county fdry....	4.45-5.00
Wise county fur....	4.00-4.50
By-Product Foundry	
Newark, N. J., del.	9.70-10.15
Chi., ov., outside del.	9.00
Chicago, del.	9.75
New England, del....	11.50
St. Louis, del.	10.00-10.50
Birmingham, ovens	6.50
Indianapolis, del.	9.40
Cincinnati, del.	9.50
Cleveland, del.	9.75
Buffalo, ovens	7.50-8.00
Detroit, ov., out, del	9.00
Philadelphia, del.	9.38
Coke By-Products	
Per gallon, producers' plants	
Tank lots	Spot
Pure and 90% benzol....	18.00c
Toluol	30.00c
Solvent naphtha	30.00c
Industrial xylol	30.00c
Per lb. f.o.b. New York.	
Phenol (200 lb. drums)..	16.30c
Do. (100 lbs.)	17.30c
Eastern Plants, per lb.	
*Naphthalene flakes and balls, in bbls., to jobbers	7.25c
Per 100 lb. Atlantic seaboard	
Sulphate of ammonia	\$1.30
+Western prices. ½-cent up	

Pig Iron

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

Basing Points:	No. 2 Fdry	Malleable	Basic	Bessemer
Bethlehem, Pa.	\$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 Neville Island	.....	.....	.....	.....
Saginaw, Mich., from Detroit	21.75	21.75	21.25	21.25

Delivered from Basing Points:	No. 2 Fdry	Malleable	Basic	Bessemer
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
	Lylees, 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.	55.00
First Quality	Chrome brick	\$45.00
Pa., Ill., Md., Mo., Ky.	Chemically bonded chrome brick	45.00
Alabama, Ga., \$38.00-45.00	Magnesite brick	65.00
Second Quality	Chemically bonded magnesite brick	55.00
Pa., Ill., Ky., Md., Mo.		
Ga., Ala.		
Ohio		
First quality		\$40.00
Intermediary		37.00
Second quality		28.00
Malleable Bung Brick		
All bases		50.00
Silica Brick		
Pennsylvania		\$45.00
Joliet, E. Chicago		54.00
Birmingham, Ala.		48.00
Magnesite		
Imported dead-burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases (bags)..		\$45.00
Domestic dead-burned grains, net ton f.o.b. Chester, Pa., and Bal-		

Fluorspar, 85-5

Washed gravel, duty paid, tide, net ton	\$20.50
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all-rail	\$18.00
Do., for barge	\$19.00

Ferroalloys

Dollars, except Ferrochrome	
Ferromanganese, 78-82% tidewater, duty paid	75.00
Do., Balti., base	75.00
Do., del. Pittsb'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. 2% carbon, 90.00; 1%,	85.00
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. allow., 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	

Nonferrous

METAL PRICES OF THE WEEK

Spot unless otherwise specified. Cents per pound

Copper		Casting, Electro. Lake, del. del. Midwest		Straits Tin New York Spot Futures		Lead East St. L.		Alumi- num 99%		Antimony Chinese Spot, N. Y.		Nickel Cath- odes	
Apr. 18	9.50	9.62½	9.12½	46.87½	45.90	4.60	4.45	4.90	*19.00	13.50	35.00		
Apr. 20	9.50	9.62½	9.12½	46.87½	46.10	4.60	4.45	4.90	*19.00	13.50	35.00		
Apr. 21	9.50	9.62½	9.12½	46.87½	45.90	4.60	4.45	4.90	*19.00	13.50	35.00		
Apr. 22	9.50	9.62½	9.12½	46.75	45.87½	4.60	4.45	4.90	*19.00	13.50	35.00		
Apr. 23	9.50	9.62½	9.12½	46.55	45.75	4.60	4.45	4.90	*19.00	13.50	35.00		
Apr. 24	9.50	9.62½	9.12½	46.55	45.75	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.

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

Iron and Steel Scrap Prices

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated

HEAVY MELTING STEEL	COUPLERS, SPRINGS	Buffalo	8.50-9.00	Chicago, iron	14.00-14.50
Birmingham	Buffalo	Cincinnati, dealers..	6.25-6.75	Chicago, rolled steel	15.50-16.00
Boston, dock, expt.	Chicago, springs	Cleveland	9.00-9.50	Cincinnati, iron.....	11.75-12.25
Boston, domestic	Eastern Pa.	Detroit	6.75-7.25	Eastern Pa., iron	15.00-15.50
Buffalo, No. 1	Pittsburgh	Eastern Pa.	6.50-7.00	Eastern Pa., steel....	17.00-17.50
Buffalo, No. 2	St. Louis	New York, dealers..	3.25-3.75	Pittsburgh, iron	14.50-15.00
Chicago, No. 1 .....	.....	Pittsburgh	8.75-9.25	Pittsburgh, steel	17.25-17.75
Cleveland, No. 1.....	ANGLE BARS—STEEL	Toronto, dealers	4.00	St. Louis, iron	11.50-12.00
Cleveland, No. 2.....	Chicago			St. Louis, steel	13.25-13.75
Detroit, No. 1	St. Louis			Toronto, net	8.5¢
Detroit, No. 2.....	Buffalo	CAST IRON BORINGS			
Eastern Pa., No. 1..	Chicago	Birmingham, plain..	5.00-6.00	NO. 1 CAST SCRAP	
Eastern Pa., No. 2..	St. Louis	Boston, chemical.....	6.50-6.75	Birmingham	11.00-12.00
Federal, Ill.	Buffalo	Boston, dealers	3.50-4.00	Boston, No. 1 mach. ..	9.25-9.75
Granite City, R. R..	Chicago	Buffalo	8.50-9.00	Boston, No. 2	9.25-9.75
Granite City, No. 2..	Low PHOSPHORUS	Chicago	7.50-8.00	Boston, tex. con.	11.50-12.00
N. Y., deal. No. 2....	Buffalo, billet and	Cincinnati, dealers..	6.25-6.75	Buffalo, cupola	13.00-13.50
N. Y., deal. barge	bloom crops	Cleveland	8.75-9.25	Buffalo, mach.	13.75-14.25
(No. 1 for export)	Cleveland, billet,	Detroit	6.75-7.25	Chicago, agri. net....	10.50-11.00
Pitts., No. 1 (R. R.)	bloom crops	E. Pa., chemical.....	11.00-13.00	Chicago, auto	12.00-12.50
Pitts., No. 1 (dlr.)..	Eastern Pa., crops..	New York, dealers..	4.50-5.00	Chicago, mach. net..	13.50-14.00
Pittsburgh, No. 2....	Pittsburgh, billet,	St. Louis	4.00-4.50	Chicago, rail'd net..	12.00-12.50
St. Louis	bloom crops	Toronto, dealers	5.00	Cinci., mach. cup....	11.25-11.75
Toronto, dealers	Pittsburgh, sheet			Cleveland, mach.....	16.00-16.50
Valleys, No. 1	bar crops	PIPE AND FLUES		Eastern Pa., cupola	14.00-14.50
		Cincinnati, dealers..	8.25-8.75	E. Pa., mixed yard..	13.00
COMPRESSED SHEETS	FROGS, SWITCHES	Chicago, net	8.00-8.50	Pittsburgh, cupola..	14.50-15.00
Buffalo, dealers	Chicago	RAILROAD GRATE BARS		San Francisco, del.	13.50-14.00
Chicago, factory	St. Louis, cut	Buffalo	11.00-11.50	Seattle	10.00-11.00
Chicago, factory	St. Louis, cut	Chicago, net	9.00-9.50	St. Louis, No. 1.....	11.50-12.00
Chicago, dealer	SHOVELING STEEL	Cincinnati	7.25-7.75	St. L., No. 1 mach.	13.25-13.75
Cleveland	Chicago	Eastern Pa.	11.50-12.00	Toronto, No. 1,	
Detroit	Federal, Ill.	New York, dealers..	7.00-7.50	mach., net	9.00
E. Pa., new mat.....	Granite City, Ill.	St. Louis	7.50-8.00		
Pittsburgh	Toronto, dealers			HEAVY CAST	
St. Louis		FORGE FLASHINGS		Boston, del.	8.25-8.50
Valleys		Boston, dealers	7.75-8.00	Buffalo, break.	11.25-11.75
		Buffalo	12.75-13.25	Cleveland, break	12.50-13.00
BUNDLED SHEETS		Cleveland	13.50-14.00	Detroit, No. 1 mach.	
Buffalo		Detroit	10.25-10.75	net	13.00-13.50
Cincinnati, del.		Pittsburgh	13.75-14.25	Detroit, break.	11.00-11.50
Cleveland				Detroit, auto net..	12.50-13.00
Pittsburgh		FORGE SCRAP		Eastern Pa.	13.50
St. Louis		Boston, dealers	6.00-7.00	N. Y., break deal....	9.50-9.75
Toronto, dealers		Chicago, heavy	16.00-16.50	Pittsburgh	13.50-14.00
		Eastern Pa.	12.50-13.00		
SHEET CLIPPINGS, LOOSE		ARCH BARS, TRANSOMS		MALLEABLE	
Chicago		St. Louis	13.50-14.00	Birmingham, R. R..	11.50-12.50
Cincinnati				Boston, consum.	16.75-17.25
Detroit		AXLE TURNINGS		Buffalo	16.25-16.75
St. Louis		Boston, dealers	7.00-7.25	Chicago, R. R.....	17.25-17.75
Toronto, dealers		Buffalo	11.00-11.50	Cincinnati, agri. del.	13.50-14.00
		Chicago, elec. fur.	14.00-14.50	Cleveland, rail	17.75-18.00
STEEL RAILS, SHORT		Eastern Pa.	12.00-12.50	Detroit, auto, net....	14.50-15.00
Birmingham		St. Louis	9.00-9.50	Eastern Pa., R. R..	17.50-18.50
Buffalo		Toronto	4.50	Pittsburgh, rail....	18.00-18.50
Chicago (3 ft.).....		STEEL CAR AXLES		St. Louis, R. R.....	15.25-15.75
Chicago (2 ft.).....		Birmingham	12.00-13.00	Toronto, net	7.00
Cincinnati, del.		Boston, ship. point..	11.00-11.25	RAILS FOR ROLLING	
Detroit		Buffalo	15.50-16.00	5 feet and over	
Pitts., open-hearth,		Chicago, net	15.00-15.50	Birmingham	12.00-13.00
3 ft. and less		Eastern Pa.	17.00	Boston, dealers	9.00-9.50
St. Louis, 2 ft. & less		St. Louis	13.50-14.00	Buffalo	14.00-14.50
		Toronto	8.50	Chicago	15.50-16.00
STEEL RAILS, SCRAP		SHAFTING		Eastern Pa.	15.00-15.50
Boston		Boston, ship point..	13.75-14.00	New York, dealer....	10.25-10.50
Chicago		Eastern Pa.	19.00-19.50	St. Louis	14.25-14.75
Pittsburgh		New York, dealers..	14.75-15.25	LOCOMOTIVE TIRES	
St. Louis		St. Louis	13.50-14.00	Chicago (cut)	16.00-16.50
Buffalo				St. Louis, No. 1	12.00-12.50
Toronto, dealers		CAR WHEELS		LOW PHOS. PUNCHINGS	
STOVE PLATE		Birmingham	11.00-12.50	Buffalo	15.25-15.75
Birmingham		Boston, iron deal.	8.75-9.00	Chicago	16.50-17.00
Boston, dealers		Buffalo, iron	13.50-14.00	Eastern Pa.	16.00-16.50
Buffalo		Buffalo, steel	16.00-16.50	Pittsburgh (heavy)	17.50-18.00
Chicago				Pittsburgh (light)..	16.50-17.00
Cincinnati, dealers..					
Detroit, net					
Eastern Pa.					
N. Y., deal. fdry.					
St. Louis					
Toronto, dealers, net					

Iron Ore

Lake Superior Ore	
Gross ton, 51½%	
Lower Lake Ports	
Old range bessemer	\$4.80
Mesabi nonbess.	4.50
High phosphorus	4.40
Mesabi bessemer	4.65
Old range nonbess.	4.65

Eastern Local Ore	
Cents, unit, del. E. Pa.	
Foundry and basic	8.00-9.00
56-63% con. (nom.)	
Cop.-free low phos.	
58-60% (nom.).....	10.00-10.50
Foreign Ore	
Cents per unit, f.a.s. Atlantic	
ports (nominal)	
Foreign manganif-	
erous ore, 45.55%	

iron, 6-10% man.	10.50
No. Afr. low phos.	10.50
Swedish basic, 65%	9.50
Swedish low phos..	10.50
Spanish No. Africa	
basic, 50 to 60%	10.50
Tungsten, spot sh.	
ton unit, duty pd..	\$15.85-16.00
N. F., fdy., 55%....	7.00
Chrome ore, 48%	
gross ton, c.i.f.....	19.25

Manganese Ore

(Nominal)	
Prices not including duty.	
cents per unit cargo lots	
Caucasian, 50-52%	26.00
So. African, 50-52%.....	26.00
Indian, 50-52%	26.00

Warehouse Iron and Steel Prices

Cents per pound for delivery within metropolitan districts of cities specified

STEEL BARS	Cincinnati	3.25c	Buffalo	3.37c	Pittsburgh(h)	2.95c	Seattle	5.60c
Baltimore*.....	Houston	3.25c	Chattanooga..	3.56c	San Francisco	3.35c	St. Louis	3.55c
Boston††	Los Ang., cl.	2.45c	Chicago	3.20c	Seattle	3.70c	St. Paul	3.56c
Buffalo	New Orleans	3.50c	Cincinnati	3.42c	St. Louis	3.45c		
Chatanooga..	Pitts., plain (h)	3.05c	Cleveland, 1/4-		St. Paul	3.30c		
Chicago (j)	Pitts., twisted		squares (h)	3.175c	Tulsa	3.70c		
Cincinnati	San Francisco	2.45c	Detroit	3.42c			COLD FIN. STEEL	
Cleveland	Seattle	2.45c	Detroit, 1/8-in.	3.65c	NO. 24 BLACK		Baltimore (c) ..	3.73c
Detroit	St. Louis	3.25c	Houston	3.00c	Baltimore*†....	3.60c	Boston	3.90c
Houston	Tulsa	3.25c	Los Angeles..	3.60c	Boston (g)	3.95c	Buffalo (h)....	3.56c
Los Angeles..	Young	2.30c-2.60c	Milwaukee ...	3.31c	Buffalo	3.25c	Chatanooga* ..	4.13c
Milwaukee ...			New Orleans	3.55c	Chicago	4.16c	Chicago (h)..	3.50c
New Orleans..			New York†(d)	3.40c	Chatanooga..	4.16c	Cincinnati	3.72c
New York†(d)			Philadelphia*	2.98c	Detroit	3.85c	Cleveland (h)	3.50c
Pitts. (h).....			Phila. floor....	4.95c	Cincinnati	4.02c	Detroit	3.79c
Philadelphia*			Pittsburgh(h)	3.15c	Cleveland	3.91c	Los Ang. (f) (d)	5.85c
Portland			Portland	3.35c	Detroit	3.94c	Milwaukee	3.61c
San Francisco			San Francisco	3.25c	Los Angeles..	4.35c	New Orleans	4.30c
Seattle			Seattle	3.55c	Milwaukee ...	3.96c	New York†(d)	3.81c
St. Louis			St. Louis	3.45c	New Orleans	4.50c	Philadelphia..	3.75c
St. Paul			Tulsa	3.45c	New York†(d)	3.89c	Pittsburgh	3.50c
Tulsa				3.50c	Philadelphia*†	3.60c	Portland (f) (d)	6.15c
					Pitts.** (h)....	3.55c	San Fran. (f) (d)	5.95c
					Portland	4.10c	Seattle (f) (d)	6.15c
					San Francisco	4.00c	St. Louis.....	3.75c
					Seattle	4.40c	St. Paul	4.02c
					St. Louis	4.10c	Tulsa	4.85c
					St. Paul	3.90c		
					Tulsa	4.75c		
IRON BARS								
Portland								
Chatanooga..								
Baltimore*								
Chicago								
Cincinnati								
New York†(d)								
Philadelphia*								
St. Louis								
Tulsa								
REINFORCING BARS								
Buffalo								
Chatanooga..								
Chicago								
Cleveland (c)								

Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, Apr. 23

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

	British gross tons U. K. ports	£ s d	Continental Channel or North Sea ports, metric tons Quoted in dollars at current value	**Quoted in gold pounds sterling	
				£ s d	£ s d
PIG IRON					
Foundry, 2.50-3.00 Silicon	\$15.44	3 2 6	\$14.14	1 15 0	
Basic bessemer	15.44	3 2 6*	12.13	1 10 0	
Hematite, Phos. .03-.05 ..	17.54	3 11 0	.....	.....
SEMI-FINISHED STEEL					
Billets	\$29.02	5 17 6	\$18.99	2 7 0	
Wire rods, No. 5 gage	44.21	8 19 0	36.39	4 10 0	
FINISHED STEEL					
Standard rails	\$40.76	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, 1 1/2 in. or 5 mm. ...	1.78c	8 1 3	1.55c	4 5 0	
Sheets, black, 24 gage or 0.5 mm. ...	2.15c	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	2.15c	9 15 0	1.92c	5 5 0	
Galvanized wire, base	2.54c	11 10 0	2.15c	5 17 6	
Wire nails, base	2.65c	12 0 0	1.74c	4 15 0	
Tin plate, box 108 lbs. ...	\$ 4.63	0 18 9	.....	.....

