STEEL

PRODUCTION · PROCESSING · DISTRIBUTION · USE

For forty-eight years—IRON TRADE REVIEW

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ABP

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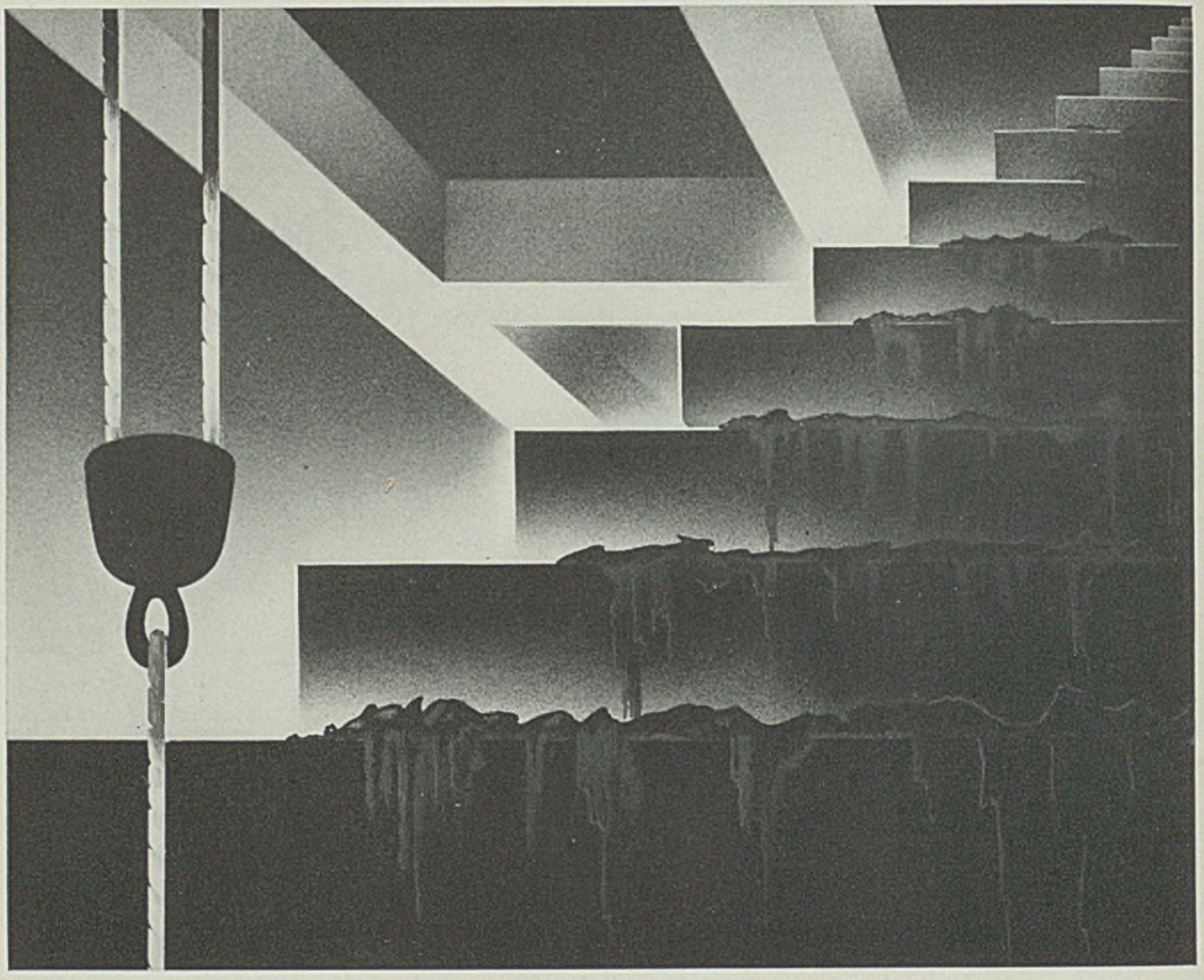

Maintenance saved is money earned

EVEN in products or equipment in which maintenance involves merely routine repairs, the use of Molybdenum steels can effect worth-while economies. But when maintenance also involves the cost of new parts, replacement labor, service interruptions, time and profit losses, the infinitely greater wearing qualities of Moly steels mean savings too substantial to be overlooked.

One of many actual instances proving the capacity of Moly steels to withstand rough service over long periods, is found in the lift-chain bushings of sand diggers. Chrome-Moly steel bushings replaced the former kind. Although subjected to terrific battering and continuous service, their records showed a decided increase in life and, consequently, a decrease in service interruptions and maintenance costs.

Under virtually every kind of operating condition, Moly steels and irons will prove their economy through greater strength and longer wear. Investigate. Send for our technical book, "Molybdenum." Ask us to mail you our monthly news-sheet, "The Moly Matrix." Consult our laboratory on your difficult ferrous problems. Climax Molybdenum Co., 500 Fifth Ave., New York.

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MOLY

As the Editor Views the News

THE result of the election held Thursday to determine the collective bargaining agency for employes of Jones & Laughlin, as in case of the outcome of the Packard vote in the automobile industry, helps to emphasize the necessity on the part of employers of recognizing the fact that they are dealing with a condition and not a theory in the present labor relations situation. Prior to these elections many well informed persons felt there was a chance CIO could not muster a majority of the votes. This opinion was based upon a fairly accurate knowledge of sentiment among employes in the plants affected.

• • •

Nonunion Men Vote Union?

However, under conditions prevailing today, many employes may not vote according to their innermost convictions. Even in an honestly conducted election, where the vote is secret, men who really prefer not to belong to a union may cast votes for the CIO because they feel it expedient to do so. They sense apparent public moral support of the union movement. They have heard so much about victories for the CIO that they think unionization is inevitable. For the sake of expediency they think it is time to get aboard the bandwagon.

• • •

Must Return to Fundamentals

Thus industry is confronted not with the issue of right or wrong in the present situation, but with the actual condition of national mass psychology, which is a more powerful influence for coercion than any direct intimidation that could be exercised by employers or unions. Employers must recognize the fact their employes in many cases probably will not vote according to their true convictions. This means employers must go back to fundamentals to regain complete understanding with employes. It means a long patient campaign to re-establish confidence.

• • •

More Use for Synthetic Resin

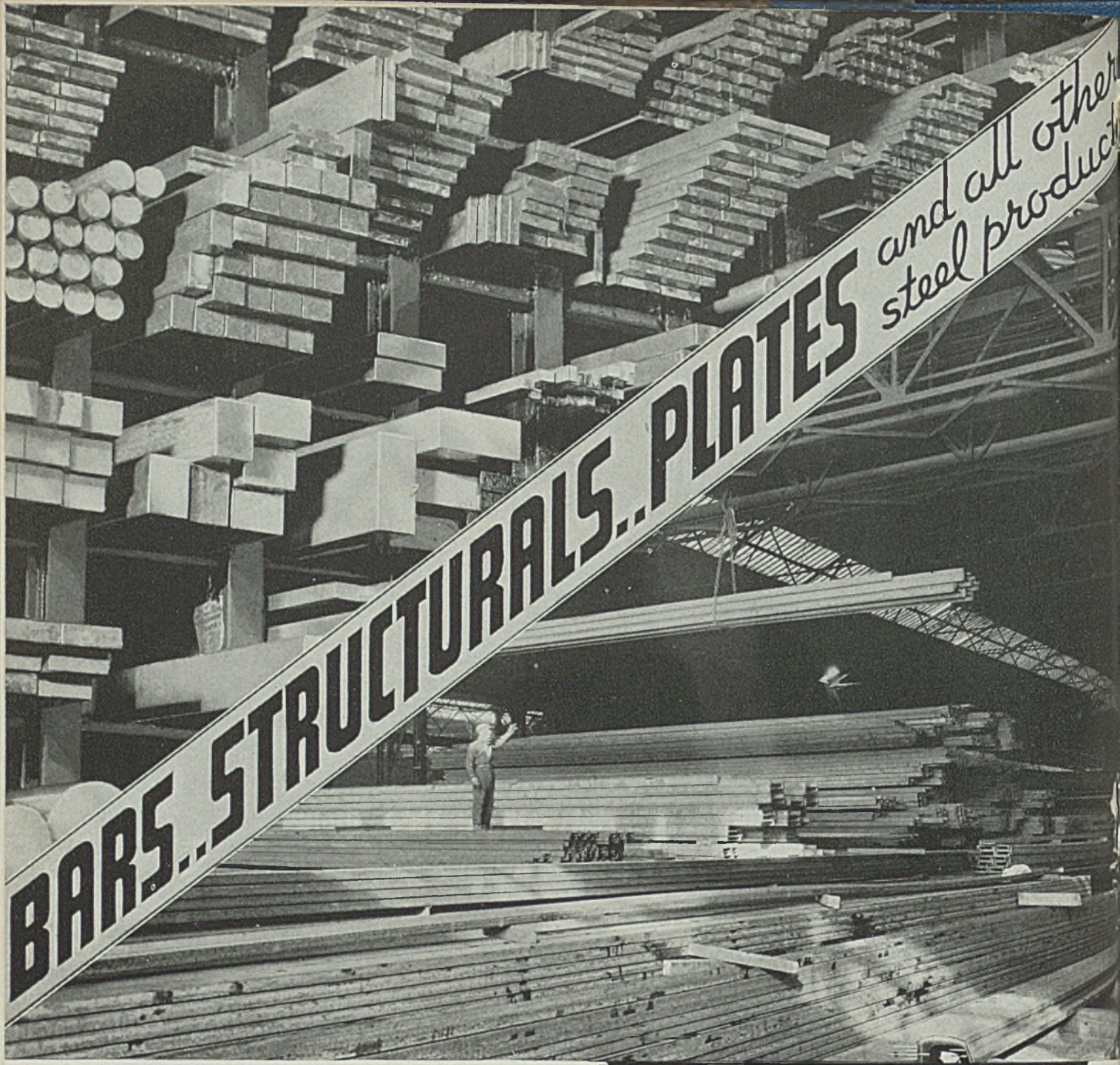
Synthetic resin coatings which protect ferrous materials against alkali, acid, abrasive and other attacks now may be had in wide variety. A steep tank in a glucose plant was coated with such material. After a year, instead of being corroded to a depth of at least ⅛-inch by the weak sulphur dioxide solution, the interior of the tank (p. 56) was found to have undergone no deterioration. Recent research in copper-molybdenum iron, it was predicted at the Mid-Atlantic sectional meeting of the American Society for Metals (p. 42) will soon release interesting developments. A new slide rule (p. 59) is available for adjusting motor speeds and roll settings of strip mills. It assists the mill operator in determining limitations and conditions of the mill for rolling various products.

• • •

Auto Industry Sets the Pace

"Research is a thing which, if you ever need it, it's too late to get," said Dr. Charles F. Kettering (p. 50) in an address at the meeting of the American Society of Mechanical Engineers in Detroit last week. Some 1000 members were told (p. 21) that mechanization under the leadership of the automotive industry has increased factory employment 85 per cent in the first three decades of this century. Electronic control now is being used increasingly (p. 64) in canmaking and paper handling machines and in welders but has not made much headway in machine tools for a number of reasons, one being a lack of a general knowledge about tubes and their applications. Heterogeneity of steel ingots, corrosion-fatigue of steel, atmospheric corrosion of roofing sheets and research on coke were principal subjects discussed (p. 68) at the recent meeting of the British Iron and Steel institute in London. Good housekeeping in a clock plant producing approximately 3,500,000 parts a week (p. 47) prevents backtracking and bottlenecks in the production line.

E. L. Shaner



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RYERSON

SWOC, Winning "a Government Election", Pushes for More Agreements

IN ITS most important victory since last March, when subsidiaries of the United States Steel Corp. were signed up, the steel workers organizing committee last week won an election to determine sole collective bargaining rights in plants of Jones & Laughlin Steel Corp.

Seven thousand workmen said they did not want SWOC to represent them. But under the outcome of the ballotting, all negotiations for wages, hours and working conditions will now be conducted by the John L. Lewis organization.

Holding this exclusive privilege for the first time with a major steel company, SWOC renewed its task of obtaining agreements with other independent producers. Unsigned were Bethlehem Steel Co., Republic Steel Corp., Youngstown Sheet & Tube Co., National Steel Corp., American Rolling Mill Co., Inland Steel Co., and a number of others.

Conferences Are Scheduled

A conference with Crucible Steel Co. is scheduled for Monday, May 24, and one with Inland is dated for Tuesday. A "consent" election for sole collective bargaining will be conducted in plants of Sharon Steel Corp., Sharon, Pa., Tuesday. On June 9 an election will be held in the plants of the Pittsburgh Steel Co., Pittsburgh.

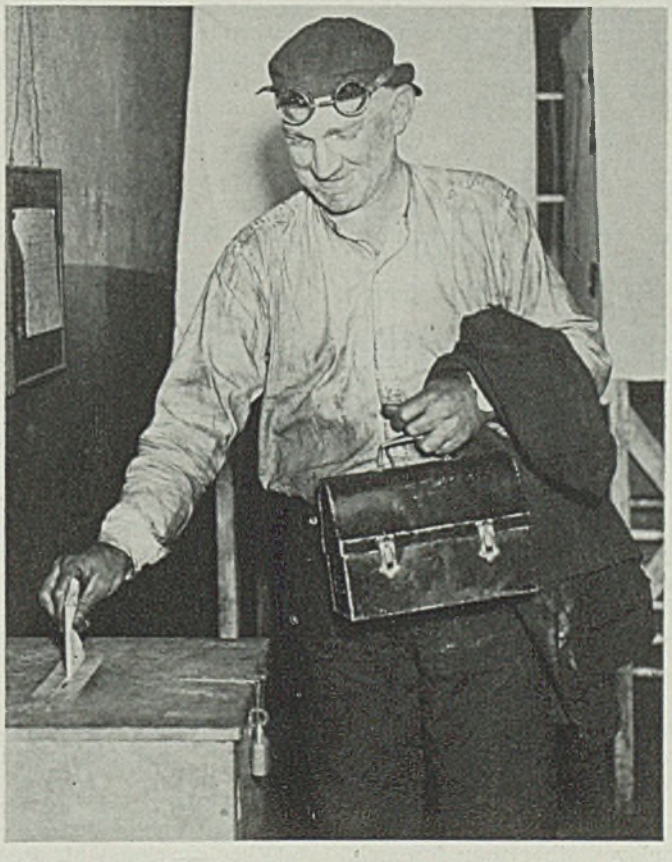
The vote in Jones & Laughlin plants was: For the SWOC, 17,028; against, 7207. The count showed 24,412 of Jones & Laughlin's approximately 27,000 eligible workers had cast ballots, with slightly more than 69 per cent of them favoring the SWOC. There were 31 blank ballots, 56 voided, and 90 challenge votes which were not counted. At Aliquippa the vote was for the SWOC, 7940; against, 3191. In Pittsburgh the vote was for the SWOC, 9073; against, 4031.

While the committee won many departments at Aliquippa, such as blast furnace, open hearth, bessemer, sintering, blooming mill, bar, billet, tin plate and wire mills, voting against it were the by-product coke works, 14-inch mill, and the field engineer and chemical and metallurgical workers and others.

Soon after the outcome of the vote was announced, Philip Murray, committee chairman, went to the Jones & Laughlin offices to begin negotiations on a written labor agreement with H. E. Lewis, chairman of the board.

Mr. Lewis issued a statement saying "The Jones & Laughlin Steel Corp. is gratified that such an important issue has been so amicably settled by peaceful and democratic methods under the provisions of the Wagner act.

"Now that the election is over and our employes have made their decision, let us forget the tension of the past few weeks and cheer-



A STEELWORKER CASTS HIS BALLOT: No bitterness, no disorder was apparent at the booths in the Jones & Laughlin plants

VOTING at Jones & Laughlin's Pittsburgh plant. This being a "consent" election, the company provided a place inside the mill for balloting. Employes were released from their work in groups, expediting the election. The mill continued in operation with little interruption while the voting progressed, from 6 a.m. Thursday to 1 a.m. Friday

fully apply ourselves to our duties, as it is important for all of us to do with our order books better filled than for sometime past."

Less than five hours were required to count and tabulate the votes. It was the first large election of its type in the steel industry.

By a series of coincidences Jones & Laughlin Steel Corp. has been prominent ever since the Wagner bill was enacted. The company opposed the act before the Supreme Court. Then it was the first major producer to offer a government supervised collective bargaining election, and it now becomes the first to recognize SWOC as sole collective bargaining agency.

The largest previous election supervised by the national labor relations board involved 12,000 workers at the Packard Motor Car Co.'s plants in Detroit.

The election started at 6 a.m. Thursday at 46 polling places in the Jones & Laughlin plants. All the ballot boxes were on company property to expedite the election.

Ballots contained only one question: "Do you want the Amalgamated Association of Iron, Steel and Tin Workers of North America through the Steel Workers Organizing committee of the CIO to represent you as the exclusive representative for collective bargaining?" Underneath were "Yes" and "No" squares for a single "X" mark.

Employes eligible to vote were all those employes other than foremen or assistant foremen in charge of any classes of labor, watchmen and salaried employes as shown by payroll records of April 30.

Both SWOC and independent employe organizations in Jones & Laughlin plants conducted vigorous election campaigns, holding numerous meetings and issuing sample marked ballots to the employes. Two independent groups had been formed following the Supreme Court decision on the Wagner act. At the South Side plant was the Pittsburgh Works Employes association, and at Aliquippa the United Iron and Steel Workers union. Both were led by former employe representative plan officials.

Election Well Handled

Ernest Dunbar, acting regional director, national labor relations board, was assisted by 65 agents of the labor board, including attorneys from Washington. In all, the election was conducted by some 241 persons. There were 176 "authorized observers," half of them employes of Jones & Laughlin and the other half appointed by SWOC. They acted as clerks and watchers at the polling places, assisted in the identification of voters, and challenged voters.

Employes were released from work in groups during working hours when notified. They had received written notice from the company as to whether they were eligible to vote. Sales of beer and liquor in vicinity of the plants were halted during the election.

Other developments in the labor situation last week included:

Signing of new wage contracts covering most of the captive mines of United States Steel Corp. in the western Pennsylvania area.

Decision of the Amalgamated Association of Iron, Steel and Tin Workers to seek the check-off system of collecting union wages in proposed future agreements. Several companies already are deducting Amalgamated dues upon written orders from individual employes, but no compulsory check-off is in force now. Ultimately, SWOC is to seek the check-off in its contracts.

Calumet Steel Co., Chicago Heights, Ill., resumed operations last week following a strike that had been in progress since the middle of April. Cause of the strike was the management's refusal to sign a contract with the CIO. Plant was reopened without signing union contract. The company manufactures billets, rails and axle steel bars and sections, as well as structural tubing and fence posts. About 500 men are employed.

NEW YORK SCRAP DEALERS, WORKERS FORM UNION PACT

First labor agreement in the iron and steel scrap industry has been completed between the New York chapter of the Institute of Scrap Iron and Steel Inc. and the waste material sorters, trimmers and handlers union, affiliated with the American Federation of Labor. The chapter includes approximately 100 dealers, more than 90 per cent of those in the metropolitan district.

A contract limited to wages and hours is to be negotiated within 45

days, the closed shop being eliminated; the agreement will cover two years with privilege of reopening at the end of one year.

The agreement is contingent on the union securing jurisdiction over all classes of workers employed in the industry, to avoid jurisdictional trouble.

Metal Trades Employment Shows Ninth Monthly Gain

April marked the ninth consecutive month in which metal trades employment at 22 leading centers has increased, according to the National Metal Trades association. Index last month was 101.6 per cent of the 1925-1927 monthly average, compared with 100.4 per cent in March and 82.7 per cent in April, 1936. The index now is at the highest level for any April since 1929.

Apprentice Pay Per Hour Near Daily Rate of 1880

BECOMING an apprentice to the machinist's trade in 1880 *was a vastly different proposition from the procedure in* 1937, *as indicated by the original indenture signed by J. H. Stratton with the Webster Camp & Lane Co., Akron, O., later absorbed by the Wellman Engineering Co., Cleveland. The text of the agreement, in the possession of Mr. Stratton's son, follows:*

Akron, O., May 23, 1880

This agreement between Webster Camp & Lane Co. of Akron, O., of the first part, and J. H. Stratton of Atwater, O., of the second part, Witnesseth:

That the said J. H. Stratton doth apprentice himself to the said party of the first part for the term of three years to learn the machinist's trade; and the party of the first part agrees to pay said party of the second part for his services during said term as follows, to wit: for the first year eighty cents per day; for the second year ninety cents per day; for the third year one dollar twenty cents per day.

Webster Camp & Lane Machine Co.
S. M. Burnham, Secy.
J. H. Stratton
Samuel Stratton, Guar.

Contrast the 80 *cents a day, presumably for ten or* 12 *hours a day, six days a week, in* 1880, *with rates paid by some companies today,* 52½ *cents an hour to begin,* 57 *cents an hour after* 60 *days. With a little training in this "machine age" a worker may earn more in an hour than in a day a half century ago.*

Mr. Stratton was 18 *years of age when he entered his apprenticeship and as a result of his training rose to the position of mechanical engineer with the Wellman Engineering Co. He died March* 19, *age* 75.

"A Government Election"

SAMPLE OF OFFICIAL BALLOT

12345
(TWELVE THOUSAND ETC.)

UNITED STATES OF AMERICA

6TH REGIONAL OFFICE
of the
NATIONAL LABOR RELATIONS BOARD

OFFICIAL BALLOT

To determine whether or not the employees, other than foremen, assistant foremen in charge of any classes of labor, watchmen and salaried employees, of the Jones & Laughlin Steel Corporation, desire to be represented by the Amalgamated Association of Iron, Steel and Tin Workers of North America through the Steel Workers Organizing Committee of the C. I. O. as the exclusive representative for the purposes of collective bargaining.

No. 1. THIS IS A SECRET BALLOT. DO NOT SIGN YOUR NAME.

No. 2. MAKE YOUR CHOICE BY MARKING "X" IN ONE SQUARE ONLY.

No. 3. IF YOU SPOIL YOUR BALLOT, RETURN IT TO THE REGIONAL DIRECTOR'S AGENT AND OBTAIN A NEW ONE.

No. 4. FOLD YOUR BALLOT TO CONCEAL THE "X" YOU HAVE MADE AND PUT IT PERSONALLY IN THE BALLOT BOX.

Do you want the Amalgamated Association of Iron, Steel and Tin Workers of North America through the Steel Workers Organizing Committee of the C. I. O. to represent you as the exclusive representative for collective bargaining.

YES ☐ NO ☐

THIS IS A SECRET BALLOT AND MUST NOT BE SIGNED

AT THE top of the ballots used at J & L plants last week were the words "United States of America." SWOC Chairman Murray, in a public statement a few days before the voting began, referred to the approaching election as "a government election."

New Streamlined Rail Motor Cars in Service

Chicago & Eastern Illinois railroad placed in operation May 20 two new streamlined air-conditioned rail motor cars, designed and built by American Car & Foundry Co. at its Berwick, Pa., plant. These trains, named Egyptian Zipper, will replace two full-length steam trains, and will operate between Danville and Cypress, Ill., a distance of 242 miles.

The cars are constructed of special steel alloys. Each weighs 62,500 pounds and is arranged to carry 61 passengers and 5000 pounds of mail. Power is supplied by a 200-horsepower Hall-Scott model 190 horizontal engine.

The overall length is 75 feet, seven and a quarter inches. The interior is divided into four compartments; the front end is for the operator, next is a 16-foot mail space, followed by two passenger compartments separated by the center-entrance vestibule with entrance doors on each side of the car.

On the test run, gasoline consumption was four and one-half to five and one-half miles per gallon, depending on varying operating conditions.

Hull Opposes Scrap Embargo

SECRETARY of State Hull last week sent a communication to Senator Sheppard, Texas, chairman, senate military affairs committee, and to Representative Hill, Alabama, of the house military affairs committee, concerning the Schwellenbach-Kopplemann scrap export bills, in which Mr. Hull recommends no action be taken at present by congress. Mr. Hull's communication stated:

"The matter has been most carefully studied by an interdepartmental committee which unanimously reached the conclusion that the export movement of scrap has created no emergency situation and that there is no actual or prospective shortage of scrap.

"Its analysis furthermore indicates that the disadvantages of direct and indirect restrictive action would outweigh the possible advantages. This report was unanimously agreed to by the executive committee on commercial policy, and, I believe, has the concurrence of various interested departments. My study of the subject leads me to the same opinion.

"I am aware of the fact that the subject is one of continuing interest and importance and have given instructions that it should be followed with the greatest of care."

It is understood on high authority that before sending this communication, Mr. Hull conferred with the President. It also is understood that the department of commerce will concur in the opinion.

Offers Prizes for Most Beautiful Steel Bridges

American Institute of Steel Construction again will award prizes to the most beautiful steel bridges completed in the United States in 1936. Photographs of bridges to be submitted in the ninth annual competition must be received by the institute, 200 Madison avenue, New York, by June 19. Entries will be judged by a jury of nationally-known architects and engineers to be announced.

Competition is in three classes, bridges costing $1,000,000 or more, bridges costing $250,000 to $1,000,000, bridges costing less than $250,000. Winners in each class will be decorated with a stainless steel plaque.

Community Participates in Ceremony Starting Work for New Irvin Mill

GROUND breaking ceremonies for Carnegie-Illinois Steel Corp's Irvin works assumed the proportions of a community demonstration last Saturday. Steel notables, community officials and residents gathered atop Camden hill, about three miles north of Clairton, Pa., where construction of the plant will be started in a few days.

William A. Irvin, president, United States Steel Corp., was guest of honor and chief speaker. He turned the first earth with a Carnegie-Illinois stainless steel spade. B. F. Fairless, president, Carnegie-Illinois, introduced Mr. Irvin, presented the spade, acted as master of ceremonies.

Many Guests Attended

Guests included executives of the Steel corporation and subsidiaries, city, county and township officials, Carnegie-Illinois officers and department heads from Pittsburgh and Chicago districts and newsmen. Many others witnessed the ceremonies, and heard the speeches through a public address system.

Speakers included Cornelius D. Scully, mayor of Pittsburgh. Music was provided by the Clairton civic band and the Clairton male chorus.

The Union railroad, a Steel corporation subsidiary which traverses the site and will serve the new plant, carried many visiting notables in a special train from East Pittsburgh. Invited guests were served a buffet luncheon at close of the ceremonies.

Contracts for excavation, grading, construction of foundations and outflows were announced last week. Successful bidders were A. Guthrie & Co., St. Paul; John Marsch Inc., Chicago; and Edward Peterson Co., Omaha, Nebr.

Clearing and preparing site and construction of mills, which will have annual capacity of 600,000 tons of sheet, strip and other light finished steels is expected to require about 12 months. The plant will be powered by electricity throughout.

Excavation of approximately 3,500,000 cubic yards of earth and pouring an estimated 150,000 cubic yards of foundation concrete are involved in contract specifications. Immediate work includes clearing of approximately 200 acres of the 600-acre tract on which the 80-inch hot strip and cold reduction mill will be built.

Contour of the site varies as does the character of the ground to be excavated. The ground is to be leveled by using material excavated from above the proposed mill yard to fill low places. Should additional fill be required, granulated slag will be used.

Contracting companies are to furnish all labor, tools and equipment for excavation, filling, grading and removal of material and build sewers and concrete floors and foundations. Specifications call for 3500 tons of reinforcing steel and 1050 tons of anchor bolts, washers and manhole steps.

The contract specifies 200,000 square yards of fine grading for floors and laying of the same amount of 10, 8 and 6-inch concrete floors. Hard finish surfaces for heavy traffic are estimated at 10,000 square feet.

$4,000,000 FOR MODERNIZING COLD-ROLL DEPARTMENT

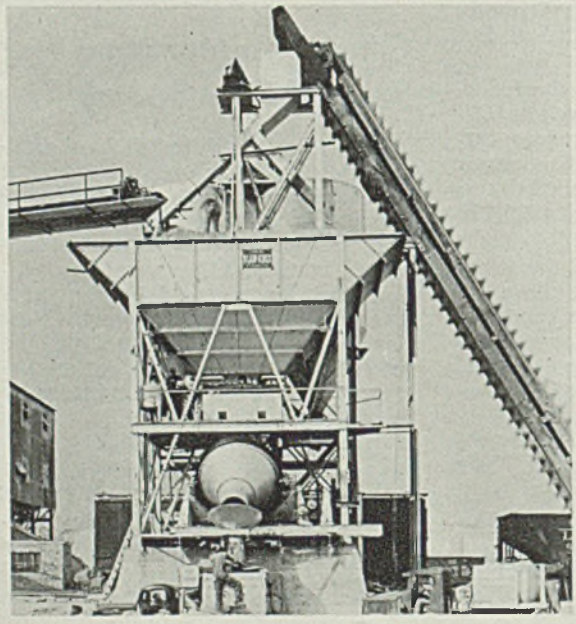
American Steel & Wire Co. will spend $4,000,000 for rearrangement and rehabilitation of cold-roll department facilities at its Cuyahoga works, Cleveland. Principal output at Cuyahoga consists of rods, wire, cold rolled strip and stainless steel.

While the program does not call for a great deal of expansion it will modernize the mill through introduction of more economical methods of production and handling, scrapping of old equipment and installation of modern equipment.

The present cold rolling equipment comprises 114 roll stands of which 96 are single machines and 18 are in five train sets. It will be necessary to remodel some of this, scrap some, and add a few additional machines. When the program is accomplished the plant will have somewhat greater capacity. One of the chief changes in the department will be the removal of 36 stands now on the second floor to a new location on the first floor. The second story will then be used for locker and wash room facilities and improved plant offices.

New slitting machinery will be added, allowing the mill to operate efficiently with the wider hot rolled sheets which are being produced by the McDonald works of Carnegie-Illinois Steel Corp., another United States Steel Corp. subsidiary.

Central Mixing Plant for Tennessee's New Strip and Plate Mill



THIS complete Blaw-Knox central mixing serves the Birmingham Slag Co. in handling 108,000 *yards of concrete used in construction of the Tennessee Coal, Iron & Railroad Co.'s* $30,000,000 *hot and cold strip and plate mill, Birmingham, Ala. In addition, ten Blaw-Knox "trukmixers" facilitate handling of* 60 *yards per hour on some pours. Batching cycle for the cement is* 15 *to* 18 *seconds*

Steel & Wire Co-ordinates Metallurgical Departments

American Steel & Wire Co. has created a central metallurgical department designed to co-ordinate and assist the district metallurgical departments which are kept intact.

The new department is headed by J. S. Richards, formerly director of manufacturing practices and is a division of the operating vice president's office. Besides Mr. Richards, the personnel consists of C. W. Meyers, assistant manager, and the following division metallurgists:

W. F. Conlin, in charge of steel standardization, practices and committee work; J. R. Thompson, in

charge of low alloy and carbon practices; A. E. Hibschman, in charge of high carbon and special practices; C. A. Schacha, in charge of metal practices; and E. F. Oviatt, in charge of packaging, specifications and general standard practice activities.

Charter Granted to New Tool Engineers Chapter

American Society of Tool Engineers has granted a charter to a new Twin City chapter at Minneapolis-St. Paul. Ford Lamb, executive secretary of the national organization, Detroit, conferred the charter upon the group, which is said to be the second largest in the society.

Chapter officers were named as follows: K. K. Roby, engineer, Minneapolis-Honeywell Regulator Co., Minneapolis, chairman; Eugene F. Huot, Huot Mfg. Co., tool manufacturer, St. Paul, vice chairman; Carl Bakule, foreman, Minneapolis-Moline Power Implement Co., Minneapolis, treasurer; and Gunner G. Widen, Electric Mfg. Co., Minneapolis, secretary.

Railroad, Steel Officials Review New Developments

"United States Steel" night was observed by the New York Railroad club at the Engineering Societies building, New York, May 21. J. R. Mills, New York manager of sales, Carnegie-Illinois Steel Corp., was master of ceremonies, being introduced by Charles A. Gill, president of the club. A. F. Stuebing, railroad mechanical engineer, United States Steel Corp., reviewed recent developments in steel for railroad equipment, and F. R. Layng, chief engineer, Bessemer & Lake Erie railroad, spoke on recent tests and developments in rails.

Motion pictures depicted rail manufacture and treatment, and showed the laying of one mile of experimental welded track on the Bessemer & Lake Erie railroad.

Midland Steel's Profits Up

Midland Steel Products Co. in its statement of earnings for the first quarter of 1937 reported net profit of $558,215 after all charges including reserves for employes' profit sharing and for federal tax, but before provision for tax on undistributed earnings. This compares with net profit of $410,725 for the first quarter of 1936, according to E. J. Kulas, president.

Mechanical Engineers Show Benefits of Mechanization

SIGNALIZING the many achievements which the automotive industry has made in the advancement of engineering science, the American Society of Mechanical Engineers was host to well over 1000 last week at its semiannual meeting in the motor capitol of the world. Interest was about equally divided between the 40-odd technical papers presented at the various sessions and the frequent inspection trips to some 14 plants in the Detroit district.

Registration totaled 668 at the end of the first day of the general sessions, and as the week progressed several hundred more arrived. Reservations for the dinner meeting Thursday quickly exceeded the 500 originally planned for and facilities for 300 more were required.

Gains Are Enumerated

Sounding the keynote of the meeting, Dr. C. F. Hirshfeld, chief of research, Detroit Edison Co., observed significantly that mechanization under the leadership of the automotive industry has increased factory employment 85 per cent in the first three decades of this century, while the population increased 62 per cent and the national income leaped 400 per cent. This increase has meant to a large extent an improvement in the wealth of the individuals who produced the goods, Dr. Hirshfeld declared, because they are the ones who consume them.

Automobiles Raise Wages

The automobile industry has led the way in establishment of high hourly wages and in mapping out production to support these wages, he pointed out, and furthermore is unique in consciously and intentionally obsoleting its own product.

"Everything in the industry is dynamic, not static," Dr. Hirshfeld concluded, "There may be changes of pace, but there can be no cessation of flow, except in the case of a complete shutdown."

Commenting upon these remarks, H. T. Woolson, executive engineer,

(*Please turn to Page* 50)

Engineers Hear "Boss Ket" on Research

JAMES H. HERRON (left), president, James H. Herron Co., Cleveland, and president of the American Society of Mechanical Engineers, with C. F. Hirshfeld (right), chief of research for Detroit Edison Co. and keynote speaker at the society's semiannual meeting in Detroit last week, greet Charles F. Kettering, General Motors research head, who was the feature speaker at an evening session attended by 800. Photo courtesy Detroit Free Press. For report of the meeting see pages 50-51

Diesel Trains To Span Continent

DIESEL-POWERED trains shortly will span the North American continent. Closing of the last link has been made possible with the completion for the Baltimore & Ohio railroad at the Electro-Motive Corp. plant at LaGrange, Ill., of a 3600-horsepower locomotive. This locomotive is one of two units to be put into service on the Capitol Limited between Washington and Chicago by the Baltimore & Ohio within a few weeks.

An inspection of the first of the new locomotives at the Electro-Motive plant May 19 attracted high officials of the railroad and General Motors Corp., parent body of the locomotive building company. The locomotive, consisting of two units, each containing two 900-horsepower diesel engines, has been started to Baltimore for formal delivery and acceptance.

Officials Make Addresses

Charles F. Kettering, vice president of General Motors in charge of research; C. W. Galloway, operating vice president of the Baltimore & Ohio; and H. L. Hamilton, president of Electro-Motive Corp., were speakers at a luncheon at the plant preceding the delivery.

With the new locomotive in service it will be possible to travel from Washington to the Pacific coast entirely by diesel trains in 54 hours and 10 minutes running time, or less time than was required a few years ago to travel from Chicago to the coast.

Electro-Motive Corp. now is employing 950 men in its two-year-old plant at La Grange and has a capacity for building 150 to 175 locomotives a year. Engines continue to be built by the Winton Engine Corp., Cleveland, another General Motors subsidiary. Mr. Hamilton stated that the company does not plan to move the Winton unit to the Chicago district.

ONE of the two 3600 horsepower diesel locomotives built by the Electro-Motive Corp., General Motors subsidiary, for the Baltimore & Ohio railroad. The two new locomotives will be used on the Capitol Limiteds between Chicago and Washington, forming the last link in transcontinental service by diesel-powered trains

125 Machine Tool Builders At Speed Show Premier

Approximately 125 representatives of leading eastern machine-tool companies met in Worcester, Mass., for the opening of General Electric Co.'s machine tool speed show May 17. A sound moving picture of machine tools in operation and exhibits of motors and control devices proved of special interest.

The principal speakers and their subjects were: A. A. Merry, Carboloy Co., "High Production Performance with Carboloy Tools"; A. C. Danekind, General Electric, "Requirements of Electric Equipment for High Production Machine Tool Performance"; R. S. Walsh, General Electric, "Meeting Your Requirements for Motors"; and N. L. Hadley, General Electric, "Industrial Control to Meet Modern Machine-Tool Standards."

The show is scheduled to appear in Cincinnati, May 24, and Rockford, Ill., May 28. A staff writer for STEEL will report the Cincinnati show in the issue of May 31.

Southern Association Aided Convention Feature

In the report of the proceedings at the triple convention of the Southern Supply and Machinery Distributors', National Supply and Machinery Distributors' and American Supply and Machinery Manufacturers' associations, held at Memphis, Tenn., May 10-12, which appeared in STEEL, May 17, page 17, it was stated that "A unique convention feature was the presentation, under auspices of the manufacturer-distributor relations committees of the National and American associations of a recorded three-act drama covering such relations."

This statement, according to Alvin M. Smith, Smith-Courtney Co., Richmond, Va., and secretary-treasurer of the Southern association does that body an injustice. The Southern association contributed its proportionate financial share of the cost of putting on this feature and its manufacturers relations committee assisted in gathering the information on which the script was based.

Follansbee Bros. Asks Modification of Plan

Follansbee Bros. Co., Pittsburgh, has petitioned Federal Judge R. M. Gibson for a modification of the company's reorganization plan.

Under modified plan the proposed bond issue will be reduced from $4,500,000 to $4,000,000, and the modernization program changed by reducing the cost from $4,820,000 to $4,000,000. Judge Gibson fixed June 1 for a hearing.

April Foundry Equipment Orders Show Recession

Foundry Equipment orders in April receded slightly from the unusually high rate of February and March. The index of orders was 208.1 compared with 293.2 in March and 134 in April, 1936. Index of shipments in April was 232.5 compared with 285.6 in March and with 105.1 in April, 1936. Unfilled order index in April was 365.4, compared with 408.5 in March and 123.2 in April, 1936. Indexes are based on averages of 1922-24 as 100.

Soil Pipe Case Filing Date Extended to June 9

Federal trade commission last week extended until June 9 date for filing answers to its complaint against the Cast Iron Soil Pipe association, Birmingham, Ala., its officers, and 35 companies producing and selling 90 per cent of total cast iron soil pipe output. This is the second time it has extended filing date.

Speakers for Institute's Technical Session

L. H. Burnett

Dr. V. N. Krivibok

C. M. White

Dr. G. B. Waterhouse

L. H. BURNETT, vice president, Carnegie-Illinois Steel Corp., will speak at the technical session of the forty-sixth general meeting of the American Iron and Steel institute at New York, May 27. His subject is "Fundamentals of Safety and Accident Prevention in Steel Plants."

Mr. Burnett was born at Springfield, O., Sept. 14, 1874. He attended the public schools of that city and later spent three years at Kenyon Military Academy, where he graduated in 1892.

He entered Kenyon college in the fall of that year and graduated with the class of 1896. He then entered the class of 1899 at Columbia university law school and after two years went to Pittsburgh where he was admitted to the bar in September, 1899.

In September, 1901, he entered the law department of Carnegie Steel Co. as clerk to the solicitor and later became assistant solicitor of that company and vice president of Carnegie Land Co.

In 1912 he was appointed assistant to the president in charge of legal matters, as well as safety, sanitation and welfare. In 1927 he was elected a vice president of Carnegie Steel Co. and served in that capacity until Sept. 30, 1935, when he was elected vice president and director of Carnegie-Illinois Steel Corp., which position he now occupies.

Mr. Burnett is now in charge of legal matters, real estate, pensions, workmen's compensation and the medical and surgical department.

CHARLES M. WHITE, vice president in charge of operations of Republic Steel Corp., Cleveland, will deliver an address on "Technological Advances in Steel Products."

During and following his schooling at Hutton, Md., and Maryland State college, he was a lumberman, tanner, telephone lineman, and railroad construction worker.

In 1913 he took his first steel job as a machinist helper for the American Bridge Co., in Ambridge, Pa. He progressed to millwright helper in a sintering plant, becoming plant superintendent.

For the Jones & Laughlin Steel Corp., he was progressively assistant blast furnace superintendent of the Eliza works; master mechanic in charge of construction and power; and assistant to the general superintendent in charge of all mechanical and construction work.

For a short time he was employed on a railroad subsidiary of Jones & Laughlin, in 1927 going to the Aliquippa works, of which in 1929 he was made general superintendent.

In 1930 he went with Republic as assistant vice president in charge of operations, and in 1935 was made vice president in charge of operations, his present title.

DR. VSEVOLOD NICHOLAS KRIVOBOK, author of the paper, "Stainless Steels," was born in Russia in November, 1892. After completing his studies at the Politechnical Institute of Petrograd, he went to work in the pressing and forging department of the Putiloff Works in Petrograd.

Following a trip to this country as a junior member of the artillery commission in 1915-17, he was transferred to the Russian mission of ways of communications, and in 1919 returned to Russia, becoming an engineer in the metallurgical department of the ministry of railroads of South Russia.

A year later he returned to the United States, completed his graduate work at Harvard in 1924, was made research associate in the bureau of metallurgical research at Carnegie Institute of Technology, Pittsburgh, and later was made associate professor of metallurgy of that institution.

DR. GEORGE BOOKER WATERHOUSE, professor of metallurgy at Massachusetts Institute of Technology, Cambridge, Mass., will close the technical session with a paper on "Developments in Production Metallurgy of Iron and Steel."

Born in Sheffield, England, May 25, 1883, Professor Waterhouse was graduated from the University of Sheffield in 1901, did post-graduate work in that university for two years and received his doctor of philosophy degree from Columbia university, New York, in 1907. Coming to the United States in 1903, he became a naturalized citizen in 1910.

With the Lackawanna Steel Co., now a part of the Bethlehem Steel Corp., as metallographist, metallurgist and metallurgical and inspecting engineer until 1922, he became a professor at M. I. T. in that year. He has also carried on a consulting practice.

He is a member of the American Iron and Steel institute, the American Institute of Mining and Metallurgical Engineers, American Society for Testing Materials, American Society for Metals, the Iron and Steel Institute of Great Britain and other technical bodies.

During the World war he served with a New York regiment. He had been chairman of the ferrous advisory committee of the federal bureau of standards. Numerous scientific papers and articles have come from his pen, and in many law suits relating to iron and steel he was qualified as an expert witness.

Men of Industry

R. L. LEVENTRY and Frank E. Flynn have been named district managers of Republic Steel Corp.'s Youngstown and Warren-Niles districts, respectively, following the transfer of Charles H. Elliott to the company's general offices at Cleveland as assistant vice president in charge of operations.

Mr. Leventry has been associated with Republic the past 19 years, prior to which he attended Cornell university and worked at various mill jobs with Cambria Steel Co., now Bethlehem Steel Co. Since 1935 he has served as general superintendent. Mr. Leventry has named B. W. Norton, superintendent of blast furnaces and coke plant since 1933, as assistant district manager.

Mr. Flynn joined Trumbull Steel Co. in 1928 as assistant vice president in charge of operations, and was assistant district manager of Republic Steel at Warren from its formation to October, 1935, when he was named general superintendent. He is treasurer, Association of Iron and Steel Engineers. F. C. Farrell has been named assistant district manager at Warren. He has been in the industry since 1903.

♦ ♦ ♦

L. B. Alliason, prominent in transmission gear manufacturing as engineering representative, has joined the staff of National Broach & Machine Co., Detroit, as sales engineer.

♦ ♦ ♦

Philip P. Edwards, vice president, Kearney & Trecker Mfg. Corp., Milwaukee, for the past six years, has resigned to take an executive position with Ingersoll Milling Machine Co., Rockford, Ill.

♦ ♦ ♦

William A. Marshall, resident engineer at Vandergrift, Pa., works, Carnegie-Illinois Steel Corp., from March, 1935, has been promoted to superintendent of construction for the Irvin works.

♦ ♦ ♦

Dr. Gilbert E. Doan, associate professor of metallurgy, department of metallurgical engineering, Lehigh university, Bethlehem, Pa., has been advanced to the position of professor of metallurgy.

♦ ♦ ♦

E. A. Tanner, formerly general manager and vice president of Milcor Steel Co. at Canton, O., has been elected executive vice president. Through a typographical error, Mr. Tanner's name appeared as Turner in a previous issue.

♦ ♦ ♦

Frank C. Thompson, purchasing agent, Link-Belt Co., Indianapolis, has been elected president, Purchasing Agents Association of Indianapolis, succeeding Spencer M. Raymond, purchasing agent, Diamond Chain & Mfg. Co.

♦ ♦ ♦

Joseph J. Sweeney, 737 South Frazier street, Philadelphia, formerly connected in a sales capacity with Botfield Refractories Co., has taken over the eastern territory as sales representative for the Thermal Products Corp., Pittsburgh.

♦ ♦ ♦

John B. Thomas, heretofore assistant manager of wire sales division, Wheeling Steel Corp., Wheeling, W. Va., has been transferred to Atlanta, Ga., as district sales manager. He succeeds R. F. Smith, who is now engaged in special sales activities.

♦ ♦ ♦

George M. Croft, formerly blooming and bar mill superintendent at the Vandergrift, Pa., works of Carnegie-Illinois Steel Corp., has been made plant maintenance superintendent. James M. Bortz, assistant resident engineer, has been named to succeed Mr. Croft as superintendent of blooming and bar mill.

♦ ♦ ♦

William G. Hulbert, formerly superintendent of the Easton, Pa., plant, Taylor-Wharton Iron & Steel Co., has been appointed general works manager in charge of manufacturing at both the Easton, and High Bridge, N. J. plants. H. F. Heyl, formerly chief engineer at the Easton plant, succeeds Mr. Hulbert as superintendent.

♦ ♦ ♦

L. L. Mitchell, sales engineer in the Detroit office of Mullins Mfg. Corp., Salem, O, has been appointed vice president and general manager of Steel Materials Co., Detroit, manufacturer of steering wheels, automobile accessories, plated parts and miscellaneous stampings. Mr. Mitchell at one time was general manager of E. F. Hauserman Co., Cleveland, and later was superintendent of the body plant of Hudson Motor Car Co., Detroit.

♦ ♦ ♦

E. E. Wright has been appointed to take charge of the Cleveland office of Electro Metallurgical Sales Corp., New York. From 1918 until his present appointment, he has been with both the works and the sales departments of National Carbon Co. Inc. Both companies are units of Union Carbide & Carbon Corp.

♦ ♦ ♦

Charles M. Young, 30-year old vice president and treasurer, L. A. Young Spring & Wire Co., Detroit, has been elected president and general manager, succeeding his uncle, L. A. Young, who is now chairman of the board. Mr. Young has been associated with the company since graduation from college. He worked through various departments, and in 1935 was elected treasurer and vice president.

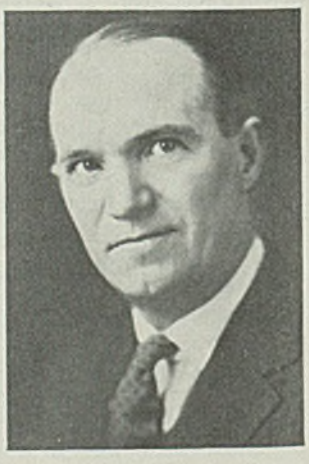
♦ ♦ ♦

Harry M. Whittaker has been

R. L. Leventry

Frank E. Flynn

B. W. Norton



F. C. Farrell

named chief engineer for the Micromatic Hone Corp., Detroit, manufacturer of honing machine tools. He has had wide experience both as consultant and sales engineer in tooling up high-production applications for automotive and aircraft engine manufacturers. He formerly was associated with Ex-Cell-O Corp., Detroit, and until recently was head of the Whittaker Engineering Co., Detroit.

♦ ♦ ♦

Walter A. Bonitz has resigned as president of Pressed Steel Car Co. Inc., Pittsburgh. He will remain on the board of directors. Mr. Bonitz was one of the receivers and trustees in the reorganization proceedings of Pressed Steel Car Co. of New Jersey and at the termination of those proceedings became president of the reorganized company. In his resignation, Mr. Bonitz pointed out that the new company is now functioning completely, and that his health would not permit his continuing service as chief executive officer.

♦ ♦ ♦

A. E. White, professor of metallurgical engineering and director of department of engineering research, University of Michigan, Ann Arbor, Mich., has been nominated for president of the American Society for Testing Materials to succeed A. C. Fieldner, chief engineer, experiment stations division, bureau of mines, Washington.

H. H. Morgan, manager, rail and fastenings department, Robert W. Hunt Co., Chicago, has been named for the post of vice president.

Nominees for the executive committee are: P. H. Bates, chief, clay and silicate products division, national bureau of standards, Washington; H. F. Clemmer, engineer of materials, District of Columbia, Washington; G. E. F. Lundell, assistant chief, chemistry division, national bureau of standards, Washington; H. C. Mougey, assistant technical director and chief chemist, research laboratories, General Motors Corp., Detroit; and R. L. Templin, chief engineer of tests, Aluminum Co. of America, New Kensington, Pa.

Election will be by mail ballot between May 20 and June 1, with nomination virtually assuring election. The new officers will be installed at the annual meeting of the society in New York, June 28-July 2.

♦ ♦ ♦

Raymond C. Bullard, advertising and publicity manager, Bullard Co., Bridgeport, Conn., has been elected to the board of directors. Following graduation from college, Mr. Bullard served a period of six years as an engineering student in various departments of the company's manufacturing division. Following this he spent considerable time in the sales engineering department and then was placed in the advertising

Raymond C. Bullard

department. He was appointed to his present position in 1932.

♦ ♦ ♦

S. D. Mahan has been appointed general advertising manager, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. He formerly was manager of merchandising advertising. Mr. Mahan will have general supervision over all advertising and sales promotion work of Westinghouse and its subsidiaries. His headquarters will be in Mansfield, O.

Roger Bolin has been appointed merchandising advertising manager and will also have his headquarters in Mansfield. He joined Westinghouse in 1925 at East Pittsburgh.

♦ ♦ ♦

George B. Waterhouse, professor of metallurgy, Massachusetts Institute of Technology, Cambridge, Mass., has been nominated for national president of the American Society for Metals, to succeed Edgar C. Bain, assistant to vice president in charge of metallurgy and research, United States Steel Corp., New York.

W. P. Woodside, vice president, Climax Molybdenum Co., Detroit, is the nominee for the office of vice president to succeed Prof. Waterhouse. Dr. Bradley Stoughton, dean

A. E. White

of engineering, Lehigh university, Bethlehem, Pa., was nominated for treasurer for two years to succeed Mr. Woodside, who served in that capacity the past two years.

Nominees for the office of trustee for two years are James P. Gill, metallurgist, Vanadium-Alloys Steel Co., Latrobe, Pa., and Harvey Anderson, metallurgical engineer, Western Electric Co., Chicago. These selections were made at a meeting of the nominating committee in Pittsburgh, May 17. Nomination to the offices virtually assures election at the National Metal Congress in Atlantic City, N. J., Oct. 18-22.

Died:

ARTHUR S. BOOTH, 51, vice president, Sharon Steel Corp., Sharon, Pa., in St. Petersburg, Fla., of heart attack, May 19. Mr. Booth spent his entire business life in the employ of Sharon Steel Corp. and its predecessor. In 30 years with the company he rose from office boy to vice president.

