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STEEL

ESTABLISHED 1882

Contents

Volume 109—No. 25 December 22, 1941

PRODUCTION • PROCESSING • DISTRIBUTION • USE

ALLOYS

Timely information about metals... CATALOGUED for your convenience

Specific answers to many of your questions about the selection, fabrication and uses of Nickel alloys are available to you quickly from our files.

This fund of helpful information we have gathered, checked and condensed into convenient printed form. The graphs, charts and shop guides are especially useful to men handling new materials or performing unfamiliar operations . . . and to new employees. This literature is available on request.

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NICKEL

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STEEL

HIGHLIGHTING THIS ISSUE OF STEEL

■ BASED on conclusions that this is to be a long war, the government-sponsored iron and steelworks expansion program definitely is to be accelerated and it will be allotted higher priority ratings. The plan (p. 21) envisions 30 more blast furnaces in addition to the six now under construction; of these 30 half have been authorized and are being cleared by the Defense Plant Corp. Capacity of many existing blast furnaces will be increased by air conditioning. Steel expansion projects to date provide for 7,000,000 more ingot-tons capacity. Electric steel capacity will be further increased . . . Machine tool builders are requested (p. 31) further to step up their output by 50 to 100 per cent.

• • •

Steel Men On OPM

OPM's Iron and Steel Branch has been reorganized (p. 21); Charles E. Adams, new head, has appointed nine steel executives as full-time consultants. . . The baffling problem of priorities extensions on small orders (p. 22) has been simplified; Metals Reserve Co. will pay premiums to encourage production of domestic chromite and manganese ore. . . Metals in immobilized inventories have been seized (p. 22) . . . An amendment to General Preference Order M-21-a restricts melting certain alloys (p. 22) . . . Several new wages-hours law rulings (p. 23) are announced. . . . Preference Rating Order P-100 replaces Repair and Maintenance Order P-22 (p. 32); George C. Brainard replaces Mason Britton as chief of OPM's Tools and Equipment Section; Harry A. Rapelye is new chief of the Nickel Branch.

• • •

More Prices Are Frozen

Last week (p. 31) the government took over all tin; the chromium content of ferrochromium will be reduced. . . . Ceiling prices (p. 34) have been named on zinc oxide; industrial solvent prices are under control; use of metal in stoves and ranges will be curtailed; allocation of steel plates does not relieve consumers of necessity of filing PD-73 forms. . . . Ceiling prices (p. 35) have been established on warehouse-quantity steel resales. . . . The War Department no longer (p. 43) will publicize new contracts; farm equipment output will be reduced 20 per cent. . . . Prices on coal tar products (p. 30) have been frozen. . . . There is enough scrap in this country, declares E. L. Shaner, STEEL's editor-in-chief; let's cut through red tape and get it to steel plants. . . . Demand for steel in general (p. 83) is easier.

