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STEEL

ESTABLISHED 1882

Contents

Volume 106—No. 21 **May 20, 1940**

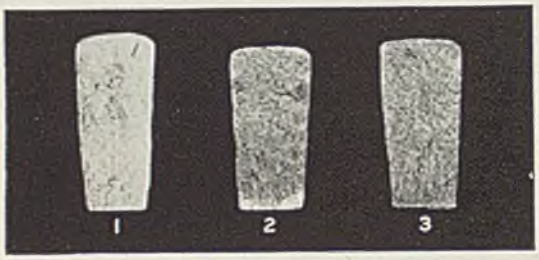
PRODUCTION • PROCESSING • DISTRIBUTION • USE

SMZ

Trade-Mark

Alloy

A New Alloy for Addition to Cast Iron in the Ladle . . . .



1.—This test specimen cast from a low-silicon iron shows the typical white iron structure. 2-3.—These specimens show the graying effects of increasing amounts of "SMZ" alloy added to the same iron.

LEFT: This photomicrograph shows the typical structure of a low-silicon white iron.

RIGHT: This photomicrograph shows the structure of the same iron graphitized by a ladle addition of a small amount of "SMZ" alloy. (Photomicrographs taken at 100 diameters.)

Useful information about other "Electromet" ferro-alloys for the cast iron foundry is contained in the following booklets: "Chromium In Cast Iron", 48 pages; "Briquetted Alloys for the Cast Iron Foundry", 16 pages; and "Electromet Special Graphitizer", 4 pages. A request on your letterhead will bring you copies of those which interest you, without obligation.

ELECTROMET has recently developed a new graphitizing alloy composed of silicon, manganese, and zirconium, which has been named "SMZ" alloy. Due to the balanced composition of this alloy, it is particularly effective in producing the following beneficial results when it is added to cast iron in the ladle:

1. It converts a normally hard white iron into a high-strength gray iron.
2. It reduces the chill of gray iron and minimizes wall sensitivity — prevents chilling of thin sections.
3. It produces a better microstructure of the iron with resultant improvement in strength and physical properties.

Our metallurgists will gladly tell you more about this new "SMZ" alloy and other "Electromet" ferro-alloys for the foundry, and will give you practical help in using them to advantage. Ask for this service, or write for further information. They are available without obligation, of course.

ELECTRO METALLURGICAL COMPANY

Unit of Union Carbide and Carbon Corporation

UCC

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

Available through offices of Electro Metallurgical Sales Corporation in Birmingham, Chicago, Cleveland, Detroit, New York, Pittsburgh, and San Francisco. In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

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Electromet

TRADE MARK

Ferro-Alloys & Metals

As the Editor Views The News

■ PROFOUND changes in the government's thinking on the subject of the national defense were manifested last week when developments in the European war revealed clearly that only armed might is respected by aggressor nations. The President's recommendations to congress (p. 21) indicate that mobilization of industry toward this objective will be vast and that it will be pushed with utmost vigor. The plans provide for large industrial expansion, particularly in the aircraft and machine tool production industries, for educational campaigns to break the bottleneck in the supply of skilled labor, for priority of certain equipment and materials needed for rearmament.

• • •

Last week saw substantial gains on the business front. Steel production moved up 3½ points (p. 25) to 70 per cent of ingot capacity, and appears headed for materially higher levels. Domestic demand (p. 85) is gaining. So is export demand — although not to the extent reported in some quarters last week. Steel prices are firm but no advances are expected. Scrap prices are advancing rapidly, mostly in anticipation. Predictions are heard that this year's lake iron ore shipments will be the largest in history . . . A novel feature of the American Iron and Steel institute's annual meeting, May 23, is to be (p. 39) a forum on industrial relations.

Production Higher

• • •

Under present conditions, warns John E. Lovely, continuous planned machine tool replacements (p. 23) are vital to the future success of American industry . . . Of timely interest (p. 22) is Warner & Swasey Co.'s campaign for training machine operators . . . Attention again was focused last week on our reserves of strategic materials. It was stated in the house (p. 31) that tin stocks in this country would not last three days under war conditions . . . United States Steel Corp. has a new contributory pension plan (p. 38) under which employes earning more than $3000 annually are cared for adequately . . . Vanadium Corp. of America (p. 38) announces a new "Grainal" group of alloys.

Need Tool Renewals

• • •

L. O. Sordahl and R. B. Sosman describe (p. 44) an economical, easily used method for determining open-hearth bath temperatures. A recording photocell unit is employed. . . . F. H. Emery (p. 48) clarifies the factors that enter into the problem of color matching of porcelain enamels. . . . The American Society for Testing Materials (p. 52) announced the program for its annual meeting, June 24-28. . . . Results of a recent investigation by A. J. Smith and J. W. Bolton (p. 56) appear to explode the theory held in some quarters that cast steel lacks the weldability of rolled steel. Howard F. Taylor and Edward A. Rominski find chaplets the frequent cause of casting rejections.

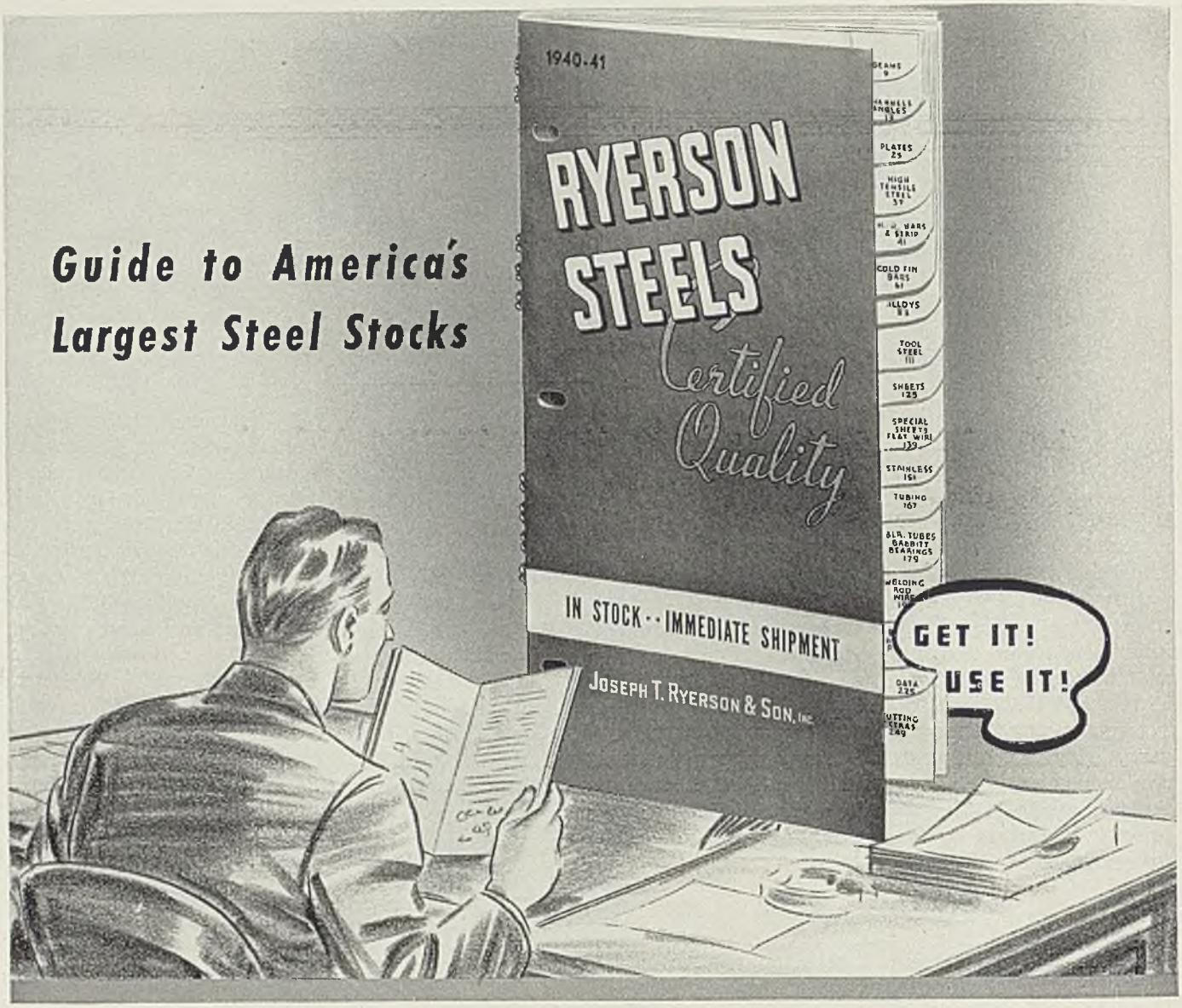
Matching Enamels

• • •

E. K. Carlson (p. 62) describes methods by which torch cutting operations may be performed with maximum efficiency. . . . M. A. Snell (p. 66) discusses health hazards in the operation of pickling tanks—and their control by mechanized exhaust ventilating systems. . . . Automatic carbon arc buttwelding used in the construction of aluminum tank cars (p. 69) results in higher quality of welds and without raising costs. . . . Max Essl summarizes advantages (p. 72) that result from the use of welded construction in the production of diesel engine frames. . . . A belt conveyor is the key unit (p. 70) in simplifying materials handling at a new die-casting plant.

Efficient Cutting

E C Kreutzberg



THE NEW RYERSON STOCK LIST

speeds—and simplifies—steel buying

New products . . . new analyses . . . new sizes . . . more reference tables and helpful charts . . . improved mechanical features—all combine to make the new Ryerson Stock List an outstanding manual for steel users. Whatever your need in steel and allied lines, you can rely on the Ryerson Stock List as a dependable guide to Immediate Stock Shipment of uniform high quality products.

Over 10,000 kinds, shapes and sizes of Ryerson Certified Steels are available from 10 large, fully-equipped plants. Every pound of steel carried in stock by Ryerson represents the highest quality available in each particular classification.

If you have not received your copy of this new book, write for it today. If you do have one, keep it handy, use it often, profit by it repeatedly. Joseph T. Ryerson & Son, Inc. Plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.

RYERSON STOCK LIST INCLUDES

Many New Products

Cold Forming Plates, Inland Hi-Steel Cold Rolled Stretcher Leveled Sheets, Pluramelt Stainless Steel Sheets, SAE 4815 Hot Rolled Alloy Rounds, W. D. X4130 Hot Rolled and Cold Rolled Rounds, and SAE X4340 Hot Rolled Alloy Rounds are among the new products listed in this new book.

Handy Reference Tables and Charts

SAE Standard Specification tables, physical properties charts showing physical properties and machinability ratings of over 50 steels, weight tables, numerical equivalent charts and other important data are included in the 1940 Ryerson Stock List.

Complete Description of Many Lines

Over 10,000 kinds, shapes and sizes of Certified steel are shown. These include structurals, bars, plates, sheets, cold finished steels, heat treated alloys, tool steel, high tensile steel, stainless, mechanical tubing, babbitt metal, welding rod, reinforcing bars, bolts, nuts, rivets, etc.

Improved Mechanical Features

In addition to an enlarged product index, the new book has an improved thumb tab margin index. Eye-conditioned paper assures easy reading. A new type of mechanical binding has been adopted so the book will lie flat and pages turn easily.

M DAY

Approaches for Industry!

Alarmed by fresh developments in the European war, the government decides on a strong policy of national defense. With numerous bottlenecks in sight, vast expansion is necessary in some industries and in reserves of skilled labor. Stage is set for priorities covering certain equipment and materials

■ AS WAR in Europe reached hurricane tempo last week, industry in America prepared to gear more closely its operations to the conflict and to our own new national defense program. Conviction crystallized that from now on military requirements will be the dominant factor in many lines of industry.

Increases in demand for products for export to belligerents and neutrals and for this country's armament program presage a situation in which many industries' capacities will be taxed to the limit. Some leading industrialists believe we are on the eve of the greatest industrial mobilization ever attempted in this country in peace time.

President Roosevelt's arms program, outlined to congress last week, was generally well received. although the method of financing, which the Chief Executive left to congress, is questioned. To cost $1,182,000,000, the program is designed: First, to procure the essential equipment of all kinds for a larger and thoroughly rounded out army; second, to replace or modernize all old army and navy equipment with the latest type of equipment; third, to increase production facilities for everything needed for the army and navy for national defense; fourth, to speed up to a 24-hour basis all existing army and navy contracts and all new contracts to be awarded.

Priority on War Materials

The President asked for an immediate appropriation of $896,000,000 and an additional authorization of $236,000,000.

"I should like to see this nation geared up to the ability to turn out at least 50,000 planes a year," said the President. "Furthermore, I believe that this nation should plan at this time a program that would provide us with 50,000 military planes."

Just how this rearmament program is to be organized and directed—and by what experts— has not been indicated. This phase must be decided by the President as commander-in-chief of the army and navy.

It is believed, from the President's remarks at his press conference on Friday, the program will require construction and equipment of airplane and munitions plants by the government for operation by private industry and also large expansions by private industry itself.

New problems in regard to procurement of certain essential materials are more clearly envisioned. Establishment of a system of priorities for materials and machinery and the allocation of production in certain industries is probable.

Skilled Labor a Bottleneck

Scarcity of skilled labor again will become acute and—it is believed by many—will be the No. 1 bottleneck in the program. The inability to obtain skilled workers will make it difficult to establish extra shifts, especially in the aircraft, aircraft engine, shipbuilding and machine tool industries. In many skilled processes the work must be carried through by the same technicians who started it.

The problem of skilled labor shortage is receiving serious study by both industry and government, with the government having a somewhat different idea as to procedure. President Roosevelt in press conference Friday, calling attention to the shortage, declared the government will undertake many types of labor training activities through the national youth administration and otherwise. He also intimated there will be a recommendation for legislation on labor conditions and standards in shipyards and other munition industries. In some quarters this was interpreted as meaning a relaxation of present wages and hours regulations.

Machine Tools a Bottleneck

Should the emergency become sufficiently pressing, it was intimated, skilled workers could be drafted from other industries to make up the deficiency until training programs could be instituted.

Another bottleneck in the program will be the machine tool industry, already heavily loaded with unfilled orders.

C. S. Stilwell, executive vice president, Warner & Swasey Co., Cleveland, estimates at least one year would be required to supply the machine tools involved in the President's program. Six months would be needed for the government to complete designs and place orders in builders' hands and an equal period to complete assembly, even at top speed.

The President acknowledged this problem in his request for $200,000,000 to be granted him for emergencies. He pointed out that it might be necessary during the summer for the government to place large orders for machine tools for which appropriation had not been made. This, he said, might create a bottleneck which would make it necessary to create additional machine

tool plants. The government might have to help finance such plants, he said.

He also stated that the government might have to take over machine tools ordered by foreign governments and explained that in foreign machine tool contracts there is provision that the order can be taken over by the United States government if necessary.

Due for the greatest expansion, of course, is the aircraft industry. The President's program for raising capacity would necessitate practically tripling present capacity, now estimated at 15,000 military planes annually.

Conferences between government officials and aircraft builders regarding the expansion are being held almost constantly.

It is the President's plan to have new aircraft plants built between the Alleghenies and the Rockies as a defense measure. This may require government financial aid, as private aircraft builders would prefer to expand at their present locations on the coasts.

Exact influence of defense measures on general industrial building is not clear, but it is apparent the proposed enlargement of capacity will have a stimulating effect.

Building of new manufacturing plants and extensions already has had a substantial growth this year. In some districts such work has increased markedly the past few weeks. While small units predominate, total volume is fairly impressive.

Since last September industry has been watchful in order to avoid duplicating the mistakes of 25 years ago, when manufacturing capacity was increased to accommodate wartime demand and later was found to be excessive for peacetime needs.

Extension of the war to Holland and Belgium brought a strong upsurge in steel demand from the Allies. Leading exporters in the East, however, insist the orders from the Allies in the past week do not approach the several hundred thousand tons recently reported in the newspapers. They declare that at present it would be almost physically impossible to handle such orders on short notice. There has, however, been a substantial increase in Allied buying and much tonnage is under consideration, including one inquiry for 100,000 tons, comprising ten products.

In addition to demand by England and France, export business has been enlivened by neutral inquiries since supplies from Belgium and Luxembourg have been cut off. Improvement in foreign demand combined with the defense program is having a decidedly stimulating effect on miscellaneous domestic requirements, and domestic bookings increased sharply last week. There has not been, however, the surge of buying that featured the early days of the war last September. Some consumers are proceeding cautiously until the war situation is clarified.

The Allies had placed a 50,000-ton order for wire rods with Belgium just before the latter was invaded. No deliveries were made and it is assumed most of the tonnage will come to the United States. Some eastern producers predict a shortage in wire rods within the next four to five weeks.

Since last September United States exports of iron and steel have been far ahead of the volume in the corresponding period of the World war. March shipments, latest available figures, totaled 457,000 tons, compared with only 173,000 tons in March, 1915. Not until 1916 did exports in the last war approach the recent pace. It now appears likely to be accelerated further within the next 60 days.

Recent export business represented a larger percentage of total steel bookings than was true last fall, and producers indicate they are not attempting to restrict foreign orders. Instead, they are supplying all buyers on a first-come first-served basis.

Mills already have fairly large backlogs of steel for the United States army and navy. These include not only shell steel, armor plate and alloy products for government ordnance plants, but also material placed by private manufacturers building various types of military equipment.

■ Production has been started at plant of Crosby Aircraft Co., Van Nuys, Calif., on a newly developed 400-mile-an-hour interceptor warplane, according to Claude Grimm, business manager. The company has orders for 130 of these ships from a South American and an Oriental country, deliveries to be completed within 6 months. Planes are reported to cost $60,000 each.

Warner & Swasey Launches Turret Lathe Operators' Service Bureau

■ WARNER & Swasey Co., Cleveland, was host to 50 personnel executives of large machine tool using industries at a luncheon at Biltmore hotel, New York, Thursday, May 16. The occasion was the announcement by the company of the launching of an educational program designed to help turret lathe users during the present employment crisis to develop new operators and increase skill of older operators.

This program, as outlined by Clifford S. Stilwell, Warner & Swasey executive vice president, who presided at the luncheon, is based upon a comprehensive text book on turret lathe operation and tooling which has just been published by his company. Under the guidance of a Turret Lathe Operators Service Bureau, which has been set up to carry out this program, and with the help also of a monthly publication for turret lathe operators, *Blue Chips,* trained lecturers will be sent into manufacturing plants all over the country.

These experienced production men will be provided with sound slide films, charts and models through which will be emphasized points brought out in the text book as to improved techniques of utilization of various kinds of turret lathes and their tooling equipment.

The text book will be sold to accredited operators at $1.00 and to the general public at $2.50 per copy. It has 240 pages, with at least 367 illustrations as well as complete charts and tables. It is designed for active home study.

The magazine, *Blue Chips,* characterized by Mr. Stilwell as the "third arm of the program," actually was started several months ago and now is being received by more than 15,000 operators. It covers questions and answers, and tooling ideas and short cuts developed by operators—$3.00 each being paid for such contributions. According to Mr. Stilwell there already are 55,000 turret lathes actively in operation in this country making it one of the key machines in the production metalworking field. In view of current events the program will immediately be pushed with all the vigor possible with the training personnel now available in the bureau.

Machine Tool Dealers Discuss Procurement Rush Problems

■ MEETING at Claridge hotel, Atlantic City, N. J., May 13 and 14, more than 100 members of the Associated Machine Tool Dealers of America, representing a majority of the membership of this organization, discussed the problems which have arisen out of today's unparalleled rush for procurement of the "Master Tools of Industry."

It is significant of the high degree of friendly understanding existing between the leading dealers and the leading builders of machine tools, that among the guest speakers at this spring convention of the dealers were John E. Lovely, vice president and chief engineer, Jones & Lamson Machine Co., Springfield, Vt., who is president of the National Machine Tool Builders' association, and Tell Berna, general manager of that association.

Mr. Lovely, in his address entitled "The Machine Tool Industry Under Pressure", pointed out that in an industry which over a long period has averaged only one good year in every eight, the temptation to overspend at a time like the present is one which both builders and dealers should try hard to resist, to a reasonable degree at least.

Mr. Lovely stated that forward-looking builders are co-operating with their dealers by conserving a fair part of their output for domestic customers despite the ever increasing demands by foreign customers. Long range planning is needed, he said, not simply by machine tool builders but even more by machine tool users, if the future is to be faced as it should be. As long as the builders lack knowledge of what users plan to do to meet future world competition, it is very difficult for the builders to set up a long range program.

Plan for Replacements

As the situation now stands, the United States is likely to be poorer equipped at the end of the war than those European countries which American builders are now so busy equipping. Germany in particular is planning way ahead. Continuous, planned replacement of machine tools is vital to the future success of American industry, and according to Mr. Lovely, dealers can aid greatly in driving this point home.

Mr. Berna dealt with the subject of "Special Ordnance Machine Tools". He explained that certain plans now being prepared for simplified machinery for shell production are not to be interpreted as being designs for machines to take the place of standard, top quality machines which already are widely accepted and time-tried. Rather, the simplified machines are intended to be used in an emergency merely to tide over the situation until quantities of the regular machines can be put into action along the lines of the "model plant" at Frankford Arsenal.

Col. L. H. Campbell, of Frankford Arsenal, Philadelphia, covered the achievements at that government plant, in a paper entitled "Artillery Shell Production". This paper, which was illustrated by slides and motion pictures, revealed the methods and machinery—a large part of it of latest type—by which high speed production of shells is achieved by machine tools which largely are of standard design.

Visit Arsenal

This plant, which on Wednesday was visited on Colonel Campbell's invitation by many who attended the convention, is intended to be a "laboratory" in which methods are worked out which quickly can be copied throughout industrial America in case of an emergency. Its production of 600 shells per day thereby could be augmented rapidly by private manufacturers and newly organized plants, to the 325,000 per day which experts have figured might be required in event of war.

The paper on "Production of Interchangeable Precision Parts" by H. W. Young, production manager, Hamilton Watch Co., Lancaster, Pa., was delivered by Carl W. Coslow, mechanical superintendent of that company. In contrast to heavy parts such as the majority of those commonly thought of as the products of machine tools, those dealt with by Mr. Coslow enter into the manufacture of watches some of which are themselves no larger in diameter than a dime. When magnified, it became apparent, however, that the problems of getting correctly shaped gear teeth, good threads, etc., are essentially the same on these minute parts as they are in the case of big precision work. Mr. Coslow brought out that accuracy and surface finish in watch parts is not merely a matter of interchangeability but also is highly important because of the extremely small power available to drive the mechanism. A lady's wrist watch has only 1/100,000 horsepower, for instance, and the slightest amount of extra friction would render it inoperable.

Other speakers at the general sessions were John Sauer Jr., Peninsula Machinery Co., Detroit, who as president of the association was presiding officer; George A. Fernley, advisory secretary, who dealt with "Taxes"; F. W. Schiefer, F. W. Schiefer Machinery Co., Rochester, N. Y., on "What To Sell When Factories Are Loaded and Deliveries Are Bad"; and D. N. Macconel, Machinery Sales Co., Los Angeles, on "How the Machine Tool Market Is Affected by the Airplane Industry Activity". Among other things, Mr. Schiefer suggested pushing the sale of small machines to relieve large machines of work other than the large jobs which no other machines can do.

Mr. Macconel mentioned that in California, where over 80 per cent of the machine tools sold are now going into aircraft or related industries, the demand is for high cutting speed and fast feed, rather than for rigidity, and also for great flexibility of settings. He cited the case of a milling machine for light alloy, which has top feed of 144 feet per minute and spindle speed of 10,800 feet per minute.

Speakers at the banquet on Monday evening were: Burnham Finney, editor, *American Machinist*, on "After the War—What?"; Commander H. M. Schull, U.S.N., of the navy department, Washington, on "Navy Procedure in Machine Tool Purchases"; and Dr. Allen A. Stockdale, head of the speakers' bureau, National Association of Manufacturers, New York, on "Free Enterprise in Free America."

Machine Tool Builders Hold Peak Activity

■ Machine tool builders' activity in April held at 93.4 per cent of capacity, the peak reached in March, according to the Machine Tool Builders' association, Cleveland. The previous peak was in January, 93.3 per cent. In April, 1939, the rate was 61.2 per cent.

April Gear Sales Gain 12 Per Cent Over March

■ April gear sales were 12 per cent above March this year and 45 per cent above April, 1939, according to the American Gear Manufacturers' association, Wilkinsburg, Pa. Sales for four months this year were 30 per cent greater than for the same period in 1939. Comparative index figures follow:

	1940	1939
January	123	91
February	116	86
March	114	104
April	128	88

Steel and Metal Companies Again Exhibit at New York World's Fair

■ REVITALIZED and strengthened by addition of new products and details, steel and allied metal industries' exhibits again occupy a prominent place in second New York World's Fair.

Space is held by following concerns affiliated with steel and allied industries: American Hardware Corp., New Britain, Conn.; American Radiator & Standard Sanitary Corp., New York; American Telephone & Telegraph Co., New York; Babcock & Wilcox Co., New York; Carrier Corp., Syracuse, N. Y.; Chamberlin Metal Weather Strip Co., Detroit; Chrysler Sales Corp., Dodge Motors Inc., New York; Combustion Engineering Co. Inc., New York; Consolidated Edison Co. of New York Inc., New York; Copper & Brass Research association, New York.

Crane Co., Chicago; E. I. du Pont de Nemours & Co., Wilmington, Del.; Fiat Metal Mfg. Co., Long Island City, N. Y.; Ford Motor Co., Detroit; General Electric Co., New York; General Motors Corp., Detroit; International Business Machines Corp., New York; Mosler Safe Co., New York; National Cash Register Co., Dayton, O.; New York Steam Corp., New York.

Otis Elevator Co., New York; Petroleum Industry Exhibition Inc., New York; M. H. Treadwell Co. Inc., New York; Underwood Elliott Fisher Co., New York; United States Steel Corp., New York; Westinghouse Electric & Mfg. Co., New York; White Sewing Machine Corp., Cleveland; Yale & Towne Mfg. Co., New York; York Safe & Lock Co., York, Pa.; and Continental Scale Corp., Chicago.

Missing this year from the 1939 list are: American Chain & Cable Co. Inc., Bridgeport, Conn.; Bemis & Call Co., Springfield, Mass.; Bethlehem Steel Co., Bethlehem, Pa.; Chicago Flexible Shaft Co., Chicago; Ferro-Enamel Corp., Cleveland; A. C. Gilbert Co., New Haven, Conn.; Hershey Machine & Foundry Co., Manheim, Pa.; Link-Belt Co., Chicago; Remington Rand Inc., Buffalo; John A. Roebling's Sons Co., Trenton, N. J.; Sperry Gyroscope Co. Inc., Brooklyn, N. Y.; Timken Roller Bearing Co., Canton, O., and several who exhibited in the Town of Tomorrow joint display.

Copper and Brass Prominent

Railroads, again having largest site, have somewhat revised their exhibit, depicting history, service and achievement of the industry.

Copper and brass industry, with 2500 square feet in Hall of Industry and Metals, has for its keynote, "Old as Time, Modern as Tomorrow". Thirty major copper mining, smelting, refining, wire, cable and fabricating companies are sponsors. Story of copper, from its discovery by prehistoric man to the present time, its preparation and qualities is presented by animated dioramas, murals and extensive exhibits of modern uses of the oldest commercial metal. Building's circular entrance lobby displays an animated "atom" of copper, magnified about twenty billion times, that the modern concept of its structure may be understood.

Consumers' building of last year is now named World of Fashion; Electrical Products building has become Power-Electrical and Steam. America at Home replaces Home Furnishings building and Communications building now is Maritime, Transport and Communications.

Dismantling May Affect Market

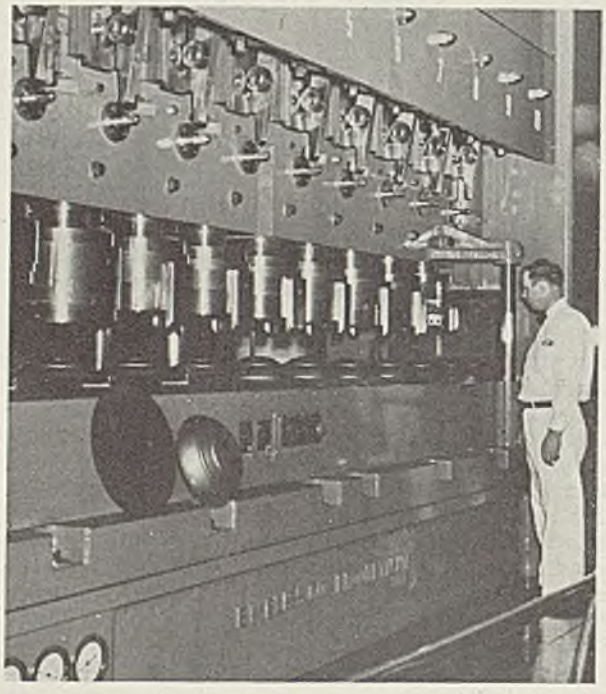
Direct effect on the steel industry later will result from razing this gigantic project, an original construction job equivalent to building a city housing 80,000. Nearly 50,000 tons of structural steel will come down, some of which will go into the scrap market while a substantial tonnage will probably influence the structural steel market as used and refabricated material suitable for numerous smaller projects. Additional hundreds of tons of nonferrous and miscellaneous scrap will result from dismantling. Unseen by the casual visitor are 15 miles of water mains, 13 miles of gas mains, 15 miles of electrical cable conduits and 30 miles of sewers.

Site, after fair closes Oct. 27, will become a city park, all land on which buildings stand being New York City property. With exception of New York City building and New York State amphitheater, practically all buildings will come down. New York City building will become a permanent museum.

New features installed for this summer include a foot-cooler in Carrier Corp.'s air-conditioned igloo, where weary feet are relieved. General Electric Co. has a television studio where one can be televised and then witness his own television picture. Mechanical cow, whose interior is a busy factory, has animated figures showing how hay and other feed become milk and cream. This is sponsored by the department of agriculture in the Hall of Industry and Metals.

Petroleum industry has working models of refinery equipment and a derrick crew goes through routine of boring a well outside the building. Electro, the robot man is back at Westinghouse Electric & Mfg. Co.'s building, and this year has brought his dog, the mechanical Sparko. General Motors has its 25,000,000th car sealed in glass for posterity. Streamlined chromium-fin-

Shows Fair Visitors How Machines Create Jobs



■ Showing millions of World's fair visitors how modern machines create jobs, as well as provide more and better goods for more people at lower costs, is this 160-ton punch press at the Ford exhibit. The press turns out hubcap inner shells at cost of 12½ cents each, while same product handmade would cost $2.50. Exhibit is designed to emphasize that a handmade Ford would cost $17,850—a cost that would have prohibited the establishment of an industry now employing 6,000,000

ished tire production machines are operated by Firestone Rubber Co. Sheet metal palm trees coated with frost make up the "frozen forest", one of many Chrysler Motor Co. features.

Ford Motor Co. has added a new wing to its building, installed a theater and shows "A Thousand Times Neigh", a ballet in modern tempo indicating what the horse thinks of the motor age. Visitors may also ride on the highway of tomorrow, an engineering detail of ramps and curves.

Fifteen commercial aviation enterprises, including five major airlines and several manufacturers, and the army, navy and marine corps tell the story of today's air activities.

SKF President Defines Industry's Selling Job

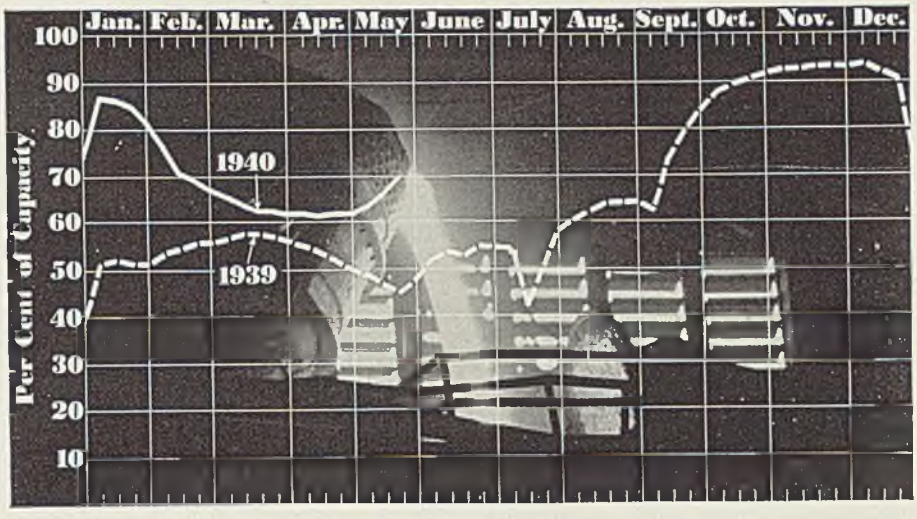
■ "How Industrial Advertising Can Reduce Cost of Selling" was theme discussed at thirty-fifth anniversary meeting of Technical Publicity association, New York, May 15. Topic was discussed from four viewpoints at seminars conducted by Charles McDonough, Combustion Engineering Co., New York; M. V. Merrihue, General Electric Co., Schenectady, N. Y.; C. C. Chamberlain, Jenkins Bros., New York and R. A. Wheeler, International Nickel Co., New York.

W. L. Batt, president, SKF Industries Inc., Philadelphia, was guest speaker. He urged business men to improve their relations with the public by leveling production between slow and busy periods, thereby steadying consumption and employment.

"We have not thoroughly sold the man in the street," said Mr. Batt, "that he and his government must provide an atmosphere in which industry can thrive and make that great contribution to his existence, to his comforts and luxuries, of which it is capable and which it has never yet fully realized. Words won't convince him, but performance will. . . . Business alone can save the private property system and check the downward trend toward totalitarianism."

Other topics discussed were: "How to Analyze Sales Objectives as the Basis for Planning"; "How to Integrate Advertising With Industrial Sales Activity"; and "How to Evaluate Results".

■ Over 40 industries, producing chemical materials and equipment, will display their products at the seventeenth Exposition of Chemical Industries in Grand Central Palace, New York, Dec. 4-9. Nearly 300 exhibitors already have engaged space.



PRODUCTION... Up

■ STEELWORKS operations last week made a further rise, 3½ points to 70 per cent, with prospects for another increase this week. Eight districts showed larger operations, one a decline and three were unchanged. A year ago the rate was 45.5 per cent; two years ago it was 30 per cent.

Chicago — Increased 4½ points to 70 per cent, a rise of 13 points in the past three weeks, to the highest rate since February. All but two mills were producing at a higher rate.

Detroit — Unexpected resumption by three open hearths early last week moved the rate up 10 points to 80 per cent.

Birmingham, Ala. — Unchanged at 83 per cent, with 18 open hearths in production.

Cleveland — Rose 1 point to 72 per cent, with a further gain of 2 to 3 points indicated this week.

Cincinnati — Steady at 61 per cent, although some nearby mills are at better than 70.

St. Louis — Gained 2½ points for the second successive week, reaching 47½ per cent.

New England — Up 3 points to 56 per cent, one producer going to capacity.

Central eastern seaboard — Advance of 3 points to 60 per cent with further increase expected during next two weeks.

Pittsburgh — Further increase of 3½ points to 65 per cent with some indication of reaching 70 per cent this week.

Wheeling — Continued at 88 per cent with possible gain soon.

Buffalo — Off 4½ points to 53½ per cent as two interests each withdrew one open hearth.

Youngstown, O. — Increased 1 point to 54 per cent, three open hearths being added and two taken off. Active units included 49 open hearths and three bessemers. This week addition of two open hearths by Youngstown Sheet & Tube Co. will raise the rate 2 points, according to present schedules. One Sheet & Tube blast furnace will be blown out for rebuilding about July 1.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended May 18	Change	Same week 1939	Same week 1938
Pittsburgh	65	+ 3.5	33	30
Chicago	70	+ 4.5	45.5	29
Eastern Pa.	60	+ 3	37	27
Youngstown	54	+ 1	42	26
Wheeling	88	None	53	38
Cleveland	72	+ 1	50	23
Buffalo	53.5	— 4.5	37.5	25.5
Birmingham	83	None	57	63
New England	56	+ 3	45	30
Cincinnati	61	None	44	45
St. Louis	47.5	+ 2.5	39	33.3
Detroit	80	+10	59	18
Average	70	+ 3.5	45.5	30

Foundry Equipment Orders Drop in April

■ Foundry equipment orders and shipments in April, reported by the Foundry Equipment Manufacturers' association, Cleveland, fell off sharply from the high mark attained in March, but unfilled orders showed considerable increase. All indexes were much higher than for corresponding months in 1939. Comparisons follow, indexes based on 1922-24:

	Apr. 1940	Mar. 1940	Apr. 1939
Net orders	192.9	243.4	146.0
Shipments	154.1	179.0	131.0
Unfilled orders	331.4	291.0	208.6
3 mos. av. gross orders	205.3	206.9	142.8

Canadian Steel Purchases Reflect Rising Demand for War Materials

TORONTO, ONT.

■ ALLIED governments' greatly increased demand upon Canada for war equipment and munitions is reflected in the Dominion's much heavier purchases of iron and steel in the United States. Recent lull in Canadian war materials production has ended, with rush orders necessitating capacity production in many plants.

New contracts, it is stated, will be largely for shells, guns, munitions, armored trucks, airplanes and similar equipment. Report from Ottawa states British Supply board has placed with Canadian firms orders totaling $62,000,000, initial expenditure of the $450,000,000 outlay planned to Sept. 1, 1940, for war materials and supplies. Many additional orders have been placed directly from United Kingdom through other agencies.

Supply board officials declared, last week, arrangements for placing more than $150,000,000 in war contracts are under way, will be completed without delay. Proposed new orders are limited almost exclusively to manufactured articles necessary to actual fighting.

Primary iron and steel producers in Canada are hastening enlargement programs to meet the expanding demand for steel. Dominion Steel & Coal Corp., Sydney, N. S., officials report the company's second new open hearth is in operation; first new unit was completed and put in operation earlier this year. These two new furnaces increase Dominion Steel's production capacity 30 per cent, to upwards of 600,000 tons per year. The plant is operating at capacity.

Wabana, Newfoundland, ore mines have been producing at capacity since war started, with the Sydney plant absorbing most of the output, much of which formerly went to Germany. No decrease in production is in sight.

Robert Mitchell Co. Ltd., Montreal, Que., has completed a short test period, is operating at capacity on a large munitions order for British government. Company is also engaged in building a $300,000 plant addition to expedite production. Enlargement is financed through arrangement with the supply board.

Otis Stack, Never Out in Ten Years, To Be Rebuilt

■ After ten years of continuous production, the 600-ton No. 2 blast furnace at the Otis Steel Co.'s Riverside Works, Cleveland, has been shut down in preparation for a $200,000 rebuilding program.

The furnace, which was blown in May 20, 1930, was producing iron day in and day out even through the worst years of the depression, never even being banked, according to J. E. Montgomery, vice president and general manager. He believes this probably was the longest period of uninterrupted use ever obtained on a single blast furnace lining. The furnace was blown out May 6, after 1,735,500 gross tons had been tapped and poured into the adjacent open hearth furnaces. The design and engineering work connected with the rebuilding and modernization will be handled by Otis' own engineering department.

Copper and Brass Associations Merge

■ Copper and Brass Research association, New York, and Copper and Brass Mill Products association, New York, meeting at Hotsprings, Va., last week, completed plans for merging the two associations. Combined organization will be known as the Copper and Brass Research association. Membership will include 34 copper and brass mill products fabricating companies, representing about 95 per cent of that industry in United States.

Officers elected for coming year: President, John A. Coe, president, American Brass Co., Waterbury, Conn. Vice presidents: Wylie Brown, president, Phelps Dodge Copper Products Corp., New York; Ralph E. Day, president, Bridgeport Brass Co., Bridgeport, Conn.; R. L. Coe, vice president, Chase Brass & Copper Co. Inc., Waterbury, Conn.; Curtis L. Smith, treasurer, National Copper & Smelting Co., Cleveland; W. M. Goss, vice president, Scovill Mfg. Co., Waterbury, Conn.

C. D. Dallas, president, Revere Copper & Brass Inc., New York, was elected treasurer and Bertram B. Caddle, manager, Theodore E. Veltfort, was elected secretary of the new organization.

New Aviation Gas Has Octane Rating Above 100

■ An aviation gasoline using "Neohexane," to be placed on the market soon by Phillips Petroleum Co., Bartlesville, Okla., is said to have an octane rating of over 100. Use of 100 octane in place of 87 octane gasoline now used by most commercial craft, increases power output 25 per cent, fuel with a rating equivalent to 115 octane, 50 per cent. A plant to produce Neohexane in commercial quantities is being built in Borger, Tex.

Magnaflux Tests Entire Part at One Setting

■ Magnaflux inspection of an entire automobile part at one setting is accomplished by this new machine, recently installed in the Cadillac-LaSalle laboratory. The part, in this case a rear axle pinion, is first clamped between positive and negative plates, as shown, and thus becomes part of a magnetic circuit. A solution of suspended iron filings is poured over the part and the iron filings tend to collect over flaws in surface of the metal, continuous surfaces causing no accumulation

MEN of INDUSTRY

■ A. S. RAIRDEN, the past seven years rope engineer, has been appointed wire rope sales manager, Wickwire Spencer Steel Co., New York. A graduate of Massachu-

Conway Studios

A. S. Rairden

setts Institute of Technology, Cambridge, Mass., he began his career in the wire rope industry 20 years ago. He first joined the former Carnegie Steel Co., following which he became wire rope mill superintendent for American Steel & Wire Co. From 1930 to 1933, he was with American Cable Co. and Hazard Wire Rope Co. as chief engineer and assistant to the vice president in charge of sales.

♦

J. E. Beck, metallurgist, Pittsburgh works of Jones & Laughlin Steel Corp., has joined the New York sales office of the company.

♦

William Taggart, associated with the Steel and Tube division of Timken Roller Bearing Co., Canton, O., since 1928, has been appointed manager of tube sales.

♦

John Weiler, the past 17 years associated with Mullins Body & Tank Co., Milwaukee, as vice president and general plant manager, has been elected president.

♦

A. H. Paterson, former factory manager, Plymouth division, Chrysler Corp., Detroit, will succeed E. S. Chapman as general works manager. Mr. Chapman has become vice president in charge of production.

♦

A. C. Anderson, general foreman in charge of assembly and testing of machines, and A. G. Hansen, tool estimator, engineering department, Gisholt Machine Co., Madison, Wis., recently were honored as the first recipients of the Gisholt diamond service pin, denoting a half century of active service.

♦

Wilfred Sykes, assistant to the president, Inland Steel Co., and chairman of the board, Wilson & Bennett Mfg. Co., Chicago, has been elected to the board of trustees of Armour Institute of Technology.

♦

George P. Needham has been appointed representative in the Ohio territory for Cowles Detergent Co., Cleveland, maker of industrial alkalies and soaps. He will work out of the Cleveland office.

♦

W. V. Peters and C. B. McGehee have been named managers of sales, Truscon Steel Co., Youngstown, O., in charge of northern and southern

W. V. Peters

areas, respectively. Mr. Peters formerly was assistant general manager of sales.

Mr. McGehee heretofore was manager of sales, highway products division in Youngstown and district sales manager in Atlanta, Ga., and Dallas, Tex. These appointments follow the resignation May 10 of Grover J. Meyer, general manager of sales.

♦

E. C. Stout has resumed his duties as manager, eastern district, in charge of sales of all products, Wickwire Spencer Steel Co., New York, after completing a special executive assignment for the company.

♦

Raymond Szymanowitz, technical director, Acheson Colloids Corp., Port Huron, Mich., and staff, have moved from Port Huron to the company's new research laboratories at 1019 Broad street, Newark, N. J.

♦

Louis N. McDonald, who recently retired as general superintendent, Youngstown district, Carnegie-Illinois Steel Corp., last week was guest of honor at a testimonial dinner given by officials of the corporation and his former associates. J. L. Perry, president of Carnegie-Illinois, presented Mr. McDonald a gold medal, commemorating his more than 50 years with the corporation. Mr. McDonald also was presented a steel desk and chair, a lamp and a traveling bag.

♦

Eugene J. Ivanso, formerly on the metallurgical staff of Bundy Tubing Co., Detroit, is now associated with Michigan Alkali Co., Wyandotte, Mich., as metallurgist specializing on foundry problems. He is a graduate of Case School of Applied Science, Cleveland, and a member, Detroit chapter, American Society for Metals.

♦

H. S. Strouse, treasurer, Harnischfeger Corp., Milwaukee, has been elected chairman, Electric Hoist Manufacturers association, New York. He succeeds W. W. Peattie, Northern Engineering Works. F. F. Seaman, general manager, Robbins & Myers Inc., hoist and crane division, Springfield, O., has been named vice chairman of the association.

♦

A. B. Homer has been named vice president, Bethlehem Steel Co.,

C. B. McGehee

Bethlehem, Pa., in charge of the shipbuilding division. He succeeds

the late S. Wiley Wakeman. He has been with Bethlehem since 1919, first as assistant to the general superintendent, Fore River, Mass., plant; later became manager of sales for the East coast yards of the company, with headquarters in New York, and then returned to Fore River as assistant to Mr. Wakeman. In 1934 he was made assistant vice president of all shipbuilding and ship repair business of Bethlehem on both East and West coasts, and while continuing that post he returned to New York in 1936 when the United Drydocks property was acquired by Bethlehem and supervised the organizing of that property in addition to his other duties.

♦

Lawrence V. Nagle has been elected vice president, Udylite Corp., Detroit, maker of electroplating and polishing equipment and supplies. He joined Udylite in 1932, and five years later was appointed Detroit district sales manager. He will continue to direct sales in the Detroit district.

♦

Stewart E. Lauer, president, York Ice Machinery Corp., York, Pa., has been elected president, Air Conditioning Manufacturers association. Other officers elected are: Vice president, Stuart M. Crocker, manager, air conditioning department, General Electric Co.; treasurer, P. A. McKittrick, general manager, Parks-Cramer Co., Fitchburg, Mass.

♦

W. B. Hurley, staff engineer, sales department, Detroit Edison Co., Detroit, has been named assistant chief of the Detroit ordnance district by Maj. Gen. C. M. Wesson, chief of ordnance department, Washington. Mr. Hurley, a member of the board of directors, Detroit section, Society of Automotive Engineers, will be working under Alex Dow, retired chairman of Detroit Edison, who is chief of ordnance in Detroit.

♦

Howard R. Murphy, at one time manager, sales development division, Caterpillar Tractor Co., Peoria, Ill., and since 1938 in charge of tractor business for Sears-Roebuck & Co., has returned to Caterpillar Tractor to manage the central sales division. He succeeds C. M. Burdette, who has resigned to take a brief rest and later to become associated in another business.

♦

W. M. Barr, chief chemical and metallurgical engineer, Union Pacific Railroad Co., Omaha, Neb., has been nominated for president, American Society for Testing Materials. H. J. Ball, professor of textile engineering, Lowell Textile institute, Lowell, Mass., is named for vice president. Nominees for the executive committee are: C. H. Fellows, head, chemical division, research department, Detroit Edison Co., Detroit; R. C. Griffin, treasurer, Arthur D. Little Inc., Cambridge, Mass.; P. D. Merica, vice president and director, International Nickel Co. Inc., New York; Jerome Strauss, vice president, Vanadium Corp. of America, New York; and Stanton Walker, director of engineering, National Sand and Gravel association, Washington.

O. D. Spellman

Lawrence V. Nagle

♦

William R. Hoyt, works manager, Yale & Towne Mfg. Co., Stamford, Conn., has been promoted to general manager of the Stamford division. He succeeds Richard G. Plumley, resigned. Associated with the company 38 years he has served successively as foreman, departmental superintendent, superintendent of production, assistant to the vice president on production, and comptroller of production. In 1930 when the materials handling division was transferred to Philadelphia Mr. Hoyt was made works manager.

♦

H. H. Whittingham has been promoted to assistant general manager, Norge division, Borg-Warner Corp., Detroit. He has been identified with the automotive and accessory fields since 1919. When Norge was organized in 1927, Mr. Whittingham was made secretary, and has since held various executive positions, including that of assistant sales manager. Early last year he was made vice president in charge of engineering. In his new capacity as vice president and assistant general manager, he will supervise engineering, production and sales.

H. H. Whittingham

♦

C. L. Austin, a vice president and director, Mellon Securities Corp., has been elected a director, Blaw-Knox Co., Pittsburgh, to fill the vacancy created by the recent resignation of J. Theodore Goddard, London, England. Mr. Goddard retains his position as board chairman of Blaw-Knox Ltd., English subsidiary of the company.

♦

Paul Klotsch, automotive and aviation engineer, has been appointed chief engineer, automobile division, Crosley Corp., Cincinnati. The past five years he was with Briggs Mfg. Co., Detroit, in the experimental engineering department. Before that he was with Chance-Vought Corp., Hartford, Conn., now a subsidiary of United Aircraft Corp., and General Development Co., New York.

♦

H. Rodgers Dorney was elected president, Baltimore Steel club, Baltimore, at a meeting at Lord Baltimore hotel, Baltimore, May 3. He is local representative for Jones & Laughlin Steel Corp. Other officers elected were: Vice president, James Aldridge, Bartlett-Hayward Co.; secretary-treasurer, Joseph Hagger, Charles T. Brandt Inc. Directors are: Henry A. Lowrey, Seaboard Steel & Iron Co.; Charles W. Teet, Youngstown Sheet & Tube Co.; Leonard F. Clt, Crown, Cork & Seal Co., and Harold K. Dell, John J. Greer & Co.

♦

C. B. Boyne, associated with Allegheny Ludlum Steel Corp., Pittsburgh, and its predecessor, Ludlum Steel Co., since 1913, has been appointed manager of stainless sales, with headquarters at Pittsburgh. He served successively as manager of order and billing department; supervisor of warehouse stock control; assistant manager of sales; in 1930 was transferred to Associated Alloy Steel Co., Cleveland, as assistant sales manager; returned to Ludlum in 1934 as assistant to the president, and in 1936 became manager of stainless sales. After the merger with Allegheny Steel Co. Mr. Boyne was transferred to Pittsburgh as manager of stainless bar and wire sales.

Died:

■ MAX F. WIRTZ, 71, founder and president, Atlas Mineral Products Co., Mertztown, Pa., at his home in Allentown, Pa., May 7. He founded the company in 1892 and maintained an active interest until his death.

♦

James P. Karr, 83, founder and former president, American Steel Dredge Co., Fort Wayne, Ind., in that city, April 19.

♦

Maj. Lee Clayton Morganroth, 66, retired chief engineer, Harbison-Walker Refractories Co., Pittsburgh, May 5, in that city.

♦

Edward E. Horrocks, 65, president, Joshua Horrocks Wire Works Inc., Brooklyn, N. Y., May 16 in that city.

♦

A. H. Leichtfuss, 53, manager, Mayville Iron Co. properties, Mayville, Wis., in Fond du Lac, Wis., recently.

♦

C. E. Swindler, since 1927 district sales manager at Tulsa, Okla., for Jones & Laughlin Steel Corp., recently.

♦

Horace W. Flashman, 55, who retired in 1931 as managing director of Australian Westinghouse Electric Co., recently in New York.

♦

Martin Madsen, Nashwauk, Minn., mechanical and electrical superintendent of iron ore mines of the Wisconsin Steel Mines, International Harvester Co., April 23.

♦

Jacob H. Weil, 77, April 22 in Philadelphia. In 1890 he founded J. H. Weil & Co., an engineering equipment business, from which he retired two years ago.

♦

Ralph S. Gildart, 56, advertising manager for 18 years, General Fireproofing Co., Youngstown, O., May 8 at his home near Youngstown. He joined General Fireproofing in 1922.

♦

George H. Shefferly, 69, president and general manager, Michigan Engine Valve Co., Detroit, May 7 in that city. He had been with the company 30 years.

♦

Charles Brown, president of the former A. & F. Brown Co., Elizabeth, N. J., maker of power transmitting machines, May 1 in Niagara Falls, N. Y. The Brown plant went out of business ten years ago.