♦ ♦ ♦

Frank M. Spitz, 55, co-founder and president, Brown Fence & Wire Co., Cleveland, in that city, May 16.

♦ ♦ ♦

Charles N. Teetor, 66, president Perfect Circle Co., Hagerstown, Ind., in that city, May 2.

♦ ♦ ♦

William Transue, 63, production manager of Transue & Williams Steel Forging Corp., Alliance, O., until his retirement in 1927, in Alliance, May 16.

♦ ♦ ♦

George H. Porter, 52, president, George H. Porter Steel Treating Co., Cleveland, in that city, May 11. He was a machinist until 1920 when he and J. D. Myers formed the steel treating company.

♦ ♦ ♦

Gilbert M. Black, 85, for many years vice president in charge of operations, Park Bros. & Co., which later became part of the Crucible Steel Co. of America, in Pittsburgh, May 11. He retired 15 years ago.

♦ ♦ ♦

Joseph William Bowman, president of both the American Steel Band Co., Pittsburgh, and Bowman Supply & Mfg. Co., Pittsburgh, and vice president of Bostwick Steel Lath Co., Niles, O., May 13 in Pittsburgh.

♦ ♦ ♦

Michael D. Flynn, 83, one of the inventors of a process for the continuous rolling of hot strip steel, May 14, at his home in Carnegie, Pa. He had been employed at the Cartwright & Macurdy mill in Youngstown, O., Superior Steel Co., and Weirton Steel Co., Weirton, W. Va. He retired ten years ago.

Meetings

WESTERN METAL CONGRESS AND SHOW IN LOS ANGELES

AMERICAN Society for Metals, Cleveland, announces a Western Metal congress and exposition at the Pan-Pacific auditorium, Los Angeles, March 21-25, 1938. This will be the third event of its kind to be held on the Pacific coast; the first was in Los Angeles in 1929 and the second in San Francisco in 1931.

Twelve national societies and associations with branches in the West will again co-operate in arranging the technical program which will have for its theme, "Metals in Industry."

The Pan-Pacific auditorium is a new exposition hall containing over 100,000 square feet all on one level. The exposition will include exhibits of raw materials, heat treating apparatus and supplies, inspection equipment, machinery, foundry supplies, materials handling, welding and cutting, oil field equipment, small tools, and finished products. Floor plans and contracts for space will be issued about June 15.

W. H. Eisenman, 7016 Euclid avenue, Cleveland, secretary of the American Society for Metals, will manage the congress and show.

GAS GROUPS TO DEAL WITH METAL TREATING FURNACES

Furnace engineers in the metalworking industries should find much of interest in the program of the national conference on industrial gas sales to be held at the Palmer House, Chicago, June 8-9, under sponsorship of the industrial gas section of the American Gas association and Midwest Industrial Gas Sales council.

Papers to be presented on the first day will deal with modern gas radiant tube applications and controlled atmosphere in modern industrial furnaces. The second day will be devoted to plant visitations.

Technical papers on the first subject are: "Applications of Gas Radiant Tubes to Continuous Enameling Furnaces—Facts and Figures," by George M. Parker, Mississippi River Fuel Corp., St. Louis; "Application of Gas Radiant Tubes to Galvanizing," by A. M. Thurston, East Ohio Gas Co., Cleveland; "Application of Gas Radiant Tubes to Short Cycle Malleable Annealing Furnaces," by C. H. Martin, Holcroft & Co., Detroit, and Eclipse Fuel Engineering Co., Rockford, Ill.; "Application of Gas Radiant Tubes to Batch Type Enameling Furnaces," by F. S. Markert, Ferro Enamel Corp., Cleveland.

Papers dealing with the second subject include: "Application of Controlled Atmospheres to Bright Annealing of Copper," by W. A. Darrah, Continental Industrial Engineers Inc., Chicago; "Design and Application of Equipment for Generation of Controlled Atmospheres with Respect to Annealing and Hardening Processes," by W. O. Owen, Surface Combustion Corp., Toledo, O.; "Gas Engines for Power Generation," by R. S. Wenner, Ohio Fuel Gas Co., Toledo, O.

District Steel Rate

Percentage of Open-Hearth Ingot Capacity Engaged in Leading Districts

	Week ended May 22	Change	Same week 1936	Same week 1935
Pittsburgh ..	96	+13	61	38
Chicago	85	+ 1	70½	44
Eastern Pa...	73½	None	43	29½
Youngstown..	80	— 3	76	50
Wheeling	94	None	89	68
Cleveland ...	82	+ 2½	74	54
Buffalo	88	— 2	78	37
Birmingham..	83	None	69	54½
New England	100	+13	75	60
Detroit	99	— 1	88	94
Cincinnati ..	90	— 4	80	†
St. Louis....	94	None	†	†
Average....	91½	+ 2½	66½	44

†Not reported.

ELECTRO-PLATERS' ARRANGING SILVER JUBILEE PROGRAM

American Electro-Platers' society will celebrate its silver jubilee at its annual meeting in New York, June 14-17. Headquarters will be at the Pennsylvania hotel. Features of the technical program will include a series of educational papers and six composite papers from six branches of the society dealing with work of the foreman plater.

In connection with the meeting, the society will sponsor exhibits of plated products and finishes. In addition, Metal Products Exhibits Inc., International Building, Rockefeller Center, will conduct through the period of the meeting an exhibit of plating equipment, and materials and plated products, as announced in STEEL, May 10, page 30.

W. J. R. Kennedy, 90 Maynard street, Springfield, Mass., is executive secretary of the society, and F. J. MacStocker, 25 Princeton street, Garden City, Long Island, N. Y., is general chairman of the convention committee.

EXPECT 140 EXHIBITORS IN STEEL EXPOSITION

Over 100 manufacturers of steel mill equipment have reserved space in iron and steel exposition which the Association of Iron and Steel Engineers will sponsor in connection with its annual convention at the Stevens hotel, Chicago, Sept. 30-Oct. 1. Officials of the association anticipate that another 35 or 40 will make reservations.

Production

NATIONAL steelworks operating rate rebounded 2½ points to 91½ per cent last week, as Pittsburgh, recovering from the brief labor disturbance, reported a gain of 13 points. Increases at Chicago, Cleveland and New England also contributed to this rise.

Cleveland-Lorain—Up 2½ points to 82 per cent. Otis Steel Co. added one unit to its active list to operate all eight, while Corrigan, McKinney division of Republic Steel Corp., and National Tube Co., Lorain, each continued to schedule 13 and 11, respectively.

Cincinnati—One open hearth was taken off last week for repairs, cutting production 4 points to 90 per cent.

Chicago—Increased 1 point to 85 per cent, bringing operations back to practically the previous peak for the year. Indications point to a maintenance of output near the present level at least through June. Carnegie-Illinois Steel Corp. has lighted its ninth furnace at South Chicago, giving the district 32 active stacks out of 39.

Central eastern seaboard—Held at 73½ per cent, with little early change indicated.

Detroit—Brief interruption of one furnace for repairs brought the rate down to 99 per cent. Schedules this week call for full capacity.

Pittsburgh—Up 13 points to 96 per cent, a new post-depression high. The leading interest was operating at close to 100 per cent.

Wheeling—Unchanged at 94 per cent.

New England—Lifted 13 points to 100 per cent. This week the rate will drop sharply due to repairs.

St. Louis—Ingot operations remained at 94 per cent.

Birmingham—Continued at 83 per cent, with little change indicated.

Buffalo—Off 2 points to 88 per cent, due to operating necessities rather than lack of demand. It is expected the rate will advance to 90 per cent this week when furnace repairs are completed.

Youngstown—Off 3 points to 80 per cent, Republic Steel Corp. dropping three units at its Youngstown plant. Sixty-seven open hearths, three bessemers and 21 blast furnaces are operating.

Air conditioning installations in 1937 will exceed 1936 by 40 per cent, according to dealers' estimates compiled by the American Heat and Air Conditioning institute. About 80 per cent will be in commercial buildings.

Activities of Steel Users and Makers

LEWIS FOUNDRY & MACHINE CO., subsidiary of Blaw-Knox Co., Pittsburgh, has been awarded a contract by Dorman, Long & Co. Ltd., Middlesborough, England, for a completely mechanized three-high mill. The mill will have electric motor-driven screw down, automatic pre-set control, electric middle roll balance and Lewis roller and catcher tables.

♦ ♦ ♦

John A. McKay Mfg. Co., Dunn, N. C., has developed and placed in production a new combination seed planter.

♦ ♦ ♦

Golden-Anderson Valve Specialty Co. has moved from the thirteenth floor to the tenth floor, into larger quarters, in the Fulton building, Pittsburgh.

♦ ♦ ♦

Reed-Prentice Corp., Worcester, Mass., has appointed J. L. Osgood Machinery & Tool Co., Buffalo, its exclusive agent in the Buffalo territory.

♦ ♦ ♦

Yarnall-Waring Co., Chestnut Hill, Philadelphia, is completing an 80 x 80 foot extension to its plant to provide increased facilities for the manufacture of Yarway steam specialties.

♦ ♦ ♦

Niles Forge & Mfg. Co., Niles, O., has added an ornamental department equipped for the manufacture of steel stairs, pipe and ornamented handrails, iron enclosures and allied products.

♦ ♦ ♦

Iverson Tool Co., Tulsa, Okla., recently erected a large steel building of portable construction type to house its new stock of oil well supplies at Odessa, Tex., and will service the oil industry from that point.

♦ ♦ ♦

Edgar M. Moore & Co., Farmers Bank building, Pittsburgh, has recently been appointed sales agent for General Control Co., Cambridge, Mass., manufacturer of special control equipment.

♦ ♦ ♦

Samson-United Corp., Rochester, N. Y., has developed and placed in production a new all-purpose electric fan. Known as the Safe-Flex, it has flexible, molded, rubber blades which cannot cause injury.

♦ ♦ ♦

Carnegie-Illinois Steel Corp., Pittsburgh, has completed a one-story addition, 53 x 74 feet, to its office building at the McDonald, O., plant for housing the order and shipping billing departments. Space left vacant by the transfer of this department will be occupied later by the industrial relations and compensation and pension departments.

♦ ♦ ♦

Fairbanks, Morse & Co., Chicago, has appointed the Sioux Steel Co., formerly the Sioux Falls Corrugating Co., Sioux Falls, S. Dak., as distributor in that territory for its line of air conditioning equipment.

♦ ♦ ♦

Republic Steel Corp., Cleveland, has removed its export department to the thirteenth floor of the Chrysler building at Forty-second street and Lexington avenue, New York. D. H. Bellamore is general export manager.

♦ ♦ ♦

American Car & Foundry Co. will resume operations shortly at its Madison plant in St. Louis, idle for seven years, with the exception of the wheel department which opened last February. Employment for about 700 men will be provided.

♦ ♦ ♦

Standard Alloy Co. Inc., manufacturer of heat and corrosion-resisting castings, Cleveland, has acquired the site at 1679 Collamer road, where it has been located for the past ten years. The property comprises four acres and is improved with three buildings.

♦ ♦ ♦

James C. Heintz & Co., Cleveland, manuacturer of tire service station equipment, announces the introduction of a new machine for retreading and a new machine for repairing a popular range of tire sizes, and a vulcanizer to make rubber belts endless.

MAN-MOUNTAIN" Martin Levy, 620-pound wrestler, smashes a nail between the heat-treated, stainless steel seat and disk of a globe valve made by the Hancock valve division, Consolidated Ashcroft Hancock Co., Bridgeport, Conn. It is one way of dramatizing a claim that boiler scale, pipe turnings and nails can be crushed between the superhard surfaces, without leaving a mark on seat or disk

♦ ♦ ♦

Bucyrus-Erie Co., South Milwaukee., Wis., manufacturer of excavating, drilling and material handling equipment, has appointed the following new distributors: Abrams-Anderson Co., Detroit; A. F. Deaney Co., Indianapolis, and Ginsberg & Horan, New York.

♦ ♦ ♦

Homestead Valve Mfg. Co., Coraopolis, Pa., has appointed the following representatives for the sale of its complete line of quarter-turn plug valves, protected seat hydraulic operating and boiler blow-off valves: Warren Bruce & Co., St. Louis; Proctor Engineering Co. Inc., Baltimore.

♦ ♦ ♦

Ohio Fire Brick Co., Oak Hill, O., has improved quality of its refractories by installing heavy duty dry presses at Ohio works and a deairing machine at Davis works. Company now is building and equipping a new plant at Cambria works to be devoted to silica brick production.

♦ ♦ ♦

Carrier Corp., Newark, N. J., has moved its Chicago offices from 180 North Michigan boulevard to windowless, air conditioned offices on the seventh floor of the Merchandise Mart. Refrigeration will be supplied by a 380-ton Carrier centrifugal machine, and indirect lighting will supply illumination.

♦ ♦ ♦

West Coast Steel Co., recently organized, has started production at its plant at South San Francisco, Calif. The company rolls bars, and light structural and reinforcing steel from scrap steel rails. Officers are C. B. Runkel, president; L. S. Runkel, vice president, and William Tynan, secretary-treasurer.

♦ ♦ ♦

Viking Pump Co. of Delaware, Cedar Falls, Iowa, will open a direct factory branch office at 881 Massachusetts avenue, Indianapolis, June 1. Clifford D. Sadler, formerly manager of the small pump division, will be in charge of sales and service for the state of Indiana and will also make this the eastern headquarters for fuel oil burner pump sales and service.

♦ ♦ ♦

Emerson Electric Mfg. Co., St. Louis, has established a new field service station policy. Forty-one firms have been appointed authorized Emerson Electric service stations for their respective territories and in the future will handle all repairs on motors. A list of these names and addresses will be furnished by Emerson Electric upon request for data sheet X2042.

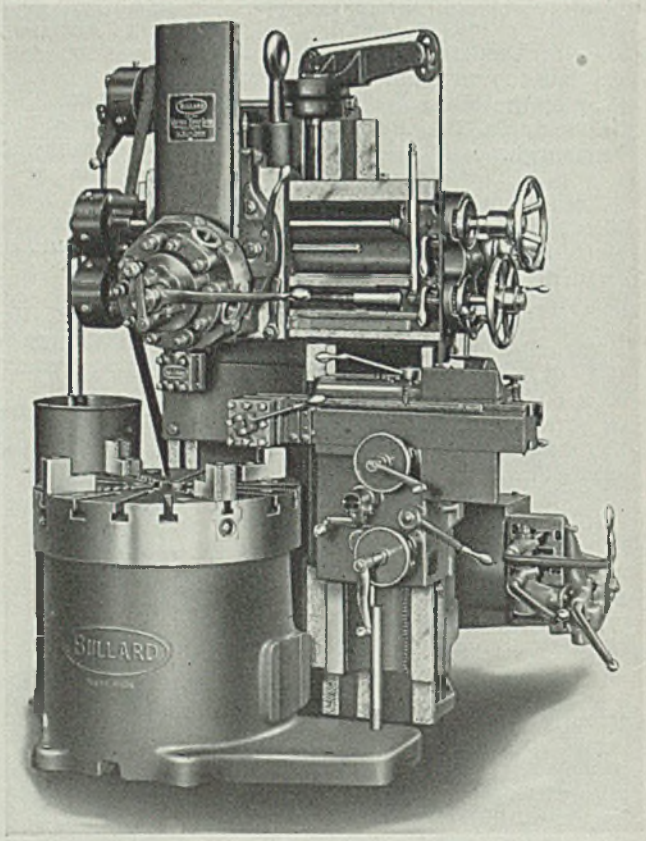
BULLARD

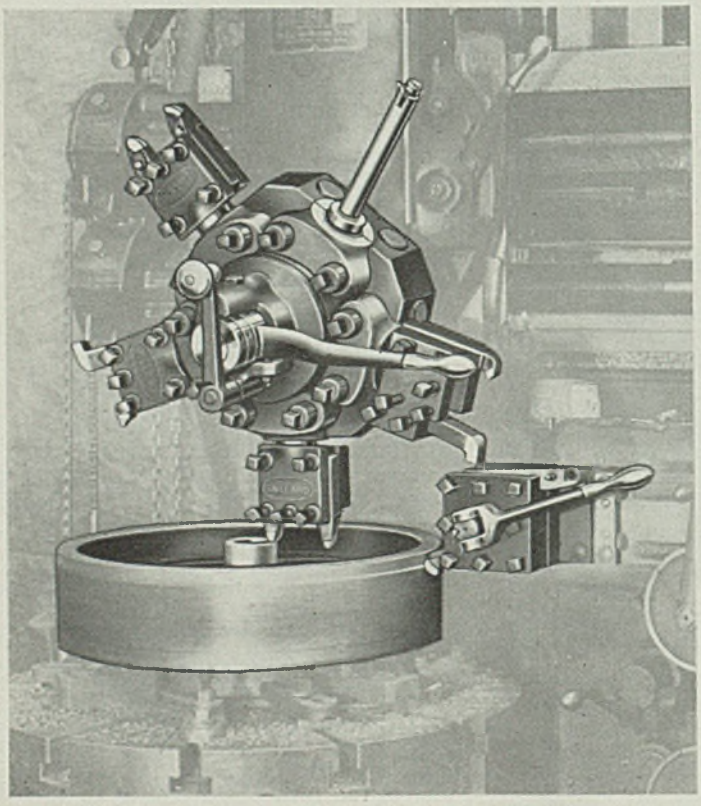
"SPIRAL DRIVE"

VERTICAL TURRET LATHES

For Greater Profits

Accuracy with heavy cutting is only possible when machine design and construction are extremely rigid. Accuracy minimizes rejects. Fewer rejects mean more Profitable Operation. Inasmuch as Bullard Vertical Turret Lathes assure a high degree of Accuracy, they are Universally acknowledged as Profitable Equipment Investments.





As a matter of fact there are many installations where these Vertical Turret Lathes have Saved 50% and 60% over the Best Previous method. If others are Profiting with Bullard installations, so can you.

Ask for estimates on your work.

THE BULLARD COMPANY

BRIDGEPORT CONNECTICUT

MIRRORS OF MOTORDOM

DETROIT

TRIAL "transmission" balloon was sent up here Saturday in the form of a carefully guarded announcement by Oldsmobile of a new automatic gearshift known as an "automatic safety transmission."

Because of low initial production, showings of the device will be made only in Detroit, Chicago, New York and possibly a few other cities. Reception by the public may be the guide to adaptation of the transmission for 1938 Oldsmobile models, possibly some other General Motors cars as well.

It will be recalled last year at this time Oldsmobile was supposed to have been about set to adopt automatic transmission on the 1937 models, but the plan finally was abandoned. For the present the new transmission will be supplied for an additional $80 on the Oldsmobile "8" only.

Claim Better Gasoline Mileage

The transmission comprises primarily two planetary gear sets which replace conventional forward speed gears. These gears are placed in series, one in front of the other, so that power from the engine may be transmitted through either set, both sets or direct. It provides four forward speed gears selected automatically through a centrifugal governor actuating hydraulic pistons. Control is through a short lever located below the steering wheel and extending from steering post to a point approximately flush with the right rim of the wheel. Foot clutch pedal is necessary only when going into reverse or when starting from a full stop.

Oldsmobile engineers claim 15 per cent better gasoline mileage and 12 per cent greater acceleration for the new transmission. Gear ratio in first speed is 11.22 to 1, in second speed 7.91 to 1, in third 5.03 to 1 and in fourth or direct 3.55 to 1.

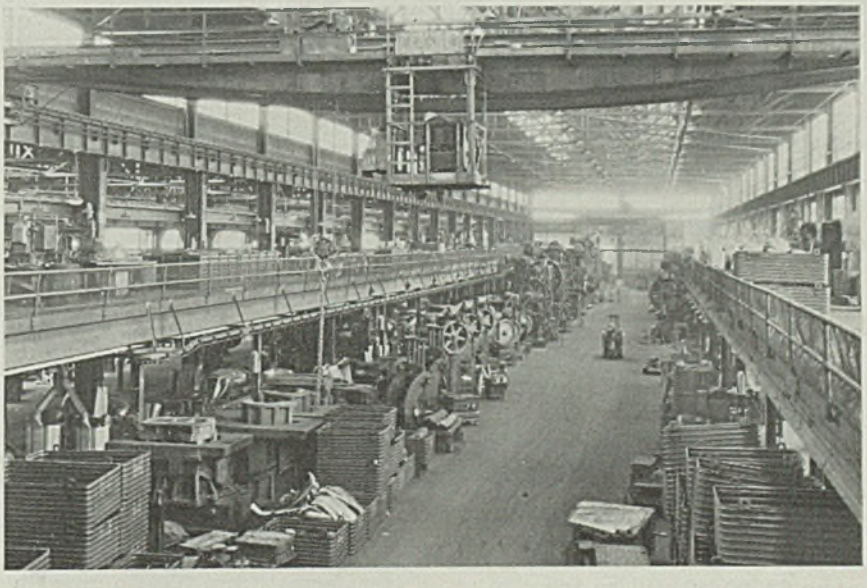
Many of the changes on next year's models will not be readily discernible by the car buyer inasmuch as they involve revisions in material specifications aimed to effect reductions in costs without sacrifice of quality. In steels, for example, research is being directed constantly toward selection of grades which will provide the desired physical characteristics, but at a saving in cost.

Thus, in hypoid gear differentials, to take but one instance, it is being found possible by one car builder to shave costs by about 15 cents per job by substitution of S.A.E. 4120 steel in place of the present S.A.E. 4620. The latter contains 1.65-2.00 nickel and 0.20-0.30 molybdenum, with 0.40-0.70 manganese and carbon about 0.20. The 4120 analysis shows about the same manganese, but 0.50-0.80 chromium substituted for the nickel.

Similarly, in other parts the trend appears to be toward steels of lower alloy content which will perform equally with the higher alloy steels. For one thing, the advances made in steelmaking technique in recent years have yielded materials of low alloy content with about the same characteristics of the

BY A. H. ALLEN
Detroit Editor, STEEL

Wheels Turning Again



AFTER an idleness of about 15 months following financial difficulties, activity has been resumed in the large Hupmobile plant in Detroit. New models have been designed, added capital arranged for and Hupp shortly will again be in the automotive market with a six and an eight in the $1000 class. The above view shows half of the stamping plant, 560 feet in length, as it appeared a few days ago. Fully equipped with modern sheet metal machinery, the plant is capable of making all necessary stampings with the exception of frames. Dies in the left foreground are for former models, 500 of which were in process at the plant when it was shut down. These are being completed for export shipment

MIRRORS OF MOTORDOM

high alloy steels several years ago. Added to this are the numerous forward steps in treatment of steels at automobile plants.

In carburizing practice, good results are being obtained with gas carburizing furnaces, and it is likely future work will be toward thinner cases on steels of higher carbon content, perhaps a case of 0.015-inch on a 30 carbon steel instead of the present 0.045-inch case on a 10 or 15 carbon steel. Gas carburizing is ideally suited to large-volume work where carefully controlled case characteristics are essential. Of course, its primary advantage is reduction of carburizing time.

Buick is achieving excellent results with gas carburizing which was started in an experimental way about two years ago and has now been expanded to include the better part of all gear steels processed.

In steels for trucks, the trend is just the reverse, being toward higher alloy compositions which will provide increased strength and toughness. Reasons for this include the greater margin of profit in trucks, smaller production runs and the unusually heavy service demands imposed on many trucks, some of which are operated far beyond their rated capacity.

Automobile Production

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

	1935	1936	1937
Jan.	300,335	377,306	399,426
Feb.	350,346	300,874	383,540
March	447,894	438,992	518,715
April	477,059	527,726	†558,320
4 Mos.	1,575,624	1,644,898	†1,860,001
May	381,809	480,571	.....
June	372,085	469,355	.....
July	345,297	451,474	.....
Aug.	245,075	275,951	.....
Sept.	92,728	139,785	.....
Oct.	280,316	229,989	.....
Nov.	408,550	405,702	.....
Dec.	418,317	519,132	.....
Year	4,119,811	4,616,857	.....

Calculated by *Cram's Reports*

Week ended:

April 24	133,164
May 1	139,475
May 8	*140,188
May 15	*140,396
May 22	134,500

	Week ending May 22	May 15
General Motors	54,250	*54,604
Ford	35,835	35,900
Chrysler	28,000	31,250
All others	16,415	*18,642

Labor uncertainties late last week make total subject to revision.

*Revised. †Estimated.

CHRYSLER divisions expect to hold the present production pace through the end of July, scouting reports of an imminent reduction in auto assemblies. Having fallen behind by approximately 100,000 cars during the strike tie-up, Plymouth, Dodge, DeSoto and Chrysler are hard pressed to make up this deficiency and at the same time match the flow of incoming orders.

Further details on the expansion program which Dodge now has under way at Kokomo, Ind., reveal some $2,500,000 will be spent in reconditioning and re-equipping the old Davis building of the former Haynes plant there for manufacture of Dodge and Plymouth engines, as well as transmission and axle shafts. The plant is located on a 14-acre tract of land and will be considerably expanded and remodeled before operations start in 90 days. Employment of 1000 is expected. Local citizens are attempting to raise $25,000 to buy adjoining ground which the company may use later for further expansion.

Reports also are heard of plans to install additional press equipment in the DeSoto plant on Wyoming avenue in Detroit to handle stamping work which is now being done out of town. An appropriation of slightly under $1,000,000 is said to be awaiting approval for this program. Some time ago the stamping of radiator shells, for Dodge trucks in particular, was transferred from Toledo into this new plant and it is believed now some larger stamping jobs will be brought here where there is ample room for additional presses.

Miscellaneous stamping work for 1938 Chevrolets and also for General Motors trucks has been released for bids, indicating that under the ambitious program which GM has laid out for Chevrolet next year it will not be possible to accommodate all stamping work in the company's plants at Cleveland, Flint and Grand Rapids. Chevrolet currently is matching Ford's 35,000 cars per week, but it is the intention to push this up to 40,000 weekly for next year to keep pace with Ford's projected 2,000,000-car year which figures out to something like 7600 daily for a full year. Of course, it is impossible to maintain a production pace like this for a full year; consequently during peak season it might be necessary to hit 8000 or 9000 daily.

Can Ford do it? This is the big question here today. Remembering production now is confined to five days a week instead of six as in past eras of high production, it is no small tribute to equipment and production men that it is possible to turn out 40,000 cars a week. To make it, Ford is now proposing to go to three 6-hour shifts, on motor assemblies for example, in place of the present two 8-hour tricks. Naturally an adjustment would be made in wage rates so no loss would be incurred in weekly earnings.

Figures are being taken on equipment for the Matford plant in Alsace which supplies parts for the Ford of France organization, suggesting that Ford is planning to step up production abroad in line with the trend in this country.

Nash Enters Expansion Derby

Latest entrant in the plant expansion derby is Nash which has announced intention to spend approximately $1,500,000 to refurbish and enlarge facilities at Kenosha, Milwaukee and Racine by about 25 per cent. The work will be completed in time for 1938 models. Nash currently is producing about 2300 cars per week, and for the first four months of this year output came close to 40,000 units.

All this talk of expanding production at a time when it is near or over an alltime peak seems to indicate unusual optimism on the part of automobile executives. In general they appear convinced 1938 and 1939 will be banner years and that they had best make hay while the sun shines. They are willing to gamble on a bright retail sales picture at least until the next presidential election in 1940. After that it's anyone's guess. Go down through the list of automobile producers and it is the exception rather than the rule to find no plans for improving plant facilities to permit greater production.

Hudson may be one exception, but with a bank of unfilled orders estimated at close to 20,000 and with two assembly lines now turn-

(*Please turn to Page* 105)

WINDOWS OF WASHINGTON

BY L. M. LAMM
Washington Editor, STEEL

WASHINGTON

THE President stated at a White House press conference last week that it would not be guessing at all to state that some kind of labor legislation will be sent to Capitol Hill, but when it will be sent is another matter. He said that he would not even hazard a guess himself.

At one time there was definite talk that the White House wanted to include hours, wages, child labor and unfair trade practices in a bill. It is known now, however, that the unfair trade practice question is out. In any labor legislation that may be asked for and enacted it is practically certain that it will deal only with hours, wages and child labor.

It will be recalled that Donald Richberg, erstwhile head of the dead blue eagle, had what was considered a comprehensive plan, but his approach was through the federal trade commission and it is now considered unlikely, by those in inner circles, that this line will be followed.

A number of administration officials are working on the labor legislation, including, it is reported, Ernest G. Draper, an assistant secretary of the department of commerce.

Delay Has Lost Support

An interesting current question is whether the administration will continue to withhold proposed industrial control legislation until the court issue has been finally settled.

There have been some whisperings here recently that the administration might reverse its strategy and come out soon with hour and wage legislation. It is believed by many Washington observers that the delay in enacting industrial legislation has not worked out in its favor as some of those who originally advocated it, particularly some labor groups, have weakened in their support.

It looks also as though all of the agitation for additional Walsh-Healey government contract law amendments has quited down. This was first evident when Madame Perkins expressed an opinion at a recent industrial-labor conference that congress should give the government an opportunity to see how the act works out before making amendments.

HULL WOULD POPULARIZE TRADE AGREEMENT PROGRAM

Secretary of State Hull is apparently trying to do everything he can to make his trade agreement program agreeable to manufacturers. Some of these activities have been considerably criticized and he has just taken another step to popularize, if possible, this work in which he has taken and still is taking so much interest.

The secretary announced last week that the committee for reciprocity information, which has up to this time merely heard arguments on the trade agreements by American manufacturers, has been reconstituted in such a way as to integrate it even more closely than heretofore with the rest of the interdepartmental trade agreement organization.

This has been accomplished mainly by designating as members of the committee for reciprocity information officers of the government who are at the same time members of the committee on trade agreements. Henry F. Grady has been made chairman of the committee for reciprocity information and a member of the committee on trade agreements. Grady, former chief of the division of trade agreements in the state department and former chairman of the committee on trade agreements, has recently been appointed a member of the United States tariff commission by the President, to fill the vacancy caused by the death last January of Thomas Walker Page, who at the time of his death was vice chairman of the tariff commission and chairman of the committee for reciprocity information.

Government officials contend that the committee as reconstituted will become even more closely allied than heretofore with the rest of the organization, to the advantage of both the government and industry generally.

It may be recalled that the committee for reciprocity information was established by an executive order in June, 1934, to receive the views of persons interested in proposed trade agreements with foreign countries.

Under a new procedure set up by the state department in connection with the proposed trade agreements with Ecuador and Czechoslovakia, domestic producers and other interested persons are saved the expense of submitting briefs or making statements at public hearings, in regard to imported products not under consideration for the granting of concessions to the foreign country. This results from the publication, at the time public notice is given of intention to negotiate, of a list of products under consideration for the granting of concessions.

PRESIDENT MAY SETTLE SCRAP EXPORT EMBARGO

That a great deal of underground work is going on in Washington both for and against the Schwellenbach iron and steel scrap export bill, is evidenced on every side. It is a question of fact that the matter either has been or will be taken up with President Roosevelt before it is finally disposed of.

Another question that has been brought up during the past week in connection with this matter in the report of the executive committee on commercial policy is freight rates. That was an angle that had not developed until the past few days. The committee expressed interest in the freight rate structure with regard to iron and steel scrap, to which special rates are given for

scrap to seaboard points for export. It was felt by some members of the committee, it is understood, that these cheaper rates may be unduly encouraging the export movement and some of the members of the commitee, at least, believe that the interstate commerce commission should make an investigation of this question and of the way in which the iron and steel industry in different parts of the United States would be affected by a revision of this rate structure.

There is every expectation that a report on the pending measure will go forward to the senate military affairs committee within the next few days unless it is unexpectedly held up by the White House.

One well known government official stated last week that as far as the economic situation is concerned there is no question the legislation should not be passed. He refused to comment on the political significance of the measure.

It is reported at this time that the senate military affairs committee and Senator Schwellenbach will probably not get a copy of the complete report made by the commercial policy committee but that answers will be forwarded by the secretary of state, and that this will be backed by a similar communication from the secretary of commerce. That is the present intention. Some of the information contained in the report of the commercial policy committee is considered confidential, both from the standpoint of diplomacy and national defense.

In connection with the national defense angle it is known that a letter was drafted by the war department in which it recommended passage of the legislation. On the other hand, it is also known to be a fact that the letter after having been drafted was never sent to Senator Morris Sheppard, Texas, chairman of the senate military affairs committee. There has been talk here for some time also that the navy department is in favor of the legislation for national defense purposes but it is not believed that any actual communication has been sent.

It was pointed out in these columns some weeks ago that "Danny" Bell, acting director of the budget gets all of these communications before they are sent to congress to prevent just such instances as the present, in which some government departments are for legislation and others against it. The bureau of the budget co-ordinates the communications.

NLRB ISSUES COMPLAINT

The national labor relations board has announced that a formal complaint has been issued against the Lukens Steel Co., Coatesville, Pa., and that a hearing will be held at Coatesville May 24.

It is charged in the complaint that the company discharged Charles W. Brown for union activity. Also that it distributed circulars with the intention of interfering with the workers' rights of self organization; and that it has by threats of discharge caused several employes to take oath that they will not join the Amalgamated Association of Iron, Steel and Tin Workers of North America; and has dominated an organization known as the Lukens Employes' association.

CEASE-DESIST ORDER FOR HYDRANT, VALVE MAKERS

An order has been entered by the federal trade commission directing 33 companies and their officers to cease and desist from combining and conspiring to fix and maintain uniform delivered prices, in the interstate sale of water gate valves, hydrants, fittings and similar products used for water supply systems.

The order also is directed against the water works valve and hydrant group of the Valve and Fittings institute, New York, its governing committee, and two officers of the institute, George V. Denny, president commissioner, and Sam G. Moyers, assistant secretary. All but one of the respondent companies are members of the water works valve and hydrant group.

Selling their products principally to municipalties and to divisions and institutions of the federal and state governments, the respondents are said to dominate their industry in the United States.

According to findings in the case, the respondents filed answers in which they consented that all the material facts alleged in the commission's complaint against them "might be deemed to be admitted, but not within the intent and meaning of any law of the United States other than the federal trade commission act, such answers not constituting an admission of any conclusions of law and not constituting an admission of fact for any other purpose, nor to be used against them in any other proceeding, suit or action."

JAPAN'S MACHINE INDUSTRY SHOWS STEADY GROWTH

Manufacturing plants in Japan which employ more than five workers each and which engage in the production of machinery and equipment, totaled 10,354 at the end of 1935, a gain of 12.8 per cent over 1930, according to statistics to the department of commerce.

The value of the output of these plants during 1935 was approximately $438,570,000, an increase of 26.1 per cent over the total of the preceding year and accounted for 13.4 per cent of the country's entire industrial output in that year, the report states.

Total labor hours in the industry increased 19.2 per cent compared with 1934 and a 15.6 per cent increase in the aggregate wages paid was recorded. The number of persons employed increased 16.7 per cent and numbered 367,000 at the end of 1935.

SWEDISH STEEL AT RECORD FOR THIRD SUCCESSIVE YEAR

Swedish output of iron and steel in 1936 reached record levels for the third successive year, according to American Commercial Attache Charles E. Dickerson Jr., Stockholm, in a report to the bureau of foreign and domestic commerce.

The production of steel ingots, iron blooms and rough bars is stated to have aggregated a total in excess of 1,000,000 metric tons, while that of finished rolled and hammered steel reached some 687,000 metric tons. The steel mills have been working at capacity and are stated to be fully supplied with orders for many months. A shortage of charcoal has led to an increase in the price of pig iron which, in 1936, was produced to a total of 584,900 metric tons, compared with 569,000 metric tons in 1935.

Workers employed in the Swedish iron and steel mills increased steadily in number each month throughout the year. The number of furnaces, hearths and ovens in operation aggregated 171, compared with 176 at the end of 1935.

Exports of iron and steel in all forms from Sweden are reported to have reached a total of 310,500 metric tons in 1936, a record figure since the World war. Imports of iron and steel in all forms also surpassed the total for 1935.

BILL AMENDS TARIFF ACT

Hearings were begun last week before the house ways and means committee in connection with H. R. 6738, introduced by Representative Doughton, North Carolina, chairman of the committee. The purpose of the bill is to amend certain administrative provisions of the tariff act of 1930. It is reported that this is an administration bill and there is every evidence on the part of the White House to have it passed during the present session. Some of the changes are made necessary by the trade agreements. No changes in rates are suggested at all in any schedule of the tariff act. It is said by domestic producers who have looked into the matter that the proposed changes would strengthen the law.

Editorial

'More Goods for More People' Would Aid Capital Lines

BEFORE President Roosevelt departed for his recent fishing trip to the Gulf coast, he made a few pointed remarks about the relative merits of the capital goods and consumer goods industries as recipients of government pump-priming assistance. He declared that public money should be used more sparingly for the former than for the latter.

Undoubtedly the President was thinking of the price factor. When one thinks of prices one immediately encounters a marked distinction between conditions in the capital goods and consumer goods industries. In general capital goods embrace equipment, materials, etc., which are built or supplied according to individual specification. Sometimes each project is distinct and has nothing in common with any other project. More often than not it is "tailor-made."

On the other hand most of the products of the consumer goods industries are susceptible to manufacture by mass production methods. Sewing machines, refrigerators, lamp bulbs, razor blades, tin cans, automobiles, etc.—all products of the consumer goods industries—are adapted to continuous processes and to efficient repetitive operations.

This distinction in method of manufacture has a direct bearing upon price. Obviously the product turned out in lots of several hundreds or thousands can be sold to the buyer at a price that is lower per unit of value than that obtained for a product which is tailor-made, or in which repetitive mass production methods cannot be employed.

Mass Production of Flat Rolled Steel Precedes Assembly Line Output of Consumer Goods

Therefore, when the President attacked the capital goods industries on the basis of what he considered to be a dangerous trend in material prices, he probably gave little heed to the fact that the selling prices of products in the durable and consumer goods industries are not comparable.

Analyses of the trend in the distribution of finished steel show that the materials adapted to the consumer goods industries are gaining more rapidly than those used chiefly for the heavy industries. In 1887 flat rolled steel products accounted for only 11 per cent of the total output of finished steel. In 1936, the tonnage of flat rolled steel products accounted for over 50 per cent of the total. Flat rolled steel is ideally adapted to mass production methods—to the consumer goods industries.

This decided shift toward consumer goods markets must be significant. What does it mean?

For one thing, it suggests that there may be a significant relation between consumption of steel and the consuming outlets in which mass production methods are employed extensively.

We have stated that consumption for automobiles, tin cans, refrigerators, stoves, household appliances of all kinds, etc., has increased. These are products particularly adapted to mass production methods. Also, the steel products best adapted to use in the manufacture of these products—namely tin plate, strip, and sheets—are produced in the steel mill by continuous methods, which is the steel industry's nearest approach to mass production technique.

Industry Will Solve Economic and Social Problems By Adopting Consumer Goods Technique More Widely

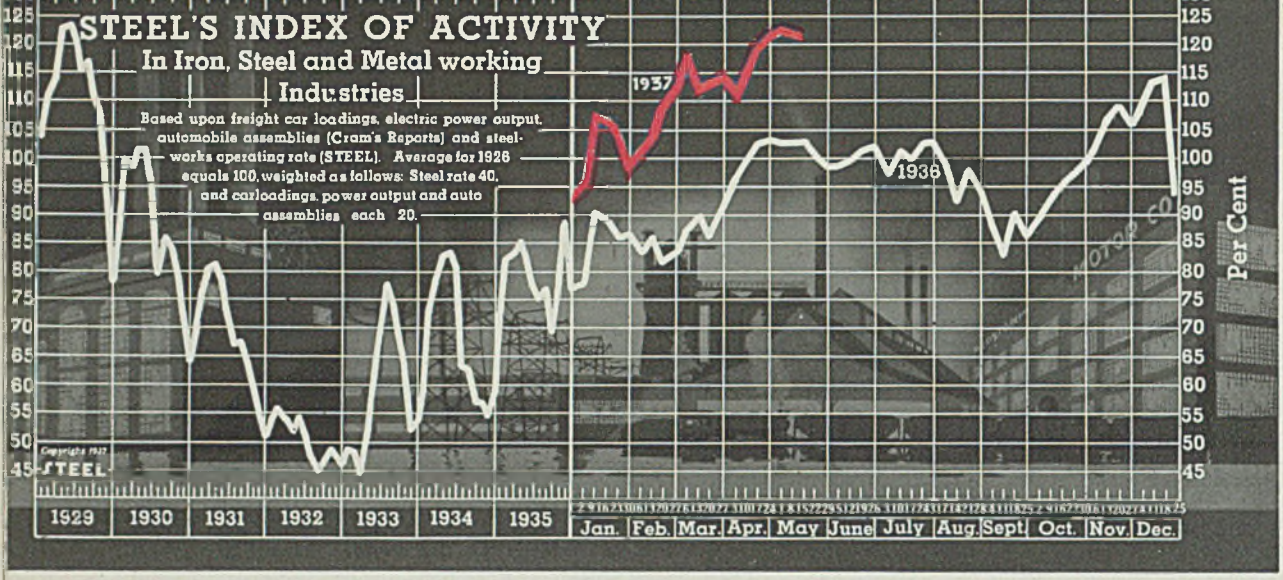
The double application of mass production—first to the production of the material and then to its fabrication, manufacture and assembly in the finished article—makes for volume and low price. In other words, this synchronization of effort all along the line from mine to finished products means that industry is geared to a technique which conforms to the general policy of "more goods for more people."

This is the principle by which industry will solve its economic and social problems of the near future. Manufacturers and distributors will do well to study this phase of the business. If they can key themselves into the spirit of the "more goods for more people" idea, they will get in on the ground floor of a movement which undoubtedly will sweep the American nation in the next decade.

If the idea of "more goods for more people" is successful in consumer goods products, why shouldn't it be encouraged in capital goods? Probably mass production can be introduced only sparingly if at all in some capital goods lines. Nevertheless, some of the technique of the consumer goods industries certainly could be adopted in the durable goods field to good advantage.

Building construction—typical of the capital goods field—still is at the tail of the recovery procession. Isn't it possible that if the building industry adopted simpler financing methods, better salesmanship, more co-ordination of engineering skill and other practices which are commonplace in the consumer goods industries, the demand for building would mount?

"More goods for more people" is an ideal that would help the capital goods industries.



The

STEEL'S index of activity declined 0.5 points to 123.3 in the week ending May 15:

Week ending	1937	1936	1935	1934	1933	1932	1931	1930
March 27	114.0	91.2	84.3	79.3	45.2	53.5	80.6	99.6
April 3	112.0	86.8	83.4	79.6	49.1	53.4	81.5	97.6
April 10	112.8	99.6	85.4	82.2	52.6	52.6	80.9	102.9
April 17	119.6	103.1	86.3	85.0	55.8	53.4	81.1	103.1
April 24	122.0	103.6	84.9	87.5	59.5	52.3	80.6	103.7
May 1	123.9	103.2	84.6	86.0	60.3	52.5	80.7	103.3
May 8	123.8†	103.0	79.3	84.4	62.5	54.7	79.7	102.8
May 15	123.3*	103.1	80.5	82.4	65.2	54.3	78.7	102.5

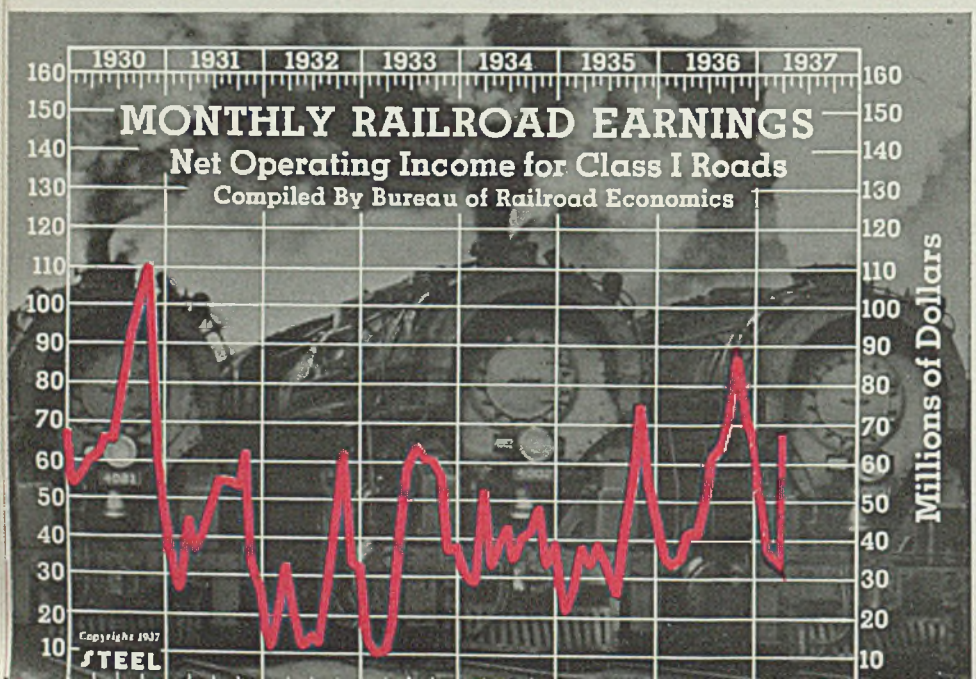
*Preliminary. †Revised.

Index of Industrial Activity Holds Despite Labor Discord

DESPITE the 2-point drop in steelworks operations, which declined to 89 per cent last week, due to the temporary strike in the Pittsburgh districts, STEEL'S index of industrial activity in the iron, steel and metal-working industry remains close to the alltime high point of 1929. The index for the week ending May 15 stands at 123.3, a loss of only 0.5 points from the previous week and compares with 123.9 in the week ending May 1, the high point thus far this year.

Automobile production and electric power output continue at record breaking strides. By putting out 367 more cars last week than the week before the automobile industry established another alltime record for a single week with a total of 141,892 cars. The peak in 1929 was 140,822 units assembled in the week ending April 13. Electric power production continues to hold close to the 2,200,000,000-mark, advancing to 2,194,620,000 killowatt-hours in the week ending May 15. This is a gain of 12.7 per cent over the same week in 1936, and compares with 2,176,383,000 killowatt-hours produced during the week ending May 8.

Loadings of revenue freight for the week ending May 15 are expected to show a slight drop and are estimated close to the 762,000 mark.

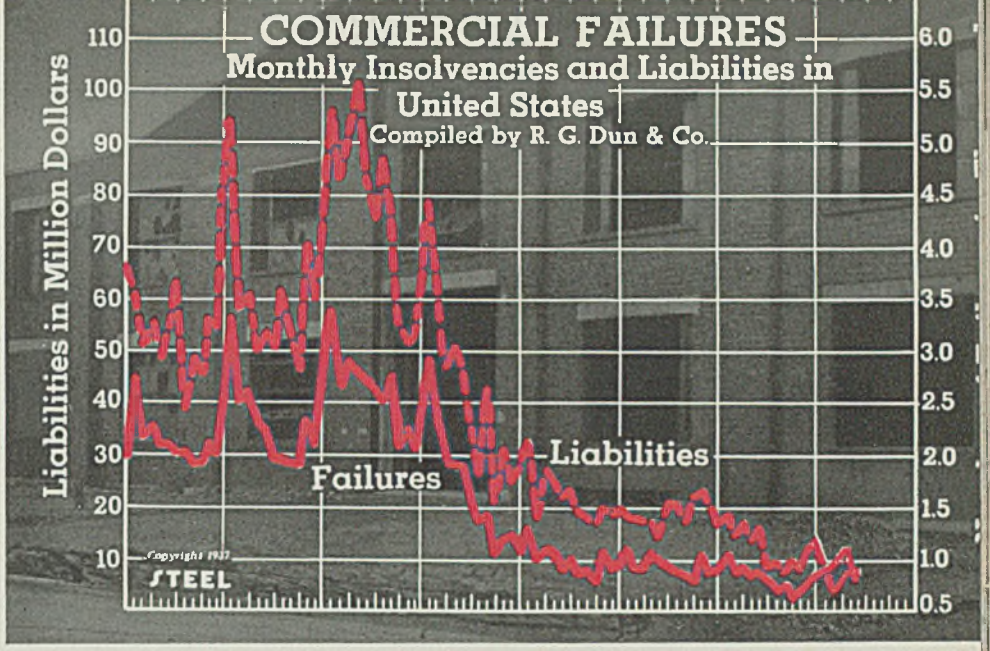


	1937	1936	1935
Jan.	$38,436,679	$35,728,532	$21,934,645
Feb.	38,358,638	33,594,718	26,296,411
March	69,379,328	35,205,513	38,129,871
April	.....	41,547,644	34,708,718
May	.....	41,842,147	39,598,511
June	.....	50,312,580	34,102,703
July	.....	61,773,765	26,919,343
Aug.	.....	64,680,717	42,156,706
Sept.	.....	70,166,026	57,349,265
Oct.	.....	89,851,409	75,454,501
Nov.	.....	72,410,571	54,224,290
Dec.	.....	70,519,601	46,020,695

BUSINESS TREND

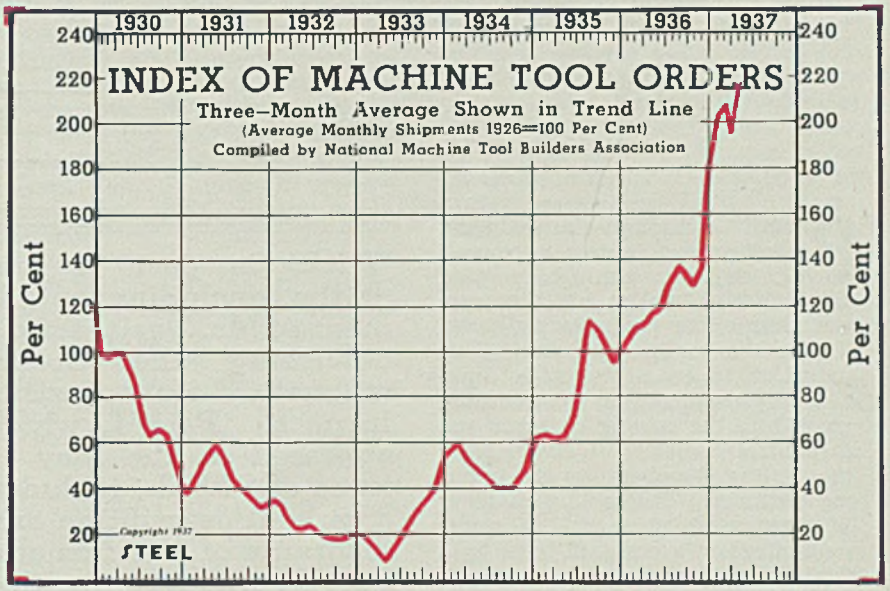
April Business Failures Follow Seasonal Downward Trend

	Failures, Number		Liabilities, Dollars (000 omitted)	
	1937	1936	1937	1936
Jan.	811	1,077	$8,661	$18,104
Feb.	721	856	9,771	14,089
March	820	946	10,922	16,271
April	786	830	8,906	14,157
May	.....	832	.....	15,375
June	.....	773	.....	9,177
July	.....	639	.....	9,904
Aug.	.....	655	.....	8,271
Sept.	.....	586	.....	9,819
Oct.	.....	611	.....	8,266
Nov.	.....	688	.....	11,532
Dec.	.....	692	.....	12,288



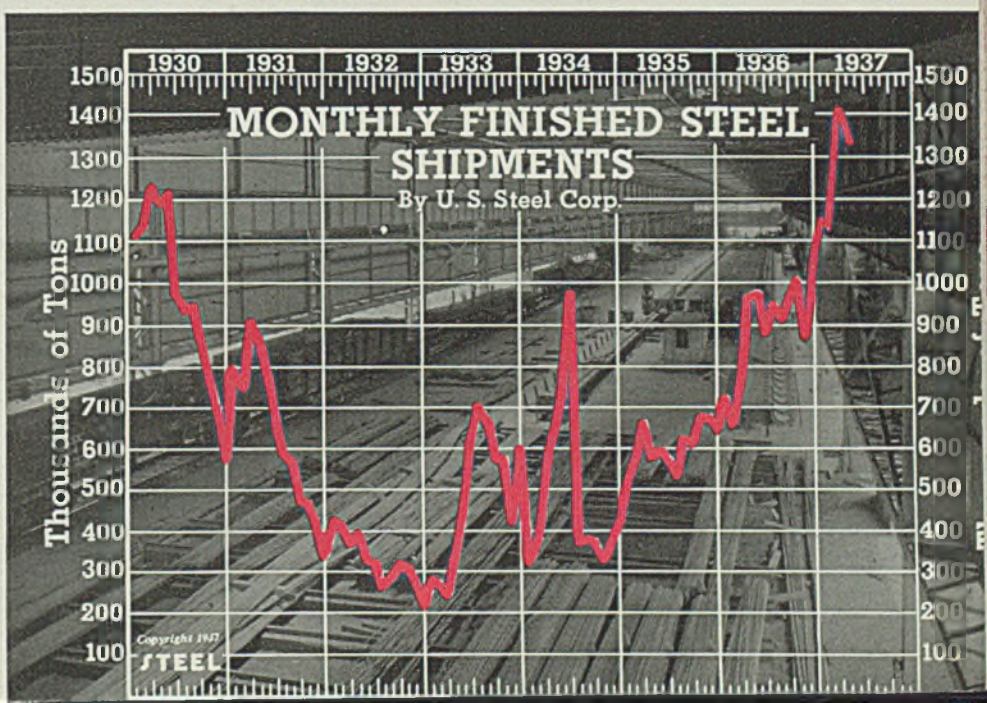
Machine Tool Orders Hit New High in April

	Three-Month Average			
	1937	1936	1935	1934
Jan.	201.7	102.6	61.3	56.5
Feb.	207.7	107.1	61.5	58.2
March	192.4	109.4	60.3	50.9
April	219.8	114.4	60.3	48.5
May	.....	116.6	67.1	46.8
June	.....	124.5	76.7	42.6
July	.....	132.6	94.7	38.6
Aug.	.....	135.5	112.2	37.1
Sept.	.....	132.0	108.5	37.4
Oct.	.....	127.5	102.9	40.5
Nov.	.....	134.0	93.8	44.2
Dec.	.....	180.4	89.9	54.1



Finished Steel Shipments Register Decline in April

	Gross Tons		
	1937	1936	1935
Jan.	1,149,918	721,414	534,055
Feb.	1,133.724	676,315	583,137
March	1,414,399	783,552	668,056
April	1,343,644	979,907	591,728
May	.....	984,097	598,915
June	.....	886,065	578,108
July	.....	950,851	547,794
Aug.	.....	923,703	624,497
Sept.	.....	961,803	614,933
Oct.	.....	1,007,417	686,741
Nov.	.....	882,643	681,820
Dec.	.....	1,067,365	661,365



BY E. W. DAVIS
Superintendent, Mines Experiment Station
University of Minnesota

First magnetic roasting plant indicates possibility of extending Minnesota iron mining operations for hundreds of years

Beneficiating Low-Grade Iron Ores

THIS is part II and the concluding installment of Mr. Davis' article describing the Cooley magnetic ore roasting furnace. Part I, which appeared in the May 10 issue of STEEL, included a general description and diagrams of the furnace. Part II includes detailed operating conditions

PASSING through the reducing chamber, ore enters the cooling chamber through a pipe considerably smaller in cross section than either the reducing chamber or the cooling chamber. This reduction in cross section is desirable to prevent the flow of reducing gases into the cooling chamber and to control the flow of steam from the cooling chamber into the reducing chamber. The cooling chamber is surrounded by a tank of water maintained at a constant level by a float valve. The water in this tank not only seals the bottom of the furnace and prevents the flow of gases into the air, but also provides the means for cooling the ore.