• • •

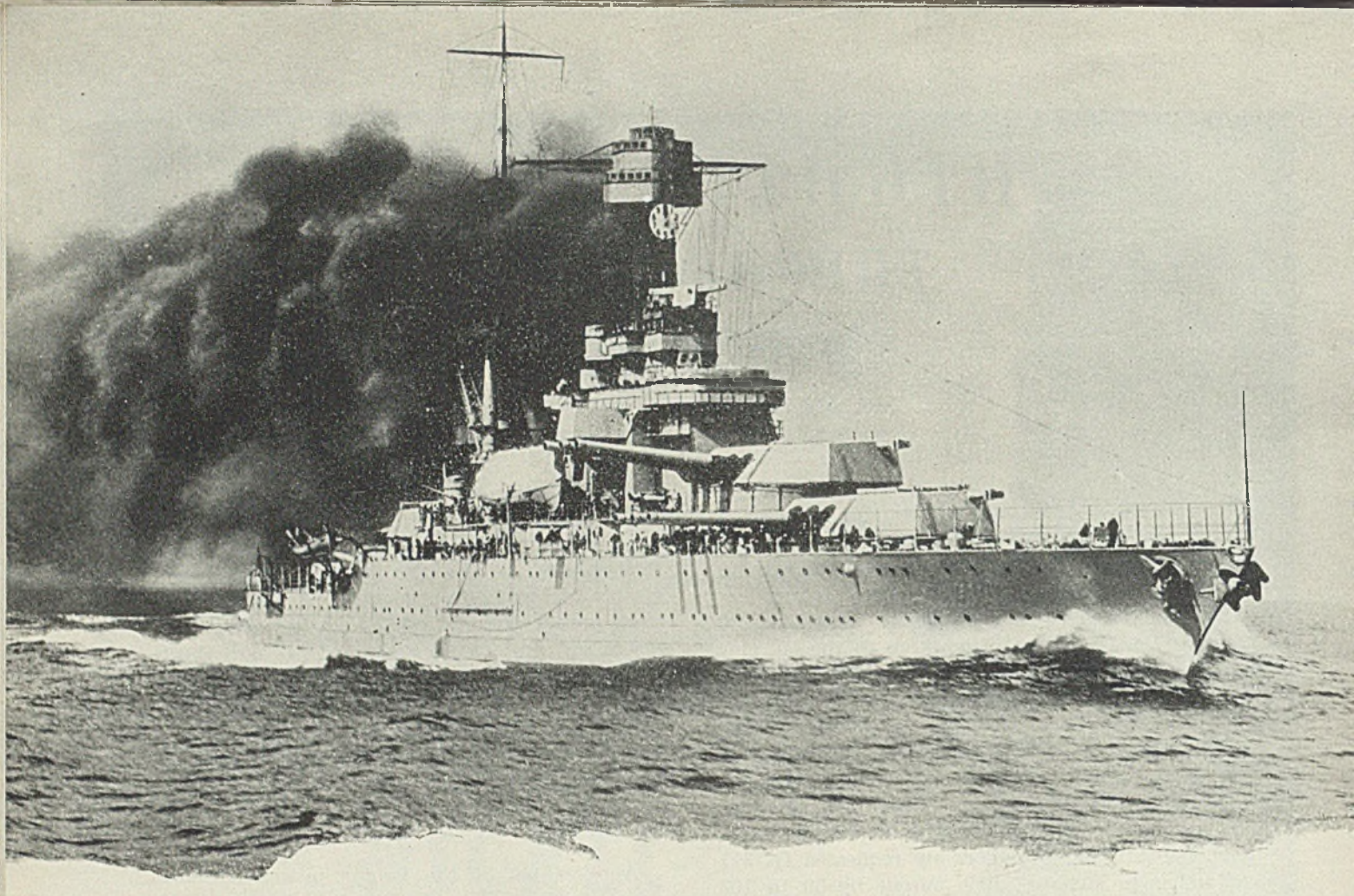
Honing In Ordnance Work

Applications of the honing process in ordnance production are described (p. 48) by A. M. Johnson. This is an important phase in making many items such as recoil mechanisms, airplane engines, airplane propellers and landing gear. . . . John R. Geir tells (p. 54) how carbon pressure control of furnace atmospheres enables the operator to preadjust the atmosphere to that point where it neither carburizes nor decarburizes the work. . . . Mechanized handling speeds tractor manufacture (p. 67) when a carefully planned plant layout is combined with highly efficient handling devices. Much of the processing is done right on the conveyor lines.

• • •

Uses of X-Ray Diffraction

X-ray diffraction methods are proving increasingly useful as a method of identifying the elements in metal alloys and the form in which they are present. L. L. Wyman explains (p. 70) some of the more important uses of this valuable tool. . . . E. W. P. Smith presents (p. 75) details on the steps involved in training welding operators for immediate production work, from the supervisor's standpoint. . . . Erie Works of General Electric Co. is making pack howitzers, using much equipment already at hand. Some of the important operations are detailed (p. 50). . . . Magnets for handling metal in steel plants are discussed (p. 58) by A. E. Lillquist.



At Inland "Full Speed Ahead" Helps Build Our Two-Ocean Navy

The United States is rapidly building the greatest Navy the world has ever known—a powerful two-ocean Navy to protect our shores and keep the sea lanes open, in the Pacific as well as in the Atlantic.