Domestic Prices at Works or Furnace—Last Reported

	£ s d	French Francs	Belgian Francs	Reich Marks				
Fdy. pig iron, Si. 2.5.	\$17.29	3 10 0(a)	\$17.13	260	\$13.85	410	\$25.35	63
Basic bessemer pig iron ...	17.29	3 10 0(a)	12.52	190	11.82	350	27.97(b)	69.50
Furnace coke	5.19	1 1 0	6.26	95	4.14	122	7.65	19
Billets	29.02	5 17 6	28.34	430	18.75	555	38.83	96.50
Standard rails	1.82c	8 5 0	2.00c	671	1.68c	1,100	2.40c	132
Merchant bars	2.00c	9 1 0	1.67c	560	.99c	650	2.00c	110
Structural shapes	1.93c	8 15 0	1.64c	550	.99c	650	1.91c	107
Plates, 1 1/2 in. or 5 mm. ...	2.00c	9 1 3	2.09c	700	1.22c	800	2.31c	127
Sheets, black	2.54c	11 10 0§	1.78c	600†	1.35c	875†	2.62c	144†
Sheets, galv., corr., 24 ga. or 0.5 mm.	2.98c	13 10 0	2.84c	950	2.29c	1,500	6.75c	370
Plain wire	2.15c	9 15 0	2.68c	900	1.76c	1,150	3.15c	173
Bands and strips	2.17c	9 16 0	1.98c	650	1.27c	800	2.31c	127

*Basic. †British ship-plates. Continental bridge plates. §24 ga. †† to 3 mm. basic price. British quotations are for basic open-hearth steel. Continent usually for basic-bessemer steel. a del. Middlesbrough. b hematite. ††Close annealed. **Gold pound sterling carries a premium of 66.00 per cent over paper sterling.

BANDS	Baltimore*.....	3.20c
Boston††	3.30c	
Buffalo	3.42c	
Chatanooga..	3.61c	
Chicago	3.30c	
Cincinnati	3.47c	
Cleveland	3.36c	
Detroit, 1/8-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	
BOLTS AND NUTS (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; † New extras apply; ††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 90

Pittsburgh—Last week's aggregate buying in merchant steel bars was virtually unchanged from the total of the week preceding. No decrease in the rate of automotive bar specifying has appeared and requirements of other users, such as agricultural implement manufacturers, railroad car shops and nonintegrated cold-drawn bar finishers, are fairly steady. On current transactions, 1.85c, base, Pittsburgh, is the market.

Chicago—With bar mills engaged virtually at capacity, deliveries have lengthened to three or four weeks, this being one of the most active products in this district. Specifications are close to the highest point since 1929. Some producers with mills in other districts are balancing up capacity, so that actual shipments may be made from those mills, which otherwise would be moved from Chicago. This is especially true concerning material wanted by Michigan automobile manufacturers. Farm implement manufacturers' releases are in steady volume; road machinery builders are engaged with good schedules, which promise to extend into early summer; and miscellaneous requirements are heavy. Prices are firm.

New York—Steel bar demand is bolstered by improved requirements of bolt and nut manufacturers and somewhat better releases by railroads.

Philadelphia — Commercial steel bars are moving fairly well with outlets much diversified. Prices are steady.

Plates are quoted at 1.80c, Pittsburgh.

Chicago—Recent freight car awards are providing the best market for plates, and releases have increased moderately. Early action is expected on 750 cars for Northern Pacific, requiring a considerable tonnage of plates. Demand for plates from structural fabricating shops is fair. Little oil tank work has developed here. Prices are steady.

Philadelphia — Specifications are spotty but are augmented somewhat by further releases from the Penn-

sylvania for its carbuilding program. Tank work is dull and shipyard buying is at a minimum. No action has been reported on steel for the tanker placed with a yard in this district a month or so ago.

New York—Plate demand is still spotty but railroad equipment demands are increasing and more tank work is being figured.

Birmingham, Ala.—Plate mills are keeping pace with sheet mills, with steady operation and heavy output. Joint bid of Chicago Bridge & Iron Works and Ingalls Iron Works Co.

Plates

Plate Prices, Page 90

Pittsburgh — Chicago Bridge & Iron Works, Chicago, bidding \$1,028,383.59, was low bidder April 20 on 7475 tons of steel plate tunnel lining in 25-foot sections for delivery to the Fort Peck dam. The only other bid was that of Bethlehem Steel Co. at \$1,087,252.21, Leetsdale, Pa. River Terminal Corp., New Orleans, which closed bids April 22 on ten 195 x 35 x 11-foot steel barges, requiring 1800 tons of steel plates and structural shapes, attracted more than 10 bids. Successful bidder has not yet been named. Dravo Contracting Co., Pittsburgh, bidding \$3940, submitted the only estimate April 21, to federal engineers at Pittsburgh for repairing four steel cargo box barges.



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THESE cold finished shafts, ground and polished to a smooth, unblemished, mirror-like surface, and produced to B & L standards of straightness, concentricity and uniformity, will enable you to build quality and accuracy into your product—and at minimum manufacturing costs because they are furnished true to size ready to use. In precision shafting applications, they save time and eliminate machining operations. For exposed members, they present a beautiful polished finish. Ask for Shafting Folder.

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- Screw Stock
- Special Sections
- Extra Wide Flats
- Alloy Steels

BLISS & LAUGHLIN, INC.

HARVEY, ILL. Sales Offices in all Principal Cities BUFFALO, N.Y.

for furnishing welded steel pipe for the Birmingham industrial water project, has been accepted by the government and contract awarded at more than \$1,250,000.

San Francisco—Interest in the plate market centers around the opening of bids May 4 for over 6000 tons for two freighters for the Matson Navigation Co., San Francisco. Bids have just been opened on 2700 tons of 12 and 16-inch welded steel pipe for Sheridan, Wyo. Alternate bids were taken on cast iron pipe. The largest letting involved 427 tons for ring beams and splice plates for the Fort Peck dam, Mont., and was placed with an unnamed interest. So far this year 50,721 tons have been placed, compared with 18,242 tons for the same period in 1935.

Seattle—Demand is improving, there being a good turnover in light gages for tank and repair work. Rert, gas and other tanks are included in plans, yet incomplete, for the new plant at Tacoma, Wash., of the Pennsylvania Salt Mfg. Co.

Contracts Placed

- 750 tons, marine work for Great Lakes Dredge & Dock Co., to Manitowoc Shipbuilding Corp., Manitowoc, Wis.
- 700 tons, for four tank barges, 170 x 35 x 8½ feet, for Standard Oil Co. of New Jersey, to Marietta Mfg. Co., Point Pleasant, W. Va.
- 427 tons, ring beams and splice plates for Fort Peck dam, Wiota, Mont., to unnamed interest.
- 230 tons, 13 tanks, Allied Industrial Alcohol Corp., Brooklyn, N. Y., to Chicago Bridge & Iron Works, Chicago.
- 190 tons, welded fuel tanks, Burrell-Mase Engineering Co., Pittsburgh, to Buffalo Tank Corp., Buffalo.

Contracts Pending

- 7475 tons, steel plate tunnel lining in 25-foot sections, Fort Peck tunnel No. 1; Chicago Bridge & Iron Works, Chicago, low at \$1,028,383.59 on bids of April 20.
- 6000 tons, two cargo ships for Matson Navigation Co., San Francisco; bids May 4.
- 2700 tons, 12 to 16-inch welded steel pipe, Sheridan, Wyo.; bids opened.
- 1800 tons, ten 195 x 35 x 11-foot steel barges, for River Terminal Corp., New Orleans.
- 500 tons, dredge, United States engineers, St. Paul.
- 300 tons, hopper dredge for United States engineers, San Francisco; bids postponed from April 12 to April 28.
- 180 tons, emergency gate shafts in tunnels; bids May 21, to United States engineers, Ft. Peck, Mont.
- 124 tons, pipe for Ralston Creek dam, Denver; bids May 12.
- Unstated, outlet diversion pipes for Arrowrock dam, Boise project, Idaho; bids May 1.
- Unstated Tooth Rock railroad tunnel, Bonneville project; Birkenmeier & Saramel, Portland, Oreg., low.

Sterling Grinding Wheel Co., Tiffin, O., May 1 will open a branch office and warehouse at 912 West Washington boulevard, Chicago, to

serve its western customers. At this branch the sales department for the western division will be concentrated.

Sheets

Sheet Prices, Page 90

Pittsburgh—Quantity differential method of pricing sheets may undergo some refinement soon, according to recommendations since its universal adoption on April 1. For example, galvanized sheets, which were not subjected to the quantity allowance scheme (other than the usual jobber's allowance), may be placed on the basis of hot and cold-rolled sheets. Furthermore, the time clause may be amplified inasmuch as many producers now are considering shipment within one week as constituting "shipment at one time". Obviously, shipment at one time, especially by hand mills, is a physical impossibility. Meanwhile, specifications for sheets have declined the past week to ten days, indicating that the spring buying peak was reached recently. Sheet mill operations find an average of 65-70 per cent maintained for common black, full finished and galvanized grades, although jobbing mills remain at about 50 per cent.

Cleveland—Northern Ohio sheet mills are operating at practically capacity, some booked well through May. Black and galvanized sheets have been most in demand, but heavier gage sheets now are believed involved in the new railroad car inquiries appearing. The state of Ohio received on its inquiry for 300 tons of auto-tag sheets the same price from 14 bidders. This tonnage was for second quarter delivery, but it is known that the total tonnage required will reach 1100 tons.

Chicago—Demand is strong, varied in character, and mill operations continue close to capacity. As shipments on first quarter specifications have declined, new orders have replaced a good share of producers' backlogs. Many consumers who did not buy far ahead in March have returned to the market. Substantial new business has been placed by automobile manufacturers, stove, refrigerator, and farm equipment companies. Jobbers' requirements show considerable expansion. Producers report favorable reception of second quarter prices.

Philadelphia — Sheet buying is slightly better as consumption continues brisk and some consumers have used practically all the tonnage contracted before present prices were effective. New buying, however, is still far from active. New

extras are holding on such business as is now being offered.

Cincinnati—There is a steady inflow of orders for sheets, supporting district mill rolling schedules near capacity. Backlogs are fair. Rising volume is chiefly from the automobile requirements, and other demand is likewise heavy. Almost all of the tonnage on first quarter contracts has been shipped.

St. Louis—Business in steel sheets has undergone further expansion and buying is well diversified. Demand for galvanized is showing particular improvement, heavy tonnages moving to the rural areas and for special jobs. The leading local producer is operating its corrugating department at close to capacity and expects a still higher schedule during the next week or ten days. Stove, implement, refrigerator and railroad interests are the chief purchasers.

Birmingham, Ala.—Demand for sheets is active and there is no change in production. Sales are being made from warehouse stock as well as mills.

Seattle—Jobbers report a good volume for general repair work and miscellaneous building projects. The largest award in some time, 420 tons of blue annealed, was taken by Gulf States Steel Co., Birmingham, Ala., for the Tacoma concrete pipe line, through American Concrete & Steel Pipe Co., Tacoma, Wash. The same firm also let a tonnage of mesh wire for the same job to Spencer Steel Products Inc., New York.

Transportation

Truck Material Prices, Page 91

Chesapeake & Ohio has issued an inquiry for 5400 freight cars, which will require close to 54,000 tons of steel and Pere Marquette asks bids on 500 automobile cars. Nickel Plate will award 777 freight cars this week on the inquiry which has been current for some time.

Missouri Pacific has withdrawn its inquiry for 1500 box and 500 hopper cars on account of delay in providing for financing by equipment trust certificates. The inquiry probably will be reissued about the middle of the year.

New York, New Haven & Hartford will spend about \$750,000 for alterations to more than 2500 box and coal cars to conform to interchange provisions of railroad association rules, which will become effective in January.

Two western railroads are in the market for about 10,000 tons of rails. Los Angeles harbor commission has bought 403 tons of relays and is

in the market for 400 tons of relayers for Wilmington, Calif. Long Beach, Calif., has closed for 603 tons of relayers.

Nashville, Chattanooga & St. Louis has placed 3425 tons additional of rails with Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., and sufficient accessories.

Norfolk & Western has placed about 2000 tons of plain carbon steel, largely angles and 20-inch beams, with Steel Corporation and Bethlehem mills, mainly the former. About 500 tons of high tensile steel stakes for Norfolk & Western cars will be supplied by Ralston Steel Car Co., Columbus, O., and Virginia Bridge & Iron Co., Roanoke, Va., the latter also participating in furnishing about 1000 hopper bottoms.

Car Orders Placed

Wheeling & Lake Erie, 50 automobile cars, to own shops at Toledo, O.

Rail Orders Placed

Municipal Railway, San Francisco, 257 tons 110-pound rails, to Bethlehem Steel Co., Bethlehem, Pa.
Nashville, Chattanooga & St. Louis, 3425 tons, to Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.; sufficient accessories also placed.

Car Orders Pending

Chesapeake & Ohio, 5400 cars, bids asked; includes 3500 hoppers, 500 coal gondolas, 250 low-side gondolas, 1000 box cars, 150 automobile.
Norfolk Southern, nine light-weight coaches, including three passenger coaches, three passenger and baggage, three baggage and mail; bids asked.
Pere Marquette, 500 automobile cars; bids asked.