Ore Is Discharged in Water

The rotary feeder plate, as shown on the drawing, is below the level of the water, and as the feeder plate rotates, the hot ore from the reducing chamber slowly moves downward into the water, producing steam, which escapes through the pipe shown in the drawing, and warm water, which is removed from the tank with the ore. The steam is formed where the hot ore meets the water, which is at a level below the surface of the ore in the steam chamber. The steam formed must, therefore, pass upward through the ore to escape from the chamber. This contact between the steam and the hot ore superheats the steam to a temperature that is approximately the same as the temperature of the ore. A thermocouple in the steam outlet from the cooling chamber is a direct indication of the temperature of the ore being discharged and is used as one of the major operating controls.

To prevent reducing gases from passing downward into the steam chamber, it is necessary to keep the steam pressure equal to or greater than the pressure of the gases in the reducing chamber. The presence of a limited amount of steam in the reducing chamber is desirable; it tends to prevent overroasting and also reacts with the carbon, to some extent, to produce hydrogen and carbon monoxide.

Oil vapor is a concentrated reducing gas, therefore the quantity required is small and the pressure in the reducing chamber seldom exceeds ⅛-inch of water. The best operating conditions are obtained by maintaining a steam pressure of about ¼-inch of water. This pressure prevents the flow of reducing gases downward and provides the desired amount of steam in the reducing chamber.

Steam Control Is Simple

The method used for controlling the pressure of the steam in the cooling chamber is very simple. As previously stated, the superheated steam, after leaving the cooling chamber, passes through the oil vaporizer. From that vaporizer it enters the condenser, where it meets several water sprays, which condense all of the steam, leaving only the noncondensable gases, consisting of the air dissolved in the water and the hydrogen formed by chemical reactions in the cooling chamber. The quantity of these noncondensable gases is small, and they are pumped from the condenser with a small suction pump. By controlling the suction on this pump, the pressure of the steam in the cooling chamber can be adjusted as desired. The noncondensable gases are at times an explosive mixture and therefore are passed through an explosion trap before they enter the combustion chamber.

In the Cooley furnace, no use is made of the hot steam except for vaporizing the oil for reduction purposes, but this steam may be used for any purpose desired, the only

requirement being that control means must be available so that the pressure in the reduction chamber may be regulated as desired. If the steam is used for some useful purpose, a material saving in heat units can be secured, since the steam contains about two-thirds of the heat absorbed by the ore in the heating zone. In the Cooley furnace, approximately 200 pounds of steam at a temperature of 1000 degrees Fahr. is produced per ton of ore fed to the furnace. It is at a pressure of about ¼-inch of water and contains considerable dust, part of which is as coarse as 20 mesh. This dust is all in the form of magnetite and is returned to the quenching tank with the water from the condenser. If the steam is to be used for other purposes, the dust must be removed, the degree of cleanliness required depending upon the use to which the steam is put. Any degree of cleanliness desired can be secured by the use of Cottrell precipitators.

Alloy Steel Is Used

The hot ports and all the baffles in the furnace are made of an alloy of iron, nickel and chromium, the exact proportion of these three elements depending upon the service required. They were designed to retain their shape for 20,000 hours of continuous operation, which would be about four operating seasons, and from the information that has been obtained, it is certain the castings will last at least three seasons and, in all probability, most of them will be good for a considerably longer period of time.

Under normal conditions, the operation of the furnace is quite simple. Thermocouples placed in the entrance to the hot port castings indicate the temperature of the gases from the combustion chamber, and this temperature is maintained at 1800 degrees Fahr. at all times by means of the controls on the oil burners in the combustion chamber. A thermocouple in the cooling chamber indicates the temperature of the steam being produced, which is approximately the temperature of the ore being discharged from the reducing chamber, and it has been found that this temperature should be maintained at approximately 1050 degrees Fahr. to produce properly roasted ore. This temperature is maintained by controlling the speed of the rotary feeder at the bottom of the furnace. If the temperature drops below 1050 degrees Fahr., the feeder is slowed down slightly, and if the temperature increases above 1050 degrees Fahr., the speed of the feeder is slightly increased.

The chief duty of the operator is to maintain the temperature at the entrance to the hot ports at 1800 degrees Fahr. and to operate the feeder at the proper rate of speed to maintain a steam temperature of 1050 degrees Fahr. A pyrometer records the important temperatures throughout the furnace, and the number of revolutions per shift of the feeder indicates the tonnage of ore the operator has been able to roast. Occasional readings were made of the oil and gas pressures at various points in the furnace during the test periods, to analyze more closely the operating conditions. The chief operating difficulties are due to changes in the moisture in the ore. As long as the moisture remains fairly constant, the furnace operates practically without attention, but rapid changes in moisture throw the furnace out of balance to such an extent that constant attention is required for several hours in order to again secure proper operating conditions. The furnace is operated by one man, with the assistance of a part-time helper whose principal duty it is to look after the mechanical equipment. The skill required to operate the furnace is not beyond the capabilities of an intelligent workman. At the Cooley plant, the furnace operator also acts as the shift boss.

Table III shows the principal operating data for the month of Sept., 1935, and also the major items of operating expense per ton of furnace feed. These figures show that the fuel cost is 81 per cent of the direct operating expense.

Table III

Furnace Operating Records, Sept. 1935

Number of days operating	30
Operating hours	692
Lost time, per cent	3.89
Tons of feed	5,802
Total gallons of oil	55,182
Number men employed for shift	1.3
Electric power consumption, kilowatt hour	19,050
Gallons oil per ton of feed	9.5
Electric power per ton of feed, kilowatt hour	3.3
Cost per ton of feed:	
Oil	$0.555
Power	0.050
Labor	0.072
Total	$0.677

Table IV

Effect of Moisture in Ore on Plant Operation

	High Moisture	Normal	Low Moisture
Date	Sept. 30	Sept. 15	Sept. 22
Hours of operation	23.3	24	22
Tons feed per hour	7.4	8.5	9.0
Ratio, coarse to fine ore	6:1	6:1	6.1
Furnace feed:			
Per cent Fe	50.30	49.07	49.10
Per cent moisture	8.6	7.4	6.2
Gallons oil per ton:			
Combustion	6.79	6.18	5.85
Reduction	3.55	3.30	3.15
Temperature at entrance to hot ports, degrees Fahr.	1818	1820	1816
Temperature at exit from exhaust ports, degrees Fahr.	220	202	204
Temperature of steam chamber, degrees Fahr.	1038	1020	1087
Furnace product:			
Per cent Fe	53.55	52.20	52.26
Per cent C	0.64	0.50	0.55
Roasting efficiency	90.0	89.2	91.1
Magnetic concentrate:			
Per cent Fe	62.12	62.18	62.02
Per cent weight recovery	71.8	70.1	70.6
Per cent Fe recovery	88.7	88.6	89.0

Moisture Reduces Capacity

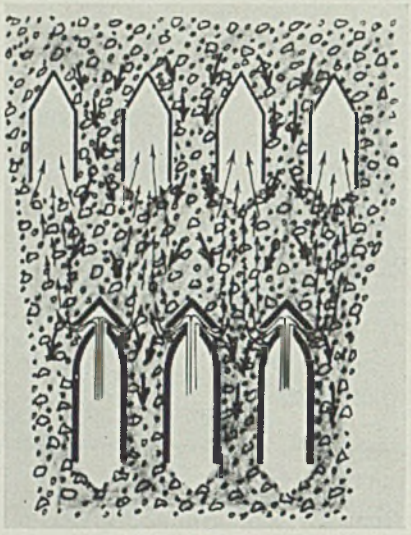
Table IV shows the plant operating data for three days during the month of September when the moisture in the ore was high, normal and low, respectively. These figures show the effect of moisture in the feed on the operation of the plant; that is, the fuel consumption per ton increases and the capacity of the furnace decreases as the ore becomes wetter. This change, however, has practically no effect on the metallurgical results secured in the magnetic concentration plant, the grade of concentrate, the percentage

weight recovery, and the percentage iron recovery remaining practically constant. On Sept. 22, when the ore was exceptionally dry, containing only 6.2 per cent moisture, the temperature of the steam was 1087 degrees Fahr., indicating that the feed rate could have been increased above 9 tons per hour. This tendency to underfeed the furnace when the ore is dry is quite usual, because it is difficult to tell by the appearance of the ore that it has decreased 1 or 2 per cent in moisture and because it is hard to convince the operators that this slight change has such a marked effect upon the operation of the furnace.

Gas Flow Affects Temperature

The temperature of the gases from the combustion chamber entering the hot ports is dependent only upon the amount of oil being burned and the amount of air being drawn through the combustion chamber by the fan. Since the oil burners always consume an amount of oil dependent upon the valve setting, and since the fan is operated at a constant speed, the only reason for a change in the temperature of the combustion gases is a change in the resistance to the flow of the gases through the heating zone, and a change in this resistance is caused only by a change in the screen analysis of the coarse ore.

The crude ore is screened normally at ¼-inch on a vibrating screen, but when it is exceptionally wet it is necessary to use a ⅜-inch screen. Even with the use of this coarser screen, the oversize contains considerably more fine ore than when drier material is screened at ¼-inch. For this reason, when wet ore is encountered, necessarily more fine material passes through the heating zone with the coarse ore, thus increasing the resistance to the flow of the gases and decreasing the amount of oil that may be burned in the combustion chamber, and this occurs at a time when additional heat is necessary for the evaporation



Illustrated here is heating zone showing hot ports and exhaust ports. Arrows show downward direction of ore movement and upward direction of gas flow

of the additional water. This statement may be justified from the furnace records, which show that the amount of oil burned per hour is actually less when the ore is wet than when it is dry.

As the ore becomes wetter, owing to rain or other causes, the first noticeable effect on the operation of the furnace is an increase in the temperature of the hot gases from the combustion chamber. This makes necessary an immediate reduction in the amount of oil being burned to reduce the temperature to normal.

The next effect is a decrease in the temperature of the steam, indicating that the ore in the reduction chamber is cooler. To counteract this, it is necessary to reduce the feed rate until the temperature of the steam again reaches normal. If this is not done, the quality of the roast decreases rapidly.

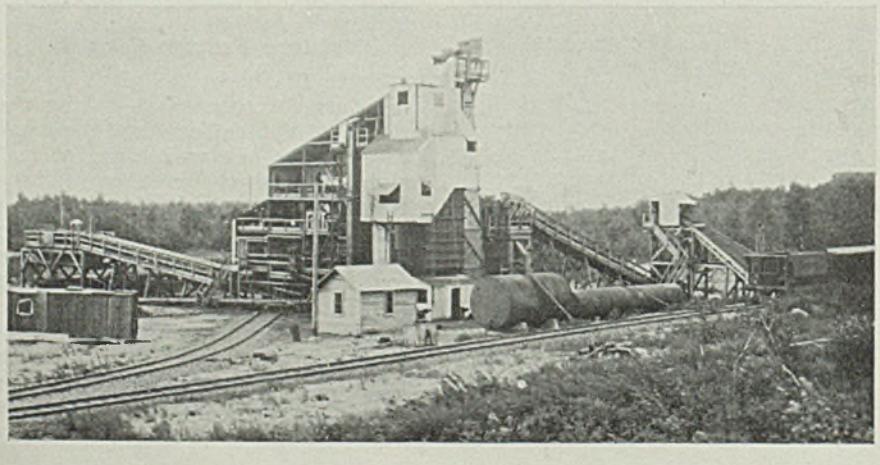
Roasting efficiency is defined as the percentage of iron as magnetite divided by the percentage of total iron in the furnace product. As the steam temperature decreases, the efficiency falls off rapidly, and as it increases, the efficiency increases slowly. A thermostatic control that would automatically change the speed of the feeder to maintain a constant steam temperature could be installed, but frequently the furnace operates throughout an entire shift with no adjustment to the feed rate, and the cost of automatic controls could not be justified on the single unit of the Cooley furnace.

Moisture Causes Irregularities

From the above information, it is evident that most of the operating difficulties and irregularities are due to changes in the moisture of the ore. If the ore could be dried before screening and before feeding to the furnace, most of the operating difficulties would disappear, the fuel consumption per ton would be materially reduced, and the capacity of the furnace would be materially increased. Efforts are being made at the present time to determine the effect of drying the ore on the operation of the furnace, using for the purpose a drier heated either with steam from the furnace or with auxiliary fuel.

The diagram shows the temperatures at different points in the furnace and the percentage of the total heat added that is removed from the furnace at various points under normal operating conditions. The total heat required per ton of ore is 1,402,570 B.t.u., 67 per cent of which enters the furnace at the oil burners in the combustion chamber, and 33 per cent of which enters the reducing chamber as oil vapor. Of this total heat, 31.7 per cent is lost in the stack gases, 32.6 per cent escapes as warm water from the quenching tank, 12.4 per cent is lost as carbon with the ore, and only 18.8 per cent is used for the useful work of reduction. A study of these various heat losses indicates the possibility of materially reducing the fuel consumed per ton of ore and increasing the fuel consumed per hour.

The stack gases are discharged at a temperature of 202 degrees Fahr. Reducing the temperature of these gases to 150 degrees Fahr., at which temperature they are saturated with water vapor, would save only 8 per cent of this heat loss. An analysis of the gas, however, indicates that the heat required to vaporize the water contained in the gases is 85 per cent of the total heat they con-



Cooley magnetic ore roasting plant as it now appears in commercial operation. Operated by Butler Brothers, St. Paul, this plant produces merchantable ore from the rejected tailings of two nearby jigging plants

tain. Part of this water is the result of reactions in the reducing and combustion chambers, but much of it enters the furnace with the ore. The ore ordinarily contains 7.5 per cent moisture and 6 per cent water of crystallization, making a total of 292 pounds of water per ton of ore. Of the total heat in the exhaust gases, amounting to 441,520 B.t.u. per ton of ore, 323,000 B.t.u., or 73.2 per cent, represent the heat required to vaporize the 292 pounds of water in the ore. This amount of heat may be produced by the combustion of 2.2 gallons of oil, and if this water were removed from the ore before it entered the furnace, the fuel consumption would be reduced by nearly 25 per cent.

The moisture in the ore can easily be removed in a standard ore drier, but the water of crystallization can be removed only at a temperature of 1000 degrees Fahr. or above, which could not be secured in an ore drier without considerable difficulty and expense. However, the fuel required for the operation of an ore drier would be approximately the same as the fuel saved by using dry ore in the furnace, and, therefore, the only saving made by drying the ore would be due to the increase in capacity that would be secured. If waste heat is used, however, the saving in fuel consumption would be as indicated.

Utilize Heat of Steam

As shown in the diagram, 22.5 per cent of the total heat required by the furnace is discharged from the cooling chamber as superheated steam. This amounts to 317,000 B.t.u. per ton of ore. More than sufficient hot air may be produced from the steam in a properly designed heat interchanger to completely dry the ore and, if desired, the excess may be used in the combustion chamber to replace the cold air with which the oil is burned. The use of the heat in the steam for these purposes would make a material saving in the fuel required for the operation of the furnace.

The use of oil vapor for the reducing agent results in the deposition of carbon on the particles of ore. This carbon is discharged from the furnace with the roasted ore and is a distinct loss, amounting to 12.4 per cent of the total heat required by the furnace, or 173,920 B.t.u. per ton of ore. This is the equivalent of 1.2 gallons of fuel oil. This loss may be eliminated by the use of a gas that does not crack and deposit carbon under the conditions encountered in the reducing chamber.

By taking advantage of the possible savings in fuel that have been discussed, it is estimated that it may be possible to roast ore containing 7.5 per cent moisture and 6 per cent water of crystallization with the consumption of approximately one million B.t.u. per ton of feed. This quantity of heat may be secured by the combustion of 80 pounds of coal, 7 gallons of fuel oil, or 1000 cubic feet of natural gas.

The work of improving this process for more general application is being pursued vigorously. A further report is now in the course of preparation and will be issued as a bulletin by the mines experiment station of the University of Minnesota.

Welding Section Supports Society's Expansion Program

Recognizing functions of the American Welding society as a technical spokesman for the welding industry, the National Electrical Manufacturers association's electric welding section has voted to furnish financial support to the extent of $10,000 for the expansion program which the A.W.S. recently proposed. A matter of immediate importance is the co-ordination of tests of men, machines and filler metal, so as to relieve some of the unnecessary burden which a great duplication of test requirements has brought about. It is also desirable to increase the membership of the society, and especially to enroll members from a larger number of industrial companies.

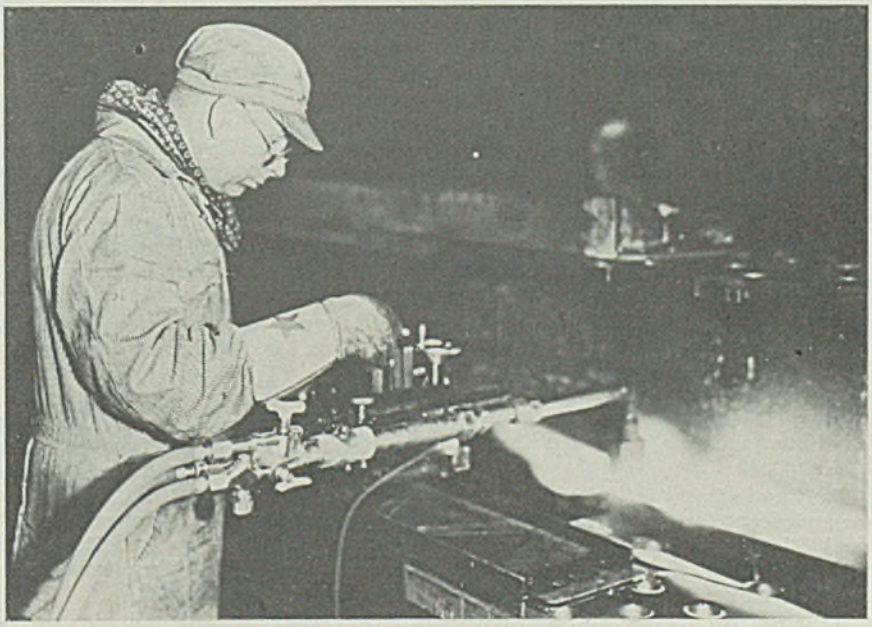
At the March meeting of the N.E.M.A. welding section a co-ordinating committee was appointed to work with the management committee of the A.W.S. and to finance the new activities.

Beam Flanges Are Flame Hardened

BY H. O. JONES
Air Reduction Sales Co., Cleveland

AN INTERESTING flame hardening job recently was done on flanges of 16-inch H-beams rolled from Man-ten steel containing 0.35 to 0.39 carbon. Each beam was 254 inches long and the track to be hardened about 4 inches wide. Depth of hardness required was not less than 3/32-inch over a total area of nearly 1000 square inches. Degree of hardness required was 450 to 500 brinell. The setup for this job was as shown in the accompanying illustration, using Air Reduction equipment. The flange of the beam was hardened in three passes of the torch. The torch tip, 2 inches wide, made three overlapping passes over the area hardened and consumed approximately 375 cubic feet of oxygen and 355 cubic feet of acetylene per hour. A torch speed of 8 inches per minute was used. The heated area was immediately quenched with water sprays following the flames. The operation was completely successful.

Altogether four beams were treated in this manner, one flange of each being hardened. The hardened flanges are to serve as runways for supporting rollers of a movable gear reduction unit and must bear up under a maximum wheel load of 38,000 pounds being imposed on them.



Flame hardening the flange of an H-beam which is to serve as one of the runways for supporting rollers of a movable gear reduction unit imposing a maximum wheel load of 38,000 pounds

Study Effects of Alloying Elements in High-Test Gray Iron Castings

THE rapidly widening field for high-test alloy iron castings, resulting from metallurgical progress in the use of molybdenum, nickel and chromium as alloy additions, was made the subject of a symposium at the Mid-Atlantic sectional meeting of the New York, Philadelphia, Lehigh Valley and New Jersey chapters of the American Society for Metals at Newark, N. J., May 14. Approximately 500 attended the meeting, at which the New Jersey chapter served as host.

Advantages of molybdenum as an alloying agent in gray iron castings were outlined by Norman F. Tisdale, sales metallurgist, Molybdenum Corp. of America, Pittsburgh. Nickel was discussed by J. S. Vanick, development and research department, International Nickel Co. Inc., Bayonne, N. J.; while the case of chromium was presented by C. O. Burgess, research laboratories, Union Carbide & Carbon Co., Long Island City, N. Y.

Plant Visits Made

The meeting was arranged under direction of H. D. McKinney, metallurgist, Driver-Harris Co., Harrison, N. J. E. S. Davenport, research laboratories, United States Steel Corp., Kearny, N. J., presided at the technical session which was followed in the afternoon by plant visitations to Crucible Steel Co of America, Wright Aeronautical Corp., Ford Motor Co. and Kearny generating station of the Public Service Electric & Gas Co.

Dr. Zay Jeffries, technical director, incandescent lamp department, General Electric Co., Cleveland, spoke at the dinner in the evening, his subject being "Metallic Vitamins."

Tracing the history and discovery of molybdenum, 90 per cent of the known deposits being in the United States, Mr. Tisdale predicted recent research in the production of copper-molybdenum iron would soon release interesting developments. Such an alloy gives a structure permitting unusual wear for certain products, notably sleeves. In determining an alloy analysis, Mr. Tisdale urged a study of the requirements a casting must meet in actual use.

Better Uniformity Obtained

Relatively small amounts of molybdenum results in a fine graphitic iron, as it effects the distribution of graphite, giving a greater degree of uniformity. Carbon is also equalized and more finely distributed and increased strength, both tensile and transverse results. Molybdenum iron castings show improved fatigue and impact resistance.

Machinability is enhanced and creep strength raised with a reduction in pattern shrinkage. This alloy also tends to retain ductibility at lower temperatures. Illustrating specific percentages of molybdenum additions, Mr. Tisdale said an alloy of 1.5 per cent in car wheels gives an ideal structure for hard wear and resistance to abrasion. Other products improved by molybdenum include crankshafts, brake drums and piston rings in diesel engines.

The roll industry was especially cited by Mr. Tisdale as a leading exponent of the use of alloys, all but 20 per cent of the output makes use of alloys with no one element apparently especially favored. The idea that 20,000-pound iron is the limit may be forgotten, according to the speaker who declared 70,000-pound iron is now practical. In some cases, alloy castings have properties unattainable in steel.

Due largely to the demands of the automotive industry, speed of adoption of high test alloy iron has been rapid in recent years, according to Mr. Burgess, leading the discussion in the use of chromium as an alloy. Chromium iron is now used in parts where formerly it was generally thought only steel would meet requirements.

For wear resistance, small amounts of chromium have a great effect on the casting; also a pronounced influence favorably resisting deterioration when exposed to high temperatures. In camshafts and other parts subject to severe wear, life has been increased three to four times by chromium. For uniformity, chromium is a valuable alloy. Its effect as an alloy agent on graphite appears to be a limit as the fineness of the graphite to be carried. Especially suitable in the control of silicon content, is chromium. While stressing chromium as an alloy, Mr. Burgess took the view each of the common alloy elements contributes certain desirable properties to cast iron for specific uses.

Careful charging of the furnace in the production of high test cast iron was stressed by Mr. Vanick, covering the alloying of nickel. Reviewing the steady increase in tensile strength in high-test alloy irons, Mr. Vanick estimated 10 to 15 per cent of iron castings are now of alloy analysis. Earlier experience in nickel iron revolved largely on the function of nickel in the reduction of carbon and silicon. With this still the basic principle, great progress has been made in late years. Nickel is used in many of the prevailing processes in casting production to increase hardening and graphitizing control.

Nickel Aids Heat Treatment

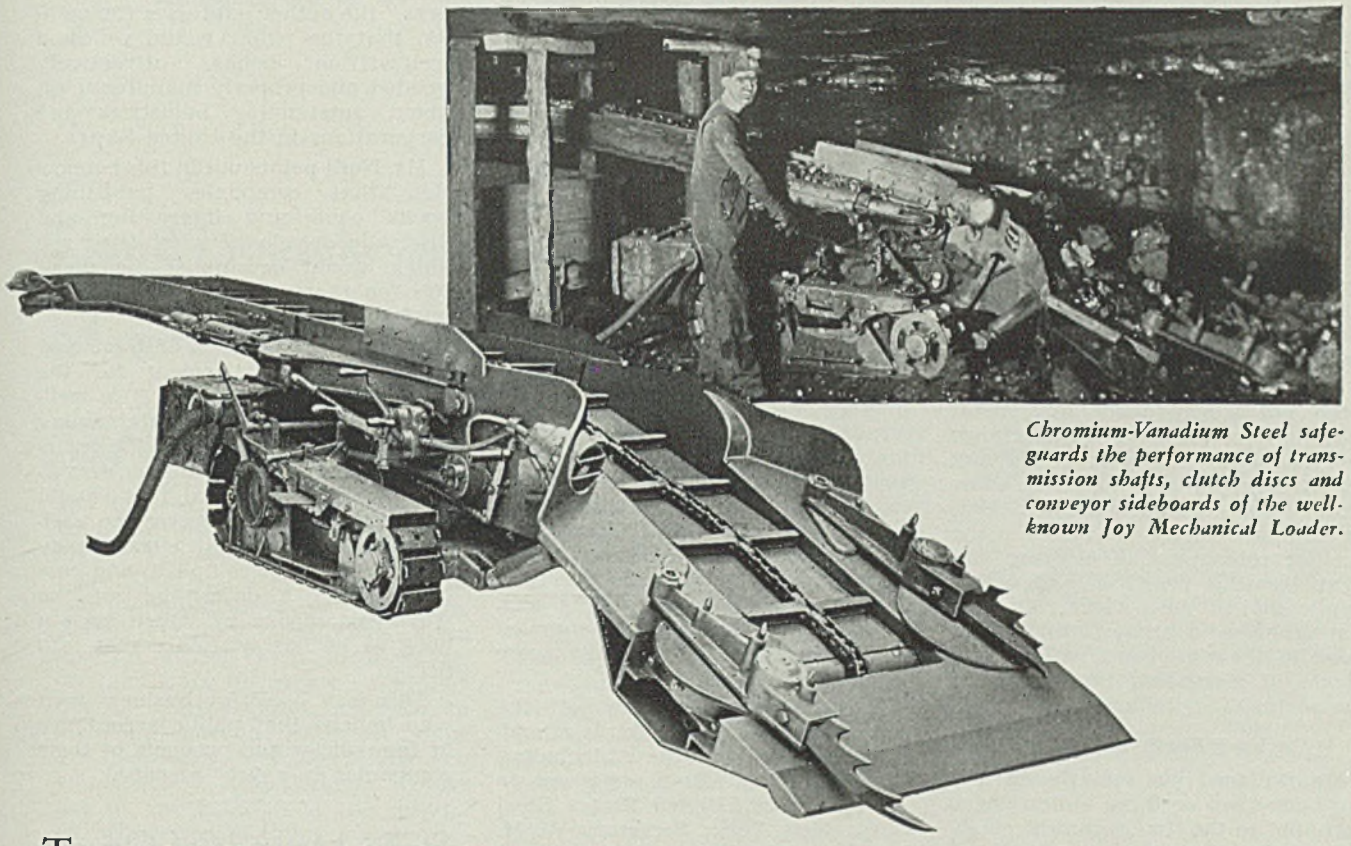
The stronger the iron, the less graphite present, with a gain in stiffness. High-strength nickel cast iron responds splendidly to heat treatment. With nearly one-third of the iron foundries using alloys for a part of their castings, Mr. Vanick outlined the advantages of nickel, giving added strength, rigidity, and resistance to vibration, twist and fatigue.

Special applications include gears, automobile parts, valves, heavy machine tool spindles, and when great strength consistent with machinability is needed, heavy frames and various lines of machinery, notably that used in canning.

In his dinner address on "Metallic Vitamins," Dr. Jeffries presented an analogy between the special elements or vitamins required by plants and animals and those special elements or "vitamins" required in metallurgy. In the evolution of life, we had simple forms at first and the requirements for maintenance were also simple; man, on the other hand, is complex and his needs are complex. Seeking a parallel in the met-

VANADIUM STEEL *Goes* UNDERGROUND

WITH THE JOY LOADER



Chromium-Vanadium Steel safeguards the performance of transmission shafts, clutch discs and conveyor sideboards of the well-known Joy Mechanical Loader.

Typical of a wide range of mechanical coal loaders made by Joy Manufacturing Company, Franklin, Pennsylvania, is the Model 8-BU, a one-man unit that is particularly effective on comparatively thin seams.

Underground service is severe . . . dependability is the big factor . . . a breakdown would mean the loss of productive hours—so Joy Manufacturing Company safeguards loader performance by using Chromium-Vanadium Steel in vital parts of Joy loaders — transmission shafts, clutch discs and conveyor sideboards.

Underground, on the road, at sea and in the air, Vanadium Steels play an important part in the performance of machinery and transportation units. Vanadium Steels are tough, strong, with high resistance to fatigue and impact. Perhaps you, too, can improve the performance and dependability of your product with Vanadium Steels. Metallurgists of the Vanadium Corporation of America will be glad to help you. No obligation, of course.

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al world, Dr. Jeffries showed that early metals were simple structures, but as industrial civilization has become more complex, the need for special properties in these metals has grown in proportion.

To illustrate his point, Dr. Jeffries classified high speed steel as a vitamin in its relationship to the metals industry; tungsten a vitamin to the incandescent lamp; gold a vitamin to currency; and chromium and nickel vitamins to corrosion resistance.

The main structures in man have already been discovered, he continued, while in the field of medicine, the science of maintaining and treating these structures, is just opening up. By the same token, the main structures of metals were discovered long ago, but the science of improving them and imparting special properties has advanced only a short distance.

Dr. Jeffries asserted metallurgists need not worry about any metal forging ahead of iron in importance and added that they will not find any metal that they do not already know about coming into prominence. But, he emphasized, the job ahead is the further refinement of alloying and heat treating practices and better application of the various elements. As progress continues, more and more of these elements will assume places of increasing importance in the realm of metallurgy.

Reviews Earth Formation

He prefaced his remarks by going back "two or three billion years perhaps" to the time when the earth was nothing more than a ball of fire. Then tracing briefly the transformation of the earth to its present form, he referred to the core as being of unknown analysis, although probably as having more than 80 per cent iron, with quite a little nickel, gold and platinum. This core probably has a density of 10, he said.

Around this core is a shell of possibly 1800 miles thickness, he stated, with a density of possibly 4 to 5. Then comes a 100-mile layer of what may be termed as slag. All of the elements known to science—some 92 in all—exist in this slag, he said. In the order of their volume comes first oxygen, then silicon, then aluminum and fourth, iron. Radium, Dr. Jeffries said, is the item farthest down the list.

But what is first in this tabulation is not first in the order of commercial importance. In this latter order, it is iron. He added that of all the metals being produced 92 or 93 per cent are ferrous metals.

Discussing the importance of some of the special metals—the metallic "vitamins"—he mentioned tungsten in particular. About 10,000 tons are produced in a year and some 90 per cent goes into steel. Its market value is negligible, compared with its billions of value in economic utility. Only 100 tons of tungsten are used in filaments of electric lamps, yet the use of the metal effects a saving of $2,900,000,000 a year in the United States alone as compared with the same amount of light if produced with carbon filaments. He was of the opinion there would be no other special metal, except possibly gold, which would leave a greater void if it were no longer obtainable.

Dr. Jeffries alluded to nickel and other corrosion-resisting elements and emphasized that in the complexity of present-day activity these special metals have become as necessary to industrial health as the vitamins of medical classification to physical health.

Other Elements Mentioned

He spoke of potassium, one of the essential elements of light; uranium, another radio-active element; and cobalt, which latter, he said interestingly, owes its place among the essential elements in part to its value to the soil in certain sheep raising sections of the world. "Bush sickness" among sheep in New Zealand, he said, was found to be due to a lack of this element in the soil. When the element was supplied artificially, beneficial results were produced.

Four national officers of the American Society for Metals attended the meeting, these including President E. C. Bain, assistant to vice president, United States Steel Corp., New York; Secretary W. H. Eisenman, 7016 Euclid avenue, Cleveland; Trustee R. L. Kenyon, supervising research engineer, American Rolling Mill Co., Middletown, O.; and Trustee S. C. Spalding, metallurgist, American Brass Co., Waterbury, Conn.

New officers of the New Jersey chapter were announced as follows: Chairman, C. S. Cronkright, Public Service Electric & Gas Co., Newark; vice chairman, G. M. Rollason, Aluminum Co. of America, Garwood, N. J.; secretary, J. L. Auer, Crocker-Wheeler Electric Mfg. Co., Perth Amboy, N. J.; and treasurer, R. W. Thorne, Faitoute Iron & Steel Co., New York.

Stories of Business Are Good Publicity Material

Untold Stories of Business, by Humphrey B. Neill; 218 pages, cloth, illustrated; published by Kingsport Press, New York; supplied by STEEL, Cleveland, for $1; in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

Columnists and magazines have proved that the public possesses an insatiable curiosity about the private and business lives of famous people. What the king of England eats for breakfast, the type of fly favored by the President of the United States when fishing, and the private opinions of business leaders on the economic outlook are all choice and tasty morsels for an ever-curious public.

In "The Untold Stories of Business," the author expresses the opinion that the public would welcome well-written books, attractively printed and properly manufactured, about outstanding industries and corporations in the United States.

Mr. Neill points out in this connection that companies publishing books containing interesting and dramatic details of what they are doing would accomplish no mean job for themselves in the field of public relations.

"The Untold Stories of Business" is a good advertisement for the theory that it advocates. It is well-printed, interesting, entertaining and factual. It discusses the material that should go into such volumes and the material that should not be put in. It discusses the various objectives that such books may be designed to accomplish, and concludes with a description of the ways and means by which such a book as he has written comes into being.

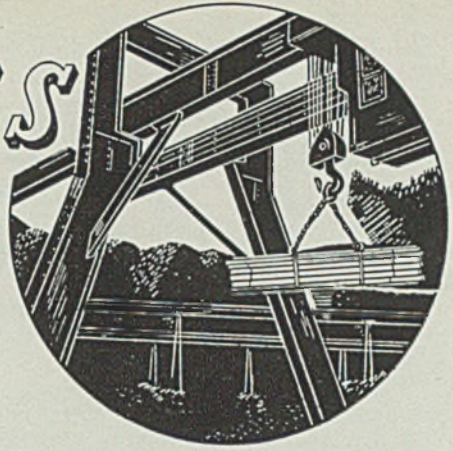
This is a book for business men who believe that public acceptance of the policies and products of their companies is a first essential.

Study Methods of Oxygen Content Determination

Data from reports of 35 laboratories, comprising more than 2000 analytical determinations, indicate that the vacuum-fusion method yields accurate results for the oxygen contents of plain-carbon steels either aluminum-killed, silicon-killed, or of the rimming type, according to results published by the national bureau of standards. These facts are contained in research paper RP 976, entitled "Co-operative Study of Methods for the Determination of Oxygen in Steel." The editors are John G. Thompson, Herbert C. Vacher, and Harry A. Bright.

According to the data gathered, the aqueous-iodine method yields accurate results for some types of killed steels and low results for other steels; more data, and particularly more concordant data, are necessary to define the accuracy of the other methods employed in this co-operative analysis. The vacuum-fusion procedure is reviewed and recommendations given for obtaining optimum results by this method.

MATERIALS HANDLING



Good Housekeeping Keynote of Smooth Materials Handling in Clock Plant

WATERBURY, Conn., has a most unusual manufacturing plant. Its tallest part, as you look at it from the street on which it fronts, is four stories high. Yet, believe it or not, as Bob Ripley phrases it, this plant has grade entrances on four floors. Actually, motor trucks may drive up and deposit their loads at receiving doors on any of the four floors. Furthermore, approach to all floors is on the level; no ramps are necessary and no ramps are employed. It is all done by making use of the contour of the ground on which the building rests.

This plant is owned and used by the Lux Mfg. Co., maker of automatic timers and clock mechanisms, and its layout incorporates a materials handling system in which backtracking is at a minimum, where there are no bottlenecks and where raw materials are received and finished products shipped at points nearest to use and to final operations, respectively.

It can be said truthfully that materials handling in the Lux plant runs much like clockwork; every part of the system serves a definite purpose and operation is timed precisely. The building provides approximately three acres of floor space, and to use an expression of Fred Lux, vice president of the company, "it's a job of good housekeeping." In fact, that is the keynote of the company's materials handling system. Throughout the plant, wide, well-marked aisles are established, and strict rules have been laid down by the management to prevent any cluttering of them. The company's executives insist that all foremen see that these rules are enforced at all times, and the 900 employes all understand that these rules are not to be broken.

Short Hauls Are Used

Upwards of 200,000 pounds of steel—in coils, strip and rods—are received and used in a normal month's operations. "We have such a variety of incoming materials," explained Mr. Lux, "that short distance transportation has been found to be the only sensible solution." Truckloads of incoming steel are unloaded at the receiving platform and the materials placed in the raw materials stockroom, as shown in Fig. 1. The major portion of all the incoming steel—and brass, too—comes from sources of supply lo-

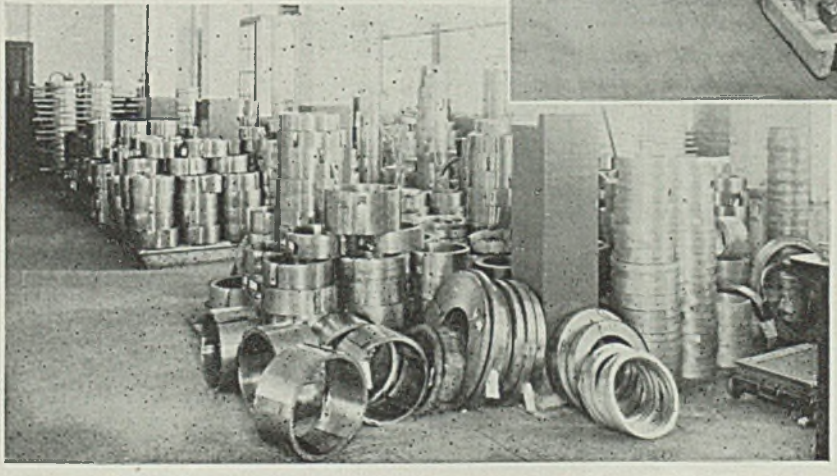
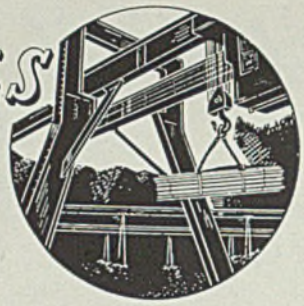


FIG. 1 (left)—View of raw stock storage room. Strip steel is delivered in the form of coils and piled up until needed. A lift truck and skids carry much of the burden in moving material into and out of storage. Fig. 2 (above)—Parts from screw machine and other departments are distributed by lift truck and skids to storage shelves located near assembly lines. Aisles are wide and well marked; rigid rules are enforced to keep them clear for trucking



cated within easy trucking distance. This explains why the vast majority of incoming materials arrive by motor truck although the company has a railroad siding and switch track in the rear of the plant.

All flat stock is received in coils, strip or sheet form so that it may be issued immediately from the stockroom to the press or cutting-up department, which adjoins the raw stock storage. This material is delivered to the cutting-up department by means of hand lift trucks.

Interfloor Handling Minimized

After the steel has been cut to suitable lengths for the particular jobs for which it is intended, it is placed on skids for distribution to manufacturing departments. Interdepartmental handling of materials is accomplished also by lift truck and skids. One operator with a lift truck maintains an almost continuous schedule covering all parts of the plant. Approximately 10 round trips per day serve to keep a smooth flow of materials and parts from department to department.

Four large freight elevators are available for service between floors, although at the present time only two of these are in general use. Careful scheduling of plant transportation and services provided by the four-level entrances has reduced the need for this interfloor equipment.

One illustration of how "good housekeeping" results in efficiency is found in the tool storage department. In this department are nine storage racks, each 10 feet long and having eight shelves, providing a total of 720 feet of shelving. Each rack is marked on its end by a capital letter, with an additional marking, "L" or "R," to indicate left or right hand side of the rack. The shelves are numbered from top to bottom, and each section along each is also numbered. Record of all tools is maintained in a post index, and it is a simple job to locate the exact position of any one of the hundreds of tools which are kept in storage.

Similar in its operation to that of the tool storage is the system employed for storage of parts in process, or at sub-assembly stations. Multiple shelf racks are located at convenient points along the aisles, as shown in Fig. 2. Each storage section is given a letter marking, and each shelf and each container are given numbers. An accurate record of all parts thus stored is entered in a post index, records being maintained by stock clerks, located at stations at central points in assembly departments.

Stock for automatic machines is stored at the end of the plant opposite that at which the cutting-up operations are performed. This location, being nearest to the points of use, saves rehandling time. There are 90 automatic screw machines, and in a normal working week they produce approximately 3,500,000 parts. The machines are grouped in a separate department, and are group driven. For handling long rod stock, use is made of special four-wheel racks, constructed of pipe and special castings.

Highly Departmentalized

It is observed that the Lux plant is highly departmentalized. For example, drilling and tapping machines are grouped into a separate department and a tool shop is housed in a separate room. The 28 skilled toolmakers in this tool shop not only make the various tools used throughout the plant and maintain all production equipment, but they also build numerous special machines and make the tools to go with them. In the gear department is one machine, a product of this tool shop, which automatically drills 180 holes per minute in a small pinion. In addition to these specialized departments there is a tool grinding room, a special tool crib, a department for assembling special novelty clocks and a testing department.

Records show that approximately 30,000,000 clocks made by the company are in service throughout the United States today. Yet, a department containing eight or nine employes on the average handles all repairs and adjustments. Five of these employes do the actual repair work, the others performing paper work in connection with records. On

(*Please turn to Page* 81)

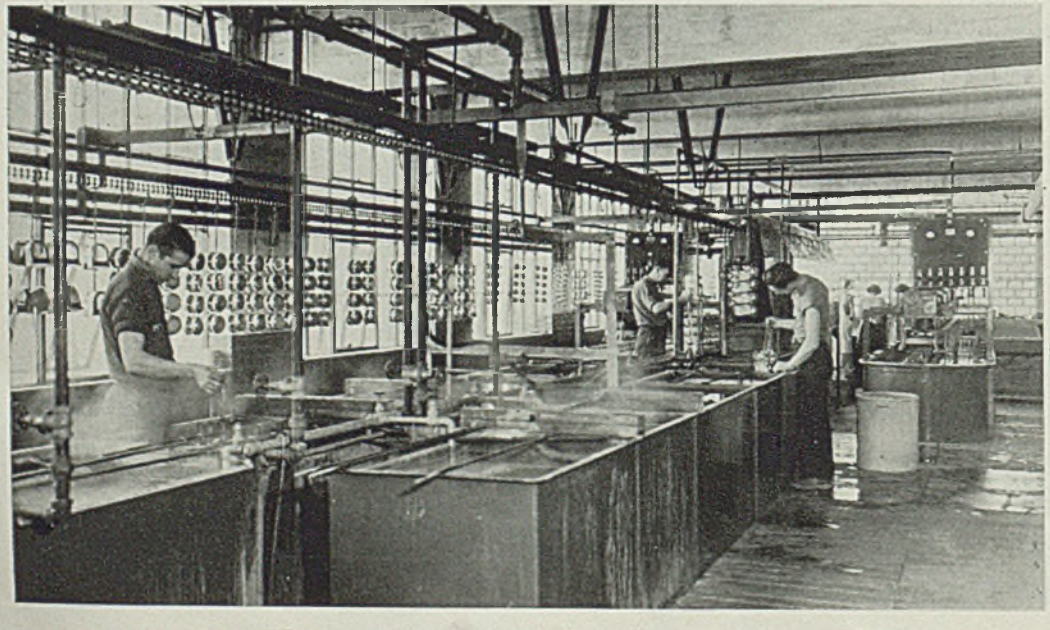


FIG. 3—A new continuous conveyor carries parts through plating baths and drier. Plated parts are carried on the return line of the conveyor to end of room where they are packed in boxes and moved by gravity conveyor to the floor below

JEFFREY CHAINS

IN THE STEEL MILL

CROP CONVEYORS

Carrying white hot, large and small, irregular and jagged crops is the 24-hour lot of a crop conveyor. While it conveys only waste material, its job is of prime importance in the cycle of continuous steel production. ● With full knowledge of this service demand, Jeffrey builds its Vulcan chains methodically . . . by careful selection of materials, precision manufacture, and uniform heat treatment . . . to impart higher strength, greater wear resistance, superior performance. ● Check the extra economic value of Vulcan chains in quality and construction. That same degree of superiority is found in all Jeffrey chains applicable to steel mill service.

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Mechanical Engineers Show Benefits Of Mechanization in Auto Industry

(*Continued from Page* 21)

Chrysler Corp., and president of the Society of Automotive Engineers, reiterated Dr. Hirshfeld's opinions and pointed out how the automotive industry had pioneered in originating demands for the development of improved alloys, better rubber, finer sheet steel, new lubrication methods, bearings and other products by which all industry has benefited.

Highlight of early sessions was the Tuesday evening address of Charles F. Kettering, vice president in charge of research for General Motors Corp., who presented one of his customary sparkling and shrewd discourses on the subject of research—what it should accomplish, how it should be directed and where it falls short. Originally scheduled was an address by William S. Knudsen, president of General Motors, but the press of other business kept him away and Dr. Kettering ably substituted for him.

Eliminating Business Dips

Chief problem of research in industy today, Dr. Kettering maintained, is how to achieve normal advancement and how to iron out the severe dips in cycles of business. He likened the problem to one in "actuarial accounting" such as used by insurance companies, and called upon research directors to apply more effort to this problem. It is one function of a research department to have all the facts on present trends well in hand so designers can be supplied the necessary elements to provide a product which will continue to make a profit.

Industry today falls short in one important direction, he said, and that is in knowing how to bridge the "shirt-losing zone" between development of a new idea and putting it into profitable production. This shortcoming is one which calls primarily for human understanding of the transition period, and does not necessarily devolve upon the shoulders of management or finance.

Many of the present social ills of the country have been ascribed to the fact industry has progressed too far ahead of social welfare, but Dr. Kettering scoffs at this idea, holding that industry actually is too far behind social progress and is gradually coming to realize it "knows nothing about anything."

He urged caution in the matter of developing standards, saying that once everything becomes standardized, in business or in engineering, the door is open to stagnation and cut-throat competition.

"Standardize the industrial house on three sides," said Dr. Kettering, "but leave one side open to run away to a new field of prosperity."

How improvements have been made in the running and driving gear of existing and newly built steam locomotives to permit operation at much higher speeds was summarized in a paper by T. V. Buckwalter, W. C. Sanders and O. J. Horger of Timken Roller Bearing Co., Canton, O., and presented by Mr. Buckwalter. Abstract of this discussion appears on page 52 of this issue of STEEL.

Advantages of direct and indirect heated industrial furnaces were discussed by E. F. Holser, assistant chief engineer, Dow Chemical Co., Midland, Mich., with data presented to show typical applications of both types in the chemical industry.

What the technique of broaching has contributed to the automotive industry was reviewed in a discussion by Sol Einstein, vice president and chief engineer, and Millard Romaine, mechanical engineer, Cincinnati Milling Machine Co., Cincinnati, who pointed out that high production of parts is the main advantage of surface broaching. Both continuous and ram-type machines, with relatively simple work-holding fixtures designed for rapid chucking and unchucking of parts are coming into steadily widening usage.

Accuracy at High Production

Similar sentiments were echoed in a paper presented by F. W. Cederleaf, manager of machinery division, Ex-Cell-O Corp., Detroit, who showed that fundamentally most machine processes are based on the same principles which were in use before automobiles came into prominence, but that the machine tool builders' most important contribution has been the development of high-production machinery yielding toolroom accuracy.

Mr. Cederleaf emphasized the importance of machine tool builders sharing their experience with each other, to the end that new developments in machinery may be speeded up to provide an answer to automotive engineers' demands for better productive efficiency at lower cost.