♦

Enos Paullin, 70, vice president, Manufacturers Association of New Jersey for 16 years, and a director, National Association of Manufacturers, recently at his home in Bridgeton, N. J. He had been associated 42 years with Ferracute Machine Co.. Bridgeton, of which he was secretary-treasurer from 1903 to 1931.

♦

Arthur C. Hollingshead, 77, April 23 in Chicago. He had been president of three railroad supply companies, Viloco Railroad Equipment Co., Viloco Machine Co., and Okadee Co.

♦

Frederick J. Haynes, 69, president of Dodge Bros., Detroit, from 1921 to 1925, May 3 in Detroit. He served as chairman from the time of his retirement as president until the summer of 1928 when he retired from business.

♦

Henry H. Mandell, former veteran employe of American Steel & Wire Co., Cleveland at his home in Cleveland Heights, O., April 25. He joined Washburn & Moen Mfg. Co., Waukegan, Ill., in 1892, and when this company became part of American Steel & Wire in 1899 he was transferred to Chicago. He was with the Cleveland office from 1904 until his retirement 11 years ago.

MEETINGS

COST REDUCTION THEME OF MANAGEMENT CONFERENCE

■ "MANAGEMENT'S Approach to Cost Reduction" will be theme of annual conference of the production division, American Management association, at Hotel Pennsylvania, New York, May 22-23. The program has been arranged to drive home principles that can be applied to all types of industries, with an effort to present ideas of prime interest to production executives of small as well as large plants.

Fundamentals in organizing for cost reduction will be discussed at the opening session, with stabilization of production and employment and personnel factors in cost reduction among other matters to be considered. "How Modern Wage Administration Can Contribute to Cost Reduction" will be another problem for broad discussion.

STEEL LEADERS TO SPEAK TO PURCHASING AGENTS

Proceedings of the twenty-fifth annual convention and silver anniversary of the National Association of Purchasing Agents at the Netherland Plaza hotel, Cincinnati, June 3-6, will be keyed around the theme "Chartering Our Purchasing Course." Subtopics for each of the four days are: "Where Are We?", "Where Are We Going?", "How Can We Get There Safely?", and "Checking Our Compass," respectively.

Charles R. Hook, president, American Rolling Mill Co., Middletown, O., will address a general session, morning of June 3, on "Where Is American Business and How Did It Get There?" Speakers at a dinner meeting of the iron and steel committee that evening will be: Norris J. Clark, vice president in charge of sales, Republic Steel Corp., Cleveland, on "Steel Sales Problems;" and R. E. Zimmerman, vice president in charge of research and technology, United States Steel Corp., Pittsburgh, on "Standardization and Simplification in the Steel Industry."

Louis Johnson, assistant secretary of war, Washington, will address a luncheon on June 4. His subject will be "The United States Industrial Mobilization Plan for War."

Seventy-two companies will exhibit in the Inform-a-Show to be held concurrently with the convention.

A nerican Rolling Mill Co. To Enlarge Blast Furnace

■ American Rolling Mill Co., Middletown, O., will rebuild and enlarge one of its blast furnaces to produce 20,000 tons of pig iron a month. Stack is the one moved from Columbus, O., to Hamilton, O., two years ago and at present has a capacity of 12,000 tons a month. Contract for the rebuilding was awarded to Arthur G. McKee & Co., Cleveland.

First Quarter Steel for Sale off 22 Per Cent

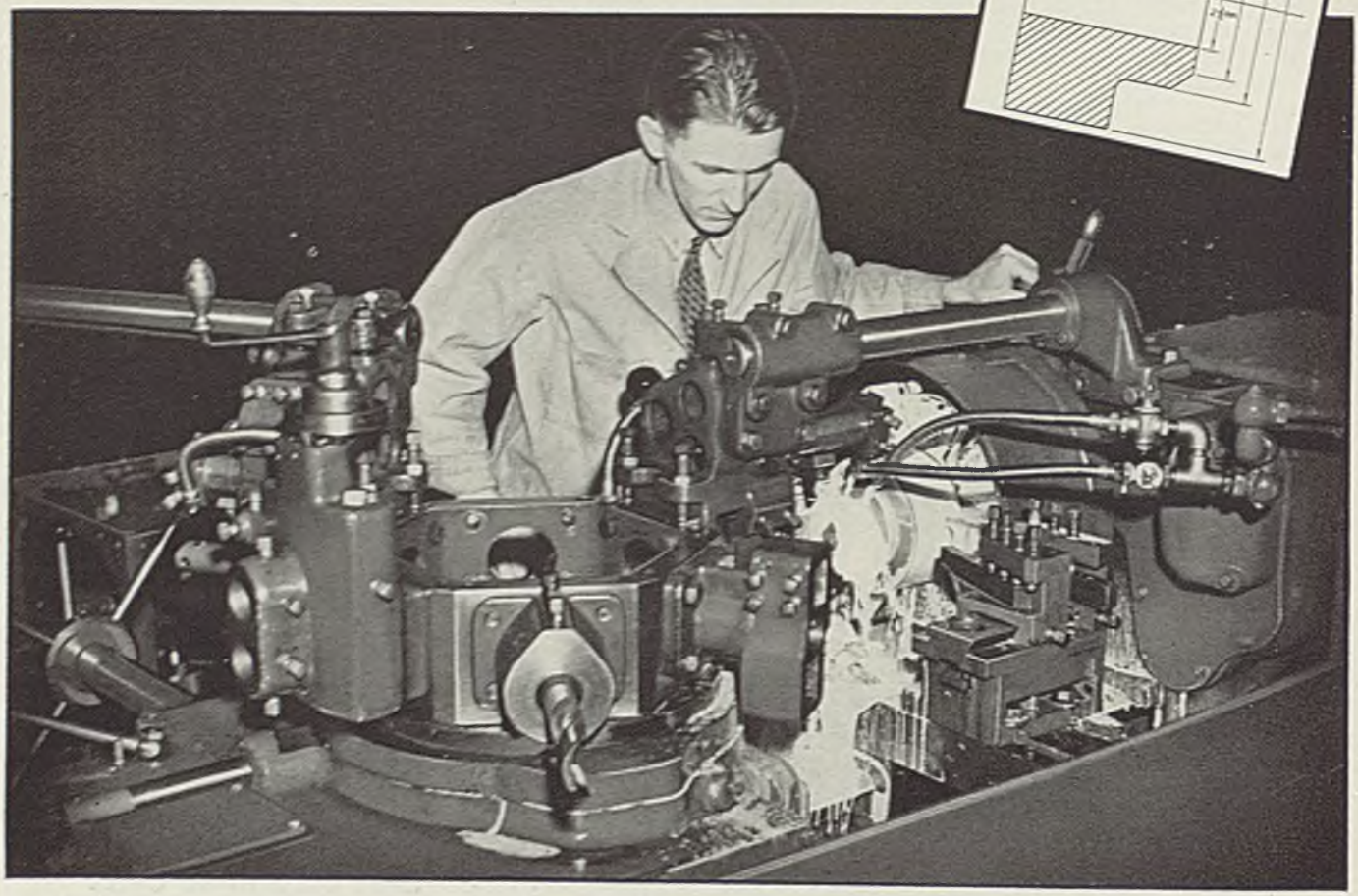
■ Finished steel made for sale during first quarter, as reported by the American Iron and Steel institute, totaled 10,558,975 net tons, compared with 13,560,069 net tons in fourth quarter, last year, a decline of 22 per cent. Production for export in first quarter was 1,302,814 tons, compared with 1,013,786 tons in fourth quarter. Pig iron, ferromanganese and spiegeleisen made for sale in first quarter totaled 1,309,597 tons; in fourth quarter it was 1,754,588 tons.

Comparisons of representative products made for sale in first and fourth quarters follow:

	Net Tons	
	First quarter 1940	Fourth quarter 1939
Steel sheets	2,364,413	3,042,175
Steel bars	1,715,007	2,226,332
Steel plates	880,496	1,055,873
Semifinished	1,073,843	1,453,156
Pig iron, ferroalloys	1,209,597	1,754,558
For Export:		
Steel sheets	210,924	128,659
Cold-reduced tin plate	122,504	100,242
Hot-rolled tin plate	51,283	68,578
Steel bars	174,777	95,372
Semifinished	316,210	237,396

Saving 60 percent

PER PIECE ON THE J&L No. 7-A SADDLE TYPE TURRET LATHE



Old turret lathes may be reducing your profits more than you realize — especially if you have not compared the present cost of your parts with the cost of parts produced on a new Jones & Lamson No. 7-A Saddle Type Turret Lathe.

The machine part shown above, is produced in lots of 15 in 6.5 minutes — a saving of 10 minutes per piece. In cases such as this, where forgings would be impractical, the No. 7-A shows to full advantage — set-ups may be changed rapidly, and full advantage may be taken of High Speed Steel, or Carbide Tipped Tools.

Further advantages are: holding tolerances easier, removing metal faster, getting better finish, and earning more per dollar invested *with less operator fatigue.*

Plan for tomorrow's profits by sending us your samples or blueprints today!

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Windows of WASHINGTON

By L. M. LAMM
Washington Editor, STEEL

WASHINGTON

■ GOVERNMENT must either throttle monopoly or halt invention of new machines, the house unemployment conference was told in reports from its committees on technological changes and monopoly.

Representative Bryson of South Carolina, chairman, committee on technological changes and Representative Coffee of Washington, chairman, committee on monopoly, reached almost identical conclusions concerning effect of machines and monopolies on employment. Both showed that employment was not reduced by invention of machines, but when monopolies got control of machine production and refused to reduce prices of machine-made goods and thus pass on to the consumer benefits of machine production, demand for goods decreased and jobs were destroyed.

Deplores Concentration of Wealth

"It was during the years of economic expansion (1900-1930) that new machines—labor saving devices—served to double and redouble America's volume of production to the end employment opportunities were increased rather than decreased," Representative Bryson stated. "In the past, technological change has aided multiplication of employment opportunities because through mechanization costs were lowered drastically, and as costs were lowered, more goods were sold, and as more goods were sold more and more workers were required to make, service and distribute them."

Confronted by those economic facts, Representative Bryson said, obviously the cure was not to destroy the machine but to throttle monopolies which withheld from the public benefits resulting from machine production.

Representative Coffee's report purported to show how these monopolies control the country's production and cause unemployment. He said 200 major corporations now manufacture one-half the nation's goods; possess one-fifth the national wealth; two-fifths the financial assets; one-half the industrial and three-fifths the corporate wealth of United States. Particularly dangerous to sound economic conditions, he said, was concentration of wealth and development of monopoly control over natural resources, where in many fields a few corporations dominate the entire industry.

"The small concerns are forced either to follow the leaders in their price policies or to go out of business," Representative Coffee stated. "At present, the number of major competing companies in most of the major industries has been reduced to the point that, in the event of a drop in demand, the leading corporations in an industry are often able to slacken production and keep up prices to a point where maximum profits are gained. Having control of the market, the large corporations benefit more by a drop in production than a drop in price, temporarily at least. The result of such a policy is to throw men out of work and eventually to decrease purchasing power."

Committee on monopoly was unanimous in demanding attack on monopolies should continue, but divided forces concerning adoption of government ownership of monopolistic industries when regulation failed. Some members stated the government should own and operate basic industries where competition has been destroyed and cannot be restored and added government should take over natural resources now "completely controlled by certain corporations."

URGE INCREASED STRATEGIC MATERIALS PURCHASES

War developments in Europe have served to focus attention on United States' low supplies of strategic and critical materials, with resulting requests for increased purchases. President Roosevelt asked congress, last week, for a $12,500,000 strategic materials appropriation, to be available immediately instead of during fiscal year 1941, beginning July 1. This amount would be additional to a like sum provided in the original strategic materials act, passed last year.

Asserting tin supplies would last only three days should the nation become involved in war, Representative Sol Bloom, New York, last week suggested speeding up strategic materials purchases. He said he would, if it appeared necessary, seek immediate action on a resolution to accelerate the program enacted last year to spend $100,000,000 over a ten-year period for purchase of reserve supplies of these materials.

Seeks $500,000,000 Purchase Fund

Quoting commerce department statistics, Representative Bloom declared tin stocks on hand would meet normal commercial demands for only three or four months. About one-sixth the country's tin, he pointed out, comes from Netherlands East Indies, most of the remainder from British Malaya.

Letter from secretary of war to banking and currency committee chairman says war department approves senate joint resolution calling for $500,000,000 purchase of strategic and critical materials. Senator John G. Townsend Jr., resolution's author, cited the letter last week in a senate speech urging proposal's consideration.

Secretary of war says, in his letter:

"The war department has frequently emphasized vital importance to national defense of strategic and critical materials and has repeatedly recommended measures de-

signed to facilitate accumulation of adequate stock piles of such materials. It heartily approves the objectives of senate joint resolution 230 and administrative procedure proposed therein, and is of the opinion that from the long range view of national security, both military and economic, the amount therein provided for the acquisition of such materials is not excessive."

Townsend resolution has two purposes: First, to acquire strategic and critical materials in which United States is not self-sufficient, and which army and navy munitions board has recommended be acquired; and second, to make use of some surplus and idle gold held in this country.

It would not involve any purchases within United States, the funds being earmarked entirely for foreign products not obtainable here in sufficient quantities. Provision is made for storage of materials purchased, and in case of perishable commodities, for rotation.

SENATE TO CONSIDER NAVY EXPANSION BILL THIS WEEK

Naval expansion bill providing for 21 additional combatant and 22 auxiliary ships comes up for consideration in senate this week. This bill is in addition to recommendations included in President Roosevelt's new defense plans.

Unanimously reported by senate naval affairs committee, it is based on assumption that before congress adjourns the bill will be implemented with an appropriation sufficient to permit immediate start on construction of vessels the bill authorizes.

Navy enlargement, authorized by the bill, is not to represent our maximum national defense necessities, as related to the navy, it is asserted. Construction already authorized and in contemplation, it is said, is not measured by future needs, but by ship- and equipment-building facilities. It is believed to represent maximum capacity of these facilities projected over next two years.

When bill was reported by senate naval affairs committee last week, Senator David I. Walsh, chairman, stated "it is highly improbable that congress and the country realize that, according to uncontradicted testimony before our committee, it will be 1945 in some categories and 1946 in others before all these naval vessels will be completed and commissioned. That refers to the completion and the commissioning of the ships now under construction, plus the ships already authorized but not yet commenced, plus the ships authorized in the present bill."

Senator Walsh further said that under no circumstances now conceivable should United States be drawn into war in Europe, nor should our naval needs be considered with any such objective in mind. Nevertheless, he pointed out, armies of Europe and Asia cannot menace us unless transported across the seas in ships. Aircraft must be based in or near the Western Hemisphere in order to seriously threaten our security, he declared, and must first be conveyed thither in vessels.

"We need," said Senator Walsh in discussing a policy enabling us to command the sea and air approaches to the Western Hemisphere, "in this connection a navy sufficiently strong to meet and defeat the enemy at sea before he reaches our shores and an army and air force of sufficient strength to make our navy free to act."

BELGIUM MINOR MARKET FOR AMERICAN MACHINERY

American manufacturers, in 1939, sold to Belgium industrial machinery aggregating $1,576,460; printing and bookbinding machinery worth $149,372; and farm equipment totaling $156,605, according to commerce department, machinery division. England, France and United States supply only minor quantities of machinery to Belgium, each selling that nation 10 to 12 per cent of its imports in recent years. Germany has been principal source of machinery imported into Belgium, supplying 40 per cent of Belgian foreign machinery purchases during past several years.

Machinery building industry in Belgium is well established, and is normally able to supply most of its own requirements. Belgian exports in 1937 were valued at approximately $39,000,000. Only a negligible amount of Belgian machinery is sold in United States. Manufacturers of mining machinery in Belgium obtain most of their business in Belgian Congo, although United States usually sells from $300,000 to $400,000 worth of mining machinery annually in that colony.

Germany's Sales Largest

The Netherlands purchased machinery totaling $3,284,032 from United States in 1939. This consisted of $2,361,038 for industrial machinery; $537,148 for farm equipment purchases and $385,846 for printing and bookbinding equipment imports. In these groups, metalworking machinery and wheel and tracklaying tractors were most prominent machinery types imported.

British machinery sales to The Netherlands are approximately equal to America's, but Germany's machinery exports to The Netherlands were about five times as large as American and British sales.

United States exports to Netherlands East Indies, consisting largely of petroleum well and refining equipment, construction machinery, tractors, engines, and pumps had a value of $7,025,933 in 1939. Netherlands West Indies purchased $4,780,481 worth of American equipment in 1939.

PROCUREMENT DIVISION TO RECEIVE CHROMIUM ORE BIDS

Bids for chromium ore will be received May 24, under strategic materials act's provisions, procurement division reports.

Maximum of 17,500 gross tons of ore, according to specifications and proposals, is asked for. Quantities ranging from 1000 to 12,500 gross tons will be considered for delivery at Philadelphia harbor, Philadelphia, or at United States army general depot, New Cumberland, Pa., f.o.b. cars. From 1000 to 5000 gross tons will be considered for delivery at United States army ordnance depot, Ogden, Utah, f.o.b. cars.

GOVERNMENT WALSH-HEALEY PURCHASES TOTAL $782,505

During week ended May 4, government purchased $782,505.12 worth of iron and steel products under Walsh-Healey act as follows: Bethlehem Steel Co., San Francisco, $12,676.20; W. H. Kiefaber Co., Dayton, O., $10,222.44; Grayson Heat Control Ltd., Lynwood, Calif., $98,092.43; Pennsylvania Forge Corp., Philadelphia, $30,114.

Provo Foundry & Machine Co., Provo, Utah, $23,850; Washington Iron Works, Seattle, $13,970; M. K. Epstein Co., Springfield, Mass., $22,632; Bolt and Nut Division, Republic Steel Corp., Cleveland, $9,889.44 (estimated); Pittsburgh Screw & Bolt Corp., Pittsburgh, $13,717.73.

Hayes Mfg. Corp., Grand Rapids, Mich., $20,856; Keystone Steel & Wire Co., Peoria, Ill., $19,000 (indefinite); The Midvale Co., Washington, $18,675; Breeze Corps. Inc., Newark, N. J., $85,564; Heppenstall Co., Pittsburgh, $47,700.50; Howard Foundry Co., Chicago, $93,097.50; Mitchell Metal Products Inc., Cleveland, $28,350.39; Crucible Steel Co. of America, New York, $16,178.20.

Pressed Steel Tank Co., West Allis, Wis., $32,548.77; Noland Co. Inc., Washington, $20,193.69; Crane Co., Chicago, $9,981.66 (estimated); J. M. Tull Metal & Supply Co. Inc., Atlanta, Ga., $9,999.13; Ramon a Pla, San Juan, P. R., $44,860.16; M. Mocoroa Arsuaga Inc., San Juan, P. R., $11,200; American Hardware Corp., New Britain, Conn., $29,340.60; Federal Screw Works, Detroit, $59,795.28.

Light Plane Manufacture Trends to Production Methods

■ LIGHT plane manufacturers, anticipating a large increase in demand for their product, are adopting mass production methods as rapidly as possible. Meeting recently in Pittsburgh to discuss improved production methods, the light plane builders organized as a permanent committee within the Aeronautical Chamber of Commerce of America, New York. Original plan had been to form an independent organization.

Chief stimulant to private flying is expected to be the completion next month of the current civilian pilot training program by the civil aeronautics authority which will augment the number of civilian pilots by about 10,000.

Committee now includes: W. T. Piper, president, Piper Aircraft Corp., Lock Haven, Pa.; Carl Wootten, vice president in charge of sales, Aeronautical Corp. of America, Lunken Airport, Cincinnati; William A. Mara, vice president, Stinson Aircraft division, Aviation Mfg. Corp., Wayne, Mich.; John H. Torrens, president, Luscombe Airplane Corp., West Trenton, N. J.; W. L. Pinney, Porterfield Aircraft Corp., Kansas City, Mo.; Dee Hollowell, Continental Motors Corp., Muskegon, Mich.; R. E. Fowler, Aircooled Motors Corp., Syracuse, N. Y.; Dick Palmer, Lycoming division, Aviation Mfg. Corp., Williamsport, Pa.; Richard H. Depew Jr., vice president, Taylorcraft Aviation Corp., Alliance, O.

Light plane makers believe that eventually planes will be made by much the same methods now used by auto producers. Present rate of production, according to Luscombe Airplane Corp., West Trenton, N. J., is leading to increased use of specially made shop equipment to facilitate mass production. Trend in tools is to gang punch presses, gang riveters and drills.

Keynote of the production methods used by Luscombe is predrilling and preassembly of component parts and final assembly on a production line. Sheets of aluminum Alclad for skins are sheared to size, drilled with the aid of jigs and then shaped in rolling machines and placed in stock. Component parts of fuselage structure are similarly formed and predrilled. Predrilled fuselage skins are attached to frames of planes on the production line temporarily with Cleco spring clamps, and rivets inserted and covered with masking tape temporarily to hold them in place. Four riveters then attack the inserted rivets in the skin and completely rivet the fuselage in 3 hours and 40 minutes, doubling the production achieved by old methods.

Completed fuselage then is hung on an overhead conveyor and from there on, assembly methods are similar to those used by automakers.

Wings come through a similar production line. Wing ribs and spars are made well in advance of assembly. Corrugated skins for ailerons now are formed by press brakes instead of by hand. Metal wing frame is covered with fabric, given six coats of aluminum dope and placed in stock to await assigned planes. Advantage of metal wing structure is that members may be straightened out after minor ground collisions and that wing tips may be made separate. Repairs to ends of wings may be made by replacing tips without necessity of replacing entire wing.

Plane Aids Traffic Police

■ To assist highway traffic patrol cars in untangling serious traffic jams, New York police have adopted airplanes. Planes fly over auto congested areas and by means of two-way radio communications give directions to ground patrol cars for expediting traffic. Similar experiments have proved successful in Indiana, Michigan and Washington

New Companies Formed To Make Aircraft, Parts

■ Continental Aviation & Engineering Corp., Richmond, Va., has been incorporated with a capital of $1,000,000 to design, manufacture and deal in aircraft. Officers include: Clarence Reese, Grosse Point, Mich., executive vice president; Harold K. Young, New York, treasurer.

Recently organized aircraft companies in Los Angeles county include: Aircraft Specialties Corp., incorporated with a capital of $25,000, represented by Robert Omer, 214 Security building, Burbank, Calif.

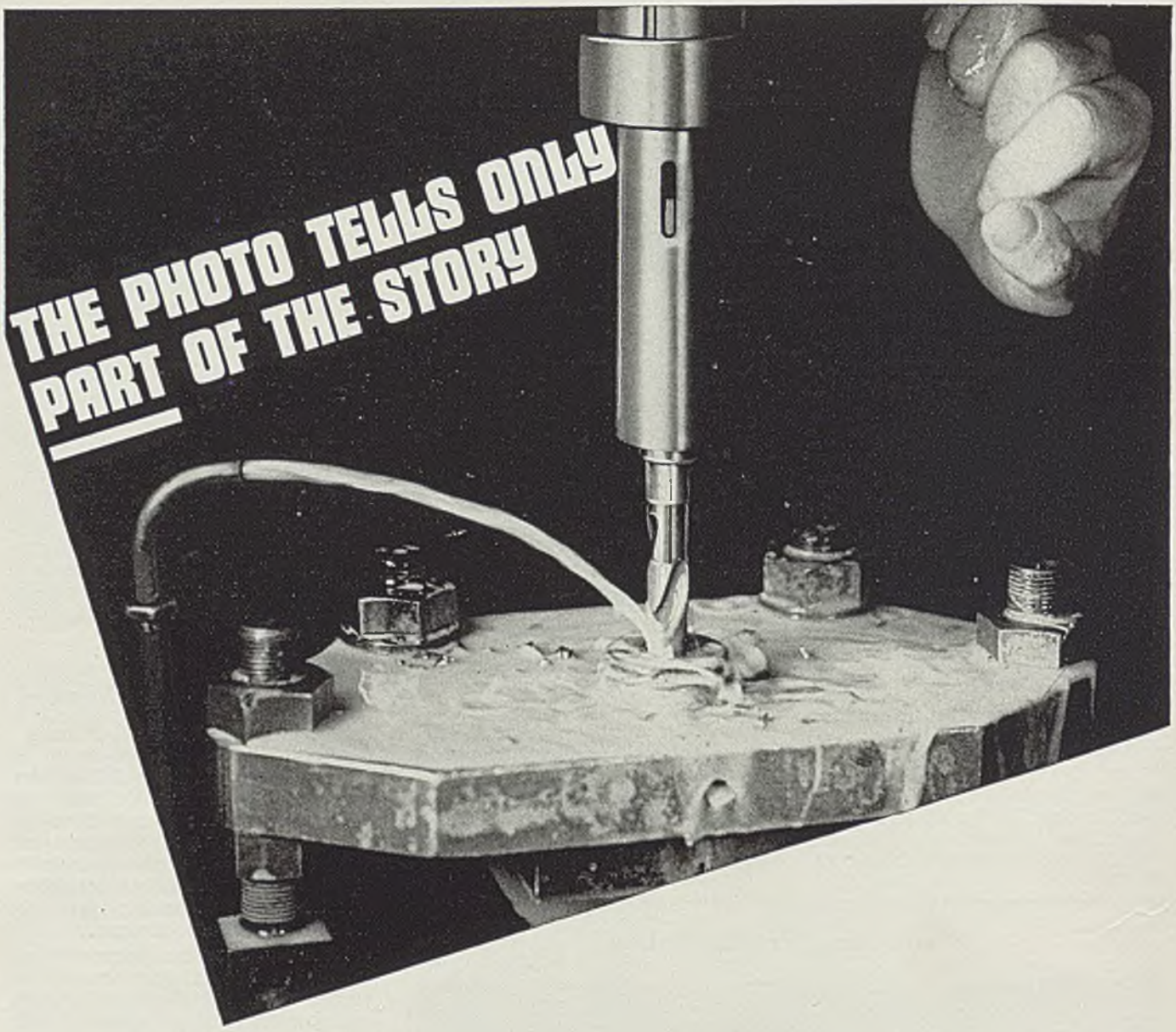
National Aircraft Equipment incorporated with a capital stock of $25,000, represented by Roland Kinney, 2525 East Forty-ninth street, Los Angeles.

Federal Aircraft Corp. incorporated with a capital stock of $500,000, represented by Guthrie & Darling, Pacific Mutual building, Los Angeles.

Hardman Aircrafts Products Inc. incorporated with a capital stock of $100,000, represented by Sprague, McClanahan, Goddard & Hunt, Title Insurance building, Los Angeles.

Fletcher Aviation Corp. incorporated with a capital of $2,000,000; directors are Wendell and Maurice Fletcher of Burbank and Frank P. Fletcher of Santa Monica, Calif.

Brown Aircraft Corp. incorporated with a capital of $1,000,000, represented by Durley-Downes, Syndicate building, Oxnard, Calif.; directors are L. W. Brown and D. B. Palmer, Los Angeles, and Peter Fox, Oxnard, Calif.



● Action photography caught this stream of coolant right in "mid-stream," so to speak. It even "stopped" the drill which was churning in at a speed of over 500 R. P. M.

But the photo does *not* show the study that a G. T. D. Greenfield engineer put into this particular job. It does *not* show long discussions of jig design. It does *not* show a number of tests made to determine the best speed to drill the particular alloy steel used in the part for which this jig was designed. It does not and cannot show the cooperation which "*Greenfield*" sales engineers give to every "*Greenfield*" customer, large or small, to enable him to get only the best out of his "*Greenfield*" tools — to get more production at less cost than from any other tools he can buy anywhere. And because G. T. D. Greenfield is a large, experienced concern, "*Greenfield*" is able to furnish this type of service at no extra cost.

So, when you look at this photograph, remember that what it does *not* show is far more important than what the camera caught.

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Detroit Plant: 2102 West Fort St. — Warehouses in New York, Chicago, Los Angeles and San Francisco
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Mirrors of MOTORDOM

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

DETROIT

■ PRACTICALLY the only topic of conversation—whether in plant, office or lunchroom—last week was the German blitzkrieg of the low countries and its possible outcome on business in this country. The stock market promptly dropped to a new low for the year, but business people were inclined to the belief that a precipitate, albeit artificial, climb in industrial activity is certain to be the immediate result in this country.

Two factors suggest this. One is the prospect of instantaneous hiking of funds for national defense, which will call for trucks, airplanes, armored cars, munitions and other military paraphernalia required by the limping defense forces of this country. The other is the probable relaxation of restrictions against movement of this type of material to the Allies. If the seemingly superefficient German military machine continues on its uninterrupted drive toward Paris and London, the three M's of the United States —money, machinery and material— certainly will come under powerful pressure from the Allies.

Steelmaking Up

Already a sharp boost in the steelmaking rate has started the scrap barometer on the upgrade. Some steel plants have been caught short as far as scrap supplies are concerned and are back in the market buying. Some grades of scrap material have advanced as much as $2 per ton in the past week or ten days. The ingot rate in the Detroit area jumped ten points last week to 80 per cent, as three more open hearths were returned to service.

Co-ordination of industry's ability to produce and the needs of the various branches of national defense agencies more and more is coming to be recognized as a crying need. Such a co-ordination patently has been effected in Germany, or that country's mechanized forces would not have the devastating power already exhibited. True, the various ordnance districts here have prepared their industrial surveys, and each plant supposedly has been catalogued for its part in any wholesale arms program, and some experimental orders have been released for production. But at the moment a fine emergency is being built up in the opinions of commentators and business analysts which, when properly transferred to the minds of congressmen, seems certain to result in wholesale expansion in industry's contributions to war materiel.

The various motor companies, with their perfected systems of mass production and assembly, have been touted as ideally suited to a quick change to the manufacture of airplanes, tanks and the like. The manufacture of airplanes, however, is a vastly different technique than the manufacture of automobiles, and the economy of converting an auto plant to a plane plant is doubtful. Considering the speed with which new plants can be erected today, it probably would be more feasible to build entire new plants for airplane production than to attempt any conversion.

There have been no indications that any major automobile company or its executives have given any serious thought to mass production of airplanes. Direct questions as to the possibility of such a move generally elicit a laugh.

■ LARGE-SCALE expansion of facilities, particularly in the foundry, are under way at the Pontiac Motor division of General Motors Corp. and it is possible this division may join in the spotlight which has been focused on Buick as a manufacturing center for the past few years. The figure of $5,000,000 is heard as the overall expenditure being planned at Pontiac, this covering new buildings, equipment, dies, etc.

Five extensions are being made to the foundry buildings, including a new cupola house to accommodate two new 96-inch cupolas, a 100-foot extension to the pouring bay, a 20 x 100-foot sand laboratory, a sand storage building, and a building to house sand drying equipment.

Austin Co., Cleveland, has the contract for the building work which is scheduled for completion around June 1. The foundry was slated to stop operations about May 17 to make way for construction gangs. Cupolas are being built by Whiting Corp. and are duplicates of the four now operated. They have deep wells, use high-pressure cold blast and are in every sense of the word high-production units. Expenditure for them will run around $30,000, with $30,000 more required for blowing equipment.

Foundry Capacity Increased

With six cupolas ultimately available, two can be run on hard iron, two on soft iron and two held in reserve or being repaired. Iron is tapped directly into pouring ladles, no receiving ladle being used, one reason for the deep-well design. Tapping temperature is kept fairly high, 2850 degrees Fahr. or more.

New equipment will raise foundry capacity roughly 50 per cent and will permit pouring around 750 tons of iron daily. One reason for the additional capacity is that a considerable amount of casting work for Olds will be taken over by the Pontiac foundry for 1941 models, relieving Buick from this load to some extent, as well as outside

foundries. Chief tonnage item will be cylinder blocks, the understanding being that all of the Olds 8 blocks and some of the Olds 6 blocks will be handled at Pontiac. In addition to the expanding requirements for castings for Pontiac 6 and 8 models, parts are supplied to Yellow Truck & Coach in Pontiac, and housings for the Hydra-Matic drive also are cast.

It is likely next year will see some expansion of production of automatic transmissions as manufacturing difficulties are ironed out. Currently assemblies are running at around 250 daily which is not enough to meet demand. Among the more knotty problems which have beset the Detroit Transmission division is that of obtaining satisfactory die castings for the complicated valve bodies and governor bodies. These small castings must be cored out with a veritable maze of main and tributary passages and holes, making it a tough job for the die caster to avoid porosity after the delicate machining operations have been completed. Tolerances of 0.001-inch on some of these holes are specified, giving some idea of the precision involved. Castings rejects have been high, but it is believed that can be reduced possibly by slight changes in design.

■ SEVERAL plant expansion projects have been announced in this district recently. One is a 175 x 200-foot plant for Detroit Stamping Co. on Midland avenue in Highland Park, in a new industrial section. Of modernistic design, the plant, with equipment, will cost in the neighborhood of $100,000, it is estimated, and will provide 35,000 square feet of floor space. It is scheduled for completion in July. Some new equipment, including a crane and a few presses, will be installed. The company has operated for 25 years in its present location on West Fort street, employing normally 150. The new plant is expected to expedite handling operations and thereby contribute to lower costs.

First use of the tree-form steel truss, developed by Austin Co., in this district will be seen in the plant now going up for Vickers Inc., on Oakman boulevard. The plant will be 200 x 375 feet in extent, with two-story offices in front 50 x 375 feet. The saw tooth rigid frame construction, with no web members or lower chords in roof trusses gives plenty of room for manufacturing operations, overhead conveyors, craneways and the like. The company is allied with Sperry Gyroscope Co. and is a pioneer manufacturer of hydraulic equipment and controls.

Production of the **Ford** tractor, which had been proceeding at a rapid pace, roughly 350 units per day, was suspended last Monday for a reported two weeks at least. No explanation is offered, conjecture being that inventories of finished units were becoming excessive, and perhaps some interruption to foreign shipments encountered.

Dodge has announced a new 2-ton cab-over-engine model, companion truck to the present 1½-ton job. It is offered in three wheelbases of 105, 129 and 159 inches, with maximum gross weight rating of 15,000 pounds in conventional use and 25,000 pounds when operated as a tractor-trailer unit.

Fruehauf Trailer Co. is now building a 3-story addition at one end of its office building to accommodate increased volume of work resulting from expanding sales in the commercial trailer field.

Graham has launched assemblies of its new Hollywood model, patterned after the **Hupp** Skylark, and is now turning out about 175 units weekly. Later the Clipper series will be introduced, utilizing the same style of body but with supercharged Graham engine. Meanwhile, attempts are being made to initiate assemblies of the same body on the Hupp chassis.

Upward of 20,000,000 spring dampeners have been used in **Pontiac** engines since their development several years ago by William Manning, assistant chief engineer. Patented by him, they are small two-pronged forks which press against opposite sides of each valve spring to dampen the "dancing" and resultant noise of these springs.

Comparison of April production figures for four producers, this year and last are as follows:

	April, 1940	April, 1939
Studebaker....	10,898	10,974
Chevrolet	108,362	76,852
Buick	28,652	21,343
Pontiac	22,741	16,010

Buick has announced a new convertible coupe on the 70 series chassis, with body by Brunn and built to specifications developed by Hood Bassett, son of the late Harry F. Bassett, one-time Buick president. It is distinguished by lower door lines and specially embossed belt moldings.

Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

	1938	1939	1940
Jan.....	226,952	356,962	449,314
Feb.....	202,597	317,520	421,820
March....	238,447	389,495	439,911
April.....	237,929	354,266	.....
May.....	210,174	313,248	.....
June	189,402	324,253	.....
July.....	150,450	218,494	.....
Aug.....	96,946	103,343	.....
Sept.....	89,623	192,678	.....
Oct.....	215,286	324,688	.....
Nov.....	390,405	368,541	.....
Dec.....	406,960	469,120	.....
Year	2,655,171	3,732,608	.....

Estimated by Ward's Reports

Week ended:	1940	1939†
April 20.....	103,725	90,280
April 27.....	101,405	86,640
May 4	99,305	71,420
May 11	98,480	72,375
May 18	99,030	80,145

†Comparable week.

263 Great Lakes Vessels Commissioned

■ Of the total 298 bulk freighters on the Great Lakes, 88.3 per cent or 263 have been commissioned and 73.3 per cent or 218 are in the ore trade as of May 15, according to C. C. Lindeman, statistician, M. A. Hanna Co., Cleveland. This compares to a total of 303 vessels as of May 25, 1939, of which 56.1 per cent or 170 were commissioned and 46.5 per cent or 140 were in the ore trade.

Trip capacity this year is 2,722,740 gross tons of which 90.52 per cent or 2,464,540 tons have been commissioned compared to the total trip capacity of 2,765,140 tons of May 25, 1939, when 57.3 per cent or 1,584,600 tons were commissioned.

At the peak of last season's activities early in October, 287 vessels with 2,645,090 tons capacity were in commission, aggregating 94.7 per cent of lake bulk freighters.

Columbia Steel Starts New Coast Sheet Mill

■ Several units of new sheet mill of Columbia Steel Co.'s plant at Pittsburg, Calif., have started operations. Columbia Steel Co. is a subsidiary of the United States Steel Corp. The old mill discontinued operations about two weeks ago to allow for the change to new equipment. The new units put in service include a three-high breakdown mill, a pair furnace, three cold roll mills and the annealing department. Other units to start soon include two finishing stands and two pack furnaces.

The new sheet mill will not add to the present capacity of the plant but will insure improved products for Pacific Coast consumers.

Compact?
Sure! But plenty room for husky fisted maintenance men!

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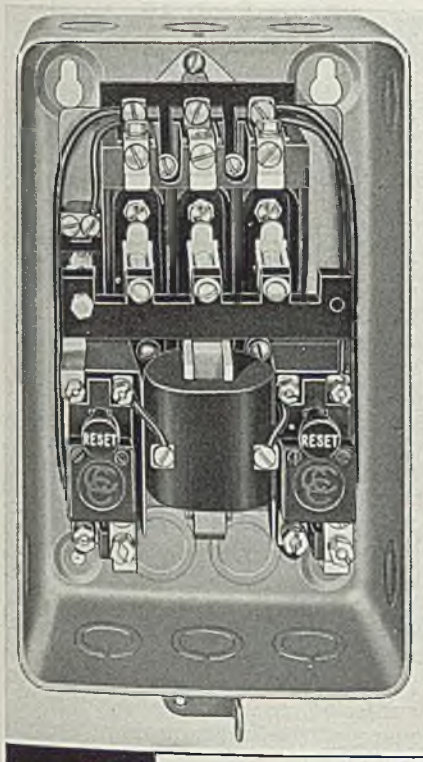

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RATING

VOLTS	MAXIMUM HORSEPOWER	
	1 PHASE	3 PHASE
110	1	1½
220	1½	2
440	1½	2
550	1½	2

AVAILABLE

- With enclosure or open.
- With normally open or normally closed control circuit contacts.
- In single phase or polyphase types.
- In form MA, with overload reset button in cover. Separate pilot device required.
- In form MB, with "Manual-Off-Automatic" switch and reset button in cover.
- In form MC, with "Start" and "Stop-Reset" button in cover.
- In machine tool gray finish on heavy drawn steel enclosure.
- With concentric knockouts on top, bottom, sides and back.

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U. S. Steel Establishes Pension Plan To Include All Employes

■ ESTABLISHMENT of United States Steel Corp.'s contributory pension plan, providing retirement pensions for employes whose annual earnings exceed $3000, or $3600 for railroad employes, was reported last week by Benjamin F. Fairless, president. Provision for the contributory plan was made last December, when the corporation's pension system, inaugurated in 1911, was revised to correlate with federal social security and railroad retirement acts.

Provision also was made, when the rules were revised in anticipation of commencement of federal social security payments in January, 1940, to continue pension credits for service prior to 1940. In addition, the rules as then revised, continue to make provision with respect to special retirement conditions and to employes retiring after 1939 until they qualify for federal or state old age retirement benefits. These provisions are not affected by the corporation's contributory pension system.

Pension coverage, with respect to all employe earnings, is thus made available to all United States Steel Corp. employes. Those whose annual earnings are less than $3000 or $3600 limit set by the contributory plan are covered by federal pension laws, supplemented also by the corporation's pension system.

The contributory plan is intended to provide an annual pension for life, upon retirement at 65, of 1 per cent of the aggregate eligible compensation received by an employe during participation in the plan. Aggregate eligible compensation is defined as the amount in excess of earnings taxable under the federal pension laws. Approximately 11,000 employes are eligible to participate in the plan.

Cost of the pensions, under the contributory pension plan, will be met by participating employes' contributions and their employing companies' payments. This method is very similar to federal pension methods, where public pensions' cost is provided by joint payments of employes and employing companies, through medium of taxation.

Employes participating in the plan will contribute 3 per cent of their earnings in excess of $3000 or $3600 per year, as the case may be. Employing companies will provide such varying amounts, which it is expected will be substantially in excess of participating employes' contributions, as may be required to cover the plan's cost.

Guarantee Trust Co., New York, will be trustee for the contributory plan's funds.

Corporation's revised pension plan for employes whose annual earnings are within the $3000 and $3600 limits provides retiring employes shall receive benefits according to the former regulations, less the amount received under federal plans. Employes retiring before 65, the age at which federal pensions are granted, due to permanent and total incapacitation after 25 or more years' service, will receive a company pension until they are eligible for federal social security pension.

Scrap Consumption Declines in April

■ Domestic consumption of iron and steel scrap declined in April for the fifth consecutive month. April consumption is estimated by the Institute of Scrap Iron & Steel Inc. at 2,753,000 gross tons, compared with 2,932,000 tons in March, and 2,317,000 tons in April, 1939.

However, scrap consumption for the first four months, at 12,514,000 tons, is one-third larger than in the corresponding period of 1939, when 9,759,000 tons were melted.

Monarch Tool To Expand Plant by 15 Per Cent

■ Monarch Machine Tool Co., Sidney, O., last week authorized a 20,000 square foot addition to its plant to increase capacity by about 15 per cent. This is the sixth plant addition in six years for the company. Extension is necessary to house approximately $200,000 worth of the new production equipment which has been ordered since the first of the year, according to Wendell E. Whipp, president.

"This equipment was bought to handle the mounting volume of orders which, even in view of the new plant addition, constitutes a backlog that bids fair to assure capacity production the rest of 1940," Mr. Whipp stated.

Work on the new building will start immediately and company expects to occupy the addition within 60 days.

Vanadium Develops New Alloys To Increase Uniformity, Control

■ DISCOVERY of a group of new-type alloys designed to assist the steelmaker in meeting more easily the high specification limits required by the automotive, armament, machinery and other large industries was announced last week by E. D. Bransome, president, Vanadium Corp. of America, New York. The name "Grainal" has been given to these alloys which act to give positive control and uniform results to the steelmaking process.

By the addition of a few pounds, in some cases as little as two pounds, of one of these alloys to a ton of steel, ordinary carbon steels and low alloy steels attain the hardness and other important physical characteristics of more highly alloyed steels, Mr. Bransome said.

"It is worth noting that alloys of this type may be made from ores readily available in the United States. Equally important, their employment should enable greater economy in the use of higher-priced alloys, conserving them for use in the 'higher' alloy steels of which they are basic constituents."

This particular group of alloys, said Mr. Bransome, was the subject of research for more than three years before actual field work was started. In the original form, the material was a ferroalloy of vanadium, titanium and aluminum but subsequent experiments have shown that variation in the proportions of each of the constituents and even in the constituents themselves is possible within certain limits in producing alloys of remarkable characteristics.

"For more than a year now, Grainal has been subjected to tests in various of the large steel plants of the country," said Mr. Bransome. "The steels turned out in these experimental heats have further been subjected to rigorous scrutiny by many of the larger users of steel in this country, such as the automotive and farm implements industries.

"The results have shown a remarkable uniformity, with the steels produced possessing a hardness and other qualities hitherto attainable only through the use of much larger quantities of other alloys."

Earle C. Smith

Dr. C. H. Herty

A. C. Cummins

Institute Program To Include Industrial Relations Forum

■ PROGRAM for the forty-ninth general meeting of the American Iron and Steel institute at the Waldorf-Astoria, New York, May 23 has been expanded to include an afternoon session devoted to industrial relations.

This session will consist primarily of a question and answer forum on the institute's industrial relations subjects. Questions will be answered by a panel, including members of the institutes industrial relations committee, and attorneys of wide experience in industrial relations.

Questions contributed from many sources will be put by the chairman for members of the panel to discuss and answer. Opportunity also will be provided for questions from the floor.

The forum will begin promptly at 2:15 p. m. and will be open only to institute members.

James E. Lose, vice president, Carnegie-Illinois Steel Corp., Pittsburgh, will be chairman at the afternoon technical session. Papers will be presented by Earle C. Smith, chief metallurgist, Republic Steel Corp., Cleveland; A. C. Cummins, general superintendent, Youngstown district works, Carnegie-Illinois Steel Corp.; and Dr. C. H. Herty, research engineer, Bethlehem Steel Co., Bethlehem. Pa.

Mr. Smith, who will speak on "The Control of Steel Composition and the Problems It Presents," was born in New Brighton, Pa., where he attended public schools. He was graduated from Ohio State university with the degree of engineer of mines, and immediately became associated with United States Steel Corp. at Gary, Ind., where he remained for a year. In 1915 he did post-graduate work at Columbia university and then returned to Ohio State university as instructor for one year. In 1917 he became an employe of the United States army signal corps and later became associated with the aircraft production unit of the army, a part of the signal corps.

After the war he joined Central Steel Co. at Massillon, O., and remained with that company until it became a part of Republic Steel Corp. in 1930. Mr. Smith is a member of many scientific societies, both in this country and abroad.

To Discuss Test Requirements

Dr. Herty, who will speak on "Producing Steel to Meet Physical Test Requirements," is perhaps best known for his work on the physical chemistry of steelmaking at the Metallurgical Advisory board, Pittsburgh, where he served as director before joining the development and research department of Bethlehem as research engineer in 1934. Dr. Herty has been engaged continuously in the study of metallurgy of steel since 1921.

Born in Athens, Ga., Oct. 6, 1896, Dr. Herty received most of his public schooling in Chapel Hill, N. C., where the family moved when he was eight years old. He was graduated from the University of North Carolina in 1918 with the degree of B.S. in chemistry. In 1921 he received his master's degree in chemical engineering and in 1924 the degree of D.S.C. in chemical engineering from Massachusetts Institute of Technology.

While studying at M.I.T. he served as assistant director at the institution's Buffalo station, school of chemical engineering practice, in 1921-22 and 1924-25. He was in charge of ferrous metallurgical section, United States bureau of mines, 1926-31; director of research, Metallurgical Advisory board, Pittsburgh, 1931-34. Dr. Herty was Campbell memorial lecturer, American Society for Metals in 1931, and Howe memorial lecturer, American Institute of Mining and Metallurgical Engineers in 1940.

Mr. Cummins, who will speak on "Dimensional Variations in Rolled Steel Products and the Problems of Control," is a graduate of Lehigh university and has been associated with the Carnegie-Illinois Steel Corp. and former Carnegie Steel Co. since 1911. He started as an electrical draftsman at the Duquesne, Pa., works and served in various engineering, construction and operating capacities there for several years. In 1919 he was named superintendent of the electrical department.

He was appointed assistant general superintendent of the plant in 1932 and a year later became general superintendent. On Aug. 1, 1936, he was named assistant manager of Pittsburgh district operations of Carnegie-Illinois and on May 1 this year was appointed general superintendent of Youngstown district operations.

An active member of the Association of Iron and Steel Engineers since 1919, Mr. Cummins is a past president and honorary director of the association.

■ Wage earners cost of living in the United States rose 0.5 per cent between March and April, largely due to increases in food prices, according to division of industrial economics of the Conference Board, New York. Food prices rose 1.4 per cent; rents rose 0.1 per cent; clothing prices remained unchanged; coal declined 0.8 per cent and sundries increased 0.1 per cent.

Let's Pay It in Cash!

■ ALL of a sudden it has dawned on the administration at Washington that our national defense is inadequate. The President has asked congress for a billion dollars to be spent for the equipment and the materials of war. He will, of course, succeed in getting any amount that is needed for this purpose because—after what has happened recently in Europe and elsewhere—the people of this country realize that only armed might is respected by aggressor nations.

The President, as commander-in-chief of the army and navy, will have charge of the direction and co-ordination of the vast industrial mobilization program that will be required to carry out this objective. It is indeed unfortunate that the history of his administration is such as to arouse grave forebodings as to the effectiveness with which we will spend the vast sums of money that will be necessary.

Country Has Abundant Talent for Organizing National Defense

For nearly two presidential terms this administration has striven to improve the country's condition through measures which in many cases have worked just the other way. It has saddled many brakes on business and shaken business confidence. It has prevented the industrial expansion that is necessary to afford widespread employment. It has played politics. It has catered to pressure groups. It has encouraged subversion. It has squandered billions in the purchase of useless gold and silver. Instead of providing employment by building military aircraft, anti-aircraft guns, battleships, munitions, it has wasted billions in such enterprises as raking up leaves. Above all, it has weakened the national financial structure by placing the country in the hole to the extent of 45 billions of dollars.

We have abundant talent for organizing for national defense on the required scale. The question remains as to whether this talent will be drafted in the national service, or whether the organization and execution of the national defense program will be entrusted to "experts" of the same type as some of those who have had a leading part in shaping our national policies over the past seven years. That is up to the President and business men and technicians can help only as they are called upon for service.

Nation Should Pay Cash for Armament And Not Go Farther into the Red

There is one positive helpful action that business men can take at this time—if they will. They can insist that the national defense program be paid for in cash. Such a demand if voiced with sufficient emphasis would force an issue at Washington. It would mean the enactment of higher taxes, or economies in some of the present and contemplated expenditures. It may be noted, for example, that the billion asked for national defense just about equals the amount requested for relief. Might it not be possible that intelligent expenditure for national defense would cut down the cost of relief?

Manufacturers can render a service to the country by writing to their senators and representatives—demanding that national defense should be paid for in cash. This is one time when an administration and a congress that have allowed the country to get into the present emergency situation should be forced to solve a financial problem on a business-like basis, rather than charge another billion dollars on the cuff.

The BUSINESS TREND

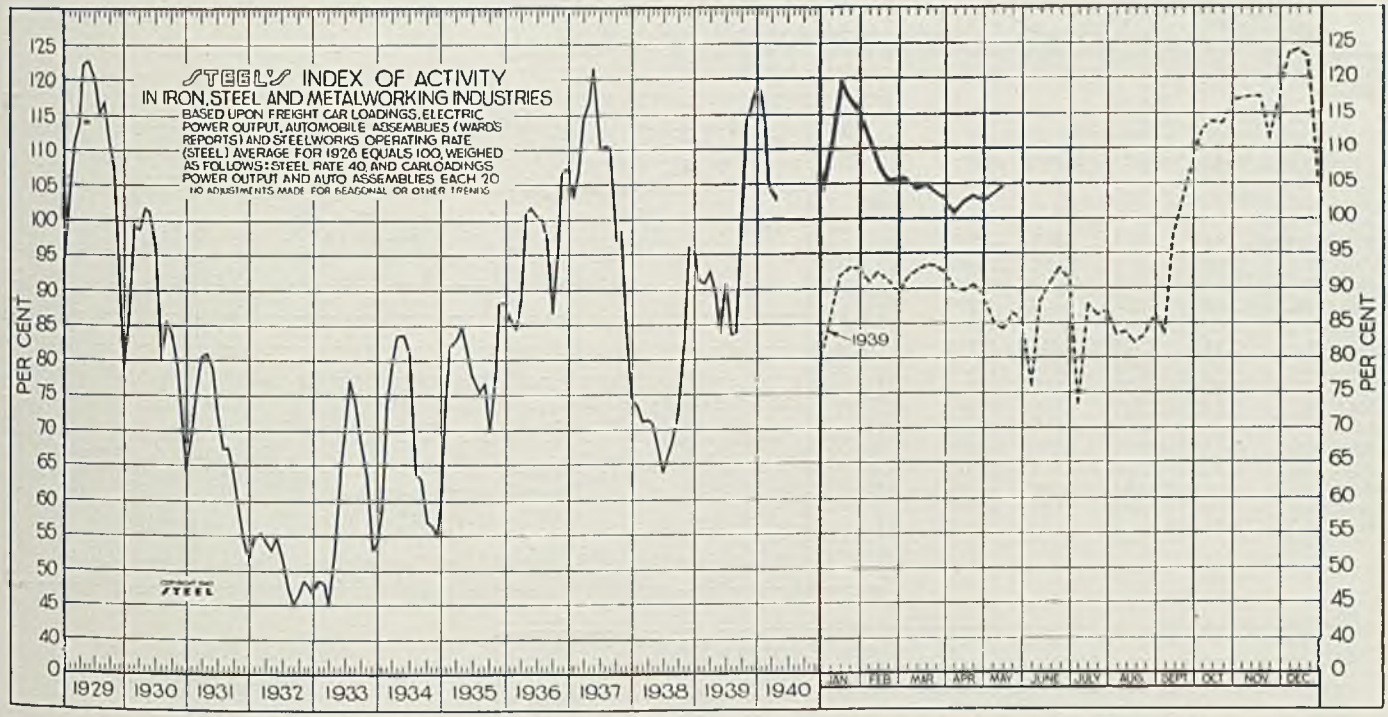
Signs of Business Upturn Appear More Positive

■ Improved inventory position and increased volume of new business in a number of industrial lines would seem to indicate further improvement in industrial activity. Of particular significance at this time is the encouraging upturn in steelmaking operations, greater than seasonal increase in freight traffic to the highest level this year, and improvement in electric power output.