Buses Booked

A. C. F. Motors Co., New York: Eight 35-passenger and two 36-passenger for Capital Transit Co., Washington; four 42-passenger and three 40-passenger for Worcester Street Railway Co., Worcester, Mass.; five 42-passenger for Boston Elevated Railway, Boston; five 34-passenger for Blue Way Lines Inc., Springfield, Mass.; two 30-passenger for Des Moines Railway Co., Des Moines, Iowa.
Twin Coach Corp., Kent, O.: Fifteen 30-passenger for San Antonio Public Service Co., San Antonio, Tex.; eleven 30-passenger for Northern Texas Traction Co., Fort Worth, Tex.; ten 30-passenger for Milwaukee Electric Railway & Light Co., Milwaukee; ten 40-passenger for North Shore Bus Co., Flushing, L. I.; nine 30-passenger for Tennessee Public Service Co., Knoxville, Tenn.; five 37-passenger for Boston Elevated Railway, Boston; four 23-passenger for Erie Coach Co., Erie, Pa.; three 23-passenger for San Jose Railroads, San Jose, Calif.; two 30-passenger for Louisville Railway Co., Louisville, Ky.
White Motor Co., Cleveland: Five 23-passenger for Duke Power Co., Spartanburg, S. C.; five 39-passenger for Blue & Gray Sightseeing

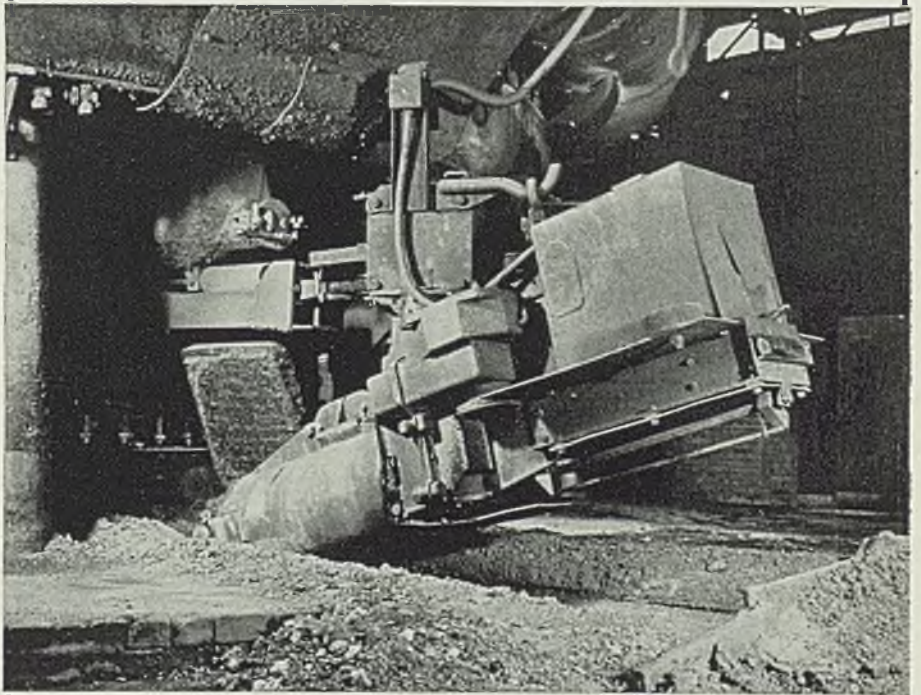
Tours, Baltimore; ten 17-passenger for Buckeye Stages Inc., Columbus, O.; three 23-passenger for Chicago Heights Transportation Co., Chicago Heights, Ill.; three 23-passenger for Interurban Bus Line, Newark, N. J.; two 25-passenger for Virginia Stage Lines, Baltimore; two 32-passenger for Grand Rapids Railroad Co., Grand Rapids, Mich.; two 23-passenger for C. & L. E. Bus Co., Cincinnati; two 23-passenger for Club Transportation Co., New York; two 20-passenger for John M. Grant Inc., New York; two 21-passenger for Foster Bus Lines, St. Louis; two 23-passenger for Buffalo-Lackawanna Transit Corp., Buffalo; two 32-passenger for Emerson Bus Co., Stapleton, L. I., N. Y.

Pipe

Pipe Prices, Page 91

Pittsburgh — Pipe mills, which are operating at an average of 50-55 per cent continue to find sustained demand in oil country goods, mechanical tubing and specialty tubes to the comparative absence of line pipe and standard pipe orders. Pipe jobbers are benefiting from several attractive orders last week from western Pennsylvania coal

One of these BROSIOUS Two-Motor Electric Mechanical Clay Guns in the Pittsburgh District made 890 continuous full pressure stops before the furnace was banked, another made 715 before the furnace was blown out for relining, another just recently put in service in Birmingham District has made more than 600 to date, and another put in service two months ago in Colorado is following the same practice. Stopping under full wind pressure continuously is standard practice with this gun and, if necessary, the hole can be stopped with the iron flowing full.



Patented in the United States & Foreign Countries

EDGAR E. BROSIOUS, Inc.

Sharpsburg Branch
PITTSBURGH, PA.

PRODUCTS: Steam, Hydro-Electric, and Electric-Mechanical Clay Guns, Motor and Hand Operated Goggle Valves, Hot Blast Valves, Stock Line Indicators, Motor Driven Cinder Notch Stoppers, Flue Dust Conditioners, Blast Furnace Slag Granulating Machines, Coke Testing Tumbling Barrels, Automatic Dump Buckets, Single Hook Grab Buckets, Automatic Single Hoist Grab Buckets, Auto Floor Charging Machines for serving Heating and Melting Furnaces, Auto Floor Manipulators for serving Steam Hammers, Presses, Etc.

Distributor for Continental Europe: Dango & Dienenthal, Siegen, Westphalia, Germany

mines, covering tubular products to be used in rehabilitation of flooded shafts. Discounts on all tubular products are without quotable change and the market is fairly firm.

Chicago—Cast pipe awards for government and municipal projects, while small, are in fairly heavy volume, and tending to increase. Pipe has not been purchased as yet for many jobs on which general contracts were placed earlier in the year, and these are expected to develop into orders this quarter. Some producers are building up stocks. Demand for

line pipe is quiet. Prices are steady.

New York—No new awards of size are reflected in the cast pipe market here, and no new projects of size are pending. In fact, the market is unusually quiet.

Commercial pipe and tubular demand shows sharp improvement over two months ago, although volume as compared with March is about unchanged. Approximately 1600 tons of pipe and tubes is now being placed for oil refinery development in Texas City, Tex.

San Francisco—Demand for cast pipe is lagging, and only two projects

in excess of 100 tons are pending. The largest calls for over 4100 tons of 16-inch pipe for Sheridan, Wyo., bids on which have been opened.

Seattle—New projects are developing slowly, and a few jobs are pending. Seattle will receive bids April 30 for an unstated tonnage for a waterworks extension. Elmira, Wash., is considering an improvement program involving about 110 tons.

Strip Steel

Strip Prices, Page 91

Pittsburgh — Bookings of hot and cold-rolled strip steel tonnage in this district showed a decline last week, explainable largely by the automotive assembly forecast for late May and early June requirements. Current specifications, however, are adequately testing the new quantity differential system, which names 1.85c, base, Pittsburgh, for 1 to 25-ton lots on hot-rolled and 2.60c, base, Pittsburgh or Cleveland, for 3 to 25-ton requirements to be shipped at one time on cold-rolled strip steel.

Cleveland—Wide and narrow strip orders continue to be received in good volume from a wide variety of consumers. Shipments of some of the wider widths are beginning to fall behind, and delivery dates are being extended. Some mills are unable to name a delivery date earlier than toward the middle or end of June.

Chicago — Specifications for hot and cold strip have increased moderately, as a larger volume of new buying for prompt shipment has supplemented shipments on orders placed in March. No recession is noted in releases from automobile manufacturers and partsmakers. Second only to automotive requirements is the aggregate of miscellaneous tonnage. Farm manufacturers are taking considerable tonnage. Demand from building and hardware interests is light.

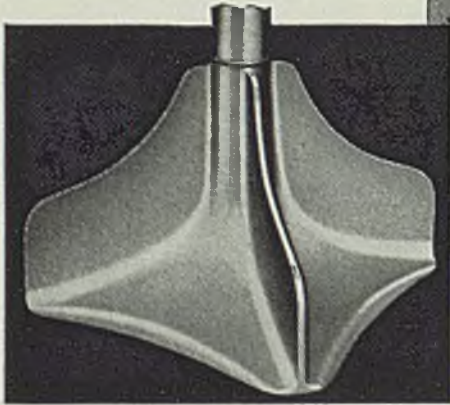
Wire

Wire Prices, Page 91

Pittsburgh — Specifications covering manufacturing wire items declined last week compared with the week preceding. However, merchant wire products showed no appreciable change from their former rather low volume. Pittsburgh base prices on plain manufacturing wire remain at 2.30c, spring wire, 3.05c and nails, \$2.10 per keg.

Chicago—After strong demand in March and the first half of April.

We've changed this for the better!



Another Casting Problem solved by PERMITE!

NO longer need women use old-fashioned methods, or old-fashioned washers. Not when the washing machine agitator is a Permite Aluminum Alloy Casting—giving a better product at lower cost . . . The smooth finish of the casting, combined with close dimensional tolerance, means lower finishing and machining costs. Uniformity of dimensions and weight is assured by Permite's permanent mold casting process. Lighter weight (only two-fifths as heavy as cast iron) means lower shipping costs and less power required to operate the washer . . . Put your casting problems up to Permite. Perhaps we can help you also, to improve your product or reduce costs or both . . . Write for full information or send blueprints for recommendations today.

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PERMITE *Aluminum* ALLOY CASTINGS

best since 1929, the volume of new business shows a moderate decline, which producers consider temporary, pending absorption of consumers' stocks. Farm buying is picking up and more railroad business is anticipated shortly. Second quarter prices so far have received little test.

New York—Notwithstanding substantial specifications placed before the price advance at the beginning of this quarter, a moderately good volume of new business is being booked in wire products. It is scarcely sufficient to give the new prices real test, but it is expanding. Sellers declare that fabrication of wire for miscellaneous purposes is probably the heaviest so far this year.

taking 15,000 tons, will be readvertised early in May. A Chicago district producer has booked approximately 1000 tons in small miscellaneous lots.

Philadelphia—School and bridge work features a rather sluggish market. McCloskey & Co. was low on a vocational school at Ninth and Mifflin streets, requiring 5000 tons including 1700 tons bars, but bid exceeded appropriation so there is possibility of delay. Superstructure for a school at Twenty-second and Lehigh streets requiring a similar tonnage is ex-

pected up shortly. District fabricators are figuring on 3000 tons for army hangars at Hawaii, bids to open early in the week of April 27. Several bridge jobs have been placed and more are pending.

St. Louis—Freer specifications for structurals for highway, bridge and some private projects during the past week or ten days are reflected in noticeable betterment in the structural shape market. Operations at fabricating plants have been increased moderately, and the present rate is assured for some weeks. Low

Shapes

Structural Shape Prices, Page 90

Pittsburgh—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has an inquiry current for 2000 tons of fabricated structural steel for a five-story warehouse addition to its Mansfield, O., works. Fort Pitt Bridge Works has contracted for 917 tons for a state bridge in Lawrence county, Pennsylvania, through Holmes Construction Co., Wooster, O. The same company received sub-contract for its Massillon, O., shops to fabricate about 3000 tons of split I-beam sections for the congressional library bookracks, Washington, sublet through Snead & Co., Jersey City, N. J. A weakness in fabricated steel prices is noticed from recent state highway awards. On a job opened April 17, the low general contractor submitted a steel sub-contract estimate of \$3 a ton beneath that of the lowest direct bid by any fabricating shop.

Chicago—Both public and private work is increasing moderately. Largest pending project is the Chicago outer drive system. For the Randolph street bridge in this system, requiring 3000 tons, Joseph T. Ryerson & Son Inc. was low on bid of April 21. The outer drive bridge proper,

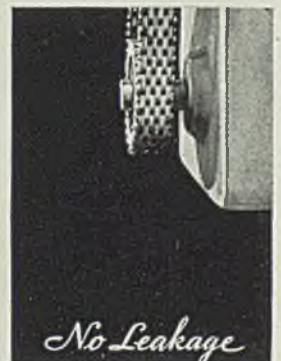
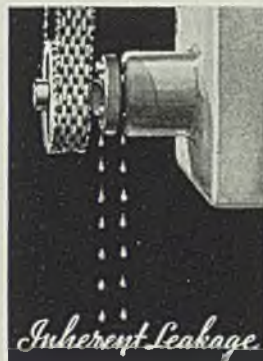
Shape Awards Compared

	Tons
Week ended April 24	13,328
Week ended April 17	18,991
Week ended April 10	18,507
This week, 1935	14,052
Weekly average, 1935	17,081
Weekly average, 1936	20,004
Weekly average, March	15,069
Total to date, 1935	263,748
Total to date, 1936	340,061

HOW TO REDUCE SPACE WHEN DESIGNING MODERN MECHANISM

INSTEAD of using extended bearings and a battery of felt washers, packing or stuffing boxes in an effort to retain lubricants around rotating shafts, you can simplify the entire assembly, save space, reduce cost of castings and other materials by simply applying National Oil and Fluid Seals.

Incorporate these seals in your new designs. The actual saving you will effect in materials alone will usually more than offset the cost of the Seals.



THE OLD WAY

Ungainly housings and longer shafts used to make room for stuffing boxes, packing, etc., not only require space but fail to solve the problem of leakage.

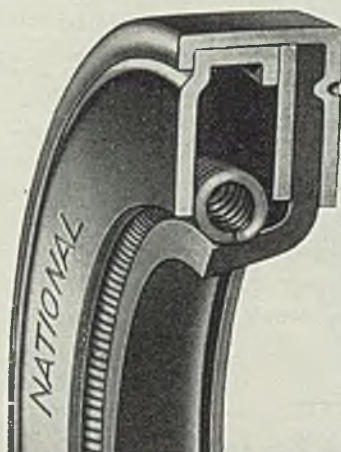
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National Seals are the modern method of protecting bearings. They are the proven Seal incorporating sound engineering principles for imprisoning lubricant or excluding extraneous matter. National Seals are made for all shaft sizes in types suitable for varied applications.

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bidders on general contracts for the Fifteenth street and Sixteenth street viaducts, Kansas City, Mo., were respectively, List Construction Co., Kansas City, 620 tons and M. E. Gilloiz, Monette, Mo., 850 tons. Kelly & Underwood, Granby, Mo., was low bidder on general contract for state of Missouri highway bridge calling for 155 tons of structurals.

New York—Numerous awards aggregating approximately 4000 tons featured the market. The list of pending work was increased by 12 new projects, aggregating 5650 tons.

Outlook for the placing of business during the remainder of the second quarter continued promising. Plain structural steel is unchanged at 1.90c, base, Bethlehem, Pa.

San Francisco—The market was active with awards aggregating 2937 tons to bring the total for the year to 42,087 tons, compared with 24,232 tons for the corresponding period last year. Unnamed interests secured 672 tons for two bridges for the All-American canal project, Yuma, Ariz. Minneapolis-Moline Power Implement Co., Minneapolis, booked

540 tons for berth No. 155, Wilmington, Calif. Unnamed interests took 350 tons of steel sheet piling for the extension to a quay wall in Pearl Harbor, T. H. Bids have been opened on 105 tons for an overcrossing near Pueblo, Pueblo county, Colorado.

Seattle—Inquiry is fairly active with several large jobs up for figures. The week's largest award, 700 tons for the Boeing airplane assembly plant, Seattle, was taken by Pacific Car & Foundry Co., Seattle. Bids for the Boulder Canyon project were opened by the reclamation bureau at Denver April 16, involving 672 tons of shapes and 55 tons of steel piling. Parker & Schram, Portland, Oreg., is low at \$289,416 for a state overpass in Clackamas county, Oregon, and P. L. Crooks & Co., Portland, at \$76,476 for an undercrossing at Bend, Oreg. Bids were opened April 24 by Oregon for the \$300,000 proposed state bridge at Portland.



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While merely piled at random, every inch of this rod will be baked thoroughly and evenly in this Morrison oven. Recirculating forced convection puts uniform heat into every portion of every coil. Time is saved in loading trucks. Drawing operations are aided by the perfect condition of the rod. This new two-alley Morrison oven completes its normal run in one hour; replacing and out-producing older equipment of six-alley capacity requiring three to four hours per charge. This same practical economy can work for you in your own mill.

Other Morrison equipment is designed for annealing, heat-treating, and galvanizing; tank and pot heating; and other industrial process heating applications utilizing the recirculating forced convection method.