Industrial bearing design as influenced by automotive practice was examined by A. B. Willi, engineer, Federal-Mogul Corp., Detroit. With reference to split bearings of the general type used for main and connecting rod automotive applications, three rather definite stages of design were shown, culminating in the so-called precision insert or interchangeable bearing which began to receive general acceptance about 1926. Mr. Willi discussed various bearing materials, including babbitts, and the newer copper-lead and cadmium-silver analyses. Lower costs of the latter types were attributed to the smaller amount of material needed and fewer machining operations involved. Value of this

"Ketterisms"

"Research is a thing which, if you ever need it, it's too late to get . . .

* * *

"A salesman can always sell something he doesn't have . . .

* * *

"Don't ask the public what it wants, because it always wants what it doesn't have . . .

* * *

"The price of progress is trouble . . .

* * *

"Engineers assume because they know something, everybody else knows it too . . .

* * *

"A certain amount of intelligent ignorance is essential in a research man . . .

* * *

"Research and industry are one lap behind, not ahead, of social progress . . .

* * *

"The engineer lacks most of all the ability to tell people what he knows . . .

* * *

"It is easy to be quite profound if you know the correct synonym . . .

* * *

"The period between development of a model and actually putting it into successful production is the 'shirt-losing zone' and industry as yet has not learned how to bridge it . . .

* * *

"What industry needs to do today is to go back and check a lot of things now taken for granted . . ."

—CHARLES F. KETTERING, vice president in charge of research, General Motors Corp., before semi-annual meeting of the A. S. M. E. in Detroit.

type of bearing for industrial machinery was appraised.

Production of compounded rubber, a material commonly used under the name of plain rubber, was explained by Dr. Hirshfeld in a paper presented under auspices of the process industries division of the society. Springs of steel and or rubber were compared with respect to certain important characteristics and the conclusion drawn that neither can replace the other completely for springing purposes. Some of the applications of rubber to the springing of rail vehicles were presented.

Railroad division of the society arranged a session on light-weight high-speed trains at which two speakers from the Edward G. Budd Mfg. Co., Philadelphia, reviewed the engineering work involved in designing these trains and the economics of their power.

Welded Railroad Steel

The role of welded steel in high-speed railroad service was outlined by Everett Chapman, president, Lukenweld Inc., Coatesville, Pa., who described the basic factors entering into welded steel construction, especially for those types of loads which are of a fatigue nature. With the introduction of high working stress levels to achieve light weight, characteristics of the steel to be welded must be considered carefully. Another important factor, if the structures is to have a long service life under dynamic loads, is attention to details, since stress concentrations are present at any sudden change of contour and these concentrations, if severe, are the starting points for fatigue cracks.

Abrupt contour discontinuities can occur around a welded joint if it is not made correctly and effort must be put forth to avoid them. Importance of heat treating and thermal stresses were included in Mr. Chapman's discussion.

Under auspices of the materials handling and management divisions of the society, lectures followed by inspection trips were scheduled on the Plymouth Motor Corp. assembly line and the Chevrolet forge plant. The former plant contains 24.7 acres of floor space—all on one floor level and under one roof. The plant includes over 17 miles of conveyors and over 1700 individually driven machine tools, motors ranging from ¼ to 100 horsepower. Much of the equipment is less than a year old.

Visitors to Chevrolet saw a steam hammer plant with 78 steam hammers, nine forging presses and 12 forging rolls; a board hammer plant with 57 board drop hammers, 28 upsetters and heat treating equipment; the crankshaft plant with six units of 5000 and 12,000-pound steam hammers and the necessary heat treating and pickling equipment; the spring plant, bumper plant and power plant.

Comparisons of the older and newer methods of rolling wide mild steel drawing sheets were presented by T. F. Olt, supervising metallurgical engineer, American Rolling Mill Co., Middletown, O. His paper also dealt with aspects of quality control in the modern sheet mill and data were presented covering effects of variations in the cold reduction, normalizing, box annealing and temper rolling operations. Aging effects were discussed briefly and applications cited of drawing sheets in the autobody fabrication field.

This paper was presented under auspices of the iron and steel division of the society, as was a paper by J. E. Angle, assistant general superintendent, sheet and tin mills, Chicago district, Carnegie-Illinois Steel Corp., in collaboration with W. E. McGarrity, strip metallurgist, Pittsburgh district, Carnegie-Illinois Steel. They presented a brief but specific discussion of the basic metallurgical features of hot and cold rolled strip, consideration being given to recrystallization in hot rolling, effects of finishing temperature on the grain structure and properties of hot strip, effects of hot and cold rolling and data regarding forming and drawing qualities of hot strip.

They mentioned certain operating features and limitations from the steel producer's standpoint, and outlined cold strip processing and physical properties for deep drawing operations.

Further details of papers presented at later sessions will be published in STEEL next week.

A.S.T.M. Standards in New Volume for 1936

A. S. T. M. Tentative Standards, 1936; 1390 pages, 6 x 9 inches; published by American Society for Testing Materials, Philadelphia; supplied by STEEL, Cleveland for $7 paper and $8 cloth, in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

This annual publication of the American Society for Testing Materials contains 264 tentative specifications, methods of test and definitions of terms covering widely used engineering materials. A number of the standards are included in the volume for the first time and others which have been revised during 1936 are presented in the new form.

Ferrous metals, including forgings, castings pipe and others, include 47 standards; nonferrous metals, including aluminum, magnesium, copper and copper alloys, zinc, die castings, include 33 standards.

New tentative specifications published for the first time in 1936 cover the following ferrous and nonferrous materials: Alloy-steel bolting materials and carbon and alloy-steel nuts for service up to 1100 Fahr.; high-strength structural rivet steel; fabricated steel bar or rod mats and welded wire fabric for concrete reinforcement; high-carbon and quenched-carbon steel joint bars; one-wear and two-wear wrought steel wheels; seamless alloy-steel (4-6 per cent chromium) heat-exchanger and condenser tubes, and still tubes for refinery service; single and double refined wrought iron bars; light-weight and thin-sectioned gray-iron castings; uniformity tests, by the Preece method, of coating on zinc-coated iron or steel wire; hard-drawn copper alloy wires for electrical conductors; sheet and strip phosphor bronze; seamless copper-nickel alloy condenser tubes and ferrule stock; magnesium-base alloy bars, rods and shapes; test for deflectivity of thermoflex (thermostatic metals).

Issues Report on Welded Aircraft Joints

Information on the strength of welds in chromium-molybdenum steel, alloy largely used in aircraft construction, is now available from the national bureau of standards, department of commerce, following tests made on tubing and sheet and involving three kinds of oxyacetylene welds.

Tests consisted of welds made by the usual process of using low carbon steel welding rod and a neutral flame, similiar welds made with chromium-molybdenum steel welding rod, and welds made by a recently developed carburizing flux process in which a special technique with an excess acetylene flame was used. For welding joints in tubing having a very thin wall, this latter process was found to be the only one producing joints free of cracks.

Butt joints in heavier chromium-molybdenum tubing and sheet made by the three kinds of welds had about equal strengths after welding, although, when heat treated, joints made by the carburizing flux process and those welded with chromium-molybdenum rod were stronger than joints in which low carbon welding rod was used. The strength of tubular joints loaded under tensile, compressive and bending stresses, was also determined, while it was further found that in certain kinds of joints the strength was materially increased by gusset plates inserted in slots in the tubing.

Designing Light-Weight Rotating and Reciprocating Parts for Locomotives

GENERAL objects of mechanical and design improvements for high-speed operation of steam locomotives are to obtain: (1) Reduced dynamic augment on the rails due to unbalanced rotating and reciprocating parts; (2) improved movement of the locomotive over the track by reducing nosing and fore-and-aft vibrations; (3) increased availability; (4) reduced operating maintenance cost; (5) greater acceleration; (6) increased speeds and (7) increased tractive effort.

Timken Roller Bearing Co., Canton, O., for years has been dealing with the problems of obtaining these desired improvements in operating characteristics. Co-operation of various railroads in this development has resulted in modifications of locomotive design which incorporae the application of (a) light-weight reciprocating parts including the piston, piston rod and crosshead assembly; (b) light-weight main and side rods, (c) roller bearing crosshead pins, main pins, and side pins; and (d) roller bearing equipped driver, trailer, engine and tender truck axles.

Weight Reduction Preferred

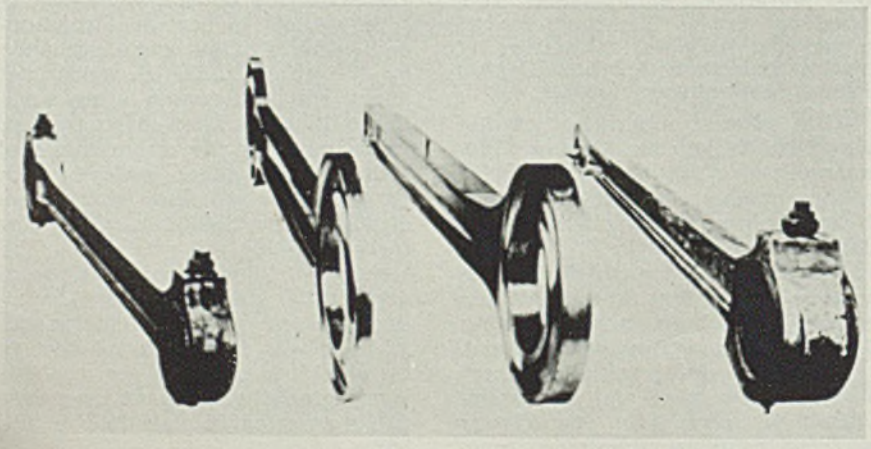
Higher speeds require either a reduction in the weight of the reciprocating parts and rotating parts or improved and strengthened locomotive and track structure. Obviously the former is the logical and economical procedure to follow, and such was the basis for the development of the Timken light-weight design. Weight reduction in reciprocating parts of 1072 pounds per side and up to 52 per cent of the conventional designs has been made. Dynamic augment curves show in general it is possible by reduction of weight to increase the diameter speed of steam locomotives by about 35 miles per hour without change in the dynamic augment. The reduced weight results in greatly decreased horizontal forces acting to cause vibrations and to stress the locomotive frame, axle and other members.

BRIEF review of work incident to the development of light-weight steam locomotive equipment is presented in the accompanying article, abstracted from a paper presented at the semiannual meeting of the American Society of Mechanical Engineers in Detroit last week. The authors are T. V. Buckwalter, vice president, Dr. O. J. Horger, research engineer, and W. S. Sanders, general manager railroad division, Timken Roller Bearing Co., Canton, O.

In general arrangement of the application of light-weight revolving and reciprocating parts, the shape of all parts deviates considerably from conventional design and is determined by the proper distribution of metal to give maximum strength and minimum weight so far as this is consistent with good forging and machining practice. The eye ends of rods are deep, narrow-width I-sections which give considerable rigidity and low bending stresses. Plain bearings and roller bearing side rods and main rods are shown in the accompanying illustration. Column stresses due to eccentric loading are reduced to a low value because the narrow width of the rod ends and their simple knuckling action on the outer race of the bearing permits little eccentricity. Knuckle-pin joints in side rods and oil and grease holes through the rod eye, which introduce high local stresses, have been eliminated.

Tube Sections Employed

In this new design the crankpins are made of thin-walled, tapered tubular sections, while the crankpin bearings are of the usual tapered roller design fitted directly to the crankpins. The crosshead pin also functions as the inner race of the bearing. A thin-walled tube is used for the piston rod. The usual massive one-piece cast steel crosshead has been entirely re-designed, eliminating the taper key connection and



FROM left to right, plain bearing side rod, tapered roller bearing side rod, roller bearing main rod and plain bearing main rod. The roller bearing rods are die forged from chrome-nickel-molybdenum steel

using two thick plates die forged to proper shape. A forged and rolled shape of comparatively thin section is used for the conical piston. Its low weight permits successful operation with only two piston rings.

Rods, pistons, and the principal members constituting the revolving and reciprocating parts are made from Timken high dynamic steel, which is a chrome-nickel-molybdenum alloying having the following nominal chemical analysis: 0.37 carbon, 0.70 manganese, 0.27 silicon, 0.75 chromium, 1.60 nickel and 0.25 per cent molybdenum. Design parts of this nature call for a material possessing high yield strength, high endurance limit, good ductility as measured by elongation and reduction in area, and favorable impact strength. Likewise it is important to obtain these properties with minimum weight as expressed by the strength-weight factors. Good forging, heat treating and machining characteristics are also required.

Driving rods, piston and crosshead all are die forged; the piston rod is of cold drawn steel tubing, and the crankpins are hammer forgings. To obtain the beneficial effects of grain flow, the proper development of die shape and forging technique was required. Longitudinal etched sections of the eye were made to determine the proper grain flow so that in the subsequent machining operations cutting would be parallel and not transverse to the flow lines. Only ⅛ to 3/16 inch stock is left on each surface for machining, except at the rod bore where ¼-inch is allowed.

How Rods Are Fabricated

The eye and slightly over half of the column section of the rod is die forged in three forming, blocking and finishing operations. The opposite end of the rod is forged in a similar manner and a center die used to straighten the column section with the ends and to control the length. Forming begins by hot upsetting the end of a 7-inch round billet into a sphere which is then flattened into a pancake-shape in the plane of the rod. This blank is then placed in a 1500-ton hydraulic press for the blocking operation where it is pressed into the die shape of the column and eye sections. Final forging is done in finishing dies on a 18,000-pound drop hammer.

Proper temperature of the metal must be maintained during each of these operations by reheating and a steam jet used to remove all scale after each hammer blow. Flash is trimmed in three operations. The thin plate left in the bore of the eye is removed after the blocking, the outer flash is removed after the completion of one half the finish forging, and final trim is made after completion of the forging.

Design of the column sections used in the main and side rods is based on compression tests of full-size tapered columns. The columns tested were machined from standard structural steel I-beam sections to dimensions comparable with those of full-size main and side rods used in service.

To investigate fatigue strength of full-size axle assemblies up through 14 inches in diameter, a locomotive axle testing machine (STEEL, April 12, p. 50) was installed in the Timken research laboratory. At the present time full-size outboard driver axles having a wheel seat diameter of 11½ inches are being tested in co-operation with the Pennsylvania railroad.

Considerable information is now available from scale model tests to show conclusively the fatigue strength of 0.45 per cent plain carbon, steel, normalized and tempered, is decreased from 34,000 pounds per square inch without a press fitted wheel, to about 14,000 pounds per square inch with a press fitted wheel, leaving only 41 per cent of the strength available. This greatly reduced strength is a result of high stress concentration introduced by the wheel fit.

Several means of improving this weakness have been developed, the most effective method being burnishing or cold rolling of the axle in the region of the press fitted members. This rolling operation more than doubles the fatigue strength of the axle. Other methods such as relief grooves in the wheel hub face, raised axle seats at the wheel fit, and various steels and heat treatments do not appear to give more than about 10 to 25 per cent increased strength for any one method. The schedule of tests includes the investigation of all these effects and others on both 2-inch and full size axles. The stress concentrations and weakening effect of axle fillets will also be investigated at a later date.

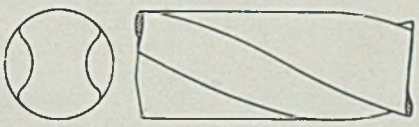
Energy Must Be Absorbed

Any impact between the wheel and rail develops a certain energy, most of which must be absorbed in the unsprung-weight system. If the axle between the wheels is imagined as being an elastic member, then much of this energy would be expended in deflecting the axle, with resultant small impact forces in the axle as compared to the case where a rigid member connects the wheels.

In practice, the portion of the axle between the wheels is comparatively rigid, particularly with inboard axles, where this portion is about the same diameter as wheel and bearing seats. This portion of the axle could be tapered safely to a much smaller diameter, which would result in lower axle impact stresses due to increasing the ability of the axle to deflect. This smaller diameter is further justified when one considers that the bending movement gradually decreases between the bearing and wheel seats and that a stress concentration factor of at least two exists at wheel and roller bearing seats due to the fitted members on the axle. The center of the axle could therefore have a diameter with a section modulus as small as one half that at existing at the wheel and bearing seats.

New Concrete Reinforcing Bar Permits Weight Saving

New deformed concrete reinforcing bar developed in Poland and now coming into use in the building industry in Europe, is being introduced in this country by Conrad Wolff, consulting metallurgist, Newark, N. J. Known as Griffel-Stahl, the new bar, as shown in the sketch,



has a unique shape. This is said to permit a reduction of one-third in the weight of reinforcing steel used, as compared with the usual practice. Designers can use the current tables of properties for round shapes when specifying the new bars.

Statistics of Metals In Handy Volume

Metal Statistics, 1937; cloth, 592 pages, 4 x 6 inches; published by American Metal Market Co., New York; supplied by STEEL, Cleveland, for $2; in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

The thirteenth annual edition of this statistical review of the ferrous and nonferrous markets is in the same form as its predecessors, with a number of additions, especially in the nonferrous department.

In the steel section world production of tin plate is covered, steel production rates are on a weekly instead of daily basis and scrap imports and exports are given separately.

In the nonferrous section, the statistical record of zinc has been enlarged by tables showing prime western zinc production and a monthly record of unfilled orders. In tin, lead and copper, additional statistical material has been included.

SURFACE TREATMENT AND FINISHING OF METALS

Industrial Equipment Protected by Specially Formulated Synthetics

PROBABLY no industry has undergone greater change in recent years than the field of protective coatings. Due to the peculiar chemical characteristics of the materials used in the manufacture of the newer synthetic resins, laboratories have been able to produce innumerable modifications of so widely varying properties that special resins can be designed for individual requirements. Thus, the paint and varnish manufacturer today can formulate a variety of coatings, each having one or more outstanding desirable characteristics. For example, one may have exceptional alkali resistance, another better acid resistance, and still another resistance to abrasion.

Greater knowledge of corrosion and its prevention through the use of synthetic resin base coatings has stimulated progress in devising new means of protecting equipment employed in chemical and other branches of industry. In the manufacture and handling of many products the problem of corrosion is ever present and several manufacturers specialize in the development of phenolic resin base coatings which will protect both large and small equipment from corrosion.

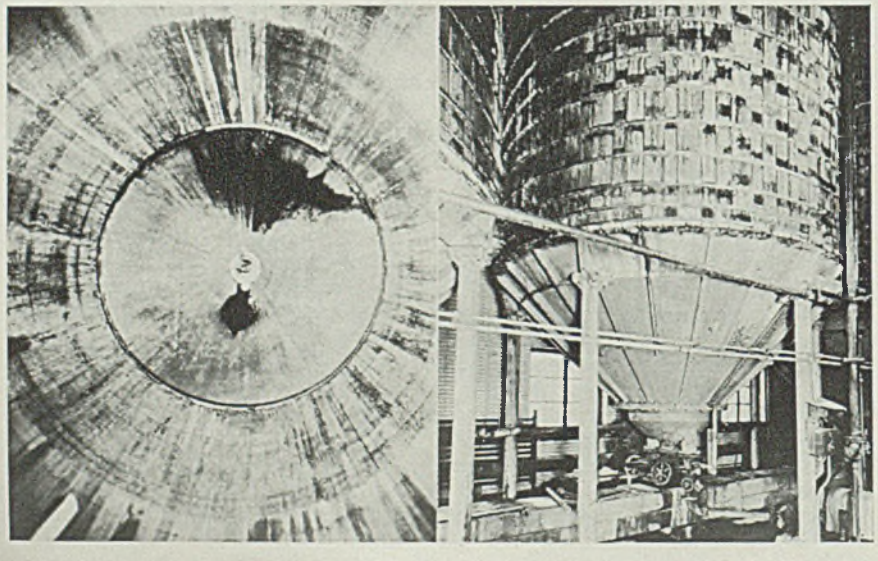
Bakelite Corp., New York, manufacturer of phenolic and other types of synthetic resins, is frequently called upon to furnish resins for specially formulated protective coatings. Special coatings designed to meet a wide variety of corrosive conditions have been formulated, a few interesting examples of which are outlined in this article.

A test conducted on a steep tank in the plant of a large glucose manufacturer is a good example of what can be done with specially formulated finishes. Steep water is a solution which varies from 0.01 to 0.04 per cent sulphur dioxide content which is one of the most severe corrosive conditions confronting industry. As a rule this weak sulphur dioxide solution in steep tanks eats its way through the cast iron shell very rapidly leaving nothing but the carbon contained in the iron. When this carbon is scraped out periodically to prevent its contaminating the liquid the iron shell becomes thinner and thinner until the entire one-inch thickness of metal becomes porous.

Complete Protection Afforded

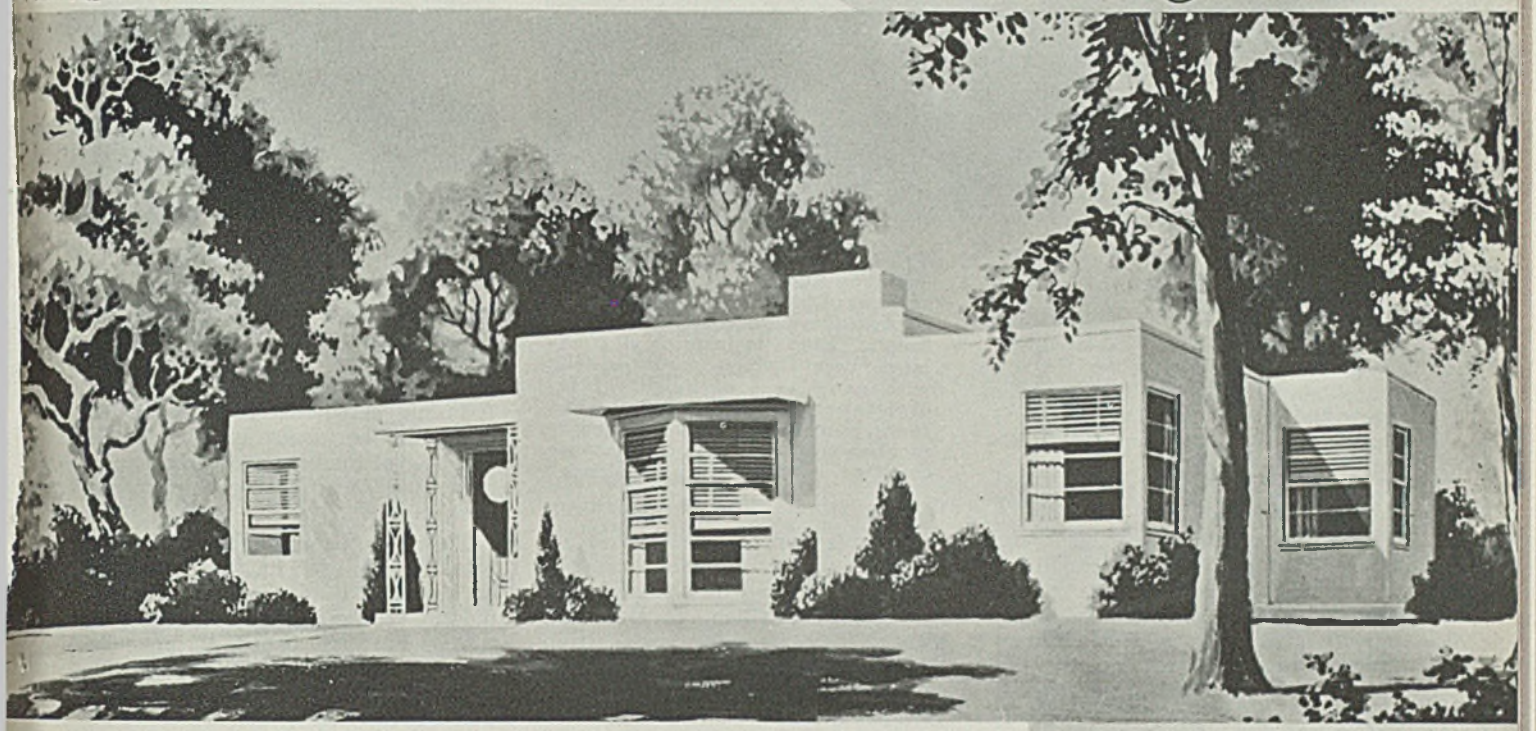
The interior of one of these tanks was coated with a phenolic resin finish and tested for one year. At the end of this time it was found to be unaffected whereas normally the cast iron would be worn away at least ⅛-inch. At the base of the cone this tank, shown in an accompanying illustration, is 14 feet in diameter and the cone proper, which is cast iron, is 9 feet high. The wooden sides of the tank are about 40 feet high and although the process of applying the finish necessitates baking it was accomplished by a special method without injury or shrinkage to the wooden staves of the tank.

Large steel beer storage tanks, formerly pitch-lined, have been finished in like manner. These tanks have been used both for beer storage and intermediate ferementation products with excellent results. In many cases the tanks had to be coated and the films baked on in cellars where the temperature must be maintained between 32 and 40 degrees Fahr. to protect beer in adjacent tanks. After application has



INTERIOR of this steep tank shown left, used in manufacture of glucose, is protected by a synthetic resin finish specially formulated for the purpose by Lithgow Corp., Chicago. Right is exterior view of tank showing cast iron cone and wood sides

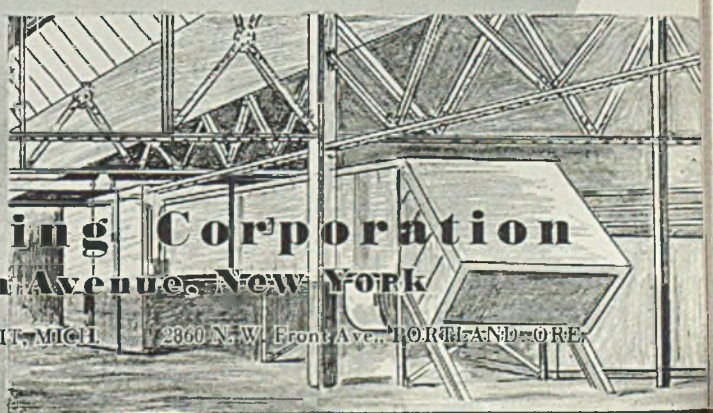
Ross looks to the future



ROSS *looks to the Future in improving today designs of Air Heaters and Ovens for baking protective coatings on steel*

THEY'RE in the *raw* — these pre-fabricated homes of tl coming generation . . . a laboratory infant so to spea They're fast becoming a fact — and when they do J. O. RO Engineering Corporation will be foremost in position to hand the baking problem that will be requisite to their trim, smoo exterior and interior steel refinements.

The J. O. ROSS Engineering Corporation through a consisten of effort has managed to keep *a step ahead* of the advanc finish problems that confront the designer of the modern hom automobile, locomotive, aircraft and interior furnishings. RO Air Heaters and Industrial Ovens provide every conceivab feature pertinent to the efficient baking of protective coatin on metal. Permit our nearest office to mail you bulletins N 122 and No. 123.



J. O. Ross Engineering Corporation

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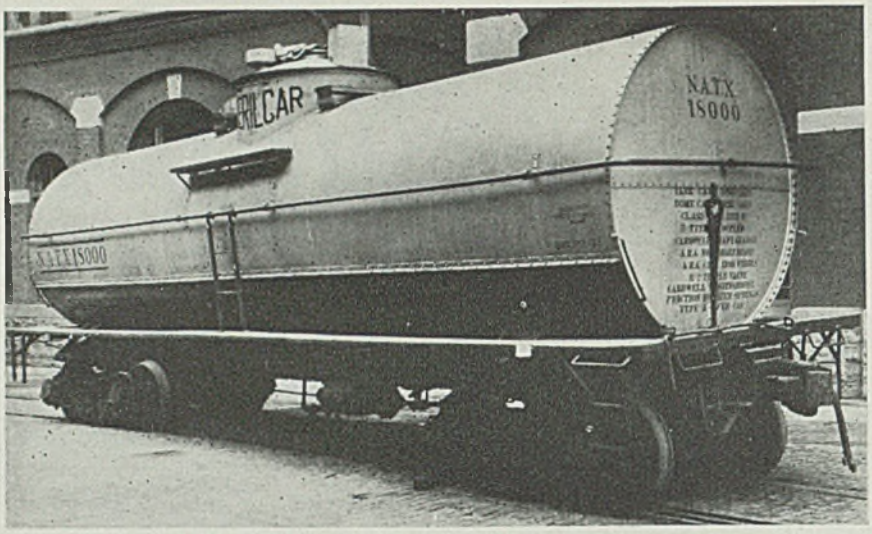
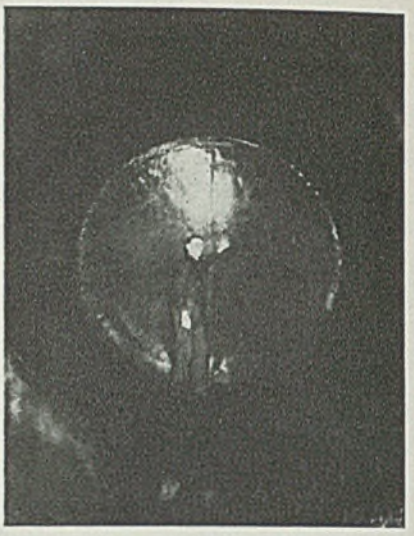
201 North Wells St., CHICAGO, ILL. 12953 Greeley Ave., DETROIT, MICH. 2860 N.W. Front Ave., PORTLAND, ORE.





BULK transportation of beer was made possible by coating the interior of tank car shown left with a phenolic type synthetic resin finish. Right is interior view of large beer storage tank coated with same type of finish. Life expectancy of this finish is seven to ten years if care is taken to avoid mechanical abrasion. Photos courtesy Lithgow Corp., Chicago

been completed the protective coating is subjected to normal operating temperatures of from 32 degrees Fahr. to room temperature. In several instances the coating has been subjected to occasional steam sterilization at high temperatures without adverse effect.

Cleaning Costs Are Reduced

The cost of cleaning these tanks under average brewing conditions is only 30 per cent of the former cost and due to the extremely smooth and glossy surface the new coating produces, the need for a chloride solution germicidal washout is being eliminated. Washing with hot water is all that is necessary. The film is nonporous and hard, yet tough enough to withstand metal distortion, including tank car railroad service. The life expectancy of this new coating, based on studies made by the organization applying it, is from seven to ten years without the necessity of retouching when care is taken to avoid mechanical abrasion.

About a year ago government analysis disclosed that maple sugar and maple syrup contained certain quantities of a metallic substance, greater than had previously been suspected. Further investigation showed this impurity came from two or three sources, chiefly from the type of paint then used for painting sap buckets and other utensils and from the use of solder in repairing equipment which comes in contact with maple products.

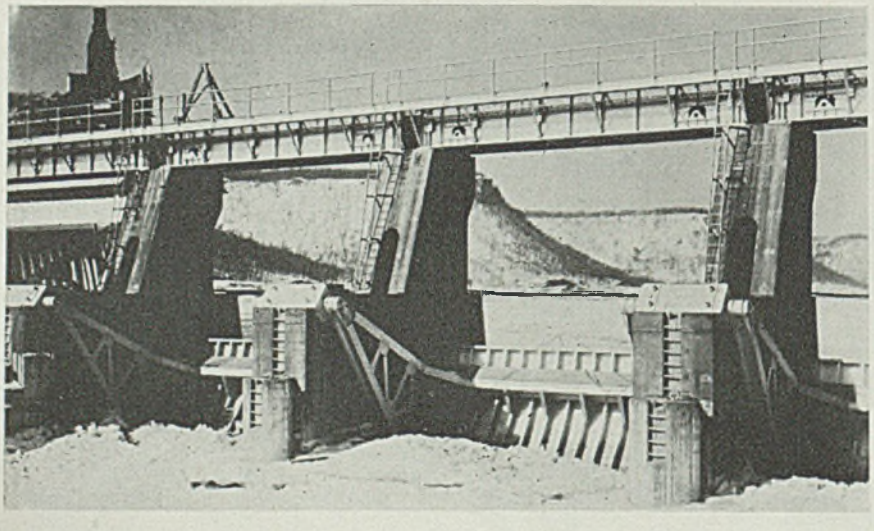
In advocating a method of overcoming this condition, the Vermont department of agriculture has suggested refinishing equipment with paints free from poisonous substances. Several brands of enamels and aluminum paints containing phenolic synthetic resins were applied and tested under actual operating conditions. These finishes were approved as being satisfactory from the standpoint of ease of application, adhesion, time of drying, hardness after contact with sap and resistance to abrasion and freezing. It is suggested that finishes of this type can be used for the initial painting of buckets and other equipment and for covering paint previously applied.

The above examples are typical of what can be done in the protection of steel food and beverage equipment. However, the use of protective coatings based on phenolic resins is not confined to these industries. These resins have been utilized in rust inhibitive outdoor paints with equally satisfactory results.

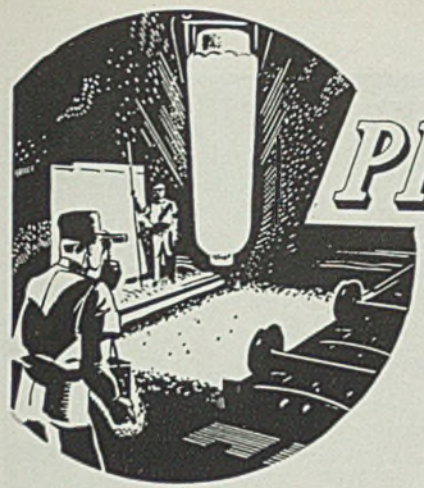
Finish Resists Abrasion

An interesting application of corrosion protection is shown in an experiment on a steel tainter gate of a dam in the Mississippi river near St. Paul. This gate was coated with an anticorrosive primer and aluminum paint based on a synthetic phenolic type resin. The adjacent gates were finished with red lead oil primer and aluminum paint. These gates were all coated at the same time in the fall of 1935. The following winter was unusually severe and ice packed several feet high against the gates. The fol-

(*Please turn to Page* 82)



STEEL tainter gate shown here was coated with anticorrosive primer and aluminum paint based on synthetic resin in the fall of 1935. Despite severe ice conditions during the following winter the finish was not worn completely through when gates were inspected in the ensuing summer. Softer red lead paints on other gates were worn completely away in many places exposing the steel to corrosion. Photo courtesy Bakelite Corp., New York



PROGRESS IN STEELMAKING

Develops Slide Rule for Setting Strip Mill Roll Passes

ADJUSTING motor speeds and roll settings of strip mills now is accomplished by a slide rule developed and patented by H. C. Goodrich, McDonald works, Carnegie-Illinois Steel Co., McDonald, O. A facsimile of a rule designed for setting of a 43-inch 4-high hot strip mill is shown in the accompanying illustration.

This new device assists the mill operator to determine the limitations and conditions of the mill for rolling various products.

The unit, which can be developed for practically any hot strip mill as well as continuous cold strip mills, is described by Mr. Goodrich in *United Effort*, as follows:

Three types of adjustment can be made on the board. All other characteristics of the individual mill are built into the board which must be made to order for each mill.

1. ADJUSTMENT FOR ROLL SIZE: This is done by turning knob "A" about a quarter turn to the left to unclamp it; then, using the knob as a handle, moving the upper slide up or down until the correct roll size appears opposite the index in the window "B." The knob is then turned to the right to reclamp the slide.

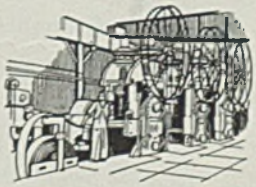
Made When Changing Rolls

This adjustment needs to be made only when rolls are changed in the mill; it need not be touched when changing to a different finished thickness of strip.

The same slide that carries the roll size adjustment also has fastened to it the motor speed scale, since a difference in roll size is compensated for by a proportional difference in speed.

2. ADJUSTMENT FOR ROLL OPENING, PER CENT REDUCTION, OR MOTOR SPEEDS: These slides each carry three indices; one (G) at the bottom pointing to the roll opening scale, another (E) on the per cent reduction scale, pointing to the next adjoining per cent reduction scale, and one more (D) at the top, pointing to the motor-speed scale. The slide is unclamped, moved, and reclamped by the knob "F," and may be set up to whichever of the three sets of indices that the occasion demands. This will be discussed later.

3. ADJUSTMENT FOR FINISHING SPEED: This adjustment is made by moving the bridge which carries with it all of the motor-speed scales. Both knobs "C" are loosened and used as handles to move the bridge.



Selection of finishing speed is limited by the upper and lower limits of each individual stand. It sometimes occurs on certain setups that a variation of only 20 or 30 revolutions per minute on the last stand will move from the top limit on some one stand to the bottom limit on some other stand. At other times a setup may throw you entirely out of your available speed range; that is you may be over the top limit on one or more stands and at the same time below the bottom limit on others. The board will indicate what changes must be made in the setup to correct this trouble.

Functions of Board

The board has a number of useful functions, the most important being:

1. TO PREDETERMINE THE CORRECT ROLL OPENING AND MOTOR SPEEDS FOR ANY ORDER WITHIN THE RANGE OF THE MILL

(a) Correct roll sizes are set up at "B."

(b) The lower slide on the last finishing stand is set and clamped so that pointer "G" indicates the desired thickness of the finished material.

(c) The next to the last slide is set up so that the arrow on per cent deduction scale "E" indicates the per cent reduction desired on the last stand. The per cent reduction for each stand is characteristic for each individual rolling mill and does not vary greatly from order to order. It is calculated, or determined from experience and built into the mill. It is limited by the speed range and available horsepower of each stand; when perfectly calculated, it will cause each main drive motor to be loaded to the same per cent of capacity and also will cause the speed of each motor to be in the same relative position in the available speed range.

The board is so constructed that when these characteristic percentages of reduction are set up for each stand, the scales "E" will be in a straight line across the board. It is realized, however, that conditions

VisControl

Taking the slag viscosity reading, which forms the basis of VisControl.

greatly facilitates the processing of steel

VISCONTROL, the new Bethlehem development for the control of steel making, eliminates many of the variables that have caused different heats of steel made to the same specifications to behave differently in processing. Whether you forge, draw, machine or heat-treat steel, production will go along much more smoothly with Bethlehem steels made under VisControl.

VisControl gives the melter a firmer grip on the tool he uses in refining steel—the slag. He can steer the process accurately through the critical final hours of the heat. The difference in accuracy between former processes and VisControl can be compared to the difference between putting a golf ball toward the hole and carrying it to the hole.

The characteristics of steel which determine forging, deep-drawing, machining and heat-treating qualities are largely governed by two factors aside from analysis—grain structure and degree of oxidation in the open-hearth furnace. With VisControl the melter can guide these factors accurately to obtain the desired properties to a high degree and can turn out heat after heat with practically identical processing characteristics.

With VisControlled steels, once you establish a heat-treating cycle, a tool set-up or a forging practice you are all set for production with uniform results. This super-accurate control of tonnage steel making is equally advantageous to large and small buyers. The big-tonnage user gets steel that goes through his plant as though it were made in one huge heat. The small user can buy a few tons now and then with the assurance that it will behave in the same way.

Practically all Bethlehem steels are now made under VisControl.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

often arise when variation of even 10 or 20 per cent from the characteristic reductions must be used. These variations must be left up to the judgment of the speed operator, roller, turn foreman, or whoever is responsible for setting up the board.

(d) All other lower slides are set up consecutively in the same manner and clamped in position.

(e) The bridge is moved so that the desired finishing speed is indicated.

(f) All indicated roll openings are marked down and sent to roller; all motor speeds are given to the speed operator.

2. To determine the actual roll opening at each stand in order to recalibrate roll opening indicators on the stands:

(a) The mill must be running smoothly.

(b) Set up finishing stand slide at actual finished size as measured by the gager.

(c) Move bridge so that actual motor speed is shown for the finishing stand. Get this speed from the tachometer.

(d) Set all other slides to actual motor speeds as shown on the tachometer.

(e) Read correct roll opening at "G."

3. To determine actual percentage of reduction occurring in each stand:

(a) Set up the same as previously described.

(b) Read percentages of reduction on scales "E."

4. To balance up a mill when some motors are taking excessive loads:

(a) Set board to actual rolling conditions at time of trouble.

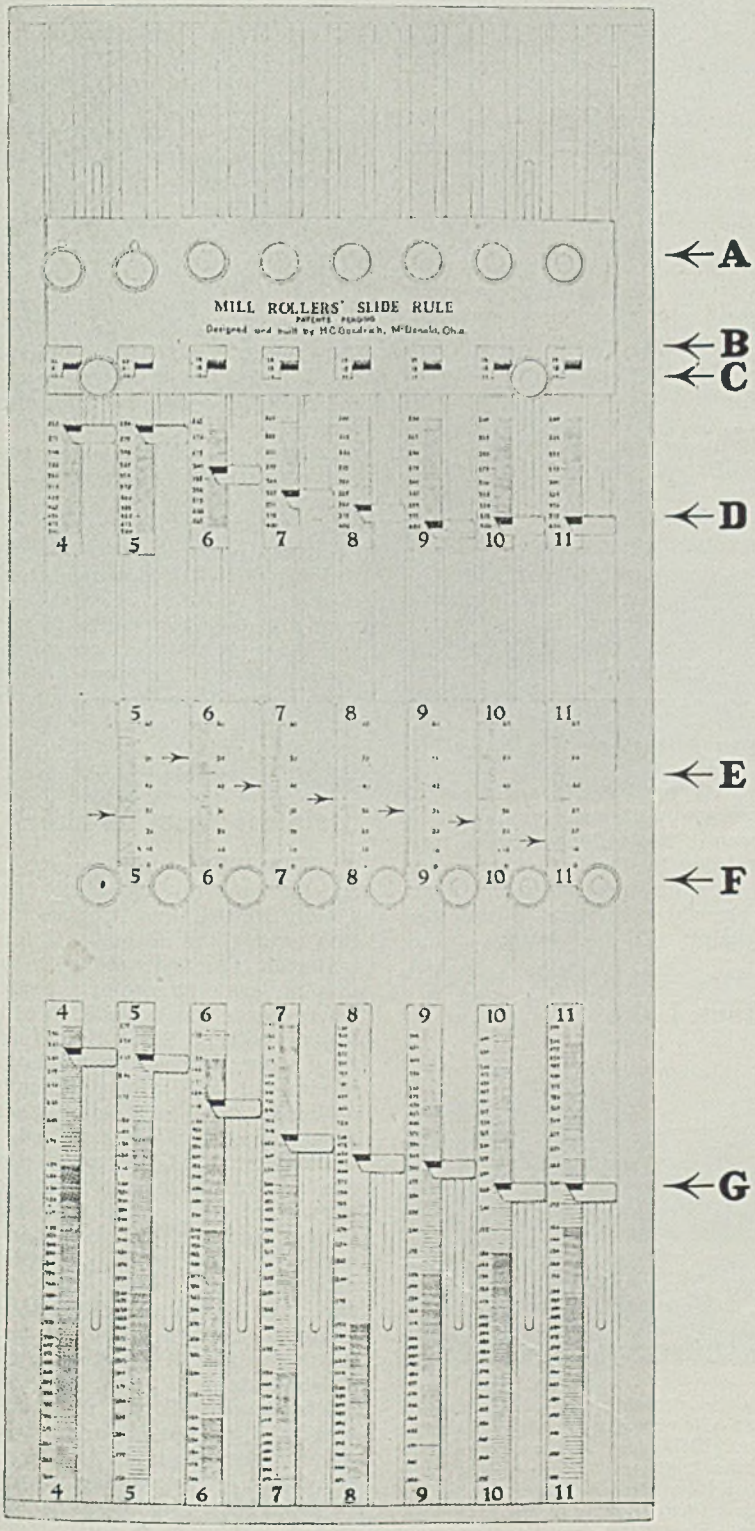
(b) Adjust slides to permit lighter reductions on stands where motors are overloaded.

(c) Read new roll openings and motor speeds and make the necessary corrections to the mill. This method takes the guesswork and "feeling your way" out of such an operation.

5. To determine whether or not a given order can be rolled on the mill from a given size slab:

(a) Set up the board as the order is to be rolled.

(b) See if the motor speeds fall within available ranges and if characteristic reductions are being made. A little experience will show what variations in per cent of reductions are possible. A set to be "dummied" on the mill is taken care of on the board by setting the reduction scale for that stand at zero.



Slide rule which assists mill roller in determining pass settings

Hot Dip Galvanizing Explained in Booklet

Announcement is made of a booklet issued by American Hot Dip Galvanizers Association, Inc. 903 American Bank Bldg., Pittsburgh. *A Guide to Longer Life for Iron and Steel Products* presents a concise history of zinc and its application in the protection of iron and steel.

A short discussion of the advantages of hot dip galvanizing and a list of articles commonly protected by this coating are included. The purpose of the association and its work in maintaining quality standards in hot dip galvanizing are also described.

Copies of this booklet can be obtained by writing the association at the above address.

WELDING, ETC.

BY ROBERT E. KINKEAD

Current Welding Progress

WELDING has become the subject of many meetings of corporate directors and executive committees. The questions most frequently asked are:—How is the rapid advance of welding likely to affect our business? Is welding being sold to the country to an unwarranted degree? From trade publications and other sources of information, the following activity in welding is noted. The reader may judge for himself what the answers to the above questions might be.

Government is to build all welded wind tunnel at Langley Field, Va.

Milwaukee Road completes building of 1000 all welded automobile freight cars.

Dravo Corp. launches six all welded barges at Pittsburgh in one day. Starts quantity production of all welded single screw towboats of greatly improved design.

Strip steel producers buy welding machines costing from 50 to 100 thousand dollars each for welding ends of strip coils.

Harnischfeger Corp. builds new and improved line of excavating machinery, all welded and made of new low alloy steels.

Electrical manufacturers sold 8000 motor generator sets for arc welding in 1936.

Estimates indicate between 150,000 and 200,000 spot welders in use. Probably 500,000 gas welding and cutting torches in daily use.

Commercial welding shop building welded steel machinery parts only, employs 110 welding operators, produces about 30 tons per day.

U. S. Navy proposes to use welding extensively in new 35,000 ton capital ships,—welding has heretofore been used on the relatively light gages of steel plate used in destroyers and submarines. Sun Ship Building Co. demonstrated heavier plates could be welded economically.

New Beechcraft Model 18 eight passenger transport plane has most of its strength members except skin welded. Material is tubing S.A.E. X-4130.

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

Young Men In Welding

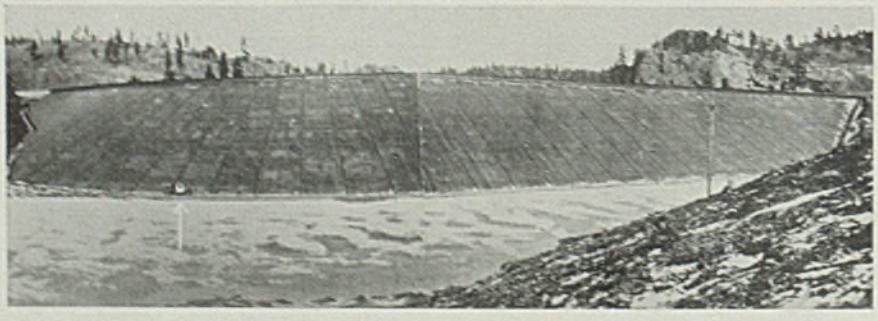
YOUNG mechanical engineer of our acquaintance complained to us recently he could not break into the welding business in such a way as to offer any possibilities of "getting anywhere." That is the age old plaint of the young — and particularly the young and faint hearted.

Rich and powerful men of the welding industry seem permanently entrenched to the young engineer. All he can see is a chance to work for some one at a small salary. But twenty years ago not one man who may be thus described was either rich or powerful in the welding industry. The peak of a man's life lasts about ten years; then younger men begin to menace his position. In exceptional cases leadership lasts for 20 years. Nature arranged the life cycle of human beings so the strong and virile would push the older individuals out of the way. Nor are the devices of corporate organization protection sufficient to perpetuate the old and reject the new.

Nature renews and perpetuates herself in corporate affairs in the same way as she does in the simplest form of life—by division and creation of new entities. When the old company gets rotten at the top the young progressive individuals go out and form a new company to compete with the old one. A strong man surrounds himself with relatives and yes-men and seems invulnerable, but when his days of personal leadership are over the competition wrecks his edifice.

There are no opportunities in the welding industry for the tame, the docile, the easily handled young men who are too polite to say no and make it stick. There are more opportunities than ever before for young engineers who can, by a surge of new ideas, dish it out as well as take it.

Steel Plate Holds Back Lake



APPROXIMATELY 150 feet high and ¼ mile wide, Catamount dam on Catamount creek, Pike's Peak, Colo., will provide 2500-acre feet of water for the city of Colorado Springs. The dam is at an elevation of approximately 9500 feet, and is composed of ¼-inch plates joined together by arc welding. Approximately 1100 tons of structural steel was used. To prevent overflow of the water in a high wind the top of the dam is curved. Lines which make the structure appear as a football gridiron are expansion joints to take care of effects of temperature changes. Size of the dam is indicated by reference to the truck at the left. Photo courtesy James F. Lincoln Arc Welding Foundation

Stainless Steel Welding

ESTIMATED stainless steel production in 1936 of approximately 102,000 tons is cause for elation among the enthusiasts for this material. For the welding industry, it is no less a source of satisfaction. There never was a tradition of riveting or bolting the stainless steels; they were born after welding had become of age, and practically all stainless steel is welded when an assembly of parts is required. This is particularly significant in view of the difficulties which had to be overcome to make satisfactory welds. New welding rods, new processes and new technique had to be developed at a time when manufacturers of the steel itself could never be certain what the product would be like when it reached the finished stage.

Practically all of the stainless steel welding rod for arc welding is made by two plants in Cleveland. It sells at prices ranging from $1500 to $2500 per ton. Current production is estimated at about 1500 tons of welding rod per year.

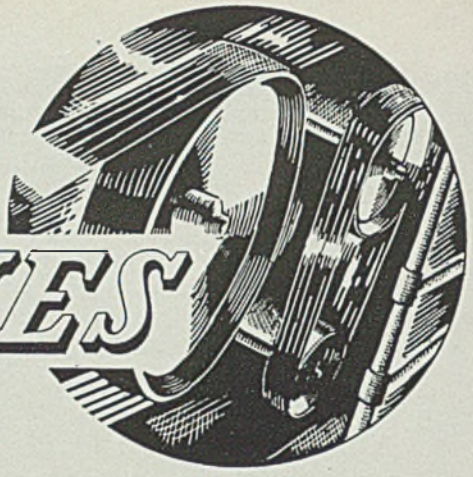
Whitey Sez:

"It's not necessary to worry about your station in life—as someone is ever ready to tell you where to get off . . . although a reputable product did take me to the coast and back."

MAURATH, INC., CLEVELAND

BUILDER OF BETTER WELDING ELECTRODES IN ALL ANALYSES

POWER DRIVES



Electronic Control and Its Relation To Machine Tool Operating Cycles

BY EDWIN H. VEDDER*
Electronic Sales Engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

ELECTRONIC control has been adapted to machine tools less rapidly than to other machines. The cause of this delay is two-fold: One reason is lack of general knowledge about tubes and their applications, and, second, machine tools have been developed to such a high degree of precision that it is relatively more difficult to make major improvements in their design than in that of other machines more crude in nature.

Some machines should be revised to adapt them to electronic control. Many times the control designer is expected to adapt electronic devices to existing machine designs when the best results can only be attained through simultaneous machine redesign. Typical applications of electronic control may indicate possible machine-tool applications.

Electric Eye Is Used

The phototube or "electric eye" is being used to perform relaying or limit-switch service. The phototube is most useful for this purpose when the actuating object cannot be conveniently used to operate a mechanical switch. Paper cutting, wrapping and handling control is typical. The photo-electric relay can be used to initiate limit switch operation by a very small mechanical motion. The mechanical device can be arranged to interrupt a narrow light beam such as on a beer-weighing machine. In this application, the scale beam moves only about 0.002-inch to operate the relay.