STEEL's index of activity in the iron, steel and metalworking industries advanced 1.5 points to 104.8 during the week ended May 11. The index now exceeds any week since the period ended March 16, and represents the second consecutive weekly increase.

Steelmaking operations recorded the largest weekly advance so far this year during the period ended May 11. In that week the national steel rate advanced three points to 66.5 per cent and still further gains were noted during the latest period.

Freight traffic rose to 680,657 cars from the 665,510 car level reported in the previous period. The lone business indicator composing STEEL's index to record a decline during the week ended May 11 was automobile production. Motor car output in that week eased less than seasonally to 98,480 units.



STEEL'S index of activity gained 1.5 *points to* 104.8 *in the week ended May* 11:

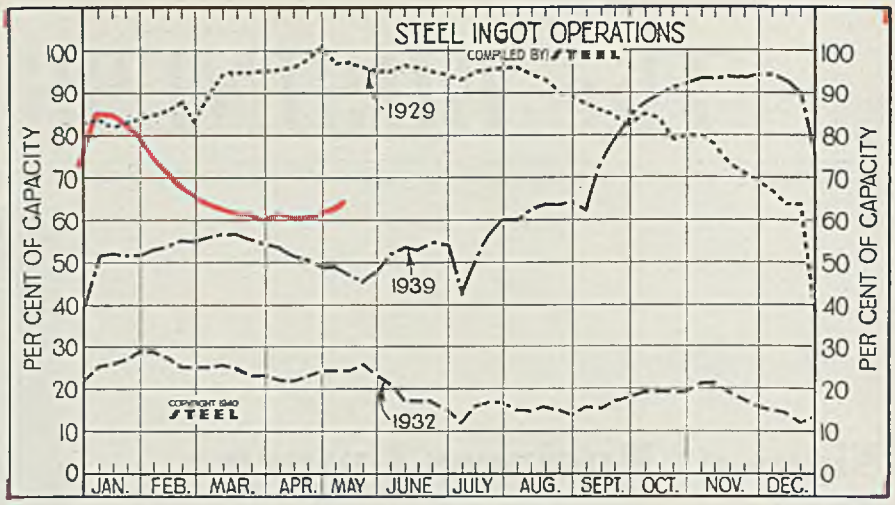
Week Ended	1940	1939
Mar. 2	105.6	91.5
Mar. 9	104.7	92.7
Mar. 16	104.9	93.3
Mar. 23	103.7	93.2
Mar. 30	103.2	92.2
Apr. 6	101.8	90.0
Apr. 13	102.7	89.7
Apr. 20	103.4	90.4
Apr. 27	102.8	89.2
May 4	103.3	85.1
May 11	104.8	84.2

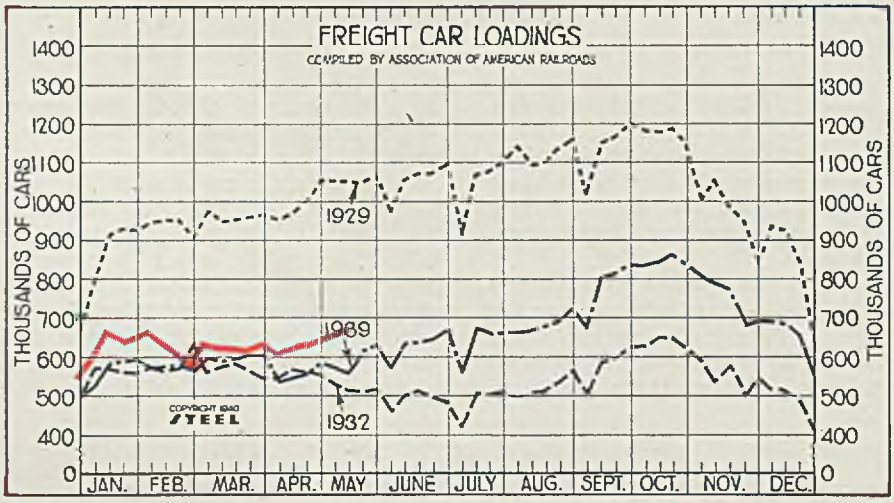
Mo. Data	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Jan.	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6	104.1
Feb.	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2	111.2
March	104.1	92.6	71.2	114.4	88.7	83.1	78.9	44.5	54.2	80.4	98.6	114.0
April	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0	101.7	122.5
May	.....	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6	101.2	122.9
June	.....	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1	95.8	120.3
July	.....	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3	79.9	115.2
Aug.	.....	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4	85.4	116.9
Sept.	.....	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3	83.7	110.8
Oct.	....	114.0	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2	78.8	107.1
Nov.	.....	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4	71.0	92.2
Dec.	.....	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3	64.3	78.3

Steel Ingot Operations

(Per Cent)

Week ended	1940	1939	1938	1937
Feb. 10....	71.0	54.0	30.0	81.0
Feb. 17....	69.0	55.0	31.0	83.0
Feb. 24....	67.0	55.0	30.5	84.0
Mar. 2....	65.5	56.0	29.5	86.0
Mar. 9....	63.5	56.5	30.0	87.0
Mar. 16....	62.5	56.5	32.0	89.0
Mar. 23....	62.5	55.5	35.0	90.0
Mar. 30....	61.0	54.5	36.0	91.5
Apr. 6....	61.5	53.5	32.0	91.5
Apr. 13....	61.0	51.5	32.0	91.5
Apr. 20....	61.5	50.5	32.5	91.5
Apr. 27....	61.5	49.0	32.0	91.0
May 4....	63.5	49.0	31.0	91.0
May 11....	66.5	47.0	30.0	89.0





Freight Car Loadings

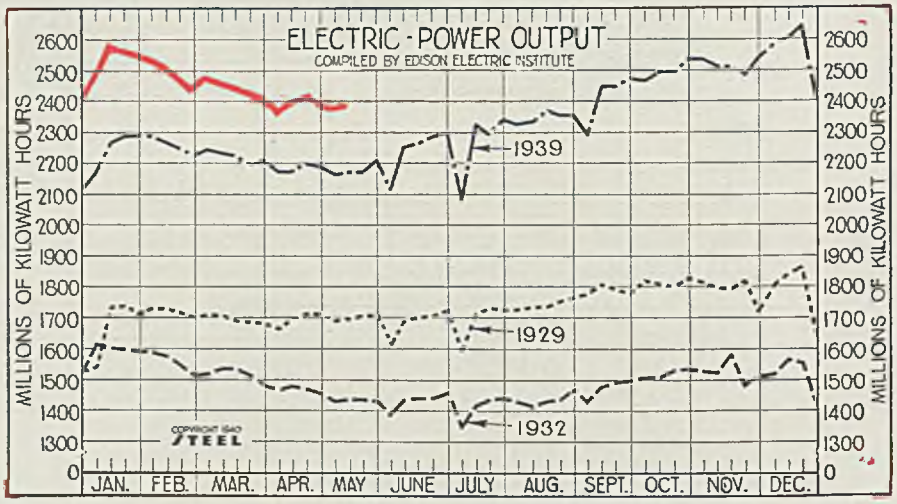
(1000 Cars)

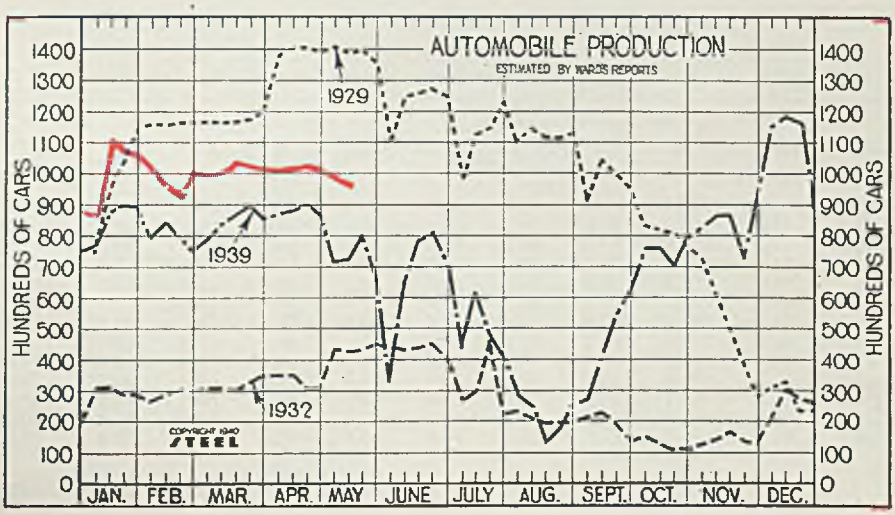
Week ended	1940	1939	1938	1937
Feb. 10.....	627	580	543	692
Feb. 17.....	608	580	536	715
Feb. 24.....	595	561	512	697
Mar. 2.....	634	599	553	734
Mar. 9.....	621	592	557	749
Mar. 16.....	619	595	540	759
Mar. 23.....	620	605	573	761
Mar. 30.....	628	604	523	727
Apr. 6.....	603	535	522	716
Apr. 13.....	619	548	538	751
Apr. 20.....	628	559	524	761
Apr. 27.....	645	586	543	782
May 4.....	666	573	536	767
May 11.....	681	555	542	774

Electric Power Output

(Million KWH)

Week ended	1940	1939	1938	1937
Feb. 10...	2,523	2,268	2,052	2,200
Feb. 17...	2,476	2,249	2,059	2,212
Feb. 24...	2,455	2,226	2,031	2,207
Mar. 2....	2,479	2,244	2,036	2,200
Mar. 9....	2,464	2,238	2,015	2,213
Mar. 16...	2,460	2,225	2,018	2,211
Mar. 23...	2,424	2,199	1,975	2,200
Mar. 30...	2,422	2,210	1,979	2,147
Apr. 6 ...	2,381	2,173	1,990	2,176
Apr. 13...	2,418	2,171	1,958	2,173
Apr. 20...	2,422	2,199	1,951	2,188
Apr. 27...	2,398	2,183	1,939	2,194
May 4....	2,386	2,164	1,939	2,176
May 11...	2,388	2,171	1,968	2,195

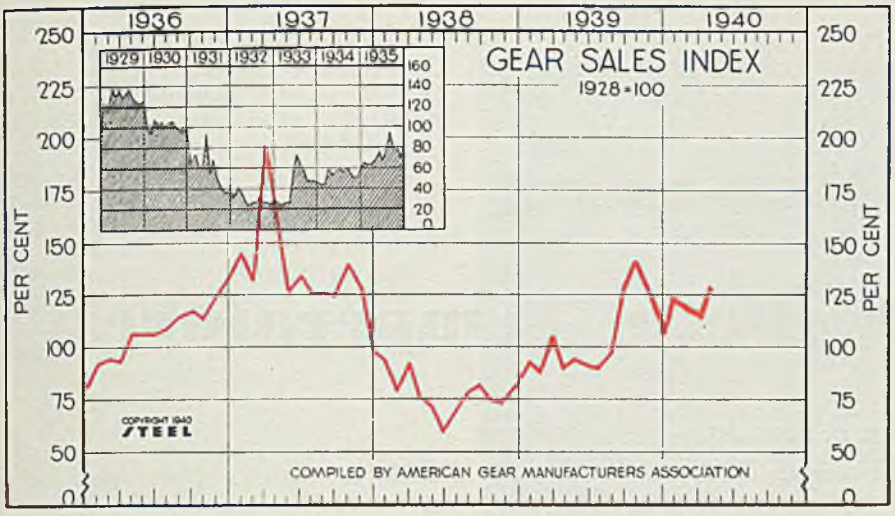




Auto Production

(1000 Units)

Week ended	1940	1939	1938	1937
Feb. 10....	96.0	84.5	57.8	72.8
Feb. 17....	95.1	79.9	59.1	95.7
Feb. 24....	102.6	75.7	57.0	111.9
Mar. 2....	100.9	78.7	54.4	127.0
Mar. 9....	103.6	84.1	57.4	101.7
Mar. 16....	105.7	86.7	57.5	99.0
Mar. 23....	103.4	89.4	56.8	101.0
Mar. 30....	103.4	86.0	57.5	97.0
Apr. 6....	101.7	87.0	70.0	99.2
Apr. 13....	101.9	88.0	62.0	125.5
Apr. 20....	103.7	90.3	60.6	133.2
Apr. 27....	101.4	86.6	50.7	139.5
May 4....	99.3	71.4	53.4	140.2
May 11....	98.4	72.4	47.4	140.4



Gear Sales Index

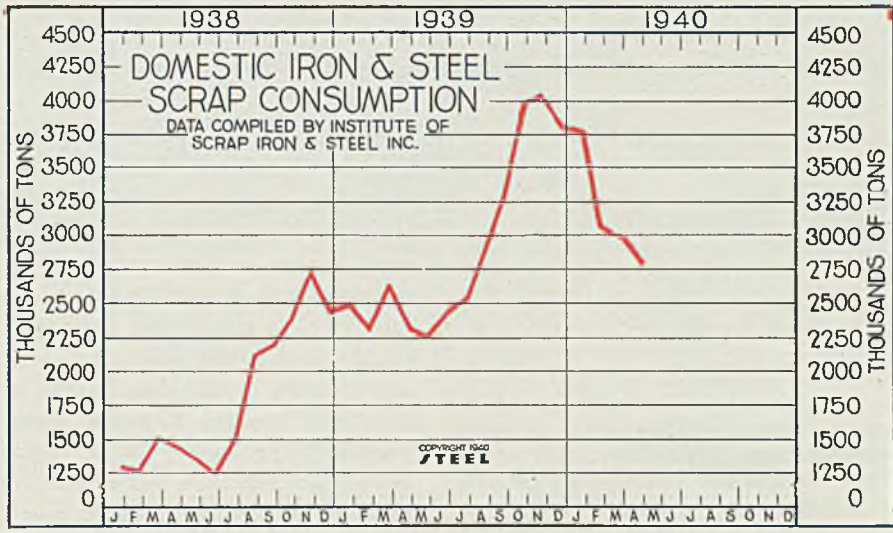
(1928 = 100)

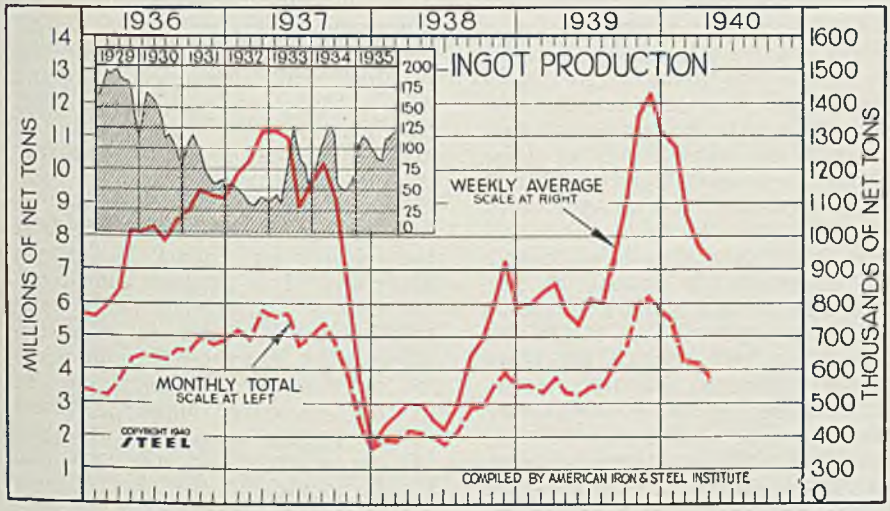
	1940	1939	1938	1937	193
Jan.	123	91.0	93.0	144.0	90.5
Feb.	116	86.0	77.0	130.5	93.0
Mar.	114	104.0	91.0	195.0	92.0
April	128	88.0	74.0	164.0	105.0
May	.....	93.0	70.0	125.5	105.0
June	.....	90.0	58.0	134.0	105.0
July	.....	89.0	67.0	124.0	107.5
Aug.	.....	96.0	76.5	125.0	113.0
Sept.	.....	126.0	80.5	123.0	115.5
Oct.	.....	141.0	72.5	139.5	112.5
Nov.	.....	126.0	72.0	127.5	122.5
Dec.	.....	111.0	81.0	97.0	132.5
Ave.	.....	103.5	76.0	135.5	107.5

Iron and Steel Scrap Consumption

Gross Tons

	1940	1939	1938
Jan.	3,775,000	2,495,000	1,332,000
Feb.	3,054,000	2,313,000	1,306,000
Mar.	2,932,000	2,634,000	1,543,000
Apr.	2,753,000	2,317,000	1,477,000
May	.....	2,263,000	1,387,000
June	.....	2,428,000	1,257,000
July	.....	2,551,000	1,520,000
Aug.	.....	2,919,000	2,133,000
Sept.	.....	3,282,000	2,218,000
Oct.	.....	3,974,000	2,393,000
Nov.	.....	4,025,000	2,740,000
Dec.	.....	3,805,000	2,441,000
Total ...	.....	35,006,000	21,746,000





Steel Ingot Production

(Unit 100 Net Tons)

	Monthly Total		Weekly Average	
	1940	1939	1940	1939
Jan.	5,655.3	3,578.9	1,276.6	807.9
Feb.	4,409.0	3,368.9	1,065.0	842.2
Mar.	4,264.8	3,839.1	962.7	866.6
Apr.	3,974.7	3,352.8	926.5	781.5
May	.....	3,295.2	.....	743.8
June	.....	3,523.9	.....	821.4
July	.....	3,564.8	.....	808.5
Aug.	.....	4,242.0	.....	957.6
Sept.	.....	4,769.5	.....	1,114.4
Oct.	.....	6,080.2	.....	1,372.5
Nov.	.....	6,147.8	.....	1,433.0
Dec.	.....	5,822.0	.....	1,317.2
Total	.....	51,585.0	.....	989.4†

†Weekly average.

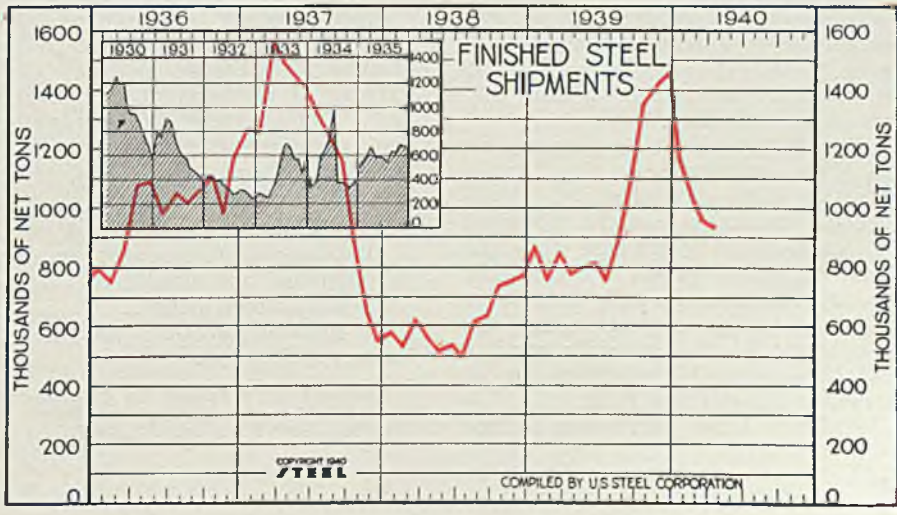
Finished Steel Shipments

U. S. Steel Corp.

(Unit 1000 Net Tons)

	1940	1939	1938	1937	1936
Jan.	1145.6	870.9	570.3	1268.4	795.2
Feb.	1009.3	747.4	522.4	1252.8	747.4
Mar.	931.9	845.1	627.0	1563.1	863.9
Apr.	907.9	771.8	550.5	1485.2	1080.7
May	.....	795.7	509.8	1443.5	1087.4
June	.....	807.6	525.0	1405.1	978.0
July	.....	745.4	484.6	1315.3	1050.1
Aug.	.....	885.6	615.5	1225.9	1019.9
Sept.	.....	1086.7	635.6	1161.1	1060.7
Oct.	.....	1345.9	730.3	876.0	1109.0
Nov.	.....	1406.2	749.3	648.7	947.3
Dec.	.....	1444.0	765.9	539.5	1178.6
Total†	....	11707.3	7315.5	14097.7	11905.0

†After year-end adjustments.



Measuring Open-Hearth Bath Temperatures

By L. O. SORDAHL and R. B. SOSMAN
Resarch Laboratory, United States Steel Corp., Kearny, N. J.

While a number of methods give readings that check closely, recording photocell equipment sighted through tube immersed in bath with air flow to keep tube clear is found most practical. It reads reproducibility temperature of any steel in basic or acid open hearths and in electric melting furnaces. System provides a permanent record, is easy to use, economical in first cost as well as maintenace. Equipment is rugged, portable and can be handled by a single operator

■ MEASURING accurately the temperature of liquid steel in the open-hearth furnace involves certain difficulties since the instrument must be portable enough to be moved quickly out of the way to clear the floor for charging; must be rugged to withstand steel mill conditions, dust and vibration; must make an automatic record independent of any personal equation; should not require experienced personnel for accurate operation and must do a better job than is being done at present by the melter's trained eye.

The last condition especially is not so easy. An experienced open-hearth melter is able to make a fairly good estimate of the temperature of his metal without the aid of any pyrometer simply by observing activity of reaction between slag and metal, brightness of the slag surface, effect of metal on an inserted steel rod, brightness of liquid metal when poured from a sampling spoon. His blue glasses also help as these are not merely protective but act as a color pyrometer.

In addition, the instrument must be usable without interfering too much with the melter's regular work. Equipment should measure with a precision (reproducibility) of plus or minus 10 degrees Fahr., even though it may not be possible to measure accurately within that range of tolerance.

The liquid metal is inaccessible to direct observation in the furnace because of its slag covering. While precise readings can be obtained with an optical pyrometer while the metal is being tapped into the ladle or poured from the ladle into ingot molds, a large correction for the emissivity of the metallic surface must be added, amounting to as much as 270 degrees Fahr.

While a large correction is not objectionable if it can be accurately determined, it is unlikely that emissivity is independent of composition even though pure iron and iron containing several per cent carbon appear to have the same emissivity. Already it is known that emissivity is measurably increased by certain alloying elements such as manganese and chromium. It may also be affected by gases escaping from a flowing stream. Furthermore, these readings are obtainable only when the metal is already out of the furnace or ladle, and little can then be done to change or control its temperature.

Since accurate temperature determination is most important to the open-hearth process, a 10-day comparison of methods of open-hearth bath temperature determination was conducted at Pencoyd works of the American Bridge Co. The methods compared were:

1. Dissolving-tube method using a platinum thermocouple encased in porcelain and graphite.
2. Test-spoon method.
3. Bath-equalization method of Larsen and Shenk.
4. Rod-boil method.
5. Slag-bubble method.
6. Slag-surface method.
7. Collins-Oseland tube method.

The Collins-Oseland tube appeared the most practical and dependable method for routine use, although quite reliable readings also were obtained with the test spoon when the procedure was standardized carefully.

1. Disolving-tube method

A platinrhodium-platinum thermocouple is enclosed in a small porcelain tube, 3/16-inch bore and 1/16-inch wall, about as small and thin a tube as can be handled. Its use in the steel bath is made possible only by encasing it loosely in a graphite tube, 1¾-inch outside diameter and 14 inches long, tapered for 4 inches at the closed end down to ½-inch diameter. The graphite tube with its enclosed porcelain tube and thermocouple is set in a water-cooled head and thermocouple wires led out through a pipe inside one of the two water pipes. Asbestos cord is packed around the porcelain in the opening of the graphite sheath to prevent the rise of gases which would carry spurts of steel into the water-cooled head after the graphite has begun to dissolve away.

This combination is inserted through a door of a furnace with a sheet metal shield to protect the operators. Immersed in the steel bath, the graphite quickly dissolves away below the slag level, leaving the porcelain in direct contact with the liquid metal and immersed therein to a depth of 6 to 8 inches. Within the slag layer, the graphite remains to protect the porcelain. Readings can be made with a semi-precision portable potentiometer connected to the couple and can be

Abstract from paper in temperature symposium, American Institute of Physics, New York, Nov. 2, 1939.

continued for several minutes before the porcelain begins to be attacked. If withdrawn in time, the couple can be used repeatedly, but gradually becomes contaminated. To secure an accuracy of 5 degrees Fahr., the couple should be used only once or twice. It was found that inequalities in the metal bath itself far exceeded the range of accuracy of the thermocouple reading. Thus this method gives dependable results, at least in a killed steel bath.

In an active bath or in a ladle of rimming steel, it is doubtful if a true temperature can be obtained with an immersed tube owing to vigorous evolution of gas around the inserted colder object. The dissolving tube method appears too awkward and expensive for routine plant work. Also, presence of enclosed water near liquid steel is dangerous.

2. Test-spoon method

Metal is held in or poured from a slag-coated test spoon and the temperature of the dark liquid in the spoon is read with an optical pyrometer. A correction based on an emissivity of 0.4 is added. Not all such readings are satisfactory. Only when the slag is thin enough to permit the dipping of a clean sample in a properly slagged spoon can the reading be taken. If slag is lump or viscous, readings are unreliable.

Satisfactory readings by this method could not be obtained with the disappearing-filament optical pyrometer. Only the type in which brightness of the image of the object is varied to match a small spot of constant brightness could be used successfully because it is necessary to find the target quickly and match it almost instantly.

Readings by this method, although consistent, proved, when corrected for the assumed emissivity of 0.4, to be 20 to 30 degrees Fahr. higher than probable true temperature.

3. Bath-equalization method

In developing the photoelectric roof pyrometer, the principle of letting the open-hearth furnace come to a radiative equilibrium and then measuring its temperature automatically was tested. A pyrometer was sighted on the inner surface of the roof through an opening in the back wall. Another pyrometer was sighted downward through a water-cooled opening in the roof upon the slag surface. The two pyrometer circuits were connected in opposition together with a relay which would turn on the fuel as soon as the difference between the two pyrometers fell below a certain set minimum of 10 or 20 degrees Fahr.

To take bath temperature, fuel and air supplies were shut off.

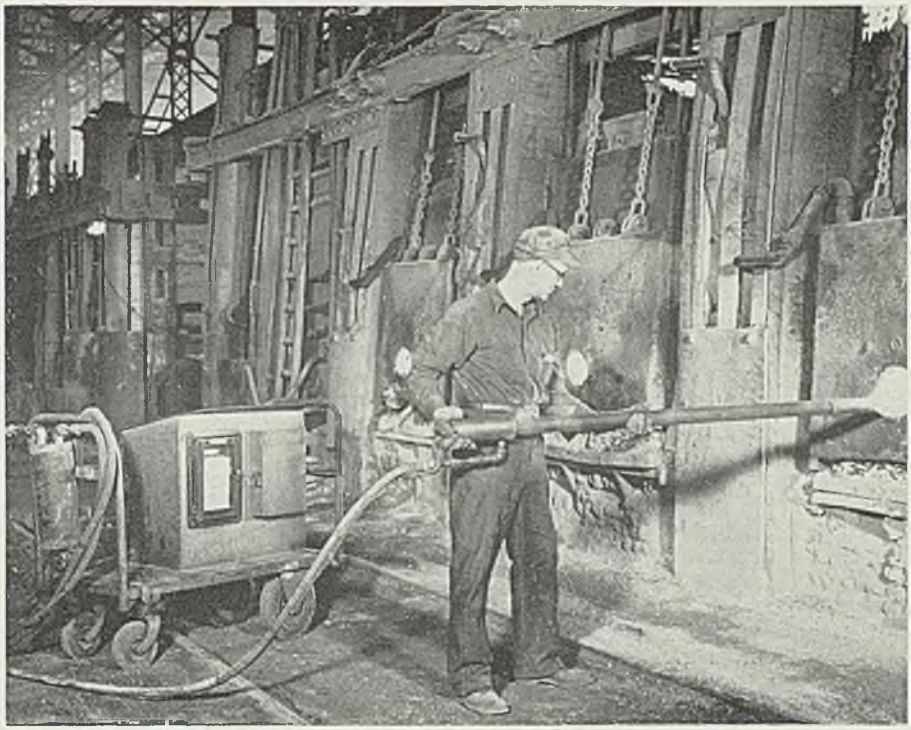


Fig. 1—Collins-Oseland pyrometer tube being inserted through wicket in door of open-hearth furnace at Gary works, Carnegie-Illinois Steel Corp. Air filter and portable amplifier-recorder set are seen on truck at left

Within 15 to 20 seconds the slag, if not too viscous, presumably attained the temperature of the large mass of metal beneath it. At the same time temperature of roof and slag is equalizing due to radiation, quite rapid at this high temperature. When metal slag and roof become equal in temperature within the prescribed tolerance, fuel and air are turned on automatically, meanwhile pyrometer recorder has been charting roof temperature. The minimum shown on the chart is the the equalized bath temperature.

Bath temperature obtained in this way is an average surface indication. If bath is not homogeneous, reading at individual points such as obtained with a thermocouple or spoon will differ from this temperature. No doubt this is why the equalization method gave a terminal temperature just before tapping that appeared more nearly correct than any other method. At the same time it was more erratic than results by tube method, which has the effect of stirring the bath vertically within a restricted area.

During the series of heats, equalization temperature was 20 to 30 degrees Fahr. above probable true temperature. Its precision is high, however—about plus or minus 5 degrees Fahr. When more than one equalization temperature was taken when tapping, furnace temperature was found to drop 5 to 10 degrees Fahr. during the 4 to 6-minute tapping period.

4. Rod-boil method

A cold steel rod is inserted into the bath while the bath is still active. An optical pyrometer is sighted on the surface of the metal as it boils up through the slag. The boiling is caused by escape of carbon monoxide from solution as result of the local chilling. Readings are made during reversal of the furnace when the flame is off. There is no correction for emissivity. The few readings secured by this method were consistent with the equalization and test spoon methods.

5. Slag-bubble method

An optical pyrometer reading is made during reversal on the interior of a gas bubble just as it bursts. The slag surrounding the bubble has just risen from the surface of the metal, presumably carrying the metal temperature with it. In fact, the bubbles often can be observed to be appreciably darker than main body of slag. The relatively small number of readings made by this method were consistent with equalization and spoon methods.

6. Slag-surface method

Temperature of the bath is inferred from a series of optical pyrometer readings during reversal taken on the brighter areas of the slag as the bath is heated up toward the end of a heat. There is no emissivity correction. While such readings are useful in showing general course of temperature increase, they cannot be used as a basis for estimating true bath temperature.

7. Collins-Oseland tube method*

The liquid steel is observed with an optical pyrometer through an open tube inserted into the liquid and kept clear by a current of air. Tube consists of a 6-foot length of 2-inch steel pipe closed at one end with a heavy glass window and provided at other end with a steel tip having a central orifice ½ to ¾-inch diameter. A side opening connects the pipe to a source of air pressure. Fig. 3 is a diagram of the tube.

With air pressure turned on so air is passing freely through the tube, the heavy tip end with the small orifice is submerged in the liquid iron or steel. A reading then is taken with an optical pyrometer sighted through the glass window on the bright spot outlined by tip orifice. Readings must be made quickly before the pipe becomes hot enough to bend and before the tip begins to melt in the bath.

Although the observer sees only a bright disk of light, the reading actually is being made on the inner surface of a bubble or cavity in the liquid metal. This cavity is not a perfect radiator because one side of it is cold. Therefore the optical pyrometer readings must be corrected.

Although this method yields consistent results in the hands of an experienced observer, it requires the services of two men—one to hold the pipe while the other takes the readings, and the observer is under some nervous strain to obtain a reading quickly. The air jet bubbling into the bath shifts the tube position, adding to the difficulty.

An improvement in this method was accomplished** by changing the form of the tube and substituting an automatic photoelectric recording pyrometer for the optical pyrometer. A satisfactory combination for routine use resulted. As shown in Fig. 4, essential parts of the equipment include inserting tube and photocell which is connected to automatic recording system.

The cell is the self-generative or blocking-layer type known as the Photronic cell. This unit delivers a current proportional to intensity of light received on cell surface and is nearly independent of external resistance as well as temperature of cell. Unit, however, is subject to damage by temperatures above 120 degrees Fahr. and thus must be guarded carefully against overheating.

Known methods of amplifying and recording the current can be employed and a recorder scale can be calibrated in terms of bath temperature.

The tube itself as originally developed for the optical pyrometer is modified for use with the Photronic cell by addition of a set of diaphragms, shown in Fig. 4, to prevent wall reflections and to maintain proper alignment of optical parts. It is impossible to prevent some distortion of the tube, but a reasonable amount is permissible since only the small orifice in the tip and the last diaphragm near the Photronic cell determine the incident cone of light under proper conditions of operation.

The cell has a special sensitivity approximately corresponding to the visibility curve of the human eye and so is well suited for this application. Its response to radiant energy from a body below a dull red temperature is too minute to be detected with the arrangement used, an important factor as it eliminates errors due to radiation from the hot interior walls of the tube. Such

*U. S. Patent 2,020,019; Nov. 5, 1935.

**U. S. Patent 2,184,169; Dec. 19, 1939.

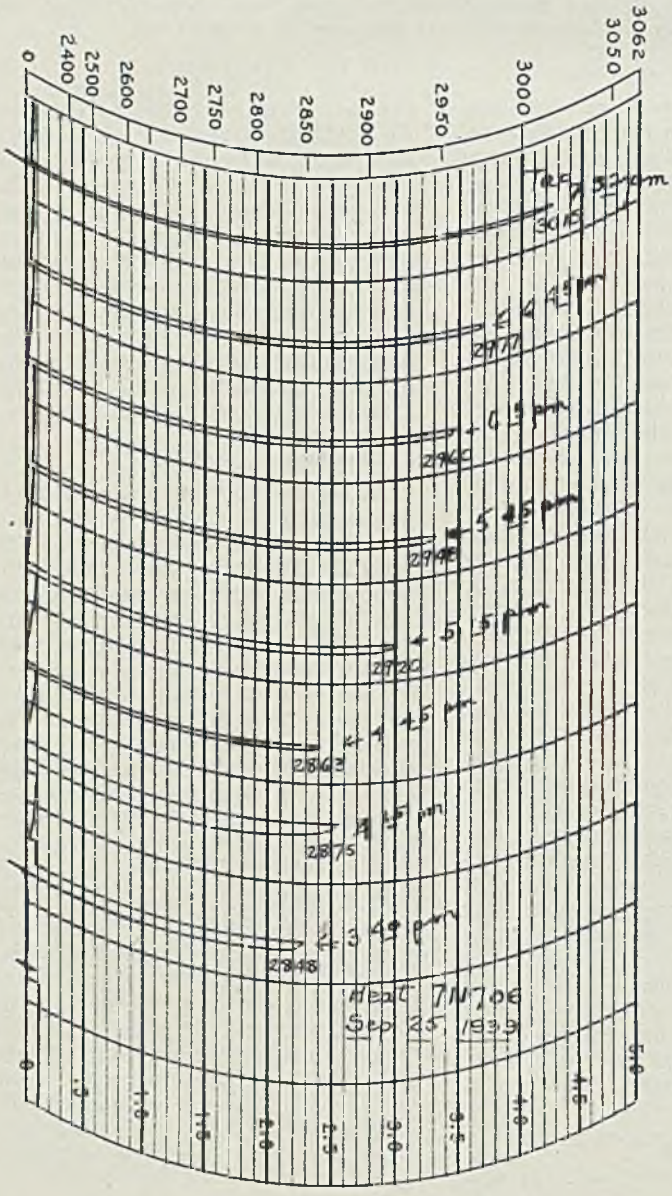


Fig. 2. (Left) — Open-hearth bath temperature readings. Temperature scale at top

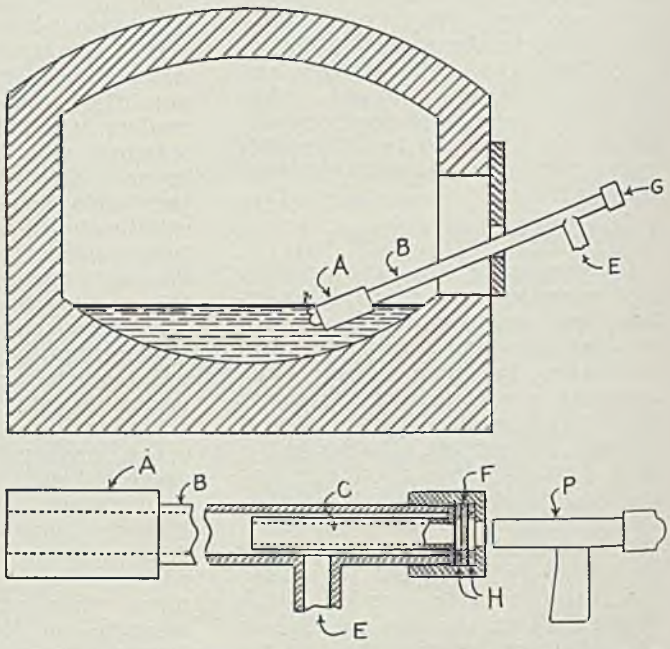


Fig. 3—First Collins-Oseland tube, as used at Pencoyd. A is welded steel tip; B, pipe; C, inner pipe to protect window; E, connection to air supply; F, glass window; G, air-tight cap; H, asbestos gaskets; P, optical pyrometer

radiation constitutes a major obstacle to use of total radiation receivers for this purpose.

Current from the Photronic cell varies approximately as the twelfth power of the absolute temperature of the radiating surface. Such a current-temperature relation is extremely useful here since it condenses the unimportant portion of the temperature scale and greatly expands working range portion. Thus on a temperature scale covering a range from absolute zero to 3100 degrees Fahr., the last 200 degrees from 2900 to 3100 degrees Fahr. extend over slightly more than one-half the entire width of the record.

Fig. 2 reproduces a series of bath temperature readings made during a basic open-hearth heat. Here the scale across the top brings out the rapid expansion law whereby a temperature of 3000 degrees Fahr. can be read with a precision of 5 degrees Fahr. Readings can be reproduced within 10 degrees Fahr. Thus it is possible to control the temperature of a bath of given composition to this precision provided the temperature is uniform. This does not mean that actual temperature is known to any such degree of accuracy. Absolute determinations must await further study and calibration.

Takes Over 1000 Readings

The complete unit attains full scale deflection in 1 second. A satisfactory temperature determination requires but 5 seconds. Standard practice is to take from 8 to 10 seconds per reading.

In the hands of an experienced operator, the all-steel tube will last for more than 1000 readings. Barring an accident in handling, only the outer tube and tip need replacing. Readings at 10 minute intervals can be taken continuously with the same tube. If desired, two or three readings can be taken in rapid succession, but more time then is necessary for the tube to cool.

Using compressed nitrogen in the tube instead of air on ordinary steel baths below 1 per cent carbon during last stages of the refining period gave readings about 50 degrees Fahr. lower than when using air, possibly due to influence of the gas in cooling surface of the liquid metal. With air, this cooling is balanced against action of oxygen in brightening and heating the surface, making the apparent temperature higher.

Prior to furnace deoxidation or block, most open-hearth steels are fairly similar except for carbon content and the presence in some cases of the less easily oxidized alloying constituents — nickel, molybdenum and copper. Temperature readings during this period thus should be relatively comparable.

However, the method also has been used extensively after furnace deoxidation and addition of alloying constituents on nearly every grade and type of alloy steel made in an open-hearth furnace. Results have been consistent, showing little detectable effect due to bath composition. This method also is being used in regular plant practice on electric furnaces, both in the furnace and the ladle, on steels up to 14 per cent manganese and in the acid open hearth on steels up to 2 per cent carbon, all with satisfactory results.

It is improbable that bath composition has no influence upon results. Effect, however, is so small it is undetectable. Possibly the continuously renewed inner surface of the cavity is swept out of the field of view before any chemical reaction can manifest itself. Apparent emissivity thus varies but slightly with variation in small amounts of alloying constituents. Consequently, conditions are not comparable with those on the surface of a tapping or pouring stream.

♦

Peninsular Steel Opens New Cleveland Facilities

■ Official opening of the new office and warehouse of Peninsular Steel Co., at 2222 Lakeside avenue, Cleveland, was held Saturday, May 18, as over 300 executives, engineers, metallurgists and representatives were entertained by company officials in the new quarters.

The occasion marked the twenty-fifth anniversary of the company and its tenth year in Cleveland. The new building doubled warehouse space from 6000 to 12,000 square feet and office space to about 2000 square feet. It was part of an expansion program by the company which included new buildings at Toledo, O., and Grand Rapids, Mich., and an addition at Detroit.

Sheet & Tube Co. To Award Service Medals

■ Youngstown Sheet & Tube Co., Youngstown, O., awarded gold service emblems to 1080 employes May 18, in recognition of 25 or more years' continuous service with the company. Average length of service for the group is 29.7 years; longest record is 56 years. Company's normal Youngstown district employment approximates 15,000.

Many of the employes honored have been with the company since it first started operations, in 1902. Some helped in early construction at Sheet & Tube's Campbell, O., works, before operations began.

Proportional Feed Diagrams Offered

■ The first three of a series of Proportional Feed Diagrams are being distributed by Milton Roy Pumps, 3160 Kensington avenue, Philadelphia. Diagram No. 1 is a flow-sheet showing proportional continuous feed of sulphuric acid, the reciprocating pump being actuated either by meter with extension register or by means of a ratchet counter. Diagram No. 2 is a similar flow-sheet for continuous feed of chemicals, and Diagram No. 3 shows a shot-feed system as used for boiler water chemicals to either feed line or direct against boiler pressures.

Materials or equipment required for each feed system are listed in the diagrams. These three diagrams are shortly to be followed by another series of three and are available free of cost.

Copper Content Change

■ In last week's issue, the copper content in the middle column of Paul McKimm's article, "Residual Tin in Steel", page 60, should have read 0.140, 0.144, 0.140 and 0.144 per cent, respectively, in the first table and 0.140 throughout in the second table.

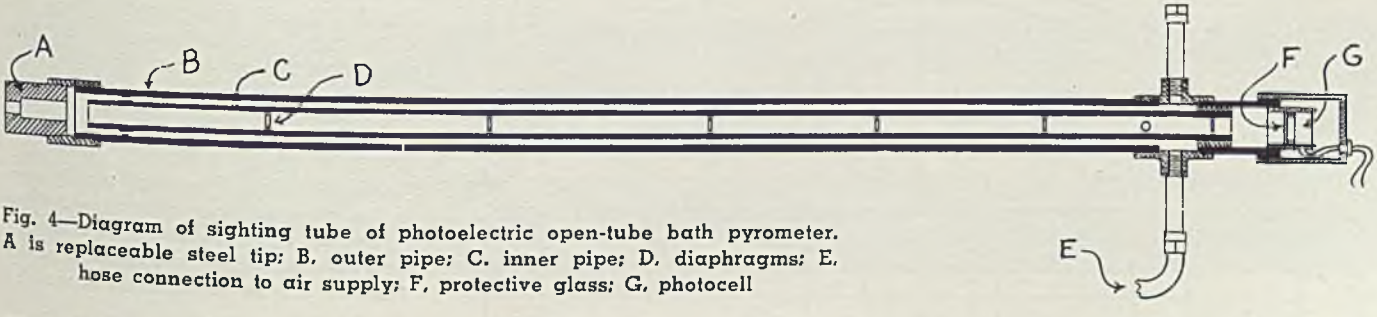


Fig. 4—Diagram of sighting tube of photoelectric open-tube bath pyrometer. A is replaceable steel tip; B, outer pipe; C, inner pipe; D, diaphragms; E, hose connection to air supply; F, protective glass; G, photocell

Matching Porcelain Enamels

Perfect color match requires the surfaces reflect light of different wavelengths in same proportion, usually obtainable only by using the same ceramic color oxides and the same type base materials

By F. H. EMERY

Harshaw Chemical Co.
1945 East 97th Street
Cleveland

■ THERE are two kinds of color matches: An absolute match which will be good under any illumination; and a drifting match good only under a specific illumination. It is possible to make only the second and less desirable kind of a color match when it is required that a synthetic and a porcelain near-white be matched.

Kind of light used in matching colors is important. Many different light sources are used in the comparison of color samples. Some match under whatever daylight happens to be available at the point where the panels are located; others use some standard lamp; others determine which of the two panels is the lighter under two different but standard light sources; and there are some who match colors by determining which panel is lighter when illuminated by all the different pure spectral colors in turn. This last method is too tedious to carry out manually and so is commonly done on a machine called a spectrophotometer.

Presented before Central District Enamelers' club at Cleveland.

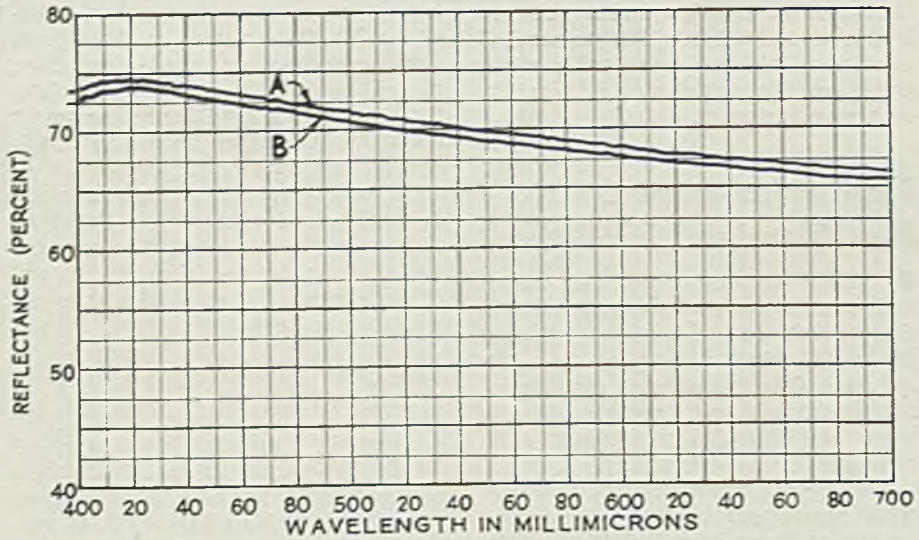


Fig. 1—"Dead" type match. Here reflectance of one surface is a definite proportion of the other regardless of wavelength of the light under which it is viewed. A with a tin oxide opacifier, B a substitute opacifier

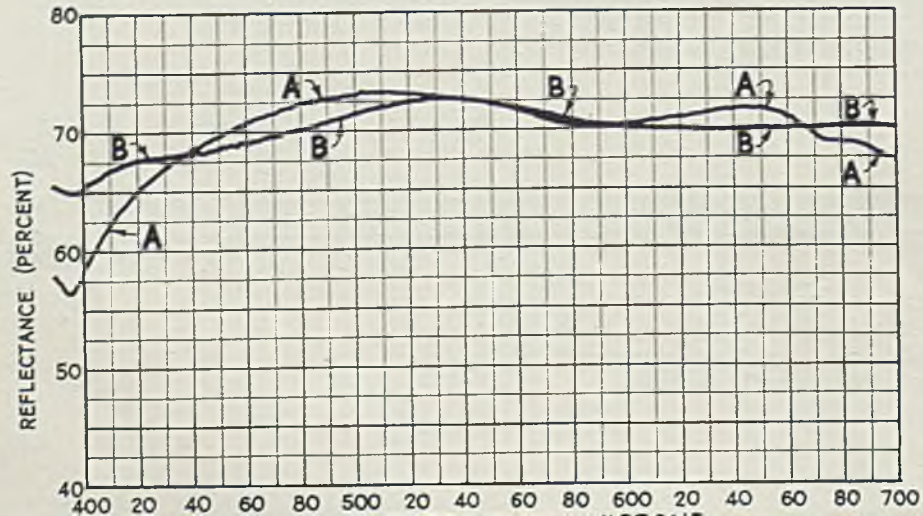


Fig. 2—This is a "drifting" match, one or the other surface appearing lighter depending upon the wavelength of the light source. A is a synthetic white enamel, B a porcelain enamel match

The Hardy spectrophotometer plots a curve showing the relative lightness or per cent reflectance of the various samples as they would appear if illuminated with 30 pure spectrum colors, starting with the violet end and then going on through the red. Fig. 1 is such a plot and constitutes the first kind of color match. I call it a spectrophotometric match, but perhaps it might better be called a "dead" match. Since the curves are parallel, one plaque will always be lighter than the other, regardless of whether the samples are viewed under reddish tungsten illumination, bluish north daylight or any other light source.

The second kind of color match is shown in Fig. 2. I call this type of match a nonspectrophotometric match, or perhaps it might better

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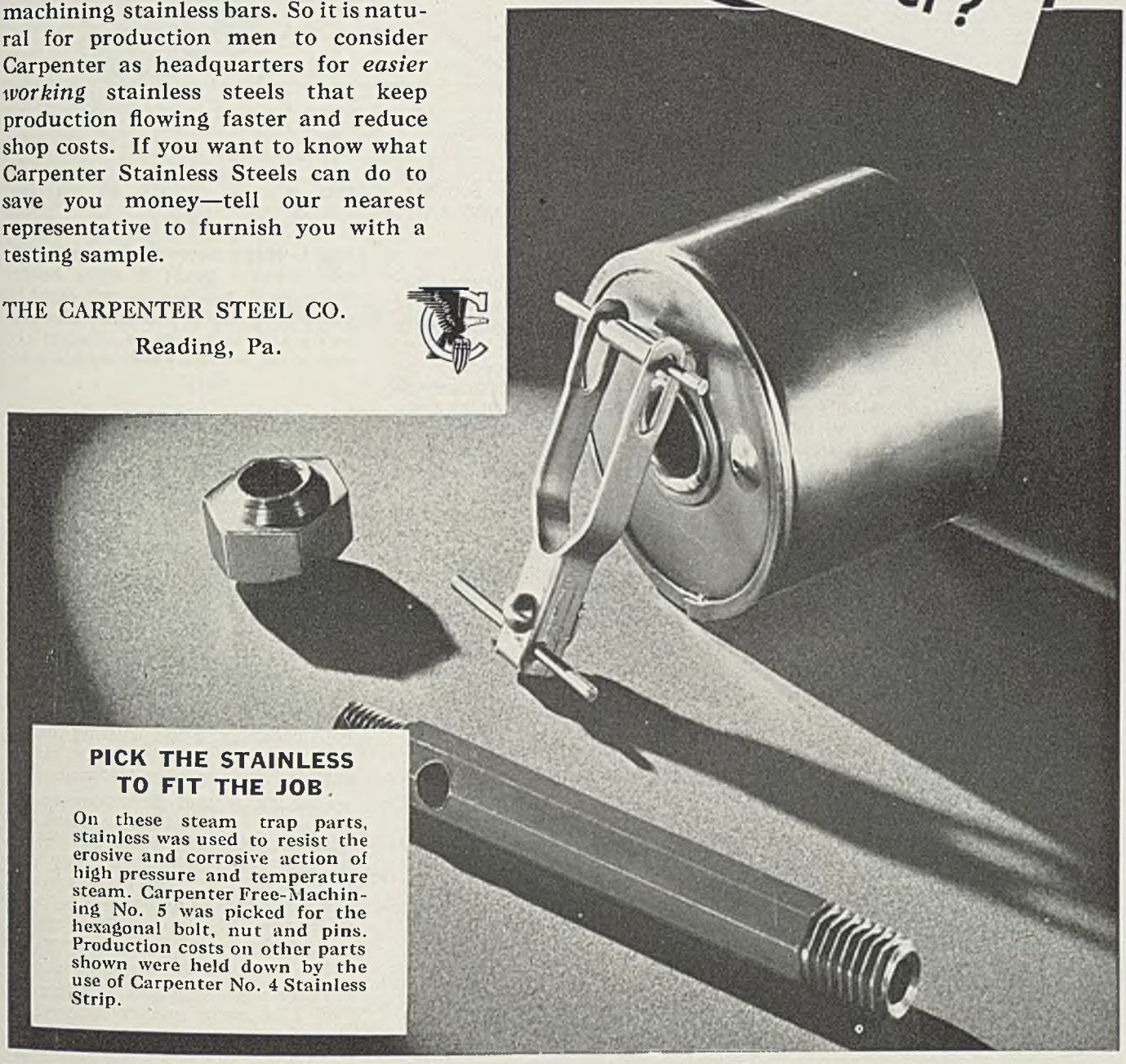


PICK THE STAINLESS TO FIT THE JOB

On these steam trap parts, stainless was used to resist the erosive and corrosive action of high pressure and temperature steam. Carpenter Free-Machining No. 5 was picked for the hexagonal bolt, nut and pins. Production costs on other parts shown were held down by the use of Carpenter No. 4 Stainless Strip.