To the shipyards in which these vessels are being built and to manufacturers throughout the land, who are producing parts and equipment for them, Inland is shipping thousands of tons of steel products. This steel is being used not only for the great "ships of the line" but also for many less spectacular but very essential craft such as submarine chasers, tankers, seaplane tenders, transports, lighters and barges.

At Inland, as in the Navy, it is "full speed ahead" for America's defense. We have broken many production records—we are operating as close to capacity as the available supply of raw materials will permit—and still making the finest steel in our history. And, of course, our mills are being scheduled in strict conformance with priority ratings and allocations.

National Defense dominates our business today—as it should. It is our No. 1 Job, and we are proud of it.

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Steel Expansion Projects Assigned Higher Preference Ratings

✦

Sixteen Million-Ton Increase in Pig Iron Capacity Wins OPM Approval. Will Require 36 New Blast Furnaces, Including Those Now Building . . . Facilities for Special Products Needed in Arms Manufacture To Be Rushed

✦

WASHINGTON

■ EXPANSION of iron and steel producing facilities, particularly in the field most vital for war production, will be pushed forward with all possible speed, OPM officials promised last week.

First step in accelerating the program is the granting of high preference ratings to expansion projects. OPM officials in charge of the expansion program have been dissatisfied with ratings assigned before this country became involved in actual war; the new ratings, however, will be in the high military categories.

One of the immediate aims is to increase pig iron capacity to balance present finishing facilities and to offset the shortages in iron and steel scrap. The steel expansion unit in OPM has completed a survey of pig iron facilities, which indicates a need for 16,000,000 tons of capacity.

Such an expansion program would necessitate 36 new blast furnaces, including those now being built with private capital. OPM officials list six of the latter, leaving 30 to be built with government funds. About half that many already have been allocated, and clearances still are being made by the Defense Plant Corp.

A second immediate aim is to further increase electric furnace capacity and finishing facilities to provide the special treatment steels, alloy steels and special finished products necessary for war production.

To rush these facilities to completion, preference ratings just below the top military projects are planned. All other steps possible to rush the program will be taken, according to W. L. Batt, director of the OPM Materials Division.

One now under consideration is to equip an important number of existing blast furnaces with air conditioning units, which can be installed within four or five months without delaying plant operations. It is estimated this will increase pig iron output by 5 to 8 per cent for eight months a year, meaning an additional 1,000,000 to 2,500,000 tons a year. This dry blast process also would result in a substantial annual saving of coke.

Steel expansion projects approved to date, totaling more than 7,000,000 ingot tons, Mr. Batt pointed out, are designed to meet specific needs of war production. These are alloy bars, tool steel bars, cold finished bars, armor plate, special steel castings and steel plates.

Another consideration of prime importance is the increase in Great Lakes ore shipping capacity. Contracts for the construction of 16 new ore boats already have been let by the Maritime Commission.

Detailed reports on steel will be made regularly to the SPAB, Mr. Batt said, based on additional information being gathered by the Iron and Steel Branch.

OPM emphasis will be given to completion of projects now approved or under construction, and additional projects will be recommended as the need for them is demonstrated. Long-range planning is vital in steel because it takes from 18 to 24 months to complete all production facilities necessary for each million ton increase in steel output.

Timing of the building of various units and the amount of tonnage which may ultimately be required will depend, Mr. Batt said, on the turn of war in various parts of the world.

Nine Top-Flight Steel Executives Join OPM Iron and Steel Branch

Reorganization of the Iron and Steel Branch of the OPM Materials Division was effected last week, with the appointment of nine top-flight steel industry executives to the division as full time consultants.

These men, some of whom are already on the job, will devote their time to specific problems arising in connection with the various iron and steel divisions.

Charles E. Adams, chief of the Iron and Steel Branch, will be assisted by the following as consultants:

J. L. Block, executive vice president, Inland Steel Co., Chicago.

Norman W. Foy, general manager of sales, Republic Steel Corp., Cleveland.

George G. Gries, vice president in charge of sales, Great Lakes Steel Corp., Detroit.

J. V. Honeycutt, assistant vice

president, Bethlehem Steel Co., Bethlehem, Pa.