Photo-electric relays are used to control automatic can-making machinery in a continuous production line having several machines in tandem with conveyors between. In one such installation, the relay is used to stop a can-making machine when the conveyor leading to that machine is empty. A second relay is used on the same line to indicate when the conveyor is becoming jammed because of the first machine in the line operating faster than the second. This is accomplished by means of a photo-electric relay arranged so that the relay does not operate normally, the relay operating only when abnormal conditions exist. This prevents excessive mechanical wear since all the indication is performed electronically.

Sometimes it is desirable to eliminate mechanical relays. This is done by operating a solenoid or other semipower device directly from a tube without an interposed relay. This is done in the E. W. Bliss can leak testing machine. The electronic control is actuated by contacts on a sylphon bellows which move only about 0.01-inch. If all cans in succession are defective, the rejection system must operate 300 times per minute.

Many photo-electric relays are being used to stop automatically the electric heating process when a metal part reaches a preset temperature. The light emitted by the hot metal is focused on the phototube by a lens. Since the light emitted is a direct function of the temperature, the photo-electric relay is used to trip the power at the same light for each operation. About 75 of these units are in service operating at temperatures from 1200 degrees Fahr. up. The electronic balancing machine has found wide acceptance because of its sensitivity.

A large number of register regulators are used for regulating the cutting of paper, cellophane, cloth and similar materials from a preprinted roll of strip so that the cut occurs with definite relation to the position of printed matter, labels, or other patterns. Several types of this equipment are available, the least expensive of which regulates package wrapping machines in which the speed of the paper is relatively slow and a guillotine-type cutter is satisfactory. More elaborate equipment is used for regulating the cutting on machines for making bags. These usually use a rotary cutter and operate at paper speeds up to 500 feet or more per minute. Accuracies of cuts as close as 1/32-inch are readily obtained.

Tubes Control Motor Accurately

In many paper-handling machines, it is important that the web of paper be controlled within close limits sideways in its travel through the machine. With the more elaborate type of control such as used on slitting machines, accuracies as high as 1/64-inch are obtainable. Less expensive equipment may be obtained for regulation within wider limits, such as 1/16-inch.

Use of electronic tubes for motor control has been largely for accurate regulation of motor speed. Some experimental installations are in service using power tubes for handling the motor-armature current. It appears that the function most immediately desirable would be remote control of motor speed by field variation. If this is to be done manually, the problem is quite simple as the tubes required are rather small and the amount of current supplied to the field can be

*Abstract of paper presented at the second machine tool electrification forum held April 19-22, 1937, under the auspices of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

varied by means of either variable reactor or resistor. This type of field control has the advantage that the small controlling device for manual operation can be readily located in the push-button station.

Tubes are beng used for speed regulation of single-motor paper machine drives in a considerable number of installations to regulate motor speed within a fraction of 1 per cent of preset value.

Tubes Control Welding

Within the last several years, resistance welding has become a precision process. Exact fractional-second weld timing, as low as 1/120-second, is largely responsible. Today, steel is welded without warping, burning or electrode marking on the exposed surface. Premachined mechanical parts are welded for accurate fit. As high as 120 feet per minute of continuous formed channel is being fabricated with 3-inch spaced spots each the equivalent of a rivet.

The ignitron welding timer has proven ideally suited to the requirements of precision spot, projection, butt, and seam welding. The timer inherently operates in terms of half-cycles or in 1/120-second increments of welding current. It is designed and calibrated to apply power to the machine for a timed interval which is composed of an adjustable exact number of half-cycles within a range of from 1 to 30 or more cycles. High operating speeds are obtained because of reliable reproductibility. Essentially, the ignitron timer serves as a single-pole, fast-acting switch operating noiselessly and without the usual arc burning obtained with contactor control. The primary current of the welding machine, which has in some cases been as high as 8500 amperes, is carried and interrupted entirely by ignitron power tubes. No mechanical or electro-magnetic device affects the accuracy of timing.

When Consolidating

MANY times desirable changes in equipment, arrangement and drives are not made either because everything is operating satisfactorily, apparently, or the cost and confusion are unwisely considered to be more important than the advantages obtained. However, when plants or departments are moved or consolidated there is little excuse for leaving arrangements as they were.

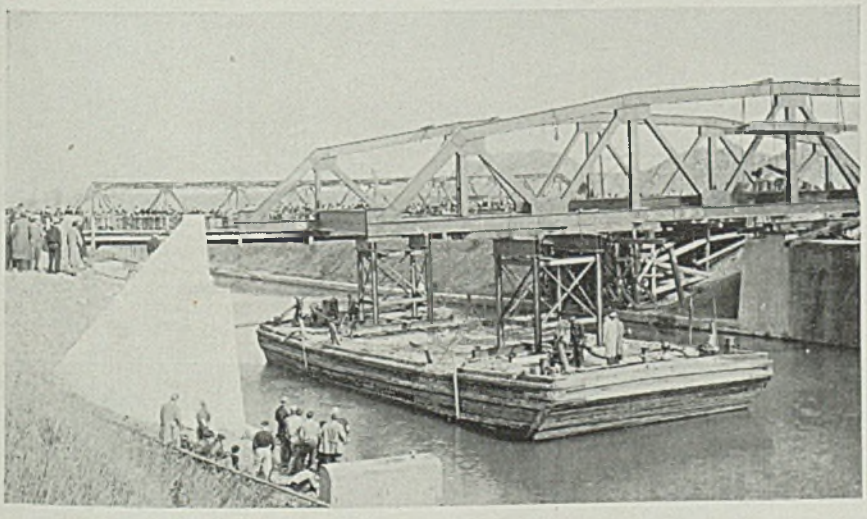
Such was the opportunity afforded one plant when it consolidated two branch plants with the main organization. At both branch plants, large group drives had been used. For instance, in the screw machine department of one plant all the machines had been lineshaft group driven from a 40 and a 60 horsepower motor. At the other plant 60 screw machines had been group driven by a 20 and a 30 horsepower motor. Frequently in both of these plants it was necessary to run the big motors to operate only a few automatic screw machines.

At the consolidated plant almost 200 screw machines are placed in small groups of 5 to 10 machines, each driven by a 5 or 7½ horsepower motor. Work is scheduled to groups so that some entire groups may be idle at times or operated fully loaded. In addition, a few machines are individually driven for use on special items which require overtime or extra production.

Large punch presses are individually driven; smaller units are grouped in batteries of 5 to 7 machines each. Similarly drill presses are group or individually driven according to the production requirements and layout. In several cases individually driven drill presses are set in line with other machines. In general, drill presses are group driven.

No attempt was made to standardize on group or individual drive but the drive of each unit or group of units was considered according to the production requirements and advantages.

Use Barge To Place Bridge



UNIQUE method in erecting bridge was used by Genesee Bridge Co., Rochester, N. Y., when placing a span over the barge canal in that city. Span, weighing over 200 tons, was rolled from the bank onto a barge, drawn across the canal by wire cables and lowered into position by pumping water from the barge

Publishes New Book on Resistance Welding

Engineering Data, Resistance Welding Theory and Practice; Hard, High-Conductivity Alloy Applications, published by P. R. Mallory & Co. Inc., Indianapolis; 96 pages, cloth; supplied by the company or by STEEL, C'eveland. for $2; in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

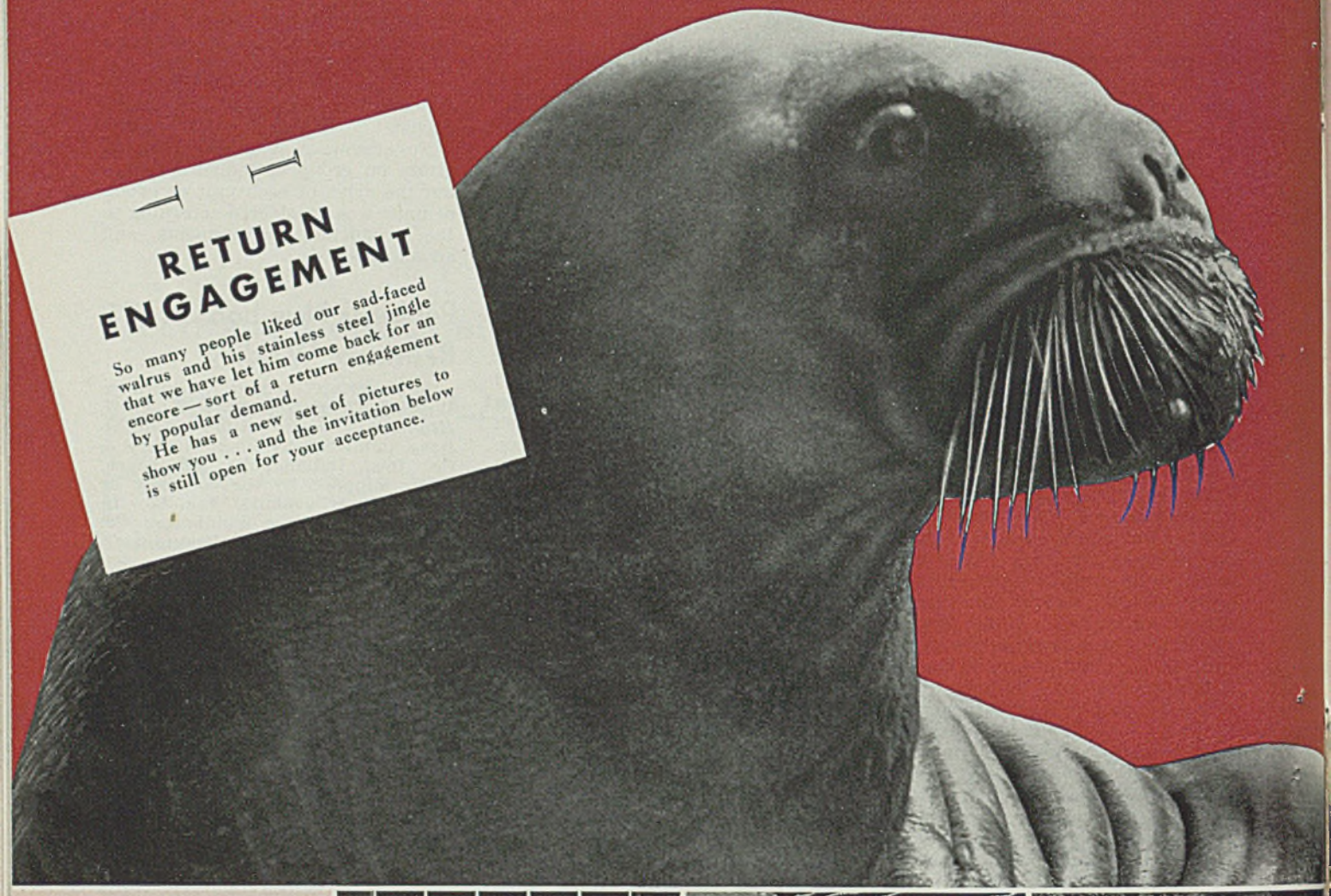
Resistance welding, says the introduction, has made tremendous advances and has made possible the fabrication of many similar and dissimilar metals, forgings and stampings into finished products of strength, lightness and symmetry. Many problems in resistance welding have been worked out in rapid succession. Some of the most notable advances have been made in the development and use of automatic machines. There also has been a great advance in the art of making electrodes. The purpose of the book is twofold, to give plant executives, engineers and shop men a clear, comprehensive picture of the entire resistance welding field as well as practical methods, materials that may be welded and proper electrodes and dies.

The book consists of four main sections. One describes the various types of resistance welding. Another describes the materials that can be welded by these methods. Another lists and describes alloys specially designed for use in resistance welded design. The fourth section contains miscellaneous tables, a bibliography and an index.

Reel Is Explosion Proof

A light duty reel especially suitable for shorter length of light gage cable, known as the Type SNSN reel lite has recently been announced by the Appleton Electric Co., 1701 Wellington avenue, Chicago. It is particularly useful in installations supplying current to fractional horsepower motors, hand lamps, base mounting.

THE TIME HAS COME, THE WALRUS SAYS, TO THINK OF . .



RETURN ENGAGEMENT

So many people liked our sad-faced walrus and his stainless steel jingle that we have let him come back for an encore — sort of a return engagement by popular demand.

He has a new set of pictures to show you . . . and the invitation below is still open for your acceptance.

INVITATION

MR. MANUFACTURER: Without any doubt, the next few years (even months) will see many new products and old products, perhaps some of them competitive with your own, made better and more attractive and more saleable . . . through the skillful use of USS Stainless Steel.

Manufacturers who wish to investigate, today, the possibilities of improving their product or service with USS Stainless Steel are invited to write our nearest District Office. They may write freely, in full confidence, with no subsequent obligation.

Their inquiries will receive the attention of stainless steel specialists of wide experience in many fields — and, if necessary, be investigated in modern laboratories where the most advanced equipment is available to study any problem for which the answer is not already known.

Make no mistake about it — the trend to USS Stainless Steel has just begun. Countless opportunities remain to be explored.

Five years old and it looks "brand new!" USS Stainless Steel in entrances, lobbies, stairways, banking rooms and vaults keeps Philadelphia's famed P S F S building looking young.

Waterproof wristwatches sell like hotcakes! Their rigid stainless steel cases can be closely machined to form a tight seal. They are also tarnish-proof and almost scratch-proof.

Talk about repeat orders! The Pioneer Zephyr is only three years old . . . but already the Burlington has bought seven more. These silvery trains cost less to run and they sell more tickets.

Stainless Steel

For railroad trains and air-o-planes
And ships with stainless keel
For boudoirs, beds and valve - in - heads
For plaques and plats and platters
For water gates and dental plates
And other wondrous matters . . .

The Walrus and the Carpenter, as seen in *Alice Through the Looking Glass*, talking "of many things; of shoes and ships and sealing-wax . . . And whether pigs have wings."

JUST a few years ago, stainless steel was thought of only in connection with cutlery.

Then some adventurous architect tried trimming a building with stainless steel . . . and the owner was delighted. He found that stainless steel gave it an air of modern dignity, never needed polishing, kept his building always looking young.

A motor-car maker beautified his car with stainless trimming which simply couldn't rust because it was "stainless" all the way through . . . and he found it helped him sell more cars.

A watch maker started putting his watches in strong cases of silvery stainless steel which were machined so closely that people could even wear his watch in swimming . . . and of course he began selling more watches.

A restless engineer designed a new kind of train . . . and thanks to stainless steel this train cost less to run because it was lighter; attracted more fares because it gave people the kind of a ride they wanted.

Before long, all kinds of people began making all sorts of things out of this wondrous new metal. But the important fact is that practically every experiment with stainless steel was an outstanding success.

Even more important are the opportunities still undeveloped. In the days ahead, there will be many more successful developments in stainless steel which will earn money and fame for the people who make them.

The Walrus is right-er than he thinks. The time *has* come when every manufacturer — whether he sells razors or soap or milk or transportation—should investigate the improvements and savings now possible with USS Stainless Steel.

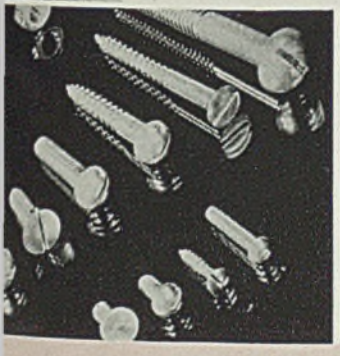
SUGGESTION

MR. BUYER: In USS Stainless Steel, metallurgy has closely approached "the perfect metal." In countless applications this brilliant new metal is *permanent*; it effectively resists every destructive force of nature — stress, wear, corrosion, heat, and time itself.

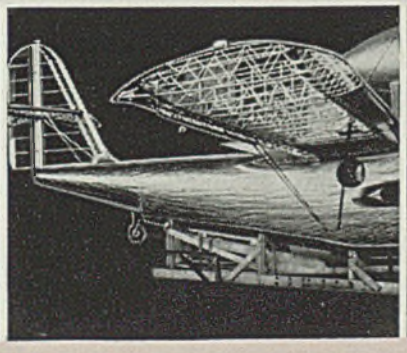
Whenever you are considering any important purchase, we suggest you investigate the possibility of getting a better piece of equipment made wholly or partly of USS Stainless Steel. Almost without exception, the product which benefits through the unusual properties of USS Stainless Steel will be more attractive, last longer, cost less for maintenance, do a better job for you . . . give you more value per dollar spent.

Our nearest District Office will be glad to recommend competent fabricators and sources of supply skilled in making better products of USS Stainless Steel.

Remember that in many products, there is no known limit to the useful life of USS Stainless Steel: it will stay "brand new" forever!

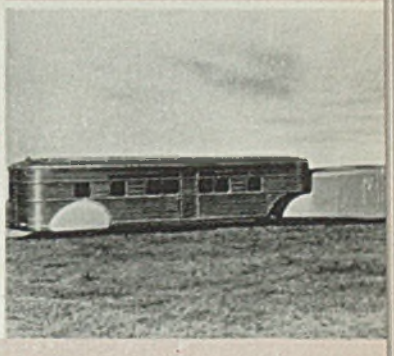


Stainless steel fastenings stay fast! No corrosion. No weakening. No failures. And no "rusting on." For screw machine parts, we offer a special modification — USS 18-8 Free Machining.



Aircraft built of USS Stainless Steel is lighter and stronger, faster and safer. Rivet-less, light-weight stainless steel design makes the entire structure virtually one homogeneous metal unit.

A new way to whet appetites! In kitchens, restaurants or bars USS Stainless Steel suggests fresh tasteful refreshments. It is the only metal which foods will never pit nor tarnish.



Across the Arabian Desert in 16 hours! This light-weight, air-conditioned stainless steel trailer-bus cuts in less than half the former running time from Bagdad to Damascus.

USS

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CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
NATIONAL TUBE COMPANY, *Pittsburgh*

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

UNITED STATES STEEL

British Steel Institute Discusses Seventh Report on Heterogeneity of Ingots

HETEROGENEITY of steel ingots, corrosion-fatigue resistance of steel, atmospheric corrosion of roofing sheets and research on coke, were principal subjects considered at the annual meeting of the British Iron and Steel institute in London, April 29-30. The meeting was marked by attendance of a relatively large number of foreign members, particularly from Germany, but also including Belgium, France, Luxemburg, Spain and the United States.

It was announced that institute membership of 2243 at the close of 1936 was the highest yet attained. Alfred Hutchinson, chairman, Skinningrove Iron Co. Ltd., Saltburn-by-the-Sea, Yorkshire, assumed the office of president, succeeding Sir Harold Carpenter, Imperial College of Science and Technology, London, who had served two terms.

Three vice presidents were re-elected as follows: C. E. Lloyd, Netherton Iron Works, Dudley, Staffordshire; Dr. W. H. Hatfield, director, Brown-Firth Research Laboratories, Sheffield; and Sir William Larke, director, British Iron and Steel Federation.

Given Honorary Offices

Honorary vice presidents named were Roland Kitson, London; Dr. Fritz Springorum and Dr. Ernst Poengsen, Dusseldorf, Germany. Prof. W. A. Bone, Imperial College of Science and Technology, London; and Dr. Otto Petersen, editor, *Stahl und Eisen*, and director, German iron and steel institute, were made honorary members of the British institute.

Bessemer gold medals were presented to Col. N. T. Belaiew, Paris, and Aloyse Meyer, managing director of ARBED, Luxemburg, as announced in STEEL for March 29, page 26. The Carnegie silver medal was awarded to Hans Esser, Aachen, Germany, for his paper on the atlotrophy of iron published in the *Carnegie Scholarship Memoirs of* 1936.

President Hutchinson announced that the institute had accepted the invitation of the American Iron and Steel institute and American Institute of Mining and Metallurgical Engineers to hold a joint meeting in the United States in the fall of 1938. The British Institute of Metals had previously accepted a similar invitation. The 1937 fall meeting of the British Iron and Steel institute will be held in Middlesbrough, Sept. 14-17.

In his presidential address, Mr. Hutchinson gave an historical review of technical inventions and discoveries that had taken place in the north-east coast area. In 1869, when the institute first visited Middlesbrough, a fully-developed wrought iron and pig iron industry was in operation; at present, the wrought iron trade has completely disappeared, being replaced by steelworks in which molten pig iron is converted into steel without loss of its original heat.

ACCOMPANYING report of activities of the recent annual meeting of the British Iron and Steel institute in London was prepared by Vincent Delport, European manager of STEEL.

Broadly speaking, he said that three great inventions aided the production of steel, namely: (1) The basic bessemer converter with its basic lining; (2) the Siemens-Martin open-hearth regenerative furnace in which steel was first made by the acid process; and (3) the basic open-hearth process.

The seventh report on the heterogeneity of steel ingots, a report of a joint committee of the Iron and Steel institute and the British Iron and Steel Federation to the Iron and Steel Research council, was presented by Dr. Hatfield, chairman of the committee. The report comprised seven sections as follows: A study of rimming steel; inclusions in a series of bath samples from an electric furnace; oxygen determination on a series of bath samples from an electric furnace; determination of oxygen in steel; results of further experiments on gases in iron and steel, and their effect on the solidification of ingots; first report of the ingot molds sub-committee; and pyrometry.

In discussion, admiration was expressed to the committee, which commenced its work in 1924 and presented its first report in 1926. The present report comprises 238 pages. Sir William Larke, director, British Iron and Steel Federation, commenting upon the length of time during which the committee had been at work, stated that this was one of the few instances in which a committee had to deal with a subject about which one expected no finality.

Much Discussion of Report

Dr. Korber, director, Kaiser Wilhelm institute, Dusseldorf, referring to a remark by Dr. T. Swinden, United Steel Co.'s Ltd., and vice chairman of the committee, to the effect that manganese and sulphur do not segregate together, mentioned that experiments are being conducted at the institute and that, generally speaking, he was in accord with Dr. Swinden's remarks. Referring to a statement by J. H. Whiteley, Consett Iron Co. Ltd., another member of the committee, to the effect that sulphur comes out in a solid state, the speaker said that he did not think this happened in every case. He stated also that tests are being conducted at the institute on the determination of oxygen and on effects of gases.

Commenting upon statements in the beginning of the report on the subject of segregation, Prof Benedicks, Stockholm, said that he agreed generally with the main conclusions of the committee. Dr. E. Houdremont, Friedrich Krupp, Essen, Germany, stated that interesting investigations also are being made at laboratories of the Krupp company, particularly in regard to the presence of oxygen and sulphur in steel. He pointed out that it should be possible to increase the life of ingot

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IS TO IRON AND STEEL

In selecting a protective coating it pays to be particular; it must have no weak spots and must be adequate in thickness . . . A hot galvanized product has no weak spots because in the Hot Dip Process molten zinc flows into and fills every crevice, leaving the most uniformly thick coating possible by any process . . . Patronize our members and be assured that our high association standards for workmanship and thickness of coating guarantee the ultimate in rust protection for iron and steel products. May we send you our new booklet? Write American Hot Dip Galvanizers Association Inc., American Bank Building, Pittsburgh, Penna.

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Diamond Expansion Bolt Company, Inc. Garwood, N. J.
Enterprise Galvanizing Co., Philadelphia, Pa.
The Fanner Mfg. Company, Cleveland, Ohio
John Finn Metal Works, San Francisco, Cal.
Thomas Gregory Galvanizing Works Maspeth, N. Y.
Hanlon-Gregory Galvanizing Company Pittsburgh, Pa.
The Hodell Chain Company, Cleveland, Ohio
Independent Galvanizing Co., Newark, N. J.
International Derrick & Equipment Co. Columbus, Ohio
Joslyn Co. of California, Los Angeles, Cal
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.
The Sanitary Tinning Co., Cleveland, Ohio
Standard Galvanizing Co., Chicago, Ill.
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The Witt Cornice Co., Cincinnati, Ohio

molds by from 50 to 70 per cent by controlling carbon in the pig iron from which the molds are made, by proper control of the cupola and by more complete control in steelworks in use of the molds.

Commenting upon the report of the ingot molds subcommittee, presented by R. H. Myers, British Iron and Steel Federation, Dr. Hatfield said that a certain standard of life should be set for ingot molds used for rimming steel or alloy steels, respectively, for the purpose of determining when molds should be scrapped. He emphasized that work of the subcommittee should have immediate practical bearing on the industry.

One speaker pointed out it is often the case that two molds identical in their composition and specification, but coming from different manufacturers, have widely different lives. He suggested this might be due largely to molding technique, and, furthermore, that everything else being equal, the life of a mold depends upon the temperature at which it is used. He said that he did not think use of the ratio minimum wall thickness to weight of ingot was advisable, since it happens that ingots of different lengths may be cast in the molds, and he suggested that a better ratio would be wall thickness to section of ingot.

What Causes Mold Cracks?

Another speaker, referring to that part of the report stating that crazing is due primarily to growth, expressed the opinion that crazing is due mainly to variations of temperature in the mold. Referring to the occurence of cavities, he said that while it is true that thermal stresses may cause cracking in cast iron molds, they would cause distortion in steel molds. He mentioned the use of copper molds, which have the property of having a much smaller temperature gradient than iron molds.

J. E. Hurst, Bradley & Foster Ltd., Darlaston, Staffordshire, asserted that failures in cast iron ingot molds may be attributed to stresses, and pointed out that mechanical properties of cast iron have a considerable bearing. He mentioned that for some years he had measured the mechanical properties of cast iron, including its elastic characteristics, and he had found that for individual samples of the same iron the properties varied considerably in time. This, he stated, may have a bearing on behavior of molds in service. He had also found variations in individual castings, such as cylinder liners, in which properties vary in different sections of the casting.

Two papers, "Influence of the Mean Stress of the Cycle on the Resistance of Metals to Corrosion-Fatigue," and "Effect of Protective Coatings on the Corrosion-Fatigue Resistance of Steel," both by Dr. H. J. Gough and D. G. Sopwith, National Physical Laboratory, Teddington, were discussed together at one session. The first paper described results of tests on repeated or fluctuating stresses made on six aircraft materials including a cold-drawn 0.5 per cent carbon steel, three stainless steels, duralumin and a magnesium alloy containing 2.5 per cent aluminum. These materials were tested in air, also in a spray of 3 per cent salt solution, and results showed that, as in air, the fatigue resistance of a material in a corrosive environment is influenced considerably by the mean stress of the applied cycle.

Coatings Are Investigated

The second paper described results of tests made to ascertain suitability of various protective coatings when applied to streamline wire steel subjected to alternating stress in a spray of salt water. The coatings consisted of zinc, electrodeposited cadmium sprayed aluminum, phosphates plus enamel, and enamel only.

In discussion, Dr. H. Sutton laid stress on the remark made by the authors to the effect that a small amount of corrosion, hardly discernible to the naked eye, may cause a reduction of mechanical properties that affects service conditions of components and parts of mechanical structures. Dr. S. F. Dorey, Lloyd's Register of Shipping, London, pointed out the rapid fall of resistance in fatigue tests when those tests are made in a corroding medium. He said that small stresses can in time reduce the life of a component. He remarked that the tests had been made on small specimens, and expressed hope that experiments would be made with larger specimens, as in practice the components under service present relatively large dimensions.

Dr. Dorey also said the results of tests made with protective coatings might lead one to think that much higher stresses can be experienced when the material is thus coated. This can be misleading, he said, citing experience of coatings on certain components. The coating itself broke down under certain circumstances as soon as would have been the case had the components been unprotected. Another speaker, referring to work done in Germany, stated that nitriding prolongs life and gives a fatigue limit.

Replying to discussion, Dr. Gough said that no size-effect studies had been made for corrosion fatigue, but that for ordinary fatigue, larger sizes always have disadvantages.

Dr. Hugh O'Neill, London & North-Eastern railway, Derby, contributed a paper on alloy and fine-grained steels for locomotive coupling rods, in which was discussed the mechanical properties of heat-treated nickel-chromium-molybdenum and manganese-molybdenum steels giving good service as locomotive coupling rods. H. Turner, London, Midland & Scottish railway, said that fine-grained steels had already existed in alloy steels, such as nickel-chromium steels used in locomotive coupling rods; now one uses nickel-chromium-molybdenum steel. He stated he had found some wrought iron rods which, when tested, were brittle transversely, notwithstanding the well-known toughness of the material longitudinally. He contended that nickel-chromium-molybdenum steel is better than manganese-molybdenum steel, and that less weight of the former is required to obtain the necessary qualifications. Referring to a question about banding, he said he found this an undesirable feature.

Another speaker, from Hungary, stated that experiments had been made with nickel-chromium steel in his works and that an appropriate special heat-treatment improved impact values of the steel. Dr. Swinden, who gave a paper on controlled grain-size at the Dusseldorf conference in 1936, referred to the irregularities of impact values on coarse-grained manganese-molybdenum steel and asserted that if the molybdenum does segregate, as stated in the paper, it is to be concluded that temperature must be closely controlled.

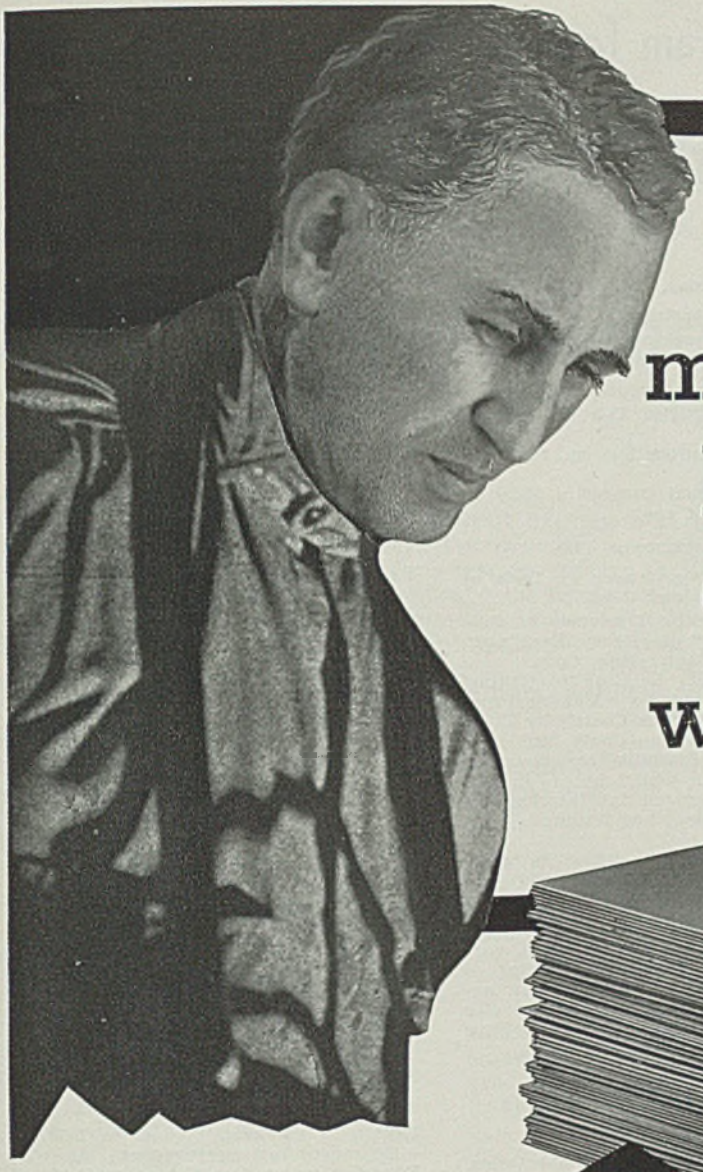
Roofing Sheets Under Test

"A Practical Trial of Roofing Sheets of Copper Steels and Other Materials" was the title of a paper by Sir Robert Hadfield, chairman, Hadfield's Ltd., Sheffield's Ltd., Sheffield, and S. A. Main. This paper gave a brief account of a series of practical trials of roofing sheets now in progress in Sheffield, with the results so far ascertained after almost ten year's exposure.

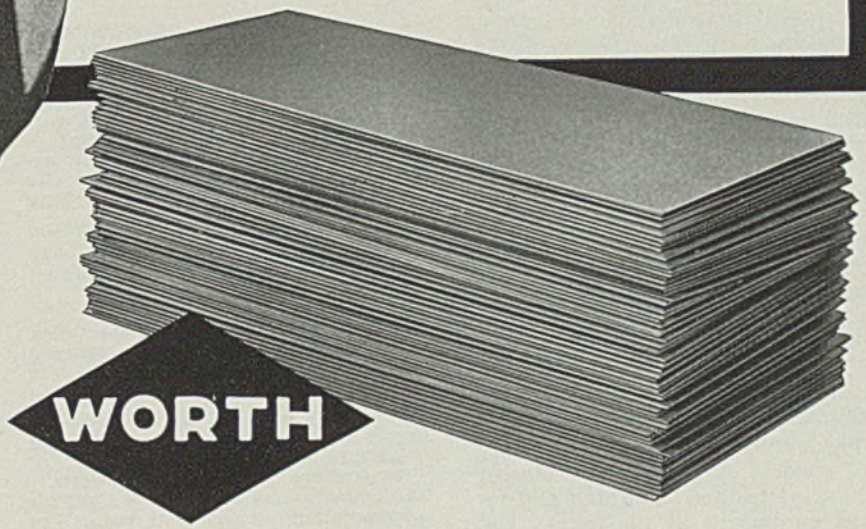
The trials concern galvanized sheets, both painted and unpainted, of the following materials: (a) Copper-bearing steels of two different makes; (b) ingot iron; and (c) ordinary unalloyed sheets as currently employed. Copper-bearing steel is proving definitely superior to ordinary steel, but its merits did not appear until the galvanized coating had weathered off. Ingot iron is proving definitely inferior to ordinary steel, it was stated. The trials probably will continue for another four or five years.

Dr. Hatfield volunteered information that at the corrosion station of the corrosion committee, Sheffield, tests were made on plates, and that so far conclusions of the committee

(*Please turn to Page* 78)



"I'm no metallurgist, but I know Good Plate when I see it!"



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A.S.T.M. Announces Program for Its Fortieth Annual Meeting in New York

ELABORATE preparations are being made for the fortieth annual meeting of the American Society for Testing Materials at the Waldorf-Astoria, New York, June 28-July 2. Because this is the first time the meeting has been held in this city for many years, customary evening sessions are being eliminated by careful scheduling of simultaneous sessions.

Sessions which will prove of interest to engineers in iron, steel and metalworking industries will be those dealing with steel, wrought iron and metallography; cast iron; corrosion; fatigue and effect of temperature; nonferrous metals; refractories; methods of testing; coal, coke and gaseous fuels; and paint and related products.

The formal program will start Monday afternoon, June 28, and continue through Friday morning, July 2. Dr. T. Smith Taylor, professor of physics, Washington and Jefferson college, Washington, Pa., will deliver the twelfth Edgar Marburg lecture on Wednesday afternoon. He will discuss plastics, their application and testing.

To Receive Dudley Medal

Presentation of the Charles B. Dudley medal will be made to W. H. Swanger and G. F. Wohlgemuth, national bureau of standards, Washington, for their prize winning paper, "Failure of Heat Treated Steel Wire in Cables of the Mt. Hope, R. I., Suspension Bridge," presented at the 1936 annual meeting.

Throughout the week, the society will conduct its fourth and largest exhibit of testing apparatus and related equipment at the hotel. Exhibitors will total approximately 40. In connection with the show, four of the society's committees will sponsor exhibits of their work. These committees include those on corrosion of iron and steel, metallography, effect of temperature on properties of metals, and electrical insulating materials.

Important details of the meeting program are as follows:

Monday, June 28

AFTERNOON

Report of committee E-9 on research.
Report of committee E-10 on standards.
Report of executive committee, by C. L. Warwick, secretary-treasurer.
President's address: "Fuels of Today and Tomorrow," by A. C. Fieldner.
Introduction of new officers.

EVENING

Roundtable on precision and accuracy.
Roundtable on physical basis of metal properties.

Tuesday, June 29

MORNING

Symposium on present-day practices in consistency measurement.

Coal, Coke, Gaseous Fuels

Report of committee D-3 on gaseous fuels.
Report of committee D-5 on coal and coke.
Report of sectional committee M-20 on classification of coals.

AFTERNOON

Symposium on Significance of Tests of Coal and Coke

"Significance to the Consumer of Sulphur in Coal," by Henry Kreisinger, Combustion Engineering Corp.
"Laboratory Tests Relating to Caking, Plastic, Gas and Coke-Making Properties of Bituminous Coals," by O. O. Malleis, Appalachian Coals Inc.
"Significance of Friability and Size Stability Tests on Coal," by R. E. Gilmore, fuel research laboratories, department of mines and resources, Canada.
"Significance of Tests of Coke from Standpoint of Blast Furnace and Cupola Utilization."

Paint and Related Products

Report of committee D-1 on paint, varnish, lacquer and related products.
Symposium on correlation between accelerated laboratory tests and service tests on protective and decorative coatings.

Wednesday, June 30

MORNING

Refractories

Report of committee C-8 on refractories.
"Celite Type High Temperature Thermal Conductivity Apparatus," by C. E. Weinland, Johns-Manville Corp.

Fatigue, Effect of Temperature

Report of joint research committee of A.S.M.E. and A.S.T.M. on effect of temperature on properties of metals.
"A Comparison of the Methods Used for Interpreting Creep Test Data," by Joseph Marin, Rutgers university.
"New Equipment for Creep Tests at Elevated Temperatures," by P. G. McVetty, Westinghouse Electric & Mfg Co.
"Relaxation of Copper at Normal and at Elevated Temperatures," by John Boyd, Engineering Foundation.
Report of research committee on fatigue of metals.
"A Fatigue Machine for Testing Metals at Elevated Temperatures," by F. M. Howell and E. S. Howarth, Aluminum Co. of America.
"Fatigue Properties at 3450 and 10,600 Cycles," by T. T. Oberg and J. B. Johnson, air corps, United States army, Wright Field.

AFTERNOON

Steel, Wrought Iron, Metallography

Report of committee A-2 on wrought iron.
Report of committee A-1 on steel.
Report of research committee on yield point of structural steel.
"Steel Structures Identified and Flaws Located by Means of Balancing Wave Tests," by Carl Kinsley, consulting engineer.
"Weld Metal as an Engineering Material," by L. J. Larson, A. O. Smith Corp.
"A Fundamental Study of the Design of Impact Test Specimens," by H. C. Mann, Watertown arsenal.
Report of committee A-10 on iron-chromium, iron-chromium-nickel and related alloys.
Report of committee E-4 on metallography.

Marburg Lecture

"Plastics: Some Applications of the Different Classes—Methods of Testing," by Dr. T. Smith Taylor, professor of physics, Washington and Jefferson college.
Award of Dudley medal to W. H. Swanger and G. F. Wohlgemuth.

EVENING

Roundtable on impact testing.

Thursday, July 1

MORNING

Corrosion

Report of committee A-5 on corrosion of iron and steel.
Report of sectional committee G-8 on specifications for zinc coating of iron and steel.
Report of committee B-3 on corrosion of nonferrous metals and alloys.
"Corrosion Testing Methods for Copper Alloys," by D. K. Crampton and N. W. Mitchell, Chase Brass & Copper Co.
"Corrosion Symposium Digest," by L. W. Hopkins, American Chain Co.

AFTERNOON

Water

Report of research committee on boiler feedwater studies.
Report of committee D-19 on water for industrial uses.
"Technique in Determination of Traces of Dissolved Oxygen," by T. H. Daugherty, Hall Laboratories Inc.
"A Thermodynamic and Colloidal Interpretation of the Published Studies on Corrosion Cracking of Steel in Water Solutions," by J. A. Tajc, Duquesne Light Co.

Methods of Testing

Report of sectional committee Z-23 on sieves for testing purposes.
Report of committee E-1 on methods of testing.
"Analysis of the Brinell Hardness Test," by R .H. Heyer, Purdue university.
"Measuring Elastic Hysteresis," by R. W. Carson, Instrument Specialties Co.
"Improvement in Adaptability of Tuckerman Strain Gage," by L. A. Meisse, Ohio Brass Co.
"Speed Control for Screw-Power Testing Machines Driven by Direct-Current Motors," by A. H. Stang and L. R. Sweetman, national bureau of standards.
"Dynamic Tests by Means of Induced Vibrations," by R. K. Bernhard, consulting engineer.

Friday, July 2

MORNING

Cast Iron

Report of committee A-3 on cast iron.
Report of committee A-7 on malleable iron castings.
"Tensile Strength of Cast Iron," by J. O. Draffin and W. L. Collins, University of Illinois.
"A Study of the Effect of Length of Span on the Transverse Test Results for Cast Iron," by J. T. MacKenzie and C. K. Donoho, American Cast Iron Pipe Co.
"Relation of Properties of Cast Iron to Thickness of Castings," by H. L. Campbell, American Hoist & Derrick Co.
"A Proposed Standard Classification of Graphite in Gray Cast Iron," by W. E.

Foundrymen Turn Attention To Management Problems

ATTRACTING unusual interest at the forty-first annual convention of the American Foundrymen's association in Milwaukee, May 3-7, were six sessions devoted to management problems. These sessions comprised the first complete series attempted at an annual convention; without doubt they fulfilled a current need and will become an established part of future programs. Specific subjects discussed at these sessions included job evaluation, apprentice and foreman training, safety and hygiene, occupational disease laws, and foundry costs. Report of the job evaluation session was presented in STEEL for May 10, page 82; others are reviewed here. Reports of other convention sessions were carried in the issues of May 10 and May 17.

Apprentice Training

AS A vital concern to both small and large foundries throughout the country, apprenticeship training programs, necessitated by a shortage of skilled labor caused by depression curtailment, received comprehensive treatment. John H. Ploehn, French & Hecht Inc., Davenport, Iowa, urged return to educational systems based on the fundamentals rather than the arts and a more literary training. School boards should be more concerned with vocational training, he stated, and attempt to teach a returning respect for trades in general.

Requirements Are Listed

The three necessities for successful application of an apprentice system, namely, an objective, careful planning and hard work, formed the basis for a paper by Macon P. Miller, Lynchburg Foundry Co., Lynchburg, Va., outlining the program used by that company. The apprentice is given complete departmental experience in as many parts of the shop as possible. Classwork, rates of pay, molding shop procedure, the job sheet and general aspects of the shop plan were explained by Mr. Miller.

A paper contributed by K. P. Crowell, Caterpillar Tractor Co., Peoria, Ill., described the plan employed by that plant and remarked that the first consideration in an apprentice plan is the motive behind it. He stated that the boy should be prepared as fully as possible, equipment should be analyzed, the necessary literature acquired to teach him and the terms of his agreement should be made clear.

Presents Apprentice Viewpoint

Carl F. Haertel, Falk Corp., Milwaukee, gave his impressions of apprentice training as viewed by a graduate. He referred to earlier methods as compared with present-day scientific comprehensive programs. The speaker placed emphasis on broadening the apprentice's field and explaining the opportunities offered in trades.

In discussion, interest centered on Mr. Ploehn's statements on educational systems C. J. Freund, University of Michigan, Detroit, and J. C. Goldie, Cleveland Trade school, Cleveland, pointed out that hundreds of young men seem willing to half starve in white collar jobs while many jobs in numerous vocations are available. W. E. George, American Steel Foundries, Chicago, stated the picture of education has changed in the last 15 or 20 years, to the extent that apprentices logically are demanding more from the companies for which they work. George E. Larsen, Spanish Fork Foundry Co., Spanish Fork, Utah, emphasized the desirability of a high school education as a definite aid to any apprentice system.

Foreman Training

INDUSTRY must strive for an answer to foreman training programs progressively and without bias and make its policies effective and fair, according to A. D. Lynch, J. I. Case Co., Racine, Wis. Foreman training, he said, is no longer an innovation. The largest problem is to adopt the best training method for the average foundry.

Management has recognized the need for better foremen, according to the speaker, and foremen in turn have recognized the necessity for better equipment. The majority of men foundries propose to train should and do come from the ranks. Management must train foremen broadly and give them a comprehensive education in as many phases as possible.

The two jobs required of foremen are to get out the product and handle people, the speaker continued. A good foreman must supervise intelligently, maintain schedules, keep informed on plant and equipment condition, encourage orderliness and cleanliness, promote safety and insist upon economy.

Foreman Must Know Men

Foremen must have confidence in management and supervisory authorities. Their responsibilities should be delegated correctly and their compensation distributed fairly. A foreman, according to Mr. Lynch, must know his men and manage them according to their temperament, set a proper example and adjust rates properly.

W. E. George, American Steel Foundries, Chicago, commented on the selection of foremen and diversity of requirements, and expressed the opinion that skill is not as essential as a comprehensive knowledge of many things. Other discussion brought out the difficult problem caused by the fact that employed forces today are generally more educated than the foremen.

Stewart Scrimshaw, Marquette university, Milwaukee, interpreted the labor situation in the light of apprentice training. He stated that labor has been organizing, but apprentice training programs have

not organized soon enough. He urged that foundries build around the youth of the country. Bringing up the question of the Wagner labor act and its effect on apprenticeship, he stated that unions are going to be interested in training programs. There will be amendments to the act, he said.

The welfare of society is the most important consideration in determining the number of apprentices to be trained, asserted H. A. Frommelt, Marquette university, Milwaukee, who traced the trend in evolution of apprentice training programs.

In the general discussion which followed, Mr. Scrimshaw discussed wage payments and payments of bonuses in particular to apprentices.

Occupational Disease Laws

OCCUPATIONAL disease codes and laws provided the subject for another management session. The matter of industrial codes and their applications was considered by James R. Allen, International Harvester Co., Chicago, while O. E. Mount, American Steel Foundries, Chicago, dealt with matter of laws.

Mr. Allen contended that codes relating to industry are just as necessary as legislation, and in general each code may be divided into three phases relating to safety, sanitation and hygiene. He mentioned the work that the safety and hygiene section of the A.F.A. is conducting to make available to the foundry industry a number of basic codes.

He said that in formulating the codes already issued, and those to be issued, members of the section endeavored not only to set up the basic principles, but best practical working practice. He also said the codes would be found superior to existing state codes. Mr. Allen announced that a new code on exhaust systems be available in about two months.

The paper prepared by Mr. Mount stated that successful laws relating to occupational diseases must not be built up on existing laws or acts relating to industrial accidents. A separate act is necessary, and it must be just, fair and practicable to both employe and employer. It must be written so that insurability can be assured with reasonable cost.

Mr. Mount mentioned that in states where occupational disease laws are to be formulated, drafting committees should be composed of employes, employers, insurers, and legal advisors. A schedule of diseases should not be incorporated, but rather the principles and tests to be met. Ordinary diseases should be eliminated, and all terms should be defined as closely as possible.

Need Careful Administration

Mr. Keatley, Employers Mutual Liability Insurance Co., Milwaukee, asserted that the type of occupational disease act is not nearly as important as its administration. Since most of the cases to be decided involve medical testimony, the administrators must be capable and educated to distinguish whether the testimony is based on scientific information. He also mentioned advisability of including a rehabilitation phase in the act to care for individuals who, while not having a complete disability, are forced to seek other work due to the fact that further exposure on their present jobs will result later in complete disability. Mr. Keatley pleaded for a medical program developed on a fair basis to both employe and employer.

Safety and Hygiene

GROWING interest in safety methods and good housekeeping was indicated amply by an attendance of 500 at a session dealing with these subjects and shop cleanliness. H. A. Nelson, Wisconsin Industrial commission, Madison, Wis., who acted as chairman, pointed out that 95 per cent of industrial accidents are preventable, and are the result of carelessness of individual workmen. Therefore, he said it is neces

sary to select men carefully, to educate them in safety and obtain their whole-hearted co-operation.

Contributing a paper on foot and leg protection, M. W. Dundore, Beloit Iron Works, Beloit, Wis., stated that proper protection of the lower extremities when designed to take care of the extreme hazards, gives good results. He made a plea for more comfortably designed leggings, saying that other protective devices such as goggles, respirators, shoes, etc., have been made fairly comfortable and attractive. Leggings should protect from the knee to the foot, be free from projecting clasps, and be not to stiff. He advocated use of aprons with partial leg attachment for such operations as pouring. Leggings as well as shoes should not be purchased on a price basis. Safety shoes should be worn by all employes connected with the shop proper. Best results are obtained by giving a good fit in shoes, and the best method of handling sales is through payroll deductions.

J. Holzborg, Chain Belt Co., Milwaukee, spoke on eye and respiratory protection, and said that 300,000 eye accidents last year resulted in the loss of 3,000,000 man-hours of work in addition to costing several millions of dollars. He stressed the necessity of education and instruction of men on why and how to use goggles and respirators. While many types of goggles are available, he favored the cup type because it can be fitted more closely to the face. However, choice must depend upon the particular job. As to respirators, it is necessary to analyze the problem first and then select the type. Airline type respirators should be used wherever possible although the filter type has many applications. Close attention must be given to cleaning and maintaining respirators.

Dust Removal Important

Speaking on the subject of silicosis, Dr. Norbert Enzer, Milwaukee, advocated removal of dust as the best means of prevention. Men subjected to dust exposure should be selected through examination and they must be watched through periodic examination. Dr. Enzer said presence of silicosis can not be determined by x-ray examination alone.

Good housekeeping was discussed by Dr. E. G. Meiter, Employers Mutual Liability Insurance Co., Milwaukee, who pointed out that cleanliness in the shop begins with the foremen, and depends upon them for enforcement. Proper procedure in good housekeeping, according to Dr. Meiter, is to put things in order, and then preserve order with regular clean-ups. He also stressed the necessity of removing dust from overhead beams, etc., by water spraying, vacuum cleaning, etc.

James Thomson, Continental Roll & Steel Foundry, East Chicago, Ind., spoke on safety as affected by maintenance. He said that an essential requirement is to establish a strict policy, and then see that it is enforced.

Foundry Costs

FOUNDRY cost methods with reference to malleable, gray iron and nonferrous practice were treated in one management session. Sam Tour, Lucius Pitkin Inc., New York, as chairman of the session, commented briefly on the foundry cost investigations made in connection with the work of the A.F.A.

R. E. Belt, secretary, Malleable Founders' society, Cleveland, discussed cost methods in the malleable industry, emphasizing the preparation of a predetermined cost in advance of quoting. Direct costs, the first step in his system, were described, as well as indirect costs.

Arrangement of accounts in a cost system and bases of application of indirect costs were presented in a comprehensive manner by Mr. Belt. The procedure in determining

the factors of indirect costs, through the establishment of a cost formula, was of interest. According to the speaker, a cost formula having been set up, a clerk with calculating machine experience can prepare a cost estimate in a short time. Practice generally followed in the industry is to determine piece prices of direct labor operations, he stated.

Mr. Belt stated that setting up of the system in a plant involves little more than rearrangement of the cost accounting already in use at the plant. J. J. Whitenhafer, Lake City Malleable Co., Cleveland, pointed out that a comptometer operator in his office handles 80 to 90 estimates per day under the system explained by Mr. Belt.

Interpreting a cost estimating procedure applied in the gray iron industry, W. J. Grede, Liberty Foundry Co., Milwaukee, stated that this system is more difficult to use than that developed for malleable iron because of a wider range of work and a larger number of units to set up. He recommended that cleaning expense be handled separately and referred to the method of figuring core costs by weight of core material. A definite need for a simple system was supplied by a publication in July, 1936, of the Gray Iron Founders' society, according to Mr. Grede. He urged general adoption either in whole or part of this system and emphasized the importance of accurate estimating rather than guesswork.

Peter Rentschler, Hamilton Foundry & Machine Co., Hamilton, O., said cleaning costs in his foundry are well in excess of the combined molding and core costs. He advocated a simplified cost system.

J. L. Wick Jr., Falcon Bronze Co., Youngstown, O., presented an interesting discussion by the use of a large chart on nonferrous foundry cost methods. He compared the system of the Falcon company as a refinement of a system which could be applied hypothetically to a foundry having about $25,000 sales for a production of 82,000 pounds of miscellaneous castings.