Morrison Engineering Co., Inc.
5005 EUCLID AVE. CLEVELAND, OHIO

Shape Contracts Placed

- 1850 tons, 302 transmission towers for Tennessee Valley authority, to American Bridge Co., Pittsburgh.
- 950 tons, South Valley junction approach, East St. Louis, Ill., to Mississippi Valley Structural Steel Co., Decatur, Ill.
- 860 tons, state viaduct, Albuquerque, N. Mex., to Bethlehem Steel Co., Bethlehem, Pa.
- 800 tons, six bridges over New York Central railroad, New York, to Bethlehem Steel Co., Bethlehem, Pa.
- 755 tons, mid-town Hudson tunnel ventilation building, to Fort Pitt Bridge Works, Pittsburgh.
- 700 tons, bridge, Jackson county, Missouri, to Wisconsin Bridge & Iron Co., Milwaukee.
- 700 tons, assembly plant for Boeing Aircraft Co., Seattle, to Pacific Car & Foundry Co., Seattle; Austin Co., Seattle, general contractor.
- 672 tons, two bridges for All-American canal, Boulder Canyon project, Yuma, Ariz., to unnamed interest.
- 600 tons, home for Jewish aged, Brooklyn, N. Y., to Ingalls Iron Works Co., Birmingham, Ala.
- 545 tons, school building, Marcellus, N. Y., to Smith & Caffrey Co., Syracuse, N. Y.
- 489 tons, state bridge, Peoria, Ill., to Vincennes Steel Co., Vincennes, Ind.
- 400 tons, machine shop, Chrysler Corp., Detroit, to Jones & Laughlin Steel Corp., Pittsburgh. This contract additional to a 400-ton machine shop addition recently placed by Chrysler Corp. with R. C. Mahon Co., Detroit.
- 375 tons, warehouse for Owens-Illinois Glass Co., Streator, Ill., to Bethlehem Steel Co., Bethlehem, Pa.
- 365 tons, railroad bridge, Philadelphia, to American Bridge Co., Pittsburgh.
- 350 tons, sheet piling, extension to quay wall, specification 8014, Pearl Harbor, T. H., to unnamed interest.
- 300 tons, bridge, Cresson, Pa., to Phoenix Bridge Co., Phoenixville, Pa.
- 280 tons, Pennsylvania state highway bridge, Bloomsburg, Pa., to Pittsburgh-Des Moines Steel Co., Pittsburgh.
- 275 tons, bridge, Columbia county, Penn-

sylvania, to Pittsburgh-Des Moines Steel Co., Pittsburgh.
 250 tons, section 130, SF, Lake Forest, Ill., to Milwaukee Bridge Co., Milwaukee.
 214 tons, viaduct at Whitefish, Flathead county, Montana, to unnamed interest.
 200 tons, mill building, Fostoria, O., to Fort Pitt Bridge Works, Pittsburgh.
 175 tons, state highway bridge, Radford, Va., to Virginia Bridge & Iron Co., Roanoke, Va.
 170 tons, dormitory for state school, Grafton, N. Dak., to American Bridge Co., Pittsburgh.
 170 tons, state highway bridge, St. Lawrence county, New York, to Jones & Laughlin Steel Corp., Pittsburgh.
 170 tons, state bridge, Bureau county, Illinois, to Illinois Steel Bridge Co., Jacksonville, Ill.
 165 tons, state highway bridge, Coshoc-ton and Muskingum counties, Ohio, to Burger Iron Co., Akron, O.
 130 tons, grade crossing elimination, Wharton, N. J., to American Bridge Co., Pittsburgh.
 130 tons, bridge repairs, Pennsylvania railroad, Tuckahoe, N. J., to Phoenix Bridge Co., Phoenixville, Pa.
 130 tons, trestle and bins, Ohio Valley Coal Co., Elm Grove, W. Va., to Riverside Steel Casting Co., Newark, N. J.
 125 tons, bridge, Knox county, Nebraska, to American Bridge Co., Pittsburgh.
 125 tons, bridge repairs, Trafford, Pa., to Pittsburgh Bridge & Iron Works, Rochester, Pa.
 110 tons, chemistry building, University of Delaware, Newark, Del., to Bethlehem Steel Co., Bethlehem, Pa.
 105 tons, under-crossing, Rocker, Silver Bow county, Montana, to unnamed interest.
 101 tons, under-crossing, Granger, Sweetwater county, Wyoming, to unnamed interest.
 100 tons, tunnel ribs, bid 55,719, metropolitan water district, Los Angeles, to Consolidated Steel Corp., Los Angeles.
 100 tons, power house, Marshfield, Oreg., to Northwest Steel & Equipment Co., Vancouver, Wash.

Shape Contracts Pending

15,000 tons, outer drive bridge, Chicago; to be readvertised in five sections.
 3000 tons, Randolph street viaduct, part of Chicago outer drive system; Joseph T. Ryerson & Son Inc., Chicago, low.
 2000 tons, five-story warehouse addition, Mansfield, O., for Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.; Rust Engineering Co., Pittsburgh, awarded general contract.
 1600 tons, Kings county hospital, nurses home, Brooklyn, N. Y.; Riess & Weinsier, Brooklyn, low.
 1500 tons, St. Luke's hospital addition, New York; general contract to Marc Eidlitz & Son, New York.
 1200 tons, various state highway bridges, scattered locations, New York.
 1000 tons, state grade crossing elimination, Joliet, Ill.
 1000 tons, building for bureau of printing and engraving, Washington; bids opened April 24.
 800 tons, Rackham school, University of Michigan, Ann Arbor, Mich.
 800 tons, building, Gordon Baking Co., Long Island City, N. Y.
 700 tons, state bridge, Frackville, Pa.; bids May 1.
 650 tons, steel truss bridge, Westmoreland county, Pennsylvania; John F. Casey Co., Pittsburgh, low on April 17 bids; includes 69 tons

of plain steel bars.
 650 tons, Bennings viaduct, Washington, for Baltimore & Ohio and Pennsylvania railroads.
 610 tons, two state highway bridges, Gladstone and Negaunee, Mich.
 600 tons, school, Norwalk, Conn.
 500 tons, club house and grandstand, Roosevelt field, Hempstead, N. Y.
 500 tons, tunnels, Golden Gate bridge road project, Sausalito, Calif.; T. E. Connelly, San Francisco, low on general contract.
 425 tons, building for Campana Sales Co., Batavia, Ill.
 405 tons, over-crossing near Pueblo, Pueblo county, Colorado; bids opened.
 400 tons, plant for Pipe & Tube Bend-

ing Corp. of America, Newark, N. J.
 313 tons, deck plate girder underpass, Cambria county, Pennsylvania; G. A. & F. M. Wagman, Dallastown, Pa., low on April 17 bids; includes 29 tons of plain steel bars.
 300 tons, three-span pony truss bridge, Bedford county, Pennsylvania; Pittsburgh-Des Moines Steel Co., Pittsburgh, low on April 17 bids; includes 37 tons of plain steel bars.
 300 tons, addition to federal land bank building, Baltimore.
 300 tons, hospital, Hackensack, N. J.
 280 tons, state highway bridge, Swanton, Vt.
 275 tons, state highway bridge, Mt. Pocono, Pa.
 270 tons, high school, Gouverneur, N. Y.

SPECIAL SEAMLESS SHELLS SHAPES

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DEEP DRAWN TANKS, BOTTLES, ETC.

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This Seamless Drawn Tank is
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Stamping Specialists Since 1896

An Experience You Should Not Overlook
Send Us Your Next Specification

THE CROSBY COMPANY

BUFFALO, N. Y.

NEW YORK — CHICAGO — PHILADELPHIA — DETROIT — CLEVELAND

230 tons, state highway bridge, Pasco, Wash.
 215 tons, state highway bridge, Andover street, Lawrence, Mass.; bids taken April 23.
 200 tons, hopper dredge for United States engineers, San Francisco; bids postponed until April 23.
 200 tons, school, Montgomery, N. Y.
 196 tons, under-crossing, Reno, Nev.; J. F. Knapp Co., San Francisco, low on general contract.
 150 tons, South Brooklyn Savings Bank building, Brooklyn, N. Y.
 147 tons, 81 tons fabricated structural steel, 66 tons plain steel bars, state highway work, Lancaster county, Pennsylvania; bids May 8.
 122 tons, Pennsylvania state highway

department garage, Greensburg, Pa.; bids taken at Harrisburg, Pa., April 22.
 100 tons, German Masonic temple, 220 East Fifteenth street, New York.
 Unstated, state overpass, Clackamas county, Oregon; Parker & Schram, Portland, Oreg., low.
 Unstated, state under-crossing, Bend, Oreg.; P. L. Crooks & Co., Portland, Oreg., low.
 Unstated, \$300,000 state bridge, Portland, Oreg.; bids in.

Pennsylvania Pump & Compressor Co., Easton, Pa., has appointed Lieb-Jackson Inc., 337 South High street, Columbus, O., to represent it in the Columbus district.

Reinforcing

Reinforcing Bar Prices, Page 91

Pittsburgh—Fort Pitt Bridge Works has taken the reinforcing steel bar requirements for a bridge in Lawrence county, Pennsylvania, for the Holmes Construction Co., Wooster, O. Approximately 184 tons of plain bars are involved. State highway awards are still a market feature, with attractive lots included in bids requested for April 24, May 1 and May 8. The market on new billet bars is generally quoted 1.95c to 2.05c, base, Pittsburgh.

Chicago—Numerous small awards make up a fairly substantial tonnage, while state projects up for figures indicate a larger volume shortly. Illinois, Wisconsin and Indiana highway departments are taking bids on jobs aggregating 1800 tons. Outdoor construction work has increased, and contractors are pressing for deliveries on material for which they received protection earlier in the year. Prices are steadier.

New York—Lettings are small and the amount of new work coming out for bids shows a tendency to taper off. The price situation is not yet fully tested but, as previously noted, there is more of a tendency to quote 2.40c, base, delivered, plus \$2 a ton for trucking to the building site, on new billet bars.

Philadelphia—Two pending school jobs, requiring approximately 1700 tons each, feature the market. Specifications are expected to be issued soon on the one at Twenty-second and Lehigh streets. Bid on the Ninth and Mifflin street school exceeded appropriation, however, so both projects may be delayed.

San Francisco—Over 2500 tons were placed, bringing the aggregate for the year to 81,675 tons as compared with 39,100 tons for the corresponding period in 1935. The largest award went to Carnegie-Illinois Steel Corp., 979 tons for the bureau of reclamation, to be delivered at Odair, Wash. Unnamed interests

Drop Forgings

What can compare with drop forgings for parts that must be accurate to design; uniform; reliable; easily machinable and with a minimum finish allowance; capable of treatment to develop almost any desired quality—high strength with light weight, fatigue resistance, resistance to wear? Attempts to find a substitute only add emphasis to the drop forging's outstanding superiority.

This advertisement, first printed four years ago, is repeated, cooperating with the campaign of the commercial drop forge shops to promote the use of drop forgings. Consult any of these shops for assistance in applying drop forgings to improve your product and reduce your costs.

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Concrete Awards Compared

	Tons
Week ended April 24	4,627
Week ended April 17	4,875
Week ended April 10	3,078
This week, 1935	1,712
Weekly average, 1935	6,862
Weekly average, 1936	7,302
Weekly average, March	7,980
Total to date, 1935	93,091
Total to date, 1936	124,130

took 315 tons for an extension to a quay wall in Pearl Harbor, T. H., and 225 tons for the Hodges reservoir, San Diego, Calif. Bids open May 21 for gate shafts for the Fort Peck dam, Mont., calling for over 540 tons.

Seattle—Local mills are busy with pending business but there are few new projects of importance. The weeks awards included 525 tons of hot-rolled rods and 36 tons of plates, to Gulf State Steel Co., Birmingham, Ala., by American Concrete & Steel Pipe Co., Tacoma, Wash., for a concrete pipe job in Tacoma, and 300 tons to Northwest Steel Rolling Mills, Seattle, for cement storage bins for the Superior Portland Cement Co., Concrete, Wash. Bids were opened by bureau of reclamation, Denver, April 16, for the Boulder Canyon overpass involving 640 tons.

Reinforcing Steel Awards

- 979 tons, bureau of reclamation, invitation 38,229-A for delivery at Odair, Wash., to Carnegie-Illinois Steel Corp., Chicago.
- 600 tons, waterworks project, Cincinnati, to Joseph T. Ryerson & Son Inc., Chicago.
- 561 tons, (including 36 tons plates) Tacoma, Wash., pipe line, to Gulf States Steel Co., Birmingham, Ala.; American Concrete & Steel Pipe Co., Tacoma, Wash., general contractor.
- 375 tons, bridge, Lake county, Illinois, to Calumet Steel Co., Chicago.
- 315 tons, extension to quay wall, specification 8014, Pearl Harbor, T. H., to unnamed interest.
- 300 tons, cement storage bins for Superior Portland Cement Co., Concrete, Wash., to Northwest Steel Rolling Mills, Seattle.
- 225 tons, Hodges reservoir, San Diego, Calif., to unnamed interest.
- 200 tons, underpasses for Soo Line railroad, Hayward, Wis., to Bethlehem Steel Co., Chicago.
- 200 tons, government warehouse, Peoria, Ill., to Bethlehem Steel Co., Bethlehem, Pa.
- 200 tons, storage building for Century-Fox Film Corp., Los Angeles, to unnamed interest.
- 184 tons, reinforced concrete bridge, Lawrence county, Pennsylvania, to Fort Pitt Bridge Works, Pittsburgh, through Holmes Construction Co., Wooster, O.
- 100 tons, alterations, Barton high school, San Pedro, Calif., to unnamed interest.
- 100 tons, state grade crossing elimination, Westfield, N. J., to Igoe Bros., Brooklyn, N. Y.
- 100 tons, Laurelton Parkway, Queens, N. Y., to Concrete Steel Co., New York, through Wilson & English Construction Co., New York.

Reinforcing Steel Pending

- 6000 tons, building for bureau of printing and engraving, Washington; bids April 24.
- 1700 tons, school, Ninth and Mifflin streets, Philadelphia; McClosky & Co., Philadelphia, low; bid exceeded appropriation.
- 1700 tons, school, Twenty-second and Lehigh streets, Philadelphia; specifications expected soon.
- 800 tons, state road work, Indiana; bids

- April 27.
- 640 tons, Boulder Canyon overpass; bids in at Denver.
- 500 tons, state road work, Illinois; bids being taken.
- 500 tons, state road work, Wisconsin; bids being taken.
- 200 tons, building for Dole Valve Co., Chicago.
- 200 tons, pump house and reservoir; R. C. Wieboldt & Co., Chicago, general contractor.
- 161 tons, highway work, Butler county, Pennsylvania; McCrady Construction Co., Pittsburgh, general contractor on April 9 bids.
- 150 tons, Naugatuck river bridge, Seymour, Conn.; A. I. Sabin, Hartford, Conn., low.
- 150 tons, high school addition, Wauke-

sha, Wis.; R. L. Reisinger & Co., Milwaukee, general contractor.


Pig Iron

Pig Iron Prices, Page 92

Pittsburgh — Shenango Furnace Co., Pittsburgh, blew in its No. 1 merchant furnace at Sharpville, Pa., last week, after the stack had been on bank since mid-January. Davison Coke & Iron Co. continues in blast with its Neville Island, Pa.,

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ONLY ONE
LOGICAL
MATERIAL**

**WYCKOFF
COLD DRAWN STEEL**



WYCKOFF DRAWN STEEL COMPANY

General Offices: First National Bank Bldg., Pittsburgh, Pa.
Mills at Ambridge, Pa. and Chicago, Ill.

WHERE SIZE

TRUE CROSS SECTION . . .

ACCURACY

STRAIGHTNESS

MACHINABILITY

AND SUPERIOR

SURFACE CONDITION . . .

ARE ESSENTIAL

merchant furnace, and Hanna Furnace Co. is considering lighting an additional furnace at Buffalo for the merchant trade. Pig iron requirements continue to be without much feature. Prices are steady.

Cleveland—Blast furnace interests are maintaining a steady shipping rate, with most shipments involving foundry and malleable grades. Auto partsmakers still are the best single customers, although other users are increasing in number but for small or moderate tonnages.

Chicago—Heavy shipments to agri-

cultural implement manufacturers, automobile and railroad foundries, and well diversified demand contribute to a strong situation in pig iron. Implements give no indication of a letdown, while automobile and railroad deliveries show further moderate gains. Consumption is at the highest point of the year. New buying is restricted to early requirements. Prices are firm.

New York—Sellers look for improved buying soon. Melt shows gradual expansion and it is believed that in the next two or three weeks

a material portion of the iron specified in March against contracts placed before the advance last November will be absorbed. The New York state barge canal will be officially opened April 27, according to reports, and there will probably be a good movement of iron as stocks at foundries using the canal are about depleted.

Philadelphia—Sizable orders for pig iron are scattered, with general volume light and showing little change so far this month. Foundry melt is expanding slowly, but a number of consumers still are drawing on stocks placed last quarter. Outlook is for better buying in May. Foreign iron is more in evidence, with substantial concessions noted in some cases.

Buffalo—Wickwire Spencer Steel Co. is reported preparing its blast furnace for operation, although the date of blowing in is as yet uncertain. Much of the steelworks production is being concentrated on malleable. Orders for merchant iron were slow this month after a fair start, and inability to move tonnage by water will hold down shipments substantially below the expectations of the trade.

Cincinnati — Shipments, although gradually expanding, are not yet attuned to the melt, which has improved to about 65 per cent. Much iron is being taken from stocks, but this supply is diminishing, as spot business attests. Forward contracting is not general and there is no inquiry. The market is holding firm.