C. H. Longfield, general manager in charge of sales, Youngstown Sheet & Tube Co., Youngstown, O.

J. H. McKown, assistant vice president, United States Steel Corp., New York.

Arthur V. Wiebel, chief engineer, Pittsburgh district, Carnegie-Illinois Steel Corp., United States Steel Corp., Pittsburgh.

Melvin W. Cole, Bethlehem Steel Co., has been appointed special adviser on plates.

W. G. Hume, general manager of sales, Pittsburgh Steel Co., has assumed similar duties in connection with wire rods and cold-rolled bars.

The Iron and Steel Branch is one of the OPM divisions transferred to the recently completed temporary building opposite the Social Security building.

Regulations Governing Extension of Ratings on Small Orders Simplified

■ NEED for speeding up production has prompted the Priorities Division to streamline and simplify regulations governing the extension of preference ratings on orders involving less than $500 worth of material.

Such orders amount to approximately 60 per cent of the total number of extensions handled in the field by the Army and Navy contracting officers, although these small orders amount to only about 2 per cent of the total dollar value covered by all certificates.

Under the previous system a manufacturer who wanted to extend a preference rating had to go to the appropriate contracting officer and have him fill out and authenticate a PD-3 form in order to extend his rating to a supplier.

This system still holds for extensions of ratings in transactions over $500.

Under the new system, however, a manufacturer who wants to extend an Army or Navy preference rating to obtain material valued at less than $500 may attend to the extension himself, without the necessity of having a contracting officer go through the previous routine requirements.

This new streamlining privilege, however, may be used only if the material to be obtained with the rating is to be physically incorporated in the finished product covered by the certificate being extended.

To make such an extension, the manufacturer involved will certify on his purchase order the rating applicable, the name of the issuing bureau, the number of the prime contract, the serial number of the certificate being extended and will type on the purchase order the wording of Paragraph No. 3 of the PD-3 Form, which reads as follows:

"I hereby certify (a) that the material specified in this certificate is essential for completion of the contract(s) cited herein, (b) that the specified quantities are not greater than required for said contract(s), and (c) that the specified *delivery date*(s) in the installment delivery schedule on the face of this certificate (or appended hereto) are not earlier than actually necessary for completion on time of said contract(s).

(Signed)_____"

This endorsement on the purchase order must be signed by the manufacturer but need not be countersigned by a government official where the amount is less than $500 and the material is to be physically incorporated.

Copies of purchase orders so certified must be distributed by the manufacturer as follows:

One to the supplier of the material in question;

One to the supply arm or bureau of the Army or Navy initiating the prime contract; and

One to the director of priorities in Washington.

Priorities Division Limits Melting of Alloy Iron, Steel

Under an amendment to general preference order M-21-a, effective immediately, producers are prohibited from melting any alloy iron or alloy steel containing specified alloying elements in specified amounts except to fill orders with a rating of A-10 or higher, or by special direction of the Priorities Division.

On Jan. 1, a further prohibition under this amendment becomes effective against delivery of such materials except on the same terms and a further prohibition becomes effective that the director of priorities may issue orders permitting or disallowing specific deliveries. The director also may issue orders governing the amounts of any alloying material to be issued in the production of any alloy steel or alloy iron.

Alloy iron or alloy steel containing any of the following elements in the following amounts are covered by today's amendment: Manganese in excess of 1.65 per cent; copper in excess of .60 per cent; chromium in excess of .60; molybdenum in excess of .60; nickel in excess of .60; cobalt, tungsten or vanadium in any amount specified or known to have been added to obtain a desired alloying effect.

OPM Requisitions Materials Held for Foreign Account

Requisitioning of more than $1,000,000 worth of critical scarce materials held in warehouses and railroad terminals for shipment to foreign countries was announced today by Director of Priorities Nelson. The seizures were the first under the property requisitioning order signed by the President Nov. 19.