Must Know All Costs

Main points of the system involved the following: Cost of doing business for one year; fixed overhead; operating overhead; metal for the year; melting for the year; molding; core making; finishing, etc. The departmental burden is applied on the basis of hours worked in each department, equipment installed and general investment. Mr. Wick believes that successful application of any system is based on the actual knowledge of overheads and operating expenses in each department.

C. I. Ritchie, Gray Iron Founders' society, Cleveland, brought up the question of appraising as against normalizing and was answered by Mr. Tour who said that normalizing is the true cost of production at a given volume of business and appraisal is the acquiring of a fair knowledge of investment, amortization, depreciation and interest on the investment.

Perrin Process Used in Basic Electric Practice

In reporting discussion at a steel castings session held during the recent annual convention of the American Foundrymen's association in Milwaukee, STEEL, issue of May 10, page 74, incorrectly recorded remarks which Jerome Strauss, vice president, Vanadium Corp. of America, Bridgeville, Pa., made concerning the Perrin steelmaking process used in France and other European countries and now attracting renewed interest in the United States. The statement of Mr. Strauss should have read as follows:

"It (the Perrin process) has been used in France for the past seven or eight years in connection with the basic electric process, and now is be-

ing applied to bessemer practice; it is essentially a means of producing by a very rapid reaction a steel of the acid type of very uniform characteristics regardless of the melting method employed."

Announces Program For A.S.T.M. Annual Meeting

(*Concluded from Page 72*)

Mahin, Westinghouse Electric & Mfg. Co., and J. W. Hamilton, Vanadium Corp. of America.

Report of sectional committee A-21 on specifications for cast iron pipe and special castings.

Nonferrous Metals

Report of committee B-1 on copper and copper alloy wires for electrical conductors.

Report of committee B-2 on nonferrous metals and alloys.

"Fatigue Studies of Nonferrous Sheet Metals," by C. H. Greenall and G. R. Gohn, Bell Telephone Laboratories Inc.

Report of committee B-4 on electrical heating, electrical resistance and electric furnace alloys.

"The Stiffness or Flexure Test," by H. L. McBride, Tinius Olsen Testing Machine Co.

Report of committee B-6 on die-cast metals and alloys.

Report of committee B-7 on light metals and alloys.

Report of committee E-2 on spectrographic analysis.

Report of committee E-3 on chemical analysis of metals.

A.S.T.M. Proceedings On Wide Range of Subjects

A. S. T. M. Proceedings, 1936; Part I, 1245 pages, Part II, 846 pages, 6 x 9 inches; published by American Society for Testing Materials, Philadelphia; supplied by STEEL, Cleveland, for $6 per part in cloth and $7 per part in half-leather; in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

Part I of this publication contains committee reports and appended papers and new and revised tentative standards. Part II contains the technical papers, including the Marburg lecture.

The reports cover 45 standing committees. Tentative standards and test methods number 115, newly published or revised in 1936. In the section covering ferrous metals extensive reports are given covering steel, wrought iron, cast iron, corrosion of iron and steel, magnetic properties, iron-chromium, iron-chromium-nickel and related alloys, fatigue of metals and effect of temperature on the properties of various metals.

Other reports cover the society's work on copper and copper alloy wires for electrical conductors, nonferrous metals and alloys, electrical heating, electrical resistance and electric furnace alloys, copper and copper alloys, die-cast metals and alloys, light metals and alloys and reports of exposure tests of plating on nonferrous metals.

In Part II are included a number of papers on the general subject of metals, including one on failure of heat-treated steel wire in cables of the Mt. Hope, R. I., suspension bridge. In other papers are discussions of high-velocity tension-impact tests, damage and overstress in the fatigue of ferrous metals, creep test on lead and lead alloys, ductility tests of aluminum and aluminum alloy sheet, effect of time on tensile properties of hard-drawn copper wire and influence of time at 1000 deg. Fahr. on characteristics of carbon steel.

Reveals Lignum-Vitae Facts

Lignum-Vitae Products Corp., Jersey City, N. J., recently started publication of a new house organ know as *Lignum-Vitae Fact Flashes.* It sets forth facts in connection with the uses of lignum vitae in the form of roll neck bearings, bushings, mauls, marine propeller shaft bearings, mallets, pulleys and the like.

British Discuss Report on Heterogeneity of Ingots

(*Concluded from Page 70*)

agreed with those of Sir Robert Hadfield. Life of roofing steels depends mostly upon the preservation of the protective covering in a continuous way, he said. Referring to the reported relatively poor results of the ingot iron, he suggested that if the sheets had been rolled from rimming steel, one would have expected a better surface and better service.

Prof. Benedicks stressed the importance in such tests of keeping continuous and complete meteorological reports. Another speaker recalled an early paper by Sir Robert Hadfield, given 15 years ago, which probably was the first to record results of investigations on copper steels. He emphasized the importance of the influence of oxygen-sulphide in the air, and also stated that as regards the composition of copper steels, there is not much advantage in going over 0.25 per cent copper.

Prof. J. H. Andrew, University of Sheffield, pointed out that of the two steels mentioned in the paper, the one giving best results had the lowest carbon, and he suggested that might be the reason for its better quality. Dr. J. C. Hudson, Birmingham, said the author's findings confirmed tests made on steel sheets by the American Society for Testing Materials. He confirmed that ingot iron is somewhat more corrodible than mild steel under the same conditions.

A report covering work of the coke research committees of the Iron and Steel Industrial Research council was presented by E. C. Evans and J. M. Ridgion, British Iron and Steel Federation. This report summarized work of the committees up to December, 1936, the main objectives being: (1) To devise methods of testing coke which would express its value in the blast furnace; (2) to investigate factors determining quality of coke; and (3) to devise methods of improving quality of coke in practice.

No Coke Test Suitable

Mr. Evans declared there is not yet a test that will give the blast furnace man a correct measure of the value of coke. He mentioned that in periods of great consumption, coke quality appears to be less good, however, that did not hold for 1936, when consumption was high and there was no corresponding depreciation of quality. The speaker pointed out that continental coke appears to give better results than British coke, yet it is not possible to explain the reason. He was of the opinion that to find the answer one must study the fundamental properties of coal.

President Hutchinson recalled that in the early days coke made in Middlesbrough was of good quality, and it came from beehive ovens. To make good coke in by-product ovens used today, one must start from coking coal just as good as that used in the time of the beehive oven, he contended. Dr. F. S. Sinnatt, director, fuel research, and chairman, coke coordinating committee, pointed out that coal of high quality used in the past has now gone, and the question of obtaining good coke from less-good coal must be studied.

W. J. Brooke, John Lysaght Ltd., Scunthorpe, Lincolnshire, emphasized importance of the test that can be used to measure the property of resistance of coke. Prof. H. L. Riley, secretary, Northern Coke Research committee, pointed out that investigations on coke present more difficulties than those made in the metallurgical field. Coke cannot be studied by micrography in the same way as metals, and yet it is the fundamental properties of carbon that must be tackled. He mentioned the considerable amount of work that is being done in that direction in Germany.

NEW EQUIPMENT

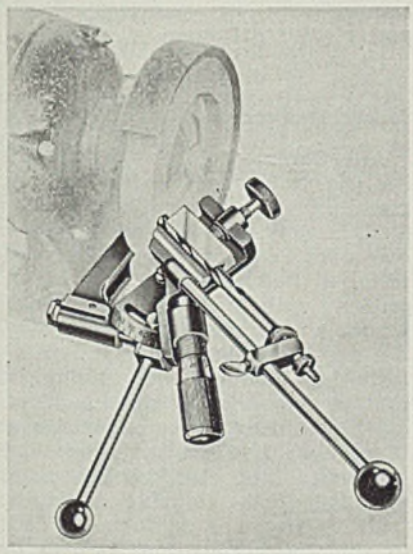
Strapping Tool—

Signode Steel Strapping Co., Chicago, announces a new electric strapping tool for strapping around large and heavy packages. The tool is well powered with a reversible electric motor which makes it easy to back the tool off the strap. Adjustable control provides the required tension and makes each job uniform.

♦ ♦ ♦

Drill Grinding Attachment—

Atlas Press Co., Kalamazoo, Mich., has recently placed on the market a new drill grinding attachment designed for adaptation to any grinder and any wheel thickness. Swivel bar allows wide range of 40 to 80 degrees. An adjustable shank stop



Atlas Press Co. has recently introduced this new drill grinding attachment for attachment to any grinder

is provided with a micrometer feed and special lip stop to insure both lips being ground the same. A chuck and V-block attachment assures accurate centering of the drill against the wheel. The attachment is designed to sharpen drills between 3/32 and ½-inch in diameter.

♦ ♦ ♦

Pipe Vise—

Billings & Spencer Co., Hartford, Conn., has recently announced an improved chain pipe vise embodying a new construction feature in a heavily knurled and elongated adjustment nut. This new feature provides a gripping surface for rapid take-up of slack in the chain. A partial turn of the handle is sufficient to clamp the pipe. The new vise is made entirely of steel; the base, handle and jaws are drop forged, the latter of special tempered steel, specially heat treated. These are constructed for heavy duty work, and the entire vise is light in weight. It is made in four sizes with capacities from ⅛ to 8-inch pipe.

♦ ♦ ♦

Contactor —

General Electric Co., Schenectady, N. Y., has recently announced a new size 00 alternating current multipole magnetic contactor. This contactor is designed for controlling small

single-phase and polyphase motors, or for use as a flexible relaying device for comprehensive control systems such as are used on machine tools. Contactor can also be furnished as a magnetic switch mounted in a small sheet-metal case which is suitable for general-purpose applications where atmospheric conditions are normal. Device, used either as a contactor or a magnetic switch, has a maximum rating of 10 amperes at 600 volts. Fine-silver contacts, of the double-break type, are used to minimize arcing and to increase the interrupting capacity, thus enabling the contactor to withstand severe service. Layer-wound coils offset the possibility of breakdown of the insulation between the turns of the coils. All parts of the contactor are readily accessible and can be easily removed in order that they may be inspected at desired intervals.

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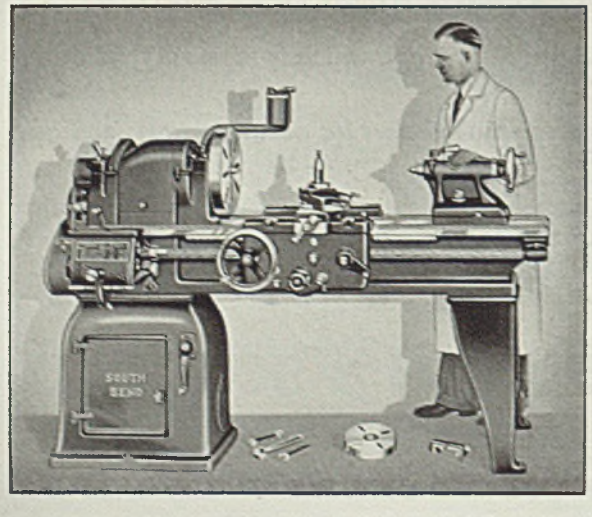
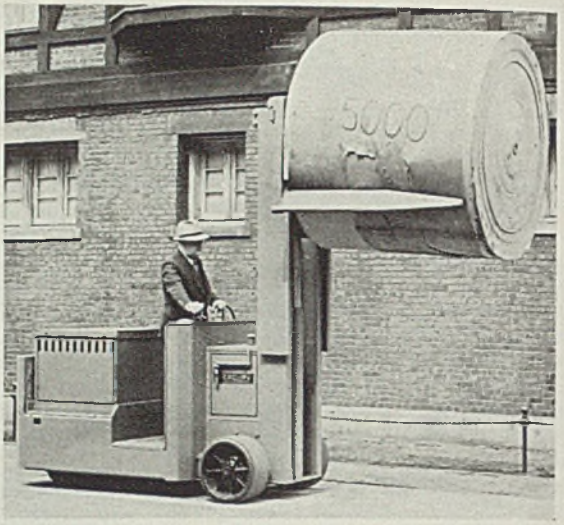
Lathe —

South Bend Lathe Works, South Bend, Ind., announces a new line of back-geared, screw cutting, precision lathes in the new underneath belt motor drive. The new series of lathes are offered in 9, 11, 13, 15 and 16-inch swing, and in bed lengths from 3 to 12 feet. Motor and driving mechanism is fully enclosed in the cabinet leg underneath the headstock. Power is transmitted from the motor to the countershaft by V-belt, and from the countershaft up through the lathe bed to the headstock cone pulley by a flat leather belt. Adjustment is provided for taking up belt stretch and for obtaining any desired tension on both motor belt and cone pulley belt. Headstock spindle is heat treated with all bearing surfaces hardened and ground. Spindles are special alloy steel with phosphor bronze bearings; all gear shafts are supported on both ends; and a multiple disk friction clutch is supplied in the apron according to specifications of the new line.



South Bend underneath belt motor driven lathe



New roll handling industrial truck of telescopic lift type with hydraulic fork elevation

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Roll Handling Truck—

Mercury Mfg. Co., Chicago, has recently designed and constructed a new 4-wheel, front wheel drive, rear wheel steer industrial truck of center control type. The overall length of the machine is 162½ inches when equipped with 54-inch long forks. The truck has a capacity for loads up to 60 inches in diameter and 80 inches in length, and weighing 5600 pounds. Of telescopic lift type and with hydraulic actuation of fork elevation, the forks travel from a lowered position of 12 inches above the ground to a height of 92⅝ inches, permitting three high stacking of 60-inch diameter rolls. Forks are adjustable center to center, adjustment being accomplished through use of a demountable crank which moves the forks by means of a rack and pinion arrangement. The drive axle is of double reduction spiral bevel and spur gear type, and the rear or trailing axle assembly is of the compensating controlled castor type. Drive tires are size 20-by 10-inch, and trail tires are 15- by 6-inch. The steering mechanism is of the Ross cam and lever type and steering control is by means of a vertically disposed wheel. Battery power assembly is housed in a demountable box compartment permitting quick removal and replacement of power source. The truck will accommodate either battery box compartment or gas-electric unit power source if same is desired.

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Material Feeder—

Allis-Chalmers Mfg. Co., Milwaukee, has introduced to the mining, metallurgical, chemical and related fields a new type feeder to handle ore, rock, chemicals or other material that must be fed at a highly uniform rate. Developed in conjunction with the Utah Copper Co., the rugged feeder uses standard alternating current and, having no contact or sparking points, is adapted to use in explosive atmospheres. It may be had in two types, one suspended and the other rubber mounted on the foundation; can be built in any size or form of deck to suit the application; or can be supplied in types to handle material at high temperatures, in all enclosed types for dusty materials, or in tubular types for special uses.

• • •

Office Furniture—

Globe-Wernicke Co., Cincinnati, has recently announced a new line of steel office chairs of modern design. The chairs are available in three types; the executive, waiting-room type and secretarial type. The first two types are available either with legs or swivel type base, and with or without arms. These chairs are available in varying types of finish and upholstered to match any office.

MATERIALS HANDLING

Good Housekeeping Aid to Smooth Materials Handling

(*Continued from Page* 48)

the average, 80,000 separate clock works are kept in one storage department. Approximately 200,000 are maintained in stock under normal conditions.

With this volume of work, interdepartmental handling and testing are exceedingly important. The fact that each major operation is departmentalized, and that the departments are so located that there is no backtracking in the journey from raw materials receipt to finished products shipment, provides a smooth flow, with lift-truck and skids furnishing a simple, but effective, means of transporting the materials.

On the first floor of one of the buildings, and immediately adjoining the cutting-up department, are located the plating, polishing and lacquer departments. In these is now in use recently installed equipment designed to furnish more economical materials handling through production, while at the same time providing greater safety for employes. The new plating installation, shown in Fig. 3, includes a continuous conveyor which carries parts through automatic plating tanks and drying chamber. To the right and left, respectively, of the automatic machine are two semi-automatic machines. All three units are synchronized.

Continuous Plating Conveyor

The continuous conveyor carries racks of parts, such as clock cases, through the cycle of plating operations. It passes above a bench, where operators load the racks and hang them on the hooks of the conveyor. The conveyor then carries the parts along to stations where operators take them off, dip them in the washing tanks and hang them back on the moving hooks of the conveyor chain in the automatic plating tank. As an operator puts two racks on this chain, two finished ones are ready to be removed, and he takes them off the plating conveyor to hang them on the overhead conveyor, which immediately enters a sheet metal drying compartment, where the parts are dried with hot air circulated by electric fans.

Emerging from the drying chamber, the plated parts are carried to another bench to be unloaded by girls. The empty racks are placed back on the conveyor and pass on to the filling stations, thus completing the cycle of operations.

This overhead conveyor is approximately 80 feet end to end and 10 feet wide with hooks spaced 12 inches apart. Conveyor speed is 4 feet per minute. The track is equipped with single trolleys. Pintle chain is employed. A worm reducer belt driven by electric motor permits changing the speed to suit requirements. Supplementing the overhead conveyor system is a roller conveyor arranged in two lines; this brings tote boxes of parts to the loading station, and permits rapid and easy exchange of boxes to the other line of rollers for reloading with the plated products.

Polishing operations are performed in another department where buffing and other necessary tasks are performed, several polishing machines being utilized.

In the lacquer department is a most interesting arrangement of equipment. Down the center is a long line of steel storage racks; to the right of these is a line of spraying booths, 17 in number at the present time. There are 17 different lacquer jobs performed here and each girl operator has her own booth, which is protected by an individual exhaust system. No spray is in evidence in this department.

Many of the operations performed are of a sort requiring painstaking care in preparation of the work before spraying. On one, which entails lacquering of a spot on the face of a clock dial, more time is required to set up the work on the stencil fixture than to do the actual lacquering. Adjacent to the spraying booths, and on the other side of the storage racks, is an inspection and packing department. On the opposite side of the room is a section where work to be lacquered in bunches is sprayed, the parts being laid on a coarse wire screen while the lacquer is applied. Here also brass plated and colored work is done.

Assembly Set-Up

Sub-assembly and final assembly departments are arranged so that straight-line flow is provided from point to point. Assembly lines run the entire length of the room. Most of these assembly operations are performed at long tables, set up near the windows so that there is an abundance of natural light. When final assembly work is completed, the clocks are placed on test shelves, and after testing, finished products are packed for immediate shipment,

or trucked to the old plant building, which is connected with the new one by an enclosed bridgeway and is used as a warehouse for finished goods.

Storage of parts at points nearest to place of use in assemblies, made practical by the method of post index recording, and efficient schedules which have been worked out for lift-truck and skid deliveries have simplified to a large extent a problem of manufacture involving hundreds of parts, some of them minute and most of them of precision class. Grouping of plating equipment and installation of continuous and gravity roller conveyors have proved to be means of increasing efficiency.

RECENT PUBLICATIONS OF MANUFACTURERS

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

Rotary-Vane Pumps — Pine-Ihrig Machine Co., Oshkosh, Wis. Folder describing its light and heavy duty rotary-vane pumps.

Malleableizing — Surface Combustion Corp., Toledo, O. Leaflet form No. 81, describing malleableizing process with gas-fired radiant tube heating element.

Refractory Cement—Midwest Refractories Co., 638 Union Trust building, Cleveland. Folder IC-3M, describing its refractory cement and bonding mortar "Ignisite."

Grinding Machinery — Samuel C. Rogers & Co., 191 Dutton avenue, Buffalo. Illustrated price list covering its line of automatic knife and saw grinding machinery.

Air Conditioning — Carrier Engineering Corp., Newark, N. J. Bulletin No. 30-F-I, describing its air conditioning and automatic heating equipment for the home.

Copper Alloys — Chase Brass & Copper Co., 1155 Babbitt road, Cleveland. Booklet No. A-1012, on commercially important copper alloys; booklet giving definitions of brass and copper terms.

Conveyer Equipment — Mathews Conveyer Co., Ellwood City, Pa. Book showing how modern industrial organization is based on the principle of continuous flow, by applying natural laws to production.

Pyrometers — C. J. Tagliabue Mfg. Co., Park and Nostrand avenues, Brooklyn, N. Y. Catalog No. 1101C, describing its photocell, electric, light ray pyrometers with high speed photo-electric action.

Testing Sieve Shaker — Newark Wire Cloth Co., 351 Verona avenue, Newark, N. J. Folder illustrating and describing its new "End-Shak" testing sieve shaker; includes information on testing sieves.

Shape and Cutting Machine—National Cylinder Gas Co., 205 West Wacker drive, Chicago. Booklet describing its flame shaping machine capable of cutting shapes from steel plate, slabs, billets or forgings.

Plugs and Receptacles—Delta-Star Electric Co., 2400 Fulton street, Chicoga. New price lists: 7-1 on designators, 303-1 on heavy duty plugs and receptacles and 9-B on indoor bus supports.

House Trailers — Covered Wagon Co., Mt. Clemens, Mich. Catalog describing its line of house trailers, illustrated with exterior and interior views of trailers, containing complete information on points of interest to prospective purchaser.

Refractories Specialties — Robinson Clay Product Co., Akron, O. Catalog illustrating its complete line of refractories specialties, describing characteristics of each product, the results of comprehensive tests, as well as instructions for applying these products.

Belt Conveyors—Chain Belt Co., 1600 West Bruce street, Milwaukee. Catalog No. 270, containing complete and specialized information on design and application of belt conveyors for handling bulk materials, with full listing and description of belt conveyor equipment.

Air Conditioning — Westinghouse Electric & Mfg. Co., Mansfield, O. Data sheet CLS-415-A, description and specifications for type CLS-415 condensing unit. Data sheet CLS-640-A, description and specifications for type CLS-640 condensing unit. Dimension sheet AH-000-C1, for all type AH air conditioning units. Dimension sheet AV-000-C1, for all type AV air conditioning units. Dimension sheet EV-000-C1, for all type EV evaporative condensers.

Disk-Brake Motors — Reliance Electric & Engineering Co., Ivanhoe road, Cleveland. Bulletin No. 305, describing its open-type, squirrel-cage motor with integral magnetic disk brake and its splash-proof alternating current squirrel-cage disk-brake motor.

Arc-Welding — Harnischfeger Corp., 4200 West National avenue, Milwaukee. Bulletin No. W10, describing advantages gained by the internally stabilized arc; what single current control means to the operator and improvement on the finished welded product.

Packings — Metalastic Mfg. Corp., Hackensack, N. J. Catalog, with numerous photographs, illustrating sizes and types of formed-ring packings, coils, and how to pack high pressure steam valves, water faucets, swing joints, gasoline generating lamps, and refrigerating equipment.

Steam Generator — Combustion Engineering Co. Inc., 200 Madison avenue, New York. Catalog No. P-155, describing its type VU steam generator of standard construction, in sizes from 15,000 to 250,000 pounds of steam per hour and for any steam pressure up to 1000 pounds per square inch.

Synthetic Resins Protect Industrial Equipment

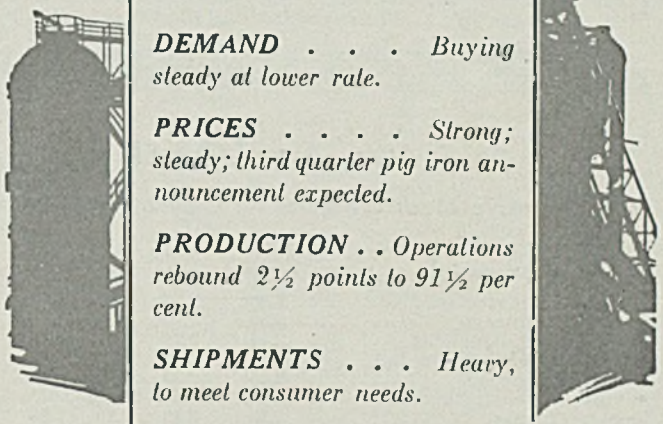
(*Concluded from Page* 58)

lowing summer an inspection showed that the "phenolic" finish system had stood up very well. At the ice line a small amount of the aluminum paint had been worn down to the primer but the primer itself was hard and tough enough to remain intact and still protect the base metal. The adjacent gates, however, did not fare so well. In many places the old paint system was entirely removed exposing the steel to corrosion.

From the examples given here it can be seen that the modern protective coating is "tailor made" to fit the job for which it is intended. Every finishing problem is an individual one and should be treated accordingly. Phenolic type resins are not the only type giving satisfactory results in the continual fight against corrosion. Each type has its individual characteristics and is best suited for certain purposes. The paint chemist is best fitted to select the resin for any specific use and should always be consulted.

Steel Faces Summer Lull With Confidence

Mills Raise Output; Consumer Needs Heavy; Scrap Near Year's Low



MARKET IN TABLOID

DEMAND . . . *Buying steady at lower rate.*

PRICES . . . . *Strong; steady; third quarter pig iron announcement expected.*

PRODUCTION . . *Operations rebound 2½ points to 91½ per cent.*

SHIPMENTS . . . *Heavy, to meet consumer needs.*

FACING a natural rebound from the artificially stimulated demand for steel a few weeks ago, when a rise in price was expected, and also the effect of a seasonal lull at midyear, the steel market possesses many elements of strength that promise fairly steady production at a high rate.

Though buying is consistently less than shipments, volume of current orders, when added to mill backlogs, is sufficient to assure activity well into the summer. No alarm is felt by steelmakers because of lessened buying, as consumers continue to ask delivery as soon as possible, indicating that stocks are low and material is going into consumption at once.

A seasonal factor in summer decline in demand, change of automobile models, is not likely to be as strong this year as builders have heavy orders for 1937 models and will run later than usual before the change. New models are to be brought out earlier, thus shortening the period between seasons.

Threat of labor difficulties among independent producers has caused only slight efforts to obtain earlier deliveries, although in some instances this has caused acceleration of demand.

The national operating rate has rebounded 2½ points to 91½ per cent of capacity, equal to that of April, the highest level of the year. Pittsburgh increased its rate 13 points to 96 per cent, Chicago added one point to 85, New England 13 points to 100 and Cleveland 2½ points to 82 per cent. Youngstown lost three points to 80 per cent, Buffalo two points to 88, Detroit one point to 99 and Cincinnati four points to 90. Rates were unchanged at Wheeling, 94 per cent, Eastern Pennsylvania, 73½, Birmingham, 83, and St. Louis, 94.

In spite of reduced buying, authoritatively estimated at 20 to 25 per cent under the April rate, mills are making slow progress in reducing backlogs and making prompt delivery possible. Best deliveries on bars now range from four to six weeks, and on plates three to four weeks in the case of some producers, while most mills can offer eight to 10 weeks. Some platemakers are able to take business only for delivery in 14 to 20 weeks.

Sheet consumers are beginning to take thought for fourth quarter supplies and some tonnage is being booked at prices prevailing at time of delivery.

Prices of pig iron for third quarter are expected to be announced within the coming week. Melters apparently hold the opinion that no advance will be made as there has been no effort to obtain additional coverage. Consumption is generally at a high rate and stocks are not being accumulated.

Tin plate continues to lead in production, some mills operating at better that 100 per cent of rated capacity. A Pittsburgh producer which lost some time because of strike interruption is straining every facility to catch up on the lost production that resulted.

Numerous pipe line projects are under consideration, promising additional large tonnages of plates. Those being actively considered by Chicago mills involve a total of 10,000 to 15,000 tons of plates. Placing of three ocean steamboats with Bethlehem Shipbuilding Corp. brings 15,000 tons of hull steel to the parent mill.

Because of continuance of labor difficulties in the Detroit area automobile production last week fell off from the peak of the two preceding weeks. Total last week was 134,500, compared with the revised figure of 140,396 the previous week. General Motors produced 54,250, Ford 35,835 and Chrysler 28,000.

Scrap continues to decline, but more slowly, and indications lead to belief the bottom may be near. Inasmuch as prices may have been pressed higher than conditions justified a few weeks ago the drop may be below a reasonable level. With lower range of price the incentive to bring out accumulations from remote locations will be less. Renewal of consumer buying is relied on to rectify the situation before long.

The composite of scrap prices fell 73 cents to $17.87, the level of the second week in January, practically the low for the year. The iron and steel composite declined 8 cents to $39.97 on lower scrap prices. The finished steel composite is unchanged at $61.70.

COMPOSITE MARKET AVERAGES

	May 22	May 15	May 8	One Month Ago Apr., 1937	Three Months Ago Feb., 1937	One Year Ago May, 1936	Five Years Ago May, 1932
Iron and Steel	$39.97	$40.05	$40.14	$40.39	$36.74	$32.92	$29.84
Finished Steel	61.70	61.70	61.70	61.45	55.92	52.20	47.62
Steelworks Scrap ..	17.87	18.60	18.79	21.27	19.19	13.40	7.03

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel, hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

A COMPARISON OF PRICES

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

Finished Material

	May 22, 1937	April 1937	Feb. 1937	May 1936
Steel bars, Pittsburgh	2.45c	2.45c	2.20c	1.85c
Steel bars, Chicago	2.50	2.50	2.25	1.90
Steel bars, Philadelphia	2.74	2.74	2.49	2.16
Iron bars, Terre Haute, Ind.	2.35	2.35	2.10	1.75
Shapes, Pittsburgh	2.25	2.25	2.05	1.80
Shapes, Philadelphia	2.45½	2.45½	2.25½	2.01½
Shapes, Chicago	2.30	2.30	2.10	1.85
Tank plates, Pittsburgh	2.25	2.25	2.05	1.80
Tank plates, Philadelphia	2.43½	2.43½	2.23½	1.99
Tank plates, Chicago	2.30	2.30	2.10	1.85
Sheets, No. 10, hot rolled, Pitts.	2.40	2.40	2.15	1.85
Sheets, No. 24, hot ann., Pitts.	3.15	3.15	2.80	2.40
Sheets, No. 24, galv., Pitts.	3.80	3.80	3.40	3.10
Sheets, No. 10, hot rolled, Gary	2.50	2.50	2.25	1.95
Sheets, No. 24, hot anneal., Gary	3.25	3.25	2.90	2.50
Sheets, No. 24, galvan., Gary	3.90	3.90	3.50	3.20
Plain wire, Pittsburgh	2.90	2.90	2.60	2.40
Tin plate, per base box, Pitts.	$5.35	5.25	4.85	5.25
Wire nails, Pittsburgh	2.75	2.75	2.25	2.10

Semifinished Material

Sheet bars, open-hearth, Youngs.	$37.00	$37.00	$34.00	$28.00
Sheet bars, open-hearth, Pitts.	37.00	37.00	34.00	28.00
Billets, open-hearth, Pittsburgh	37.00	37.00	34.00	28.00
Wire rods, No. 5 to ⅜-inch, Pitts.	47.00	47.00	43.00	40.00

Pig Iron

	May 22, 1937	April 1937	Feb. 1937	May 1936
Bessemer, del. Pittsburgh	$25.26	$25.26	$22.30	$20.81
Basic, Valley	23.50	23.50	20.50	19.00
Basic, eastern del. East Pa.	25.26	25.26	22.51	20.81
No. 2 fdy., del. Pittsburgh	25.21	25.21	22.21	20.31
No. 2 fdy., Chicago	24.00	24.00	21.00	19.50
Southern No. 2, Birmingham	20.38	20.38	17.63	15.50
Southern No. 2, del. Cincinnati	23.69	23.69	20.94	20.20
No. 2X eastern, del. Phila.	26.135	26.135	23.385	21.68
Malleable, Valley	24.00	24.00	21.00	19.50
Malleable, Chicago	24.00	24.00	21.00	19.50
Lake Sup., charcoal, del. Chicago	30.04	30.04	26.54	25.25
Gray forge, del. Pittsburgh	24.17	24.17	21.17	19.67
Ferromanganese, del. Pittsburgh	107.29	99.79	84.79	80.13

Scrap

Heavy melting steel, Pittsburgh	$18.75	$22.75	$19.65	$14.75
Heavy melt. steel, No. 2, East Pa.	16.75	19.06	17.75	10.81
Heavy melting steel, Chicago	16.75	20.75	19.50	13.05
Rail for rolling, Chicago	21.25	23.35	20.75	14.65
Railroad steel specialties, Chicago	20.75	23.75	21.00	14.65

Coke

Connellsville, furnace, ovens	$4.85	$4.50	$4.00	$3.50
Connellsville, foundry, ovens	5.30	5.05	4.25	4.25
Chicago, by-product foundry, del.	11.00	11.00	10.25	9.75

Steel, Iron, Raw Material, Fuel and Metals Prices

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

Sheet Steel

Prices Subject to Quantity Extras and Deductions (Except Galvanized)

Hot Rolled No. 10, 24-48 in.

Pittsburgh	2.40c
Gary	2.50c
Chicago, delivered	2.53c
Detroit, del.	2.60c
New York, del.	2.73c
Philadelphia, del.	2.69c
Birmingham	2.55c
St. Louis, del.	2.63c
Granite City, Ill.	2.60c
Pacific ports, f.o.b. dock	2.95c

Hot Rolled Annealed No. 24

Pittsburgh	3.15c
Gary	3.25c
Chicago, delivered	3.28c
Detroit, delivered	3.35c
New York, del.	3.48c
Philadelphia, del.	3.44c
Birmingham	3.30c
St. Louis, del.	3.38c
Granite City, Ill.	3.35c
Pacific ports, f.o.b. dock	3.80c

Galvanized No. 24

Pittsburgh	3.80c
Gary	3.90c
Chicago, delivered	3.93c
Philadelphia, del.	4.09c
New York, delivered	4.13c
Birmingham	3.95c
St. Louis, del.	4.03c
Granite City, Ill.	4.00c
Pacific ports, f.o.b. dock	4.40c

Tin Mill Black No. 28

Pittsburgh	3.30c
Gary	3.40c
St. Louis, delivered	3.53c
Granite City, Ill.	3.50c

Cold Rolled No. 10

Pittsburgh	3.10c
Gary	3.20c
Detroit, delivered	3.30c
Philadelphia, del.	3.39c
New York, del.	3.43c
St. Louis, del.	3.33c
Granite City, Ill.	3.30c
Pacific ports, f.o.b. dock	3.70c

Cold Rolled No. 20

Pittsburgh	3.55c
Gary	3.65c
Detroit, delivered	3.75c
Philadelphia, del.	3.84c
New York, del.	3.88c
St. Louis	3.78c
Granite City, Ill.	3.75c

Enameling Sheets

Pittsburgh, No. 10	2.90c
Pittsburgh, No. 20	3.50c
Gary, No. 10	3.00c
Gary, No. 20	3.60c
St. Louis, No. 10	3.13c
St. Louis, No. 20	3.73c

Tin and Terne Plate

Gary base, 10 cents higher.

Tin plate, coke, (base box), Pittsburgh	$5.35
Waste-waste, 2.75c; strip	2.50c
Long ternes, No. 24, unassorted, Pitts.	4.10c

Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.

Chrome-Nickel

	No. 302	No. 304
Bars	24.00	25.00
Plates	27.00	29.00
Sheets	34.00	36.00
Hot strip	21.50	23.50
Cold strip	28.00	30.00

Straight Chromes

	No. 410	No. 430	No. 442	No. 446
Bars	18.50	19.00	22.50	27.50
Plates	21.50	22.00	25.50	30.50
Sheets	26.50	29.00	32.50	36.50
Hot strip	17.00	17.50	23.00	28.00
Cold stp.	22.00	22.50	28.50	36.50

Steel Plate

Pittsburgh	2.25c
New York, del.	2.53c
Philadelphia, del.	2.43½c
Boston, delivered	2.65c
Buffalo, delivered	2.50c
Chicago or Gary	2.30c
Cleveland, del.	2.44½c
Birmingham	2.40c
Coatesville, base	2.35c
Sparrows Pt., base	2.35c
Pacific ports, f.o.b. cars, dock	2.80c
St. Louis, delivered	2.52c

Structural Shapes

Pittsburgh	2.25c
Philadelphia, del.	2.45½c
New York, del.	2.50½c
Boston, delivered	2.63½c
Bethlehem	2.35c
Chicago Chicago	2.30c
Cleveland, del.	2.45c
Buffalo	2.35c
Gulf Ports	2.65c
Birmingham	2.40c
Pacific ports, f.o.b. cars, dock	2.80c
St. Louis, del.	2.52c

Bars

Soft Steel

(Base, 3 to 25 tons)

Pittsburgh	2.45c
Chicago or Gary	2.50c
Duluth	2.60c
Birmingham	2.60c
Cleveland	2.50c
Buffalo	2.55c
Detroit, delivered	2.60c
Pacific ports, f.o.b. cars, dock	3.00c
Philadelphia, del.	2.74c
Boston, delivered	2.85c
New York, del.	2.78c
Pitts., forg. qual.	2.80c

Rail Steel

To Manufacturing Trade

Pittsburgh	2.30c
Chicago or Gary	2.35c
Moline, Ill.	2.35c
Cleveland	2.35c
Buffalo	2.40c

Iron

Terre Haute, Ind.	2.35c
Chicago	2.40c
Philadelphia	2.64c
Pittsburgh, refined	3.50-8.00c

Reinforcing

New billet, straight lengths, quoted by distributors

Pittsburgh	2.55c
Chicago, Gary, Buffalo, Cleve., Birm., Young.	2.60c
Gulf ports	2.65c
Pacific coast ports, f.o.b. car docks	2.95c
Philadelphia, del.	2.84c

Rail steel, straight lengths, quoted by distributors

Pittsburgh	2.40c
Chicago, Buffalo, Cleveland, Birm., Young.	2.45c
Gulf ports	2.80c

Wire Products

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

Base Pitts.-Cleve. 100 lb. keg.

Standard wire nails	$2.75
Cement coated nails	$2.75

(Per pound)

Polished staples	3.45c
Galv. fence staples	3.70c
Barbed wire, galv.	3.40c
Annealed fence wire	3.20c
Galv. fence wire	3.60c
Woven wire fencing (base column, c. l.)	$74.00
Single loop bale ties, (base column, c. l.)	63.00

To Manufacturing Trade

Plain wire, 6-9 ga.	2.90c

Anderson, Ind. (merchant products only) and Chicago up $1; Duluth and Worcester up $2; Birmingham up $3.

Spring wire, Pitts. or Cleveland	3.50c

Do., Chicago up $1, Worc. $2.

Cold-Finished Carbon Bars and Shafting

Pittsburgh	2.90c
Chicago	2.95c
Gary, Ind.	2.95c
Detroit	2.95c
Cleveland	2.95c
Buffalo	3.00c

Subject to quantity deductions and extras. List dated Aug. 26, 1935; revised Oct. 1, 1936.

Alloy Steel Bars (Hot)

(*Base, 3 to 25 tons*)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem	3.00c

Alloy	Diff.	Alloy	Diff.
S.A.E.		S.A.E.	
2000	0.35	3100	0.70
2100	0.75	3200	1.35
2300	1.55	3300	3.80
2500	2.25	3400	3.20
4100 0.15 to 0.25 Mo.			0.55
4600 0.20 to 0.30 Mo. 1.50-2.00 Ni.			1.10
5100 0.80-1.10 Cr.			0.45
5100 Cr. spring			0.15
6100 bars			1.20
6100 spring			0.85
Cr. N., Van			1.50
Carbon Van.			0.85
9200 spring flats			0.15
9200 spring rounds, squares			0.40

Piling

Pittsburgh	2.60c
Chicago, Buffalo	2.70c

Strip and Hoops

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

Hot strip to 23⅛-in. Pittsburgh	2.40c
Chicago or Gary	2.50c
Birmingham base	2.55c
Detroit, del.	2.60c
Philadelphia, del.	2.69c
New York, del.	2.73c
Cooperage hoop, Pittsburgh	2.50c
Chicago	2.60c
Cold strip, 0.25 carbon and under, Pittsburgh, Cleveland	3.20c
Detroit, del.	3.40c
Worcester, Mass.	3.40c

Carbon	Cleve. Pitts.	Worcester, Mass.
0.26—0.50	3.20c	3.40c
0.51—0.75	4.45c	4.65c
0.76—1.00	6.30c	6.50c
Over 1.00	8.50c	8.70c

Rails, Track Material

(Gross Tons)

Standard rails, mill	$42.50
Relay rails, Pittsburgh, 20—100 lbs.	32.50-35.50
Light rails, billet qual., Pittsburgh, Chicago	$43.00
Do., rerolling quality	42.00
Angle bars, billet, Gary, Pittsburgh, So. Chicago	2.80c
Do., axle steel	3.35c
Spikes, R. R. base	3.15c
Track bolts, base	4.35c
Tie plates, base	$46.00

Base, light rails 25 to 60 lbs.; 20 lbs. up $2; 16 lbs. up $4; 12 lbs. up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base tie plates 20 tons.

Bolts and Nuts

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

Carriage and Machine

½ x 6 and smaller	65-5 off
Do. larger	60-10 off
Tire bolts	50 off

Plow Bolts

All sizes	65-5 off

Stove Bolts

In packages with nuts attached 72½ off; in packages with nuts separate 72½-5 off; in bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-inch.

Step bolts	60 off
Elevator bolts	50-10-5 off

Nuts

S. A. E. semifinished hex.: ½ to ⅞-inch	60-10 off
Do., ½ to 1-inch	60-5 off
Do., over 1-inch	60 off

Hexagon Cap Screws

Milled	50-10 off
Upset, 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	75 off
Headless set screws	75 off

Rivets, Wrought Washers

Structural, Pittsburgh, Cleveland	3.60c
Structural, Chicago	3.70c
⅞-inch and smaller, Pitts., Chi., Cleve.	65-5 off
Wrought washers, Pitts., Chi., Phila. to jobbers and large nut, bolt mfrs.	$5.75 off

Cut Nails

Cut nails, C. L., Pitts. (10% disc. on all extras)	$3.60
Do., less carloads, 5 kegs or more, no discount on any extras	$3.90
Do., under 5 kegs no disc. on any extras	$4.05

Welded Iron, Steel Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less. Chicago, del. 2½ less. Wrought pipe, Pittsburgh.

Butt Weld

Steel

In.	Blk.	Galv.
⅛	59½	49
¼	62½	53
⅜—⅝	64½	55½

Iron

¼	26	8
⅜—1¼	30	14
1½	34	16½
2	33½	16

Lap Weld

Steel

2	57	47½
2½—3	60	50½
3½—6	62	52½
7 and 8	61	50½
9 and 10	60½	50

Iron

2	26½	10
2½—3½	27½	12½
4	29½	16
4½—8	28½	15
9–12	24½	10

Line Pipe

Steel

1 to 3, butt weld	63½
2, lap weld	56
2½ to 3, lap weld	59
3½ to 6, lap weld	61
7 and 8, lap weld	60
10-inch, lap weld	59½
12-inch, lap weld	58½

Butt Weld

Iron

	Blk.	Galv.
¾	25	7
1 and 1¼	29	13
1½	33	15½
2	32½	15

Lap Weld

1½	23½	7
2	25½	9
2½ to 3½	26½	11½
4	28½	15
4½ to 8	27½	14
9 to 12	23½	9

Boiler Tubes

Carloads minimum wall seamless steel boiler tubes, cut lengths 4 to 24 feet, f.o.b. Pittsburgh, base price per 100 feet subject to usual extras.

Lap Weld

Sizes	Steel	Charcoal Iron
1½" OD x 13 Ga.	$10.45	$23.71
1¾" OD x 13 Ga.	11.89	22.93
2" OD x 13 Ga.	13.31	19.35
2" OD x 11 Ga.	15.49	23.36
2¼" OD x 13 Ga.	14.82	21.68
2¼" OD x 11 Ga.	17.38	26.02
2½" OD x 12 Ga.	17.82	26.57
2¾" OD x 12 Ga.	18.86	29.00
3" OD x 12 Ga.	19.73	31.36
3½" OD x 11 Ga.	24.89	39.81
4" OD x 10 Ga.	30.81	49.90
5" OD x 9 Ga.	47.57	73.93
6" OD x 7 Ga.	73.25	.....

Seamless

	Hot Rolled	Cold Drawn
1" OD x 13 Ga.	$ 8.41	$ 9.46
1¼" OD x 13 Ga.	9.96	11.21
1½" OD x 13 Ga.	11.00	12.38
1¾" OD x 13 Ga.	12.51	14.09
2" OD x 13 Ga.	14.02	15.78
2¼" OD x 13 Ga.	15.63	17.60
2¼" OD x 12 Ga.	17.21	19.37
2½" OD x 12 Ga.	18.85	21.22
2¾" OD x 12 Ga.	19.98	22.49
3" OD x 12 Ga.	20.97	23.60
4½" OD x 10 Ga.	40.15	45.19
3½" OD x 11 Ga.	26.47	29.79
4" OD x 10 Ga.	32.83	36.96
5" OD x 9 Ga.	50.38	56.71
6" OD x 7 Ga.	77.35	87.07

Cast Iron Water Pipe

Class B Pipe—Per Net Ton

6-in. & over, Birm.	$46.00-47.00
4-in., Birmingham	49.00-50.00
4-in., Chicago	57.00-58.00
6 to 24-in., Chicago	54.00-55.00
6-in. & over, east fdy.	50.00
Do., 4-in.	53.00

Class A Pipe $3 over Class B
Stnd. fitgs., Birm., base $100.00

Semifinished Steel

Billets and Blooms

4 x 4-inch base; gross ton

Pitts., Chi., Cleve., Buffalo and Young.	$37.00
Philadelphia	42.30
Duluth	39.00

Forging Billets

6 x 6 to 9 x 9-in., base

Pitts., Chicago, Buffalo	43.00
Forging, Duluth	45.00

Sheet Bars

Pitts., Cleve., Young., Sparrows Point	37.00

Slabs

Pitts., Chicago, Cleveland, Youngstown	37.00

Wire Rods

Pitts., Cleve., No. 5 to ⅜-inch incl.	47.00
Do., over ⅜ to 41/64-inch incl.	52.00

Chicago up $1; Worcester up $2.

Skelp

Pitts., Chi., Young., Buff., Coatesville, Sparrows Pt.	2.10c

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur.	$4.75- 4.90
Connellsville, fdry.	5.25- 5.50
Connell. prem. fdry.	6.00- 6.50
New River fdry.	6.50- 6.75
Wise county fdry.	5.75- 6.00
Wise county fur.	4.75- 5.00

By-Product Foundry

Newark, N. J., del.	10.85-11.30
Chi., ov., outside del.	10.25
Chicago, del.	11.00
Milwaukee, ovens	11.00
New England, del.	12.50
St. Louis, del.	11.00-11.50
Birmingham, ovens	7.25
Indianapolis, del.	10.50
Cincinnati, del.	10.50
Cleveland, del.	11.00
Buffalo, del.	10.50
Detroit, del.	11.10
Philadelphia, del.	10.60

Coke By-Products

Spot, gal. Producers' Plants

Pure and 90% benzol	16.00c
Toluol	30.00c
Solvent naphtha	30.00c
Industrial xylol	30.00c

Per lb. f.o.b. Frankford and St. Louis

Phenol (200 lb. drums)	14.75c
do. (450 lbs.)	14.00c

Eastern Plants, per lb.

Naphthalene flakes and balls, in bbls. to jobbers	7.25c

Per 100 lbs. Atlantic Seaboard

Sulphate of ammonia	$1.35

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.	$25.00	$25.50	$23.50	$26.00
Birdsboro, Pa.	25.00	25.50	24.50	26.00
Birmingham, Ala.‡	20.38	.....	19.38	24.50
Buffalo	24.00	24.50	23.00	25.00
Chicago	24.00	24.00	23.50	24.50
Cleveland	24.00	24.00	23.50	24.50
Detroit	24.00	24.00	23.50	24.50
Duluth	24.50	24.50	.....	25.00
Erie, Pa.	24.00	24.50	23.50	25.00
Everett, Mass.	25.75	26.25	25.25	26.75
Hamilton, O.	24.00	24.00	23.50	.....
Jackson, O.	24.00	24.00	.....	.....
Neville Island, Pa.	24.00	24.00	23.50	24.50
Provo, Utah	22.00	.....	.....	.....
Sharpsville, Pa.	24.00	24.00	23.50	24.50
Sparrows Point, Md.	25.00	.....	24.50	.....
Swedeland, Pa.	25.00	25.50	24.50	26.00
Toledo, O.	24.00	24.00	23.50	24.50
Youngstown, O.	24.00	24.00	23.50	24.50

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

Delivered from Basing Points:

Akron, O., from Cleveland	25.26	25.26	24.76	25.76
Baltimore from Birmingham	25.58	.....	24.46	.....
Boston from Birmingham	26.37	.....	25.87	.....
Boston from Everett, Mass.	26.25	26.75	25.75	27.25
Boston from Buffalo	26.25	26.75	25.75	27.25
Brooklyn, N. Y., from Bethlehem	27.27	27.77	.....	.....
Brooklyn, N. Y., from Bmghm.	27.05	.....	.....	.....
Canton, O., from Cleveland	25.26	25.26	25.76	25.76
Chicago from Birmingham	24.22	.....	24.10	.....
Cincinnati from Hamilton, O.	24.07	25.01	24.51	.....
Cincinnati from Birmingham	23.69	.....	22.69	.....
Cleveland from Birmingham	24.12	.....	23.62	.....
Mansfield, O., from Toledo, O.	25.76	25.76	25.26	25.26
Milwaukee from Chicago	25.00	25.00	24.50	25.00
Muskegon, Mich., from Chicago, Toledo or Detroit	26.90	26.90	26.40	27.40
Newark, N. J., from Birmingham	26.01	.....	.....	.....
Newark, N. J., from Bethlehem	26.39	26.89	.....	.....
Philadelphia from Birmingham	25.38	.....	25.26	.....
Philadelphia from Swedeland, Pa.	25.76	26.26	25.26	.....
Pittsburgh district from Neville Island	Neville, base plus 63c, 76c, and $1.13 switch'g charges			
Saginaw, Mich., from Detroit	26.25	26.25	25.75	25.75
St. Louis, northern	24.50	24.50	24.00	.....
St. Louis from Birmingham	†24.12	.....	23.82	.....
St. Paul from Duluth	25.94	25.94	.....	26.44

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Standish, N. Y., $28.50, Phila. base, standard and copper bearing, $29.63.

Gray Forge		Charcoal	
Valley furnace	$23.50	Lake Superior fur.	$27.00
Pitts. dist. fur.	23.50	do., del. Chicago	30.04
		Lyles, Tenn.	26.50

Silvery†

Jackson county, O., base: 6-6.50 per cent $28.50; 6.51-7—$29.00; 7-7.50—$29.50; 7.51-8—$30.00; 8-8.50—$30.50; 8.51-9—$31.00; 9-9.50—$31.50; Buffalo $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base: Prices are the same as for silveries, plus $1 a ton.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Manganese differentials in silvery iron and ferrosilicon, 2 to 3%, $1 per ton add. Each unit over 3%, add $1 per ton.