St. Louis—Steady expansion in melt has been in progress since the final week of March, with the average now being the highest of the year. Shipments are also increasing, indications pointing to a heavier total than a year ago. In view of the size of the melt, new buying is disappointing, users being disposed to fill only nearby needs. Farm implement industry continues to figure heavily in the melt. Jobbing plants have stepped up operations, and recent orders include a broad diversity of castings. Stove plants have increased operations.

Birmingham, Ala. — Delivery is not as active as it has been, but production continues at a steady pace, with 12 blast furnaces producing.

Toronto, Ont.—Demand for merchant iron again is showing improvement and sales are running about 1300 tons weekly. Inquiries are appearing, and while a few melters have booked for second quarter delivery, the majority are taking iron on a spot basis only. Dominion Steel & Coal Corp., Sydney, N. S., is reported to have blown in its No. 1 blast furnace. Prices are firm.



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GARAGE IN CONNECTION

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DETROIT

Scrap

Scrap Prices, Page 93

Pittsburgh — Faced with considerably heavier inbound shipments of scrap here, consuming mills the past week began issuing embargoes or had placed scrap shipments on a regulated basis. Consequently, the market took on a further tone of weakness and reductions of 25 to 50 cents a ton occurred through practically the entire list. The No. 1 steel market remains nominal at \$15.50 to \$16, and in spite of brokers' willingness to sell at \$15.50, no new sales were reported. This week the market faces a severe test in absorbing the May railroad lists, chief among which is the Pennsylvania including 8000 tons of No. 1 steel, 3140 tons of rails and numerous other items.

Cleveland—Some slight easiness in some minor grades of iron and steel scrap is noted, but the heavier grades seem to have maintained their equilibrium and are unchanged. Borings, No. 2 busheling and machine shop turnings in Cleveland are down 25 cents. In the Youngstown district turnings have been marked down 50 cents.

Good grades of heavy scrap continue difficult to obtain even at the market. Heavy steel and pressed sheets are firmly held. The Pennsylvania list, which came out several days ago, is comparatively small, containing about 25,000 tons of all grades, including 8000 tons of heavy melting. Other railroad lists are expected to be put out shortly.

Chicago—Scrap is moving freely on contracts, but little new buying was done during the week, and prices were unchanged. No. 1 heavy melting steel apparently is firm at \$14.25 to \$14.50, with reports of moderate purchases at the higher figure. The Rock Island disposed of 117 carloads of 40 to 50 tons each in the Chicago and tri-cities districts, and on some of the choice heavy melting tonnages it was reported, though not confirmed, that \$14.70, delivered, was paid. Offerings are not heavy, but steel mills are not buying as briskly as in March.

Boston — A sharp advance in the price of railroad malleable scrap has developed here. Consumers now are paying \$16.75 to \$17.25, delivered, compared with the former price of \$15 to \$16. On the other hand, dealers have dropped by 75 cents to \$1 a ton their buying prices on chemical cast iron borings, now quoted at \$7.25 to \$7.75 f.o.b. cars.

New York—The export market in scrap has been stimulated further

by the placing of a large new order from Japan. While the price is not revealed, it is said to be the highest so far done on export business. Since the placing of this order dealers' buying prices on scrap have moved up. No. 1 heavy melting steel delivered on New York or Brooklyn docks for export now is being bought by dealers at \$10 to \$10.50, with the range on No. 2 or auto steel \$9 to \$9.50.

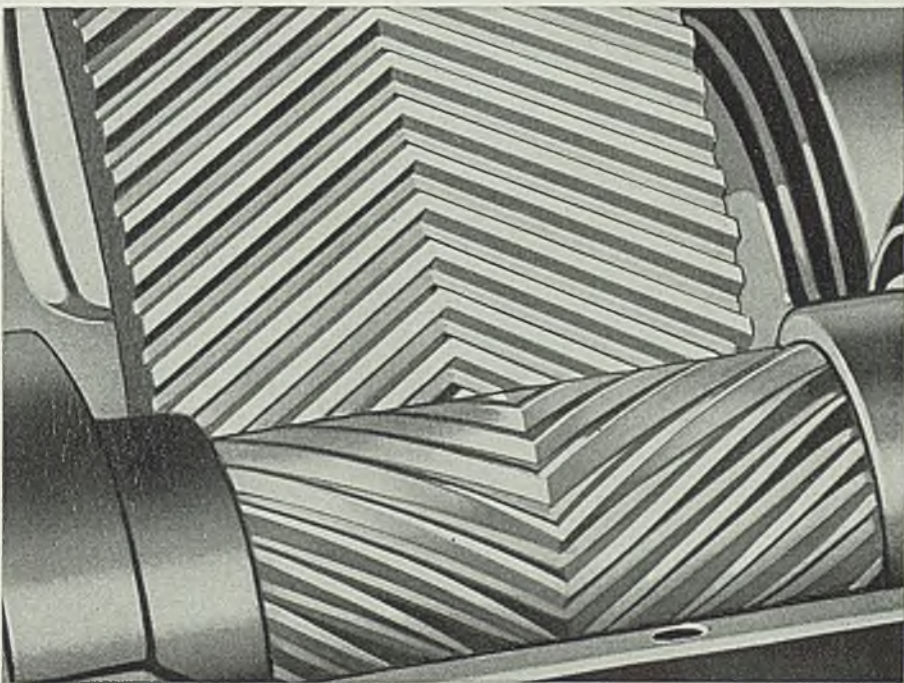
Higher prices on cast scrap are being paid by local foundries, No. 1 machinery cast now ranges from

\$11.50 to \$12 and No. 2 cast from \$10.50 to \$11, delivered in this territory.

The only change in dealers' buying prices for material for shipment to plants outside of this district is an increase of 25 to 50 cents on specification pipe which now is quoted at \$8.25 to \$8.75, f.o.b. cars, New York. Eastern Pennsylvania and Pittsburgh district steel mills as a result of receiving good shipments on old orders lately are disinclined to pay existing prices on new tonnages of scrap. In fact, some of the



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Pittsburgh district consumers are holding up shipments. This situation has not resulted in any change in the dealers' market here.

Buffalo — Dealers predict more scrap buying if the ice jam off this port holds a few days longer. Freezing weather last week set back still further the prospective opening date and made it seem certain that local mills would have to draw further on stocks of scrap held here. There is active buying of all grades at top prices established in previous deals.

Philadelphia—While the melt of steel and iron scrap continues heavy

supplies are more plentiful and prices are easier. No. 2 heavy melting steel is generally quotable at \$12.50, delivered, with the Pencoyd, Pa., consumer having recently bought as low as \$12. Domestic prices on No. 1 heavy melting steel are unchanged but dealers' bids for export have been dropped 50 cents to \$12.50. Several foundry grades are quoted slightly lower.

Detroit — Heavy scrap supplies have forced the market lower. Losses of 25 cents a ton have been recorded in machine shop turnings, cast iron borings, mixed borings and short

turnings, new No. 1 busheling, and forge flashings. One exception to the present downward trend is in cast scrap, where scarcity and better demand has caused an advance in No. 1 machinery.

Cincinnati — Quotations on iron and steel scrap remain nominally unchanged. An upriver mill took some rails on a recent railroad offering but most consuming interests profess adequate supplies in rejecting tonnage commitments. Country scrap is being moved in considerable quantity to dealers' yards.

St. Louis — Buying of iron and steel scrap is somewhat more active and dealers look for a purchasing movement of real size during the next few weeks. An east side mill purchased 5000 tons of heavy melting steel for delivery over the next sixty days, at currently quoted prices. The business was split among several dealers. One leading east side interest has lifted a three-weeks embargo. The prohibition was due to a heavy accumulation.

Birmingham, Ala.—While demand is not as strong as it has been the market is considered firm and considerable tonnage is moving. Quotations remain unchanged.

Seattle — The market continues firm with local and foreign buyers interested. While prices are about on the same levels, the situation is strong. Easing of trans-Pacific freight rates is noted and this will stimulate export sales which have been handicapped for several months because of a scarcity of steamer space.

Toronto, Ont. — Iron and steel scrap is moving more freely and demand is increasing steadily. Heavy melting steel has a steady call and sales of steel turnings are increasing; car wheels and axles are in fair demand and there is a market for rails, although supplies of the latter are limited.

Warehouse

Warehouse Prices, Page 94

Pittsburgh—In the experience of most steel jobbing houses here, April will be the best month of 1936 for specifications and shipments. Prices are firm.

Chicago—Distribution of iron and steel from warehouse is broadening, disclosing a favorable underlying market situation. Turnover is fairly rapid, with no particular commodity outstanding. Volume this month shows a moderate gain over March. Prices are unchanged.

New York—A slight falling off in demand is noted by jobbers here.



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Daily average bookings are somewhat less than during the first half of April. Prices are unchanged and in general are firm, with the exception of galvanized sheets which continue weak due to the competition from so-called second sheets.

Philadelphia—Jobbing demand is unchanged, with resellers looking for this month to about hold its own with March. Prices are steady.

Detroit—Measurable improvement in warehouse specifications and shipments continue and April to date is definitely a high point for 1936. Improvement is not being sustained by motor plant rehabilitation work, most of which is being delayed.

Cincinnati—Sales are holding to a steady volume, at unchanged prices. Estimating activity gives hopes for a large tonnage in building materials, both for governmental and private projects, although bookings so far on this class of demand continue light.

St. Louis—Jobbing and warehouse interests report further increase in sales. Movement of wire and wire products, galvanized sheets, and machine shop supplies is good. General manufacturing trade is accounting for larger tonnages, and materials for railroad shops and track accessories are moving in considerable volume. Prices are steady.

Seattle—Business is better than a year ago, all items being in good demand. No item is outstanding, although sheets are probably moving most freely. Occasional mill buying is reported. Prices are unchanged.

Metallurgical Coke

Coke Prices, Page 91

Improved rate of activity in blast furnaces in the Western Pennsylvania district has reacted favorably in the furnace coke market. Hanna Furnace Co., Buffalo, is considering blowing in another merchant furnace and has been inquiring for coke from outside sources, and the resumption of Shenango Furnace Co.'s Sharpsville, Pa., stack last week provided an important outlet. The market on Connellsville beehive coke is firm at \$3.50 to \$3.65 for standard furnace grade and has been tested the past week by substantial sales at this level. In addition, foundry requirements appear to have picked up and are going at the unchanged level of \$4.25 to \$4.35 for common foundry grades, f.o.b. Connellsville, Pa., ovens, and \$5.35 to \$5.50 on the same basis for premium grades.

Shipments at Chicago are at the highest point of the year, with prices strong. Suppliers at Cincinnati find demand for by-product foundry coke increasing steadily. At Birmingham,

demand is holding at a high rate.

Carnegie-Illinois Steel Corp. has fired 192 additional by-product ovens at its Clairton, Pa., works, increasing operations to a total of 1482 ovens on, the highest in three years.

Bolts, Nuts, Rivets

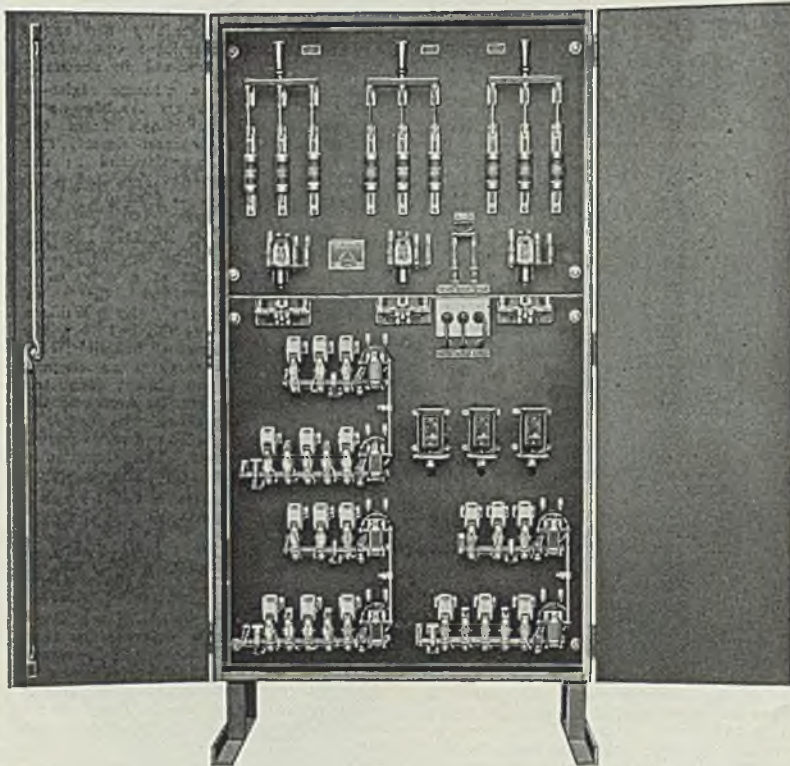
Bolt, Nut, Rivet Prices, Page 91

Bolt, nut and rivet market appears more active at Pittsburgh from the standpoint of specifications from jobbers, automotive industry, railroad car

shops and farm implement manufacturers. Last week Pittsburgh Screw & Bolt Corp. reported its "unfilled orders at the highest for any time in the last five years," and in general, bolt, nut and rivet makers have accumulated considerable tonnage for production in late April and May.

At Chicago a steady upward trend in demand is noted. Prices are firm in many quarters, and irregular in others. Some substantial orders have developed from railroad car shops, and from heavy mill supply houses. Buying for farm equipment continues strong. Jobbers' requirements are fair.

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Iron Ore

Iron Ore Prices, Page 93

Cleveland—Half a dozen bulk freighters last week sailed from Lake Erie ports with coal for Lake Michigan ports and will take on iron ore at Escanaba on the return trip. The Ford Motor Co.'s bulk freighter HENRY FORD II left Detroit Wednesday for Escanaba and may be the first freighter down with a cargo of ore.

Fields of floating ice still are hampering navigation through the Straits

of Mackinac, but a number of passages have been made. The ice still is unbroken at the Soo and Whitefish Bay, and several feet of snow still cover iron ore stock piles at the upper lake mines.

The Ford iron ore inquiry now has been closed for a total of 490,000 tons of various grades, being divided among four or five shippers. Other long-term contracts are being closed up gradually. It is understood that the Ford ore went at the going market established by sales a fortnight ago.

The Lake Superior Iron Ore asso-

ciation has issued the following statement of ore consumption and stocks:

	Tons
Consumed in February	2,632,306
Consumed in March	2,897,867
Increase in March	265,561
Consumed in March 1935	2,582,986
On hand at furnaces April 1, 1936	18,199,287
On Lake Erie Docks April 1, 1936	4,734,146
Total at furnaces and Lake Erie docks April 1, 1936	22,933,433
Total April 1, 1935	26,931,629

Cold Finished

Cold Finished Prices, Page 91

Pittsburgh—After several successive weeks of consecutive increase, last week's specifications for cold-drawn bars commenced to show a downward tendency. Automotive parts makers, now buying for late May finished car assemblies, have instituted some reductions from the April rate. The market is steady on the basis of 2.10c, base, Pittsburgh, without any report of base price concessions.

Tin Plate

Tin Plate Prices, Page 90

Pittsburgh—Strongly supported by a leading interest's operations last week at 89-91 per cent, the average of production for the entire tin plate industry moved up better than 5 points to an 85-90 per cent rate. This strong rate follows in part better releases of canmakers against stocks of finished tin plate in the hands of producers. Present schedules indicate shipments of tin plate in May will be at the heaviest rate in at least a year. The market is steady at \$5.25 per base box, Pittsburgh.

Ferroalloys

Ferroalloy Prices, Page 92

New York—Despite the present high rate of steelmaking operations, ferromanganese sellers claim they see no early letup in shipments of ferromanganese. Meanwhile prices are unchanged at \$75, duty paid, Atlantic and Gulf ports. Domestic spiegeleisen, 19 to 21 per cent, also is steady at \$26, Palmerton, Pa., on quantities up to 50 tons, and \$24 on 50 tons and over.

Semifinished

Semifinished Prices, Page 91

Pittsburgh—Bookings of sheet bars, blooms, slabs, and rerolling billets by producers declined somewhat

Behind the Scenes with STEEL

Sheik of Arizona

RISING out of the Arizona desert, hard by a couple of giant cañons somewhere west of Flagstaff, is a pyramid-shaped monument of stone and mortar perpetuating the name of the only man (outside of Walter O'Keefe) who drove a camel caravan across the great Southwest.