Property seized included more than 13,000,000 pounds of steel in bars, plates and shapes, 3,500,000 pounds of electrolytic copper, 34,000 pounds of tin and other materials. All steel stocks seized have been located during the recent survey by OPM of so-called immobilized inventories. Most of the material was taken over by the Navy Department, including copper, tin and a quantity of teakwood. Owners of the seized materials were mainly firms in Holland, Switzerland and Sweden which had placed their orders before the outbreak of the war and they will be compensated under regulations approved on Dec. 8. It is expected that further requisitioning of idle materials will be made through the Army, Navy and Maritime Commission, with the approval of OPM, and by OPM.

Speed Production of Power Units for Navy

■ Steam turbines rapidly being built to drive the nation's two-ocean navy and expanded merchant marine would produce enough power to supply electrical needs of all Atlantic seaboard states from Maine to Florida, according to Ralph Kelly, vice president in charge of sales, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Addressing the New York section of the American Institute of Electrical Engineering recently, Mr. Kelly said, "If a rough total is made of all the horsepower in turbines being built for the United States Navy and the merchant marine, it will amount to something like one-half of the present installed turbine capacity of the public utility industry."

In addition to ship turbines, electrical manufacturers are building land turbines and waterwheel generators whose power output will exceed 5,000,000 kilowatts of electricity.

LABOR

Rules Waiting Time During Blackout Not "Hours Worked"

■ TIME spent by employes on the premises of an employer covered by the wage and hour law during blackouts or air raid alarms where no work is done need not be compensated for as "hours worked," Acting Administrator Baird Snyder, Wage and Hour Division, U. S. Department of Labor, has ruled.

Plants producing war materials should be exempt from practice blackouts and air raid warning rehearsals after sufficient drill and provision of satisfactory blackout precautions, the Office of Civilian Defense declared last week.

The agency announced that industrial plants should not be evacuated and suggested that proper shelter be provided for workers in case of actual raids.

Guards, Watchmen Covered by Fair Labor Standards Act

The federal government, states, counties, municipalities or other political subdivisions of states are not "employers" under the fair labor standards act; and men hired as guards by states or political subdivisions during the war emergency may be employed without respect to the requirements of the wage and hour law, Baird Snyder, acting administrator of the wage and hour division, has ruled.

Numerous inquiries reached the division recently on the requirements with respect to the employment of special additional guards by cities, utilities, and other employers.

Where employers other than the political subdivisions either employ additional guards or, because of the lack of available man-power, lengthen the hours of guards already employed, the wage paid to such guards as are engaged in interstate commerce or in the production of goods for commerce, must meet the minimum requirement of 30 cents an hour—that is, $12 for a 40-hour week—unless a wage order sets a higher hourly rate (not over 40 cents an hour or $16 a week) for the industry. Time and one-half the hourly rate must be paid for hours worked over 40 each week. Guards or watchmen hired by employers who are in commerce or producing goods for commerce, and whose work it is to protect such activities conducted by their employers, are subject to the fair labor standards act, the courts have held, even though they do no productive work.

Gary Tries a Blackout

CHICAGO

■ Co-operating with the United States Army, Carnegie-Illinois Steel Corp.'s Gary, Ind., works is conducting "daytime blackouts" to determine how effectively the plant can be concealed rapidly from enemy bombing planes by throwing a gigantic smoke screen on all sides and top.

The plant extends three miles along Lake Michigan, and about 1½ miles wide. First experiment, only partially successful, was tried Dec. 18. The smoke screen is developed, it is understood, by tar and wet coal in the furnaces. Switch engines also were used as smudge pots. Another test will be made Dec. 22.

Republic Aviation Working on 24-Hour, Seven-Day Week

In compliance with the request of the War Department, Republic Aviation Corp. has inaugurated a three-shift "around-the-clock" seven-day work week.

"The Republic Aviation Corp. plant with the help of the War Department has been placed on a full wartime footing," President Ralph S. Damon said. "All steps which are humanly possible have been taken to assure the utmost in production results and the maximum of protection for our property. While awaiting word of the performance of Republic planes in the Pacific area, our entire organization is determined to spare no sacrifice or effort to provide every possible reinforcement in equipment to the air forces."

Arrangements for the change to the new 24-hour production schedule were completed in less than 48 hours.

Pennsylvania To Issue Daily Reports on Material Shortages

HARRISBURG, PA.