Carpenter STAINLESS STEELS

BRANCHES AT Chicago, Cleveland, Detroit, Hartford, St. Louis, Indianapolis, New York, Philadelphia

be called a "drifting" color match. The curve for the synthetic plaque A goes under and over the curve for the porcelain plaque B. In matches of this sort, the difference between the two plaques may change when the illumination is changed, hence the designation "a drifting match."

In the control of a porcelain white, the spray weight, firing and feed to the sprayer must all be controlled. A change in any of them may cause a change in reflectance or color of the plaque. Then in order to get the wanted result, six possible variations must be controlled. There will, by the same reasoning, be six possible variations in the control of synthetics, but when it is desired to keep a synthetic enamel in step with a porcelain enamel, there will be 6 x 6 or 36 possible variables.

This follows from the fact that an increase in the amount of heat used, for example, will produce a yellower synthetic and a bluer porcelain. It will then be six times as difficult to maintain a certain difference between a porcelain and a synthetic enamel, as between two porcelain enamels. When we add to this difficulty the fact that the best match which can be made between a synthetic and a porcelain must usually be a drifting type match, then one must be prepared to accept much poorer color matching when synthetics and porcelains are used together.

An alternative would be substantially increased expenditures for control, but even this would still produce a drifting type color match.

As a general rule, it may be stated that in order to produce a dead color match, it will be necessary to use the same ceramic color oxides in the same base. The oxides must have the same valence linkages and physical properties so they will absorb light in the same way to produce exactly the wanted color. A few oxides available for ceramics will give colors of great cleanliness or purity, otherwise called high brilliance or chroma. Examples are the cadmium yellows and reds. See Fig. 3.

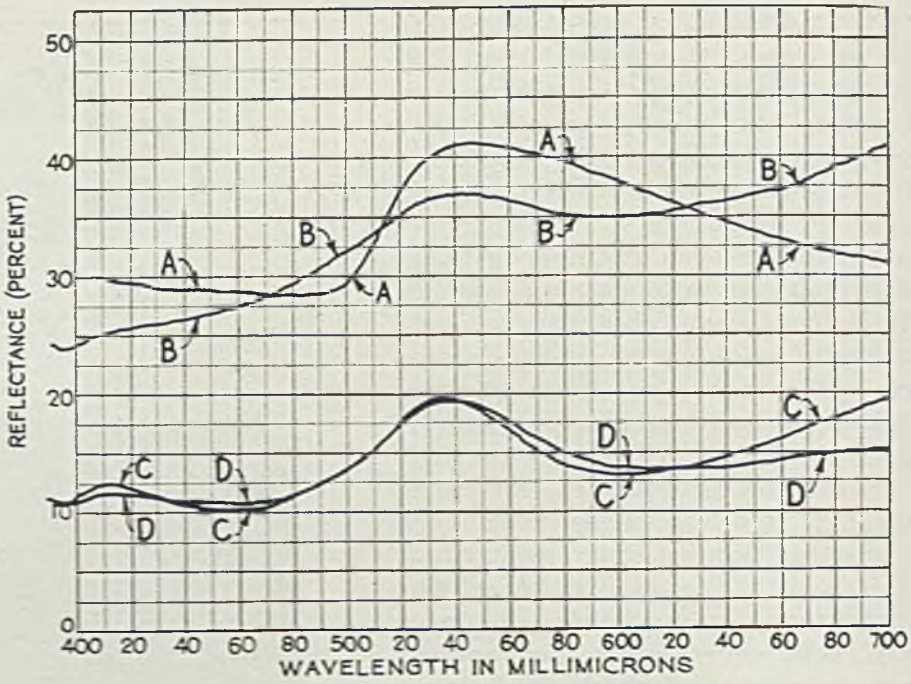
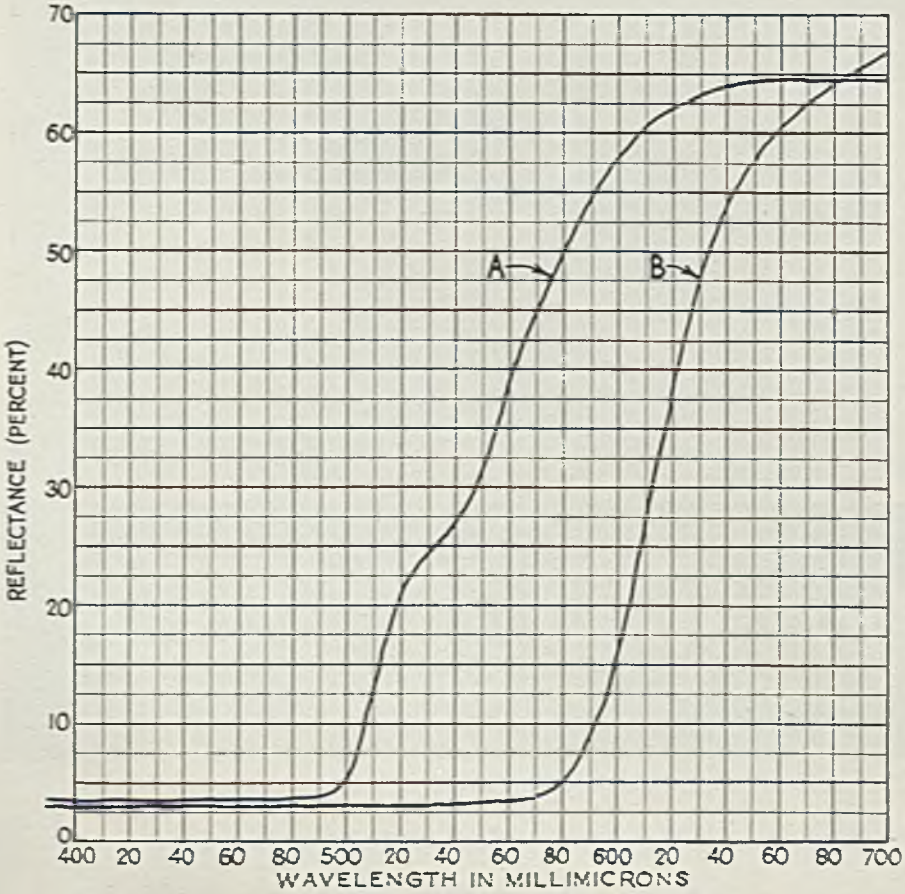


Fig. 4—Match between paint panel A and ceramic panel B drifts badly. While match between ceramic panel C and paint panel D also drifts, they are so close as to be almost identical except at the extremely high wavelengths

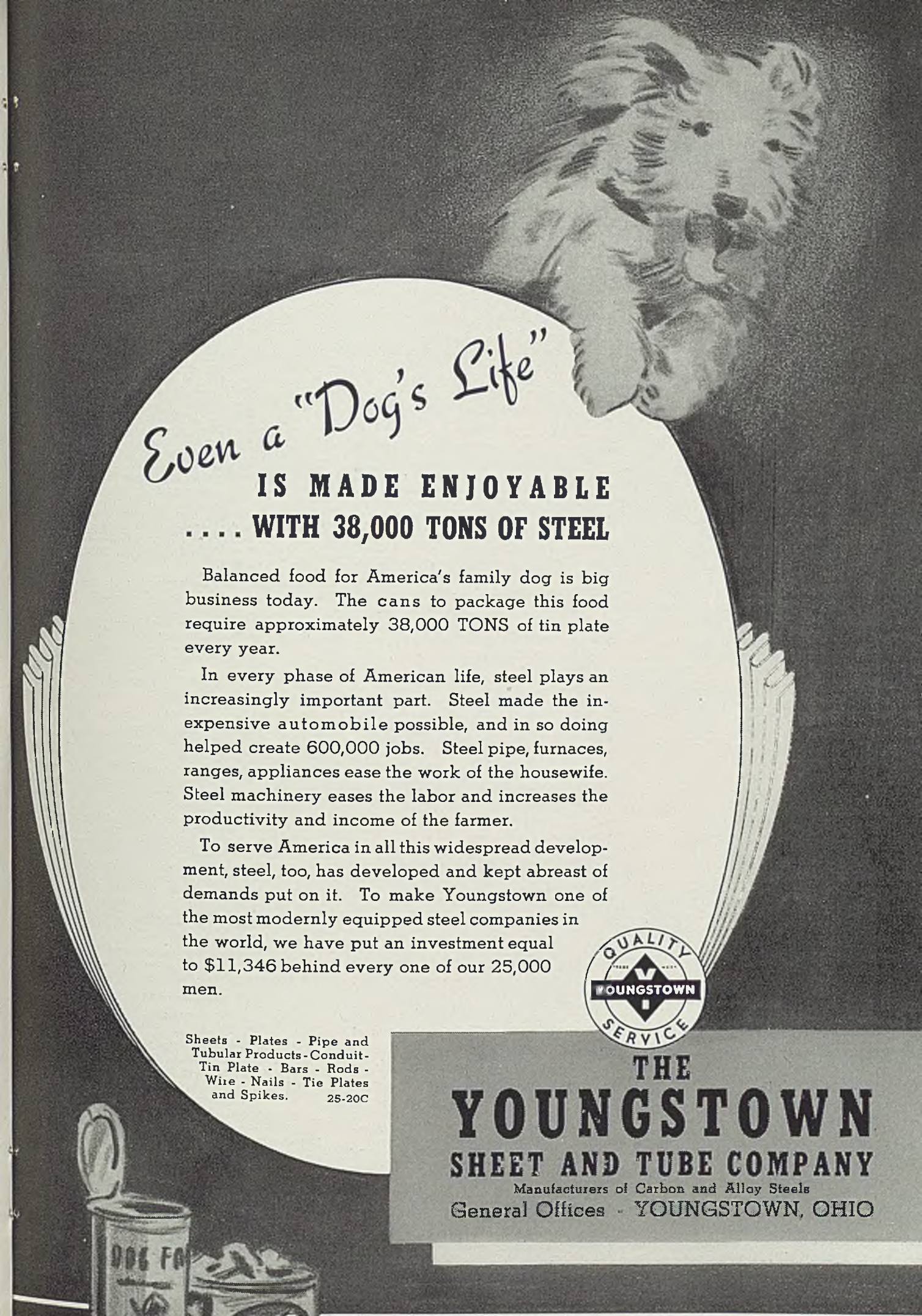
Fig. 3—Wide difference in reflectivity is illustrated here. A is a cadmium yellow, B a cadmium red



These colors have a purity of better than 90 per cent. This means that there is little use in conducting research on these oxides to improve their brilliance since it cannot be more than 10 per cent better in any case. But in general, the higher the temperature at which a color is to be processed, the more stable it will be and the less brilliant it will be. There are more brilliant colors available at present in paint colors than in ceramics. Organics offer more brilliant colors than paints. When matching certain paint colors with ceramics, a bad drifting match will be obtained, in some cases. Fig. 4 shows such an instance.

Plaques A and B appear to be the same shade when viewed by north sky daylight, but when viewed by tungsten illumination, they differ enormously. The difference between plaques C and D can be seen to change when type of illumination is varied from daylight to tungsten, but in this case the variation is less.

There are exceptions to all rules. Fig. 1 shows a spectrophotometric match in which the materials are not exactly the same. High opaque frits were used in both cases but tin was used as an opacifier in the upper curve. In the lower curve, a substitute was used. The production of an exact match in the case of the paint standards would require an enormous amount of development work.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A.S.T.M. Announces Program for Annual Meeting in Atlantic City

■ FOUR symposiums and a well-balanced array of technical sessions highlight the provisional program for the forty-third annual meeting of the American Society for Testing Materials at Chalfonte-Haddon Hall, Atlantic City, N. J., June 24-28. Many of these will be devoted to metals and related subjects. During the meeting, action will be taken on new standards and revisions to existing standards.

The four symposiums will cover the significance of the tension test in relation to design, spectrographic analysis, tools of analytical chemistry, and industrial water.

Subjects to be covered in technical sessions are: Steel, ferroalloys and metallography; corrosion and iron; fatigue and corrosion-fatigue; effect of temperature and creep; nonferrous metals; radiography; methods of testing; and fuels.

Tentative program embraces the following sessions of interest to the metals industry:

Tuesday, June 25

MORNING

Report of committee E-9 on research.
Report of committee E-10 on standards.
Annual report of executive committee, by C. L. Warwick, secretary-treasurer.
"Materials Standards in Industrial Preparedness," by Lieut.-Col. William C. Young, planning branch, office of secretary of war.
President's address by H. H. Morgan.
Introduction of new officers.

AFTERNOON

Radiography

Report of committee E-7 on radiographic testing.
"Reduction of Secondary Radiation and of Excessive Radiographic Contrast by Filtration," by Herman E. Seeman, Eastman Kodak Co.
"Observations on Radiography at 1,000,000 Volts," by Carlton G. Lutts, United States navy yard, J. T. Norton and J. G. Trump, Massachusetts Institute of Technology.

EVENING

Symposium on Water

Report of committee D-19 on water for industrial uses.
"Introduction to Symposium on Problems in Classification of Natural Water Intended for Industrial Use," by F. N. Speller.
"Reporting the Results of Water Analysis," by Robert C. Adams, United States naval engineering experiment station.
"A Review of Data on Relationship of Corrosivity of Water to Its Chemical Analysis," by V. V. Kendall, National Tube Co.
"Measuring Scale-Forming and Corrosive Tendencies of Water by Short-Time Tests," by Everett P. Partridge and G. B. Hatch, Hall Laboratories Inc.
"A Method of Measuring Corrosiveness," by J. H. Walker, Detroit Edison Co.

Methods of Testing

Report of committee E-1 on methods of testing.
"An Investigation of Effect of Rate of Strain on Results of Tension Tests of Metals," by Paul G. Jones and H. F. Moore, University of Illinois.
"Speed in Tension Testing and Its Effect on Yield Point Values," by Lawford H. Fry, Edgewater Steel Co.
Report of committee E-3 on chemical analysis of metals.
Report of committee E-2 on spectrographic analysis.
"Quantitative Spectrographic Analysis of Steels," by S. Vigo, Watertown arsenal.
Report of committee E-8 on nomenclature and definitions.

Wednesday, June 26

MORNING

Symposium on Significance of Tension Test in Relation to Design

"Introduction," by John M. Lessells, Massachusetts Institute of Technology.
"The Tension Test," by C. W. MacGregor, Massachusetts Institute of Technology.
"Strength Features of the Tension Test," by F. B. Seely, University of Illinois.
"Limited Significance of Ductility Features of the Tension Test," by H. W. Gillett, Battelle Memorial institute.

AFTERNOON

Steel, Ferroalloys, Metallography

Report of committee A-1 on steel.
"Coupon Tests of Structural Steels," by G. E. Troxell and H. E. Davis, University of California.
Report of committee A-6 on magnetic properties.
Report of committee A-10 on iron-chromium, iron-chromium-nickel, and related alloys.
Report of sectional committee on standardization of dimensions and materials of wrought iron and wrought steel pipe and tubing.
Report of committee E-4 on metallography.

Marbury Lecture

"Portland Cement—Theories (Proved and Otherwise) and Specifications," by P. H. Bates, chief, clay and silicate products division, national bureau of standards.
Award of Charles B. Dudley medal.

EVENING

Corrosion, Iron

Report of committee A-5 on corrosion of iron and steel.
"Atmospheric Durability of Steels Containing Nickel and Copper," by N. B. Pilling and W. A. Wesley, International Nickel Co. Inc.
Report of committee B-3 on corrosion of nonferrous metals and alloys.
"Influence of Cathode Area and Circuit Resistance in Galvanic Corrosion," by W. A. Wesley, International Nickel Co. Inc.
"Some Observations of the Potentials of Metals and Alloys in Sea Water," by F. L. LaQue and G. L. Cox, International Nickel Co. Inc.
Report of joint committee on exposure tests of plating on nonferrous metals.
"Adhesion of Nickel Deposits and a Study of the Ollard Adhesion Test Method," by E. J. Roehl, International Nickel Co. Inc.
Report of committee A-3 on cast iron.
Report of sectional committee A-21 on specifications for cast-iron pipe and fittings.
"Mechanical Properties of Gray Cast Iron," by Jasper O. Draffin, W. L. Collins and C. H. Casberg, University of Illinois.
Report of committee A-7 on malleable iron castings.
"Properties of Commercial Pearlitic Malleable Irons," by C. H. Lorig, Battelle Memorial institute.
"Stress-Strain Relations for Malleable Cast Iron in Tension with Special Attention to Yield Point Determination," by R. D. Landon, Southern Methodist university.

Thursday, June 27

MORNING

Fatigue, Corrosion-Fatigue

Report of research committee on fatigue of metals.
"Fatigue of Porous Metals," by Claus G. Goetzel, Electro Metal Corp., and Richard P. Seelig, Powder Metallurgy Inc.
"Fatigue of 2-Inch Diameter Axles with Surfaces Metal Coated and Flame Hardened," by O. J. Horger and T. V. Buckwalter, Timken Roller Bearing Co.
"Fatigue Tests on Zinc-Coated Steel Wire," by D. G. Watt, Hydro-Electric Power commission of Ontario.
"A Pulsating Tension-Fatigue Machine for Small Diameter Wire," by John N. Kenyon, Columbia university.
"Effect of Protective Coatings on Corrosion-Fatigue Strength of Steel," by Thomas J. Dolan and Hugh H. Benninger, University of Illinois.
"A Corrosion-Fatigue Test to Determine the Protective Qualities of Metallic Platings," by John N. Kenyon, Columbia university.

Symposium on Spectrographic Analysis

"Variables Versus Constants in Emission Spectrography."
"Accuracy Requirements Versus Reproducibility Possibilities."

AFTERNOON

Symposium on Spectrographic Analysis

"Interpretation of Results."

Effect of Temperature, Creep

Report of joint research committee on effect of temperature on the properties of metals.
"High-Speed Tension Tests at Elevated Temperatures," by M. Manjoine and A. Nadal, Westinghouse Electric & Mfg. Co.
"Creep of 17 Low-Alloy Steels at 1000 Degrees Fahr.," by R. F. Miller, W. G. Benz, United States Steel Corp., and W. E. Unverzagt, National Tube Co.
"Some Effects of Composition and Heat Treatment on High-Temperature Rupture Properties of Ferrous Alloys," by R. H. Thielemann, General Electric Co.
"Creep Recovery at Elevated Temperatures," by P. G. McVetty, Westinghouse Electric & Mfg. Co.
"High Temperature Rupture and Creep Tests," by Ernest L. Robinson, General Electric Co.

Friday, June 28

MORNING

Fuels

Report of committee D-3 on gaseous fuels.
Report of committee D-5 on coal and coke.

Nonferrous Metals

Report of committee B-5 on copper and copper alloys, cast and wrought.
"Proportional Limit Tests on Copper Alloys," by Cyril S. Smith, American Brass Co.
Report of committee B-2 on nonferrous metals and alloys.
"Internal Hydraulic Bursting Tests of Lead Cable Sheathing," by Howard S. Phelps, Albert M. Gates and Frank Kahn, Philadelphia Electric Co.

(*Please turn to Page 77*)

What

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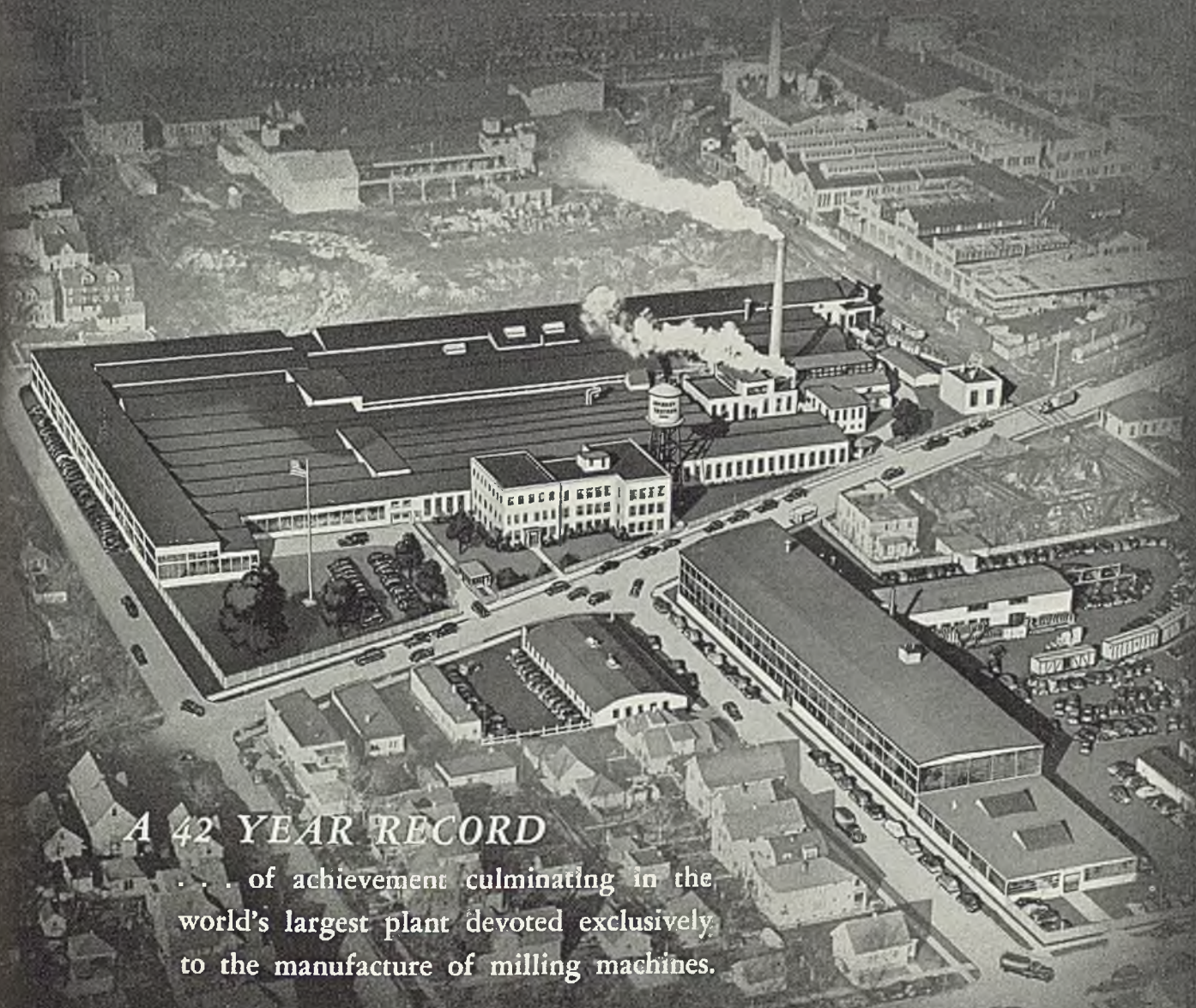

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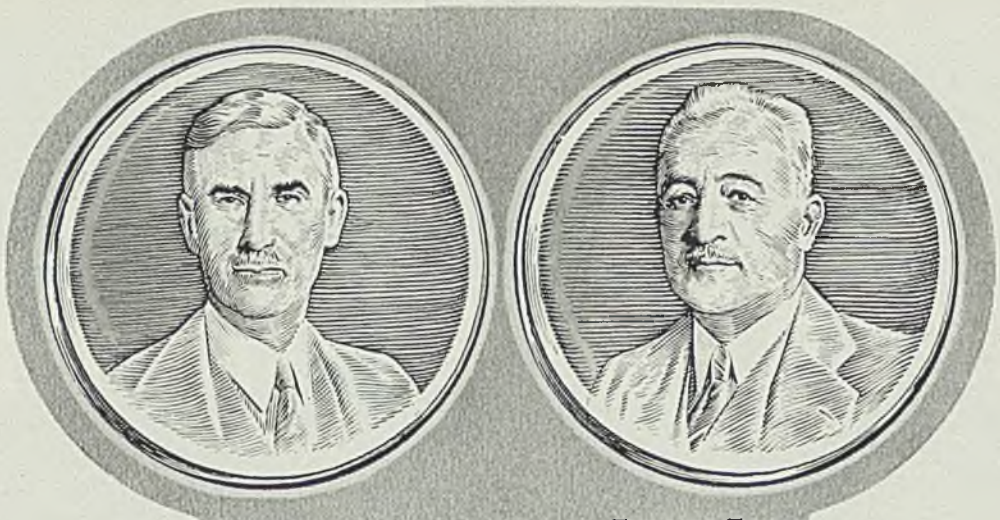

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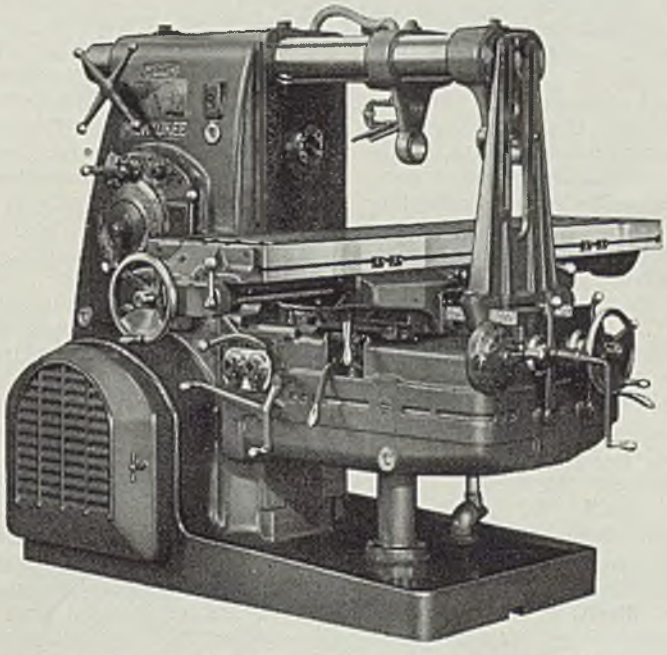

THE NEW 5H PLAIN

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Foundry Research Aims at Better Steel and Gray Iron Castings

Steel

■ ACTIVITIES of the steel division centered in three sessions and a roundtable luncheon. Papers and discussions dealt principally with research projects being conducted in an effort to produce higher grade steel castings. The division also heard the report of its committee on methods of producing steel for castings.

Reporting as chairman of this committee, C. E. Sims, supervising metallurgist, Battelle Memorial institute, Columbus, O., stated that no steel production innovations have been made during the year. Considerable interest has been shown in use of the cupola as an adjunct to the steel foundry and the converter, either for making finished steel or duplexing in combination with an electric or open-hearth furnace. Reference was made to the photoelectric cell adapted to control of the converter blow.

A paper, contributed by the Lunkenheimer Co., Cincinnati, through A. J. Smith and J. W. Bolton, reported an extended investigation which that company had conducted to determine the weldability of some cast and wrought steels widely used in the valve and fittings industry.

Find Good Weldability

In their research, the authors studied the structures of welds under various conditions of preheating, and observed and accumulated data on the reaction of the steel studied with a regard to hardenability, grain coarsening, formation of hard constituents, etc. The results indicated that under the conditions of the investigation cast steels show at least as good, and in many cases better, weldability than comparable rolled products. The investigation, it was stated, definitely explodes the theory held by some that cast steel lacks the weldability of the rolled products.

Cast steels investigated were: A. S.T.M. A216 - 39T WCA, A217 - 39T WC1, A157 - 39C1 and A217 - 39T WC4. Rolled steels were A.S.T.M. A206-39T P1 and A182-39F1, S.A.E. 1040 and type 416 stainless. The structure developed in steels of 0.25 per cent carbon were fully as good as in the steel of 0.15 per cent carbon and, so far as granulation was concerned, the wrought steel of 0.15 per cent carbon was inferior.

Concluding, the authors stated: "It is hoped that this work will help to clarify some of the misunderstandings that have arisen and that it will stimulate the foundryman, whose steels are to be subjected to a welding operation, to more extensive study and greater co-operation with the welding engineer. It should suggest to the foundryman that his product, intelligently used, is better adapted to welding usages than some trade opinions might lead one to believe."

Since the influence of chaplets on the soundness and integrity of steel castings has been a point of grave concern since their advent with the industry, Howard F. Taylor and Edward A. Rominski, division of physical metallurgy, naval research laboratory, Anacostia, D. C., have undertaken a comprehensive study of the matter in the interests of bringing to light some of the many factors operative in governing the fusion characteristics of the various types of chaplets available. Results obtained they reported in a paper.

■ HEREWITH is concluded the report of important technical sessions held during the forty-fourth annual convention of the American Foundrymen's association in Chicago, May 6-10. A number of sessions were reviewed in STEEL last week.

Many castings, Mr. Taylor stated, are rejected or repaired because of lack of fusion or some other defect occurring in the vicinity of a chaplet or internal chill. The former, it was emphasized, is really a specialized form of the latter. In their investigation, the authors used nickel, copper, silver, cadmium, and combination silver-cadmium plated chaplets, as well as aluminum sprayed, aluminum dipped, calorized, tin dipped and some of the new silicon impregnated variety.

Conclusions reached were that most desirable chaplet design has not been attained; more consideration should be given to storage and handling of chaplets, a good grade of low-carbon steel is well chosen for chaplet material; silicon impregnated chaplets fuse readily; copper and nickel-plated types prove satisfactory when properly prepared and kept clean; silver-plated types were the most consistently satisfactory; and so-called streamlining would obviate the tendency of gases to form and localize in the indented areas.

S. W. Brinson, master molder, and J. A. Duma, assistant metallurgist, Norfolk navy yard, Norfolk, Va., were co-authors of a paper on application of controlled directional solidification to large steel castings. This described a foundry technique which is successful in producing intricate castings to meet rigid navy specifications.

Technique includes use of miniature models for a critical study of the proposed design prior to construction of patterns; insistence on application of principles governing directional solidification; practice of relieving molds and cores mechanically after pouring; high quality steel; and extensive use of gamma ray examination of the internal structure of all critical sections. Castings include anchor shanks, anchor crowns, globe valve bodies, main and intermediate struts, turbine casings, throttle valve bodies and turret roller track sections.

Gray Iron

■ Effects of alloying elements, physical properties, wear resistance, and metallography were chief subjects considered by the gray iron division. This group conducted three well-attended sessions and a round table luncheon.

Results of an investigation of effect of sulphur on various properties of electric furnace iron were reported by Fulton Holtby and R. L. Dowdell, University of Minnesota, Minneapolis. At about 0.18 per cent sulphur, a transition in iron properties occurs, the authors stated. Up to this point increased sulphur lowers transverse and tensile strength and hardness and increases deflection. Above 0.18 per cent, the reverse is true.

An increase in sulphur will decrease the manganese. Fluidity of the metal decreases rapidly at about 0.18 per cent sulphur. Fluidity remains the same above and below this figure, provided manganese remains constant. Up to 0.14 per cent sulphur, machinability decreases; between 0.14 and 0.18, it increases and again decreases above the latter figure.

Effect of varying silicon content in gray iron was the subject of a paper by F. G. Sefing, International Nickel Co. Inc., New York. His conclusions were that there exists an optimum silicon content for each carbon level to obtain minimum section sensitivity indicated by hardness values of the same order between light and heavy sections. Section sensitivity generally is in a higher hardness range for the low silicon iron and in a lower hardness range for the high silicon irons.

Tensile strength, Mr. Sefing as-

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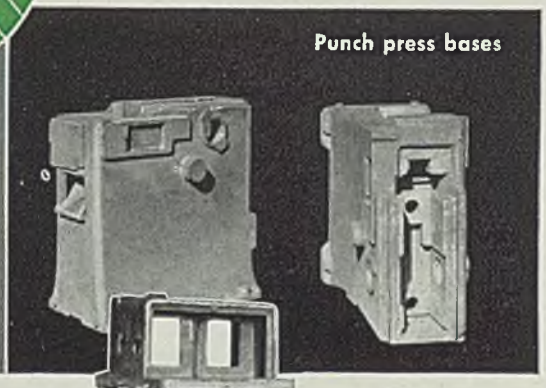

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serted, decreases with increase in silicon in the 3.50 per cent total carbon iron. It changes its response to increasing silicon as total carbon falls to 2.75 per cent. Tensile strength does not change with increasing silicon at 3.35 and 3.00 per cent total carbon and shows an increase with increasing silicon at 2.75 per cent total carbon.

Damping capacity, endurance, electrical and thermal conductivities of some gray irons were considered in a paper by C. H. Lorig and V. H. Schnee, Battelle Memorial institute, Columbus, O. Investigation of irons containing copper indicated that this element may benefit damping capacity at working stress; as copper increases up to 3 per cent a slight decrease occurs in endurance ratio; and that copper has little effect on thermal and electrical conductivities.

Discuss Wear Resistance

Asked in discussion what is the limit of solid solubility of copper in gray iron with reference to silicon and carbon, Mr. Lorig stated that with a high carbon iron copper tends to separate at about 4.5 per cent, but with high silicon iron this does not occur with copper up to 20 per cent. Considerable difference of opinion existed as to the effect of copper on wear resistance. Some believed copper reduces the resistance, others held contrary views. Discussion of this point indicated that the most important factor is type of structure, and addition of copper or any other alloy which results in improvement of structure or establishment of a preferred wear resisting structure, will increase wear resistance.

E. K. Smith, Electro Metallurgical Co., Detroit, contributed a paper on microstructure, composition, hardness and wear of some cast iron cylinder bores, in which he pointed out that there appears to be a relation between amount of ferrite in the structure and wear; the more ferrite present the greater the wear.

Paul S. Lane, Muskegon Piston Ring Co., Muskegon, Mich., said his work agreed with that of Mr. Smith, and that by control of cooling rates, trouble from ferritic structures can be eliminated. He also ventured the opinion that low wear resistance may not be due so much to presence of ferrite itself as to the accompanying fine graphite condition.

An inquiry concerning effect of alloys on wear resistance brought from Mr. Smith the reply that in the specimens examined those containing small amounts of alloys showed best resistance. While it was possible to obtain good wear resistance in unalloyed iron, it was easier to obtain preferred wear resisting structure by use of small amounts of alloys. In discussion, attention was called to importance of obtaining maximum combined wear of both piston ring and cylinder bore, and not increased wear resistance of one in preference to the other.

A device for measuring the tendency of cast irons to seize under sliding friction, was described by Bernard Fried, A. H. Dierker and H. H. Dawson, Ohio State university, Columbus, O. This device, based on a shaper, obtains results on seizure under load with boundary lubrication. Based on results obtained, Mr. Fried mentioned that gray iron should not contain large amounts of either ferrite or carbide structure if it is desired to hold seizure at a minimum.

Alfred Boyles, metallurgist, Battelle Memorial institute, Columbus, O., described an investigation of the pearlite interval in gray iron. Data indicate that ferrite, austenite and graphite exist within a range of 1450 to 1550 degrees Fahr. for the irons studied. Also it was found that rate of formation of both pearlite and ferrite is accelerated at subcritical temperatures, and under identical heat treatment conditions iron with fine flake graphite shows more ferrite than one with large graphite flakes.

Initial heating had an effect on rate of ferrite formation, and in small castings examined by quenching at various cooling stages in the mold, ferrite began to form along the graphite flakes prior to formation of pearlite, and continued to develop during the transformation period. No additional ferrite appeared after transformation was complete, and silicon not only promotes graphitization, but also provided a mechanism for formation of free graphite.

Foreman Training

■ Foreman training was the subject for a lively and profitable session conducted as a roundtable with a panel of experts leading discussion. The audience participated freely in the program, with the result that much helpful advice and information was brought into the open.

Heading the panel and directing it with an experienced hand was A. D. Lynch, industrial relations manager, J. I. Case Co., Racine, Wis. Assisting him were: W. E. George, assistant to management, Campbell, Cannon & Wyant Foundry Co., Muskegon, Mich.; George J. LeRoux, assistant manager, National Malleable & Steel Castings Co., Cleveland; W. G. Conner Jr., malleable foundry superintendent, Walworth Co., Greensburg, Pa.; E. A. Bacon, president, Smith Steel Foundry Co., Milwaukee; F. E. Bair, general superintendent, Ohio Brass Co., Mansfield, O.; and A. C. Ziebell, president, Universal Foundry Co., Oshkosh, Wis.

A number of questions were formally submitted, these falling under the general headings: "Why should we train foremen?", "Who should we train?", "How should we train them?", etc. A subject which received thorough going over was whether a foreman should be selected from within or outside an organization. The matter was brought up by a man associated with a small foundry whose personnel was not productive of foreman timber.

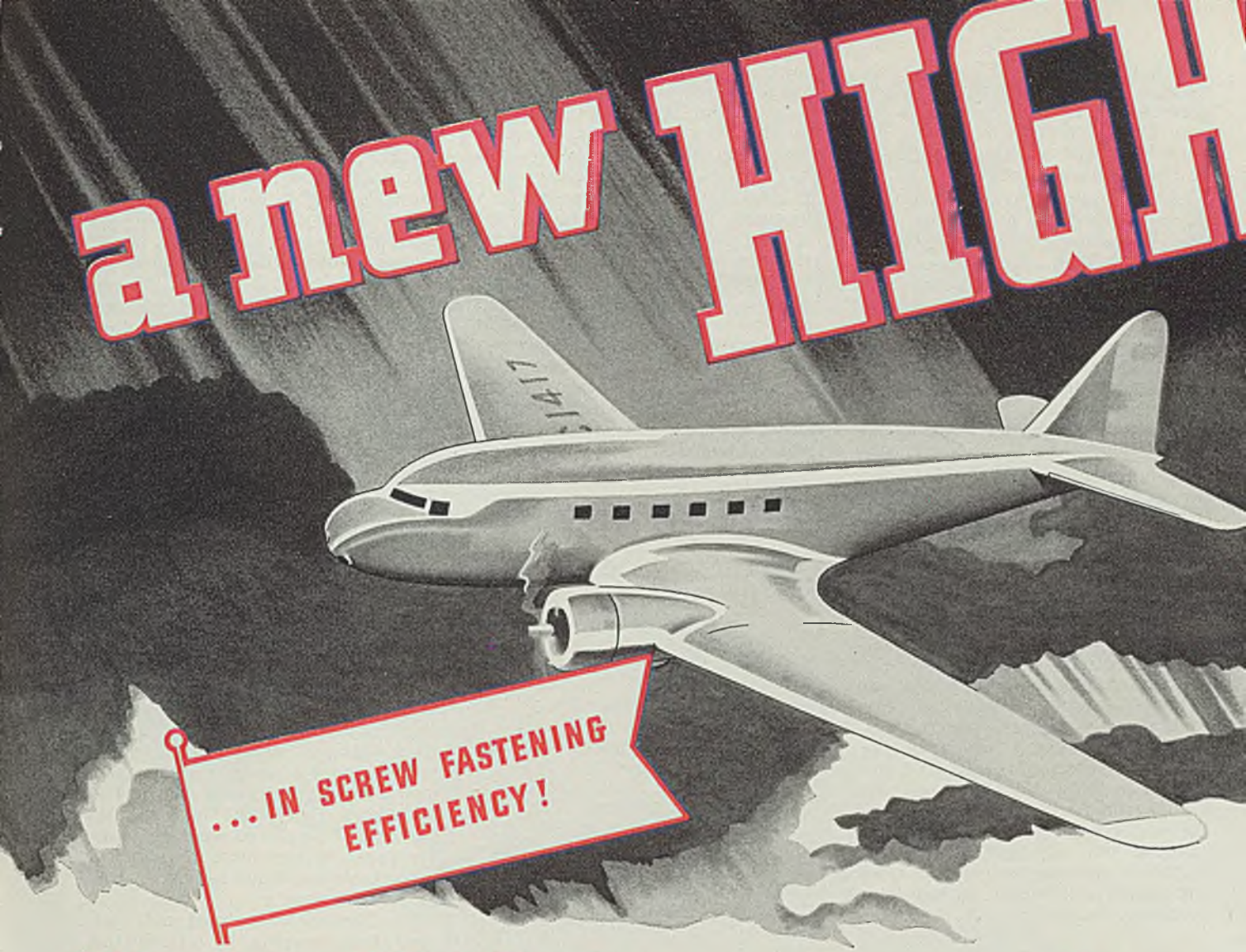
Select from Within

Consensus was almost unanimous that selection should be made from within, since promotions spur up morale. In plants which are large enough, a program of pre-training should be carried on so that men of proper qualifications are ready for advancement. One speaker pointed out, however, that it is not necessary that the man selected be a worker in the same department. He cited an example in which a foundry foreman was needed and no candidate was in sight. But a toolmaker possessed all the necessary qualifications of being able to handle men. Therefore, he was selected for the post and taught the necessary elements of foundry practice.

Another speaker asserted that fraternalism among workmen sometimes makes it difficult to elevate one of them to foreman rank. Many felt this not to be an objection, for fraternalism is something to be desired and sometimes hard to establish. Some plants take steps to organize hobby clubs and other activities to promote fraternalism and close friendships. To choose a foreman from the ranks under such conditions is regarded as far wiser than to bring in a man from outside the organization.

Answering a question as to what a worker expects of a foreman, one member of the panel likened the foreman to the umpire in a ball game—he is close to the play and is in a position to render fair decisions providing he knows the rules. The responsibility of management is to make certain that he is taught the rules. The workman also expects the foreman to possess a sympathetic understanding. Continuing, this speaker gave his definitions for complaints and grievances. He said that a complaint is a matter which a workman carries to his foreman and which is adjusted there. A grievance is a complaint which is not satisfactorily adjusted by the foreman and goes past him to the management.

The policy of one large Michigan foundry is that a foreman must pos-



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sess four attributes. First, he must be able to obtain quantity production; second, he must be able to obtain quality production; third, he must be a good teacher; and fourth, he must be consistent.

Opinion was in agreement that foremen should be acquainted with costs in the plant, particularly those over which they have some control. It was felt that foreman training is most effective when nontechnical training is given by the company management and technical training by outside experts. Because plants vary so much in size, no definite rules, it was believed, could be laid down for a standard type of training.

In summing up the panel discussion, Chairman Lynch emphasized that the task of industry is to sell the American public on the soundness of the individual enterprise system which had made the country great, but which during the past eight or nine years has been made the target of radicals, crack-pots, and others who would introduce a new system. Only the individual enterprise system, he asserted, can continue the progress which gives Americans a living which is far above the subsistence level and the highest in the world. He maintained that the program of reducing working hours and maintaining present rates of pay will not solve unemployment because prices will rise and people will be able to buy less, therefore, production will drop.

Job Evaluation and Time Study

■ Job evaluation and time and motion study were subjects considered at a five-man roundtable conference. The panel board comprised Chairman F. E. Wartgow, industrial engineer, American Steel Foundries, East Chicago, Ind.; co-chairman, H. C. Robson, industrial engineer, Continental Roll & Steel Foundry Co., East Chicago; J. A. Westover, supervisor standards and time studies, Burnside Steel Foundry Co., Chicago; W. E. George, assistant to management, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.; and E. J. Metzger, general superintendent, Falcon Bronze Co., Youngstown, O.

Job evaluation was divided into four general subtopics—job description, labor definitions, wage standardization and merit rating. Mr. Wartgow indicated that in his plant, all odd rates have been eliminated and wages standardized in 2-cent increases. Mr. Metzger observed that standardization lessened labor turnover by giving the workman a clearer picture of his future. The good job of rate classification accomplished by the Steel Founders Society of America was cited.

On the question of merit rating, the conflict with union shop agreements naturally was a leading problem. However, as Mr. Robson noted, a careful system of records, collaborated on by superintendents, foremen and time study men, can give concrete evidence of an employe's ability over a period of time, which is the only evidence worth anything in NLRB hearings, should such hearings have to be encountered.

Mr. Westover described a system in use in his shop where varying classes of work are received regularly, and of course varying skills

in workmen are present. Each job is classified according to the number of units of work in it, *A* jobs being most complicated, *B* jobs not so involved and *C* jobs relatively simple. When *A* jobs are not available for *A* workmen, then the latter are given *B* jobs in lieu of sending them home. Even though the rates on *B* jobs are lower, the *A* workmen, because of their higher skill, can earn nearly their normal rate or *A* work.

With regard to time and motion studies, extended comment developed on such matters as personnel of the department, type of payment, standardization of incentive rates, setting of standards and training of employes. Mr. Wartgow observed that a time-study man can do more harm than any other man in a plant if he is not the right type of man. While education is important, common sense was held to be about 98 per cent of such a man's qualifications.

In considering straight piecework, task and bonus, and group bonus systems of payment, each type appears to have its best adaptation in certain foundry departments. The task and bonus system, for example, is good in cleaning departments; the straight piecework system appears best in coremaking and molding departments where it provides a measure of close control, according to Mr. Westover. The group bonus system finds use where costs are too high to keep detailed track of what is done by individuals.

Mr. George advised setting standard rates on the basis of a good man working hard, then applying premium over the base rate, so that it may be possible for an exceptional workman to earn 20 per cent over what the "good man working hard" makes. But he further recommended careful analysis of each job and accurate determination of the correct method for each job, so that once the standard rate is set, there will be no deviation from it. Mr. Wartgow pointed out that a good time-study man must in reality be a motion-study man. The camera system is being used widely for motion studies, although it is not so readily applicable in the foundry as in some others.

Safety and Hygiene

■ A safety program can be established and operated successfully by the small foundry, according to P. E. Rentschler, president, Hamilton Foundry & Machine Co., Hamilton, O., who spoke before the safety and hygiene session. He stated that foundry management has a selling job to do in starting and maintaining such a program, and it must receive personal interest. All individuals connected with the foundry must be convinced that safety is for their individual benefit as well as for the firm.

Mr. Rentschler pointed out that good housekeeping is one of the most important phases in his plant. Part of the program consists in maintaining permanent displays of safety devices, unsafe tools picked up any time in the shop, regular meetings and inspection by workmen and foreman committees, meetings of employes, etc. Result of the safety program has been development of health consciousness by the employe for himself and family, interest in health lectures, safety consciousness, and greater use of first aid in the plant. Mr. Rentschler said the safety program was established and is operated without increase in personnel, and the interest is continually maintained by use of lectures, distribution of literature, and by dramatization of any phase connected with the work.

Roger Bronson, Chicago, spoke on workmen's compensation and occupational disease insurance. He stated that pure silicosis when not complicated by tuberculosis is not disabling in the foundry, but the possibility of tuberculosis complication does exist so the foundry must be on guard at all times. He said it is advisable to make available to the men involved x-ray information where tuberculosis is indicated so

(*Please turn to Page 77*)

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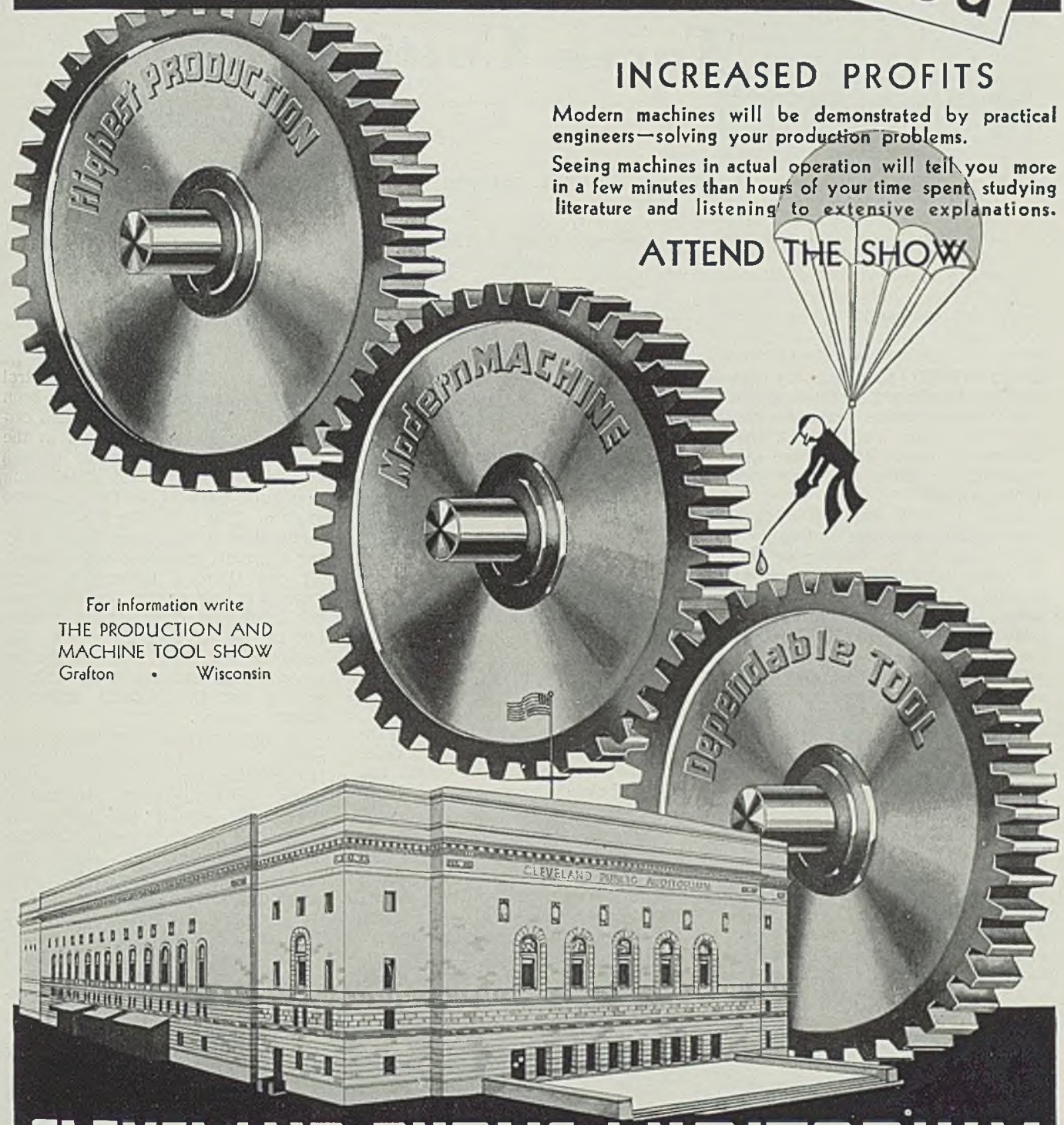

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Efficient Torch Cutting

By E. K. CARLSON
Superintendent
Chicago Bridge & Iron Co.
Chicago

Fabrication of steel plate is requiring more and more torch cutting. Here, the superintendent of a company engaged in fabricating work for 50 years details methods that have been adopted to effect maximum economy in cutting operations. Efficiency control, he says, starts with educating the designing staff to visualize the work at hand in terms of application of the torch; also includes adequate gas-distributing systems and both hand and machine-cutting facilities

IMPROVED processes have changed fabricated methods considerably during the 50 years this company has been engaged in steel fabricating work. One of the most important of these is oxyacetylene flame cutting.