Herewith is a picture of the monument, supplied by the Lincoln Electric



Co., Cleveland. Their interest in the affair grows out of the fact that the steel plate on the front of the marker is inscribed in molten steel, applied by the electric arc. The Lincoln people told us about the thing, or we might have gone on in utter ignorance.

Anyway, this camel driver, it seems, was a Greek by the name of Philip Tedro. In Arabic his name became Hadji Ali, which his pals translated freely into Hi Jolly. In addition to being a cameldriver, Hi was a "packer scout and for over 30 years a faithful aid to the U. S. Government." Born in Syria, he came to this country 100 years ago, and died in 1902 at Quartzite. The monument marks his last camp.

Says the Arizona Highway Department: "The famous camel herd with which the name of Hi Jolly is linked constitutes an interesting sidelight of Arizona history. Jefferson Davis (later Confederate President) as Secretary of War approved a plan to experiment with camels for freighting and communication in the arid Southwest. . . . Maj. Henry C. Wayne and Lieut. D. D. Porter of the U. S. Army visited the Levant and procured 33 camels which were landed at Indianaola, Tex., in 1856; 41 were added on a second voyage.

"With the camels came, as caretaker, Hadji Ali. On the Beale expedition in

1857 to open a wagon road across Arizona from Fort Defiance to California, the camels, under Hi Jolly's charge, proved their worth. . . . Nevertheless the War Department abandoned the experiment and the camels were left on the desert to shift for themselves. They survived for many years. . . . Officially the camel experiment was a failure but a fair trial might have resulted in success."

Must have been a strange sight—a Greek cowboy with an Arabic name driving a herd of camels from the Levant over the Arizona desert, and his memory now perpetuated in arc welded steel.

Improving the Mind Dept.

WE ARE in receipt of a copy of a little booklet entitled "Gems of American Architecture" by William Royal Greer, and published by the Lakeland Co., Lindeke building, St. Paul, Minn. This work is an elegant promotion job for an almost forgotten American institution. Among the various models described, we especially were impressed by The Dreadnaught, The Prairie Skipper, The Corinthian and The Patrician.

A copy is well worth the 50 cents which the publishers ask.

Spa

LYNX-EYED Associate Editor "Doc" Manlove spots the information that at Garmisch-Partenkirchen, Germany, scene of the recent Olympic contests, there is the Sonnenbichl Golf Hotel, proprietress of which is Frau Betty Bader. Tally-ho, as the English would say!

Mass Production

THESE warm spring days (oh, yeah? —where?) when a forgetful haze seems to descend over everything, we sit back and wish we had the ambition and initiative of one Ambrose H. Douglas, 91-year old negro whose second wife is now expecting a child which will be the thirty-eighth to call Ambrose pappy.

His first wife held out for 20 boys and five girls, but died in 1917. Ambrose, then 72, married again and has passed the cigars 12 times since. At least that's what the Associated Press claims.

—SHRDLU

the past week, compared with two weeks ago. The loss was chiefly in rerolling billets, as requirements of nonintegrated sheet and tin plate producers have been a sustaining force in the sheet bar market. In general, wire rod specifications are fairly steady. The market is \$28 per gross ton, Pittsburgh, for billets, blooms, slabs, and sheet bars; \$35 on forging quality billets; \$38, \$40 and \$42, Pittsburgh, for the three wire rod bases.

but eased off thereafter while quicksilver prices continued to display easiness.

Copper—Price tone of the market retained marked strength with sellers not expecting a general consumer buying pickup until late summer. All sellers quoted electrolytic at 9.50c, Connecticut. It is regarded as entirely likely that the price level will reach 10.00c, Connecticut, by the end of the year. Sales for April through the weekend exceeded 155,000 tons.

Lead—Much more active demand is foreseen for the lead market over

the next few weeks. Prices continued to hold firm on the basis of 4.45c, East St. Louis, and 4.60c, New York, with St. Joseph Lead Co. still asking \$1 premium on the latter market.

Zinc—Prime western zinc held unchanged at 4.90c, East St. Louis. Outlook is for continued price firmness here and a likely renewal of more widespread demand in the near future.

Tin—Straits tin prices ruled generally steady despite dull consumer buying. Spot closed around 46.55c. Supplies of spot English and Dutch

Steel in Europe

Foreign Steel Prices, Page 94

London—(By Cable)—Increasing demands for pig iron and steel for domestic needs have caused export trade to be sacrificed and the effect is shown in the balance of trade. March exports were 163,412 gross tons, compared with 167,845 gross tons in the shorter February. Increasing demands for semifinished steel beyond ability of British works to fill is bringing a larger total of imports. March imports of steel totaled 130,332 gross tons, compared with 123,224 gross tons in February.

Foundry pig iron output is short, the larger part of production going into steelmaking. Most foundries are fairly well covered to the middle of the year. A premium of 5s is asked on deliveries after June. Scottish steelworks have large railroad and track orders for home and export.

A slight revival in demand from export markets is noted by producers on the continent.

Coke By-Products

Coke By-Product Prices, Page 91

New York—An advance of one-half cent has developed in the spot wholesale price of naphthalene in flakes and balls. The new quotation is 7.25c per pound in barrel lots, f.o.b. Philadelphia or Newark, N. J., freight allowed to New York, northern New Jersey and Philadelphia destinations. The market in all coal tar products is strong, with demand tending to exceed supply.

Nonferrous Metals

Nonferrous Metal Prices, Page 92

New York—Price steadiness and light to moderate business ruled major domestic nonferrous metal markets last week. Commercial bar silver jumped at the start of the week

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refined tin are likely to continue tight throughout May.

Antimony—Antimony demand continued light. Chinese spot was again quoted nominally unchanged 13.50c, duty paid New York, while American spot advanced Friday to 12.62 1/2c, New York.

Indian Iron Leads Imports

Philadelphia—Arrival of 1948 tons of pig iron from British India featured iron and steel importations here during the week ended April 18. Other arrivals comprised 130 tons of steel bands, 104 tons of steel bars, 193 tons of structural shapes and 18 tons of diamond plates from Belgium; 19 tons of structural shapes, four tons of steel bands and nine tons of steel bars from France; 35 tons of steel bars, eight tons of steel bands and five tons of steel hoops from Germany; and five tons of cold-drawn steel wire from Sweden.

Quicksilver

New York—Quicksilver prices continue easy in a dull market. Small

lots of 15 to 25 flasks are now quoted \$77 to \$77.50 a virgin flask.

Labor

EXECUTIVE board of the Amalgamated Association of Iron, Steel and Tin Workers, meeting at Pittsburgh, April 22, decided to postpone indefinitely any action on an offer of \$500,000 by John L. Lewis, United Mine Workers of America, to help organize steelworkers along industrial instead of craft union lines.

Accordingly, it was presumed that the matter will be submitted at the Amalgamated's annual convention when it convenes at Canonsburg, Pa., April 28, since no other meeting of the executive board is scheduled in the interim.

Mr. Lewis' offer, proposed in a letter, asks for the formation of a central committee to direct the steel union drive and offered \$500,000 on behalf of his committee on industrial organizations.

BAR IRON WAGE RATE HOLDS

In bar iron mills having a wage rate agreement with the Amalga-

mated Association of Iron, Steel and Tin Workers the rates will be unchanged for May and June. The card rate will be 2 cents on boiling, or puddling, bar and 12-inch mills, and 2.10 cents on guide and 10-inch mills.

Safety

MIDDLETOWN, O., plant of the American Rolling Mill Co. claims to be the first steel plant employing over 4000 men to have all its personnel trained in the use of first aid under the direction of the federal bureau of mines. Since last fall classes in first aid have been held, and every official, superintendent, foreman, and workman has received a certificate from the bureau. The plant itself also has received a certificate from the bureau.

Financial

INCORPORATION papers for the Colorado Fuel & Iron Corp. to replace the Colorado Fuel & Iron Co., which were filed in Denver April 16, call for issuance of 1,000,000 shares of no-par common stock. Of this total, 552,660 shares would be issued for distribution in conjunction with income mortgage bonds to holders of the first mortgage 5 per cent bonds of Colorado Industries Co., and 315,379 shares would be reserved so long as necessary for issue upon exercise of the warrants to be distributed to holders of preferred and common stock of Colorado Fuel & Iron Co. The remainder would be issued as needed upon vote of the board. All this stock is nonassessable and will carry power of one vote for each share, with cumulative voting not allowed.

UNITED TO LIST STOCK

United Engineering & Foundry Co., Pittsburgh, has applied to the New York stock exchange to list 832,236 shares of \$5 par value common stock.

ACME STEEL NET IS OFF

Acme Steel Co., Chicago, reports for the first quarter net profit of \$391,853, compared with \$450,918 in the fourth quarter last year and with \$601,990 in the corresponding 1935 period.

G-E BILLINGS IN SHARP GAIN

General Electric Co., Schenectady, N. Y., reports its first quarter billings as \$51,423,071, compared with \$40,393,538 a year ago. Profit available for dividends in the first quarter was \$29,539,671, against \$20,551,247 in the first quarter of 1935. On the common stock, first quarter earnings



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amounted to \$1.02 per share in the first quarter, contrasted with 65 cents a year ago.

OFFERS BONDS, DEBENTURES

Youngstown Sheet & Tube Co., Youngstown, O., last week offered \$60,000,000 4 per cent mortgage bonds at 98½, and \$30,000,000 3½ per cent debentures at 102½. (See STEEL, April 6, page 17).

OTIS PROFIT DECLINES

Otis Steel Co., Cleveland, reports net profit of \$148,676 in the quarter ended March 31, after depreciation, interest and other charges, compared with profit of \$935,362 in the first quarter of 1935.

AGREE TO REORGANIZATION

Federal Judge John Knight, Buffalo, was notified last week that more than the necessary percentage of stockholders and bondholders of the Gould Coupler Co. and the Symington Co. have given consent to plans for reorganization.

INJUNCTION DEFERS MEETING

Annual stockholders' meeting of the Niles-Bement-Pond Co., scheduled for April 21 in Jersey City, N. J., was adjourned until April 28, owing to injunction proceedings against the proposed merger of the company with the General Machinery Co., Hamilton, O.

EARNINGS STATEMENTS:

Budd Wheel Co., Philadelphia, profit of \$208,605.26 for the first quarter as compared with a profit of \$291,920.49 in the first quarter of 1935, representing 19 cents a share on the common stock after provision for preferred dividends.

Edward G. Budd Mfg. Co., Philadelphia, profit of \$984,250.41 for the first quarter. The operating profit, however, was \$346,250.41 compared with \$151,589.18 earned in the first quarter of 1935. Current production schedules in the automobile division are at the highest since 1929.

Continental Can Co., New York, net income for the year ending March 31, 1936, of \$11,245,398 as compared with \$10,687,060 for the previous year. Comparison of net earnings for the two years showed earnings of \$4.22 for the common, contrasted with 4.01 cents in 1935.

Pittsburgh Screw & Bolt Corp., Pittsburgh, net profit of \$165,056 for the first quarter, compared with net loss of \$83,217 in the same quarter of 1935.

Virginia Iron, Coal & Coke Co., Roanoke, Va., net loss of \$21,446 for the first quarter in contrast to a profit of \$8950 for the previous year, equal to 45 cents each on 19,848 shares of 5 per cent preferred stock.

Doehler Die Casting Co., Toledo,

O., first quarter net profit \$209,622, equal after dividend requirements on preferred and preference stocks to 86 cents on each of the 206,195 no-par common shares, against profit of \$172,721 in the first quarter of 1935.

Minneapolis-Honeywell Regulator Co., Minneapolis, net income for the first quarter ending March 31, \$195,276, compared with \$33,858 in 1935.

Ex-Cell-O Aircraft Corp., Detroit, for the quarter ending March 31, net profit of \$2221. Net profit in same quarter last year was \$93,112.

Harbison-Walker Refractories Co., Pittsburgh, first quarter net income of \$541,100, equal to 36 cents on

the common, compared with \$467,000 for 1935. Net income for the calendar year 1935 was \$1,805,668 or \$1.18 a common share.

Timken Roller Bearing Co., Canton, O., net profit of \$2,068,856 for quarter ending March 31, equivalent to 85 cents a share on the capital stock, against \$2,361,937 in the same period of 1935.

Continental Roll & Steel Foundry Co., East Chicago, Ind., net income of \$40,162 for 1935, equal to \$1.34 a share contrasted with net loss in 1934 of \$319,398.

Briggs Mfg. Co., Detroit, net profit of \$9,266,200 for 1935 compared with \$5,121,625 for 1934.

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COPPER COATED

Current Problems and Future Outlook of Reinforcing Steel Industry Analyzed

OUTLOOK for the concrete reinforcing steel industry was reviewed by speakers at the twelfth annual meeting of the Concrete Reinforcing Steel Institute at Hot Springs, Va., April 20-22. Heavy attendance by representatives of mills and fabricators was a feature.

At the opening session, April 20, N. J. Clarke, vice president in charge of sales, Republic Steel Corp., Cleveland, spoke on "The Changing Scene in the Reinforcing Steel Industry." Mr. Clarke pointed out that during the early part of the twentieth century when reinforced concrete was introduced in this country, engineers did not attempt to produce a *detail* containing the least amount of reinforcing steel, as is the case today, but a job which after erection would show the lowest initial cost. The picture has changed, however, due largely to the change in character of the product. Formerly, reinforcing bars were purely an engineering product whereas today they are a commodity product.

The fact that the product has

changed its status to a commodity does not justify the complete price demoralization attendant upon the transition, Mr. Clarke contended.

During the operation of the NRA and the steel code new methods of marketing were developed. Estimating bureaus were established; jobbers agreements were set up; methods of bidding on "identified structures" and the handling of fabrication-in-transit rates prescribed; in fact all of the intricate details of marketing reinforcing steel and accessories were made public. The inevitable result was that many concerns which had never before handled reinforcing steel learned the details of the business and the "forgotten man" came into his own.

The control possible under the code has now been removed and there is today a serious jobber problem. As an example, there are jobbers on the Atlantic seaboard quoting on business as far west as the Pacific coast and vice versa.

The only recourse of the industry is to meet these jobber conditions

and try to operate at a profit under them. This means closer co-operation between mills and distributors.

There are about 50 rolling mills producing reinforcing steel, either rail or new billet, many of them equipped to do cutting and bending work; 250 "fabricating jobbers" who maintain stocks of straight bars and are equipped with cutting and bending facilities; 135 jobbers with some equipment and stock. Add to this total some 100 agents and jobbers who neither stock nor fabricate and it is found that there are some 400 factors in the distribution of reinforcing steel set up to handle a total volume of 500,000 tons, the 1934 total, or an average of about 100 tons each. The largest 15 fabricators might easily account for 80 per cent of the total, leaving 100,000 tons for some 470 distributors.

Another problem is the question of competition from mills and mill-owned subsidiaries. The statement has been made that independent fabricators will soon pass out of the picture, but Mr. Clarke is of the belief that such fabricators have a very definite place in the industry.

Urges Co-operation for Profit

Speaking for Republic Steel, Mr. Clarke stated his company wants to see jobbers make a reasonable profit but can do little or nothing to correct the deplorable conditions of recent months without the co-operation and assistance of Institute members.

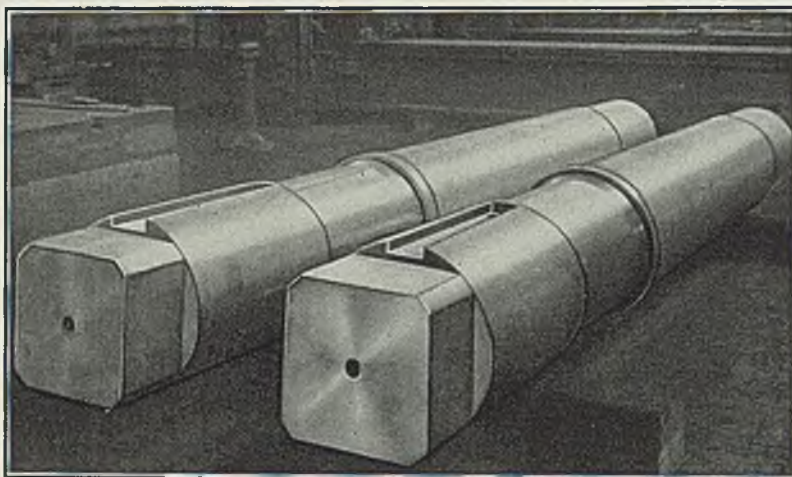
Commander Ben Moreell, navy department, Washington, addressed the meeting on "What the Future Holds for Reinforced Concrete Construction." Following Commander Moreell's comment, Arthur Fisher, legal counsel of the Institute, delivered a paper on "Legal Aspects of New Open-Price Plans."