Pennsylvania Department of Labor and Industry has announced it will make daily reports on the effect of material shortages on industry and employment throughout the state.

Preliminary surveys show unemployment has already begun to increase as a result of inability of manufacturers to obtain materials, about 15,000 workers now reported idle among 114 representative employers contacted for the survey. The state-wide studies will be carried out by the field offices of the state employment service, and as a by-product will report companies able to take defense work but without orders as yet.

Jap Bombers Wreck Honolulu Business District

■ This charred and smoldering mass of wreckage was, until the Japanese attack on Honolulu Dec. 7, a prosperous business section on the Pacific island. NEA photo, passed by United States censor

$225,000 for Employes

■ Acme Steel Co., Chicago, strip steel producer, recently announced that Christmas checks totaling $225,000 will be distributed to its employes. The equivalent of two weeks' pay will be given to those who have been with the company more than six months while those employed after July 2, 1941 will receive one week's pay.

10 to 20 Per Cent Saving in Lead Supply Possible by Conservation

■ WAYS in which lead may be conserved are outlined in a report by the advisory committee on metals and minerals, National Research Council, National Academy of Sciences.

Committee estimates the total direct war needs will not require more than 20 per cent of the total available lead and points out that production could be increased by raising lead prices.

Because of the large number of small uses for lead and the importance of the large uses, restrictions on the use of lead will entail considerable hardship. In view of the availability of smelting and refining facilities, some arrangement by which lead miners can work more than five days a week, thus increasing the domestic supply of metal, appears the most applicable method of procedure in this particular case. Until this is done, there will be lack of incentive to conserve and substitute.

Pending a suitable increase in the supply, it appears that saving can be accomplished by:

1. Limitation of the use of lead foil.
2. Substitution of other pigments for white lead as fast as substitutes become available, (or possibly limiting the use of all white pigments).
3. Reduction of cable sheathing thickness.
4. Elimination of ornamental die castings and gadgets.
5. Restrictions in building uses and revamping of building codes.
6. Substitution of asphalt or other paint for some uses of red lead.
7. Reduction in amount of lead per storage battery.

Such conservation and substitution measures might save a total of some 10 per cent, or around 100,000 tons annually, as soon as they can be put into effect and ultimately, perhaps, up to 15 or 20 per cent when all have been carried to the limit.

Experts generally agree increased lead production can be stimulated by an increased price for pig lead. Both foreign production available for importation and domestic production could, in their opinion, respond to price stimulation. Regardless of what inducements are necessary to expand the production, the bald fact stands out that the domestic lead-producing facilities are not being used to capacity. Whatever steps are necessary to reach capacity production should be taken.

Reclaimed Rubber Prices Frozen at Nov. 5-Dec. 5 Levels

Ceiling prices for reclaimed rubber, most important substitute for crude rubber, have been established at levels that prevailed between Nov. 5 and Dec. 5 in a new price schedule issued by OPA.

New schedule became effective Dec. 20. Pressure for higher reclaimed rubber prices is growing more acute with the threat to continued crude rubber supplies from the Far East. OPA has determined after investigation that further price advances will not increase supplies.

Du Pont Agrees To Maintain Present Sulphuric Acid Prices

The Grasselli Chemicals Department of E. I. du Pont de Nemours & Co., one of the largest producers and sellers of sulphuric acid, a key chemical of universal use, has agreed with OPA to continue present prices through the first quarter.

New York "Responds" to an Air-Raid Alarm

NEW YORK

■ This town was laughing last week at a demonstration of a new "super-siren."