In early days, steel plate shapes were cut by shearing and edges of plate prepared by planing or hand chipping. Originally our company fabricated and erected bridges. Later, elevated water tanks were added and still later, oil storage tanks. At present, practically any and all types of steel plate work are fabricated and erected. Considerable effort has been directed toward improved efficiency and appearance of elevated water tanks and storage tanks for liquids and gases under pressure. In addition, a number of specialty items are supplied such as oil storage tanks, pipe lines and sewage tanks.

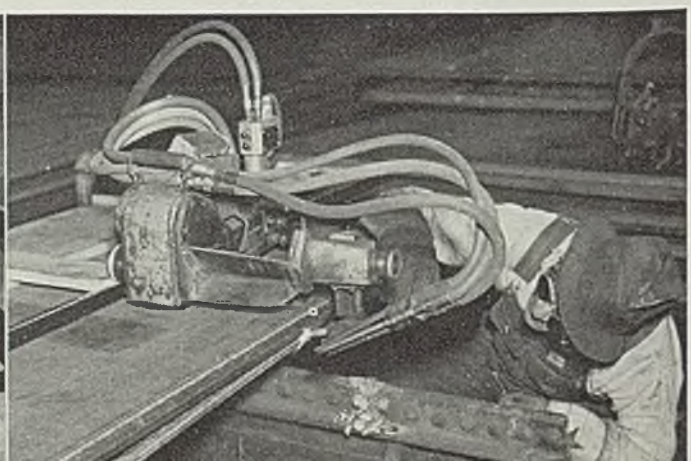
Such work requires the most flexible equipment obtainable. Complicated details cannot be fabricated economically by old-fashioned methods. The oxyacetylene torch is a most valuable tool for much of this work. In early days, cutting operations took care of themselves. Today they must be subjected to careful study and control to obtain the high efficiency necessary for most economical use.

Gas pressures and tip sizes can be found in hand books, so this discussion is confined to showing some of the procedures we have developed to obtain most efficient control and economy in cutting operations.

Most important for efficient cutting is an adequate supply of gases throughout the plant. To increase efficiency of gas supply, a central acetylene generating plant has been installed with a pipeline system carrying the gas to all points in the plant. A similar central oxygen generating system and distributing line runs parallel to the acetylene system. This is not the first pipeline installation in this plant but it is by far the most complete and efficient. At one time, a makeshift underground piping system was employed but later was discontinued, returning to use of cylinder gases. Experience with this first distribution system was extremely valuable in laying out the present improved supply system.

In addition to convenience, an adequate central generating and distributing system has other advantages. By doing away with use of cylinders, residual gas losses are eliminated, thus increasing the economy of gas usage. By eliminating cylinders throughout the shop, accidents due to handling them and to their obstructing passageways are prevented.

Oxyacetylene operating equipment in this plant is divided into three groups including hand torches, port-



able cutting machines and stationary shape cutting machines. For efficient work, this equipment is of the most modern type and is kept in tip-top condition at all times.

The accompanying illustrations, while they show many operations performed using standard equipment either hand or mechanically operated, also reveal a number of ingenious devices developed to fit a particular job. Some of these arrangements may appear crude at first glance. Actually they are well thought out and efficient operating methods which have saved countless sums of money and contribute much to our ability to fabricate anything that can be made from steel plate.

One of the most important factors contributing to successful use of the oxyacetylene cutting process is education of the designing staff to visualize work at hand in terms of how the cutting torch may be used to prepare it. From that point on, it is an easy matter to utilize standard machines or design special attachments to accomplish the desired results.

The Chicago plant consists of six shops. Altogether there are four fabricating shops, a machine shop and an erection shop covering 280,000 square feet of floor space. Three outside yards are available for storage of material and finished work.

The oxyacetylene distributing system includes 5500 feet of acetylene line plus 1600 feet of pipe required for drops to 53 stations which are located so any part of the shop is within 75 feet of some outlet. Majority of drops have double connections for a total of 99 acetylene connections. Distributing system for the oxygen duplicates this setup.

To prevent possibility of a flashback in the acetylene line, master and auxiliary hydraulic flashback preventers are installed at strategic points in the line. The layout itself is a series of loops and intermediate shutoff valves so any portion of the line can be shut down and purged for repair without interfering with operation of remainder of the line. Acetylene lines are painted red and oxygen lines painted green.

Operator Has More Freedom

Most important feature of an adequate distributing system for gases is that it enables the operator to move readily from one station to another. Since he only need carry his torch, regulators and 75 feet of hose, little effort or time is wasted when moving from one job to the next. This is a great convenience compared with need for moving cylinders about where no distributing system is available. It permits important economies.

Fig. 3 is a large-capacity elevated water tank with a patented radial cone bottom. Note the unlimited possibilities for the use of welding and cutting in fabrication of structures of this type. Consider particularly the points of intersection of the diagonal bracing and the ends of radial girders.

In Fig. 1, a shape cutter with two torches is cutting clevis plates in pairs. These are for fastening the diagonal bracing to the columns of the structure in Fig. 3. Clevis plates thus produced are noted for uniformity of shape and smoothly cut edges.

The operator in Fig. 2 is making the final and most difficult bevel cut in an elbow plate for penstock linings at Grand Coulee dam. A special outrigger is used to support the torch.

In Fig. 4 can be seen two elbow plates rolled to shape. A pile of sections of segmental rings which encircle the penstocks at regular intervals also are shown. In all, nearly 5000 of these ring segments with different radii were required. Preparing these shapes with a cutting torch was done on a special setup.

Fig. 5 shows details of this setup. The plate to be cut lies on a movable table which travels on rails underneath a bridge supporting the outer end of the torch-holding frame. Using two torches, a complete segment is cut at one pass of the machine. Both the torches can be moved on the supporting framework to accommodate different radii and different width segments. The motor propelling the torches operates a drive wheel contacting the circular outer rim supported on the bridge to advance the cutting torches uniformly across the plate.

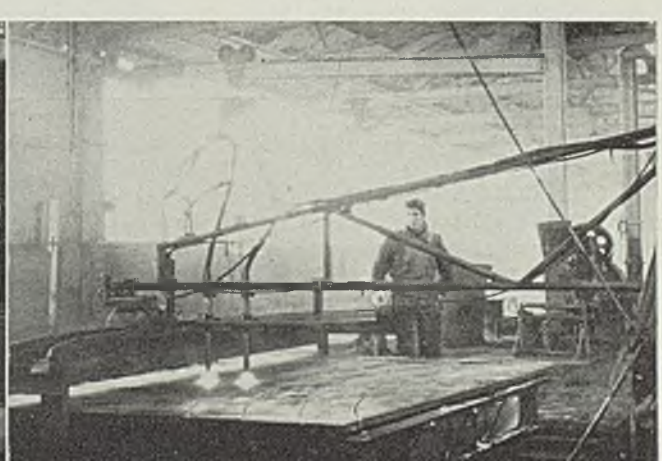
A simple jig often helps in holding a hand torch while trimming tank heads to size. It consists of an arm pivoted at top center of head and carrying a clamp for the torch at end near periphery of head. Wheels at this end permit easy steady movement of the torch by hand. This same setup can be adapted to cut any type bevel desired when preparing edges for welding. An adjusting screw is provided to space the torch as desired.

For cutting small circular plates, a typical arrangement consists of a small arm provided with an adjustable pivot point, an adjustable counterbalance and a wheel near the torch end to permit easy movement of the torch around the circumfer-

(*Please turn to Page* 64)

Page 1: Fig. 1. (Left)—Shapecutter operating torches simultaneously to cut pairs of clevis plates. Fig. 2. (Right)—Making difficult bevel cut. Note outrigger used for torch. Page 2: Fig. 3—(Above)—Large elevated water tank with radial cone bottom. This, with radial girder design, involves much shape cutting. Fig. 4. (Left)—Two elbow plates and sections of segmental rings for Grand Coulee dam penstocks. Fig. 5. (Right)—Special setup cuts segments of varying width and radii. Table moves under bridge carrying torch guide rails

From paper presented at fortieth annual convention of International Acetylene association at Milwaukee.



BETWEEN HEATS WITH Shorty

■ Say Fellers:

Trouble whistle blew the other day and when I called the main gate from the phone over in the rigger's shanty to see what was the matter, old Baldy Garner on the other end says: "This you, Shorty? 'Tis, huh. Well what did they do with the skull cracker ball?"

"Why, Baldy, she's still over in the ladle house."

"Ladle house, h——l. Just came from there and there's no 5-ton ball waitin' to take a ride up to the ceilin'. The magnet's willin' all right but the ball—well, Shorty, there just ain't any."

"Son, you think someone usin' it on their lunch hour to play table tennis?"

"O, boss. I thought maybe Vulcan borrowed it to play a game of basket ball. No foolin', boss, we goin' to be needin' some ladles for the 4 o'clock cast and we gotta have the ball to break up some skulls. Come on over and see if your peepers'll do the trick."

* * *

You know, fellers, I couldn't find the ball high or low. Moved ladles and skulls until the craneman had to stop and oil up the sheaves carryin' the big hook. But no ball. And I sez, I know. I'll bet they left the ball settin' in a ladle and then they spotted the ladle under one of the spouts the arcade track and casted the metal in 'er.

And so I gets hold of Red Sullivan, one of the yard crew, and asks him if he'd seen the skull cracker ball. Red says, sure Shorty, she's out at the slag dump. When the whistle blew last night for the feed bag the craneman in ladle house left the ball on a carload of stuff that was to go to the dump. And 'long came the yard crew with orders to couple the car on the drag of cinder ladles and she landed out at the dump back of the pipe mill, 4 miles from here. Just came from there and I watched Cohen tryin' to load her on a wagon. You know Cohen, the guy that has a contract with the company to collect all the scrap that comes to the dump. Well, Shorty, you'd a-split your sides watchin' him trying to load the ball onto his wagon. He couldn't do it with two teams so he was goin' after a couple of more when I left with the drag of empties little while ago.

* * *

And say fellers, you should a-seen me get the gasoline speeder out of the shanty and put 'er on the main line and when I got the "Go" on the signal tower I give 'er the gun. Made the 4 miles over the company's railroad with an open throttle and got to the dump in time to see Cohen tryin' to load the steel ball.

Hard time to convince him that the ball was the company's? Say, let's don't talk about it only to say the persuader was this: No ball, no more scrap iron. And he says, all right but you're ruinin' my business.

Well, sir, we got the ball back in the ladle house the next day but not until we sent an electrician out to the slag dump with about 600 feet of wire and the yard crane and magnet.

Ever hear about the rollin' stone gettin' a good polish? Well, you should a seen the polish on the 5-ton skuller after Cohen got through handlin' 'er and we got 'er back in the ladle house. No foolin' she looked like as if she was 18 and 8 stainless.

Well, I'll be seein' you.

"Shorty" Long

Efficient Torch Cutting

(*Concluded from Page* 63)

ence and to hold the torch at a uniform distance above the work.

A simple way to make straight cuts with hand torch is to hold the tip of the torch against a heavy bar to steady the tip as it is moved along the cut. This, perhaps, is the simplest method of making a straight-line cut.

A nortonspheroid for storing volatile liquids under pressure features wide use of torch cutting for bottom girder details, spiral stair, gage glass covers as well as the tank itself. These are fabricated by oxyacetylene cutting to shape, the parts then being welded together during erection. Efficient cutting methods are essential to fabricate such structures economically.

Storage tanks of the future are seen to envision greatly expanded use of cutting and welding methods to produce smooth pleasing exterior surfaces and supporting members.

♦

Pioneer Volume Covers Industrial Design

■ *Industrial Designs,* by Harold Van Doren; cloth, 420 pages, 6 x 9 inches, including 32 plates; published by McGraw-Hill Book Co., New York; supplied by STEEL, Cleveland, for $4.50.

A pioneer in the art of industrial design, the author has produced a book which is a pioneer in its field, a down-to-earth treatise on the subject. Crowded with facts, technique and anecdote the work provides a systematic background for the beginner and the industrial executive desiring knowledge of what industrial styling is all about.

Four sections make up the volume. The first surveys the field; the second concerns fundamentals, and is an elementary treatise on designing in three dimensions; the third deals with the technique of design production, and the fourth offers problems for the beginner, concluding with case histories, describing step by step the development of several products now on the market.

There are chapters on streamlining, fees, materials and processes, design patents, color technique and suggestions for operating a free-lance studio. There are descriptions of how to make art renderings, presentation models and all the data necessary for a follower of the profession.

Develops Enamels for Infra-Red Baking

■ Two new lines of enamels, especially suited for high-speed baking schedules in infra-red lamp ovens, are announced by Maas & Waldstein Co., Newark, N. J. They are known as Raydur synthetic baking and Raydur Duart wrinkle enamels. Both will bake to a hard, durable surface in 15 to 20 minutes and can be handled for assembly half an hour later with little danger of marring.

The baking enamel can be supplied in high gloss and semigloss finishes, and the wrinkle enamel can be supplied in grades to form fine, medium and coarse patterns. Both are furnished in black, white and various other colors.

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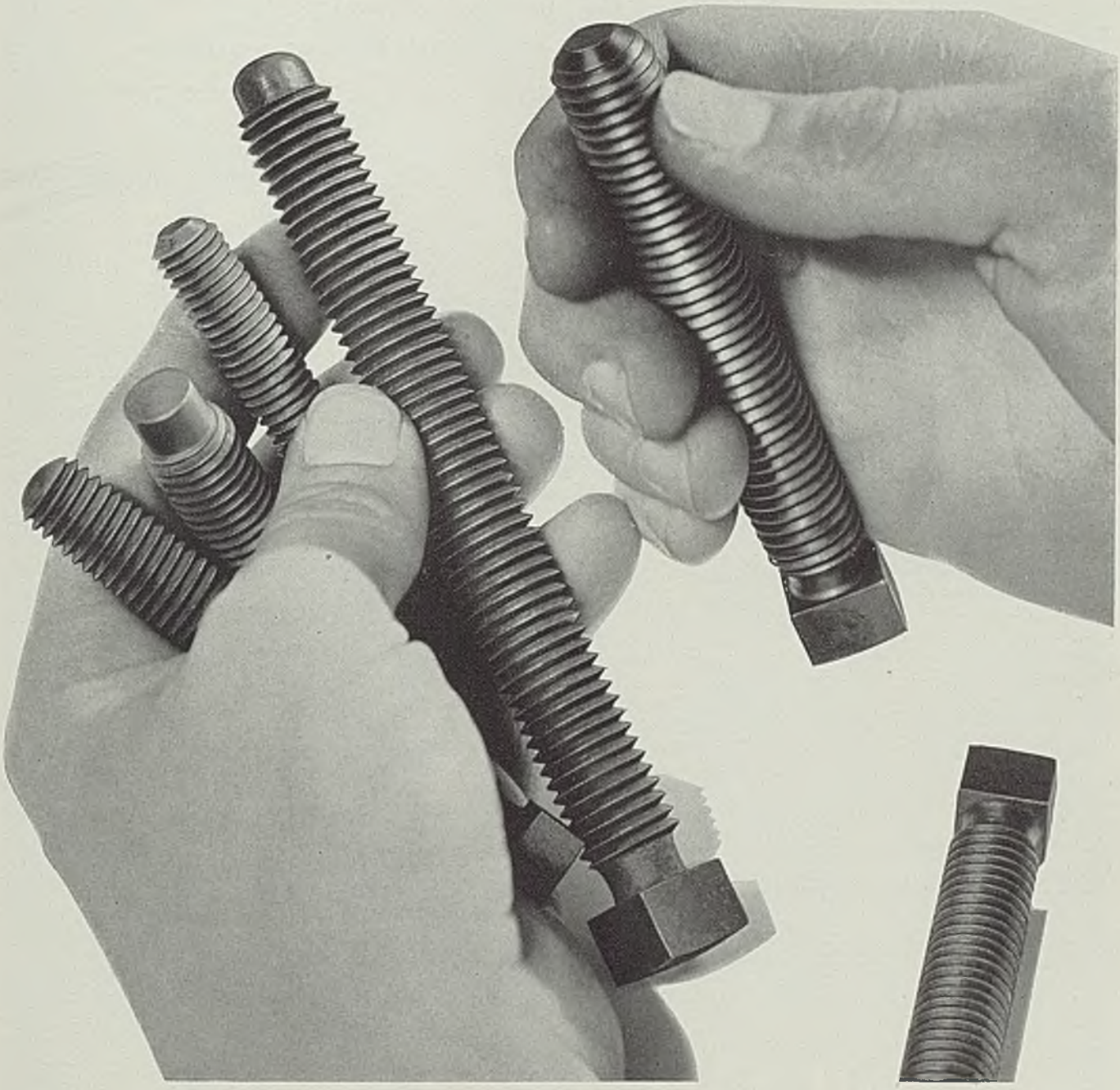

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Pickling, Ventilation

Health hazards in the operation of pickling tanks are controlled readily and efficiently by mechanized exhaust ventilating systems. Synthetic organic inhibitors tend to counteract toxic gases

By M. A. SNELL

Hartford Accident & Indemnity Co.
Chicago

■ ACIDS have been used for many years in preparing metal surfaces for vitreous enameling. No gases are formed and no bubbling or effervescing takes place in removing scale or rust in the pickling bath. However, as soon as the scale or rust has been eaten through in spots or over the entire piece, then the acid reacts with the exposed iron forming iron sulfate or chloride and hydrogen gas which bubbles to the surface and escapes into the air of the pickle room. If all rust and scale have been removed from the piece and the acid bath is strong and hot, then those bubbles of hydrogen gas will be so large and so numerous that in rapidly rising to the surface of the solution and escaping into the air, they may impart to the bath the appearance of violent boiling.

Each escaping bubble of gas is covered with a film of the acid and contaminates the atmosphere with a fine mist causing irritation of the skin, the respiratory tract and the eyes.

The hydrogen reacts with various ingredients in the iron or the acid, some of which may be present as impurities and the acid itself reacts with compounds or impurities in the iron or steel. As a result, small amounts of gases are formed which escape into the workroom with the hydrogen gas. These gases may be such ill-smelling compounds as hydrogen sulfide and the mercaptans from the sulfur present in the iron, phosphine (phosphoretted hydrogen) from the phosphorus in the iron, silicon hydride from the iron silicide and hydrocarbons from the carbides in the metal. Sulfur dioxide gas may result from reduction of the sulfuric acid by certain kinds of organic matter which may be present. Arsine gas (arseniuretted hydrogen) may be liberated from the arsenic which often is present in appreciable quantities as an impurity in certain kinds of iron or steel. If muriatic acid is used for pickling, some hydrochloric acid escapes from it into the air as a gas.

Vapors of muriatic or sulfuric acids are classed as irritants which act primarily upon the upper respiratory tract and the eyes. Frequent exposures to high concentrations of these vapors may produce conjunctivitis, rhinitis, pharyngitis, laryngitis or bronchitis, or in plain language, inflammation of exposed mucous membranes.

There is no such thing as systemic poisoning by these acids in spite of the fact that the occupational disease laws of the states of Michigan, New York, North Carolina, Rhode Island and Washington list "poisoning by sulfuric, hydrochloric or hydrofluoric acids" in their schedules.

Cases of dermatitis or skin irri-

From a paper presented at the fourth Porcelain Enamel Institute forum at Columbus, O.

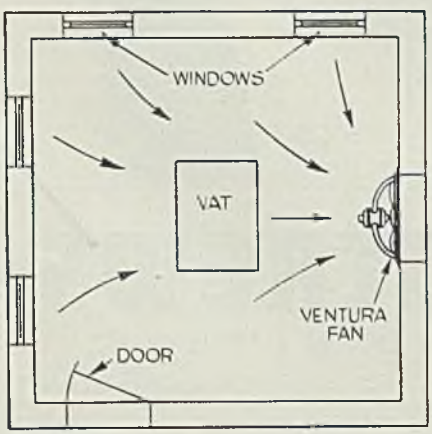


Fig. 1. (Left)—Fumes dispersed by a fan located in the sidewall of pickling room

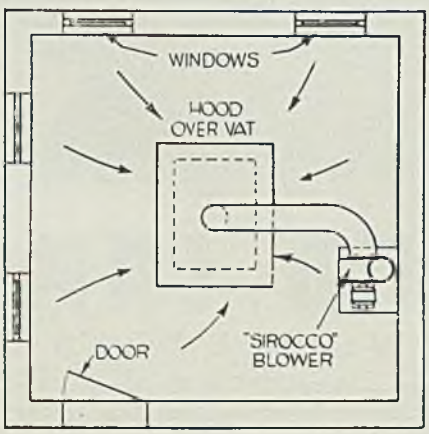


Fig. 2. (Center)—Central hood and blower provides very efficient method of fume disposal

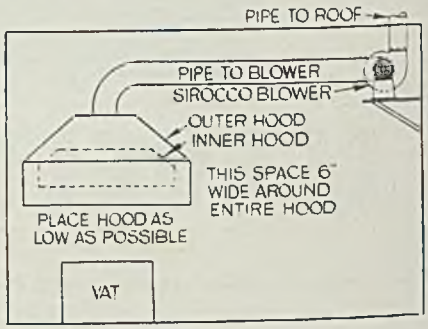
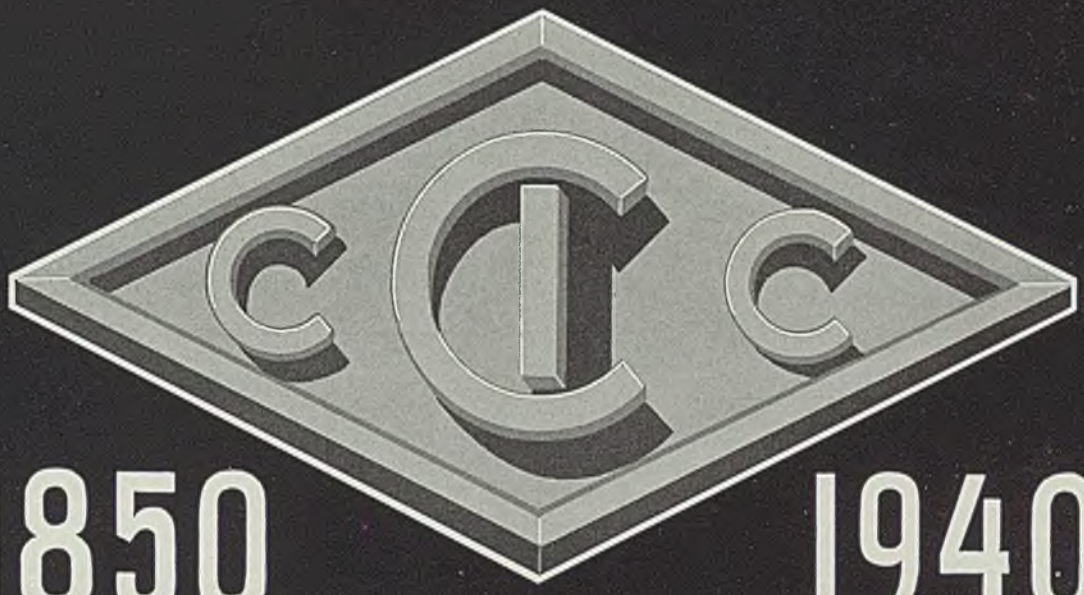


Fig. 3—Hood over pickling vat should have overhand on each side



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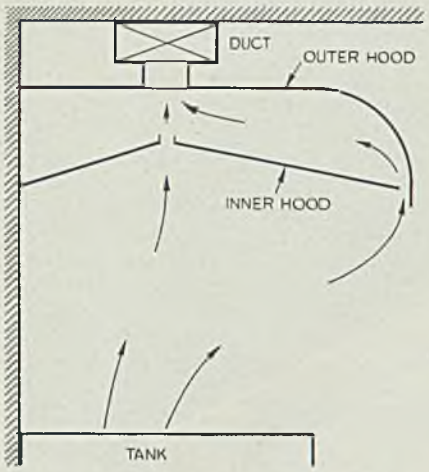


Fig. 4—Double hoods afford rapid dispersion of acid fumes

tation may also develop on exposed surfaces of the face, neck, hands or arms. This is more apt to occur if the employe uses rubber gloves or gauntlets part of the time. The acid vapors settle on the hands or arms when the gloves are off mixing with the perspiration when the gloves are worn later on, causing extreme irritation, especially in warm work rooms.

Of the gases mentioned, hydrogen sulfide, sulfur dioxide, phosphine and arsine are definitely toxic, especially arsine. However, under normal conditions none are apt to exist in the atmosphere of the pickle room in quantities sufficient to cause acute or chronic poisoning.

It is well to remember, however, that there are numerous conditions which may result in definite hazards from the presence of these gases. Some of these are overpickling, impure acid, contaminated solution, poor iron or steel and inadequate ventilation.

Sulfuric acid containing more than ½ of 1 part of arsenic per 1,000,000 parts of acid should never be used for pickling purposes. If the supplier cannot furnish the necessary chemical analysis, then the consumer should determine frequently the arsenic content for himself.

Numerous inhibitors have been placed on the market which tend to prevent the formation of large amounts of hydrogen gas when added to the pickling solution in certain small quantities by inhibiting the action of the acid on the steel or iron. The presence of the inhibitor does not prevent the action of the acid on the rust or scale which is to be dissolved from the surface of the steel object. As soon as this coating is eaten through and the acid reacts with the exposed iron, small amounts of hydrogen gas are formed as already explained. In the presence of the inhibitor, however, this gas does not escape, but forms a protective film on the surface of the exposed iron, thus preventing further solvent action of the acid and formation of more free hydrogen gas. Numerous organic materials have been used as inhibitors, including molasses, cornmeal, rye flour, sizing and others. None of them, however, is as effective as the synthetic organic inhibitors which are available commercially. They offer one means of control of the exposure to the toxic gases that may result from pickling by discouraging their formation at their source.

Ventilation Important

Good ventilation should be used in every pickling room. First, because there is always a strong possibility that one or more toxic gases may be present for reasons already discussed. Second, because the atmosphere in the vicinity of any pickling operations is disagreeable and frequently results in dissatisfied or disgruntled workers and poor production. Third, there has been a general belief that pickle room workers frequently suffer from general ill-health. Although this is probably untrue, it is certain that poorly ventilated pickle rooms result in the inhalation by the workers of air contaminated with vapors or mists which may result in irritation of the eyes and respiratory tract. Exposures such as these are not conducive to good health.

A choice of several good methods is available for the ventilation of pickling operations. All of them require the use of a mechanical exhaust system. Natural draft methods should never be used when the solutions are operated at room temperature because there must be heat present to make them effective. Even with the best possible conditions they are anything but satisfactory. The type of exhaust system which should be used depends upon the factors involved in each individual pickling department.

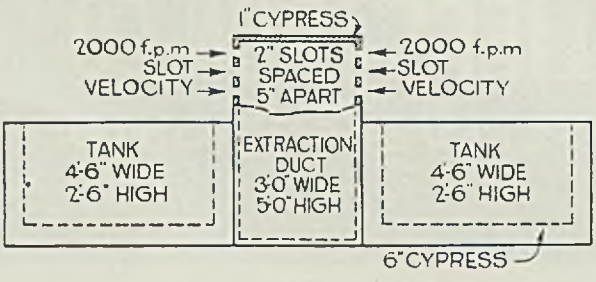


Fig. 5—Exhaust system designed with slotted ducts located between two tanks

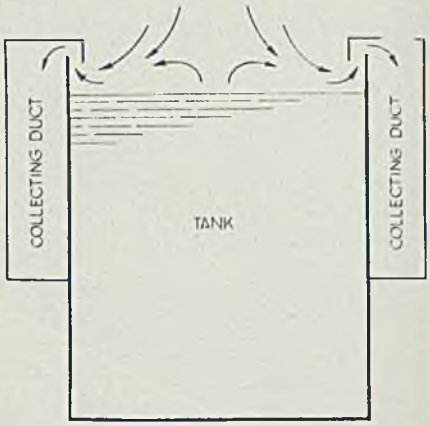


Fig 6—Exhaust system designed with slotted duct on each side of single tank

The first method is the simplest but the least effective and involves the use of general room ventilation. The fan or fans should be located so that the vapors will be drawn away from any workers present with as little dispersion as possible in the room. This system should provide at least 15 air changes per hour during working hours. In the event the pickling operations are being performed in a large room where other activities are in process, then the 15 air changes per hour should apply to a space extending 25 feet in all horizontal directions and 15 feet vertically measured from the top edges of the pickling tanks. Fig. 1, an installation with one vat in the room, depicts an undesirable way because the vapors are dispersed through a considerable portion of the room before they finally reach the fan.

Fig. 2 illustrates the use of overhead hoods which are much more efficient than general room ventilation because the vapors are collected and removed before they have had an opportunity to spread around the work room.

Several important points should be considered in the design and installation of an overhead hood. It should be placed as low as possible but not over 80 inches above the floor, and should be larger in horizontal area than the tank. This overhang or projection should be 4½ inches on each side for each foot of height from the top edge of the tank to the bottom of the hood as shown in Fig. 3. If possible, there should be an enclosure on one, two or three sides connecting the hood and the tank, either of a permanent nature or of hinged plates or aprons which may be lifted out of the way when necessary. Frequently it may be necessary to hinge or counter-

(Please turn to Page 76)

Automatic Carbon Arc Welds Plate for Aluminum Tank Cars

■ AUTOMATIC carbon arc welding is used in construction of aluminum tank cars at American Car and Foundry Co., Milton, Pa., to permit faster construction and a considerably better quality weld together with marked freedom from distortion. This development was motivated by a desire to improve quality, not to lower costs as these are practically unchanged due to increased flux cost canceling the labor saving.

Since no beveling of plate edges is required, the full thickness of metal is utilized by simply butting the square edges together, greatly simplifying setup of the work. Welding time per tank is noticeably shorter than previous methods since the automatic weld is made in two passes instead of three. The automatic process also permits welds of complete overlapping penetration, greatly improving quality of the weld.

Speed Prevents Distortion

Distortion, a disturbing factor in previous methods, is prevented with the automatic carbon arc because of the faster welding it makes possible. Little straightening is required on round tanks welded by this process. This advantage not only simplifies production of the shell itself but the heads are readily fitted to the ends of the shell because the shell is so uniformly round.

Fig. 1 shows a tractor-type Electronic Tornado automatic carbon-arc welder built by Lincoln Electric Co., 12818 Coit Road, Cleveland, making an inner longitudinal seam in an aluminum tank. In Fig. 2 the machine is welding a head in one of the aluminum tanks.

Materials used in constructing tank cars of aluminum include: A bottom plate ⅝-inch thick; two sides or top plates ½-inch thick; and two heads ⅝-inch thick. The tanks are 78 inches outside diameter and measure about 32 feet in overall length.

Square-edge tight butt welds are used throughout in construction. The difference in thicknesses of the butting edges is taken care of by maintaining outside diameters uniform and making up the difference by an off-set on the inside of the tank.

Three longitudinal welds, two ½ to ⅝-inch and one of ½-inch thickness, are required in constructing the shells. Two passes, one inside and one outside, are made for each longitudinal seam. First longitudinal pass is made on the inside with the seam properly backed up by a water-cooled copper chill bar, giving complete penetration with one pass.

The second pass which is made on the outside, is applied to obtain overlapping penetration and for the sake of appearance. It is made without any backing up.

In welding the heads to the shell, head is fitted in place and tank rotated under the carbon arc which welds the outer seam with the inside properly backed up by copper chill bars. Filler metal for the weld is supplied by ¼-inch aluminum wire fed into the arc. The second pass on the head weld is done manually after grooving with a chipping tool.

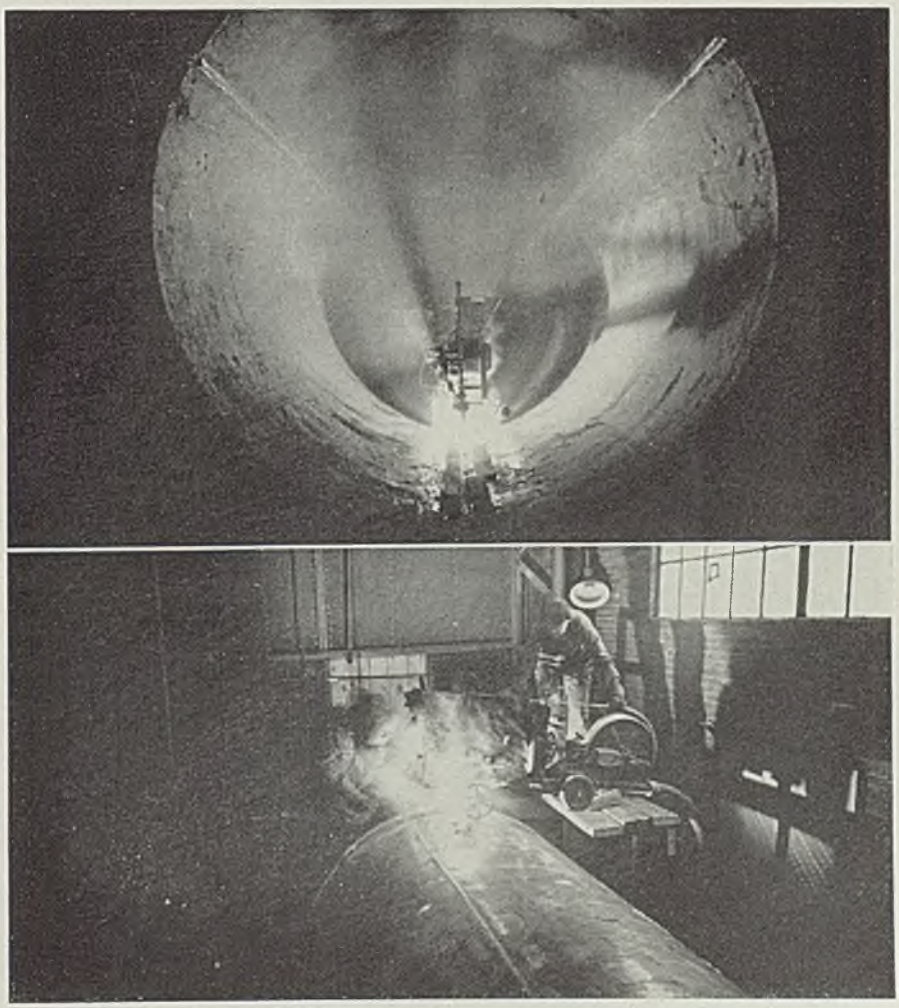
Most of these aluminum tanks are utilized for glacial acetic acid service.

This also is the basic material for the manufacture of rayon and non-inflammable film. Two of the aluminum tanks also have been put into service for carrying peroxide. These were constructed of 2-S (99.5 per cent aluminum). Tanks for acetic acid service were constructed of 3-S aluminum (97.5 per cent aluminum).

Distributes Calculator Of Welding Costs

■ A handy pocket-size calculator of welding costs in the form of a slide rule is announced by Champion Rivet Co., Harvard avenue and East 108th street, Cleveland. It displays in chart form cost standards which can be utilized as a guide to engineers and plant officials on their production welding where a definite and normal procedure is being followed.

The calculator is being distributed through all sales offices of this company and is available at a nominal charge.



Upper, inner longitudinal seam of a tank car is being welded by automatic carbon arc. Welding machine moves along seam here

Lower, when welding a head on an aluminum tank car, the welding machine remains stationary and the head is rotated underneath the arc as shown

New Die-Casting Plant

A belt conveyor returns sprues, gates and flash to melting furnaces. Machine tools are movable, so can be rearranged easily to make finishing lineup with minimum work handling

By HERBERT CHASE

■ SOME indications of the increasing use of die castings can be found in the entirely new plant for production of these castings in zinc alloy recently put in operation by Alemite Die Casting & Mfg. division of Electric Auto-Lite Co., Woodstock, Ill. The older Alemite plant adjoining the new one is among the largest in the country. Besides many machines for die casting zinc alloys, it includes a large separate unit with machines for producing aluminum alloy die castings as well as extensive facilities for plating and other finishing work. Since the new plant substantially doubles the total capacity, the older plant remaining in use, there are few die-casting plants with so large an output. New section features extensive use of conveyors for handling castings, sprues, gates and flash economically.

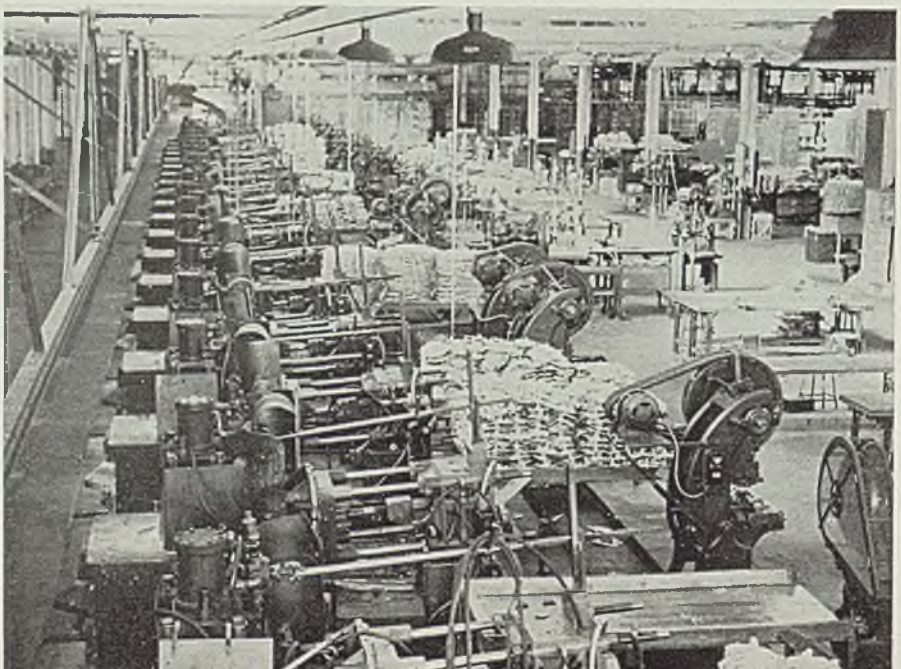
No. 3 zinc alloy is used for most work here because of its stability. This is a copper-free alloy produced from high-purity (99.99+ per cent) zinc to which is added small percentages of aluminum and magnesium as required by standard A.S.T.M. and S.A.E. specifications. Melting furnaces of 5000-pound capacity are located near the casting room to which they are connected by a monorail conveyor fitted with hoists carrying a tilting ladle for molten metal.

A belt conveyor returns sprues, gates and flash removed from castings along the production line. All the casting machines are set in a single row with their furnaces toward one wall and in such a position that metal pots can be filled readily with molten alloy from the monorail ladle. The belt conveyor runs along opposite end of the machines parallel to the wall. On opposite side of the conveyor are most of the machine tools used to cut castings from gates and to shear flash. These also perform whatever machine operations may be required on the castings.

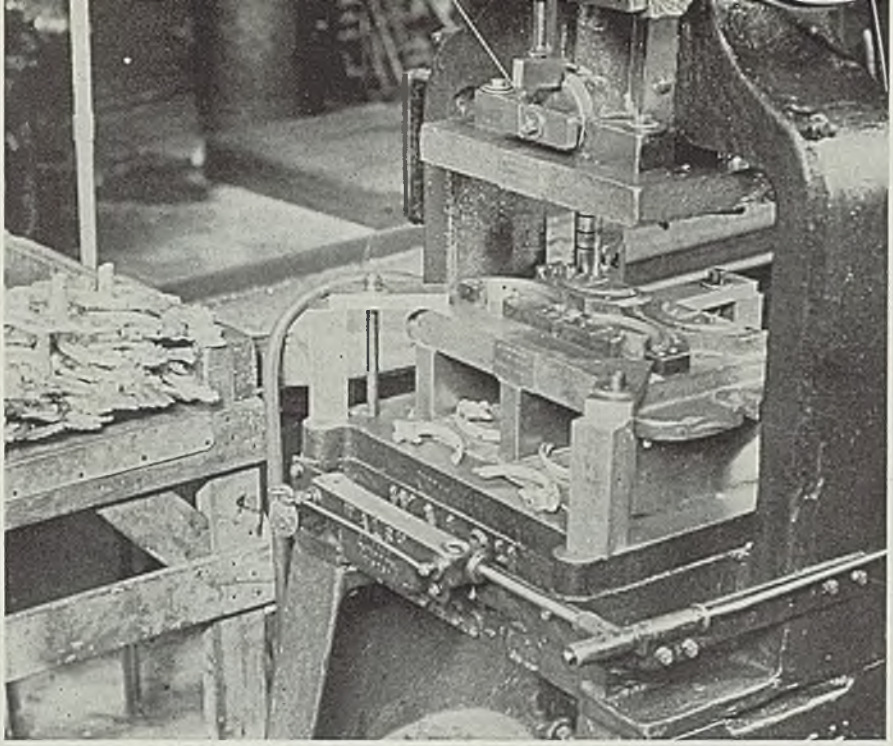
Dies in each casting machine are changed upon completion of a run. Since each different die produces castings which require different tools for fin removal, some machine tools may have to be moved about when the die is changed as this plant believes it the best practice to bring machines where they are needed than to tote the castings to different fixed machines at some distance. Fortunately, nearly all the tools are light and are provided with individual motor drives, hence they are very readily rearranged.

Gates of castings are taken from dies by operators, plunged into water for rapid cooling and then are laid on chutes which carry them to the opposite side of the conveyor belt where the machines for sprue and fin removal are located. The first machine they reach may be a punch press equipped with a trimming die to cut the castings from the gate and to remove flash from the castings in a single stroke of the press. In other cases, a hand arbor press is employed with only one casting handled at a time. In all cases as much gate, sprue and flash as possible is removed in the initial machine operation so this material can be dropped onto the belt returning it to the melting furnaces.

Where feasible trimming dies are made so castings are pushed



General view of die-casting department in new Alemite plant. There are 24 casting machines in a single row here. A belt conveyor runs underneath the loading chute between casting machines and row of presses to return the gates, sprues and the flash to the melting furnaces



This is one of several punch presses set up to remove flash simultaneously from four castings on a gate. After casting, the gate with four door handles shown here is removed from the die of the casting machine, plunged in water to cool it and placed in the chute at left which delivers it to the punch press

through a die to fall into a tote box. This applies only to small castings, however. Chutes sometimes are set up back of presses to catch gates, sprues and flash and permit them to slide onto the conveyor belt. In other cases, operators throw these onto the conveyor or into boxes later emptied onto the conveyor if the machine is not close enough. Larger castings usually are removed from trimming dies by hand. If the casting requires machining after trimming, it is passed along a bench to next operation. When completed, castings are placed in tote boxes for removal to polishing or shipping departments.

Wherever handling can be minimized by passing the castings along a straight row of machines extending away from the conveyor belt and toward the center aisle of the plant, this arrangement is used. A great many of the operations required are done on light drill presses and tapping machines. Special machining fixtures are provided where quantities are large enough or where needed to insure required accuracy.

Passing the castings directly from casting machine to fin removal and machining operations, however, makes it unnecessary to build up large banks of castings. It also avoids stacking castings which might cause them to be scratched or warped by excessive weight above. At ends of machining lines, there is sufficient space for as many tote boxes as may be necessary to take up any slack between the department just described and the polishing department to which most of the castings are transferred before they are ready for plating or shipment. This is the only bank needed. Parts are transferred to the polishing department by hand truck. Tote boxes are unloaded at points where operators doing the polishing can reach them readily.

Most of the machines in the polishing department are arranged along a belt conveyor similar to and of about the same length as that used in the casting department. Instead of handling scrap, however, this conveyor handles polished and buffed castings, carrying them toward the plating department. At end of the conveyor, castings are inspected and transferred either to tote boxes or to plating racks as they enter the plating department.

Most of the polishing and buffing is similar to that employed in other plants where die castings are handled in corresponding quantities. However, there are some exceptions. Every effort is made to cast as smooth as possible all surfaces which are to be exposed after plating. This reduces grinding to a minimum. Some grinding almost always is required to remove the parting line.

Much grinding is done with a form of belt sander developed in

(*Please turn to Page* 80)

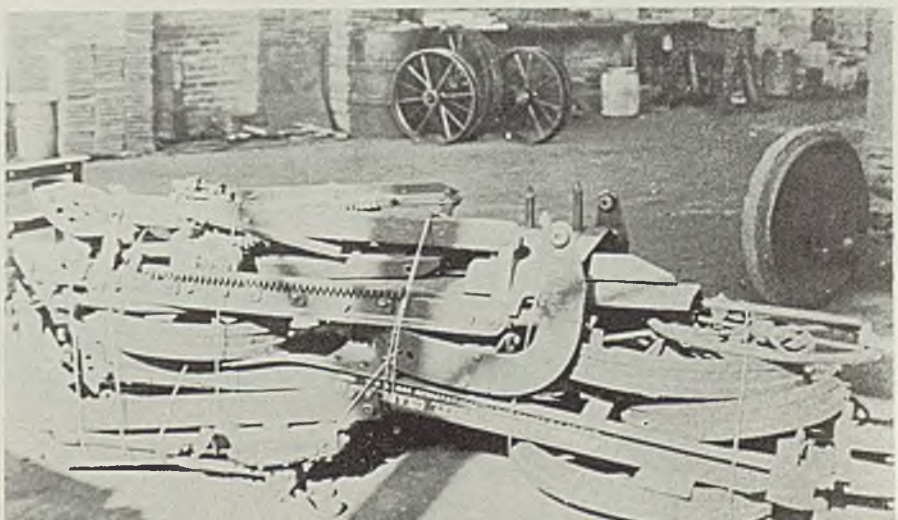
Wire Strapping Saves in Work, Material, Freight. No Crates Used

■ ECONOMY in preparation of road machinery for shipping is evident in a number of American plants exporting road scrapers, road graders, trucks, and other road machinery. Not so long ago wooden cases or crates were used to brace and protect this machinery. Now it is shipped "knocked down" and amply packaged by steel wire strapping methods to eliminate lumber, either in crate or box.

Savings in cost are notable for in this manner and with the new method of packing, the road scraper unit shown in accompanying illustration permits a saving of about $40 per unit. Chassis or frame, wheels, axles, cross pieces and other parts are wired to each other if the pieces are small and likely to be lost from the unit. These are packed or laid as flat and compactly as possible and then strapped with an 8-gage galvanized high-tensile wire binder

(*Please turn to Page* 80)

Road scraper disassembled and completely wire strapped. Shipment by this method saves $40 per unit. Photos courtesy Gerrard Co. Inc., 2915 West Forty-seventh street, Chicago



Diesel Engine Frames

Welding these highly stressed structures affords more uniform distribution of loads, produces a more sturdy frame, and permits easy production as well as quick repair and improved design

By MAX ESSL

Chief Engineer
De La Vergne Engine Co.
Subsidiary of
Baldwin Locomotive Works
Eddystone, Pa.

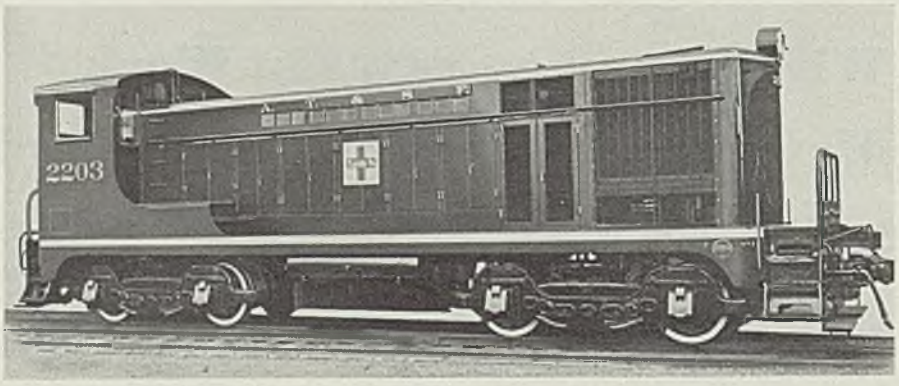
■ THE usual reason for using welded steel construction on mobile structures such as ships, railroad rolling stock and automotive equipment is to obtain light weight combined with high strength. However, the factor of light weight is not the important element in dictating use of welded steel construction for frames of diesel engines as built by De La Vergne Engine Co. for switching locomotives.

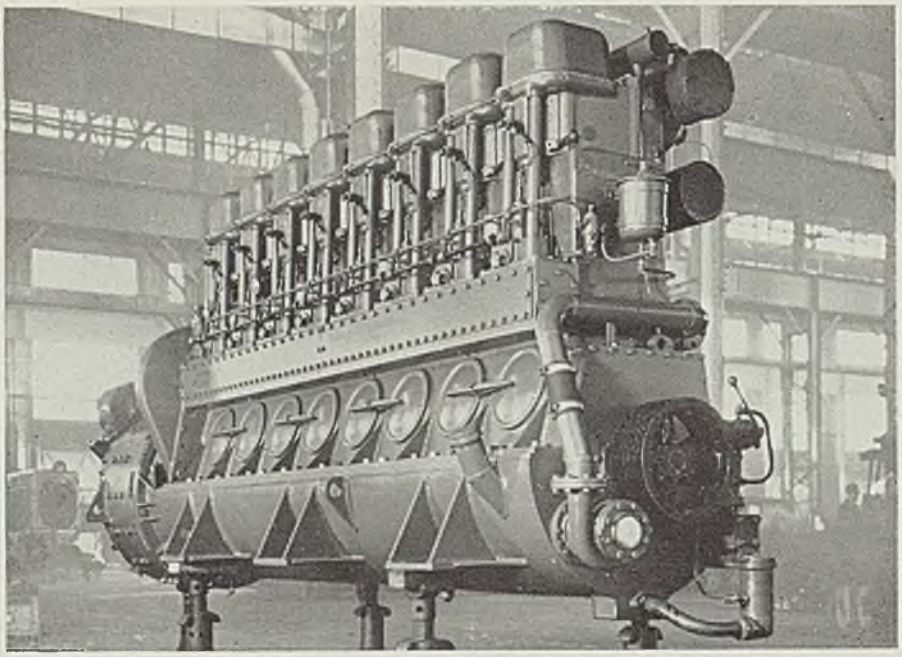
In this work, alloy steels are not used as mild steel answers the requirement satisfactorily. Neither is welded construction employed to reduce cost as cost of the welded construction is about equivalent to or perhaps a little more than cast construction.

However, welded mild steel construction is employed because a number of important advantages are obtained by its use. The welded frame has been found more sturdy, being able to withstand much harder service without failure. The reason for this is that the steel structure deflects to give more uniform distribution of stresses through load transmitting members. Also it is quite easy to design a welded steel structure to produce the load distribution desired.

Another important factor is that when an accident of any kind takes place, causing frame to fail locally, the frame structure can be welded with satisfactory results assured if the frame is of steel, whereas cast construction is quite difficult to weld satisfactorily, usually the entire frame having to be discarded.