At the third general session of the meeting A. E. Lindau, president of the American System of Reinforcing, spoke on "The Meaning of High Strength Steels and Concretes to the Industry."

OWEN IRWIN, manager, concrete bar bureau, Carnegie-Illinois Steel Corp., Pittsburgh, later presented a paper on the subject of marketing problems in the reinforcing steel industry. Mr. Irwin analyzed the present situation in the concrete bar industry from the viewpoint of 30 years' experience in the business. He visualized the industry as now being in its fourth decade, the first decade being a development stage, the second essentially standardization, the third characterized as "profitless prosperity" and the fourth present decade, one of integration and diversification.

After reviewing seven market

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*

problems in detail, Mr. Irwin declared that "the Moses who is to lead this industry out of the wilderness" must be one who can answer satisfactorily these present problems. This person must impress the industry that available tonnage is not large, that there is over-production on the part of mills and over-capacity on the part of jobbers. Some system of selling must be invented which will eliminate the evil of lump-sum bidding and of the combination and contingent bid. Harmony must be restored between those interested in rail bars, axle bars and new billet bars. Either nationally, or at least sectionally, more uniformity in selling outlets must be discovered, and this "Moses of the industry" must impress upon all elements in the industry that sales prices should be predicated upon actual costs.

New officers for the Concrete Reinforcing Steel institute for the coming year are: President, E. W. Langdon, Joseph T. Ryerson & Son Inc., Chicago; vice presidents, James F. Curley, vice president, Concrete Steel Co., New York, and Kenneth D. Mann, executive vice president, Truscon Steel Co., Youngstown, O.

Meetings

THE conference on new trends in the utilization of fluorspar, sponsored jointly by the Illinois state geological survey, the United States geological survey, and fluorspar producers of the Illinois-Kentucky district, originally scheduled for Rosiclare, Ill., on Jan. 24, will be held on May 22.

GRAY IRON FOUNDERS' MEET DURING A.F.A. CONVENTION

Gray Iron Founders Society Inc., 33 Public square, Cleveland, will hold its annual meeting in Detroit at Hotel Statler, May 5, at 11 a.m. This meeting has been arranged to tie in with the convention of the American Foundrymen's association at Detroit, May 4-9. Headquarters in charge of W. W. Rose, executive vice president, will be established at Hotel Statler by the Gray Iron Founders society.

PURCHASERS PLAN EXHIBIT AT PITTSBURGH IN FALL

Purchasing Agents Association of Pittsburgh will have its second industrial exhibit at the William Penn hotel, Oct. 22 and 23. Annual election of officers by the association will take place at the William Penn hotel April 21. Unopposed nominations include: President, T. D. Jolly, Aluminum Co. of America; treasurer, E. C. Buerkle, National Bearing Met-

als Co.; national director, Albion Bindley, Pittsburgh Steel Co. J. M. Knowles, Consolidation Coal Co., and K. F. Westerman, Columbia Steel & Shafting Co., have been nominated for vice president; C. H. Rindfuss, Pittsburgh Screw & Bolt Corp., and Charles E. Briner, McKay Co., for secretary, one to be elected for each of these offices.

POWER SHOW NOV. 30-DEC. 5 IN NEW YORK WITH A.S.M.E.

National exposition of power and mechanical engineers will be held Nov. 30 to Dec. 5 in the Grand Central Palace, New York, coincident with the annual meeting of the American Society of Mechanical Engineers. The International Exposition Co., of which Charles F. Roth is manager, with offices at the Grand Central Palace, New York, will again have charge of the exposition.

Capital Structure Must Be Protected

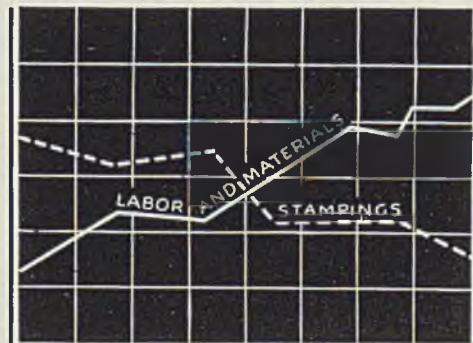
WHILE it is imperative for manufacturers to modernize their equipment and methods if they are going to stay in business, such

modernization never should be effected at the expense of the company's capital structure, said R. E. W. Harrison, vice president, Chambersburg Engineering Co., Chambersburg, Pa., in a recent address before the Philadelphia section of the American Society of Mechanical Engineers. It is fundamentally important that a company cherish and augment its capital structure in such a way that the profit earning capacity may be continuous.

Many companies, he said, have emerged from the depression with a capital set-up which is outworn and out-moded. Obsolescence in the financial department of the business is as common a cause of failure as any other form of obsolescence.

Money for rehabilitation should come from depreciation reserves and, said Mr. Harrison, "if it so happens that those depreciation reserves are not available for this purpose, but have been used to pay dividends when dividends had not really been earned, or to pay bonuses when bonuses had not been earned, or if that money has been used for any purpose other than the one for which it was precisely intended, then management is failing in its mission of protecting the original investment; in the last analysis, what are depreciation allowances other than a savings bank account to be

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used through the year to buy repairs and renewals invariably required when plants are in operation?"

Mr. Harrison mentioned the committee appointed by the Machinery and Allied Products institute which is attempting to set up recommendations for co-ordinating the policy of the internal revenue department with the recognized needs of industry. Both industry and the internal revenue department deplore the inadequate methods which characterize the present situation, the speaker asserted, but the view of the officials can be understood when it is realized that the government permits the depreciation of machinery at the rate of 10 per cent annually whereas the average age of most of our producing equipment is between 15 and 20 years.

Convention Calendar

April 27-30—Chamber of Commerce of the United States. Annual meeting in Washington. D. A. Skinner, 1615 H street, N. W., is secretary.

May 1-2—American Society for Metals. Second biennial interchapter meeting of Pittsburgh, Philadelphia, Lehigh Valley, York, Southern Tier and Penn State chapters at Nittany Lion Inn, State College, Pa. D. F. McFarland, Pennsylvania State college, State College, Pa., is secretary of the Penn State chapter.

May 4-9—American Foundrymen's association. Fortieth annual convention and exposition at Convention Hall, Detroit. C. E. Hoyt, 222 West Adams street, Chicago, is executive secretary.

May 5—Gray Iron Founders' society. Annual meeting at Hotel Statler, De-

troit. W. W. Rose, 33 Public Square building, Cleveland, is executive vice president.

May 7-8—Iron and Steel Institute (British). Annual meeting at Institution of Civil Engineers, London. K. Headlam-Morley, 28, Victoria street, London, S. W. 1, is secretary.

May 9—Power Transmission Council and Mechanical Power Engineering Associates. Annual meeting at Ambassador hotel, Atlantic City, N. J. Francis Juraschek, 1 Atlantic street, Stamford, Conn., is manager.

May 11-13—American Supply and Machinery Manufacturers association. Annual meeting at Ambassador hotel, Atlantic City, N. J. R. K. Hanson, 604 American Bank building, Pittsburgh, is secretary.

May 11-13—Southern Supply and Machinery Distributors association. Annual meeting at Ambassador hotel, Atlantic City, N. J. Alvin M. Smith, Smith-Courtney Co., Richmond, Va., is secretary.

May 11-15—American Mining congress. Thirteenth annual convention and exposition in Cincinnati. Julian D. Conover, 439 Munsey building, Washington, is secretary.

May 14-16—Refrigerating Machinery association. Spring meeting at The Homestead, Hot Springs, Va. William B. Henderson, 915 Southern building, Washington, is executive vice president.

May 16—Air Conditioning Manufacturers' association. Annual meeting at The Homestead, Hot Springs, Va. William B. Henderson, 915 Southern building, Washington, is executive vice president.

May 25-28—National Association of Purchasing Agents. Twenty-first annual convention and exhibition at Roosevelt hotel, New Orleans. George A. Renard, 11 Park Place, New York, is secretary.

May 28—American Iron and Steel institute. Forty-fifth general meeting at Waldorf-Astoria hotel, New York. Walter S. Tower, 350 Fifth avenue, New York, is executive

secretary.

June 1-4—American Electro-Platers' society. Annual meeting and exhibition in Cleveland. E. Steen Thompson, 905 West Tenth street, Erie, Pa., is secretary.

June 5-6—Electric Metal Makers Guild. Annual meeting at Hotel Onesto, Canton, O. J. H. Chivers, 1051 Woodberry road, New Kensington, Pa., is secretary.

June 8-13—Twelfth International Congress of Acetylene, Oxyacetylene Welding and Allied Industries. Meeting in London. V. A. Amodeo and A. B. Harrower, 1 Albermarle street S. W. 1, London, are joint secretaries.

June 9-12—Institute of British Foundrymen. Thirty-third annual conference, in Glasgow, Scotland. T. Makemson, St. John Street Chambers, Deansgate, Manchester, 3, England, is secretary.

June 10-12—American Steel Warehouse association. Twenty-seventh annual meeting at Edgewater Beach hotel, Chicago. W. S. Dossy, 442 Terminal Tower, Cleveland, is executive secretary.

June 16-18—National Warm Air Heating and Air Conditioning association. Semiannual meeting at Deshler-Wallick hotel, Columbus, O. Allen B. Williams, 50 West Broad street, Columbus, O., is secretary.

June 22-24—American Society of Heating and Ventilating Engineers. Semiannual meeting at The Inn, Buck Hill Falls, Pa. A. V. Hutchinson, 51 Madison avenue, New York, is secretary.

June 22-25—National Association of Cost Accountants. Annual convention at Netherland-Plaza hotel, Cincinnati. S. C. McLeod, 385 Madison avenue, New York, is secretary.

June 29-July 3—American Society for Testing Materials. Thirty-ninth annual meeting at Chalfonte-Haddon Hall, Atlantic City, N. J. C. L. Warwick, 260 Broad street, Philadelphia, Pa., is secretary.

Equipment

Chicago — While large lists are lacking, the number of individual orders and inquiries continues to increase. Implement manufacturers are buying steadily. Railroads have been less active for their Chicago shops than earlier in the year, but more inquiries are being received from western and eastern shops. Seaboard Air Line is in the market for additional equipment. Prospects appear good for substantial buying for automobile manufacturers' retooling programs in May. Deliveries on most machine tools are lengthening, eight to ten weeks now being required in many instances, in contrast with three to four weeks last fall. Demand for small tools is strong.

Seattle — Demand for road machinery and mining tools is active while miscellaneous items are also moving freely. Portland, Oreg., public docks commission is considering installation of a 100-ton derrick.

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Construction and Enterprise

Ohio

CANTON, O.—Hoover Vacuum Cleaner Co., 1310 Fifth street, Northeast, will use new \$100,000 plant addition now under construction principally for die-casting. Machinery will be installed. (Noted STEEL, March 30.)

CLEVELAND—Stires Electrical Mfg. Co. has been incorporated to manufacture automobile lamps, and will occupy part of the Stearns Motor building at Lakeview and Euclid avenues. Incorporators are Willard D. Stires, Clarence B. Stires and Ruth T. Farrow. Correspondent is Walter C. Kelsey, Hippodrome building.

COLUMBUS, O.—City has extended date from April 28 until May 5 for receiving bids on new sewage disposal plant to cost \$440,847. Llewellyn Lewis is service director, City hall, and Paul Maetzel is city engineer. (Noted STEEL April 13.)

DAYTON, O.—Contracting officer, materiel division, Wright field, will receive bids until May 7 for an electric oven and electric furnaces, circular 36-789; until May 18 for aircraft engines, circular 36-793.

GIRARD, O.—Ohio Leather Co., State street, plans improvements to its plant and equipment, to cost \$100,000.

GREENVILLE, O.—Nestles Milk Products Co., 155 East Forty-fourth street, New York, plans new modern condensing plant with 400,000-pound capacity, to cost \$300,000. H. L. Griffith is engineer, care of owner.

HAMILTON, O.—Fosdick & Hilmer, Union Trust building, Cincinnati, will award contract soon for construction of boiler plant for Beckett Paper Co., to cost \$250,000. Two water tube boilers, breechings, water heating and softening units and coal and ash handling equipment will be needed.

MANSFIELD, O.—City plans improvements in water system and will spend \$17,000 for surveys of necessary work. Murray D. Shaffer is service director, City hall.

MANSFIELD, O.—City taking bids May 5 on materials and equipment for Liberty Park swimming pool improvements, including four 54 x 96-inch straight pressure filter tanks with all necessary appurtenances, one 100-pound capacity alum and soda ash tank, one 600-gallons-per-minute circulating electric motor-driven pump, one chlorinator and all necessary accessories. M. D. Shaffer is city service director, City hall.

NEW BOSTON, O.—Village plans \$90,000 flood control project with WPA aid, to include new sewer system and pumping stations. Douglas Bowling is mayor.

NILES, O.—Republic Steel Corp., C. A. Thayer chief engineer, Republic building, Cleveland, is considering extensive improvements and enlargement of the Niles Steel Products Co., recently purchased.

Michigan

AURORA, MICH.—Arvey Ahonen will install lumber milling equipment in the

former Oliver Iron Mining Co. sawmill, and will erect a boiler room and blacksmith shop.

CAPAC, MICH.—Capac Rubber Co. will soon recondition plant of former Durowood Industries Inc. to manufacture rubber products. Thomas J. Arbron, Toll street, Detroit, is in charge.

DETROIT—Gagnier Fibre Products Co., 14401 Woodrow Wilson avenue, will erect new plant, for which H. B. Culbertson Co., 3246 Leslie street, has general building contract.

DETROIT—Wayne Lock Co., subsidiary of Wayne Screw Products Co., 521 St. Jean avenue, will construct a 40 x 220 foot two-story plant soon, and will be in the market for punch presses, plating equipment and other necessary machinery. A. C. Germer is president.

DETROIT—Buick Motor Co., 15-214 General Motors building, plans expansion of heat treating units of forge plant, new building to be 38 x 70 x 128 feet, costing \$26,000, without equipment. Harlow H. Curtice is president.

DETROIT—Chrysler Corp., 341 Massachusetts avenue, plans one-story, 80 x 930-foot addition to machine shop at East Jefferson avenue plant. Albert Kahn Inc., architect, New Center building, in charge.

FLINT, MICH.—Smith-Bridgeman Co., South Saginaw avenue, is taking bids on construction of addition to plant. MacKenzie & Pratt, 609 Citizens Bank building, are architects.

HOWELL, MICH.—City clerk will receive bids until May 5 for construction of sewage disposal plant to cost \$60,000. One pumping station and six tanks will be included. Francis Engineering Co., 303-4 Eddy building, Saginaw, Mich., have all necessary forms

and specifications. (Noted STEEL, March 30.)

LUDINGTON, MICH.—Voters have approved construction of municipal electric light plant.

QUINCY, MICH.—Village is taking bids May 12 for construction of sewage disposal plant with all appurtenances, to cost \$135,000. Engineer is A. H. Smith & Niles Co., 112 East Woodruff avenue, Toledo, O.

RIVER ROUGE, MICH.—American Malting Co. plans new building, for construction of which G. A. Mueller, architect, 1346 Broadway, Detroit, will soon take bids.

SPARTA, MICH.—Thwaites-Ray Co. has been incorporated to manufacture X-ray equipment. T. E. McFall, Sparta, is vice-president and manager.

SPARTA, MICH.—Sparta Foundry Co. has been incorporated to conduct a foundry. T. E. McFall, Sparta, is correspondent.

Massachusetts

BROOKLINE, MASS.—City plans one-story, 23 x 30 foot emergency water pumping station, to cost \$20,000. W. B. Bushway is superintendent water department, City hall, and D. A. Rollins is chairman of the board of selectmen.