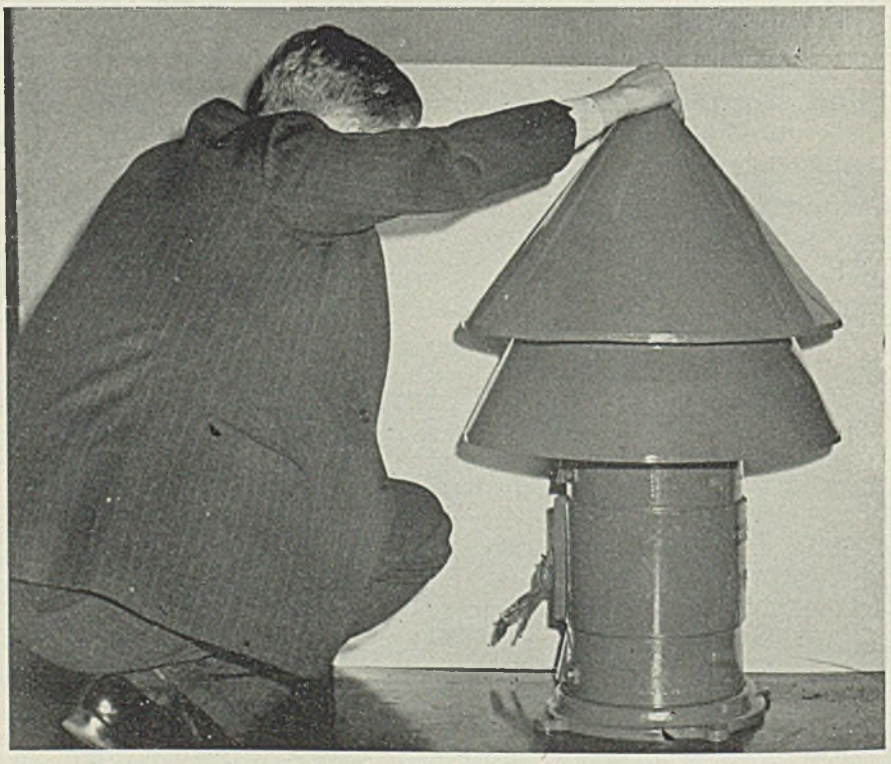
Millions of persons in the metropolitan area braced themselves at 4 o'clock Wednesday afternoon; thousands of air-raid wardens hurried to their posts, extra police were on duty to prevent panic, and "the Little Flower" stationed himself "across the Brooklyn bridge" —when a terrific sound was scheduled to be heard. The siren was mounted atop a truck at Spring and Lafayette streets.

Says the *New York Herald Tribune:* "In Manhattan the siren was as audible as Sandburg's fog. In Long Island . . . as soothing as the call of a hoot owl from a distant ridge . . . In Queens people heard a plaintive mooing sound.

"Instead of a fearsome din the note came as a low-pitched moan. It could be heard faintly three blocks away; not on Fifth avenue, nor in Times Square, nor in police headquarters."

The mayor did not hear the sound; returned sadly.

He said: "We'll have to get a large number of local sirens until some better central alarm system is devised."



The demonstrator said: "It was only an experiment, anyway." His engineer: "The steam was wet."

Perhaps, what we need here is a good old-fashioned Great Lakes fog horn.

Recondition Delaware River Blast Furnace

■ Rehabilitation was started Dec. 12 on the Chester, Pa., blast furnace formerly owned by Delaware River Steel Co. The stack will be operated by a newly formed company, Pittsburgh Ferromanganese Co., a subsidiary of Pittsburgh Coke & Iron Co., Pittsburgh.

Reconditioning will probably take 5 to 6 months, it was reported last week. When completed, the stack will be blown in on pig iron, although it is expected eventual output will be ferromanganese.

By-product coke will be supplied from ovens being built for Philadelphia Electric Co. on an adjacent property. Coke ovens are expected to be in production by March.

Financing has been approved by Reconstruction Finance Corp., the total cost including property being about $927,000. Defense Plant Corp. will retain title, Pittsburgh Ferromanganese operating under a lease.

Wade Oldham, formerly district manager for Republic Steel Corp., at Birmingham, Ala., has been appointed plant manager.

Report Cumberland Stack Being Repaired

■ Preparations are being made to bring into operation in the near future the Cumberland Furnace, Tenn., blast furnace, last reported as owned by Warren Iron Co., Nashville, Tenn. The plant, said to have been the first of its kind erected south of the Ohio river, has been operated intermittently for considerably more than one hundred years, some reports say since Revolutionary war days.