Equally important are the manufacturing conveniences. It is quite an easy matter to stock sufficient plate sizes and thicknesses to meet any requirements. Also from a manufacturing standpoint, the steel construction is greatly to be desired as it easily permits making changes in arrangement of brackets, pipe clamps and similar items. It also permits special accessories to be ap-



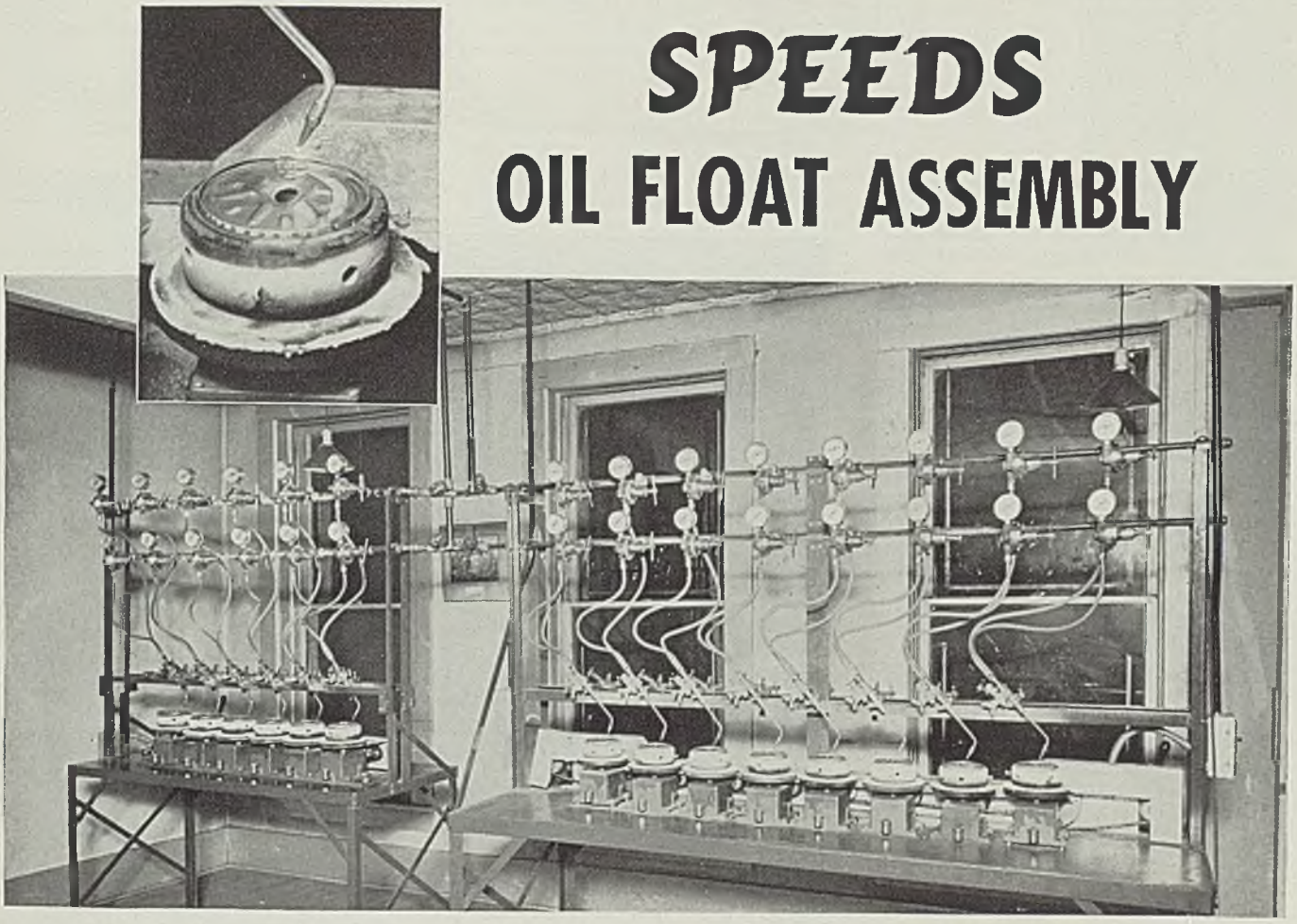


Upper, completed switching locomotive utilizing De La Vergne diesel engine with frame of welded steel as described here

Lower, diesel engine completed ready for installation in locomotive

AIRCO

PRODUCTION WELDING SPEEDS OIL FLOAT ASSEMBLY



Skimming the "cream" from the crankcase oil to assure clean, viscous oil is the job being done by the Taylor Float-O-Oil suction intake. Speed plus permanent tightness are two "musts" in the assembly of this oil float.

Airco production welding proved to be the best method of attaining these essentials. Using this economical Airco oxyacetylene process, the thin pressed steel body and cover of the oil float are welded together with a "standing seam." Then, a brass pipe gooseneck is joined to the steel body at the side and to the cover plate. The result — a light, permanently tight, speedily assembled float which rides on the oil's surface, rising and falling as the oil level changes.

This is another example of how Airco customers are continually benefiting by using economical Airco Oxygen, guaranteed to be 99.5% pure (it exceeds U.S.P. requirements), Airco Acetylene, Airco Welding Apparatus and the assistance of Airco's Applied Engineering Department. Airco engineers will be glad to send our experienced adviser to help you solve any problem involving the use of the oxyacetylene process. Write for full details.

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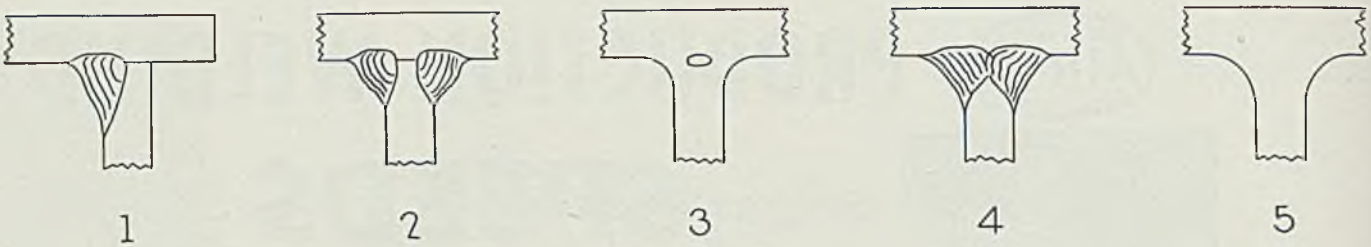
General Offices: 60 EAST 42nd ST., NEW YORK, N.Y., DISTRICT OFFICES IN PRINCIPAL CITIES

AIRCO *Anything and Everything for* GAS WELDING or CUTTING and ARC WELDING WILSON

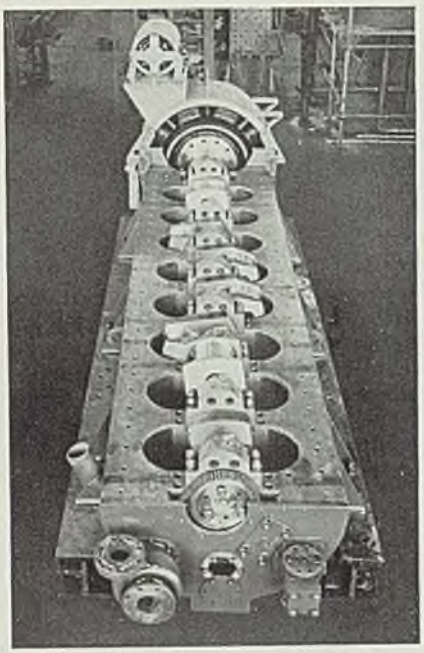


plied such as power takeoffs, etc. In addition, the ample strength of the welded steel frame gives certain design advantages. Where thin steel walls might result in drumming effects, the thick walls used here give no difficulty from this source.

Steel frame construction employed for De La Vergne diesel engines consists roughly of a box section with cross members between each cylinder, the frame structure forming in one piece the cylinder housings and upper part of the crankcase, with a second piece forming the lower portion of the crankcase.

Certain portions of the cross members, such as the camshaft block which necessitate complicated structures, are made as steel castings. These are welded to the mild steel plates and other frame sections. Cross members themselves are made from heavy mild steel plate with sections cut out with the oxyacetylene torch to permit placement of metal exactly where desired by the designer.

Bedplate is of mild steel and carries the heavy transverse webs which support the main bearings. One bearing is furnished between each cylinder, and there may be from three to eight cylinders to an engine. In any case, the structure is the same except it is extended for the additional cylinders, with of course additional bearings, cross members, webs and blocks. A flange is provided on the end for a direct-mounted electric generator. Drop forgings are being consid-



Main frame of diesel, welded from steel plate with steel castings at certain points. Unit here is ready to receive cylinder heads

Portion of engine frame below shaft line. Unit almost entirely of welded steel. Here direct connected electric generator and exciter have been already mounted

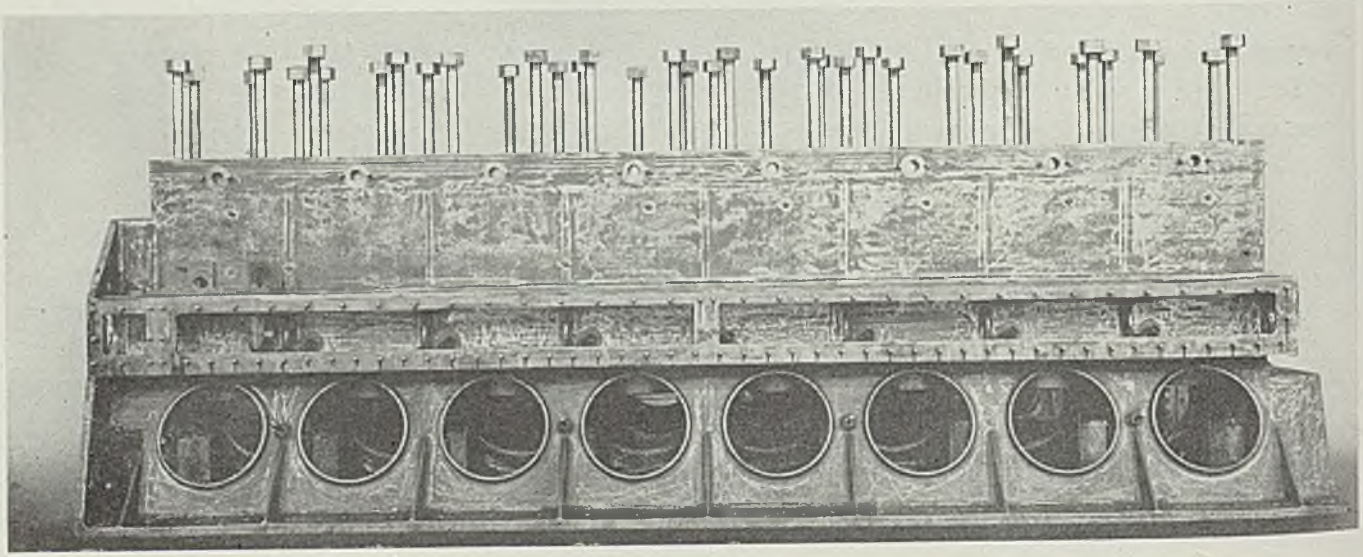
ered for use in portions of the frame as their characteristics permit certain design advantages.

Most welds used in the frame are standard T-butt type illustrated in accompanying diagrams. In each case the plain fillet weld illustrated in Figs. 1 and 2 is carefully avoided as it is impossible to eliminate an unfused section near the center which gives the effect of the noncontinuous metal design shown in Fig. 3. With such a condition, stresses through the joint are not uniform and fatigue cracks may start easily at the unfused center portion with early failure of the joint as a result.

For this reason, all joints utilize the design shown in Fig. 4 where the abutting section does not quite touch the top section of the T-joint, leaving room for complete fusion of base and weld metal. After weld is completed from one side, metal is chipped out from the other side at back of the first weld and then the fillet weld deposited on that side to give the effect of a solid continuous metal joint as diagrammed in Fig. 5. This construction avoids any discontinuities in the joint, assures proper and uniform distribution of stress from one member to another and gives a joint the strength of which can be calculated accurately in laying out the design.

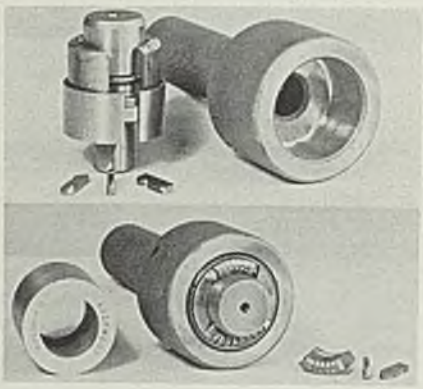
Prior to welding, plates are flame cut to shape with joint edges carefully machined to the exact contour desired. This helps provide maxi-

(*Please turn to Page* 79)



Marking Device

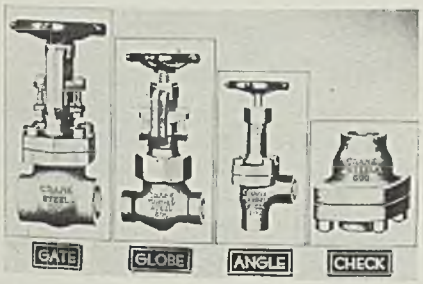
■ New Method Steel Stamp Co., 143 Jos. Campau street, Detroit, has introduced a new marking device for marking of such annular parts as gears, bushings and bearings in quantity production. Its type holder consists of a central flanged



shaft, annular anvil disk, snap ring for locating the type during assembly through grooves cut in the type and an outer spring-steel split sleeve which holds type in place. Entire assembly is carried with a slip fit in the type holder body. To change type a set-stud is unscrewed permitting removal of inner assembly from the type holder body. The split sleeve is spread and slipped downward. To mark a part, the holder is merely placed on or against the part with the shaft in the bore of the piece. The end of the holder is then given a sharp blow with a hammer.

Small Steel Valves

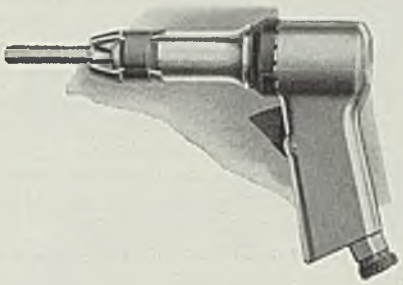
■ Crane Co., 836 South Michigan avenue, Chicago, has introduced a new line of small steel valves for power piping on services up to 600 pounds steam. This line includes gages, globes, angles and checks, in



sizes ¼ to 2-inch inclusive. Gate valves of cast steel are available with O. S. & Y. construction, having union bonnet type in screwed ends in sizes ¼ to ¾-inch inclusive, and bolted bonnet with screwed, socket weld, and flanged ends in sizes ½ to 2-inch inclusive. Globe and angle valves of forged steel may be had in two types, inside screw and O. S. Y. construction. Inside screw valves may have screwed ends with union bonnet in sizes ¼ to ¾-inch inclusive and bolted bonnet in sizes 1 to 2-inch inclusive. O. S. & Y. valves have screwed ends with union bonnet in size ¼ to ¾-inch inclusive, and screwed socket weld and flanged ends with bolted bonnet in sizes ½ to 2-inch inclusive. The check valves also are made in two types. The horizontal pattern is forged steel with union cap and screwed ends in sizes ¼ to ¾-inch inclusive, and with bolted cap and screwed, socket weld, and flanged ends in sizes ½ to 2-inch inclusive. The vertical ball pattern is cast steel with bolted joint and screwed ends in sizes ½ to 2-inch inclusive.

Riveting Hammer

■ Ingersoll-Rand Co., Phillipsburg, N. J., announces light-weight air-operated riveting hammer for use in



fabrication of iron, steel and aluminum products. It is known as model AV and is available in two types, one a short-stroke, fast-hitting model for ordinary use, and the other a long-stroke, slow-hitting machine primarily for aluminum, dural or soft iron rivets. Both types can be furnished with either a pistol grip, an offset or a pushbutton handle.

Portable Printer

■ Ozalid Corp., Johnson City, N. Y., announces a new Elpro portable printer which will reproduce engineering drawings, letters, reports and maps appearing on one side of a reasonably translucent sheet. Light source consists of six lamps. Case is finished in gunmetal, and a highly polished aluminum reflector assures uniform light distribution over printing surface. Feature of unit is a dry developing chamber located behind the metal reflector. This utilizes heat generated by the lights to vaporize the developing

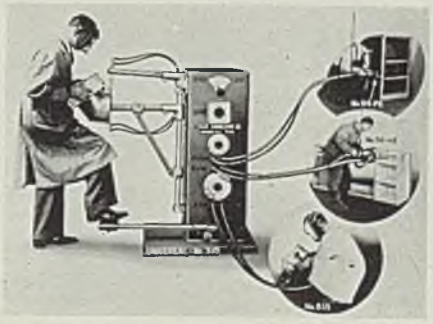
agent. Time switch allows operator to regulate the length of exposure automatically.

Flexible Couplings

■ Ajax Flexible Coupling Co., Westfield, N. Y., has introduced two forged steel flexible couplings with 1⅛ and 1⅝-inch maximum bores for heavy duty service. Flanges are forged from SAE No. 1020 steel. Couplings are built on the same principle as larger sizes. Rubber bushings and graphite bronze bearings provide resilient flexibility, positive drive, free end float, and eliminate noise, backlash and lubrication problems.

Spot Welding Machine

■ Eisler Engineering Co., Newark, N. J., has developed spot welding machine No. 310. It is similar to a standard 10 KVA spot welder having sliding horns for all kinds of sheet



metal work. Besides spot welding, machine features push welding, gun welding and arc welding. When used as a spot welder, it is foot operated. It is hand operated as a push spot welder and air operated as a gun welder. Equipment is made for 25, 40, 50, 60 cycles, with

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Pickling, Ventilation

(*Concluded from Page 68*)

balance the entire hood itself so that it can be swung horizontally or vertically out of the way. When the hood is over 6 feet long, one duct at the apex is not sufficient. Two or more pipe openings should be used spaced not over 6 feet apart nor more than 3 feet from either end of the hood. The hood should be as deep as possible, and if there is enough overhead room, and it is rectangular in shape, the depth should be at least 40 per cent of its shortest side.

The volume of air exhausted should be from 200 to 250 cubic feet per minute per square foot of tank surface. However, if there is an enclosure on two sides this figure may be reduced to 150 to 200 cubic feet per minute, and with three sides enclosed 100 to 150 cubic feet per minute should be satisfactory. The air velocity at the hood entrance may vary from 50 to 300 feet per minute according to requirements but under average conditions is about 100 feet per minute with a duct velocity of 2000 feet per minute. Cross sectional area of the duct should be from 1/10 to 1/15 of the cross sectional area of the hood entrance.

Frequently hot vapors roll down sides of the hood due to chilling effect of the metal and escape around the rim. The same thing may also happen due to cross currents of air. Double hoods are frequently used to prevent this escape of vapors into the work room as shown in Figs. 3 and 4. This additional interior hood is more expensive to construct but it is much more effective because of the high velocity of the air entering the gap between the perimeters of the two hoods. This gap should be about 6 inches wide and the rim of the inner hood should be about 2 inches above the rim of the outer hood. The installation will be still more effective if it is designed so that about half of the exhausted air will enter around the rim gap and the balance through a hole in the apex of the inner hood as shown in Fig. 4.

In many plants the work is handled by means of overhead devices which frequently prohibit the use of hoods. There are mechanical exhaust systems available for problems of this sort. Fig. 5 illustrates the use of a slotted duct located between two tanks. There are three slots on each side, each 2 inches high and 5 inches apart. The fans provide a slot velocity of 200 feet per minute and 240 cubic feet per minute per square foot of liquid surface.

Keeps the Floor Dry

Another installation in which horizontal vapor removal is also used is shown in Fig. 6. In this case a slotted duct is located on each side of a single tank. The volume of air to be removed should be from 200 to 300 cubic feet per minute per square foot of liquid surface and the air velocity at the slots should be from 1500 to 2000 feet per minute. The solution should be kept from 6 to 8 inches below the top of the tank. This system with ducts on two sides is effective for tanks up to 36 inches wide. With ducts on four sides it may be effective up to 44 inches and beyond that width a push and pull system is necessary with the supply furnished by one duct and the exhaust by the other.

A more efficient supply and exhaust system is shown in Fig. 7. A row of tanks is set flush with the wall. The work is moved by the monorail crane shown above the tanks. The exhaust hood is placed 12 feet above the tanks and extends 15 inches out from the wall. A fan connected to this hood removes about 30 cubic feet per minute per square foot of liquid surface. Air heated to 140 degrees Fahr. to prevent cooling of the solution is supplied through nozzles over the surface of the tank. Approximately 20 cubic feet per minute per square foot of surface is supplied by these air jets. An additional air supply heated to 110 degrees Fahr. is introduced into the room near the floor. This air volume is slightly more than enough to make up for the excess of air exhausted over that supplied to the tanks and is necessary to overcome infiltration. It also serves the additional purpose of keeping the floor dry.

Push-pull systems of this sort are efficient because they do not require the large volumes of exhausted air necessary in straight exhaust systems.

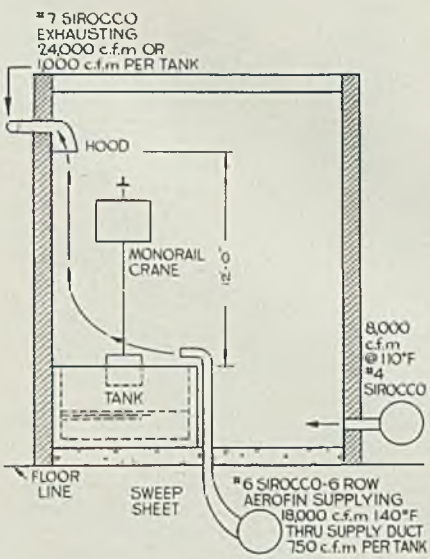


Fig. 7—Efficient supply and exhaust system which serves to keep floor dry

Hoods, ducts, fans and housings should be constructed of acid-resisting materials such as special alloys, cypress or concrete. Lead or rubber coated steel may also be used. Even black iron which has been given two coats of asphaltum paint and then repainted annually, will usually last about five years.

In exhausting acid vapors out of doors it should be remembered that the outlet should be located at a point where the vapors cannot readily re-enter the premises nor create a public nuisance. A reputable ventilating engineer should always be consulted in regard to the design and installation of a mechanical exhaust system.

Respiratory protective devices should never be considered as a substitute for effective ventilation in pickle rooms. There are no ordinary circumstances when the use of such devices should be necessary. The bureau of mines, however, has approved several mechanical filter respirators for use in Type C acid mists.

Other control measures which may be effective and deserve consideratioin are rubber gloves, boots and aprons, protective skin creams, curative skin creams or lotions, change of working clothes, adequate washing facilities and good housekeeping.

♦

Offers New Alkali and Acid Resistant Coating

■ B. F. Goodrich Co., Akron, O., has developed odorless Acidseal protective coatings for metal, concrete, stone, plaster or wood. They make a strong adhesion, are corrosion resistant and have elastic properties. Their base substance is derived from rubber.

Coatings dry by evaporation and resist action of acids, alkalies, salt spray and moisture. Their covering capacity is 300 to 400 square feet per gallon.

Metal Joiner Fuses With Low Heat

■ By use of Colaweld Metaljoiner, developed by Colonial Alloys Co., Colonial Philadelphia building, Philadelphia, the joining of aluminum or aluminum alloys to each other or to other metals is now an easy and fast operation. The joint produced has a high tensile strength and has good ductility.

Application is simple and consists of applying Metaljoiner on the metals to be joined either in powder or paste form and then applying heat. As only low heat is required, it may be applied by flame, hot air or oven.

A.S.T.M. Program

(*Concluded from Page 52*)

"Bursting Tests and Tension Tests for Lead Cable Sheathing," by H. F. Moore, C. W. Dollins and W. J. Craig, University of Illinois.

"Testing of Lead Cable Coverings," by W. H. Bassett Jr. and C. J. Snyder, Anaconda Wire & Cable Co.

AFTERNOON

Nonferrous Metals

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

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

"Anodic Coatings Seen Through the Microscope," by F. Keller, Aluminum Co. of America.

"Thickness of Anodic Coatings on Aluminum," by Junius D. Edwards, Aluminum Co. of America.

"Abrasion Resistance of Anodically Oxidized Coatings on Aluminum," by H. G. Arlt, Bell Telephone Laboratories Inc.

"Electrical Breakdown of Anodically Oxidized Coatings on Aluminum: A Means of Checking Thickness of Anodized Finishes," by K. G. Compton and A. Mendizza, Bell Telephone Laboratories Inc.

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

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

"Creep of Aluminum Subjected to Bending at Normal Temperatures," by Joseph Marin and L. E. Zwissler, Armour Institute of Technology.

♦

Blaw-Knox To Supply Bulk Plants for Gases

■ Purchase savings and handling economy for users of liquefied gases are objectives of the development by Blaw-Knox Co., Grant building, Pittsburgh, of a complete line of bulk plants for the unloading and storage of the gases.

The company reports that in most cases the price spread between cost of gases in cylinders and in tank car lots is sufficient to amortize the cost of a good bulk handling and unloading plant in six months to five years. It now is organized to design and fabricate, and, if desired, erect and place in operation complete unloading and storage plants for any of the commonly used liquefied gases.

♦

Foundry Research

(*Concluded from Page 60*)

that proper measure may be taken to restore them to health. Cost of insurance is reduced by establishment and maintenance of safety practices, and good housekeeping is important. The foundryman should always keep in mind the fact that men establishing insurance rates are laymen as far as the foundry is concerned, and act accordingly.

Even though safety and hygiene have made considerable strides in the foundry field in recent years, there still exists a great opportunity for improving conditions. In the discussion, Dr. Kronenberg, Illinois Industrial commission, said he rated good housekeeping as 65 to 70 per cent of a safety and hygiene program. Warren Cook said that it was a revelation to many that a foundry could be kept clean, and that safety and hygiene could be developed to such a high efficiency. He also stressed the fact that while the silicotic may not be disabled, there is the possibility of tuberculosis complication, and therefore, it is advisable to reduce dust conditions to the lowest possible point.

♦

Youngstown To Rebuild Campbell "C" Furnace

■ Youngstown Sheet & Tube Co., Youngstown, O., will rebuild "C" blast furnace at the Campbell works. Furnace is about 30 years old. It will be rebuilt by the William B. Pollock Co., Youngstown, O., which has ordered about 1135 tons of metal for the job.

New Equipment

(*Concluded from Page 75*)

any voltage. Machine is supplied with individual controls so each operation can be performed without interfering with the other.

Soldering Irons

■ Hexacon Electric Co., Roselle Park, N. J., announces a new electric soldering iron of larger capacity for extra heavy soldering jobs. Its element is housed in a damage and dent-proof hexagon barrel of solid steel. It is protected from all mechanical injury and the element core cannot come loose or turn in the outer housing. The iron is equipped with an extra flexible twine braid cord.

Breaker Panelboards

■ Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., announces No-fuze de-ion circuit breaker panelboards for use where air is filled with chemical or acid vapors. Panelboards are suitable for both indoor and outdoor mounting, and the new thermal-trip breaker insures constant tripping regardless of temperature change. They are constructed with 6, 12 or 24 branch poles with a main bus capacity of 50 to 400 amperes. Board consists of a cast iron head to which is suspended the panel proper and the removable sheet steel tank. Breakers are mounted on a micarta panel suspended by a frame from the head.

Outdoor Switch

■ Square D Co., 6060 Rivard street, Detroit, announces design change in its outdoor 60-ampere switch. Device is for 3-wire 115/230 volts alternating current service, with a grounded neutral. Base is of strong, light-weight bakelite. Pullout has On and Off positions clearly indicated, and enclosure is fabricated from galvannealed steel, with aluminum finish. A hold up feature on the cover allows it to be held in open position while wiring or inspecting switch. A metal trim makes the switch dead front so that no live parts are exposed.

Fluorescent Luminaire

■ General Electric Co., Nela Park, Cleveland, announces a new 2-tube RF fluorescent luminaire for industrial areas. It consists of a self-contained auxiliary mounted on a porcelain enamel reflector. Rated at 200 watts, it operates two 85-watt tubes each 58 inches long. These have a combined initial rating of over 8000 lumens.

Lamps are available in two different colors, the original blue-white tube and a new white lamp. The latter is for needs in industry where color is the prime factor. It is interchangeable with blue-white tube on all Cooper Hewitt fluorescent lamps now in service.

Stringing Loops Added To Strain Clamps

■ Ohio Brass Co., Mansfield, O., has added a stringing loop under the nose of three of its strain clamps to simplify the job of dead-ending conductors. This loop makes it possible to attach the blocks for securing proper conductor tension directly in the clamp.

However, when the tail block is hooked in the new loop and the conductor is brought to tension, the entire dead-end assembly assumes a position that is practically a continuation of the conductor. The loop is an integral part of the clamp body casting and has ample strength for any tensions to which it may be subjected. The three clamps have conductor ranges without liners of 0.400-0.680, 0.675-0.800 and 0.790-0.930-inch, respectively.

Diesel Engine Frames

(*Concluded from Page 74*)

mum efficiency of the welded joint.

Cross webs or cross members are subassemblies made with all welds in downhand position. In fact, welds throughout the entire frame are positioned carefully so the arc welds can be made in a downhand position at all important points.

Prior to finish welding, parts are joined together using jigs and tack welding to position them correctly. Jigs are available in which the entire engine frame may be rotated as desired.

One of the most important things learned in connection with welding these frames is the value of proper jigs. Result is more and more jigs are being used all the time.

Welding Sequence Calculated

Sequence of welding is carefully worked out for least warpage. Method of assembly found to work out best here is an upside-down method where the top plate, 3½ inches thick, is laid down with a jig assembly holding cross webs and various other members to the top plate for welding. This is followed by welding of front and back longitudinal plates which are first tack welded and then finish welded complete. This is followed by welding on the bottom plate last.

While the assembly could be welded from the bottom up, welding the assembly in an upside-down position appears the easiest way to handle the various parts and to work out the jig assemblies. All cross webs, of course, are subassemblies completely welded before being placed into the main assembly. Cross members are the same regardless of whether a 3-cylinder or an 8-cylinder engine frame is being assembled. The only thing that changes is the front, back, top and bottom plates which, of course, are extended for the engines using additional cylinders.

The complete welded assembly is stress relieved at a temperature from 1100 to 1200 degrees Fahr. for a period of time equal to about 1 hour per inch of thickness of metal involved. After this period, the frame is left in the furnace to cool to a temperature of 250 degrees Fahr., from which point on it is cooled in air. Subassemblies are not stress relieved separately but simultaneously as part of the completed frame.

All the welding is done by the electric arc method, using heavily coated electrodes. The accompanying illustrations show a typical frame structure and also a completely assembled engine.

Self-Lubricating Wire Seen as Possibility

■ A possibility of producing wire with a surface-impregnation of dry lubricant for use in applications where lubricant will prevent binding, sticking and wear is forecast as the result of a discovery made by Acheson Colloids Corp., Port Huron, Mich.

The discovery was made in connection with the production of wire in which presence of such a lubricating surface was actually undesirable.

In the past it has been customary to use colloidal graphite as a lubricant for drawing of fine wire similar to that used for tungsten filaments. In attempting to apply the same principle in stainless steel wire, it was discovered that the graphitic coating could not be removed by normal methods.

Investigation disclosed that movement of the wire through drawing dies, and the pressures involved in its passage through the dies, had created what is known as a "graphoid" surface on the wire. That is, the colloidal graphite particles had been intimately combined with the metal in the surface of the wire.

Die-Casting Plant

(*Concluded from Page 71*)

the Alemite plant. Here the emery cloth belt, instead of running over a solid pulley at both ends, has a soft buff substituted for one pulley at the end where the grinding is done. The buff supports the belt which is held under tension by a counterweight acting on the spindle for the solid pulley much as a solid pulley would do. At the same time, the buff provides a yielding surface which permits the belt to flex and accommodate itself to the shape of the casting being ground.

This is quite different in character than working with a relatively solid grinding wheel which is substantially unyielding. The use of belts also has been found to result in economies as compared with ordinary polishing wheels, although the latter are still used where rigid wheels are desired. Many of the belt grinders are arranged along the polishing line. After the polishing is completed, the castings then are conveniently passed along to buffing wheels, most of which are used in the conventional way.

There are, however, some straight-line buffing machines in which castings required in largest quantities are carried forward in holding fixtures by a chain along a track. Castings pass successively under buffing wheels set at different angles to reach all or as many of the surfaces of the casting as it is feasible to buff in a straight line setup.

Certain castings are circular or have surfaces of rotation. These lend themselves to buffing on a rotating arbor or holder. They are loaded on a form of Acme head having a pair of such holders arranged so one rotates the casting slowly against the buff while the other is stationary and is being loaded. Then the second is swung into contact with the buff and the first is unloaded and another casting set in place.

Naturally, polishing and buffing operations are laid out so work progresses from station to station with the general flow toward the plating department, much of it on the belt conveyor. As there are too many machines for all to be placed adjacent to the belt, however, many steps are saved by handling some parts in tote boxes.

Scratching is avoided by using corrugated board or other separators to prevent castings from rubbing against each other. Boxes filled with buffed castings are carried by wheel trucks to a point where they are inspected and enter the plating department.

Develops Core Oil From Soy Beans

■ One of the latest contributions from agriculture to industry is Soyol, a core oil developed by Velsicol Corp., 3512 North Kimball avenue, Chicago. Made from soy beans, it is especially suited for foundry work. Besides being quick baking, it will stand much over-baking. It works freely in the core boxes without sticking, gives the maximum strength and does not deteriorate the molding sand.

Wire Strapping

(*Concluded from Page 71*)

in six to seven different places around the bundle. A wire strapping machine tensions these wire binders tightly so no slippage can occur, then ties and cuts the wire in one operation and by one tool to leave a smooth knot as an integral part of the wire strap.

Wire strapping fire brick like this permits six to eight times as many brick to be handled as a unit, lowers amount of lumber used, decreases shipping costs

Reduced weight in transportation cuts rail and water rates and the wire-bundled road scraper takes up much less stowage space in the steamer hold. Both less space and lower weight make for additional savings. These savings have been so successful that this method of wire strapping is being used quite universally in many objects.

Fire brick previously were shipped in wood boxes containing only about one-sixth to one-eighth the bricks it is possible to package by this newer method. Now the brick are wrapped in heavy paper, placed on a skid, crated and wire strapped as shown in accompanying illustration. The savings by this shipment are considerable, not only in shipping weight but in a smaller amount of lumber used with decreased lumber thickness.

Steel Bar Deliveries Made in Canvas Bags

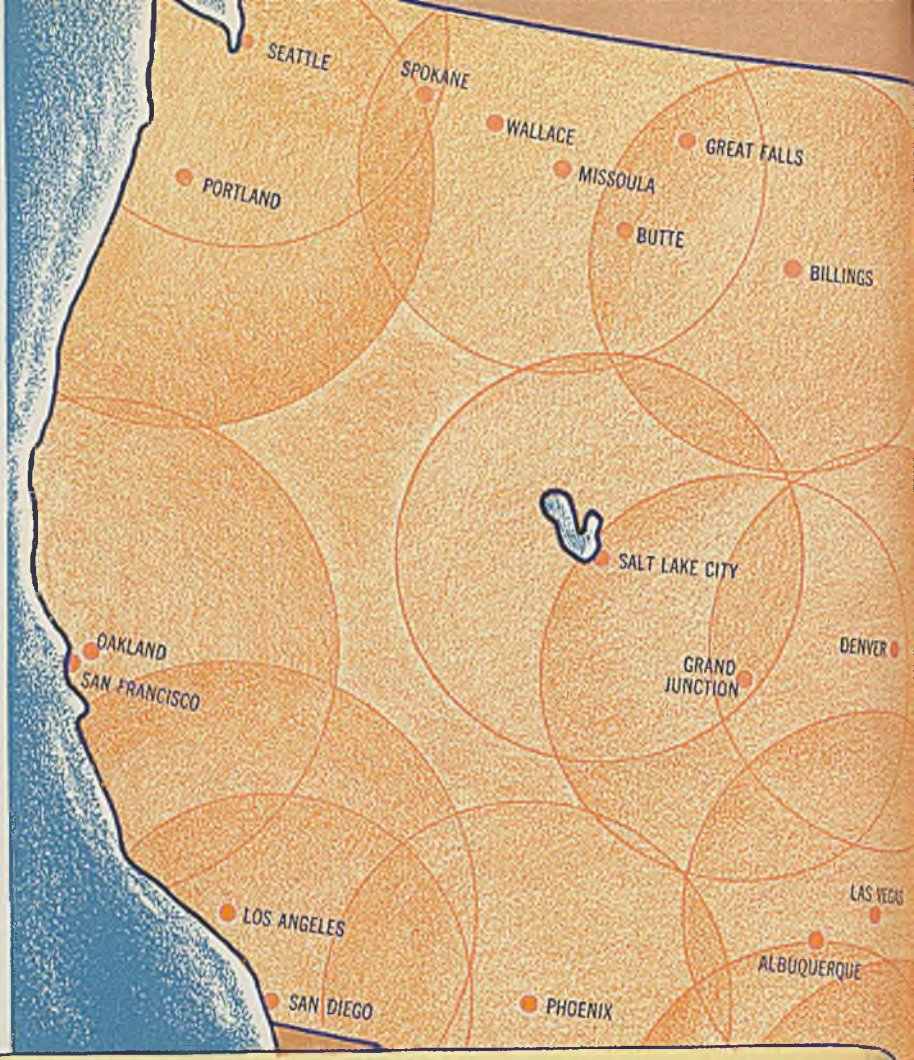
■ Special-made canvas bags are used by Allegheny Ludlum Steel Corp.'s new warehouse, 36 Berry street, San Francisco, to deliver highly polished steel bars in good condition to customers. This insures delivery of each bar with finish unmarred or even finger marked. At the time of delivery, bars are slipped out of the bags and the latter returned for reuse.

To Any Industrial Area in the United States

The American Brass Company makes every effort to furnish Anaconda Copper, Brass and Bronze to your exact requirements—in composition, temper, gauge, size, finish and working qualities—and, equally important, to have these materials readily available where and when needed. • Seven manufacturing plants and well-stocked warehouses in principal industrial centers cooperate closely with Anaconda Distributors to supply these metals in commercial form to any part of the country—usually within a few hours; at most, overnight.

ANACONDA
from mine to consumer

Anaconda Copper, Brass & Bronze



from These Strategic Points ANACONDA DISTRIBUTORS Serve the Nation's Needs for Copper, Brass and Bronze

ANACONDA DISTRIBUTORS
Are Ever Ready to Serve You

Located in practically every industrial center throughout the Nation, Distributors of Anaconda Metals are constantly alert to your needs and have adapted their stocks to the particular requirements of the areas and industries they serve.

THEY STOCK A WIDE RANGE OF METALS
for Immediate Delivery

Adequate stocks of Copper, Brass and Bronze are maintained for your occasional or emergency order, or for your regular source of supply—strip, roll, sheet, plate, wire, rods, bars, pipe, and seamless tubes—in the commonly used sizes, tempers and finishes.

MILLS AND WAREHOUSES
Supplement Distributors' Stocks

To maintain this complete service, Distributors' stocks are supplemented with stocks at the Company's warehouses in Chicago, Cleveland, Milwaukee, Philadelphia, Providence and Houston—and with mill stocks at the Company's manufacturing plants at Buffalo; Detroit; Kenosha, Wis.; and Torrington, Ansonia and Waterbury, Conn.

. . . AND THOSE SPECIAL ITEMS?

While Anaconda Distributors stock the standard co mercial alloys in sizes to fill the majority of industrial quirements, there are, nevertheless, those urgent calls special items. Here too, your Anaconda Distributor is b ter able to serve you by arranging prompt shipment fr the warehouse, mill, or other source of supply nearest y

COMPOSITE MARKET AVERAGES

	May 18	May 11	May 4	One Month Ago Apr., 1940	Three Months Ago Feb., 1940	One Year Ago May, 1939	Five Years Ago May, 1935
Iron and Steel	$37.40	$37.25	$37.17	$36.69	$37.21	$35.80	$32.35
Finished Steel	56.60	56.60	56.60	55.90	56.50	56.00	54.00
Steelworks Scrap..	17.62	16.83	16.08	16.00	16.98	14.05	10.27

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

COMPARISON OF PRICES

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

Finished Material

	May 18, 1940	April 1940	Feb. 1940	May 1939
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.20c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.52
Iron bars, Chicago	2.25	2.25	2.30	2.10
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.00	2.10	2.05
Sheets, cold-rolled, Pittsburgh	3.05	2.95	3.05	3.10
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	1.95	2.10	2.03
Sheets, cold-rolled, Gary	3.05	2.90	3.05	3.08
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.60
Tin plate, per base box, Pitts.	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.45

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods, No. 5 to 9/32-inch, Pitts.	2.00	2.00	2.00	1.92

Pig Iron

	May 18, 1940	April 1940	Feb. 1940	May 1939
Bessemer, del. Pittsburgh	$24.34	$24.34	$24.34	$22.34
Basic, Valley	22.50	22.50	22.50	20.50
Basic, eastern, del. Philadelphia	24.34	24.34	24.34	22.34
No. 2 foundry, Pittsburgh	24.21	24.21	24.21	22.21
No. 2 foundry, Chicago	23.00	23.00	23.00	21.00
Southern No. 2, Birmingham	19.38	19.38	19.38	17.38
Southern No. 2, del. Cincinnati	22.89	22.89	22.89	20.89
No. 2X, del. Phila. (differ av.)	25.215	25.215	25.215	23.215
Malleable, Valley	23.00	23.00	23.00	21.00
Malleable, Chicago	23.00	23.00	23.00	21.00
Lake Sup., charcoal, del. Chicago	30.34	30.34	30.34	28.34
Gray forge, del. Pittsburgh	23.17	23.17	23.17	21.17
Ferromanganese, del. Pittsburgh	105.33	105.33	105.33	85.33

Scrap

Heavy melt. steel, Pitts.	$18.75	$16.45	$17.75	$14.55
Heavy melt. steel No. 2, E. Pa.	16.00	15.50	16.30	12.75
Heavy melting steel, Chicago	17.25	15.20	15.75	12.75
Rails for rolling, Chicago	21.25	18.65	18.25	17.25
Railroad steel specialties, Chicago	20.25	18.05	18.50	14.75

Coke

Connellsville, furnace, ovens	$4.75	$ 4.75	$ 4.75	$ 3.75
Connellsville, foundry, ovens	5.75	5.75	5.75	5.00
Chicago, by-product fdry., del.	11.25	11.25	11.25	10.50

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

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

Sheet Steel

Hot Rolled

Pittsburgh	2.10c
Chicago, Gary	2.10c
Cleveland	2.10c
Detroit, del.	2.20c
Buffalo	2.10c
Sparrows Point, Md.	2.10c
New York, del.	2.34c
Philadelphia, del.	2.27c
Granite City, Ill.	2.20c
Middletown, O.	2.10c
Youngstown, O.	2.10c
Birmingham	2.10c
Pacific Coast ports	2.65c

Cold Rolled

Pittsburgh	3.05c
Chicago, Gary	3.05c
Buffalo	3.05c
Cleveland	3.05c
Detroit, delivered	3.15c
Philadelphia, del.	3.37c
New York, del.	3.39c
Granite City, Ill.	3.15c
Middletown, O.	3.05c
Youngstown, O.	3.05c
Pacific Coast ports	3.70c

Galvanized No. 24

Pittsburgh	3.50c
Chicago, Gary	3.50c
Buffalo	3.50c
Sparrows Point, Md.	3.50c
Philadelphia, del.	3.67c
New York, delivered	3.74c
Birmingham	3.50c
Granite City, Ill.	3.60c
Middletown, O.	3.50c
Youngstown, O.	3.50c
Pacific Coast ports	4.05c

Black Plate, No. 29 and Lighter

Pittsburgh	3.05c
Chicago, Gary	3.05c
Granite City, Ill.	3.15c

Long Ternes No. 24 Unassorted

Pittsburgh, Gary	3.80c
Pacific Coast	4.55c

Enameling Sheets

	No. 10	No. 20
Pittsburgh	2.75c	3.35c
Chicago, Gary	2.75c	3.35c
Granite City, Ill.	2.85c	3.45c
Youngstown, O.	2.75c	3.35c
Cleveland	2.75c	3.35c
Middletown, O.	2.75c	3.35c
Pacific Coast	3.40c	4.00c

Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.

Chrome-Nickel

	No. 302	No. 304
Bars	24.00	25.00
Plates	27.00	29.00
Sheets	34.00	36.00
Hot strip	21.50	23.50
Cold strip	28.00	30.00

Straight Chromes

	No. 410	No. 430	No. 442	No. 446
Bars	18.50	19.00	22.50	27.50
Plates	21.50	22.00	25.50	30 50
Sheets	26.50	29.00	32.50	36.50
Hot strip	17.00	17.50	24.00	35.00
Cold stp.	22.00	22.50	32.00	52.00

Steel Plate

Pittsburgh	2.10c
New York, del.	2.29c
Philadelphia, del.	2.15c
Boston, delivered	2.46c
Buffalo, delivered	2.33c
Chicago or Gary	2.10c
Cleveland	2.10c
Birmingham	2.10c
Coatesville, Pa.	2.10c
Sparrows Point, Md.	2.10c
Claymont, Del.	2.10c
Youngstown	2.10c
Gulf ports	2.45c
Pacific Coast ports	2.65c

Steel Floor Plates

Pittsburgh	3.35c
Chicago	3.35c
Gulf ports	3.70c
Pacific Coast ports	4.00c

Structural Shapes

Pittsburgh	2.10c
Philadelphia, del.	2.21½c
New York, del.	2.27c
Boston, delivered	2.41c
Bethlehem	2.10c
Chicago	2.10c
Cleveland, del.	2.30c
Buffalo	2.10c
Gulf ports	2.45c
Birmingham	2.10c
St. Louis, del.	2.34c
Pacific Coast ports	2.70c

Tin and Terne Plate

Tin Plate, Coke (base box)

Pittsburgh, Gary, Chicago	$5.00
Granite City, Ill.	5.10

Mfg. Terne Plate (base box)

Pittsburgh, Gary, Chicago	$4.30
Granite City, Ill.	4.40

Bars

Soft Steel

(Base, 20 tons or over)

Pittsburgh	2.15c
Chicago or Gary	2.15c
Duluth	2.25c
Birmingham	2.15c
Cleveland	2.15c
Buffalo	2.15c
Detroit, delivered	2.25c
Philadelphia, del.	2.47c
Boston, delivered	2.52c
New York, del.	2.49c
Gulf ports	2.50c
Pacific Coast ports	2.80c

Rail Steel

(Base, 5 tons or over)

Pittsburgh	2.05c
Chicago or Gary	2.05c
Detroit, delivered	2.15c
Cleveland	2.05c

Buffalo	2.05c
Birmingham	2.05c
Gulf ports	2.40c
Pacific Coast ports	2.70c

Iron

Chicago	2.25c
Philadelphia, del.	2.37c
Pittsburgh, refined	3.50-3.00c
Terre Haute, Ind.	2.15c

Reinforcing

New Billet Bars, Base

Chicago, Gary, Buffalo, Cleve., Birm., Young., Sparrows Pt., Pitts.	1.60-1.90c
Gulf ports	1.95-2.25c
Pacific Coast ports	2.00-2.30c

Rail Steel Bars, Base

Pittsburgh, Gary Chicago, Buffalo, Cleveland, Birm.	1.60-1.90c
Gulf ports	1.95-2.25c
Pacific Coast ports	2.00-2.30c

The above represent average going prices. Last quotations announced by producers were 2.15c, mill base, for billet bars and 2.00c for rail steel.

Wire Products

Pitts-Cleve.-Chicago-Birm. base per 100 lb. keg in carloads

Standard and cement coated wire nails	$2.55
(Per pound)	
Polished fence staples	2.55c
Annealed fence wire	3.05c
Galv. fence wire	3.40c
Woven wire fencing (base C. L. column)	67
Single loop bale tie, (base C.L. column)	56
Galv. barbed wire, 80-rod spools, base column	70
Twisted barbless wire, column	70

To Manufacturing Trade

Base, Pitts. - Cleve. - Chicago-Birmingham (except spring wire)

Bright bess., basic wire	2.60c
Galvanized wire	2.60c
Spring wire	3.20c

Worcester, Mass., $2 higher on bright basic and spring wire.

Cut Nails

Carload, Pittsburgh, keg..$3.85

Cold-Finished Bars

	Carbon	Alloy
Pittsburgh	2.65c	3.35c
Chicago	2.65c	3.35c
Gary, Ind.	2.65c	3.35c
Detroit	2.70c	*3.45c
Cleveland	2.65c	3.35c
Buffalo	2.65c	3.35c

* Delivered.

Alloy Bars (Hot)

(Base, 20 tons or over)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem	2.70c
Detroit, delivered	2.80c

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 flats	0.15
6100 bars	1.20
6100 spring flats	0.85
Cr. N., Van.	1.50
Carbon Van.	0.85
9200 spring flats	0.15
9200 spring rounds, squares	0.40

Electric furnace up 50 cents.

Strip and Hoops

(Base, hot strip, 1 ton or over; cold, 3 tons or over)

Hot Strip, 12-inch and less

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, Birmingham	2.10c
Detroit, del.	2.20c
Philadelphia, del.	2.42c
New York, del.	2.46c
Pacific Coast ports	2.75c
Cooperage hoop, Young., Pitts.; Chicago, Birm.	2.20c
Cold strip, 0.25 carbon and under, Pittsburgh, Cleveland, Youngstown	2.80c
Chicago	2.90c
Detroit, del.	2.90c
Worcester, Mass.	3.00c

Carbon	Cleve., Pitts.
0.26—0.50	2.80c
0.51—0.75	4.30c
0.76—1.00	6.15c
Over 1.00	8.35c

Worcester, Mass. $4 higher.

Commodity Cold-Rolled Strip

Pitts.-Cleve.-Youngstown	2.95c
Chicago	3.05c
Detroit, del.	3.05c
Worcester, Mass.	3.35c

Lamp stock up 10 cents.

Rails, Fastenings

(Gross Tons)

Standard rails, mill	$40.00
Relay rails, Pittsburgh 20—100 lbs.	32.50-35.50
Light rails, billet qual., Pitts., Chicago, B'ham.	$40.00
Do., rerolling quality	39.00

Cents per pound

Angle bars, billet, mills	2.70c
Do., axle steel	2.35c
Spikes, R. R. base	3.00c
Track bolts, base	4.15c
Car axles forged, Pitts., Chicago, Birmingham	3.15c
Tie plates, base	2.15c

Base, light rails 25 to 60 lbs., 20 lbs., up $2; 16 lbs. up $4; 12 lbs. up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base plates 20 tons.

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller	68.5 off
Do. larger, to 1-in.	66 off
Do. 1⅛ and larger	64 off
Tire bolts	52.5 off

Stove Bolts

In packages with nuts separate 72.5 off; with nuts attached add 15%; bulk 83.5 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts	60 off
Plow bolts	68.5 off

Nuts

Semifinished hex.	U.S.S.	S.A.E.
½-inch and less	67	70
⅝-1-inch	64	65
1⅛-1½-inch	62	62
1⅝ and larger	60	..

Hexagon Cap Screws

Upset, 1-in., smaller	70.0 off

Square Head Set Screws

Upset, 1-in., smaller	75.0 off
Headless set screws	64.0 off

Piling

Pitts., Chgo., Buffalo	2.40c
Gulf ports	2.85c
Pacific Coast ports	2.95c

Rivets, Washers

F.o.b. Pitts., Cleve., Chgo., Bham.

Structural	3.40c
⅞-inch and under	65-10 off

Wrought washers, Pitts., Chi., Phila., to jobbers and large nut, bolt mfrs. l.c.l. $5.40; c.l. $5.75 off

Welded Iron, Steel Pipe

Base discounts on steel pipe. Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less on lap weld, 1 point less on butt weld. Chicago delivery 2½ and 1½ less, respectively. Wrought pipe, Pittsburgh base.

Butt Weld

Steel

In.	Blk.	Galv.
⅛	63½	54
¼	66½	58
1—3	68½	60½

Iron

¾	30	13
1—1¼	34	19
1½	38	21½
2	37½	21

Lap Weld

Steel

2	61	52½
2½—3	64	55½
3½—6	66	57½
7 and 8	65	55½
9 and 10	64½	55
11 and 12	63½	54

Iron

2	30½	15
2½—3½	31½	17½
4	33½	21
4½—8	32½	20
9—12	28½	15

Line Pipe

Steel

1 to 3, butt weld	67½
2, lap weld	60
2½ to 3, lap weld	63
3½ to 6, lap weld	65
7 and 8, lap weld	64
10-inch lap weld	63½
12-inch, lap weld	62½

Iron

	Blk.	Galv.
¾ butt weld	25	7
1 and 1¼ butt weld	29	13
1½ butt weld	33	15½
2 butt weld	32½	15
1½ lap weld	23½	7
2 lap weld	25½	9
2½ to 3½ lap weld	26½	11½
4 lap weld	28½	15
4½ to 8 lap weld	27½	14
9 to 12 lap weld	23½	9

Boiler Tubes

Carloads minimum wall seamless steel boiler tubes, cut lengths 4 to 24 feet; f.o.b. Pittsburgh, base price per 100 feet subject to usual extras.