Refractories

Per 1000 f.o.b. Works

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$64.60

First Quality

Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30

Second Quality

Pa., Ill., Ky., Md., Mo.	46.55
Georgia, Alabama	41.80

Ohio

First quality	43.70
Intermediate	39.90
Second quality	35.15

Malleable Bung Brick

All bases	$59.85

Silica Brick

Pennsylvania	$51.30
Joliet, E. Chicago	59.85
Birmingham, Ala.	51.30

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$30.00
Wire cut	$28.00

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 Baltimore bases (bags)	43.00
Domestic dead-burned gr. net ton f.o.b. Chewelah, Wash. (bulk)	25.00

Base Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$49.00
Chem. bonded chrome	49.00
Magnesite brick	69.00
Chem. bonded magnesite	59.00

Fluorspar, 85-5

Washed gravel, duty paid, tide, net ton	$23.50
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	$19.00
Do., for barge	$20.00

Ferroalloys

Dollars, except Ferrochrome

Ferromanganese, 78-82%, tidewater, duty pd.	$102.50
Do., Baltimore, base	102.50
Do., del. Pittsburgh	107.29
Spiegeleisen, 19-21% dom. Palmerston, Pa., spot	33.00
Do., New Orleans	33.00
Ferrosilicon, 50% freight allowed, c.l.	69.50
Do., less carload	77.00
Do., 75 per cent.	126-130.00
Spot, $5 a ton higher.	
Silicoman., 2½ carbon	106.50
2% carbon 111.50; 1%,	121.50
Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb. del.	10.50
Ferrotungsten, stand., lb. con. del. cars	1.80-1.85
Ferrovanadium, 35 to 40% lb., cont.	2.70-2.90
Ferrotitanium, c. l., prod. plant, frt. all., net ton	142.50
Spot, carlots	145.00
Spot, ton lots	150.00
Ferrophosphorous, 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: Electro, del. Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin: New York Spot	Straits Tin: New York Futures	Lead: New York N. Y.	Lead: East St. L.	Zinc St. L.	Aluminum 99%	Antimony Chinese Spot, N. Y.	Nickel Cathodes
May 15	14.00	14.12½	13.75	55.00	54.62½	6.00	5.85	6.75	20.00	16.00	35.00
May 17	14.00	14.12½	13.75	55.00	54.62½	6.00	5.85	6.75	20.00	16.00	35.00
May 18	14.00	14.12½	13.75	55.37½	54.87½	6.00	5.85	6.75	20.00	15.00	35.00
May 19	14.00	14.12½	13.75	56.12½	55.75	6.00	5.85	6.75	20.00	15.00	35.00
May 20	14.00	14.12½	13.75	56.37½	56.00	6.00	5.85	6.75	20.00	14.50	35.00
May 21	14.00	14.12½	13.75	56.37½	56.00	6.00	5.85	6.75	20.00	14.50	35.00

MILL PRODUCTS

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 14.00c Conn. copper

Sheets

*Yellow brass (high)	19.75
*Copper, hot rolled	21.87½
Lead, cut to jobbers	9.50
Zinc, 100-lb. base	12.50-13.00

Tubes

*High yellow brass	22.50
*Seamless copper	22.62½

Rods

*High yellow brass	16.25
*Copper, hot rolled	18.62½

Anodes

*Copper, untrimmed	19.12½

Wire

*Yellow brass (high)	20.00

OLD METALS

Nom. Deal. buying prices

No. 1 Composition Red Brass

*New York	8.75-9.00
Cleveland	9.00-9.25
*Chicago	8.50-9.00
*St. Louis	8.25-8.75

Heavy Copper and Wire

*New York, No. 1	11.00-11.25
Cleveland, No. 1	11.00-11.25
*Chicago, No. 1	10.50-11.00
*St. Louis, No. 1	9.00-9.50

Composition Brass Borings

*New York	8.25-8.50

Light Copper

*New York	9.00-9.25
Cleveland	9.00-9.25
*Chicago	8.50-9.00
*St. Louis	8.00-8.50

Light Brass

*Chicago	5.25-5.50
*Cleveland	5.00-5.50
*St. Louis	5.25-5.75

Lead

*New York	4.75
Cleveland	4.75-5.00
Chicago	4.75-5.00
*St. Louis	4.50-4.75

Zinc

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

Aluminum

Borings, Cleveland	10.00-10.50
Mixed, cast, Cleve.	13.25-13.50
Clips, soft, Cleve.	15.00-15.50
*Mixed, cast, St. L.	12.50-12.75

SECONDARY METALS

Brass, ingot 85-5-5-5, lcl,	14.00
Stand. No. 12 alum.	19.00-19.50

Warehouse Iron and Steel Prices

Cents per pound for delivery within metropolitan districts of cities specified

STEEL BARS

Baltimore	4.00c
Boston††	4.05c
Buffalo	3.10c
Chattanooga	3.96c
Chicago (j)	3.85c
Cincinnati	4.05c
Cleveland	3.75c
Detroit	3.93½c
Houston	3.10c
Los Angeles	4.30c
Milwaukee	3.96c-4.11c
New Orleans	4.20c
New York‡ (d)	4.12c
Pitts. (h)	3.80c
Philadelphia	4.00c
Portland	4.45c
San Francisco	4.20c
Seattle	4.45c
St. Louis	4.09c
St. Paul	4.10c-4.25c
Tulsa	3.35c

IRON BARS

Portland	3.50c
Chattanooga	3.96c
Baltimore*	3.25c
Cincinnati	4.05c
New York‡ (d)	3.65c
Philadelphia	4.00c
St. Louis	4.09c
Tulsa	3.35c

REINFORCING BARS

Buffalo	2.60c
Chattanooga	3.96c
Cleveland (c)	2.55c
Cincinnati	3.75c
Houston	3.25c
Los Angeles, c.l.	2.45c
New Orleans*	3.14c
Pitts., plain (h)	2.55c
Pitts., twisted squares (h)	3.95c
San Francisco	2.97½c
Seattle, under 1 ton	4.22½c
St. Louis	3.99c
Tulsa	3.25c
Young	2.30c-2.60c

SHAPES

Baltimore	3.90c
Boston††	3.92c
Buffalo	3.35c
Chattanooga	4.01c
Chicago	3.75c
Cincinnati	3.95c
Cleveland	3.86c
Detroit	3.95c
Houston	3.10c
Los Angeles	4.30c
Milwaukee	3.86c
New Orleans	4.10c
New York‡ (d)	3.97c
Philadelphia	3.90c
Pittsburgh (h)	3.70c
Portland (f)	4.45c
San Francisco	4.05c
Seattle (f)	4.45c
St. Louis	3.99c
St. Paul	4.00c
Tulsa	3.60c

PLATES

Baltimore	3.90c
Boston††	3.93c
Buffalo	3.47c
Chattanooga	4.01c
Chicago	3.75c
Cincinnati	3.95c
Cleveland, ¼-in. and over	3.86c
Detroit	3.95c
Detroit, ⅜-in.	4.15c
Houston	3.10c
Los Angeles	4.30c
Milwaukee	3.86c
New Orleans	4.10c
New York‡ (d)	4.00c
Philadelphia	3.90c
Phila. floor	4.95c
Pittsburgh (h)	3.70c
Portland	4.25c
San Francisco	4.05c
Seattle	4.25c
St. Louis	3.99c
St. Paul	4.00c
Tulsa	3.60c

NO. 10 BLUE

Baltimore	3.95c
Boston (g)	4.00c
Buffalo	3.72c
Chattanooga	3.91c
Chicago	3.85c
Cincinnati,	4.00c
Cleveland	3.91c
Det. 8-10 ga.	3.93½c
Houston	3.45c
Los Angeles	4.50c
Milwaukee	3.96c
New Orleans	4.35c
New York‡ (d)	4.07c
Portland	4.50c
Philadelphia	4.00c
Pittsburgh (h)	3.75c
San Francisco	4.30c
Seattle	4.50c
St. Louis	4.39c
St. Paul	4.10c
Tulsa	3.80c

NO. 24 BLACK

Baltimore*†	4.50c
Boston (g)	4.75c
Buffalo	3.35c
Chattanooga*	4.06c
Chicago	4.45c-5.10c
Cincinnati	4.75c
Cleveland	4.66c
Detroit	4.68½c
Los Angeles	5.05c
Milwaukee	4.56c-5.21c
New York‡ (d)	4.82c
Philadelphia	4.65c
Pitts.** (h)	4.75c
Portland	5.35c
Seattle	5.35c
San Francisco	5.15c
St. Louis	4.84c
St. Paul	4.75c
Tulsa	4.85c

NO. 24 GALV. SHEETS

Baltimore*†	4.70c
Buffalo	4.10c
Boston (g)	5.30c
Chattanooga*	4.76c
Chicago (h)	5.10c-5.75c
Cincinnati	5.40c
Cleveland	5.31c
Detroit	5.40c
Houston	4.50c
Los Angeles	5.55c
Milwaukee	5.21c-5.86c
New Orleans*	4.49c
New York‡ (d)	5.47c
Philadelphia	5.30c
Pitts.** (h)	5.40c
Portland	5.90c
San Francisco	5.85c
Seattle	5.90c
St. Louis	5.49c
St. Paul	5.40c
Tulsa	5.20c

BANDS

Baltimore	4.20c
Boston††	4.25c
Buffalo	3.52c
Chattanooga	4.16c
Cincinnati	4.25c
Cleveland	4.16c
Chicago	4.10c
Detroit, ⅛-in. and lighter	4.185c
Houston	3.35c
Los Angeles	4.50c
Milwaukee	4.21c
New Orleans	4.75c
New York‡ (d)	4.32c
Philadelphia	4.10c
Pittsburgh (h)	3.70c
Portland	4.95c
San Francisco	4.50c
Seattle	4.95c
St. Louis	4.34c
St. Paul	4.35c
Tulsa	3.55c

HOOPS

Baltimore	4.45c
Boston††	5.25c
Buffalo	3.52c
Chicago	4.10c
Cincinnati	4.25c
Detroit, No. 14 and lighter	4.185c
Los Angeles	6.55c
Milwaukee	4.21c
New York‡ (d)	4.32c
Philadelphia	4.35c
Pittsburgh (h)	4.50c
Portland	6.30c
San Francisco	6.50c
Seattle	6.30c
St. Louis	4.34c
St. Paul	4.35c

COLD FIN. STEEL

Baltimore (c)	4.50c
Boston*	4.65c
Buffalo (h)	3.70c
Chattanooga*	4.86c
Chicago (h)	4.30c
Cincinnati	4.50c
Cleveland (h)	4.30c
Detroit	4.30c
Los Ang. (f) (d)	6.85c
Milwaukee	4.41c
New Orleans	5.10c
New York‡ (d)	4.57c
Philadelphia	4.53c
Pittsburgh	4.15c
Portland (f) (d)	5.85c
San Fran. (f) (d)	6.80c
Seattle (f) (d)	5.85c
St. Louis	4.54c
St. Paul	4.77c
Tulsa	4.80c

COLD ROLLED STRIP

Boston	3.845c
Buffalo	3.39c
Chicago	3.87c
Cincinnati	3.82c
Cleveland (b)	3.60c
Detroit	3.43c
New York‡ (d)	3.92c
St. Louis	4.54c

TOOL STEELS

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

	Base
High speed	69c
High carbon, Cr.	45c
Oil hardening	26c
Special tool	24c
Extra tool	20c
Regular tool	16c
Water hardening	12½c

Uniform extras apply.

BOLTS AND NUTS

(100 pounds or over)

	Discount
Chicago (a)	55 to 60
Cleveland	60-5-5
Detroit	70-10
Milwaukee	60 to 65
New Orleans	65
Pittsburgh	65-5

(a) Under 100 lbs., 50 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, 0.15c higher.

On plates, shapes, bars, hot strip and blue annealed quantity extras and discounts as follows: Under 100 lbs., add $1.50; 100 to 399 lbs., add 50c; 400 to 3999 lbs., base; 4000 to 9999 lbs., deduct 10c; over 10,000 lbs., deduct 15c. At Cleveland, under 400 lbs., add 50c, *with $1 minimum invoice.

‡Domestic steel; *Plus quantity extras; **One to 9 bundles; *† 50 or more bundles; †New extras apply; ††Base 10,000 lbs., extras on less.

Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, May 20

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

	British gross tons U. K. ports		Continental Channel or North Sea ports, metric tons	
			Quoted in dollars at current value	**Quoted in gold pounds sterling
PIG IRON	£ s d			£ s d
Foundry, 2.50-3.00 Silicon	$28.40	5 15 0	$32.04	3 19 6
Basic bessemer	19.39	3 18 6*	29.01	3 12 0
Hematite, Phos. .03-.05	21.61	4 7 6	.....	.....
SEMIFINISHED STEEL				
Billets	$38.90	7 17 6	$35.27	4 7 6
Wire rods, No. 5 gage	47.55	9 12 6	56.42	7 0 0
FINISHED STEEL				
Standard rails	$44.46	9 0 0	$48.36	6 0 0
Merchant bars	2.43c	11 0 0	1.82c	5 0 0
Structural shapes	2.35c	10 12 6	1.77c	4 17 6
Plates, †¼ in. or 5 mm.	2.55c	11 11 3	2.24c	6 2 6
Sheets, black, 24 gage or 0.5 mm	3.31c	15 0 0	3.09c	8 10 0††
Sheets, gal., 24 gage, corr.	4.14c	18 15 0	3.87c	10 12 6
Bands and strips	2.21c	10 0 0	2.37c	6 10 0
Plain wire, base	2.43c	11 0 0	2.73c	7 10 0
Galvanized wire, base	3.20c	14 10 0	2.91c	8 0 0
Wire nails, base	3.09c	14 0 0	3.09c	8 10 0
Tin plate, box 108 lbs.	$6.05	1 4 6	.....	.....

British ferromanganese $95 delivered Atlantic seaboard, duty-paid.

Domestic Prices at Works or Furnace—Last Reported

		£ s d		French Francs		Belgian Francs		Reich Marks
Fdy. pig iron, Si. 2.5	$20.50	4 3 0	(a) $19.04	425	$27.80	825	$25.33	63
Basic bessemer pig iron	24.70	5 0 0	(a) 12.32	275	14.66	435	27.94	(b) 69.50
Furnace coke	8.03	1 12 6	6.60	148	5.73	170	7.64	19
Billets	39.52	8 0 0	29.34	655	28.14	835	38.79	96.50
Standard rails	2.24c	10 2 6	1.95c	975	1.80c	1,200	2.38c	132
Merchant bars	2.53c	11 9 0	1.77c	885	1.46c	975	1.98c	110
Structural shapes	2.44c	11 0 6	1.72c	860	1.46c	975	1.93c	107
Plates, †¼-in. or 5 mm.	2.57c	11 13 0	2.21c	1,105	1.87c	1,245	2.29c	127
Sheets, black	3.48c	15 15 0§	2.80c	1,400‡	2.19c	1,460‡	2.59c	144‡
Sheets, galv., corr., 24 ga. or 0.5 mm	4.31c	19 10 0	4.30c	2,150	2.85c	1,900	6.66c	370
Plain wire	2.60c	11 15 0	2.72c	1,360	2.48c	1,650	3.11c	173
Bands and strips	2.70c	12 4 0	2.00c	1,000	2.02c	1,350	2.29c	127

*Basic. †British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price, British quotations are for basic open-hearth steel. Continent usually for basic-bessemer steel a del. Middlesbrough. b hemetite. ††Close annealed.

**Gold pound sterling carries a premium of 65.50 per cent over paper sterling.

Iron and Steel Scrap Prices

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

HEAVY MELTING STEEL

Birmingham†	13.00-14.00
Bos. dock No. 1, exp.	16.00
N. Eng. del. No. 1	15.50
Buffalo, No. 1	18.50-19.50
Buffalo, No. 2	16.50-17.50
Chicago, No. 1	16.50-17.00
Cleveland, No. 1	17.50-18.00
Cleveland, No. 2	16.00-16.50
Detroit, No. 1	15.00-15.50
Eastern Pa., No. 1	18.00-18.50
Eastern Pa., No. 2	16.50-17.00
Federal, Ill.	13.50-14.00
Granite City, R. R.	16.00-16.50
Granite City, No. 2	13.50-14.00
New York, No. 1	15.00
N.Y. dock, No. 1 exp.	14.50-15.00
Pitts., No. 1 (R. R.)	20.00-20.50
Pitts., No. 1 (dlr.)	18.50-19.00
Pittsburgh, No. 2	16.75-17.25
St. Louis, R. R.	16.00-16.50
St. Louis, No. 2	13.50-14.00
Toronto, dlrs. No. 1	11.00-12.00
Toronto, No. 2	10.00-11.00
Valleys, No. 1	20.00-20.50

COMPRESSED SHEETS

Buffalo, dealers	16.50-17.50
Chicago, factory	16.00-16.50
Chicago, dealer	15.50-16.00
Cleveland	17.00-17.50
Detroit	16.00-16.50
E. Pa., new mat.	18.50
E. Pa., old mat.	15.50-16.00
Pittsburgh	18.50-19.00
St. Louis	11.50-12.00
Valleys	19.50-20.00

BUNDLED SHEETS

Buffalo	14.00-14.50
Cincinnati, del.	13.00-13.50
Cleveland	13.50-14.00
Pittsburgh	17.25-17.75
St. Louis	10.00-10.50
Toronto, dealers	8.00

SHEET CLIPPINGS, LOOSE

Chicago	11.50-12.00
Cincinnati	11.50-12.00
Detroit	11.00-11.50
St. Louis	9.50-10.00

STEEL RAILS, SHORT

Birmingham	15.50-17.50
Buffalo	22.50-23.00
Chicago (3 ft.)	20.50-21.00
Chicago (2 ft.)	21.50-22.00
Cincinnati, del.	20.00-20.50
Detroit	19.50-20.00
Pitts., 3 ft. and less	25.00-25.50
St. Louis, 2 ft. & less	18.50-19.00

STEEL RAILS, SCRAP

Boston district	†15.00-15.50
Buffalo	20.00-20.50
Chicago	16.50-17.00
Cleveland	23.00-23.50
Pittsburgh	20.50-21.00
St. Louis	17.00-17.50

STOVE PLATE

Birmingham	10.00-11.00
Boston district	†10.50-10.75
Buffalo	14.50-15.00
Chicago	11.50-12.00
Cincinnati, dealers	10.00-10.50
Detroit, net	11.25-11.75
Eastern Pa.	14.00
New York, fdry.	†10.50-11.00
St. Louis	11.50-12.00
Toronto, deal'rs, net	9.50-10.00

SPRINGS

Buffalo	22.50-23.00
Chicago, leaf	21.50-22.00
Chicago, coil	22.00-22.50
Eastern Pa.	24.00-24.50
Pittsburgh	25.00-25.50
St. Louis	19.00-19.50

ANGLE BARS—STEEL

Chicago	20.00-20.50
St. Louis	17.00-17.50

RAILROAD SPECIALTIES

Chicago	20.50-21.00

LOW PHOSPHORUS

Buffalo, billet and bloom crops	22.50-23.00
Cleveland, billet, bloom crops	24.00-24.50
Eastern Pa. crops	25.50-26.00
Pittsburgh, billet, bloom crops	25.50-26.00
Pittsburgh, sheet bar crops	25.00-25.50

FROGS, SWITCHES

Chicago	16.50-17.00
St. Louis, cut	17.00-17.50

SHOVELING STEEL

Chicago	16.50-17.00
Federal, Ill.	13.50-14.00
Granite City, Ill.	13.50-14.00
Toronto, dealers	9.00- 9.50

RAILROAD WROUGHT

Birmingham	12.00-13.00
Boston district	†10.00-10.25
Buffalo, No. 1	16.50-17.50
Buffalo, No. 2	18.50-19.50
Chicago, No. 1 net	15.00-15.50
Chicago, No. 2	17.00-17.50
Cincinnati, No. 2	14.75-15.25
Eastern Pa.	19.00
St. Louis, No. 1	14.50-15.00
St. Louis, No. 2	16.00-16.50
Toronto, No. 1 dlr.	15.00

SPECIFICATION PIPE

Eastern Pa.	17.00
New York	13.00-13.50

BUSHELING

Buffalo, No. 1	16.50-17.50
Chicago, No. 1	15.50-16.00
Cincin., No. 1, deal.	14.50-15.00
Cincinnati, No. 2	8.50- 9.00
Cleveland, No. 2	12.50-13.00
Detroit, No. 1 new	14.50-15.00
Valleys, new, No. 1	18.00-18.50
Toronto, dealers	9.00

MACHINE TURNINGS

Birmingham	7.50- 8.00
Buffalo	11.50-12.00
Chicago	10.00-10.50
Cincinnati, dealers	9.00- 9.50
Cleveland	12.50-13.00
Detroit	10.00-10.50
Eastern Pa.	13.00-13.50
New York	†9.00- 9.50
Pittsburgh	14.50-15.00
St. Louis	8.00- 8.50
Toronto, dealers	8.00- 8.50
Valleys	13.50-14.00

BORINGS AND TURNINGS

For Blast Furnace Use

Boston district	†7.75- 8.25
Buffalo	13.00-13.50
Cincinnati, dealers	8.50- 9.00
Cleveland	12.50-13.00
Detroit	10.50-11.00
Eastern Pa.	12.00-12.50
New York	†8.00- 8.50
Pittsburgh	14.00-14.50
Toronto, dealers	8.00- 8.50

CAST IRON BORINGS

Birmingham	7.50- 8.00
Boston dist. chem.	†10.00-10.25
Boston dist. for mills	†9.25
Buffalo	13.00-13.50
Chicago	9.50-10.00
Cincinnati, dealers	8.50- 9.00
Cleveland	12.50-13.00
Detroit	10.50-11.00
E. Pa., chemical	15.50
New York	†8.00- 8.50
St. Louis	8.00- 8.50
Toronto, dealers	9.00

PIPE AND FLUES

Cincinnati, dealers	11.50-12.00
Chicago, net	13.00-13.50

RAILROAD GRATE BARS

Buffalo	15.00-15.50
Chicago, net	12.50-13.00
Cincinnati	10.50-11.00
Eastern Pa.	14.00
New York	†10.00-10.50
St. Louis	11.50-12.00

FORGE FLASHINGS

Boston district	†11.25-11.50
Buffalo	16.50-17.00
Cleveland	17.00-17.50
Detroit	13.50-14.00
Pittsburgh	17.25-17.75

FORGE SCRAP

Boston district	†6.50- 7.00
Chicago, heavy	22.00-22.50
Eastern Pa.	15.50

ARCH BARS, TRANSOMS

St. Louis	18.00-18.50

AXLE TURNINGS

Boston district	†11.00-11.50
Buffalo	16.00-16.50
Chicago, elec. fur.	18.50-19.00
Eastern Pa.	16.50-17.00
St. Louis	12.50-13.00
Toronto	9.50

STEEL CAR AXLES

Birmingham	18.00-20.00
Buffalo	22.00-22.50
Boston district	†20.00-21.00
Chicago, net	22.50-23.00
Eastern Pa.	27.00-27.50
St. Louis	24.00-24.50

SHAFTING

Boston district	†19.00-19.50
New York	†20.00-20.50
Eastern Pa.	24.50
St. Louis	14.00-14.50

CAR WHEELS

Birmingham	16.50-17.50
Boston dist., iron	†15.00-15.25
Buffalo, iron	18.50-19.50
Buffalo, steel	22.50-23.00
Chicago, iron	19.50-20.00
Chicago, rolled steel	20.50-21.00
Cincinnati, iron	18.00-18.50
Eatsern Pa., iron	19.50-20.00
Eastern Pa., steel	24.00-24.50
Pittsburgh, iron	20.50-21.00
Pittsburgh, steel	25.00-25.50
St. Louis, iron	19.00-19.50
St. Louis, steel	18.50-19.00

NO. 1 CAST SCRAP

Birmingham	12.00-13.00
Boston, No. 1 mach.	†15.00
N. Eng. del. No. 2	17.00
N. Eng. del. textile	18.50
Buffalo, cupola	18.25-18.75
Buffalo, mach.	19.00-19.50
Chicago, agri. net	13.00-13.50
Chicago, auto	14.00-14.50
Chicago, mach. net	15.00-15.50
Chicago, railr'd net	14.50-15.00
Cincin., mach. cup.	15.00-15.50
Cleveland, mach.	20.00-20.50
Eastern Pa., cupola	19.50-20.00
E. Pa., mixed yard	17.00-17.50
Pittsburgh, cupola	18.75-19.25
San Francisco, del.	13.50-14.00
Seattle	12.00-13.00
St. Louis, No. 1	13.50-14.00
St. L., No. 1, mach.	14.50-15.00
Toronto, No. 1, mach., net	16.00-17.00

HEAVY CAST

Boston dist. break.	†13.00-13.25
New England, del.	16.25
Buffalo, break.	15.75-16.25
Cleveland, break.	14.00-15.00
Detroit, break.	14.00-14.50
Detroit, auto net	15.00-15.50
Eastern Pa.	18.00
New York, break.	†13.50-14.00
Pittsburgh	16.50-17.00

MALLEABLE

Birmingham, R. R.	12.50-13.50
New England, del.	20.00
Buffalo	21.00-22.00
Chicago, R. R.	19.50-20.00
Cincin., agri. del.	15.00-15.50
Cleveland, rail	20.50-21.00
Detroit, auto, net	15.00-15.50
Eastern Pa., R. R.	20.00-21.00
Pittsburgh, rail	20.50-21.00
St. Louis, R. R.	18.50-19.00

RAILS FOR ROLLING

5 feet and over

Birmingham	16.00-18.00
Boston	†18.00-18.50
Buffalo	21.00-22.00
Chicago	21.00-21.50
Eastern Pa., R. R.	21.00-21.50
New York	†18.00-18.50
St. Louis	18.00-18.50

LOCOMOTIVE TIRES

Chicago (cut)	21.50-22.00
St. Louis, No. 1	18.00-18.50

LOW PHOS. PUNCHINGS

Buffalo	22.00-22.50
Chicago	21.50-22.00
Eastern Pa.	25.00
Pittsburgh (heavy)	24.00-24.50
Pittsburgh (light)	23.00-23.50

Iron Ore

Lake Superior Ore

Gross ton, 51½%

Lower Lake Ports

Old range bessemer	$5.25
Mesabi nonbess.	4.95
High phosphorus	4.85
Mesabi bessemer	5.10
Old range nonbess.	5.10

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56.63% con.	9.00-10.00
Cop.-free low phos. 58-60%	nominal

Foreign Ore

Cents per unit, f.a.s. Atlantic ports

Foreign manganiferous ore, 45.55% iron, 6-10% man.	*17.00
No. Afr. low phos.	17.00
Swedish low phos.	nominal
Spanish No. Africa basic, 50 to 60%	*15.50
Tungsten, spot sh. ton, unit, duty pd.	$22.00-22.50
N. F., fdy., 55%	7.00
Chrome ore, 48% gross ton, c.i.f.	$24.50-25.00

*Nominal asking price for spot.

Manganese Ore

(Nominal)

Prices not including duty, cents per unit cargo lots.

Caucasian, 50-52%	44.00
So. African, 50-52%	Nominal
Indian, 50-52%	Nominal

Sheets

Sheet Prices, Page 84

Pittsburgh—Demand for sheets continues steady, with many gages in both hot-rolled and galvanized being booked for fourth quarter on the "price later" basis. Cold-finished sheet deliveries in late July are obtainable. Requirements of the automotive industry apparently are not completely satisfied yet for 1937 models. Galvanizing mills continue operating around 77 per cent, hot and cold strip at 76 per cent, full finished around 84, and common black around 87.

Cleveland—Fear of threatened strikes brought out releases last week that otherwise would not have been taken until a later date. Some consumers are still in urgent need of material and in some instances are placing tonnage for fourth quarter delivery at prices prevailing at that time. Backlogs are extended well into third quarter on hot-rolled and galvanized sheets. However, deliveries on cold-rolled can be made in late June.

Chicago—While average deliveries on sheets have improved, some mills still have extensive backlogs which will provide heavy schedules well into third quarter. New business from the automotive industry is light though some small tonnages have been purchased for 1938 models. While motor car companies are digesting heavy tonnages ordered earlier in the year, sheet producers are provided an opportunity to catch up on deliveries and provide better service to other consumers. Mill operations hold at capacity.

Boston—Industrial fabricators of sheets, including small tank, stamping and miscellaneous consumers continue moderately active. Specifications are in fair volume and shipments steady, deliveries on most fin ishes being further improved. New buying is less active, about in line with consumption. Demand for blue annealed has held somewhat better than other finishes, several sellers report.

Buffalo—The old Seneca mill of the Bethlehem Steel Co. is operating at capacity in spite of the steady increase in output of sheets from the new strip mill. It is estimated the sheet output of Bethlehem works here is now absorbing as much as 25 per cent of the total ingot production. Large orders are on hand for sheets and June production promises to continue the heavy rates established earlier in the year.

New York—While sheet consumers are still specifying substantially,

new orders are tapering further. Most distributors appear well stocked, and in some cases appear to have excess quantities on hand which they are endeavoring to liquidate with reasonable dispatch. The possibility of further labor trouble in the midwest is not being overlooked, however, with a result that excess stocks in some warehouses and consuming plants do not appear too formidable. New York state is opening bids on 550 tons of license tag stock.

Philadelphia—While still in no sense quiet, sheet demand has shown a further letdown and deliveries are better. Jobbers are specifying less freely, although it appears that few leading distributors are overstocked. Stovemakers also are specifying less tonnage, but, sellers report, the decline here is not as pronounced as might be expected at this season. With operations at a virtual standstill due to strikes, the Philco radio company has held up shipments on sheets. Pennsylvania will open bids shortly on another lot of 350 tons of automobile license tag stock.

Cincinnati—Buying of sheets continues at the slackened rate established in the previous week, estimated at 10 to 20 per cent below district capacity. Deliveries on hot-rolled and galvanized are extended well into third quarter. Mill schedules continue unabated but stress on shipments has been much relieved, permitting fulfillment of an occasional rush specification.

St. Louis—The delivery situation on sheets, while still extended, is noticeably easier. Customers in the main have relaxed pressure for delivery. New business has fallen off to some extent, but general demand continues active, particularly for lighter gages. Galvanized sheets are reported active, with southern roofing and building requirements more in evidence than at this season since 1929.

Strip

Strip Prices, Page 85

Pittsburgh—While new tonnage in strip has declined, backlogs are still far from exhausted. Delivery promises are less uniform than a few weeks ago, but one producer offers three to four weeks on hot-rolled and five to six weeks on cold-rolled. Automotive industry apparently will operate at high rate well into summer. Household utility manufacturers have good backlogs and other consumers are active. Hot strip is quoted 2.40c, Pittsburgh, and cold strip, 0.25 carbon and under, 3.20c, Pittsburgh or Cleveland.

Cleveland—Demand for hot and cold-rolled strip continues unchanged since the first of the month, except for the slight increase in pressure for deliveries resulting from fears of threatened strikes. Most consumers continue operating close to capacity with mild tapering in some instances, due to seasonal influences. Deliveries on hot-rolled material can be made in late June, but cold-rolled is further extended. Some headway has been made against backlogs since the first of the month as shipments continue to exceed new business.

Chicago—While new strip business continues at the reduced rate in effect during the previous several weeks, backlogs are slow to decline and consumption is well sustained. Average deliveries have improved somewhat but mills face heavy operations through this quarter.

Boston—Current consumption of narrow cold strip is well maintained, but buying is slower while users work off stocks bought against anticipated higher third quarter prices. Finishing operations are high and some mills are reducing backlogs at a more rapid rate. Hot strip de-

liveries have further improved with cold rollers specifying steadily against contracts.

New York—Cold strip backlogs, although being reduced, are still large. High mill operations are maintained. Continued improvement in deliveries has resulted in some sellers promising five weeks. While buying is far below the volume of several weeks ago, the decline appears to have halted and is steadier. Consumers are working off stocks at a good rate. A fair, but spotty inquiry for hot strip prevails. Prices are unchanged.

Philadelphia—Dullness prevails in narrow strip, with deliveries still improving. Certain producers are now able to offer as little as one week's delivery on hot-rolled, and two to three weeks on cold-rolled. Prices are unchanged.

Plates

Plate Prices, Page 84

New York—About 15,000 tons of hull steel plates for three passenger-cargo boats for the Panama Railroad Steamship Co. placed with Bethlehem Shipbuilding Corp. will be fabricated at its Fall River plant at Quincy, Mass. This leaves only the two Sinclair Navigation Co. tankers, on which bids have been postponed to June 10, and the two battleships and two submarines, up for bids June 27, as the only major ship jobs in prospect. Manufacturers of domestic fuel storage tanks continue to specify freely and fabricators of larger tanks report an increase of inquiry. New railroad work has dwindled perceptibly though platemakers have much on books.

Philadelphia—Plate sellers here look for an early distribution by the Reading Co. of its carbuilding requirements. The question of underframes appears to be holding up action at the moment. Otherwise, little outstanding is being figured, although some producers declare that volume last week showed some improvement over the preceding period. Deliveries are easing slowly. Notwithstanding the fact that three and four weeks can be done in some cases, the majority of sellers have little to offer under eight and 10 weeks and not much then. One eastern producer has little available under 14 weeks, and one leading Pittsburgh interest is sold up on some grades 20 weeks ahead.

Boston—Plate requirements for bridges and miscellaneous construction are heavier. Fabricators are taking all tonnage previously placed and shipments are substantial. Some buyers, in view of uncertain labor outlook for several mills, are again anxious as to deliveries.

Pittsburgh—Deliveries on plates over 12 inches continue extended well into the summer. On smaller sizes earlier shipments are obtainable, but backlogs are still large and obtaining immediate delivery is hard to arrange. Tank fabricators and railroad and marine interests are taking good-sized tonnages.

Cleveland—Producers report only a slight improvement in deliveries as specifications from miscellaneous sources, particularly for structural requirements continue unabated. Backlogs remain from 12 to 16 weeks on most grades, supporting near capacity operations well into next quarter. Some specialty fabricators whose backlogs are still further extended have been forced to reject new business amounting to considerable tonnage because of the extended deliveries.

Chicago—Plate inquiries are fairly heavy but backlogs of some mills prevent quoting for early delivery. Several pipe lines are in prospect,

involving a total of 10,000 to 15,000 tons. Additional plate business for railroad equipment is in prospect though few large inquiries are active. Shipments to railroad shops and car builders continue heavy.

San Francisco—Plate demand continues quiet and only two projects over 100 tons are pending. No action has been taken on 550 tons for two 186-inch outlet pipes for the All American canal project in California nor on 450 tons of 30-inch welded steel pipe for the metropolitan water district, Los Angeles.

Plate Contracts Placed

500 tons, 36 aging tanks for Golden Age Breweries, Spokane, Wash.; general contract to Union Iron Works, Spokane.

190 tons, standpipe, U. S. Treasury department, Cincinnati, to Chicago Bridge & Iron Co., Chicago.

160 tons, 814,000-gallon standpipe, Westchester Joint Water Works, Mamaroneck, N. Y., to Pittsburgh-Des Moines Steel Co., Pittsburgh; bids May 13.

130 tons, softener tank, Council Bluffs, Ia., to Graver Tank & Mfg. Co., East Chicago, Ill.

Unstated, flume and penstock extensions Lehigh Cement Co., Metaline Falls, Wash.; general contract to Interstate Engineering & Construction Co., Newport, Wash.

Plate Contracts Pending

150 tons, lighthouse tender; GOLDENROD, Dubuque Boat & Boiler Works, Dubuque, Iowa, low.

Bars

Bar Prices, Page 84

Pittsburgh—New bookings continue lighter in bars and shipments are steady. Mill delivery promises vary, with some offering around six weeks. Most sellers are far from being disheartened over the outlook. Buying activity will be well maintained into the summer. Many consumers have large backlogs of orders, including farm implement and bolt and nut manufacturers.

Cleveland—Bar mills continue close to capacity as shipments to auto partsmakers, farm and road-making equipment manufacturers, steel forging concerns and cold bar finishers remains approximately unchanged. However, new business has declined to the point where deliveries on certain grades can be made this quarter. Demand for commercial and cold-drawn alloy steel bars from machine tool builders and auto partsmakers has given much encouragement to sellers here.

Chicago—Bar sales and specifications still are fairly heavy despite absence of pressure for prompt shipment. Deliveries are improved moderately, with shipments now available within 30 days from some producers. Farm implement and tractor manufacturers continue leading steel bar users, with operations at capacity and indications pointing to an uninterrupted run at this level through June. Tractor production this year appears likely to be the largest in history.

Boston—From machinery, small tool, forging and some bolt and nut specialty makers, demand for alloy and forging bars, while smaller, is fairly well sustained. Not much improvement in deliveries of alloy bars is noted. Carbon bars are less active at 2.85c, Boston.

New York—Commercial bar specifications are lighter, although no appreciable change is noted in shipments from a week ago. Most sellers are offering four to five weeks deliveries.

Philadelphia—Little improvement in bar deliveries has been noted, with four and five-week shipments the general average. However, the tendency is easier, what with the

requirements of the automotive interests in the middle west tapering off and with new demand in this district at least, perceptibly less pressing.

Pipe

Pipe Prices, Page 85

Pittsburgh—With a reasonably fair volume of new business, tube mills appear assured of steady operations well into July. Standard pipe continues active and oil country goods are moving well. Specifications and shipments, of course, have declined from the peak preceding the price announcement. Gathering lines are requiring considerable pipe. Prices are steady.

Chicago—Cast pipe shipments reflect the better rate of bookings during the past four to six weeks. New business is only moderately active and consists principally of small lots. Few inquiries have appeared lately from this district but there is scattered buying in adjacent states. A number of pipe lines are being considered but most of these have yet to develop into definite inquiries.

New York—Cast pipe inquiry is heavier with buying in small lots slightly more active. Tonnage being figured is the largest in several months. New York city closes May 25 on third quarter requirements, welded steel and wrought, while a board of water supply upstate dam contract calls for 200 tons of steel pipe. Two contracts for the Tallmans Island sewage treatment plant, New York, closing June 8, take close to 1000 tons of cast. Prices on the latter are notably firmer.

San Francisco—Cast iron pipe sales, with one exception, were confined to small lots. Inquiries are slow. Fillmore, Calif., has taken bids on 25,000 feet of 6 to 10-inch pipe. To date this year 15,651 tons have been booked, compared with 12,001 tons for the same period last year.

Steel Pipe Pending

200 tons, 18-inch and under, two exploratory caissons, Lackawack dam, Wawarsing, Ulster county, New York; bids June 2, board of water supply, New York, contract 338.

Cast Pipe Placed

580 tons, 6 to 24-inch, Minneapolis, to American Cast Iron Pipe Co., Birmingham, Ala.

352 tons, 4 to 8-inch, Fresno, Calif., to United States Pipe & Foundry Co., Burlington, N. J.

265 tons, 6 to 10-inch, Hartford, Conn., to United States Pipe & Foundry Co., Burlington, N. J.

Cast Pipe Pending

1000 tons, 54-inch and under, sewage treatment plant, Tallmans Island, New York; bids June 8, department of sanitation, New York.

200 tons, sewage disposal plant, Borough of Middlesex, N. J.

Tin Plate

Tin Plate Prices, Page 84

Pittsburgh—With some tin plate mills operating as high as 18 turns per week, operations continue well above 100 per cent. One producer who was set back several days by the short-lived strike made rapid strides last week toward recovering lost ground. Pressure for shipments is increasing as the packers' busy season draws near. All capacity is sold out until Sept. 30.

New York—Buying of tin plate is more normal following the heavy buying in March to obtain protection on as much tonnage as possible. A leading seller here reports that in

March such specifications were about 2½ times more than normal. Export demand is active although not to the point of forcing the sharp premiums offered earlier in the year. Tonnage now moving abroad is said to be billed at $5.20 to $5.50, Pittsburgh equivalent, depending on the freight.

Mercantile Metals Inc., Grant building, Pittsburgh, recently was appointed representative for William F. Jobbins Inc., Aurora, Ill., for the sale of aluminum in the western Pennsylvania and West Virginia district.

Cold-Finished

Cold Finished Prices, Page 85

Pittsburgh—Cold-finished bar producers here are encountering fair demand, although new business is lighter. Consumers continue anxious for shipments. Some additional buying is expected from automotive sources, which have prospects of two months' assemblies at a high rate. Machine tool builders and other lines are active. Cold-finished carbon bars are quoted 2.90c, Pittsburgh.

Transportation

Track Material Prices, Page 85

Railroad equipment interests and steel producers are confident that considerable freight car buying will develop soon. Indications point to a much higher peak in carloadings before the end of the year and equipment supplies are little more than sufficient to accommodate present traffic. While few live inquiries for freight cars are before the trade, a number of buying programs are under consideration. Locomotive orders include a passenger engine for the Chicago & North Western, placed with American Locomotive Co. New business in track material is light but rail mills continue well occupied and will maintain steady schedules at least through June. Spring track laying programs are progressing rapidly.

Litchfield & Madison railroad is reported inquiring for two locomotives. Purchase of about 18 locomotives is reportetd contemplated by two eastern roads.

Rail Orders Placed

Western Maryland, 2060 tons, to an unnamed mill.

Rail Orders Pending

215 tons, tie plates for seventy-pound rail, for Alaska railroad, purchasing agent, federal building, Seattle.

Car Orders Placed

Fort Worth & Denver City, four passenger lightweight streamlined trains, to Edward G. Budd Mfg. Co., Philadelphia.

Car Orders Pending

Aliquippa & Southern, 20 rack cars of 100 tons capacity; bids asked.

American Railroad of Puerto Rico, forty 5000-gallon tank cars; bids asked.

Locomotives Placed

Chicago & North Western, one type 4-6-4 passenger locomotives, to American Locomotive Co., New York.

Locomotives Pending

Litchfield & Madison, two locomotives; bids asked.

Buses Booked

A. C. F. Motors Co., New York: Twenty-one 41-passenger for Capital Transit Co., Washington; seventeen 35-passenger for Eastern Massachusetts Street Railway Co., Boston; ten 35-passenger

and eight 30-passenger for Connecticut Co., New Haven, Conn.; ten 29-passenger and seven 36-passenger for Southeastern Greyhound Lines, Lexington, Ky.; five 30-passenger for Southern Pennsylvania Bus Co., Philadelphia; four 30-passenger for Cumberland & Westernport Transit Co., Frostburg, Md.; two 40-passenger for Boston Elevated Railway, Boston.

Twin Coach Co., Kent, O.: Twenty-three 41-passenger for Capital Transit Co., Washington; ten 31-passenger for Milwaukee Electric Railway & Light Co., Milwaukee; ten 31-passenger for Honolulu Rapid Transit Co., Honolulu, T. H.; ten 23-passenger for National City Lines, Chicago; ten 40-passenger for Railway Equipment & Realty Co. Ltd., Oakland, Calif.; eight 31-passenger for Motor Transit Co., Jacksonville, Fla.; five 23-passenger for Connecticut Co., New Haven, Conn.; five 23-passenger for Berkshire Street Railway Co., New Haven, Conn.; two 23-passenger and two 31-passenger for Duke Power Co., Charlotte, N. C.; four 23-passenger for Santa Catalina Island Co., Avalon, Calif.

Wire

Wire Prices, Page 85

Pittsburgh—Demand is lighter, but better than expected in some lines. Shipments are heavy and backlogs sufficient to insure a high rate of operations through this quarter. Some consumers indicate they probably will find it necessary to reorder soon, having underestimated requirements. Stocks are not excessive. Export inquiry continues fairly active. Prices are steady.

Cleveland—Mills remain at close to capacity in all departments with consumption well maintained by most consumers, except in some merchant products affected by seasonal conditions. Specifications have declined considerably from the peak in March, as stocks of most consumers are above normal. However, since their production is at a steady high level a renewed buying movement is expected within four to six weeks. Backlogs of most wire producers are sufficient to support active operations well into next quarter.

Chicago—Wire shipments continue heavy as consumption among major users is well sustained. New business, however, is relatively quiet since users in some instances are reducing stocks. Production continues near capacity and active schedules are in prospect through the quarter. Outlook for wire products sales in farm areas is favorable despite spotty weather conditions which will affect crops adversely in some areas.

Boston—Specifications for wire are lower and well distributed. Mill operations are sustained with some finishing departments pressed for supplies of semi-finished steel. Most producers are reducing backlogs to a point where deliveries are materially better. The decline in buying is generally accepted as being due to substantial consumer stocks with removal of third quarter price uncertainty rather than material decline in consumption.

New York—Incoming wire volume has leveled to about 60-65 per cent of current heavy shipments, operations remaining high. Consumers have eased pressure for deliveries as production schedules improve, but no interruption of shipments is reported. One large eastern producer curtailed ingot production this week to make much-needed hearth repairs, indicating supplies of semi-finished are freer. Wire prices are firm and unchanged with manufacturing consumers still placing fair orders.

Buffalo—Wire mills continue to operate their open-hearth capacity at 50 to 75 per cent of available units. This contrasts sharply with the 25 per cent production schedule of past several years. Wire and rod

producers have indicated that even if seasonal peak demand for some goods should decline, other outlets would take up slack for next 60 to 90 days.

Shapes

Structural Shape Prices, Page 84

New York—Pending requirements are heavier, with 1077 tons, foundations, Bronx-Whitestone bridge, June 8, with 2510 tons, New Jersey approach, Lincoln tunnel, June 15. More than 30,000 tons are active, mostly for public works. Piling requirements are mounting with two contracts for the East river drive, New York, June 3, taking 2950 tons. Current contracts have been generally under 1000 tons, but tonnage awards will turn upward shortly.

Due to failure of contractors to bid on schools taking 3600 tons the board of education voted to reopen bidding, stipulating seperate contracts for steel and general construction. Contractors refused to bid because of a clause virtually requiring union labor, which in effect gives the board a right to cancel contracts in case of any labor controversy.

Boston—An additional 1100 tons for bridges, mostly in Massachusetts closing May 25 and June 1, brings pending bridge tonnage to about 3500 tons in New England. As new work has been coming out in heavier volume, structural contracts have been mostly for small lots. About 2000 tons for bridges are expected to be placed this week.

Philadelphia—Featuring structural buying is the award of 3600 tons for the Howard street bridge in Baltimore by a Philadelphia general contractor. Meanwhile, inquiry is somewhat livelier with an 1800-ton state bridge in Carbon county up for bids May 28 and with two new plant jobs now pending in this district.

Pittsburgh — Inquiries include many private building projects and a fair amount of bridge work. The South Canadian river bridge at Purcell, Okla., will require 2600 tons. Awards last week include 1450 tons for a factory building for Central Steel & Wire Co., Chicago, taken by American Bridge Co., Pittsburgh.

Cleveland — Structural market shows little change, with awards confined to jobs well under 100 tons. However, only slight improvement has been made against backlogs, which now range from four to six weeks. Pending list includes four projects aggregating 7000 tons. Prices remain firm.

Chicago — Structural fabricators still complain about the lag in private building work. Most of the larger awards and inquiries are coming from other districts, but the volume shows little improvement. Plain shapes are moving in large lots to railroad shops and freight car builders.

San Francisco—The most active market on the Pacific Coast during the week was that for structural steel, when 5725 tons were placed, bringing the aggregate to date to 94,963 tons, compared with 64,250 tons a year ago. The outstanding lettings were 1450 tons for the Hollywood Turf Club, Los Angeles, placed

Behind the Scenes with STEEL

Revelation

REVEALING all for the first time, this department unmasks the wiles by which STEEL'S advertising department prepares those interesting ads for Whitey Maurath and his company. On page 63 of this issue appears the latest in the series. While the masterpiece was being prepared, this department sneaked quietly up on ace cameraman Art Miller, of the Heiser Studios, Cleveland, and caught him in his treachery, with the result shown down below. So you see, boys and girls, Whitey is not really in a railroad station at all, but is only standing before a large photograph of one, prepared by Artist Bradbury, whose fiendish mind conceived the whole thing. Had us fooled, too. We thought it was the real McCoy.

* * *

No Sale

PERSISTENT heckler at sessions of the A. S. M. E. (p. 21) in Detroit last week was a gent who professed to be an inventor of no mean repute, but who had difficulty in piecing the English language together so he could be understood. Several times when discussion was requested on technical papers this brave soul launched into a long discourse on the tough row which inventors have to hoe. Each time, just as he was about to swing into a sales talk about his own accomplishments, the meeting chairman interrupted to rule him out of order.

The event marked a distinct innovation in technical society meetings, but what the man had invented was never discovered. There were rumors floating around it was an electric awakener for people who fall asleep at conventions.

* * *

Muchness

FROM the Iron and Steel institute comes word that somewhere in America is being fabricated the billionth ton of steel. In this age of billions, *one* billion doesn't seem so very large, but when our vice president in charge of box car numbers and the international debt reported, he said that a billion tons of steel was enough to give every man, woman, child and editor in the world 2¼ cubic feet of it to play with. Seems sort of foolish, though, because some of the kids might drop it on their toes. The v.p. told us a block like that weighs more than half a ton, and that is fatal to toes, also heels. Aren't you just longing to drop one on your favorite heels?

* * *

Harmony

PRIZE for the week's most harmonious headline goes to Bethlehem Steel, page 3 of this issue. After reading it we can just see in that little brown church in the wildwood a sweet children's choir and hear their silvery voices ringing out—

"Steel across the Golden Gate,
"Steal away to Jesus"

—SHRDLU

Shape Awards Compared

	Tons
Week ended May 22	22,610
Week ended May 15	14,946
Week ended May 8	25,213
This week, 1936	13,205
Weekly average, 1936	16,332
Weekly average, 1937	26,542
Weekly average, April	28,197
Total to date, 1936	399,440
Total to date, 1937	557,388

Includes awards of 100 tons or more.

with Bethlehem Steel Co., Los Angeles. Largest inquiry involves 2840 tons for the San Francisco terminal facilities of the San Francisco-Oakland bridge project, up for bids June 16.

Seattle—Larger shops are fully occupied with previous commitments, but new specifications are lacking this week. Bids are in for the Satsop river Washington state bridge, 250 tons. Bureau of Roads will open bids at Ogden, Utah, May 27 for a project in Bonneville county, Idaho for a 532 foot steel bridge.

Shape Contracts Placed

3600 tons, Howard street bridge, Baltimore, awarded through Kaufmann Construction Co., Philadelphia, to the American Bridge Co.; approximately 700 tons of reinforcing bars also are reported placed with the Truscon Steel Co., Youngstown, O.

3400 tons, subway section 6, route 101, on Sixth avenue, New York, to American Bridge Co., Pittsburgh; through Spencer White & Prentis Inc., New York.

1450 tons, factory building, Central Steel & Wire Co., Chicago, to American Bridge Co., Pittsburgh.

1450 tons, Hollywood Turf Club, Los Angeles, to Bethlehem Steel Co., Los Angeles.

1065 tons, state bridge, Merrimack river, Lowell, Mass., to American Bridge Co., Pittsburgh; through Coleman Bros. Corp,. Boston.

1035 tons, two buildings, Cincinnati Chemical Works, to American Bridge Co., Pittsburgh; through J. & F. Harig Co., general contractors, Cincinnati.

900 tons, steel sheet piling, bulkhead, Jacob Riis park, Queen, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.; through Clemente Construction Co., New York.

850 tons, bridge, Fargo, N. Dak., to Bethlehem Steel Co., Bethlehem, Pa.

600 tons, extension to transfer building, Libbey-Owens-Ford Glass Co., Ottawa, Ill., to Mississippi Valley Structural Steel Co., Decatur, Ill.

560 tons, bridge, Monticello, Miss., to Virginia Bridge Co., Roanoke, Va.

485 tons, bridge R-17040, Clearfield county, Pennsylvania, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

450 tons, government work at Kaukauna, Wis., to Carnegie-Illinois Steel Corp., Chicago.

430 tons, state highway bridge, route 32002, Tunnelton, Pa., to American Bridge Co., Pittsburgh.

430 tons, state highway bridge, route 64057 and 434, Livermore, Pa., to American Bridge Co., Pittsburgh.

425 tons, bridge 12322, Cameron county, Pennsylvania, to Lackawanna Steel Construction Corp., Buffalo.

400 tons, store and apartment building, Springler-Van Beuren estates, New York, to Drier Structural Steel Co., New York.

400 tons, bridge, project 11148, Crittenden county, Arkansas, to Arkansas Foundry Co., Little Rock, Ark.

380 tons, tunnel ventilation building, George Washington bridge approach, New York, to Bethlehem Steel Co., Bethlehem, Pa.; DeRiso Construction Co., general contractor.

330 tons, bridge 1043-R-315-C, Lawrence county, Mississippi, to Virginia Bridge Co., Roanoke, Va.