HOLYOKE, MASS.—American Writing Paper Co., 9 Main street, plans repairing flood-damaged factory buildings and will require new machinery and equipment, to cost over \$100,000.

WEST WARREN, MASS.—Ohio Carpet Co. will rebuild portion of mill recently destroyed by fire, and new machinery will be installed.

WORCESTER, MASS.—George A. Duffy Mfg. Co. plans to rebuild part of four-story 34 x 45 foot mill building, including installation of new machinery and equipment, to cost over \$37,000.

Vermont

NEWPORT, VT.—Newport Electric Corp. will award contract soon for construction of one-story 33 x 50 foot powerhouse, and for 15-ton crane, steam boiler

(Please turn to Page 116)

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(Continued from Page 115)

er, oil burner, oil storage tank and unit heaters. Total cost estimated over \$37,000. Charles T. Main Inc., 201 Devonshire street, Boston, engineer.

Pennsylvania

BELLEFRONTE, PA.—Chemical Lime Co., Thomas M. Brown president, will construct a new modern lime kiln and open a new limestone mine on property in Buffalo Run valley. Loan of \$500,000 from RFC will finance work.

CONWAY, PA.—L. G. Moskner, borough engineer, is preparing plans for construction of 150,000-gallon steel water tank.

MANSFIELD, PA.—Town plans new water supply system to cost \$65,000 at Mansfield State Teachers college, to include pump house and filtration plant. Engineers are William H. Dechant & Sons, Dechant building, 632 Washington street, Reading, Pa.

MT. PENN, PA.—Borough will receive bids until May 6 for construction of \$310,909 sewage treatment works, PWA docket 1096-R. Engineers are William H. Dechant & Sons, Dechant building, 632 Washington street, Reading, Pa.

PHILADELPHIA—Frankford arsenal will receive bids until May 4 for punch and die, inventory 36-447.

PHILADELPHIA—Superior Knitting Mills, 3747 Ridge avenue, plans plant addition, 53 x 101 feet, with equipment.

New York

BINGHAMTON, N. Y.—City will purchase pumps and appurtenances for installation in proposed nine water pumping stations, to cost \$100,000. J. A. Giles is city engineer, City hall.

DUNKIRK, N. Y.—Dunkirk Radiator Co. is constructing a 200-foot addition to its plant for added production of boilers for home heating units.

FALCONER, N. Y.—National Worsted

Mills, J. G. Ellis, general manager, P. O. box 666, Jamestown, N. Y., has purchased three-story plant of Cleveland Worsted Mills here and will rehabilitate it, including installation of new machinery and equipment, at cost over \$40,000.

HIGHLAND, N. Y.—Rathgeb Knitting Mills plans two-story addition, 50 x 100 feet, to cost \$45,000, with machinery.

NEW YORK—R. C. Stanhope Inc., 101 West Thirty-first street, is in the market for a 300-kilowatt, three phase, 60 cycle turbogenerator.

NEW YORK—American Waterworks & Electric Co., 50 Broad street, will install additional generator equipment in company plants in the East and South. N. Hobart Porter is president.

NEW YORK—Union Carbide & Carbon Corp., 30 East Forty-second street, plans 1936 construction program to cost approximately \$20,000,000, \$6,000,000 for a new chemical plant in the southwest, \$4,700,000 for completion of present construction. Jesse J. Ricks is president.

OLEAN, N. Y.—Socony-Vacuum Oil Co. Inc., 26 Broadway, New York, will erect a \$1,500,000 plant in Olean for removing wax from oils intended for lubricants.

WEST POINT, N. Y.—Construction quartermaster, United States Military academy, will receive bids until May 6 for installing 45,000-barrel steel fuel oil tank, two-compartment steel service tank, two boilers and new turbine for power house, total cost to be \$160,000.

Illinois

ALTA MONT, ILL.—W. A. Fuller Co., 2916 Shenandoah avenue, St. Louis, will receive bids until May 11 for electric light and power plant improvements, to include new power house building and 225-horsepower diesel engine generator unit with auxiliaries. Cost will be \$30,000. (Noted STEEL, April 20.)

SPRINGFIELD, ILL.—Old West Mine plans repairing and altering coal

handling plant and tippie, to cost \$37,000 with equipment.

STREATOR, ILL.—Owens-Libby Glass Co., Nicholas building, Toledo, O., will construct a bottle manufacturing plant here, estimated to cost \$2,500,000.

Indiana

INDIANAPOLIS—Indianapolis Brewing Co. Inc., C. Frey secretary, New York and Agnes streets, plans construction of three-story brewery addition at 946 West New York street, to cost \$150,000. E. Moorbach is engineer, care of owner.

INDIANAPOLIS—Bate Equipment Corp., 250 North Capitol avenue, distributor in Indiana and Illinois for Superior Body Co., Lima, O., manufacturer of bus bodies, will build a mounting station in Indianapolis. Equipment will be bought by the Superior Body Co. (Noted STEEL, April 20.)

Maryland

SALISBURY, MD.—C. W. Gale plans two one-story and one two-story distilleries, total estimated cost \$475,000.

District of Columbia

WASHINGTON—Navy department, bureau of supplies and accounts, will take bids May 19 for boiler and gaskets, schedule 7589.

WASHINGTON—District commissioners, 320 District building, will receive bids May 7 for two gasoline crawler mounted cranes, one with 3/4-yard digging bucket, the other with 1/4-yard rehandling bucket, to be delivered to Lorton, Va.

Mississippi

VICKSBURG, MISS.—United States engineer, P. O. box 667, will receive bids until May 14 for a diesel engine electric generating set, inventory 1106-36-247.

North Carolina

BURLINGTON, N. C.—City has applied to PWA for loan and grant to help to finance waterworks improvement to cost \$95,909. A. C. Linberg is city engineer, City hall.

HIGH POINT, N. C.—Diamond Full-Fashioned Hosiery Co. plans construction of one-story addition, 40 x 130 feet, to cost \$40,000.

RALEIGH, N. C.—Peden Steel Co., 512 West Hargett street, recently incorporated, is in the market for a gate shear suitable for structural shop.

TRYON, N. C.—China Grove Cotton Mills Co., China Grove, N. C., plans extension and improvements in plant of Southern Mercerizing Co., Tryon, remodeling and installation of equipment to cost \$100,000.

South Carolina

SUMTER, S. C.—Williams Furniture Co., O. L. Williams president, plans rebuilding entire large mill recently destroyed by fire.

Tennessee

CHATTANOOGA, TENN.—Reynolds Metals Co., 2934 Grand avenue, Louisville, Ky., has leased plant of Lucey Mfg. Co., and is considering improvements to cost \$300,000.

MORRISTOWN, TENN.—Ming Toy Silk Mills Inc., 1441 Broadway, New

(Please turn to Page 118)



Whitey Sez:

Welds are like Beauty—both may only be good on the surface.

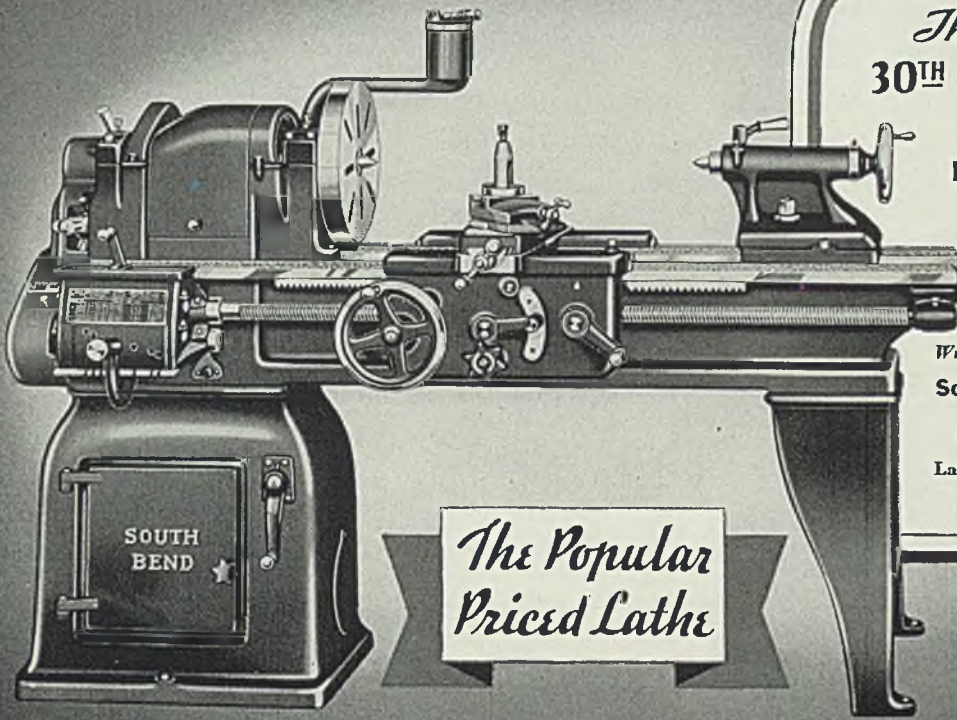
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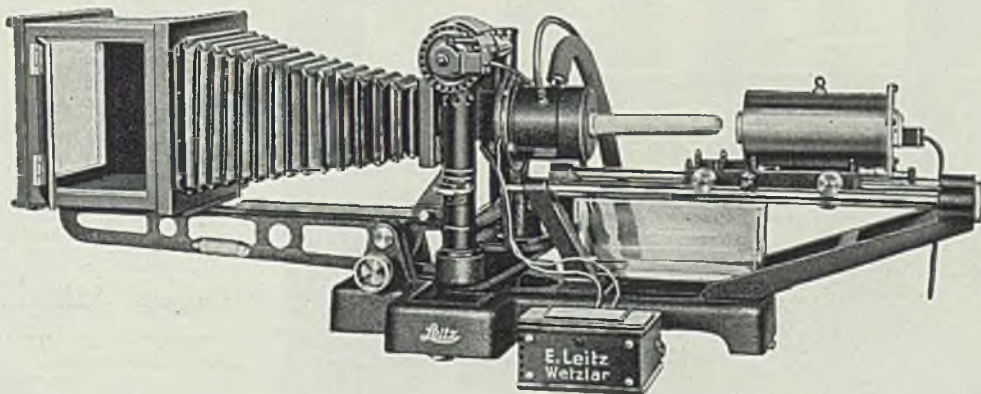
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BRANCHES:

Washington, D. C., Chicago, Ill., San Francisco, Calif., Los Angeles, Calif.

(Concluded from Page 116)

York, plans purchase of mill of Aronsohn & Hirschfeld Silk Co. Inc., Morristown, and will expand, build an addition, and install new equipment.

Missouri

DEEP WATER, MO.—City plans sewage disposal plant and new distribution system to cost \$44,000. WPA approval and aid has been sought. Engineer is E. T. Archer & Co., 609 New England building, Kansas City, Mo.

DONIPHAN, MO.—City will ask bids soon on tank, tower and materials for waterworks, to cost \$50,000. William A. Fuller Co., 2916 Shenandoah avenue, St. Louis, engineer.

THAYER, MO. — W. A. Fuller Co., 2916 Shenandoah avenue, St. Louis, will receive bids until May 14 for construction of municipal electric light and power plant and distribution system here. Two 150-175-kilowatt diesel engine generator units will be needed. Cost will be \$72,000, of which PWA has approved \$32,000 loan and grant. (Noted STEEL, March 9.)

Oklahoma

SAND SPRINGS, OKLA. — Sheffield Steel Co., R. L. Gray, president, Sheffield, Mo., will reopen branch steel mill here, and will repair open hearth furnace and other equipment.

Texas

DALLAS, TEX.—City plans additional equipment at Bachman water filtration plant, to cost \$96,000. David Morey is consulting engineer, Praet building.

FORT WORTH, TEX.—B. C. Bates, foot of North street, Little Rock, Ark., plans construction of 1,250,000-gallon capacity vinegar plant at East Rio Grande and Bryan avenue, to house 48 storage tanks and new automatic equipment. Total cost to be \$50,000.

HOUSTON, TEX.—Shell Petroleum Corp., Sterling building, plans \$3-

000,000 construction program to include entire new unit to refinery and general overhauling of present plant.

PORT ISABEL, TEX.—M. W. Whar-ton, P. O. box 912, is in the market for steam pumps and engines.

Wisconsin

DARLINGTON, WIS. — Municipal power plant to cost \$200,000 will include cooling tower, fuel oil storage tanks and power house, in addition to two diesel engine generator sets with combined capacity of 450-500 kilowatts. Bids will be asked as soon as Wisconsin Public Service commission hands down decision on distribution system price. G. L. Van Fleet Co., Union Trust building, Dubuque, Iowa, engineer. (Noted STEEL, April 20.)

MADISON, WIS.—Century Machine Co. has been organized by A. W. Freeman, and a shop has been opened in connection with the Howard Welding Co., 319 East Wilson street.

NEENAH, WIS.—City will build water filtration and softening plant to cost \$100,000. H. S. Zemlock is city clerk.

SHEBOYGAN FALLS, Wis.—Richardson-Graf Inc. has been organized to manufacture machinery and appliances of all kinds, by Jairus and Le-mont Richardson and Frederick W. Graf Jr.

Minnesota

HOPKINS, MINN. — Minneapolis-Moline Power Implement Co., manufacturer of tractors and agricultural machinery, general offices at Hopkins, will soon start construction of a new power plant to cost about \$150,000, including installation of three new boilers.

MINNEAPOLIS — Woolsey Mfg. Co., 1430 West Thirty-first street, has been incorporated to manufacture tools, machinery, etc., by C. A. and C. L. Woolsey and D. M. Ewing.

MINNEAPOLIS — Zephyr Oil Co.,

2401 Hiawatha avenue, W. H. Smith president, plans construction of oil compounding plant at Twenty-fourth street and Hiawatha avenue, to include three 340,000-gallon, two 100,000-gallon and fourteen 17,000-gallon steel tanks.

MOORHEAD, MINN. — City will take bids May 4 for construction of addition to municipal power plant, to cost \$100,000, and to include installation of a new boiler, stoker, and ash conveying and coal handling equipment. Engineer is Ralph D. Thomas, 1200 Second avenue, South, Minneapolis.

ST. PAUL—Brantdjen & Kluge Inc., 653 Gaultier street, automatic printing press manufacturers, will take bids soon for construction of two-story, 53 x 168 foot plant addition. Allen C. Fleischbein, 442 Endicott building, is architect.

Iowa

RED OAK, IOWA — Nebraska Light & Power Co., Seventeenth and Harney streets, Omaha, Nebr., will soon start construction of electrical generating plant and substation here, to cost \$200,000.

MARSHALLTOWN, IOWA — Hollingsworth Mfg. Co. has been incorporated to manufacture automobile and hardware accessories. C. V. Hollingsworth is president.

Colorado

VALMONT, COLO. — Public Service Co., 1429 Champa street, Denver, Colo., will spend \$1,200,000 to construct addition to Valmont steam plant. Guy W. Fuller is vice president and general manager.

Montana

SHELBY, MONT. — Great Northern Utilities will soon start construction of addition to power plant and installation of 1000-kilowatt turbogenerator, total cost \$100,000.

Pacific Coast

RIO VISTA, CALIF.—United States engineer, Post Office building, Sacramento, Calif., is taking bids for gasoline-engine driven two-drum stationary hoist.

WOODLAND, CALIF. — Spreckels Sugar Co., 2 Pine street, San Francisco, will construct a sugar refinery near here, at estimated cost of \$1,500,000. K. A. Miserole is engineer, care of owner.

SEATTLE—Auto Diesel Converter Co., 700 Insurance building, plans plant addition for manufacturing device for converting diesel oil into gas.

Canada

FORT McMURRAY, ALTA.—International Bitumen Co. Ltd., Edmonton, Alta., plans construction of factory to extract petroleum and other by-products from tar-sand deposits. Estimated cost \$1,500,000.

ST. CATHERINES, ONT.—English Electric Co. of Canada Ltd., 660 St. Catherine street West, Montreal, Que., plans factory to manufacture electric light bulbs, to cost \$200,000.

COMEAU BAY, Que.—Ontario Paper Co. Ltd., 455 McGill street, Montreal, Que., A. A. Schmon president, will take bids soon for construction of paper mill and power generating plant to cost \$1,000,000, at Riviere Outardes, Que.

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