Lap Welded

Sizes	Gage	Steel	Charcoal Iron
1½" O.D.	13	$ 9.72	$23.71
1¾" O.D.	13	11.06	22.93
2" O.D.	13	12.38	19.35
2¼" O.D.	13	13.79	21.68
2¼" O.D.	12	15.16	.....
2½" O.D.	12	16.58	26.57
2¾" O.D.	12	17.54	29.00
3" O.D.	12	18.35	31.36
3½" O.D.	11	23.15	39.81
4" O.D.	10	28.66	49.90
5" O.D.	9	44.25	73.93
6" O.D.	7	68.14	.....

Seamless

Sizes	Gage	Hot Rolled	Cold Drawn
1 "O.D.	13	$ 7.82	$ 9.01
1¼" O.D.	13	9.26	10.67
1½" O.D.	13	10.23	11.79
1¾" O.D.	13	11.64	13.42
2" O.D.	13	13.04	15.03
2¼" O.D.	13	14.54	16.76
2¾" O.D.	12	16.01	18.45
2½" O.D.	12	17.54	20.21
2¾" O.D.	12	18.59	21.42
3" O.D.	12	19.50	22.48
3½" O.D.	11	24.62	28.37
4" O.D.	10	30.54	35.20
4½" O.D.	10	37.35	43.04
5" O.D.	9	46.87	54.01
6" O.D.	7	71.96	82.93

Cast Iron Pipe

Class B Pipe—Per Net Ton

6-in., & over, Birm.	$45.00-46.00
4-in., Birmingham	48.00-49.00
4-in., Chicago	56.80-57.80
6-in. & over, Chicago	53.80-54.80
6-in. & over, east fdy.	49.00
Do., 4-in.	52.00

Class A Pipe $3 over Class B
Stnd. fitgs., Birm., base $100.00

Semifinished Steel

Rerolling Billets, Slabs

(Gross Tons)

Pittsburgh, Chicago, Gary, Cleve., Buffalo, Young., Birm., Sparrows Point	$34.00
Duluth (billets)	36.00
Detroit, delivered	36.00

Forging Quality Billets

Pitts., Chi., Gary, Cleve., Young., Buffalo, Birm.	40.00
Duluth	42.00

Sheet Bars

Pitts., Cleveland, Young., Sparrows Point, Buffalo, Canton, Chicago	34.00
Detroit, delivered	36.00

Wire Rods

Pitts., Cleveland, Chicago, Birmingham No. 5 to ⅜-inch incl. (per 100 lbs.)	$2.00
Do., over ⅜ to 41/64-in. incl.	2.15

Worcester up $0.10; Galveston up $0.25; Pacific Coast up $0.50.

Skelp

Pitts., Chi., Youngstown, Coatesville, Sparrows Pt.	1.90c

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur.	$4.35- 4.60
Connellsville, fdry.	5.00- 5.75
Connell. prem. fdry.	5.75- 6.25
New River fdry.	6.25- 6.50
Wise county fdry.	5.50- 6.50
Wise county fur.	5.00- 5.25

By-Product Foundry

Newark, N. J., del.	11.38-11.85
Chicago, outside del.	10.50
Chicago, delivered	11.25
Terre Haute, del.	10.75
Milwaukee, ovens	11.25
New England, del.	12.50
St. Louis, del.	11.75
Birmingham, ovens	7.50
Indianapolis, del.	10.75
Cincinnati, del.	10.50
Cleveland, del.	11.05
Buffalo, del.	11.25
Detroit, del.	11.00
Philadelphia, del.	11.15

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	16.00c
Toluol, two degree	25.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c

Per lb. f.o.b. Frankford and St. Louis

Phenol (less than 1000 lbs.)	14.75c
Do. (1000 lbs. or over)	13.75c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers	7.00c

Per ton, bulk, f.o.b. port

Sulphate of ammonia	$28.00

Pig Iron

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

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$24.00	$24.50	$23.50	$25.00
Birdsboro, Pa.	24.00	24.50	23.50	25.00
Birmingham, Ala.‡	19.38	....	18.38	24.00
Buffalo	23.00	23.50	22.00	24.00
Chicago	23.00	23.00	22.50	23.50
Cleveland	23.00	23.00	22.50	23.50
Detroit	23.00	23.00	22.50	23.50
Duluth	23.50	23.50	....	24.00
Erie, Pa.	23.00	23.50	22.50	24.00
Everett, Mass.	24.00	24.50	23.50	25.00
Granite City, Ill.	23.00	23.00	22.50	23.50
Hamilton, O.	23.00	23.00	22.50	....
Neville Island, Pa.	23.00	23.00	22.50	23.50
Provo, Utah	21.00	....	....	....
Sharpsville, Pa.	23.00	23.00	22.50	23.50
Sparrow's Point, Md.	24.00	....	23.50	....
Swedeland, Pa.	24.00	24.50	23.50	25.00
Toledo, O.	23.00	23.00	22.50	23.50
Youngstown, O.	23.00	23.00	22.50	23.50

‡Subject to 38 cents deduction for 0.70 per cent phosphorus or higher.

Delivered from Basing Points:				
Akron, O., from Cleveland	24.39	24.39	23.89	24.89
Baltimore from Birmingham	24.78	....	23.66	....
Boston from Birmingham	24.12	....	....	....
Boston from Everett, Mass.	24.50	25.00	24.00	25.50
Boston from Buffalo	24.50	25.00	24.00	25.50
Brooklyn, N. Y., from Bethlehem	26.50	27.00	....	....
Canton, O., from Cleveland	24.39	24.39	23.89	24.89
Chicago from Birmingham	†23.22	....	....	....
Cincinnati from Hamilton, O.	23.24	24.11	23.61	....
Cincinnati from Birmingham	23.06	....	22.06	....
Cleveland from Birmingham	23.32	....	22.82	....
Mansfield, O., from Toledo, O.	24.94	24.94	24.44	24.44
Milwaukee from Chicago	24.10	24.10	23.60	24.60
Muskegon, Mich., from Chicago, Toledo or Detroit	26.19	26.19	25.69	26.69
Newark, N. J., from Birmingham	25.15	....	....	....
Newark, N. J., from Bethlehem	25.53	26.03	....	....
Philadelphia from Birmingham	24.46	....	23.96	....
Philadelphia from Swedeland, Pa.	24.84	25.34	24.34	....
Pittsburgh district from Neville Island	Neville base, plus 69c, 84c, and $1.24 freight.			
Saginaw, Mich., from Detroit	25.31	25.31	24.81	25.81

	No. 2 Fdry.	Malleable	Basic	Bessemer
St. Louis, northern	23.50	23.50	23.00	....
St. Louis from Birmingham	†23.12	....	22.62	....
St. Paul from Duluth	25.63	25.63	....	26.13

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $28.50, base; $29.74 delivered Philadelphia.

Gray Forge		Charcoal	
Valley furnace	$22.50	Lake Superior fur.	$27.00
Pitts. dist. fur.	22.50	do., del. Chicago	30.34
		Lyles, Tenn.	26.50

†Silvery

Jackson county, O., base: 6-6.50 per cent $28.50; 6.51-7—$29.00; 7-7.50—$29.50; 7.51-8—$30.00; 8-8.50—$30.50; 8.51-9—$31.00; 9-9.50—$31.50; Buffalo, $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base; Prices are the same as for silveries, plus $1 a ton.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Manganese differentials in silvery iron and ferrosilicon, 2 to 3%, $1 per ton add. Each unit over 3%, add $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$60.80

First Quality

Pa., Ill., Md., Mo., Ky.	47.50
Alabama, Georgia	47.50
New Jersey	52.50

Second Quality

Pa., Ill., Ky., Md., Mo.	42.75
Georgia, Alabama	34.20
New Jersey	49.00

Ohio

First quality	39.90
Intermediate	36.10
Second quality	31.35

Malleable Bung Brick

All bases	$56.05

Silica Brick

Pennsylvania	$47.50
Joliet, E. Chicago	55.10
Birmingham, Ala.	47.50

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$28.00
Wire cut	$26.00

Magnesite

Domestic dead - burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$50.00
Chem. bonded chrome	50.00
Magnesite brick	72.00
Chem. bonded magnesite	61.00

Fluorspar

Washed gravel, duty pd., tide, net ton	$25.00-$26.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail.	22.00
Do. barge	22.00
No. 2 lump	22.00

Ferroalloy Prices

Ferromanganese, 78-82%, lump and bulk, carlots tide., duty pd. $100.00
Ton lots 110.00
Less ton lots 113.50
Less 200 lb. lots 118.00
Do., carlots del. Pitts. 105.33

Spiegeleisen, 19-21% dom.
Palmerton, Pa., spot 32.00
Do., 26-28% 39.50

Ferrosilicon, 50% freight allowed, c.l. 69.50
Do., ton lot 82.00
Do., 75 per cent 126.00
Do. ton lots 142.00
Spot, $5 a ton higher.

Silicomanganese, c.l., 2½ per cent carbon, 103.00
2% carbon, 108.00; 1%, 118.00
Contract ton price $12.50 higher; spot $5 over contract.

Ferrotungsten, stand., lb. con. del. cars 1.90-2.00

Ferrovanadium, 35 to 40%, lb., cont. 2.70-2.80-2.90

Ferrophosphorus, gr. ton, c.l., 17-18% Rockdale, Tenn., basis, 18%, $3 unitage, $8.50; electric furn., per ton, c. l., 23-26% f.o.b. Mt. Pleasant, Tenn., 24% $3 unitage 75.00

Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb., contained cr., del. carlots 11.00c
Do., ton lots 11.75c
Do., less-ton lots 12.00c

67-72% low carbon:

	Carloads	Ton lots	Less ton
2% carb.	17.50c	18.25c	18.75c
1% carb.	18.50c	19.25c	19.75c
0.10% carb.	20.50c	21.25c	21.75c
0.20% carb.	19.50c	20.25c	20.75c

Spot ¼c higher

Ferromolybdenum, 55-65% molyb. cont., f.o.b. mill, lb. 0.95

Calcium molybdate, lb. molyb. cont., f.o.b. mill 0.80

Ferrotitanium, 40-45%, lb., con. tl., f.o.b. Niagara Falls, ton lots $1.23
Do., less-ton lots 1.25
20-25% carbon, 0.10 max., ton lots, lb. 1.35
Do, less-ton lots 1.40
Spot 5c higher

Ferrocolumbium, 50-60%, contract, lb. con. col., f.o.b. Niagara Falls $2.25
Do., less-ton lots 2.30
Spot is 10c higher

Technical molybdenum trioxide, 53 to 60% molybdenum, lb. molyb. cont., f.o.b. mill 0.80

Ferro-carbon-titanium, 15-18%, tl., 6-8% carb., carlots, contr., net ton $142.50
Do, spot 145.00
Do, contract, ton lots 145.00
Do, spot, ton lots 150.00

15-18% tl., 3-5% carbon, carlots, contr., net ton 157.50
Do, spot 160.00
Do, contract, ton lots 160.00
Do, spot, ton lots 165.00

Alsifer, contract carlots, f.o.b. Niagara Falls, lb. 7.50c
Do, ton lots 8.00c
Do, less-ton lots 8.50c
Spot ½c lb. higher

Chromium Briquets, contract, freight allowed, lb. spot carlots, bulk 7.00c
Do., ton lots 7.50c
Do., less-ton lots 7.75c
Do., less 200 lbs. 8.00c
Spot, ¼c higher.

Tungsten Metal Powder, according to grade, spot shipment, 200-lb. drum lots, lb. $2.50
Do., smaller lots 2.60

Vanadium Pentoxide, contract, lb. contained $1.10
Do, spot 1.15

Chromium Metal, 98% cr., 0.50 carbon max., contract, lb. con. chrome 84.00c
Do., spot 89.00c

98% chrome, contract 83.00c
Do., spot 88.00c

Silicon Metal, 1% iron, contract, carlots, 2 x ⅛-in., lb. 14.00c
Do., 2% 12.50c
Spot ¼c higher

Silicon Briquets, contract carloads, bulk, freight allowed, ton $69.50
Ton lots 79.50
Less-ton lots, lb. 3.75c
Less 200 lb. lots, lb. 4.00c
Spot ¼-cent higher.

Manganese Briquets, contract carloads, bulk freight allowed, lb. 5.00c
Ton lots 5.50c
Less-ton lots 5.75c
Spot ¼c higher

Zirconium Alloy, 12-15%, contract, carloads, bulk, gross ton $97.50
Do, spot 102.50

34-40%, contract, carloads, lb., alloy 14.00c
Do, ton lots 15.00c
Do, less-ton lots 16.00c
Spot ¼c higher

Molybdenum Powder, 99%, f.o.b. York, Pa. 200-lb. kegs, lb. $2.60
Do, 100-200 lb. lots 2.75
Do, under 100-lb. lots 3.00

Molybdenum Oxide Briquets, 48-52% molybdenum, per pound contained, f.o.b. producers' plant 80.00c

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials

	Soft Bars	Bands	Hoops	Plates ¼-in. & Over	Structural Shapes	Floor Plates	Sheets: Hot Rolled	Sheets: Cold Rolled	Sheets: Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars: Carbon	Cold Drawn Bars: SAE 2300	Cold Drawn Bars: SAE 3100
Boston	3.98	3.86	4.86	3.85	3.85	5.66	3.51	4.48	4.66	3.46	4.13	8.63	7.23
New York Met.)	3.84	3.76	3.76	3.76	3.75	5.56	3.38	4.40	4.05	3.31	4.09	8.59	7.19
Philadelphia	3.85	3.75	4.25	3.55	3.55	5.25	3.35	4.05	4.50	3.31	4.06	8.56	7.16
Baltimore	3.95	4.05	4.45	3.70	3.70	5.25	3.55	....	5.05	....	4.05	....	...
Norfolk, Va.	4.15	4.25	....	3.90	3.90	5.45	3.75	....	5.40	....	4.15	....	....
Buffalo	3.35	3.62	3.62	3.62	3.40	5.25	3.05	4.30	4.45	3.22	3.75	8.15	6.75
Pittsburgh	3.35	3.40	3.40	3.40	3.40	5.00	3.15	....	4.75	....	3.65	8.15	6.75
Cleveland	3.25	3.30	3.30	3.40	3.58	5.18	3.15	4.05	4.42	3.20	3.75	8.15	6.75
Detroit	3.43	3.23	3.48	3.60	3.65	5.27	3.23	4.30	4.84	3.20	3.80	8.45	7.05
Omaha	3.90	3.80	3.80	3.95	3.95	5.55	3.45	....	5.00	....	4.42	....	....
Cincinnati	3.60	3.47	3.47	3.65	3.68	5.28	3.22	4.00	4.67	3.45	4.00	8.50	7.10
Chicago	3.50	3.40	3.40	3.55	3.55	5.15	3.05	4.10	4.60	3.30	3.75	8.15	6.75
Twin Cities	3.75	3.65	3.65	3.80	3.80	5.40	3.30	4.35	4.75	3.63	4.34	8.84	7.44
Milwaukee	3.63	3.53	3.53	3.68	3.68	5.28	3.18	4.23	4.73	3.54	3.88	8.38	6.98
St. Louis	3.62	3.52	3.52	3.47	3.47	5.07	3.18	4.12	4.87	3.41	4.02	8.52	7.12
Kansas City	4.05	4.15	4.15	4.00	4.00	5.60	3.90	....	5.00	....	4.30	....	....
Indianapolis	3.60	3.55	3.55	3.70	3.70	5.30	3.25	....	4.76	....	3.97	....	....
Memphis	3.90	4.10	4.10	3.95	3.95	5.71	3.85	....	5.25	....	4.31	....	....
Chattanooga	3.80	4.00	4.00	3.85	3.85	5.68	3.70	....	4.40	....	4.39	....	....
Tulsa, Okla.	4.44	4.34	4.34	4.33	4.33	5.93	3.99	....	5.71	....	4.69	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.88	3.45	....	4.75	....	4.43	....	....
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	4.80	5.00	4.60	....	....
Houston, Tex.	4.05	6.20	6.20	4.05	4.05	5.75	4.20	....	5.25	....	....	....	....
Seattle	4.00	3.85	5.20	3.40	3.50	5.75	3.70	6.50	4.75	....	5.75	....	....
Portland, Oreg.	4.25	4.50	6.10	4.00	4.00	5.75	3.95	6.50	4.75	....	5.75	....	....
Los Angeles	4.15	4.60	4.45	4.00	4.00	6.40	4.30	6.50	5.25	....	6.60	10.65	9.80
San Francisco	3.50	4.00	6.00	3.35	3.35	5.60	3.40	6.40	5.15	....	6.80	10.65	9.80

	SAE Hot-rolled Bars (Unannealed): 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.18	7.50	6.05	5.80	7.90
New York (Met.)	4.04	7.35	5.90	5.65	....
Philadelphia	4.10	7.31	5.86	5.61	8.56
Baltimore	4.10	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.10	5.65	5.40	7.50
Pittsburgh	3.40	7.20	5.75	5.50	7.60
Cleveland	3.30	7.30	5.85	5.85	7.70
Detroit	3.48	7.42	5.97	5.72	7.19
Cincinnati	3.65	7.44	5.99	5.74	7.84
Chicago	3.70	7.10	5.65	5.40	7.50
Twin Cities	3.95	7.45	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.82	7.47	6.02	5.77	7.87
Seattle	5.85	....	8.00	7.85	8.65
Portland, Oreg.	5.70	8.85	8.00	7.85	8.65
Los Angeles	4.80	9.40	8.55	8.40	9.05
San Francisco	5.00	9.65	8.80	8.65	9.30

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300-4999 pounds in Portland, Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in Birmingham.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Kansas City and St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 300-4999 in San Francisco, Portland; any quantity in Twin Cities; 300-1999 in Los Angeles.

Galvanized Sheets: Base, 1500-3499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 150-1049 in Los Angeles; 300-4999 in Portland, Seattle, San Francisco; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis, Tulsa; 1500 and over in Chattanooga; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; 10 to 49 bundles in Philadelphia.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco, 1000 and over in Portland, Seattle; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

CURRENT IRON AND STEEL PRICES OF EUROPE

Dollars at Rates of Exchange, May 16

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	British gross tons U. K. ports: £ s d	Quoted in dollars at current value	Continental Channel or North Sea ports, gross tons **Quoted in gold pounds sterling: £ s d
Foundry, 2.50-3.00 Si.	$19.44 6 0 0	$33.23	3 18 0
Basic bessemer	....	.....	.....
Hematite, Phos. .03-.05	20.25 6 5 0	.....	.....
Billets	....	$31.95	3 15 0
Wire rods, No. 5 gage	....	60.71	7 2 6
Standard rails	$34.02 10 10 0	$48.99	5 15 0
Merchant bars	1.94c 13 9 0	2.77c	7 6 0
Structural shapes	1.76c 12 2 6	2.83c	7 9 0
Plates, ¼ in. or 5 mm.	1.87c 12 17 6	3.53c	9 6 0
Sheets, black, 24 gage or 0.5 mm	2.47c 17 0 0	2.98c	7 17 0*
Sheets, gal., 24 ga., corr.	2.96c 20 6 3	3.94c	10 7 6
Bands and strips	....	2.76c	7 5 0
Plain wire, base	....	3.15c	8 6 3
Galvanized wire, base	....	3.75c	9 17 6
Wire nails, base	....	3.56c	9 7 6
Tin plate, box 108 lbs.	$ 5.18 1 12 0	....	.....

British ferromanganese $100.00 delivered Atlantic seaboard duty-paid.

Domestic Prices at Works or Furnace—

Last Reported

	£ s d		French Francs	Belgian §§ Francs		Reich §§ Mar
Fdy. pig iron, Si. 2.5.	$17.98	5 11 0(a) $14.50	788	$31.44	950	$25.33	63
Basic bess. pig iron	16.93	5 4 6(a)	...	29.79	900	27.94	(b)69.50
Furnace coke	5.13	1 11 8	4.14	225	10.92	330	7.64	19
Billets	30.38	9 7 6	21.40	1,163	42.20	1,275	38.79	96.
Standard rails	1.62c	11 3 0	1.27c	1,588	2.06c	1,375	2.38c	132
Merchant bars	2.03c	14 0 0††	1.16c	1,454	2.06c	1,375	1.98c	110
Structural shapes	1.80c	12 8 0††	1.13c	1,414	2.06c	1,375	1.93c	107
Plates, †¼-in. or 5 mm.	1.82c	12 10 6††	1.48c	1,848	2.42c	1,610	2.29c	127
Sheets, black	2.54c	17 10 0§	1.75c	2,193‡	2.85c	1,900‡	2.59c	144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.	3.02c	20 16 3††	2.87c	3,589	4.80c	3,200	6.66c	370
Plain wire	2.83c	19 10 0	1.87c	2,340	3.00c	2,000	3.11c	173
Bands and strips	2.14c	14 15 0††	1.31c	1,632	2.48c	1,650	2.29c	127

†British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continent usually for basic-bessemer steel. (a) del. Middlesbrough. 5s rebate to approved customers. (b) hematite. *Close annealed. ††Rebate of 15s on certain conditions.

**Gold pound sterling not quoted. §§Last prices, no current quotations.

IRON AND STEEL SCRAP PRICES

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated; †indicates brokers prices

HEAVY MELTING STEEL

Birmingham, No. 1.	15.00
Bos. dock No. 1 exp.	15.00
New Eng. del. No. 1	14.00-14.50
Buffalo, No. 1	17.00-17.50
Buffalo, No. 2	15.00-15.50
Chicago, No. 1	17.00-17.50
Chicago, auto, no alloy	16.00-16.50
Cincinnati, dealers.	13.25-13.75
Cleveland, No. 1	17.50-18.00
Cleveland, No. 2	16.50-17.00
Detroit, No. 1	†14.50-15.00
Detroit, No. 2	†13.25-13.75
Eastern Pa., No. 1	17.50
Eastern Pa., No. 2	16.00
Federal, Ill. No. 2	12.50-13.00
Granite City, R. R. No. 1	†13.50-14.00
Granite City, No. 2	12.50-13.00
Los Ang., No. 1, net	11.50-12.00
Los Ang., No. 2, net	10.50-11.00
N. Y. dock No. 1 exp.	13.75
Pitts., No. 1 (R. R.)	19.50-20.00
Pittsburgh, No. 1	18.50-19.00
Pittsburgh, No. 2	17.00-17.50
St. Louis, No. 1	†13.50-14.00
St. Louis, No. 2	†12.25-12.75
San Fran., No. 1, net	11.50-12.00
San Fran., No. 2, net	10.50-11.00
Seattle, No. 1	14.50-15.50
Toronto, dirs., No. 1	11.00
Valleys, No. 1	18.00-18.50

COMPRESSED SHEETS

Buffalo, new	15.50-16.00
Chicago, factory	16.50-17.00
Chicago, dealers	14.50-15.00
Cincinnati, dealers.	12.75-13.25
Cleveland	17.50-18.00
Detroit	†15.50-16.00
E. Pa., new mat.	17.00
E. Pa., old mat.	14.00-14.50
Los Angeles, net	9.00- 9.50
Pittsburgh	18.50-19.00
St. Louis	†10.00-10.50
San Francisco, net.	9.00- 9.50
Valleys	17.50-18.00

BUNDLED SHEETS

Buffalo, No. 1	15.00-15.50
Buffalo, No. 2	13.50-14.00
Cleveland	14.00-14.50
Pittsburgh	17.00-17.50
St. Louis	†9.00- 9.50
Toronto, dealers	9.75

SHEET CLIPPINGS, LOOSE

Chicago	12.00-12.50
Cincinnati, dealers.	8.75- 9.25
Detroit	†12.00-12.50
St. Louis	†8.00- 8.50
Toronto, dealers	9.00

BUSHELING

Birmingham, No. 1	13.00
Buffalo, No. 1	15.00-15.50
Chicago, No. 1	15.50-16.00
Cincin., No. 1 deal.	9.75-10.25
Cincin., No. 2 deal.	3.75- 4.25
Cleveland, No. 2	11.00-11.50
Detroit, No. 1, new	†14.50-15.00
Valleys, new, No. 1	17.50-18.00
Toronto, dealers	5.50- 6.00

MACHINE TURNINGS (Long)

Birmingham	5.00
Buffalo	10.00-10.50
Chicago	11.00-11.50
Cincinnati, dealers.	5.50- 6.00
Cleveland, no alloy.	10.50-11.00
Detroit	†9.00- 9.50
Eastern Pa.	9.00- 9.50
Los Angeles	4.00- 5.00
New York	†6.50- 7.00
Pittsburgh	12.50-13.00
St. Louis	†6.50- 7.00
San Francisco	5.00
Toronto, dealers	7.00- 7.25
Valleys	11.50-12.00

SHOVELING TURNINGS

Buffalo	12.00-12.50
Cleveland	11.00-11.50
Chicago	11.50-12.00
Chicago, spcl, anal.	14.50-15.00
Detroit	†10.00-10.50
Pitts., alloy-free	13.50-14.00

BORINGS AND TURNINGS
For Blast Furnace Use

Boston district	†4.00- 4.25
Buffalo	10.00-10.50
Cincinnati, dealers.	4.50- 5.00
Cleveland	11.00-11.50
Eastern Pa.	9.00- 9.50
Detroit	†9.75-10.25
New York	†5.25- 5.75
Pittsburgh	9.50-10.00
Toronto, dealers	6.75

AXLE TURNINGS

Buffalo	15.50-16.00
Boston district	†8.00- 8.50
Chicago, elec. fur.	17.50-18.00
East. Pa. elec. fur.	16.00-16.50
St. Louis	†9.25- 9.75
Toronto	6.00- 6.50

CAST IRON BORINGS

Birmingham	7.50
Boston dist. chem.	†8.25- 8.50
Buffalo	10.00-10.50
Chicago	10.50-11.00
Cincinnati, dealers.	4.50- 5.00
Cleveland	11.00-11.50
Detroit	†9.75-10.25
E. Pa., chemical	14.50-15.00
New York	†7.00
St. Louis	†5.00- 5.50
Toronto, dealers	6.75

RAILROAD SPECIALTIES

Chicago	20.00-20.50

ANGLE BARS—STEEL

Chicago	20.00-20.50
St. Louis	†14.75-15.25

SPRINGS

Buffalo	20.00-20.50
Chicago, coil	21.00-21.50
Chicago, leaf	19.00-19.50
Eastern Pa.	21.50-22.50
Pittsburgh	22.00-22.50
St. Louis	†16.25-16.75

STEEL RAILS, SHORT

Birmingham	16.50
Buffalo	22.00-22.50
Chicago (3 ft.)	20.50-21.00
Chicago (2 ft.)	21.00-21.50
Cincinnati, dealers.	18.75-19.25
Detroit	†20.00-20.50
Pitts., 3 ft. and less	22.00-22.50
St. Louis, 2 ft.& less	†18.00-18.50

STEEL RAILS, SCRAP

Birmingham	16.00
Boston district	†14.50-15.00
Buffalo	18.50-19.00
Chicago	17.50-18.00
Cleveland	20.00-20.50
Pittsburgh	19.50-20.00
St. Louis	†15.00-15.50
Seattle	18.00-18.50

PIPE AND FLUES

Chicago, net	12.50-13.00
Cincinnati, dealers.	10.25-10.75

RAILROAD GRATE BARS

Buffalo	13.00-13.50
Chicago, net	12.50-13.00
Cincinnati, dealers.	8.75- 9.25
Eastern Pa.	15.00-15.50
New York	†11.00-11.50
St. Louis	9.50-10.00

RAILROAD WROUGHT

Birmingham	14.00
Boston district	†9.50-10.00
Eastern Pa., No. 1	19.00
St. Louis, No. 1	10.00-10.50
St. Louis, No. 2	12.50-13.00

FORGE FLASHINGS

Boston district	†10.25-10.50
Buffalo	15.00-15.50
Cleveland	15.50-16.00
Detroit	†14.00-14.50
Pittsburgh	16.50-17.00

FORGE SCRAP

Boston district	†7.00
Chicago, heavy	20.00-20.50

LOW PHOSPHORUS

Cleveland, crops	22.50-23.00
Eastern Pa. crops.	21.00-21.50
Pitts., billet, bloom, slab crops	22.50-23.00

LOW PHOS. PUNCHINGS

Buffalo	20.00-20.50
Chicago	19.50-20.00
Cleveland	19.00-19.50
Eastern Pa.	21.00-21.50
Pittsburgh	21.50-22.00
Seattle	15.00
Detroit	†16.00-16.50

RAILS FOR ROLLING
5 feet and over

Birmingham	16.50
Boston	†15.75-16.00
Chicago	21.00-21.50
New York	15.50-16.00
Eastern Pa.	20.00-20.50
St. Louis	†17.50-18.00

STEEL CAR AXLES

Birmingham	18.00
Boston district	†17.00-17.50
Chicago, net	22.50-23.00
Eastern Pa.	23.00-23.50
St. Louis	†18.50-19.00

LOCOMOTIVE TIRES

Chicago (cut)	20.00-20.50
St. Louis, No. 1	14.75-15.25

SHAFTING

Boston district	†17.25-17.50
New York	†18.00-18.50
Eastern Pa.	22.50-23.00
St. Louis, 1¼-3¾"	†16.50-17.00

CAR WHEELS

Birmingham, iron	13.00
Boston dist., iron	†13.00-13.25
Buffalo, steel	22.00-22.50
Chicago, iron	18.00-18.50
Chicago, rolled steel	19.50-20.00
Cincin., iron, deal.	16.75-17.25
Eastern Pa., iron	20.00-20.50
Eastern Pa., steel	21.50-22.50
Pittsburgh, iron	20.00-20.50
Pittsburgh, steel	22.00-22.50
St. Louis, iron	14.50-15.00
St. Louis, steel	†15.50-16.00

NO. 1 CAST SCRAP

Birmingham	15.50
Boston, No. 1 mach.	†15.00-15.50
N. Eng. del. No. 2	14.75-15.00
N. Eng. del. textile	17.50-18.00
Buffalo, cupola	18.00-18.50
Buffalo, mach.	19.00-19.50
Chicago, agri. net	14.00-14.50
Chicago, auto net	16.50-17.00
Chicago, railroad net	15.00-15.50
Chicago, mach. net	15.50-16.00
Cincin., mach. deal.	16.75-17.25
Cleveland, mach.	20.50-21.00
Detroit, cupola, net.	†16.00-16.50
Eastern Pa., cupola	20.00-20.50
E. Pa., No. 2 yard	17.00
E. Pa., yard fdry.	16.50-17.00
Los Angeles	16.50-17.00
Pittsburgh, cupola	18.50-19.00
San Francisco	14.50-15.00
Seattle	12.00-14.00
St. Louis, breakable.	†14.00-14.50
St. Louis, agri. mach.	15.75-16.25
St. L., No. 1 mach.	†16.25-16.75
Toronto, No. 1 mach., net dealers	18.00-18.50

HEAVY CAST

Boston dist. break.	†13.25-13.50
New England, del.	15.00-15.25
Buffalo, break	15.50-16.00
Cleveland, break, net	15.50-16.00
Detroit, auto net.	†16.50-17.00
Detroit, break	†14.50-15.00
Eastern Pa.	18.50-19.50
Los Ang., auto, net.	13.00-14.00
New York break.	†14.00-15.50
Pittsburgh, break.	16.00-16.50

STOVE PLATE

Birmingham	10.00
Boston district	†10.50-11.00
Buffalo	14.50-15.00
Chicago, net	10.50-11.00
Cincinnati, dealers.	9.00- 9.50
Detroit, net	†10.00-10.50
Eastern Pa.	15.00-15.50
New York fdry.	†11.00
St. Louis	10.50-11.00
Toronto dealers, net	12.00-12.50

MALLEABLE

New England, del.	21.50-22.00
Buffalo	19.00-19.50
Chicago, R. R.	20.50-21.00
Cincin., agri., deal.	14.25-14.75
Cleveland, rail	22.00-22.50
Eastern Pa., R. R.	20.50-21.50
Los Angeles	12.50
Pittsburgh, rail	22.50-23.00
St. Louis, R. R.	†16.00-16.50

Ores

Lake Superior Iron Ore

Gross ton, 51½ %
Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract.	9.00-10.00

Foreign Ore
(Prices nominal)

Cents per unit c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mn.	15.00
North African low phos.	16.00
Spanish, No. African basic, 50 to 60%.	16.00
Chinese wolframite, short ton unit, duty paid	$23.50-24.00
Scheelite, imp.	$25.00
Chrome ore, Indian, 48% gross ton, cif.	$26.00-28.00

Manganese Ore

Including war risk but not duty, cents per unit cargo lots.

Caucasian, 50-52%	48.00-50.00
So. African, 50-52%	49.00-50.00
Indian, 49-50%	nom.
Brazilian, 48-52%	46.00-48.00
Cuban, 50-51%, duty free	61.20

Molybdenum

Sulphide conc., per lb., Mo. cont., mines	$0.75

Sheets, Strip

Sheet & Strip Prices, Pages 86, 87

Pittsburgh — Sheet and strip releases are heavy and expanding. Further gains in operations compared with the recent 60 per cent rate are in prospect. Operation of active mills is well ahead of this figure, the average being held down by idleness of some older units. Sellers are adhering to their announced intention of completing recent orders by June 30, and although there is some doubt whether this can be accomplished, remaining tonnage is expected to be small. Producers have eliminated the 10-cent extra introduced late last year on sheets sold in coils.

Chicago — Enameling sheets are in demand from household appliance interests, with further increases noted in electrical equipment and steel furniture requirements. Automotive needs, truck, tractor and farm implement requirements are well sustained. Sheet and strip specifications on April contracts are increasing but most flat-rolled sold at that time has yet to be released. Buying since first of month has been at a standstill.

Boston — Sheet and cold strip specifications against orders placed at lower prices are heavier, with indications many consumers will release more tonnage than expected. Rerolling operations are gaining, at around 70 per cent with some producers. Volume this month is well ahead of April with production schedules likely to approach a peak during June.

New York—Sheet buyers are more disposed to issue releases against recent blanket orders. Consumption in this district is expanding rather slowly, and it will not prove surprising if users carry fairly large stocks into next quarter. The general quickening in domestic and export steel markets is a factor in inducing buyers to take heavier shipments.

Philadelphia—Sheet buyers are specifying more freely against low-priced bookings. Some mills are setting June 3 as deadline for sheet specifications so tonnage can be delivered by June 30. Foreign situation and placing of heavy export business by the Allies has stimulated specifications, primarily because of heavy drain on raw and semifinished steel. Consumption is holding up well, especially in automotive lines. Edward G. Budd Mfg. Co. is working double shift five days a week on current requirements. This interest has been specifying heavily for steel for side frames.

Buffalo—Although mills are pressing to clear books as rapidly as possible of low-priced sheets and strip, production has been increased only slightly from the previous month. Buying lags as most consumers covered at the lower prices.

Birmingham, Ala. — More seasonable weather conditions have resulted in moderate increase in demand for sheets, particularly roofing. Production is steady at 80 per cent or better with some backlog yet to be rolled. Strip production, mostly cotton ties, is steady.

Toronto, Ont.—New sheet booking has been dull largely because most Canadian consumers are fairly well covered. However, war contracts are creating demand in other quarters and buyers are ordering from the United States as Canadian mills are booked to the end of July and delivery on new contracts cannot be expected until August.

Plates

Plate Prices, Page 86

Pittsburgh — Plate mill schedules are heavier and if new business

continues to increase at the present rate, deliveries are certain to be crowded. Export market is active.

Chicago — Prices are showing firmer tendencies although order volume is unchanged. Inquiries are improved and bridgework and petroleum industry requirements are prominent. Heavy construction machinery is a strong source of business but railroad demand is down slightly. Little shipbuilding material is being moved here.

Boston—Slight improvement in demand for plates is due to better miscellaneous buying in small lots for prompt delivery. Specified work continues light and few substantial tonnages are being estimated. Industrial demand, however, is gaining mildly and shipyard specifications are steady. Fabricators, as a rule, have small backlogs and are buying accordingly.

New York—Miscellaneous buying has shown mild gains but volume in general is disappointing. Outstanding business in sight is the 45,000 tons of ship steel, mostly plates, which will be required for ten high-speed tankers to cost about $25,000,000, placed by Sinclair Refining Co., four 10,000-ton and two 15,000-ton ships goiong to Bethlehem Steel Co., Sparrows Point, Md., and four 15,000-ton ships to Federal Shipbuilding & Dry Dock Co., Kearney, N. J. European war is complicating disposal of shipments intended for the Low Countries.

Cleveland—Plate orders generally are small and diversified, but total volume is fairly steady. Prospects for additional railroad business are indefinite, with little business currently pending.

Philadelphia—Plate business has been enlivened by substantial releases by Sun Shipbuilding & Dry Dock Co., Chester, Pa. Export demand, however, has been adversely affected by cutting off of Holland and Scandinavia, which have been substantial buyers in recent months. Several thousand tons were moving when Holland was invaded and is being held up pending instructions. Some tonnage already afloat was brought back to port. This was mostly ship steel to millimeter specifications and it is believed England and France may eventually take the tonnage, shearing it where necessary.

Birmingham, Ala. — Plates are exceptionally steady, particularly demand from tank manufacturers and for shipment to West Coast points. Some scattering car business and miscellaneous requirements add to demand.

Seattle—Fabricators report a fair volume of seasonal tank and boiler jobs, less than 100 tons each. Several important projects are under consideration but not out for bids. Chicago Bridge & Iron Co. is low for furnishing a 25,000-gallon steel water tank for Everett, Wash.

San Francisco — Bids have just been taken on 4200 tons for 50 to 59-inch welded steel or reinforced concrete pipe for the metropolitan water district, Los Angeles. Awards aggregated 1028 tons, bringing the total for the year to 24,788 tons as compared with 16,480 tons for the corresponding period in 1939.

Toronto, Ont. — While consumption of plates has reached a high level, most of immediate needs have been covered by orders placed several weeks ago. Canadian mills are booked almost solid on plates to the year-end and until production facilities have been enlarged imports from the States will continue heavy.

Plate Contracts Placed

220 tons, 60,000-barrel tank, Public Service Electric & Gas Co., New Brunswick, N. J., to Chicago Bridge & Iron Co., Chicago.

165 tons, 500,000-gallon tank, Stockton,

Calif., to Pittsburgh-Des Moines Steel Co., Pittsburgh.

Plate Contracts Pending

4500 to 5000 tons, tanks aggregating 500,000 barrels, Richfield Oil Co., Seattle; revised specifications being prepared.

250 tons, welded pipe, specification 1363-E, Deer Creek dam, Utah; bids May 17.

Bars

Bar Prices, Page 86

Pittsburgh—Merchant bar demand is steady, bolstered by heavier export inquiries. Most foreign demand comes from Canada and South America. Cold-finished bar prices are firm although demand has dropped slightly, especially that from agricultural implement makers.

Chicago—Alloy and carbon bar needs are increasing. Normal domestic buying has been accelerated by increased forward coverage by equipment and farm machinery interests, with ordnance needs, both for this country and Britain, adding to current tonnage.

Boston—Alloy steel bar buying continues active with some improvement noted. While machine tool builders are leading consumers, miscellaneous industrial demand is heavier. Deliveries show little improvement. Hot-rolled merchant bars have shared to a less degree in the improvement, although some increase in demand is noted by secondary distributors.

New York—Commercial bar specifications are livelier and stronger. Foreign requirements loom much larger, and anticipated expansion in the United States defense program will stimulate bar tonnage substantially. Continued heavy orders for machine tools are reflected in current specifications, and some improvement is noted in demand from bolt and nut manufacturers. Automobile accessory requirements are declining, but are likely to level off this summer at a higher level than was expected recently.

Cleveland—Business is moderately heavier. Buyers still are ordering rather conservatively, however, there being little incentive to anticipate forward needs as extensively as was done last fall. Automotive requirements are declining.

Birmingham, Ala.—Bars have shown little inclination to slacken and production is steady, probably 85 per cent. Manufacturers of agricultural implements continue to take considerable tonnage.

Buffalo—Bar demand is slightly heavier, with larger tonnages being ordered for future delivery. Rolling schedules showed little change last week, however, partly the result of motor trouble at one plant. Tool and machinery makers and auto interests are leading outlets. Exports to Canada are markedly heavier than a year ago.

Toronto, Ont.—Bar sales are holding at a good level with mills reporting additional booking for the current quarter. While new buyers are reasonably assured of deliveries under four weeks, increased demand during the past week or ten days may soon push delivery dates to six weeks or more.

Pipe

Pipe Prices, Page 87

Pittsburgh—Demand is increasing, bolstered by oil country and standard pipe requirements. Boiler tubes have been moving fairly well, and releases of mechanical tubing on large orders have been good, although buying for immediate needs still is prevalent. Jobbers' and consumers' stocks are normal, with those of the former in best condition.

Chicago—Cast iron pipe sellers

note no improvement in private requirements, but WPA needs for water systems and sewage treatment and filtration plants continue active. Some municipalities in this district also are making annual purchases, which usually amount to several carloads each.

Boston—Cast iron pipe buying in small lots mounts gradually with more blanket contracts placed, Malden, Fitchburg and Worcester, Mass., having placed limited tonnage, several foundries sharing the business. Inquiry is led by 925 tons, Westover field, army air base, Chicopee, Mass., closing May 21. Merchant steel pipe requirements for construction work loom slightly heavier, also wrought pipe. Tubing demand is also maintained, notably alloy and seamless.

Birmingham, Ala. — Pipe has failed to show anticipated improvement, and operations are on a moderate basis. Inquiries have shown a slight upward tendency, but no business of moment is in sight.

Seattle—Little interest is evident in this market and no sizable projects are out for figures. Dealers anticipate no active demand until the late summer. Washington state highway bids May 28 involve 5735 feet of galvanized water pipe.

San Francisco — The largest cast iron pipe award so far this year has just been made by Los Angeles, 1020 tons, of which American Cast Iron Pipe Co. took 829 tons and National Cast Iron Pipe Co. 191 tons. Awards totaled 2023 tons and brought the year's aggregate to 13,713 tons, compared with 10,459 tons for the same period a year ago.

Cast Pipe Placed

1020 tons, 6 and 8-inch pipe, Los Angeles; 829 tons of 6 and 8-inch, to American Cast Iron Pipe Co., Birmingham, Ala., 191 tons of 6-inch to National Cast Iron Pipe Co., Birmingham, Ala.

200 tons, water line extension, Green Bay, Wis., to James B. Clow & Sons Co., Chicago.

158 tons, 6 and 12-inch, San Diego, Calif., to United States Pipe & Foundry Co., Burlington, N. J.

145 tons, 6 and 8-inch, Leominster, Mass., to R. D. Wood & Co., Florence, N. J.

130 tons, 6-inch universal, for Omak, Wash., to Marckman & Williams, Seattle.

100 tons, 6-inch, Waltham, Mass., to Warren Foundry & Pipe Co., Everett, Mass.

Cast Pipe Pending

925 tons, 12 and 16-inch, Westover field, army air base, Chicopee, Mass.; bids May 21, to constructing quartermaster

225 tons, 6, 8 and 10-inch, Shirley, Mass.; taking bids.

210 tons, 6-inch, cast iron, cement asbestos or steel pipe, Indian irrigation division, department of commerce, for delivery at Bishop, Inyo county, Calif; bids May 20.

203 tons, 4 to 10-inch, Fresno, Calif.; American Cast Iron Pipe Co., Birmingham, Ala., low.

154 tons, water system, Stoddard, Wis.; Central Foundry Co., Chicago, low.

153 tons, pipe line extension, Evanston, Ill.; bids May 20.

Wire

Wire Prices, Page 87

Boston—Incoming wire orders are more numerous and well diversified, including specialties. While most current volume is for relatively prompt shipment some buyers seek to place tonnage for third quarter delivery, but with little success. Both export and domestic demand for rods is increasing.

New York—Wire buying is heavier, replacement orders appearing in greater volume from a broader range of consumers, with prompt delivery generally requested. Bookings are well above April and export inquiry is heavy and increasing, notably for rods. Production schedules in more finishing departments tend upward.

Philadelphia — Nail prices have

strengthened but only after most buyers had covered for their 60-day requirements.

Birmingham, Ala. — Demand for wire products has shown marked, though not phenomenal, improvement during the past few days. Some restocking of such items as nails and fencing is in evidence.

Rails, Cars

Track Material Prices, Page 87

Buying by railroads continues moderate, activity including placing 1185 cars by four roads. Though some fairly large car inquiries have been figured they are slow to close. Most car repair programs now under way were covered some months ago and much of the steel has been shipped or is under specification.

Car Orders Placed

Cincinnati, New Orleans & Texas Pacific, seventy-five 70-ton covered hoppers, to Pullman-Standard Car Mfg. Co., Chicago.

Great Northern, 1000 box cars, to Pullman-Standard Car Mfg. Co., Chicago. Also inquiring for additional 1000 box cars.

Nashville, Chattanooga & St. Louis, fifty 70-ton covered hoppers to Pullman Standard Car Mfg. Co., Chicago.

Newburg & South Shore, 60 seventy-ton ore cars, to Pullman-Standard Car Mfg. Co.

Car Orders Pending

War department, fifty 10,000-gallon tank cars; bids June 6.

Locomotives Pending

Detroit, Toledo & Ironton, four to seven steam locomotives.

Lourenco Marquis system, Portuguese East Africa, four 2-6-2 locomotives.

Navy, one diesel-electric locomotive for Bremerton, Wash.; bids May 28. Also will take bids May 31 on one diesel-electric locomotive for unspecified delivery.

Buses Booked

The a.c.f. Motors Co., New York: Fifteen 36-passenger for Houston Electric Co., Houston, Tex.; seventeen 37-passenger for Santa Fe Trail Transportation Co., Wichita, Kans.; eight 27-passenger for Lafayette Street Railway Inc., Lafayette, Ind.; five 35-passenger for Aronimink Transportation Co., Llanerch, Pa.; two 36-passenger for Springfield Street Railway Co., Springfield, Mass.; two 25-passenger for Eastern Massachusetts Street Railway Co., Boston; one 32 passenger for Kull Bus Co. Inc., Bayonne, N. J.; one 37-passenger for Norfolk Southern Bus Corp., Norfolk, Va.; one 37-passenger for Bowen Motor Coaches, Fort Worth, Tex.

Udylite Corp., Detroit, maker of electroplating and polishing equipment and supplies, has moved its eastern district office from 30 East Forty-second street to 60 East Forty-second street, New York. A. B. Hoefer is eastern district manager.

Shapes

Structural Shape Prices, Page 86

Pittsburgh—Contracts and inquiries are fairly numerous but include few large lots. New work has been bolstered by private jobs, many of which are industrial. Tonnages pending are little changed. Prices are firm on mill material, and fabricated jobs have stiffened on better volume. Export market is active.

Chicago — Orders are steady although inquiries are improved. Inquiries for lots less than 100 tons are numerous, and substantial tonnages are pending. Three state highway bridges in Wyoming will be bid May 23 for 770 tons. A warehouse for Sears, Roebuck & Co. is pending for 500 tons.

Boston—Bridge requirements at 1600 tons are the heaviest so far this year, new inquiry including 217 tons for a three-span, 252-foot bridge at Bennington, Vt., closing May 24. Private industrial needs are also heavier, including additions at Pittsfield and Worcester,

Mass., the latter a forge shop, taking 785 tons. Two brass companies at Waterbury, Conn., are expanding, contracts being placed for a tube mill and boiler house.

New York—Award of 7000 tons for grade crossing eliminations, Brooklyn, is the last of the larger active pending tonnages. Additional sections for the Long Island railroad crossing, Brooklyn, will take better than 15,000 tons, part of which is expected up for bids soon. Several thousand tons also will be out soon for schools. More private industrial projects, mostly shop additions, which have been held in abeyance, are again active.

Buffalo—Due to a few large projects structural tonnage to date is running considerably above a year ago, but the number of pending jobs is rather limited.

Toronto, Ont.—Structural fabricators report steady flow of new business. While no large awards were reported the past week, booking since the first of the year has been well ahead of that for the corresponding period of 1939, and further large orders are pending.

Seattle—L. Romano Engineering Co., Seattle, is low at $349,123 for construction of the state Kettle River bridge, involving 1632 tons of shapes. Award awaits bureau of roads approval. Bids are in to army quartermaster, San Francisco, for the Fairbanks, Alaska, hangar, tonnage unstated.

Shape Contracts Placed

7000 tons, first two sections, Atlantic avenue grade crossing project, Long Island railroad, Brooklyn, to American Bridge Co., Pittsburgh; Poirier & McLane Corp., New York, general contractor.

900 tons, steel sheet piling, sewage plant, Brooklyn, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.; through Johnson, Drake & Piper Inc., New York.

750 tons, public school 99, New York, to Harris Structural Steel Co., Plainfield, N. J.; Skolnick Construction Co., New York, general contractor.

725 tons, swing bridge, Texas & New Orleans railroad, Baldwin, La., to Nashville Bridge Co., Nashville, Tenn.

675 tons, bridge FAGM-341, Hinds county, Mississippi, to Virginia Bridge Co., Roanoke, Va.

660 tons, relocation bridges, Atchison, Topeka & Santa Fe railway, Las Animas, Colo., for United States government, to American Bridge Co., Pittsburgh.

630 tons, bridge, Caddoa, Colo., to American Bridge Co., Pittsburgh.

600 tons, shop building, Guide Lamp Co., Anderson, Ind., to Indiana Bridge Co., Muncie, Ind.

580 tons, underpass, route 6, section 13, Denville, N. J., for state, to Bethlehem Steel Co., Bethlehem, Pa.

580 tons, warehouse, for Obear-Nester Glass Co., East St. Louis, Ill., to Mississippi Valley Structural Steel Co., Decatur, Ill.

550 tons, bascule bridge, Ocean City, Md., for state, to Phoenix Bridge Co., Phoenixville, Pa.

520 tons, buildings for naval air station, Midway Island, to Columbia Steel Co., San Francisco.

505 tons, nine bridges, Hortense, Ga., to Virginia Bridge Co., Roanoke, Va.

500 tons, bureau of reclamation, specification No. 902, Estes Park, Colo., to Colorado Fuel & Iron Corp., Pueblo, Colo.

500 tons, reconstruction grade elimination, New York Central railroad, at Croton Falls, N. Y., state project, to Phoenix Bridge Co., Phoenixville, N. Y.; through John Arborio Inc., Poughkeepsie, N. Y., contractor, at $171,267.50.

Shape Awards Compared

	Tons
Week ended May 18	22,911
Week ended May 11	32,341
Week ended May 4	13,409
This week, 1939	11,337
Weekly average, year, 1940	17,749
Weekly average, 1939	22,411
Weekly average, April	10,851
Total to date, 1939	450,684
Total to date, 1940	354,977

Includes awards of 100 tons or more.

490 tons, Bowery bay sewage disposal plant, New York, to Ingalls Iron Works, Birmingham, Ala., through Lane Engineering Co., New York.

475 tons, state bridge over Sand creek, Denver, to Midwest Steel & Iron Works Co., Denver.

468 tons, heating and seat plates, specification 907, Grand Coulee dam, Wash., to Schmitt Steel Co., Portland, Oreg.

450 tons, tunnel supports, Continental divide tunnel, near Estes, Colo., station 618.39 to 698.39, to Commercial Shearing & Stamping Co., Youngstown, Ohio.

435 tons, store building, Thalheimer Bros., Richmond, Va., to Richmond Structural Steel Co., Richmond.

435 tons, storage building, for Union Potash & Chemical Co., Carlsbad, N. Mex., to Patterson Steel Co., Tulsa, Okla.

400 tons, conveyor supports, for Public Service Electric & Gas Co., Burlington, N. J., to Lehigh Structural Steel Co., Allentown, Pa.

360 tons, Union Pacific railroad bridge and Los Angeles river improvement, Los Angeles, for United States government, to American Bridge Co., Pittsburgh.

310 tons, boiler house addition, Scovill Mfg. Co., Waterbury, Conn., to Berlin Construction Co., Berlin, Conn.