300 tons, school, Endicott, N. Y., to Bethlehem Contracting Co., Bethlehem,

Unit Steel Bids, Massachusetts Dept. Public Works

Highway Bridge, Merrimack River, Lowell, May 10

Material	Unit	A	B	C	D	Lowest Total
Structural steel.....	2,130,000 lbs.	$0.07	$0.075	$0.0655	$0.075	$139,515.00
Reinforcing steel.....	200,000 lbs.	0.0385	0.04	0.048	0.045	7,700.00
Sidewalk grating....	10,428 sq. ft.	1.50	1.50	1.40	1.40	14,599.20
Pipe rail fence.....	935 lin. ft.	3.00	3.00	3.50	3.50	2,805.00

A—Coleman Bros. Corp., Boston, low on general contract, $318,909; B—T. Stuart & Son Co., Watertown, Mass., second low, $319,389.50; C—Central Construction Co., Boston, third, $356,568.70; D—M. F. Gaddis Inc., Boston, fourth, $387,680.

Multiple Steel Bridge, Westfield River, Huntington, May 10

Material	Unit	A	B	C	D	Lowest Total
Structural steel.....	1,440,600 lbs.	$0.06	$0.067	$0.0693	$0.068	$86,436.00
Reinforcing steel.....	331,300 lbs.	0.04	0.043	0.04	0.046	13,252.00

A—Arute Bros. Inc., low on general contract, $289,284.65; B—C. I. Hosmer Inc., second low, $304,126.50; C—V. Bartlett Co., third, $305,048.78; D—Central Construction Co., fourth, $305,138.70.

Pa.; through F. W. O'Connell, Binghamton, N. Y., general contractor.

295 tons, bridge FAP 217-A, Garvin county, Oklahoma, to Pittsburgh-Des Moines Steel Co., Pittsburgh; R. S. Smith & Co., Oklahoma City, general contractor.

290 tons, Di Rey bridge, United States engineer office, proposal 292, Los Angeles, to Wisconsin Bridge & Iron Co., Milwaukee.

285 tons, bridge 1043-R-322-B&A, Perry county, Mississippi, to Nashville Bridge Co., Nashville, Tenn.

255 tons, grade crossing, New York Central railroad, Jordan N. Y., to American Bridge Co., Pittsburgh; through Bates & Rogers Co., New York.

250 tons, shapes and bars, senior high school, Cheyenne, Wyo., to Midwest Steel & Iron Works Co., Denver, shapes, and Concrete Engineering Co., Omaha, Nebr., bars; F. J. Kirchof Construction Co., Denver, general contractor.

235 tons, building, American Nephaline Co., Rochester, N. Y., to Genesee Bridge & Iron Co., Rochester.

230 tons, protection screens, various locations, for Pennsylvania railroad, to American Bridge Co., Pittsburgh.

175 tons, press building No. 52, Midland Steel Products Co., Detroit, to Whitehead & Kales Co., Detroit.

170 tons, foundry addition, Lunkenheimer Co., Cincinnati, to Bethlehem Steel Co., Bethlehem, Pa.

160 tons, addition, boiler house, Libbey-Owens-Ford Glass Co., Rossford, O., to R. C. Mahon Co., Detroit.

150 tons, bridge FAP-313-B, Lowndes county, Mississippi, to Jones & Laughlin Steel Corp., Pittsburgh.

150 tons, grandstand, Rochester, Minn., to Paper, Calmenson Co., Minneapolis.

130 tons, junior high school, Gainesville, Tex., to Central Texas Iron Works, Waco, Tex.; O. K. Johnson, Waco, general contractor.

130 tons, building addition, National W. I. & A. B. Co., Washington, Pa., to Fort Pitt Bridge Works, Pittsburgh.

120 tons, factory addition, Carr China Co., Grafton, W. Va., to Pittsburgh Bridge & Iron Co., Rochester, Pa.

120 tons, water filtration plant, Lawrence, Mass., to West End Iron Works, Cambridge, Mass.; James A. Monroe & Sons, North Attleboro, Mass., general contractors.

115 tons, Essex outdoor substation, Public Service Electric & Gas Corp., Newark, N. J., to B. Katchen Iron Works Inc., Irvington, N. J.

110 tons, postoffice, Anderson, S. C., to Ingalls Iron Works Co., Birmingham, Ala.; through Beers Construction Co., Atlanta, Ga., reinforcing to Cosco Steel Products Co., Birmingham.

100 tons, building, St. Francis infirmary, Enfield, Conn., to Haarmann Steel Co., Holyoke, Mass.; through E. & F. Construction Co., New York.

100 tons, Palmer hall, Loomis institute, Windsor, Conn., to Berlin Construction Co., Berlin, Conn.; R. F. Jones Co., Hartford, general contractor.

100 tons, mill building, Brockway Glass Co., Brockway, Pa., to Independent Structural Steel Co., Pittsburgh.

Shape Contracts Pending.

6000 tons, Queens general court house, Jamaica, Queens, New York; John J. Kennedy & Co., Inc., New York, general contractor, $3,077,800, bids May 17.

5500 tons, plus 4000 tons of piling, Mississippi river dam, Cap au Gris, Mo.; United Construction Co., Winona, Minn., low for general contract. American Bridge Co. low for fabricated steel.

5000 tons, public school, Philadelphia, bids June 7.

5000 tons, three schools, Philadelphia, bids June 14.

3150 tons, two sections, West side elevated viaduct, Dyckman and lower Dyckman streets, New York; bids May 25, with New York Central railroad.

2950 tons, steel sheet piling, East river drive, New York, Grand street to East fourth street, contract 3, and East fourth to East twelfth street, contract 4; bids June 3, president, Borough of Manhattan. Two contracts also require 160 tons, structural steel.

2840 tons, San Francisco facilities, San Francisco-Oakland bridge project; bids June 16.

2600 tons, state bridge over South Canadian river, Purcell, Okla.

2510 tons, including 1900 tons, carbon and copper-bearing, and 610 tons, silicon, New Jersey approach, Lincoln (Mid-town) tunnel, New York; bids June 15, Port of New York authority, contract MHT-23.

2100 tons, accessory plant, General Motors Corp., Rochester, N. Y.

1500 tons, reconstruction, Chain bridge, Potomac river, Washington, D. C.; Tullar Construction Co., Red Bank, N. J., low; bids May 14 to district commissioners.

1077 tons, tower pier and anchorage foundation and approach, Bronx-Whitestone bridge, New York; bids June 8, Triboro Bridge authority. Tonnage includes 175 tons, cutting edges; 57 tons, anchor bolts and frames, and 845 tons, structural steel.

900 tons, plant addition Keasbey & Mattison Co., Ambler, Pa., with United Engineers, Philadelphia, opening contracts last week.

800 tons, three state bridges, Indiana; bids June 1.

600 tons, coal tipple, Madisonville, Ky.

590 tons, embedded parts, spillway gates, Chickamauga Dam; also 10 tons, stainless steel; bids May 26, Tennessee Valley Authority, Knoxville, Tenn.

560 tons, structural steelwork, Central Nebraska power and irrigation district, Hastings, Nebr.

550 tons, manufacturing building, Argonaut Realty Corp.-General Motors Corp., Detroit.

550 tons, cell block, state prison, Attica, N. Y.; bids May 27, department of correction, Albany.

525 tons, jail, Erie county, Buffalo; John W. Cowper Co., Buffalo, general contractor.

450 tons, final water purification plant building, city of Milwaukee; bids May 24.

430 tons, steel plate girder railroad bridge, Union street, Braintree, Mass.; bids June 1, department of public works, Boston, G. H. Delano, chief engineer.

425 tons, reception building, state hospital, Creedmore, N. Y.

400 tons, alterations to manufacturing building, Parrish Pressed Steel Co., Reading, Pa.

400 tons, operating bridge, for Pickwick Landing dam, Tennessee, Tennessee Valley authority, Knoxville, Tenn.

400 tons, state highway bridge, Blairsville, Pa.

400 tons, state bridge, Project FAP-113-R, Manderson, Wyo.

400 tons, court house, Erie, Pa.; Henry Dattner, Detroit, low.

360 tons, cutting edges, Louisiana river bridge, New Orleans, La.

350 tons, extension to forge shop, Standard Steel Works Co., Burnham, Pa.

345 tons, steel sheet piling, navy department, Norfolk, Va.

300 tons, building, A. C. Lawrence Leather Co., Peabody, Mass.

250 tons, eighty-foot bridge span, for Alaska railroad, purchasing agent, federal building, Seattle; bids June 10.

250 tons, post office, Salina, Kan.; James I. Barnes, Springfield, Mo., low.

240 tons, building, American Nepheline Corp., Rochester, N. Y.

230 tons, building, Schnefel Bros., Newark, N. J.

200 tons, bulkhead gates, Specification No. 758, United States bureau of reclamation, Grand Coulee dam, Washington.

175 tons, steel piling, bureau of supplies and accounts, Navy department; bids June 4, schedule 739.

160 tons, bleachers, Wrigley field, Chicago.

134 tons, steel stringer state bridge and approaches, Ware, Mass.; H. R. Cummings Construction Co., general contractor.

125 tons, highway overpass, Winnepauk, Norwalk, Conn.; Mariani Construction Co., New Haven, general contractor.

125 tons, granite plant, Wisconsin state reformatory, Green Bay, Wis.; Milwaukee Bridge Co., Milwaukee, low.

106 tons, shapes and bars, bridges, Warner and Cornish, N. H.; Arborio Road Construction Co., Hartford, Conn., and O. W. Miller Co., Inc., Springfield, Mass., general contractors.

100 tons, shapes and bars, steel stringer state bridge and approaches, Barre, Mass.; James A. Gaffey & Son, Boston, general contractor.

100 tons, power house, Lincoln park, Chicago.

Unstated, 532 foot steel bridge for bureau of roads, Bonneville county, Idaho; bids at Ogden, Utah, May 27.

Ferroalloys

Ferroalloy Prices, Page 86

New York—Shipments of ferromanganese this month will run substantially heavier than in April, it now appears. Last month a number of consumers coasted along for a while on the stocks that were laid in at the end of first quarter before the advance in prices. The outlook for next month is for a still heavier movement, according to leading trade interests, as contract customers may be faced with further advance in prices which went into effect on spot tonnage the latter part of last month. However, prices for third quarter will likely not be announced definitely much before the middle of June. The current spot market is $102.50, duty paid. Domestic spiegeleisen, 19 to 21 per cent, is moving well, with prices unchanged, at $33, Palmerton, on spot tonnage.

Reinforcing

Reinforcing Bar Prices, Page 85

Pittsburgh—Awards and inquiries continue numerous. Pending business includes 800 tons for the Lansing, Mich., sewage treatment plant, and a number of other jobs. Awards include 310 tons for a laboratory in Little Falls, N. Y., placed with Truscon Steel Co., Youngstown, O.

Cleveland—General run of miscellaneous awards from private sources aggregates considerable tonnage. Most fabricators are well stocked as more prompt delivery from mills is available. Some mills can make delivery within a week. Pending list includes seven large projects aggregating close to 2000 tons.

Chicago—Demand is steady, but inquiries are restricted by the relative quiet in private building. Shipments are sustained, aided by a resumption of operations by Calumet Steel Co. Backlogs of some distributors have receded as a result of heavy deliveries.

Boston—With bridges, sewer and

highway projects coming out in heavier volume, reinforcing requirements mount. Massachusetts closes on three bridges, May 25, and four, June 1, taking several hundred tons. Small-lot contracts are numerous with a sharp upturn expected during the next three weeks. Contractors bidding reinforcing steel in place on several jobs recently have lowered quotations to under 4.00c in several instances.

New York—With 1000 tons, mostly mesh, bought for New York state highways, reinforcing steel volume is heavier. New tonnage out for bids, however, is large. Total volume pending is estimated at more than 10,000 tons, exclusive of state highway and bridge needs which are increasing.

Philadelphia—With possible exception of 700 tons, placed by the Kaufmann Construction Co., this city, for the Howard street bridge in Baltimore, awards are light, below normal seasonal activity. However, increasing new work is in prospect, including two lots of 400 tons each. Pennsylvania state institutional work is expected next month. Prices lack test.

San Francisco — Improvement in demand is noted in the call for bids, opened June 16, for 2500 tons for the San Francisco terminal facilities of the San Francisco-Oakland bay bridge; and in the opening of bids on June 9 for 1800 tons, for the Sunset reservoir, San Francisco. Majority of the awards were confined to less than 75 tons and awards aggregated only 673 tons, bringing the total for the year to 34,193 tons compared with 89,317 tons in 1936.

Seattle — Inquiry for reinforcing materials has improved slightly but no outstanding projects are out for figures. Mills are still working on backlogs, probably sufficient to carry well into second quarter. Pending tonnage includes 375 tons for Seattle light department.

Concrete Awards Compared

	Tons
Week ended May 22	4,178
Week ended May 15	17,769
Week ended May 8	5,751
This week, 1936	2,739
Weekly average, 1936	6,005
Weekly average, 1937	4,929
Weekly average, April	5,131
Total to date, 1936	147,249
Total to date, 1937	103,512

Includes awards of 100 tons or more.

Reinforcing Steel Awards

700 tons, Howard street bridge, Baltimore, to Truscon Steel Co., Youngstown, O.; through Kaufmann Construction Co., Philadelphia.

325 tons, highway project RC 3871, Warsaw-Perry Center-Moscow, Wyoming county, New York, to American Steel & Wire Co., New York; Rochester Concrete Construction Co., Inc., Rochester, N. Y., general contractor.

310 tons, Chris Hanson laboratory, Little Falls, N. Y., to Truscon Steel Co., Youngstown, O.

275 tons, sewage disposal project, Buffalo, to Igoe Bros., Newark, N. J.; P. Tomasetti Contracting Co., Brooklyn, general contractor.

260 tons, incinerators, Wayne county, Michigan, to Joseph T. Ryerson & Son Inc., Chicago.

225 tons, apartment, Scarsdale, N. Y., to Concrete Steel Co., New York; Wilcox Construction Co., New York, general contractor.

225 tons, bridge, McKeesport, Pa., to Electric Welding Co., Pittsburgh; Freeland Inc., Pittsburgh, contractor.

200 tons, building, Pittsburgh Post-Gazette, Pittsburgh, to Jones & Laughlin Steel Corp., Pittsburgh; through Metzger-Richardson Co. and W. W. Dambach Co., Pittsburgh; W. F. Trimble & Sons Co., Pittsburgh, contractor.

200 tons, highway bridge, Easton, Pa., and Phillipsburg, N. J., to Bethlehem Steel Co., Bethlehem, Pa.

160 tons, highway project W. F. 37-2, Horace Harding boulevard, Queens county, New York, to Truscon Steel Co., Youngstown, O.; Johnson, Drake & Piper, Inc., Freeport, N. Y., general contractor.

150 tons, highway project RC-3867 Livingston county, New York, to Wickwire-Spencer Steel Co., New York; Mohawk Paving Co. Inc., Buffalo, general contractor.

150 tons, highway project HHP-37-1, Hutchinson river parkway, Bronx county, New York, to Fireproof Products Co., New York; Rusciano & Son Corp., New York, general contractor.

150 tons, Winnepauk bridge, Norwalk, Conn., to Truscon Steel Co., Youngstown, O.; through Mariani Construction Co., New Haven, Conn.

150 tons, Hockey rink, Cleveland, to Patterson Leitch Co., Cleveland.

130 tons, approaches, Bushkill street bridge, Delaware river, Eaton, Pa.-Phillipsburg, N. J., to Igoe Bros., Newark, N. J.; through Korp & Korp, Phillipsburg.

130 tons, hospital, Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa.

125 tons, highway projects, Wantagh parkway extension, Nassau county, and W. F. 37-3, Queens county, New York, to Wheeling Steel Co., Pittsburgh; Johnson, Drake & Piper, Inc., Freeport, N. Y., general contractor.

110 tons, Maggie Walker high school for negroes, Richmond, Va., to Virginia Steel Co., Richmond; T. A. Loving & Co., Goldsboro, N. C., general contractor.

103 tons, bridge in Lincoln county, Colorado, to unnamed interest.

100 tons, tunnel ventilation building, approach, George Washington bridge, New York, to Bethlehem Steel Co., Bethlehem, Pa.; DeRiso Construction Co., New York, general contractor.

Unstated tonnage, 6-story addition, L. C. Smith & Corona Typewriter Co., Syracuse, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.; Dawson Bros., Syracuse, general contractors.

Reinforcing Steel Pending

2500 tons, San Francisco terminal facilities, San Francisco-Oakland bridge project; bids June 16.

1800 tons, Sunset reservoir, San Francisco; bids June 9.

1750 tons, estimated, sewage treatment plant, Tallmans Island, New York; bids June 8, department of sanitation, New York.

1318 tons, tower pier and anchorage foundation and approach, Bronx-Whitestone bridge, New York; bids June 8, Triboro Bridge authority, New York.

1175 tons, New Jersey approach, Lincoln (Mid-town) tunnel, New York; bids June 15, Port of New York authority, contract MHT-23; work also requires 100,000 linear feet reinforcing trusses.
800 tons, sewage treatment plant, Lansing, Mich., Patterson Construction Co., low bidder.
640 tons, Mississippi river dam, Cape au Gris, Mo.; United Construction Co., Winona, Minn., low on general contract.
550 tons, reinforcing bars and miscellaneous steel, Bills Brook dam, contract 17, Connecticut; Perini & Sons low, $1,587,968.25, on May 17 bids.
450 tons, grain bins, Tonawanda, N. Y.; bids soon.
440 tons, highway, first section, Merritt parkway, Greenwich, Conn.; A. I. Savin Construction Co., East Hartford, Conn., general contractor.
400 tons, state grade crossing elimination work, Wilmington, Del.; bids June 9.
395 tons, bureau of reclamation, invitation A-42,250-A, Potholes, Calif.; bids opened.
380 tons, wharf, Fort Baker, San Francisco; bids May 28.
380 tons, building, Publications Corp., Hoboken, N. J.
317 tons, crossing at Pocatello, Idaho; bids opened.
310 tons, building, Scheidt Brewing Co., Norristown, Pa.; bids soon.
300 tons, sewage disposal plant, Cleveland.
290 tons, state hospital, Ypsilanti, Mich.
280 tons, two sections, West side elevated viaduct, Dyckman and lower Dyckman streets, New York; bids May 25, with New York Central railroad.
275 tons, building, Delco-Remy Co., Anderson, Ind.
260 tons, sewage disposal plant, at Davenport, Iowa; O'Neil Co., St. Paul, low.
250 tons, two exploratory caissons, Lackawack dam, Wawarsing, Ulster county, New York; bids June 2, board of water supply, New York, contract 338; also includes 100 tons, miscellaneous steel and metal and 25 tons structural steel.
250 tons, substructure Mississippi river bridge, La Crosse, Wis.; bids May 28.
233 tons, project 3W1, Natchez trace parkway, Adams-Jefferson counties, Mississippi; bids June 10 to agricultural department.
210 tons, East river drive, two contracts, Grand to East Twelfth street, New York; bids June 3, president, Borough of Manhattan.
200 tons, bridge over Pennsylvania railroad, near Rosslyn, Va.; bids June 4 to department of agriculture, Washington, national capitol park project 6A3.
175 tons, wholesale drug warehouse, Seattle; awaiting settlement of labor dispute.
165 tons, highway, Hyland's corner, Enfield, Conn.; Lane Construction Corp., Meriden, Conn., general contractor.
160 tons, addition, Paraffine Companies, Emeryville, Calif.; bids opened.
156 tons, Satsop river state bridge, Washington; bids in.
120 tons, Gorge intake dam, Seattle city light; Teufel & Carlson, Seattle, low.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 85

Sustained operation by farm equipment interests and freight car builders is supporting a high rate of consumption of bolts, nuts and rivets. Shipments are holding near the best rate for the year and June deliveries are expected to be comparable. Jobbers' sales to miscellaneous users also are holding well. Rivet consumption by structural fabricators has shown somewhat less than the anticipated improvement.

With the exception of some small adjustments in semifinished hexagon nuts and small rivets announced last week, bolt, nut and rivet prices will remain unchanged for the third quarter.

Pig Iron

Pig Iron Prices, Page 86

Pittsburgh—New buying continues light, but shipments are good compared with April. Two plants whose production was affected by short strikes recently have made rapid recovery. Sellers are not alarmed over decline in new business and consider it a natural reaction following March rush. Producers ex-

pect they soon will be in position to make headway in building up stocks. Consumers are catching up on orders. Prices are steady.

Cleveland—Pig iron shipments, while not comparing favorably with the peak during March, have held up better than many sellers anticipated. Operations among auto, farm equipment and railroad castings foundries are close to capacity. Most foundries are fairly well stocked and few have shown any tendency to build up excess supply as a hedge against a possible price advance or labor tie up.

Chicago—Pig iron shipments so far this month are moderately ahead of April and May deliveries may be up to previous expectations. Leading foundries show practically no recession in operations, with active schedules seen through June. Third quarter books will be opened June 1. Extension of the present $24 market on No. 2 foundry and malleable is expected.

Boston—With books to be opened for third quarter next week, belief grows pig iron prices will not advance. Current buying is mostly for small fill-in lots with shipments against old orders steady. Foundry operations continue high. The district furnace will have shipped close to 16,000 tons to Japan since resuming blast by early June. Several 500-ton lots for Sweden have also left this port.

Philadelphia—Pig iron trade looks for producers to start opening books late this week for third quarter. June 1, on Tuesday of the following week, is theoretically the day when such action might be expected, but most trade interests now believe third quarter prices will be cleared up before Memorial holiday. General expectation is that there will be no advance. This is reflected in the attitude of most consumers who are making no effort to specify heavily against contracts. Meanwhile, shipments are being maintained.

New York—Pig iron consumers apparently are showing no concern over price prospects for third quarter. Their specifications are being maintained but there is no quickening such as might be the case were higher prices expected. Producers' books are expected to be opened for the next period around June 10. Colonial furnace, Riddlesburg, Pa., is scheduled to go in immediately.

Buffalo—Twelve furnaces will be in blast within a week. Relining of furnace at the Hanna Co.'s Rogers Brown works is nearing completion. Demand for shipment on contracts is heavy and fill in orders are becoming more numerous. Lake and barge iron shipments are at rate of 5000 to 10,000 tons a week and iron stocks here are being reduced.

Cincinnati—New pig iron orders are few and light. Market was without speculation against possible third quarter advance indicating confidence prices will be reaffirmed. Stocks are being depleted by heavy melt and July, at the latest, should bring revival of buying.

St. Louis—In view of heavy purchasing of pig iron earlier in the year, when price advances were looked for, orders recently placed are in larger than expected volume. Stocks of melters vary widely, some being well supplied for the next few months, while others, who overestimated requirements, are rapidly nearing the end of their reserves. Shipments are steady at the rate prevailing earlier in the month and are about on a parity with the April average, but slightly below the peak movement in March.

Birmingham, Ala.—Fourteen furnaces are in blast and two more soon will be blown in. Producers are preparing for an active market. Demand for foundry iron continues steady with smaller industries providing a good spot market. Cast iron pipe, stove makers and other small pig iron consumers are anticipating continued steady production. No. 2 foundry holds steady at $20.38.

Scrap

Scrap Prices, Page 88

Philadelphia—Steel scrap quotations are unchanged, but several reductions have been made in cast grades and railroad specialties. Domestic buying is still sluggish and exporters here apparently have enough scrap under contract to meet needs.

With new storage charges scheduled to go into effect May 25 at all Atlantic ports south of and including New York and at Gulf ports, exporters are making every effort to schedule rail shipments so as not to bring down penalties under the new storage rates. The question prevails in some quarters as to whether these charges will be effective on tonnage already on dock at old ladings. Suspension of shipments at Phoenixville, Pa., is expected to be lifted this week and with some consumers beginning to exercise pressure for scrap under contract, it is possible that a turn, or at least a greater degree of stability is at hand.

Pittsburgh—After last week's decline of $1 per ton on No. 1 heavy melting, result of a 15,000-ton sale to the leading interest at around $19, some dealers encountered difficulty in obtaining good material at $18.50, but this was expected to be only temporary. Railroad specialties and cast grades did not exhibit sharp weaknesses. A Pennsylvania railroad list closing May 26 includes 9350 tons of No. 1 heavy melting, 3500 tons of rail steel and 2100 tons of unassorted car and locomotive material.

Chicago—Heavy melting steel has been sold to a local mill at $17 and the market for this and several other

grades is off an additional 50 cents. The trade anticipates a firmer situation in view of the contraction in the area from which present prices will draw scrap, but consumers continue uninterested in making extensive commitments and are holding out for lower prices.

Boston—Holders of iron and steel scrap are slow to release tonnage at current lower bids for domestic shipment. Most steelmaking grades are easier, including heavy melting for dock delivery, off $1 a ton. The Worcester, Mass., consumer is buying lightly with delivered prices 50 cents to $1 lower. Boat loading is active, cars moving to piers without much delay when spot cargo space is available.

New York—Most grades for export dock delivery are $1 per ton lower, including heavy melting steel, the top prices now being $15 for No. 1 and $14 for No. 2. Some dealers are paying slightly less. For domestic shipment prices are largely nominal, due to lack of buying but have weakened in sympathy, including stove plate and heavy melting steel grades. Buying is light with mills showing little interest. Export buying is smaller but purchases against export contracts is fair.

Buffalo—Scrap has dipped sharply as consumers have reduced their offers well below trading ranges of recent weeks. It is reported some small lots of No. 1 heavy melting steel have been sold as low as $17.50 while dealers are asking $18.50 for tonnage. Heavy unfilled orders tend to strengthen the sagging market. Summer & Co. shortly will begin scrapping ten Canadian steamships which will result in a large tonnage of scrap.

Detroit—Quotations on scrap have slipped further in the face of light trading, pronounced weakness being shown in cast grades. Local foundries show no interest and steel mills are following the price down for the present. Heavy melting steel No. 1, at $15.00-$15.50, is down to the level of late last year. Auto malleable scrap is again off sharply.

Cincinnati—Bidding on recent railroad offerings of scrap rails indicate a check in the downward movement of scrap prices, and serve as a stimulant to dealer sentiment, although the prolonged absence of mills from the market leaves it still soft. Many items are unchanged for the first time in a month.

St. Louis—The downward trend continues in scrap iron and steel. Declines ranging from 50 cents to $1.50 per ton affect practically all grades. Mills expect still lower prices, and are holding aloof from the market. Buying by all classes of melters is light, and confined chiefly to small lots of special grades for adjusting mixtures. The decline since April 1, about which time the peak was reached, has been the most rapid in the memory of interests long in the trade here. The advance is conceded to have been too rapid, and with increased offerings the tide turned with a rush.

Birmingham, Ala.—Prices have receded somewhat in sympathy with those in other areas but buying is light and melters have good stocks. Supplies show no signs of exhaustion. Foundry and blast furnace grades are steady.

Seattle—Japan is still willing to buy at present levels but exporting is seriously handicapped by Japanese government restrictions and continued scarcity of trans-Pacific space. These factors have weakened the market.

Metallurgical Coke

Coke Prices, Page 85

With more beehive coke on track and demand lighter, conditions in the Connellsville, Pa., region are

somewhat easier. A new working contract has been signed by H. C. Frick Coke Co. covering its employes in the captive mines.

Warehouse

Warehouse Prices, Page 87

Pittsburgh — While warehouses here have noticed a falling off in new business, demand in certain lines such as sheets and structurals is well maintained. Distributers are replenishing stocks as mill deliveries permit. Prices are steady.

Cleveland—Shipments out of warehouse seem to be leveling off at a moderate pace, with some grades of sheets, plates, and structurals holding up better than other products. Distributors anticipate a relatively even demand through this quarter, with less recession than customary during June.

Philadelphia—Volume this month will be down from April. Past week has shown a more perceptible downward trend, although business is still far from dull. Light building work continues to make good demands, and jobbers regard business as generally satisfactory. Prices are steady.

Iron Ore

Iron Ore Prices, Page 88

Cleveland—Stocks of iron ore at lower Lake ports and furnaces May 1 were approximately 4,700,000 tons less than on the comparable date last year, according to Lake Superior Iron Ore association.

The association's report follows:

	Tons
Consumed in March	5,142,496
Consumed in April	5,114,177
Decrease in April	28,319
Consumed in April, 1936	3,485,293
On hand at furnaces, May 1	12,295,385
On Lake Erie docks, May 1	2,336,653
Total on hand at furnaces and Lake Erie docks, May 1	14,632,038
Reserves, total, May 2, 1936	19,369,690

M. A. Hanna Co.'s current report shows that for the first time in many years all of the 308 ore carriers, with a trip tonnage of 2,616,600, are in commission.

Nonferrous Metals

Nonferrous Metal Prices, Page 86

New York—Nonferrous metal markets strengthened last week on the definite uptrend in prices on the London Metal Exchange. There were no major price changes, however, except in tin which advanced 1¾ cents per pound.

Copper—Export copper sold up to 24.37½c, c.i.f. around midweek but at the close metal was available as low as 24.30c. Inquiry increased in both the domestic and foreign markets with independent fabricators in this country re-entering the market in an active fashion. Copper and brass products advanced ¼-cent due to higher labor costs. Electrolytic was firm at 14.00c, Connecticut.

Lead—A decline in refined stocks to the lowest level since February, 1931, coupled with an advance of about $20 per ton in the London price, improved sentiment materially. Prices held at 6.00c, New York.

Tin—Straits tin prices moved steadily upward on the higher market abroad and general reticence on the part of sellers. Consumers bought fair tonnages around midweek. Straits spot closed at 56.37½c.

Lukens Reduces Price On Inconel-Clad Steel

Lukens Steel Co., Coatesville, Pa., has announced a new and lower price of 25 cents per pound on its Inconel-clad steel and a new list of standard extras is put in effect. Sizes up to 120 inches in width and 264 inches in length in 3/16-inch plate with cladding of 10, 15 or 20 per cent are obtainable. Cladding of five per cent may be had on ½-inch plate and heavier. Inconel metal is an alloy of approximately 70 to 80 per cent nickel, 12 to 14 per cent chromium and 6 to 8 per cent iron. It offers a high degree of corrosion resistance, strength and working properties.

Steel In Europe

Foreign Steel Prices, Page 87

London—(*By Radio*)—Iron and steel markets of Great Britain are quiet except for negotiations for contracts for delivery during last half. An increase of £1 per ton in pig iron prices is expected. All departments of steel production are active at capacity. Orders booked by shipyards are nearing a record. Increased imports of Continental semi-finished steel are easing the position of rerollers.

Steel and iron imports in April were 88,469 tons, 5812 tons less than in March. Exports at 239,461 tons in April showed a gain of 7904 tons over March.

The Continent reports no diminution in activity, with export demand outstripping available supplies. Premiums as high as 20 gold shillings are being offered freely for desired deliveries.

Equipment

Cleveland—Machine tool and equipment sales this month have been slightly slower than unusual business of previous months. Dealers expect business to level off to a steady rate. Manufacturers' operations are at high level as they attempt to reduce backlogs and improve deliveries, still far extended.

Chicago—Machinery and plant equipment sales this month are fail-

ing moderately behind April volume. Following several months of exceptional demand some recession in buying is regarded by dealers as natural. Inquiries still are fairly active, but there is less rush among buyers to close. Railroads are taking occasional small orders.

Mirrors of Motordom

(*Continued from Page* 30)

ing out 4000 cars daily on one shift, there is no cause for dismay on the part of Hudson-Terraplane officials. Last week, a short-lived sit-down strike in the paint shop there was caused by a wrangle over new wage rates, but union officials quickly "had the situation in hand" and production was resumed with no serious consequences.

OF CHIEF interest along the labor front is the crystallization of the UAW organizational drive against Ford's 90,000 at the Rouge plant. The union movement will be directed by Richard T. Frankensteen, who was ringleader of the Chrysler strike. He promises to use every resource of the UAW in signing up Ford workers and implies that if necessary the pressure of the union's "200,000 members in Detroit" would be brought against friends, relatives and families of Ford workers. This smacks of the familiar strong-arm policy which the UAW has used so successfully in organizing other plants in this territory. It is a pretty good bet the system will not work at the Rouge plant.

Meanwhile, as UAW President Homer Martin threatened disciplinary action against recalcitrant strikers in General Motors plants, the union demanded General Motors withdraw recognition extended to the American Labor League in the corporation's Ternstedt plant, not included in the list of 17 plants in the UAW-GM agreement. A shop committee of the new labor organization has been accorded recognition by the management.

Thirty striking employes at the Detroit plant of Thompson Products Inc. were evicted by a small application of tear gas following a deadlock in negotiations between the company and UAW over wage rates. The company has a six-month contract with the UAW granting sole recognition and providing minimum wage and seniority. Tuesday 125 men sat down in one of the assembly divisions on orders from UAW officials. Later about 100 left, and a conference with the UAW production was resumed. The plant employs 900.

Construction and Enterprise

Ohio

BELLEVUE, O. — Bellevue Mfg. Co. is considering construction of plant addition to provide about 3200 square feet of additional floor space. J. F. Martin is president.

CLEVELAND — Atlantic Tool & Die Co. has been organized by F. R. Fullmer, Edward A. Foote Jr., and William F. Steck. Foote, Bushnell & Chandler, Terminal Tower building, are correspondents.

COLUMBUS, O. — Columbus Conveyor Co. has started work on construction of plant addition at Goodale street and Northwest boulevard. George Reibel, 1782 Franklin avenue, is general contractor.

DAYTON, O. — Moraine Products Co., a division of General Motors Corp., 329 East First street, has awarded contract to National Concrete Fireproofing Co., 925 Citizen's building, Cleveland, for construction of one-story factory addition. D. C. McGuire, 310 General Motors building, Detroit, Mich., is agent.

EDGERTON, O. — Village is taking bids, due May 25, for construction of waterworks system, including wells, turbine pump and auxiliaries, pump house, cast iron pipe and fittings, valves, meters and elevated steel tank. Cost of project is estimated at $88,000. Carl J. Simon & Associates, Van Wert, O., is consulting engineer. R. E. Buda is mayor.

GREENFORD, O. — Salem Fruit Growers Association is considering erection of cold storage plant, here, at an estimated cost of $50,000.

MALVERN, O. — Hershey Chocolate Co., Hershey, Pa., is considering construction of chocolate manufacturing plant, one story, 30 x 300 feet, at an estimated cost of about $15,000.

MANSFIELD, O. — Tappan Stove Co. is considering erection of factory addition or extensive remodeling of present plant. Charles Conklin, 20 Dawson avenue, is architect.

NORWALK, O. — Maple City Ice Cream Co. has completed plans for construction of warehouse building. Will presumably ask for bids before long.

TIFFIN, O.—Ohio Cities Water Co. has plans under consideration for construction of 200,000-gallon elevated steel water tank and tower.

WEST MANSFIELD, O.—Village plans construction of waterworks system, estimated to cost about $16,000. Bond issue to finance project will be submitted to voters at special election, June 15. J. E. Bechtel is mayor.

Pennsylvania

BRADFORD, PA.—Bradford Oil Refining Co. has announced plans for expenditure of $500,000 to construct modern refinery plant, here. Equipment contracts have been awarded and construction is expected to be completed by the end of the year.

KNOX, PA.—Knox Glass Co. has plans under way for construction of warehouse to replace building destroyed by fire recently. Cost is estimated at $125,000.

NEWTON, PA.—All George School is having engineer take bids on general contract for construction of one-story, brick power house. G. Kendrick Bringhurst, 1700 Walnut street, Philadelphia, is engineer. Francis Pyle is secretary of the school.

PITTSBURGH — Mehler Inc., successor to Mehler Research & Engineering Inc., has been organized to manufacture precision valves. Dr. C. J. Mehler is

president; V. R. Shattuck is general manager.

PORT ALLEGANY, PA. — Pittsburgh-Corning Glass Corp. is expected to start work soon on construction of factory, here, to manufacture glass building units, particularly for soundproofing and insulation purposes. A. Vauxhall, chief engineer, Corning Glass Works, 79 Walnut avenue, Corning, N. Y., has completed test borings for foundations. Product will be distributed through the facilities of the Pittsburgh Plate Glass Co.

WEST READING, PA. — Metropolitan Edison Co., a subsidiary of Associated Gas & Electric Co., will spend $3,000,000 on modernizing its plant here. E. H. Werner is vice president and general manager.

New York

BUFFALO—J. N. Adam & Co., department store, will spend over $300,000 in remodeling, this summer, including installation of escalators extending from basement to eighth floor.

BUFFALO—Crane Co., 836 South Michigan avenue, Chicago, is having plans drawn by Frederick B. Backus, 360 Delaware avenue, Buffalo, architect, for construction of large addition to its warehouse here.

LONG ISLAND CITY, N. Y.—Allied Bronze Co. has leased about 10,000 square feet of manufacturing floor space in building at 10-01 Forty-third avenue for production of bronze, brass and similar metal goods.

MONTOUR FALLS, N. Y.—Shepard-Niles Crane & Hoist Corp., here has plans for construction of one-story addition to cost about $50,000 with equipment.

NEW YORK—Lone Star Cement Corp., 342 Madison avenue, has set aside fund of $1,000,000 for expansion and improvements in mills, including installation of additional machinery.

Michigan

DETROIT—Govro-Nelson Co., 1931 Antoinette avenue, is having figures taken by Henry M. Freier, architect, 300 Murphy building, for construction of shop addition.

HUDSON, MICH.—City is having plans prepared by Pate & Hirn, architects, 1610 Washington Boulevard building, Detroit, for extensions and improvements to waterworks system.

MENOMINEE, MICH. — M. & M. Light & Traction Co. plans construction of 80 miles rural power line extensions in Menominee county, to cost about $75,000. L. P. Works is manager.

MONROE, MICH.—Monroe port commission is considering construction of dock, warehouse and turning basin, at an estimated cost of $231,000. John S. McMillan is chairman of the board. PWA project.

TRENTON, MICH.—National Glass Co., Chicago, Ill., plans construction of bottle manufacturing plant on West road, here, at an estimated cost of $500,000.

New Jersey

HILLSIDE, N. J. — Hatfield Wire & Cable Co. has awarded general contract for construction of one-story addition, 60 x 120 feet, to Fatzler Co., 11 Hill street, Newark, N. J. Cost, with equipment, will be over $40,000.

Connecticut

GREENWICH, CONN. — C. W. Hazlett, 170 Overlook drive, plans construction of one-story machine shop, 35 x 113 feet, estimated to cost about $40,000 with equipment. Carl Ludwig, 1 West Elm street, is engineer.

HARTFORD, CONN. — Hartford Special Machine Co., 287 Homestead avenue, plans installation of boiler plant at local works. Greenwood & Noerr, 525 Main street, are consulting engineers.

Illinois

CHICAGO — Kraft-Phenix Cheese Corp., 400 North Rush street, will install power plant for central heating service in new nine-story plant now under construction on Peshtigo court near Grand avenue. Air conditioning will also be installed. Cost of entire building will be about $2,000,000. Mundie, Jensen, Burke & Havens, 39 South LaSalle street, are architects.

CHICAGO—Wilhelm Tool & Die Works Inc., 444 North Oakley boulevard, has been incorporated by J. F. Wilhelm and associates, to do all forms of tool and die work.

CHICAGO — Fairbanks, Morse & Co., 900 South Wabash avenue, manufacturer of engines, motors, stokers and other machinery, has leased two-story building at 1901-7 Roosevelt road, for expansion of stoker division.

ROCKFORD, ILL. — Rockford Drilling Machine Co., 120 Catherine street, is considering erection of one-story addition, 50 x 137 feet, for storage and distribution facilities. General contract has been awarded to Linden & Son, 1102 Tenth street.

Indiana

KOKOMO, IND.—Chrysler Corp., Detroit, has acquired part of former Haynes auto plant here and plans construction of a division of Dodge. Estimated cost of remodeling and re-equipping is about $2,500,000.

Alabama

BAY MINETTE, ALA.—Baldwin County Electric Membership Corp. has $200,000 funds from REA for construction of rural transmission lines in the southern part of the state.

NORTH BIRMINGHAM, ALA.—W. M. Smith, Forty-fifth to Forty-eighth streets, First avenue North, is in the market for a punch press, suitable for handling light sheets, eight to ten inches wide and up to 30 inches long.

Maryland

EDGEWOOD, MD.—Chemical warfare service, Edgewood arsenal, is taking bids until June 1 for one generator, invitation E. A. P. 37-177, for delivery Edgewood.

District of Columbia

WASHINGTON — Bureau of supplies and accounts, navy department, will receive bids until May 28 for one pot-type electric furnace, schedule 735, for delivery Norfolk, Va.; miscellaneous refrigerating plants and air-cooling units, schedule 743, for delivery Portsmouth, N. H., and Mare Island, Calif.; miscellaneous air cooling and conditioning plants, schedule 745, for delivery Brooklyn, N. Y., and Philadelphia, Pa.; until June 1 for miscellaneous motors, complete with electric brake, controller and spare parts, schedule 734, for delivery Philadelphia; one motor-driven single cylinder surfacer, schedule 754, delivery Submarine Base, Conn.; until June 4 for miscellaneous electric furnaces and spares; transformer, switch and cable, schedule 732, for delivery Keyport, Wash.; miscellaneous steel piling and corner pieces, schedule 739, for delivery various east or west coast points; until June 8 for miscellaneous quantities of foundry pig iron, schedule 746, for delivery various east and west coast points; for ten tons of medium plate steel, schedule 757, for delivery Mare Island, Calif.; and until June 15 for miscellaneous quantities of abrasive wheels, schedule 749, for delivery various east and west coast points.

WASHINGTON — Office of the general purchasing officer, Panama Canal, will open bids June 1 for miscellaneous quantities of tool grinding machines, pneumatic paving breakers, warehouse trucks, cast iron pipe fittings, railway carwheel brake shoes, screw jacks, chain shackles, wire cloth, pig iron, ingot copper, pig tin, ferrotitanium and wire casting brushes, among other items, schedule 3256, for delivery Canal Zone, Isthmus of Panama.

WASHINGTON — Procurement division, treasury department, Seventh and D streets S. W., will receive bids until May 29 for one generator unit, invitation 222-3645-5-29; one motor-driven saw rig, invitation 222-3650-5-29. H. E. Collins is assistant director.

Virginia

RICHMOND, VA.—Phillip Morris & Co. Ltd. Inc., 10 South Twentieth street, will construct a plant in South Richmond with an estimated expenditure of about $700,000. Plans are now in preparation. Francisco & Jacobus, 511 Fifth avenue, New York, are architects; O. H. Chalkley is president.

Georgia

ATLANTA, GA.—City water department plans improvements to waterworks system, work to extend over five-year period. First project will be replacement of pumping plants and filter units in treatment works at a cost of about $200,000. Entire projected expenditure is estimated at $1,100,000. Weideman & Singleton, Candler building, are engineers.

COLUMBUS, GA. — Georgia Power Co., Atlanta, proposes construction of underground electric system, to cost about $600,000.

REYNOLDS, GA.—Taylor County Electric Membership Corp. receives bids May 28 for construction of about 51 miles transmission lines in Taylor county. C. B. Marshall is attorney; J. B. McCrary Engineering Corp., 22 Marietta Street building, Atlanta, Ga., is engineer.

Kentucky

BARDSTOWN, KY.—Salt River Rural Electric Co-operative Corp. receives bids May 26 for construction of about 330 miles rural electric distribution system in Nelson, Bullitt, Washington and Spencer counties. Plans and specifications are on file at the office of the owner and Ray W. Chanberry Inc., 1001-3 Realty building, Louisville, Ky.

GLASGOW, KY.—City council to purchase waterworks of Kentucky-West Virginia Utilities Co., for $200,000, to operate as municipal plant.

Florida

FERNANDINA, FLA.—Florida Public Utilities Co. started work clearing plant site between Lime and Kelp streets, here. R. V. Nolan is manager.

ORLANDO, FLA.—Utilities commission receives bids until June 21 for installation of 10,000-kilowatt turbine in power plant.

Missouri

KANSAS CITY, MO.—City receives bids until May 27 for construction of addition to northeast pumping station at a cost of about $250,000. Improvement plans call for installation of electrical and other apparatus.

Oklahoma

BLACKWELL, OKLA.—Kay county cooperative receives bids until May 28 for construction of rural electric distribution system, about 275 miles in length, in Kay county. Peyton Brown is attorney; plans and specifications may be obtained from W. R. Hutchison, secretary, at Newkirk, Okla., or from E. T. Archer & Co., New England building, Kansas City, Mo.

TULSA, OKLA. — General Atlas Carbon Co., subsidiary of Cities Service Co., 60 Wall street, New York, is considering construction of chemical carbon plant to use natural gas in the Oklahoma panhandle. Production will be obtained from Matthews and Jackson wells on Rock Island railway north of Guymon, Okla.

Wisconsin

FOND DU LAC, WIS. — Simplex Mfg. Co., Chicago, maker of roof flashings, ventilators, etc., is remodeling former woodworking plant and will install machinery and equipment.

KENOSHA, WIS.—Nash Motors Co. has announced plant expansion program involving expenditure of $1,500,000 at main works in Kenosha, branch factory in Racine, Wis., and at Seaman Body Corp., wholly owned subsidiary, in Milwaukee. Conveyor system costing $150,000 is included in program for Seaman Body Corp. improvement.

LA CROSSE, WIS.—Allis-Chalmers Mfg. Co., Milwaukee, has purchased additional acreage for plant expansion, here, with expenditure estimated at $350,000 for new construction. F. J. Papenfuss is works manager in La Crosse.

MILWAUKEE—Howard Brass & Copper Co., 608 South Second street, has purchased factory of Maxwell-Ray Co., 612 South Second street, and will double manufacturing facilities at once. Maxwell-Ray Co., maker of lamp fixtures, is negotiating for smaller building.

MILWAUKEE — Esquire Tool & Die Corp. has been organized by Ed. Johnson and R. J. Teske.

RACINE, WIS.—Jacobsen Mfg. Co., 747 Washington avenue, maker of power lawn mowers, is adding 13,000 square feet to production space by purchase of four-story section, 60 x 60 feet, of former H. & M. Auto Body Co. plant on Center street. Oscar Jacobsen is president.

WISCONSIN RAPIDS, WIS.—Consolidated Paper & Water Power Co. is entering on $1,500,000 expansion program here and at Biron, Wis., to increase output of sulphite plant by 45 tons daily. Pipeline for sulphite transfer to Biron mill is contemplated. George W. Mead is chairman of the board.

Minnesota

DULUTH, MINN. — M. A. Hanna Coal & Dock Co. plans improvements to dock at foot of Thirty-ninth avenue West, to cost about $350,000 including new railway tracks, loading bridge, etc.

MINNEAPOLIS — Stremel Bros. Mfg. Co., makers of metal fireproof doors, windows and other metal products, is constructing extensive improvements to plant and will install new machinery to increase production.

MINNEAPOLIS — Western Mineral Products Co. has leased three-story factory building and will remodel, install machinery and equipment for manufacture of new type mica insulating material.

MINNEAPOLIS — Minneapolis General Electric Co., subsidiary of Northern States Power Co., has started construction of three-story plant addition, 80 x 80 feet, costing $250,000 and will install additional power plant equipment.

ST. PAUL — St. Paul Boiler & Mfg. Co. has been incorporated, with capital stock of $25,000, to manufacture boilers and do a machine shop business. L. T. Kenny is president.

WORTHINGTON, MINN. — City plans improvements to municipal light and electric plant, including installation of coal storage and handling equipment. N. D. Miller is city clerk.

North Dakota

LA MOURE, N. DAK.—Barnes county project, T. X. Calnan, county agent, has filed application with REA to finance construction of rural transmission lines in five counties to serve 2136 customers.

MANDAN, N. DAK.—City is having survey made for construction of filtration plant costing about $168,000, including mix chambers, sand filters, 450,000-gallon clear well, building, equipment, chlorinators, baffles and meters.

Iowa

ALLERTON, IOWA—City voted in favor of $24,000 bond issue at recent election, to finance construction of municipal waterworks.

DUBUQUE, IOWA — Klauer Mfg. Co., manufacturer of metal building products, culverts and rotary type snow plows, has awarded contract to R. F. Conlon Sons Construction Co., for construction of two-story factory addition, 60 x 170 feet, and will install additional metalworking machinery. C. I. Krajewski, Dubuque, is architect.

VINTON, IOWA—Benton county rural electric co-operative has permit for construction of 1400 miles rural electric lines, and will take bids soon on construction of first 417 miles of the project. H. H. Fagan is president. (Noted May 17, 1937).

WHITING, IOWA—City is taking bids, due June 1, for new plant equipment, including one diesel engine, with generator, exciter and auxiliary equipment. Bids will also be taken for general repairs and improvements to the power plant. L. H. Wilen is city clerk.

Nebraska

OMAHA, NEBR.—Nebraska state legislature has authorized city council to construct sewage disposal plant in Benson suburban district. Estimated cost is about $1,200,000. Harry Trustin, City hall, is city engineer. Plans expected to be completed in a few weeks.

Colorado

COLORADO SPRINGS, COLO. — Holly Sugar Corp. has disclosed plans for expenditures amounting to $2,500,000 for plant expansion purposes. Its factory at Alvarado, Calif., will be rebuilt at a cost of $2,000,000. The company is also considering construction of a plant at Hardin, Mont.

DENVER, COLO.—Bureau of reclamation is receiving bids until June 2 for one bulkhead gate and 16 bulkhead gate frames and track assemblies, for installation at Grand Coulee Dam, Columbia Basin project, Wash., specification No 738; until June 3 for one 50-ton motor-operated overhead traveling crane with 10-ton auxiliary hoist for Seminole power plant, Casper-Alcova project, Wyo., specification 929-D; until June 7 for two vertical-shaft, 115,000-horsepower hydraulic turbines, and two governors and auxiliary equipment for installation in Boulder Canyon project, Arizona-California-Nevada, specification 734; and until June 14 for two 82,500-kva vertical alternating current generators for Boulder power plant, Boulder Canyon project, specification 732.

PUEBLO, COLO. — City is considering construction of gas generating plant in connection with new sewage disposal system. Cost is estimated at $500,000. Federal aid will be applied for. Black & Veatch, 4706 Broadway, Kansas City, Mo., are consulting engineers.

Montana

SIDNEY, MONT. — Lower Yellowstone rural electrification association will take bids, due June 1, for construction of 110 miles rural transmission lines in Richland and Dawson counties, Montana, and McKenzie county in North Dakota. Nels Back is president; Lief Erickson is secretary. Cost will be about $115,000. J. M. Garrison, Helena, Mont., is state engineer.

Pacific Coast

LOS ANGELES — Harbor commission plans to erect machine shop at Berth 161. Cost is estimated at $119,791. Contract was awarded to Peter P. Shelby.

LOS ANGELES—Halsco Inc., 3587 Beverly boulevard, has purchased site on Council street, between Madison avenue and Beverly boulevard, for construction of line-production house trailer plant, at an initial cost of $50,000. Hal Smith is president.

PICO, CALIF. — Worley & Co., manufacturer of steel equipment, is erecting annex connecting two plant buildings at Durfee avenue and Stevens street, here. The structure will be of steel and glass construction, 60 x 175 feet.

HOQUIAM, WASH.—Grays Harbor Corp. has been allotted $50,000 by REA for construction of hydro-electric generating unit and 23 miles distributing lines.

SPOKANE, WASH.—Golden Age Breweries Inc. is increasing plant capacity by installation of 36 steel aging tanks. New railroad spurs are also under construction. Cost of improvements is estimated at $100,000. Morris Rosauer is vice president.

BAKER, OREG.—Oregon Lumber Co. is spending $60,000 on additions to plants here and at Bates. New equipment is being installed.

HOOD RIVER, OREG.—Construction is under way on cold storage warehouse, 180 x 318 feet, for Hood River apple growers association.

KLAMATH FALLS, OREG.—Klamath Ice & Storage Co. plans construction of new refrigeration unit, according to A. M. Collier, president.

PORTLAND, OREG.—Union Avenue Shingle Mill, recently destroyed by fire, will be rebuilt with enlarged capacity. E. C. Newberg is president.