300 tons, outpatient building, New York, to Bethlehem Fabricators Inc., Bethlehem, Pa.; M. Shapiro & Sons Co., New York, general contractor.

285 tons, bridge FAS-428, McCreary county, Kentucky, to Nashville Bridge Co., Nashville, Tenn.

250 tons, highway bridge, project 678, Moneta, Va., to Virginia Bridge Co., Roanoke, Va.

240 tons, building, Continental Can Co., Syracuse, N. Y., to Trojan Steel Co.

228 tons, state highway viaduct, Clark, Neb., to St. Joseph Structural Steel Co., St. Joseph, Mo.

210 tons, addition to furnace building, for Timken Roller Bearing Co., Canton, O., to American Bridge Co., Pittsburgh.

180 tons, extraction and preparation buildings, for Buckeye Cotton Oil Co., Louisville, Ky., to International Steel Co., Evansville, Ind.

170 tons, nine-story addition, building at 55 Maiden Lane, New York, to American Bridge Co., Pittsburgh, through Thompson-Starrett Co., New York.

170 tons, state bridge, Harristown, Ill., to Mississippi Valley Structural Steel Co., Decatur, Ill.

170 tons, bridge, Jennings road, Cleveland, for Cuyahoga county, Ohio, to Burger Iron Works, Akron, O.

155 tons, bridge 5337, Rice county, Minnesota, to Lakeside Bridge & Steel Co., Milwaukee.

155 tons, box shop, for Hazel Atlas Glass Co., Lancaster, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.

150 tons, Metal & Thermit Corp. building, Chicago, to Joseph T. Ryerson & Son Inc., Chicago.

150 tons, state bridge, Blissfield, Mich., to American Bridge Co., Pittsburgh.

140 tons, tube rolling mill, for American Brass Co., Waterbury, Conn., to Bethlehem Steel Co., Bethlehem, Pa.

140 tons, girls' industrial school, Oregon, Wis., for state, to Theodore Kupfer Foundry & Iron Works Inc., Madison, Wis.

130 tons, apartment house, for Ghirardelli Apartments, San Francisco, to Western Iron Works, San Francisco.

125 tons, state bridge SAP-72, Hot Springs, S. Dak., to Bethlehem Steel Co., Bethlehem, Pa.

120 tons, extension to preheating building 122, for Aluminum Co. of America, Massena, N. Y., to Lackawanna Steel Construction Corp., Buffalo.

115 tons, building, Alcogravure division, Publications Corp., Chicago, to Joseph T. Ryerson & Son Inc., Chicago.

110 tons, bridge, Chippewa county, Wisconsin, to Wausaw Iron Works, Wausaw, Wis.

105 tons, telephone building, Troy, N. Y., to James McKinney & Son, Albany, N. Y.

100 tons, bridges, McChord Field, McNeil Island prison, Washington state, and miscellaneous, to Standard Steel Fabricating Boiler Works, Inc., Seattle.

100 tons, building, coast guard, Rockaway Point, N. Y., to Bethlehem Fabricators Inc., Bethlehem, Pa.; Egan Refractory Co., New York, general contractor.

100 tons, radio transmitting station and boat house, Kanoehe, T. H., to Herrick Iron Works, Oakland, Calif.

100 tons or more, shapes and bars, civilian quarters, Albrook field, Panama, to Truscon Steel Co., Youngstown, O.; Grebmar Construction Co. Inc., Panama, general contractor.

Shape Contracts Pending

1632 tons (also 88 tons reinforcing) Kettle River bridge, Washington state;

L. Romano Engineering Co., Seattle, low.

1400 tons, building additions, Pratt & Whitney division, Niles-Bement-Pond Co., Hartford, Conn.

1300 tons, grade crossing eliminations, North Adams, Mass., for state

900 tons, bridge over Pajaro river, Chittenden, Calif., for Southern Pacific Co.

770 tons, three state highway bridges, Wyoming; bids May 23.

627 tons, including 362 tons bearing piles and 165 tons sheet piling, La Brea dam, Orange county, Calif.; bids deferred to June 5.

600 tons, state highway bridge, Radcliff, Colo.; bids May 23.

595 tons, bridge in Eagle county, Colorado, for state; bids May 27.

500 tons, warehouse, Sears, Roebuck & Co., Chicago.

450 tons, extension to tank building 14, for General Electric Co., Pittsfield, Mass.

450 tons, including 270 tons sheet piling, improvement Los Angeles river channel between Balboa boulevard and White Oak avenue, Los Angeles; bids June 13.

422 tons, including 65 tons sheet piling, Sand Creek bridge, Adams county, Colorado, for state; bids opened.

400 tons, state bridge over Big Wheeling creek, Elm Grove, W. Va.

355 tons, floating bulkhead gates, Parke dam, Earp, Calif.; American Bridge Co., Pittsburgh, low.

335 tons, forge shop, Wyman-Gordon Co., Worcester, Mass.

310 tons, cell block, state prison, Auburn, N. Y.; bids May 23, Albany.

300 tons, ice rink, Berkeley, Calif.; bids soon.

260 tons, grade separation bridge, Dearborn, Mich., for state.

260 tons, state bridge over Shetucket river, Sprague, Conn.

250 tons, fabricated structural units, sliding and rolling gates, schedule 4027, Panama Canal; bids opened.

225 tons, state highway bridge, Oglesby, Ill.; Mississippi Valley Structural Steel Co., Decatur, Ill., low bidder.

220 tons, beef house, Armour & Co., Kansas City, Mo.

217 tons, 3-span 252-foot bridge, Bennington, Vt.; bids May 24, H. E. Sargent, commissioner of highways, Montpelier, Vt.

195 tons, I-beam bridge, Schuylkill county, Pennsylvania; bids to state highway department, Harrisburg, Pa., May 24.

180 tons, outlet tunnel, Kanapolis dam, Kansas City, Mo., for United States war department.

160 tons, state bridge, Ashtabula, O.

140 tons, office building, for Beverwyck Breweries Inc., Albany, N. Y.

140 tons, beef house, section 90, for Armour & Co., Kansas City, Kans.

130 tons, state bridge 1574, Spencer, W. Va.

130 tons, warehouse, for Street Construction Corp., Syracuse, N. Y.

120 tons, garage, for Shell Oil Co., Waltham, Mass.

110 tons, building, for National City bank, New York.

110 tons, warehouse, for Grumman Aircraft Engineering Corp., Bethpage, N. Y.

105 tons, including steel bearing piles, bridge, Eliot, Me.; bids May 29, Augusta, Me.

100 tons, state highway bridge, Rossville, Ill.; Milwaukee Bridge Co., Milwaukee, low.

Unstated, army air base hangar, Fairbanks, Alaska; bids in at San Francisco.

Unstated, memorial trade school, Yakima, Wash.; bids to J. W. Maloney, architect, May 20.

Reinforcing

Reinforcing Bar Prices, Page 87

Chicago — Pending business involves mostly private construction. Jobs generally are small, but total tonnage is heavy. There was little change in volume the past week, however. Firmer tendency is noted in billet steel bar prices.

Boston—Inquiry is slightly heavier with 350 tons for a bridge, North Adams, Mass., included in more active public work. Several hundred tons for a Fall River, Mass., housing project are being estimated. Awards, however, are mostly for small lots with prices somewhat steadier.

New York — Awards of reinforcing steel are heavier, led by 2000 tons for two grade crossing sections in Brooklyn, N. Y. Bridges and highways in Connecticut account for 760 tons and pending mesh requirements for New York

state are large. Inquiry is light and unplaced tonnage is smaller following recent heavy closings. Widely spread export inquiry for reinforcing bars is active, including South America and Ireland and a substantial tonnage has been shipped to Palestine.

Seattle—Demand continues below normal but several contracts will be placed soon, including 750 tons for the Spokane postoffice addition and 493 tons for the Mill Creek flood control project, near Walla Walla, Wash., bids in. Business awarded includes 180 tons, including 15 tons shapes, for the navy air base, Tongue Point, Oreg., to Poole & McGonigle, Portland, and 100 tons of bars and mesh for the concrete water line at Cle Elum, Wash.

San Francisco — While reinforcing bar sales are not large more than 29,000 tons is pending. Bookings totaled only 1398 tons and brought the aggregate for the year to 56,382 tons, compared with 71,037 tons for the same period last year.

Reinforcing Steel Awards

2000 tons, contract No. 2, Long Island Railway subway, sections 1 and 2, Brooklyn, N. Y., to Truscon Steel Co., Youngstown, O.; through Poirer & McLane, contractors.

1200 tons, grade crossing elimnations, Delaware, Lackawanna & Western railroad, Syracuse, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.; Elmhurst Contracting Co., New York, general contractor.

800 tons, Winton-Terrace housing, Cincinnati, to Pollak Steel Co., Cincinnati; James McHugh contractor.

740 tons, Clearwater reservoir, Piedmont, Mo., to Laclede Steel Co., St. Louis, Mo.

580 tons, Nimrod dam, United States engineer, Ola, Ark., to Sheffield Steel Corp., Kansas City, Mo.; Russ Mitchell Inc., contractor.

500 tons, Rainbow bridge, Niagara Falls, N. Y., contract No. 1-A and contract No. 1-4, to Bethlehem Steel Co., Bethlehem, Pa.; McLain Construction Co., contractor.

450 tons, Vannegut Hardware Co., Indianapolis, to Laclede Steel Co., St. Louis, Mo.

450 tons, Missouri Pacific overpass, St. Louis, to Laclede Steel Co., St. Louis; G. L. Tarlton Inc., contractor.

448 tons, highway work, Yolo county, Calif., for state, to Kyle & Co., Fresno, Calif.

410 tons, mesh and bars, highway projects, Stratfield and Trumbull, Conn., to Concrete Steel Co., New York, through Osborne & Burns, contractors.

350 tons, housing project, New Bedford, Mass., to Northern Steel Co., Boston.

350 tons, mesh, grade crossing elimination, Delaware, Lackawanna & Western railroad, Syracuse, N. Y., to Truscon Steel Co., Youngstown, O.; through Elmhurst Contracting Co., New York.

225 tons, highway project, Fairfield, Conn., to Truscon Steel Co., Youngstown, O.; through Silliman & Godfrey Co., Bridgeport, Conn.

200 tons, highway project FA-201, Greenup county, to Pollak Steel Co., Cincinnati; Codell Construction Co., contractor.

181 tons, store building, Sears, Roebuck & Co., Milwaukee, to Joseph T. Ryerson & Son Inc., Chicago.

180 tons (including 15 tons shapes), navy air base Tongue Point, Oreg., to Poole & McGonigle, Portland; Western Construction Co., Seattle, general contractor.

175 tons, plant, Armstrong Rubber Co., West Haven, Conn., to Bethlehem Steel Co., Bethlehem, Pa.; Edwin Moss & Son, general contractors.

175 tons, viaduct, New York Central railroad, Eleventh avenue, New York, to Carroll & McCready Co. Inc., Brooklyn, N. Y.; through Duffy Construction

Concrete Bars Compared

	Tons
Week ended May 18	10,647
Week ended May 11	7,945
Week ended May 4	7,859
This week, 1939	10,940
Weekly average, year, 1940.	8,193
Weekly average, 1939	9,197
Weekly average, April	9,875
Total to date, 1939	211,749
Total to date, 1940	163,854

Includes awards of 100 tons or more.

Co., New York, contractor.

150 tons, 125 South Wabash garage, Chicago, to Ceco Steel Products Corp., Cicero, Ill.

148 tons, bureau of reclamation, invitation 32,796-A, New Kirk, N. Mex., to Colorado Fuel & Iron Corp., Pueblo, Colo.

115 tons, bridge, Willington, Conn., to Bethlehem Steel Co., Bethlehem, Pa.; through D. V. Frione Co., New Haven, Conn.

110 tons, city of Rutland, Vt.., to Truscon Steel Co., Youngstown, O.

105 tons, public school building, Sandoval, Ill., to Laclede Steel Co., St. Louis..

105 tons, apartment building, Wellesley, Mass., to Concrete Steel Co., Boston.

100 tons, flood protection construction, Sioux City, Iowa, to Sheffield Steel Corp., Kansas City, Mo.

100 tons, breakwater, Michigan City, Ind., to O. J. Dean Co., Chicago.

100 tons (including wire mesh), reinforced concrete water pipe line, Cle Elum, Wash., to unstated interest.

100 tons, highway bridge, Grady county, Illinois, to Sheffield Steel Corp., Kansas City, Mo.

100 tons, Blackwater dam, Swett's Mills, N. H., U. S. engineer flood control project, to Bethlehem Steel Co., Bethlehem, Pa.; A. S. Wikstrom, Bound Brook, N. J., general contractor.

Reinforcing Steel Pending

2500 tons, Goldblatt Bros. store, Chicago.

2000 to 3000 tons, general storehouse, naval air base, Alameda, Calif., specification 9686; bids May 22.

2000 tons, four storehouses, naval supply depot, Oakland, Calif.; bids June 5.

1000 tons, marginal wharf, naval supply depot, Oakland, Calif.; bids June 5.

950 tons, housing project, Jersey City, N. J.; J. Weinstein & Rubin Co., low.

750 tons, addition to Spokane, Wash., postoffice; James Leck Co., Minneapolis, low.

700 tons, Calvert Distilling Co. plant, Relay, Md.

650 tons, Charles street housing, Detroit.

493 tons, Mill Creek dam, near Walla Walla, Wash.; Parker-Schram Co., Couch building, Portland, Oreg., low on general contract, with Eaton & Smith, 715 Ocean avenue, San Francisco, at $905,570.

362 tons, East Fullerton creek dam, Orange county, California; general contract to Chas. U. Heuser, 816 Allen avenue, Glendale, Calif., at $234,900.

350 tons, steel truss and stringer bridge and approaches, Hoosic river and over Boston & Maine railroad tracks, North Adams, Mass.; bids May 21, to state department of public works, Boston.

300 tons, Sears, Roebuck & Co. store, Cleveland.

300 tons, cell blocks, state prison, Greenhaven, N. Y.

260 tons, two bridges over Los Angeles river, Los Angeles, for United States engineer office; bids June 13.

260 tons, navy yard shipway, Philadelphia.

232 tons, highway project FAS-329, Hickman-Fulton counties, Kentucky.

200 tons, procurement division treasury department, New Haven, Conn.

158 tons, wire mesh, metropolitan water district, Los Angeles, specification 332; bids May 21.

130 tons, two concrete girder bridges, Chelan county, Wash., and other state highway projects; bids at Olympia, May 28.

110 tons, cell block, state prison, Auburn, N. Y.; bids May 23, Albany.

100 tons, hospital building, Kings county, Brooklyn, N. Y.

Pig Iron

Pig Iron Prices, Page 88

Pittsburgh—Market is quiet although inquiries from domestic and export buyers have been active and production has increased. Active stacks are being pushed to the limit. Consumer stocks are low and further buying is expected. Prices are steady and it is believed new buying of any consequence will be on the $23 basis.

Chicago—Buying continues to show moderate improvement, although a major movement is not believed under way yet. Shipments hold fairly closely to recent levels, with no definite change reported for the first 15 days of May as compared with a like April period. By-product foundry coke shipments also

hold to recent levels but show some signs of early improvement.

Boston—Pig iron shipments are the best since early in the year, but mostly against commitments. Buying is light, mostly spot lots for prompt delivery. Scattered increase in foundry melt, notably in southern New England, tends to boost consumption, and while most larger users continue to draw substantially on stocks, specifications against orders are gaining.

New York—Pig iron has a strong undertone despite disruption of the export market and the slow increase in domestic melt. Specifications from machine tool builders lead domestic business, with slightly higher tonnages from soil pipe makers. General jobbing demand shows little gain. Recent strong upturn in domestic ingot production is having a salutary influence, with the growing opinion that war will increase export buying.

Buffalo—Shipments are up slightly to about the first quarter average, following a slight tapering in business during April. Numerous foundries out of the market the past month or so again are placing business, although as yet there is little forward buying. Pig iron production holds at 64 per cent of capacity.

Philadelphia—Pig iron shows a firmer undertone, reflecting in part sharp advances in scrap, possibility of an upturn in foreign demand and slightly improved domestic specifications.

Cincinnati—Shipments are steady, but commitments of most melters preclude any great activity in new purchasing. On some specialties and machine tools the foundry melt retains vigor, but a tapering appears at jobbing plants. Demand for by-product foundry coke is likewise spotty. Pig iron prices are steady.

Birmingham, Ala. — Pig iron demand is encouraging. Little stocking is evident, in contrast to considerable accumulation a few weeks ago.

Toronto, Ont.—Merchant pig iron sales show improvement as the melt is being increased to provide for war needs. Most new business is for spot delivery, in lots of 50 to 200 tons, with some larger tonnages appearing. Foundry iron is moving at about 1800 tons weekly to Ontario melters, with malleable showing about 600 tons on new order account. Basic has minor call of about 200 tons weekly.

Formica Insulation Co., Cincinnati, has begun erection of a two-story addition to its plant, containing 30,000 square feet of floor space.

Scrap

Scrap Prices, Page 90

Pittsburgh—The upward spiral continues, led by open hearth grades, which are up 50 cents to $2 per ton. Nearly all the strength has evolved from brokers since actual mill buying has been small. Bonafide offers have been made by mills but rejected because of low prices. Demand continues good for low phos grades and for railroad specialties. Supplies of nearly all materials have dried up, awaiting a leveling off period. This is expected by some observers when the list reaches $20, although there is no indication that material will be much more plentiful at that figure.

Cleveland—Scrap continues to gather strength, with advances of 50 cents to $1 per ton as dealers bid for grades that show scarcity. Some consumer buying is being done but this has not become general.

Chicago—No. 1 steel advanced $1 the past week, influenced principally by higher prices in dealer-broker trading. No significant mill pur-

chases have been confirmed, but buying is expected shortly. The market derives considerable strength from gains in steelmaking. A number of other grades also have risen sharply.

Boston—With demand for iron and steel scrap slightly more active, prices on several grades for eastern Pennsylvania and New England shipments are stronger. Busheling in some instances brings $9.50, shipping point, while shafting, chemical borings, machine shop turnings, No. 2 cast and stove plate are up 25 to 50 cents a ton. Heavy melting steel grades for district delivery are also stronger. No. 1 machinery cast is moving in better volume at $17.50 to $18.50 delivered, depending on freight. Export prices are unchanged, with buying spotty.

New York — Heavy melting steel grades have been advanced 50 cents per ton for export, barge delivery, while No. 2 cast and stove plate are also stronger for shipment abroad. Domestic prices have a stronger tone and quotations for heavy breakable cast, grate bars and shafting are higher. Steel mill consumers show more interest and in some instances seek to cover for 60 days. Sellers are reluctant to protect melters at current prices, feeling the market will make further advances. Italy has bought a round tonnage, estimated at close to 200,000 tons.

Philadelphia—Italy has placed a substantial tonnage of No. 1 and No. 2 heavy melting steel for delivery over the next several months. Prices are on a sliding scale to be adjusted monthly. Meanwhile the domestic market is strong. No. 1 steel has brought $17.50, delivered, in several instances and, according to reliable report, as high as $18 from one consumer. The Reading recently sold some high grade railroad steel at $18. Undertone is strong.

Buffalo—Scrap prices have increased further, with No. 1 steel up 50 cents for the week. Dealers report little material available at the higher level. Sentiment is bullish but has been restrained slightly by curtailment in district steelmaking. Another boatload of scrap arrived last week carrying about 5000 tons, the sixth shipment via water of this size so far this year.

Detroit — War bullishness continues in scrap trading and prices are up again 50 cents a ton on the average, marking increases of $1 to $2 per ton in the past week or ten days. Mounting steelmaking rate and receipt of substantial war orders combine to move scrap prices steadily higher, many steelmakers finding inventories low and being forced into purchases.

Cincinnati — Prices on heavy melting steel and some other grades have been advanced 25 cents for the third consecutive week, with dealers attempting to increase inventories. Large buyers are inactive, subsisting on stocks and occasional small-lot purchases. Foundry scrap needs are lighter.

St. Louis—Market is stronger although prices are steady. Inventories are ample, but strengthening factors are higher prices in other markets and the feeling that expected increased output of finished goods will increase scrap demand. Malleable is especially strong as a scarcity of these grades is reported in Indiana and Ohio markets.

Birmingham, Ala. — Better demand for heavy melting steel is noted by local dealers. Republic is buying some No. 1, and stove foundries are taking a large tonnage, comparatively, of cast. No change from the $15 quotation on No. 1 heavy melting, however, is reported.

Seattle—The market was further unsettled last week by developments in Europe, withdrawal of ad-

ditional foreign tonnage aggravating the scarcity of ocean space. Japan continues to buy in small lots but exporters are unable to guarantee prompt deliveries. Domestic sales are slow as rolling mills are not buying and other buyers show little interest. Dealers hesitate to quote prices but as a whole the situation may be considered weaker than a month ago.

Toronto, Ont.—Little change is reported in iron and steel scrap. Supplies of cast scrap and stove plate are sufficient to meet current demands. New offerings to dealers have increased, but demand also is gaining, and some dealers are importing cast grades from United States border cities to fill immediate orders. Prices are firm with indications of early advances in some materials.

San Francisco — No change in price is noted and as far as can be ascertained no new orders for export have been placed. Movement of scrap from outlying districts is practically at a standstill. Scarcity of bottoms and higher prevailing freight rates appear to be reasons why scrap is not being sold to Japan. No. 1 heavy melting steel holds at $11.50 to $12.00 a net ton, f.o.b. cars metropolitan districts of Los Angeles and San Francisco, with No. 2 quoted at $10.50 to $11.00. Turnings and borings continue unchanged at $5.00 to $5.50 and compressed sheets $9.00 to $9.50. Dealers' buying prices continue unchanged at $8.50 to $9.00 for No. 1 heavy melting steel.

Steel in Europe

Foreign Steel Prices, Page 89

London — (*By Cable*) — New developments in the war situation will tend further to intensify British output of steel and iron and will interfere seriously with deliveries of semifinished steel from the Continent. The situation in pig iron and iron ore at the moment is satisfactory but supply of steel for commercial users is tight and exports are severely restricted except in tin plate.

No reports from Belgium are available at the moment, and Luxemburg is now in German control.

Warehouse

Warehouse Prices, Page 89

Chicago—Sales continue unusually steady. May is expected to duplicate the April volume. Demand is widely diversified, with all products active.

Philadelphia—Warehouse business in May is up about 14 per cent from April on dollar basis and about on a parity with March. Prices are steady.

Buffalo — Business shows little change from the April average. While lagging behind the recovery in mill shipments, warehouse trade is considered good.

Cincinnati — Volume this month will be virtually unchanged, at the present rate, from that moved in April. Prices are firm and unchanged.

Seattle—Jobbers report a good seasonal volume of sheets, light structurals, plates and bars. However, the market is unsatisfactory as it is on leading items that cut prices prevail and profits are reduced accordingly.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 87

New York—Specifications are increasing slightly, due primarily to increased building and construction requirements. A sharp in-

Behind the Scenes with STEEL

January In May

■ Last August we rather facetiously ribbed Jay O. Lashar, adv. mgr., American Chain & Cable Co., for coming out flat footed to predict one of the severest winters on record. Being in the auto chain business (among other things), Mr. Lashar probes the idiosyncracies of the weather as sort of a business hobby. He figured out something about the ocean being cold last summer around New York and combining this with a pretracted dry spell, warned that gas and coal bills this winter were doomed to go sky high. We've swallowed every word we wrote last August, and this morning in the merry, merry month of May we again shivered our way down to that damned grinning coal eater and fed it the last few lumps in the bin. Please, Mr. Lashar—*please!*

A Bald Lie?

■ Jim Powell, Chicago editor of STEEL (and famous collector of jitterbug records), has taken quite a beating since a recent testimonial adv. by Thomas Hair Specialists appeared in newspapers throughout the country. It was a "before and after" shot of one James Powell's noggin and despite vehement denials from the windy city, there is much talk here in the home office. *Tsk, tsk.*

Still Going Strong

■ And from STEEL's able Detroit editor, A. H. Allen, comes a note that this week's Mirrors of Motordom is his 177th consecutive installment and something like the 625th since its original appearance in July of 1927. STEEL jumped the field by several years back in those days and the first edition tossed aside all the current rumors of the time, and announced that the new Model A Ford would be a four-cylinder, standard gear shift at a reasonably low price. Since then, every week Mirrors of Motordom has continued to have a remarkable batting average and today is probably the most widely read feature of any industrial magazine in the country. Close to a million words have gone into Mirrors, and according to the office statisticians, these would, if placed end to end, reach from Vladivostok to Maurice-Gustave Gamelin and back again.

Match Problem

■ E. D. Lucas, Jr., STEEL's recent poet laureate, comes out of his Indian Run Farm hiding to reveal his connection with the world's largest plate mill at Coatesville, Pa. And for the class he presents a little match problem with a very tricky solution. Seven matches are used to form the following unequal equation.

$$VII = I$$

The problem is to make the equation balance by moving just one match. In the meantime we have had to flunk the whole class for missing out on last week's rung and ladder puzzler, which was really quite easy.

Air Data

■ With all the hubbub resulting from the President's request for 50,000 fighting planes, you may be interested in latest figures reaching us which indicate that 2196 companies in the country are participating on one way or another in aircraft activities. However there are only 32 engine builders and at the most, 85 planemakers.

Beyond Us

■ It seems to us this guy "Shorty" Long had better git out a steel-mill language-to-English dictionary for us poor guys that weren't brought up on such lingo as *skull cracker ball, keep-in the stock in the throat moist, bustle pipe, snort valve, monkey,* and *peep hole,* to quote a few of his more choice ones recently. Some of our freshmen readers will begin to think we've put out a special edition in the original Greek.

SHRDLU

crease in demand is expected soon from foreign neutral countries as Belgian sources are cut off. One recent large domestic building order involved 120 tons of rods, bolts and accessories for the Coney Island sewage disposal plant and went to an eastern Pennsylvania mill, with 800 tons of sheet piling.

Nonferrous Metals

New York—Reverses suffered by the Allies on the Belgian front destroyed bullishness which had been evident in nonferrous metal markets at the beginning of the campaign. Announcement of the proposed billion dollar rearmament program failed to bring out sufficient inquiry to bolster the faltering markets. Copper and tin prices fluctuated rapidly while lead and zinc held unchanged.

Copper—Leading mine producers maintained prices at 11.50c; the leading custom smelter asked the same level at the close; resellers and custom smelters changed quotations rapidly and offered down to 11.37½c at the close. Consumers reduced their purchasers steadily after Monday when they took 10,314 tons and the daily rate at the close was around 1000 tons. Spread of the war has cut the export market drastically and prices have dropped to only 11.25c, f.a.s.

Lead—Greater consumption of lead in prosecuting the war will tend to lift further the pressure of foreign supplies on our market. Trading was moderate and prices held at 4.85c, East St. Louis, and 5.00c, New York.

Zinc—With Belgium's zinc industry greatly hampered by the war, indications are that the United States will be called upon to furnish a larger share of foreign requirements. Consumption in this country is improving with galvanized sheet outeput rising two points in two weeks. Sales were fair with prices firm at 5.75c, East St. Louis, for prime western.

Tin—Straits spot prices fluctuated widely from 51.50c to 54.50c and closed at 53.50c. Consensus is that the government likely will increase its purchases of tin sharply in its effort to build up its supply of strategic materials. Consumers showed increased buying interest following the President's message on the proposed rearmament program.

Antimony—Only routine business was booked with prices unchanged on the basis of 14.00c, New York, for American spot and nominally 16.50c, duty paid New York, for Chinese spot.

Nonferrous Metal Prices

May	Copper Electro, del. Conn.	Copper Lake, del. Midwest	Copper Casting, refinery	Straits Tin, New York Spot	Straits Tin, New York Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
11	11.50	11.50	11.12½	54.50	52.50	5.00	4.85	5.75	19.00	14.00	35.00
13	11.50	11.50	11.12½	54.50	52.00	5.00	4.85	5.75	19.00	14.00	35.00
14	*11.37½	11.50	11.12½	52.50	50.00	5.00	4.85	5.75	19.00	14.00	35.00
15	*11.37½	11.50	11.12½	51.50	49.75	5.00	4.85	5.75	19.00	14.00	35.00
16	11.50	11.50	11.12½	52.50	50.00	5.00	4.85	5.75	19.00	14.00	35.00
17	11.50	11.50	11.12½	53.50	51.25	5.00	4.85	5.75	19.00	14.00	35.00

*Based on sales by custom smelters; mine producers unchanged at 11.50c.

MILL PRODUCTS

F.o.b. mill base, cents per lb., except as specified. Copper brass products based on 11.50c Conn. copper

Sheets

Yellow brass (high) 18.31
Copper, hot rolled 20.12
Lead, cut to jobbers 8.25
Zinc, 100 lb. base 11.00

Tubes

High yellow brass 21.06
Seamless copper 20.62

Rods

High yellow brass 13.26
Copper, hot rolled 16.62

Anodes

Copper, untrimmed 17.37

Wire

Yellow brass (high) 18.56

OLD METALS

Nom. Dealers' Buying Prices

No. 1 Composition Red Brass

New York 7.12½-7.37½
Cleveland 8.00-8.25
Chicago 8.00-8.25
St. Louis 7.75-8.25

Heavy Copper and Wire

New York, No. 1 ..... 8.75-9.00
Cleveland, No. 1 ..... 9.00-9.25
Chicago, No. 1 ..... 8.75-9.00
St. Louis 8.75-9.25

Composition Brass Turnings

New York 6.75-7.00

Light Copper

New York 6.75-7.00
Cleveland 7.00-7.25
Chicago 6.75-7.00
St. Louis 6.75-7.00

Light Brass

Cleveland 4.00-4.25
Chicago 4.25-4.50
St. Louis 4.50-4.75

Lead

New York 4.50-4.75
Cleveland 3.90-4.15
Chicago 3.90-4.10
St. Louis 4.00-4.25

Zinc

New York 3.00-3.25
Cleveland 2.75-3.00
St. Louis 3.25-3.50

Aluminum

Misc., cast, Cleveland 9.00
Borings, Cleveland 6.50
Clips, soft, Cleveland 14.00
Misc. cast, St. Louis 7.75-8.00

SECONDARY METALS

Brass ingot, 85-5-5-5, less carloads 12.00
Standard No. 12 aluminum ... 13.75-14.00

Harbison-Walker Refractories Co., Pittsburgh, has acquired the plant of the Athens Brick & Tile Co., Athens, Tex. Purchase covers all plant equipment, inventories, accounts receivable, etc., and the plant is being operated as a unit of Harbison-Walker. Headquarters of the sales department for this district will be maintained at Athens.

Equipment

New York—While deferred deliveries are a retarding factor, total volume of machine tool orders is substantial. By shopping about, prospective purchasers are generally able to get promise of fairly early shipment on some units, despite heavy backlogs. Domestic business is being routed ahead of export by most shops, although foreign buyers are also pressing for deliveries and in some instances are combing the used machinery market for tools.

Large volume of machinery remains to be placed by the aircraft engine industry which for weeks has been an active buyer. Several shipyards have also bought moderately. Picatinny Arsenal, N. J., has a large list of special pelleting presses up for bids, closing May 27. Total number of units to be bought may reach 50 with a minimum of 30.

Boston—Machine tool orders from the Detroit area have been heavier, automobile builders placing some units for 1941 models. Several shops in the Worcester district have booked additional orders from Detroit. The

aircraft industry continues a leading buyer of equipment and miscellaneous demand is well maintained despite further deferred deliveries on some lines. Others, by allocating production and shop schedules, are able to cover regular domestic customers with a minimum of delay. This is notably true of some grinding equipment units. Shop schedules frequently include extra shifts and overtime. Backlogs are heavy.

Seattle—Volume has dropped as the season advances, spring requirements having been placed. Westinghouse is low to Bonneville project for furnishing 267 transformers for six substations, bidding $43,513. Same bureau has called bids May 31 for pole line and guy hardware for Covington-Tacoma transmission line, Spec. 1017. Tacoma will open bids May 20 for annual supply of distribution transformers, $25,000 available. J. R. Ummel, Seattle, purchasing agent for bureau of indian affairs, receives bids May 20 for one gas and three diesel-driven lighting plants for Nulato, Hydaburg, Kanakanak and Tanana, Alaska.

CONSTRUCTION and ENTERPRISE

Ohio

CANTON, O.—Timken Roller Bearing Co. has plans for an annealing furnace building for its plant here.

CINCINNATI—Formica Insulation Co., manufacturer of laminated electrical insulation and plastics, has started a plant addition of about 30,000 square feet floor space, consisting of two additional stories, to meet needs of increased production.

CLEVELAND—Industrial Machine Co., 1432 East Forty-seventh street, is building a plant addition costing $8000.

CLEVELAND — Steel Improvement & Forge Co., 960 Addison avenue, is building an addition costing $7000.

CLEVELAND — Pennell Sheet Metal Inc., 1515 Fairfield avenue, has leased plant at 5045 Sweeney avenue and will move operations there soon, when alterations are completed.

CLEVELAND—Artistic Iron Products Co., 7310 Bessemer avenue, Stephen Ollock, manager, plans to build two-story addition to increase space for fabricating bronze and aluminum. Additional equipment will be required.

CLEVELAND—Cowles Tool Co., 2086 West 110th street, is building an addition containing about 1200 square feet floor space for manufacturing and storage. Plans by H. M. Morse Co., 1500 Superior avenue, who is taking construction bids.

CLEVELAND — Tinnerman Products Inc., 2038 Fulton road, has let contract to Austin Co., 16112 Euclid avenue, for addition with 12,000 square feet floor space. Third expansion in three years. Albert H. Tinnerman is president and George Tinnerman general manager.

CLEVELAND—C. B. Patterson, commissioner purchases and supplies, city hall, is asking bids, closing June 7, for combustion control, flowmeters and instrumentation for Lake road generating station. Includes panels, pushbution and pistol-grip electric control stations, ammeters and annunciators, under contract No. 220.

CLEVELAND—Cleveland metropolitan housing authority, Ernest J. Bohn, secretary and director, Housing Center, The Mall, Cleveland, is taking bids to May 28 for 583 gas ranges and 582 electric refrigerators for Valleyview homes and 568 each, gas ranges and electric refrigerators, for Woodhill homes.

CLEVELAND — Durable Plating Co., 3510 East Ninety-first street, is building new plant 62 x 120 feet at Cambridge avenue and East Ninety-first street, to increase production 100 per cent. Additional generators and tanks will be installed. John T. Hyduke is president.

MARION, O.—Marion-Reserve Power

Co. has had plans prepared for an extension to its power station here.

ORRVILLE, O.—Village, R. A. Kinney, president board of public affairs, has let contract to Couse & Saunders, 12740 Lyndon avenue, Detroit, for an addition to its electric light plant, costing $18,936.

UPPER SANDUSKY, O.—Fusner Corp., Indianapolis, Ind., has bought and leased 400 acres muck land in vicinity, through John Risner, local agent, and will build fertilizer plant costing $100,000.

YOUNGSTOWN, O. — Superior Industries Inc. has been incorporated with $40,000 capital. Samuel J. Henry, 37 Wayne avenue, is agent. Company will treat and process metals.

Connecticut

BRIDGEPORT, CONN. — Bridgeport Metal Goods Mfg. Co., 365 Cherry street, will build a two-story factory addition. Gellatly Construction Co., 25 Housatonic avenue, is general contractor. Total cost is about $40,000.

EAST HARTFORD, CONN. — United Aircraft Corp., Pratt & Whitney division, South Main street, will build a power plant addition. Industrial Construction Co., 721 Main street, Hartford, Conn., is general contractor. Cost estimated at $40,000.

NEW HAVEN, CONN.—Louis H. Weiner Inc., 318 Crown street, is building a two-story machine shop, 40 x 95 feet, costing $40,000. C. H. Abramowitz, 52 Goffe terrace, is engineer.

WATERBURY, CONN. — American Brass Co. has plans for a new tube mill building addition to its plant here.

Massachusetts

BOSTON—Old Colony Gas Co., 39 Quincy street, plans rebuilding its burned gas plant at East Braintree, Mass., at cost of about $500,000.

SALEM, MASS. — Hygrade Sylvania Corp., Bridge street, plans to install electric power equipment in a two-story addition to its electric lamp and radio tube manufacturing plant. Total cost about $200,000.

SOMERSET, MASS.—Montaup Electric Co. has let contract to Stone & Webster Corp., 49 Federal street, Boston, for design and construction of an addition to its power plant, including a high-pressure turbine and boiler to supply 600,000 pounds of steam per hour. Total cost about $3,000,000.

Vermont

NEWPORT, VT. — Citizens Utilities Electric Co. has approved plans for modernizing and improving its hydro-electric generating plant at cost of about $50,000. Charles T. Main Inc., 201 Devonshire street, Boston, is consulting engineer.

SPRINGFIELD, VT.—Jones & Lamson Machine Co. is building an additional unit to its plant here. Structural steel has been awarded to American Bridge Co., Pittsburgh.

New York

CORNING, N. Y.—Corning Fibre Box Corp. will build an addition to its plant here.

LANCASTER, N. Y. — Hazel-Atlas Glass Co. Inc., Fifteenth and Jacobs streets, Wheeling, W. Va., has let general contract to John W. Cowper, 775 Main street, Buffalo, for a factory building and boiler plant to cost about $100,000.

NEW YORK—Hercules Steel Corp. has

been incorporated with $10,000 capital to conduct business in steel and iron products, by R. Robert Hochman, 233 Broadway, New York.

New Jersey

BURLINGTON, N. J.—Robins Conveying Belt Co., New York, is building an addition to its plant here, structural steel being let to Lehigh Structural Steel Co., Allentown, Pa.

CAMDEN, N. J.—Campbell Soup Co., Camden, has had plans prepared for a large addition to its manufacturing plant here. Will require considerable equipment.

CARLSTADT, N. J.—Columbia Protecktosite Co., 631 Central avenue, is building a three-story plant, 80 x 90 feet, general contract to Bonanno Construction Co., 1827 Bergen turnpike, North Bergen, N. J. J. Rothstein, 220 Hulton street, Jersey City, N. J., is architect.

CLIFTON, N. J.—Fritsche Bros. Inc., 86 Third street, will build a 2-story chemical plant addition at cost of $200,000. Epple & Kahrs, 17 Washington street, Newark, N. J., are architects.

Pennsylvania

ELLWOOD CITY, PA.—National Tube Co., Pittsburgh, is taking bids on modernizing and rebuilding its plant at cost of about $300,000.

HARRISBURG, PA. — Pennsylvania Power & Light Co., Allentown, Pa., has approved plans for two additions to its steam-electric plant on Elliott street, Harrisburg, requiring additional equipment. Cost will be about $250,000.

OAKS, PA.—B. F. Goodrich Co., Akron, O., will install electric power equipment in an addition to its branch mill here. Total cost will be about $100,000. Albert Kahn Inc., New Center building, Detroit, is engineer.

PHILADELPHIA—Gulf Oil Corp., Gulf building, Pittsburgh, will install electric power equipment, steel tank storage, pumps and other mechanical equipment as part of its expansion of refinery at Thirtieth street and Penrose avenue. Total cost about $5,000,000.

Michigan

CHELSEA, MICH.—Chelsea Spring Co. plans erection of three buildings to add about 20,000 square feet of floor space to its plant.

DETROIT—Detroit Stamping Co., Highland Park, has given contract to the Austin Co., 16112 Euclid avenue, Cleveland, for a plant to cost $80,000.

DETROIT—Donnelly Pattern & Engineering Co., 122 West Nevada street, has let contract to the Austin Co., 16112 Euclid avenue, Cleveland, for a steel and concrete plant to cost $100,000. (Noted April 29.)

DOLLAR BAY, MICH.—Frank W. Foley, veteran wire manufacturer, is organizing a company to buy and operate the Roebling copper wire mill, idle for the past three years.

FERNDALE, MICH.—N. A. Woodworth Co., manufacturer of aviation parts and specialties, has given contract to the Austin Co., 16112 Euclid avenue, Cleveland, for a machine shop to cost $50,000.

MARSHALL, MICH.—General Power Unit Corp. has been incorporated with $100,000 capital to manufacture gasoline motors, by Guy W. Mayes, Marshall, Mich.

Illinois

AURORA, ILL.—Aurora Pump Co., Frank S. Main, president, manufacturer of pumps, will build a one-story addition 60 x 120 feet. Herbert Spieler is architect.

CHICAGO—Symons Clamp & Mfg. Co., 4249 West Diversey boulevard, is building a 1-story addition 116 x 139 feet, costing about $40,000. Austin Co., 510 North Dearborn street, Chicago, is engineer.

CHICAGO—Commonwealth Edison Co., 72 West Adams street, plans expansion of its steam-electric generating plant on Fisk street. Includes installation of 147,000-KW turbogenerator unit, high-pressure boilers and accessories. Part of general development costing about $5,000,000.

EAST ST. LOUIS, ILL.—Obear-Nester Glass Co., has let general contract to George A. Barnes, East St. Louis, for an addition to its plant.

KANKAKEE, ILL.—Florence Stove Co., 222 West North Bank drive, has let general contract for a 1-story addition to cost about $75,000, to Lowrie & Lautermilch, 400 West Madison street, Chicago.

Indiana

ANDERSON, IND.—Guide Lamp Corp., F. L. Burke, general manager, will build

a boiler room and powerhouse addition, to cost about $100,000.

INDIANAPOLIS, IND.—Allison Engineering division, General Motors Corp., Speedway City, Ind., will install electric power equipment in its four-unit addition to the airplane engine manufacturing plant, total cost of which will be about $500,000. J. Lloyd Allen, Architects and Builders building, Indianapolis, architect. (Noted April 22).

LAFAYETTE, IND.—Aluminum Co. of America has plans for addition to plant building No. 16, at Lafayette.

LOGANSPORT, IND.—Logansport Machine Co., West Linden avenue, Charles Wilkinson, general manager, is building an addition 82 x 135 feet, for which equipment will be required when departments are rearranged to increase production.

RICHMOND, IND.—Board of public works, city hall, plans extensions and improvements to the municipal power plant, including a 15,000-KW turbogenerator, surface condenser and auxiliaries, at total cost of about $625,000. W. R. Stevens, superintendent, is in charge.

Delaware

WILMINGTON, DEL.—Eastern States Farmers Exchange, 95 Elm street, West Springfield, Mass., will build a four-story fertilizer plant here, 150 x 168 feet, costing $100,000. A. E. Baxter Engineering Co., Delaware avenue, Buffalo, is engineer.

Maryland

FREDERICK, MD. — Potomac Edison Co., Robert L. Smith, district manager, plans $115,000 improvement program, including substation improvements, new switching and additional voltage regulating equipment, four transformers, new substation at Mt. Airy and distribution lines.

Kentucky

LOUISVILLE, KY. — Buckeye Cotton Oil Co. will build an extraction and preparation building for its plant here.

PADUCAH, KY.—Board of city commissioners has authorized a survey and estimate of cost of a municipal electric light plant. James P. Smith, city manager, is in charge.

North Carolina

FRANKLIN, N. C.—Nantahala Power Co., J. E. S. Thorpe, president, Franklin, will resume construction of hydroelectric power development on Nantahala river, suspended in 1931. Includes powerhouse with rated turbine capacity 63,000 horsepower and rated generator capacity of 63,000 KVA. Transmission system to be augmented.

Virginia

RICHMOND, VA. — Cameron Stove Mfg. Co., J. S. Gregg, president, has been incorporated to manufacture stoves, castings and other products, with maximum capital $100,000. James W. Gordon, Travelers building, Richmond, attorney.

Missouri

ST. LOUIS—A. Leschen & Sons Rope Co., Harry J. Leschen, president, 5909 Kentucky avenue, will build plant addition, 1-story, 35 x 150 feet.

Wisconsin

GREEN BAY, WIS.—Hudson-Sharp Machine Co., manufacturer of paper converting machinery, plans construction of a factory addition.

KIEL, WIS.—H. G. Weber & Co., manufacturers of paper bag machinery, will build a one-story addition and install additional equipment. E. A. Stubenrauch, Sheboygan, Wis., is architect.

TWO RIVERS, WIS.—Schwartz Mfg. Co., manufacturer of buffing wheels and filtering products, will build a one-story factory 160 x 200 feet; shipping room 30 x 75 feet and office building 55 x 65 feet. William J. & Frederick Raeuber, Manitowoc, Wis., are architects.

WEST ALLIS, WIS.—Kempsmith Machine Co. has let general contract to Jezo Construction Co. for a one-story machine shop addition, 51 x 57 feet. M. C. Herrmann is architect.

WEST ALLIS, WIS. — Kearney &

Trecker Corp., manufacturer of milling machines, has given general contract to Klug & Smith Co., 111 East Wisconsin avenue, Milwaukee, for one-story addition 131 x 164 feet.

Minnesota

DULUTH—Hugo Mfg. Co., manufacturer of tanks and other metal products, and Duluth Culvert Co., a subsidiary, have let contract to Emil J. Zauft & Son for a one-story factory and warehouse addition.

GRANITE FALLS, MINN.—City has approved bond issue of $18,000 for waterworks improvements, including well and 250,000-gallon water tank. C. A. Barager is city engineer.

HASTINGS, MINN.—Dakota county, John Swan, county highway engineer, has let general contract to C. B. Hansen Co., South St. Paul, Minn., for a one-story county highway maintenance garage and machine shop 36 x 80 feet.

MOORHEAD, MINN.—City, R. G. Price, clerk, is taking bids on general contract for improvements to municipal power plant, costing $50,000 to $60,000. Helmick, Edeskuty & Lutz, 412 Essex building, Minneapolis, are consulting engineers.

MOUND, MINN.—Roto Wing Co. has been incorporated to manufacture snow-removal machinery by C. M. Garland and associates, Mound.

North Dakota

HILLSBORO, N. DAK. — Red River valley electric Co-operative, Ralph Diehl, chairman, is taking bids on 240 miles rural transmission lines. M. S. Hyland, 1114 Eighth avenue North, Fargo, N. Dak., is consulting engineer.

Iowa

WATERLOO, IOWA—John Deere Tractor Co., L. A. Rowland, general manager, has given general contract to Jens Olesen & Sons Construction Co. for a one and two-story plant addition 96 x 320 feet.

WATERLOO, IOWA—Rath Packing Co. has given contract to Sumner S. Sollitt & Co., 307 North Michigan avenue, Chicago, for a one-story boiler plant addition 100 x 100 feet. Helmick, Edeskuty & Lutz, Essex Building, Minneapolis, are engineers.

Wyoming

SHERIDAN, WYO.—W. L. Waegels, Ucross, Wyo., is interested in application to REA for $60,000 loan for 60 miles rural transmission line in Sheridan county, to serve 200 customers.

Montana

MISSOULA, MONT. — West Montana Electric Co. has been awarded contract for first unit of Missoula Electric Co-operative Inc., a 117-mile power line to cost about $97,000.

Idaho

BOISE, IDAHO — City, James L. Straight, mayor, will vote June 11 on proposed construction of sewage treatment plant to cost about $350,000.

California

BELLEFLOWER, CALIF.—Arc Welded Tank Co., 141 Algeroma Place, Belleflower, has been formed by Howard C. Gipe and Floyd W. Hayes.

LOS ANGELES—Brown Aircraft Corp. has been incorporated with capital of $1,000,000 by L. W. Brown and associates. Durley-Downes, Syndicate building, Oxnard, Calif., representative.

LOS ANGELES—Aircraft Specialties Corp. has been incorporated with $25,000 capital by L. M. Bach and associates. Robert Omer, 214 Security building, Burbank, Calif., is representative.

LOS ANGELES — Hardman Aircraft Products Inc. has been incorporated with $100,000 capital by Frank Hardman and associates. Sprague, McClanahan, Goddard & Hunt, Title Insurance building, Los Angeles, are representatives.

LOS ANGELES—Marvel Pacific Car Co. has been incorporated with $25,000 capital by L. M. Bleck, Minneapolis; Harold Strong, Whittier, Calif.; M. E. Strong, Los Angeles. Charles Marston, Coliseum hotel, Los Angeles, is representative.

ORANGE, CALIF.—Anaconda Wire & Cable Co. will build warehouse building addition to its plant, 76 x 140 feet, costing $14,000.

Washington

ABERDEEN, WASH.—Harbor Plywood Co. has awarded contract to C. C. Moore Engineering Co., Seattle, for a power unit, including 40 x 40-foot boiler house, two Babcock & Wilcox boilers and 50-foot steel stack, to cost about $75,000. Generators may be installed later.

SEATTLE—John S. Schorr is building 2-story pattern shop at 1320 Dearborn street. Kenneth S. Ripley is architect.

SEATTLE—Swift & Co., Chicago, will build a meat processing and packing plant at 1050 Fourth avenue South, 150 x 340 feet, to cost about $175,000.

WATERVILLE, WASH. — Centennial Flouring Mills is building grain elevators here and at Coulee City, in which latest equipment will be installed.

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Federal Works Agency, Public Buildings Administration, Washington, D. C., May 8, 1940.—Sealed proposals in duplicate will be publicly opened in this office at 1 P.M., Standard Time, June 11, 1940, for construction of the U. S. P. O., Perrysburg, Ohio. Upon application, one set of drawings and specifications will be supplied free to each General Contractor interested in submitting a proposal. The above drawings and specifications MUST be returned to this office. Contractors requiring additional sets may obtain them by purchase from this office at a cost of $5 per set, which will not be returned. Checks offered as payment for drawings and specifications must be made payable to the order of the Treasurer, U. S. Drawings and specifications will not be furnished to contractors who have consistently failed to submit proposals. One set upon request, and when considered in the interests of the Government, will be furnished, in the discretion of the Commissioner, to builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any Sub-contractor or material firm interested, and to quantity surveyors, but this privilege will be withdrawn if the sets are not returned after they have accomplished their purpose. W. E. Reynolds, Commissioner of Public Buildings, Federal Works Agency.

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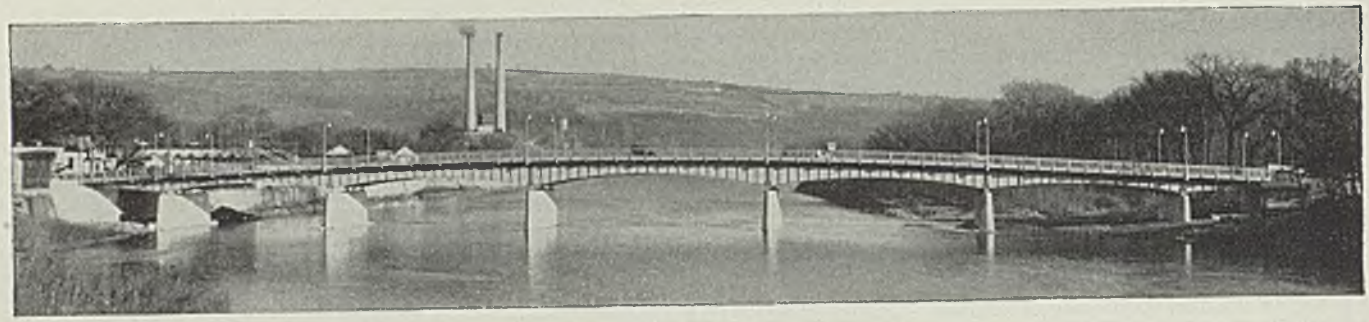

American Bridge-built is the entire superstructure of the new Madison Avenue Bridge over the Chemung River at Elmira, N. Y. It carries a 42-foot roadway flanked by sidewalks 8 feet wide. Typical of this continuous deck plate girder structure are the pleasing lines of the roadway grade and the curved bottom flange of the girder spans. The roadway slab is concrete-filled Carnegie-Illinois 4¼" I-Beam-Lok.

The deck plate girder overpass spans of the Lincoln Tunnel Approach at Weehawken, N. J., involved non-parallel alignment, skewed abutments, grades, curves and ramps. Ranking among the largest ever built, some of the plate girders erected on this project ranged up to 144 feet in length and 100 tons in weight.

The Manhattan Approach of New York's Triborough Bridge exemplifies the adaptability of steel to modern, grade-separation projects. Framed as a single roadway and overpassing existing streets immediately west of the Harlem River Crossing, this viaduct then diverges into three distinct ramps for separation of East-West and North-South bound traffic.

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