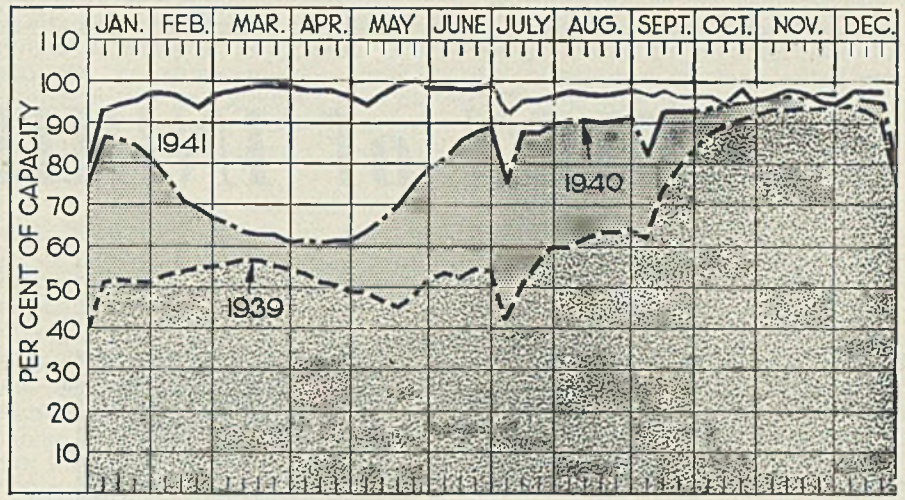
The present furnace was built in 1892 on the site of an older stack, was last rebuilt in 1899, last relined in 1929 and last operated in the latter year. It is 60 feet high, with 9-foot hearth and 13-foot bosh, and has an annual capacity of 15,000 gross tons ferrophosphorus.

The earlier stack, for which records are available, was built in 1825, and was 35 x 10½ feet, with annual capacity 4000 net tons.

Ore was formerly furnished from the company's Cumberland Furnace ore mines, also long idle.

Cancel Traffic Dinner

■ John B. Keller, assistant general traffic manager, Koppers Co., and president of the Traffic Club of Pittsburgh, announced that the board of governors of the club has canceled its annual dinner "in order that all could better direct their energies and efforts to production and transportation in the war effort."



PRODUCTION . . . . Steady

■ PRODUCTION of open-hearth, bessemer and electric furnace ingots last week was unchanged at 97½ per cent. Four districts gained, three declined and five held the rate of the previous week. A year ago the rate was 95 per cent; two years ago it was 90½ per cent.

St. Louis—Dropped 5 points to 91 per cent as one open hearth was taken off for repair. Scrap shortage still threatens.

Buffalo—Held at 79 per cent with prospect scrap supply will support this rate well through January.

Chicago—Increased 1½ points to 103 per cent, only ½-point below the alltime high established the first week in November. Several repaired open hearths have been lighted. A new record is expected this week.

Detroit—Unchanged at 90 per cent in face of dwindling scrap reserve.

Cincinnati—With two mills operating all open hearths, steelmaking gained 4 points to 95 per cent, the highest rate since March.

Birmingham, Ala.—Return of an open hearth by Republic Steel Corp. raised the rate 5 points to 95 per cent.

Central eastern seaboard—Steady at 87 per cent, with a smaller drop than usual expected Christmas week.

Cleveland—Larger production by one interest more than balanced a reduction by another, the rate advancing ½-point to 94½ per cent. A slight drop is expected this week.

New England—Continued at 84 per cent with an increase probable this week.

Pittsburgh — Repairs to open hearths caused a drop of 2 points to 96 per cent.

Wheeling—Declined 3 points to 91 per cent due to need for furnace repair.

Youngstown, O.—Production continued at 92 per cent for the third week, with 71 open hearths and three bessemers active. Only scrap shortage prevents a higher rate. Next week the schedule is for about 80 per cent, Christmas interruption cutting output. Youngstown Sheet & Tube Co. will not suspend and Republic Steel Corp. will keep some open hearths on at Warren, O., but all other units will be idle 32 to 40 hours.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended Dec. 20	Change	Same week 1940	Same week 1939
Pittsburgh	96	— 2	95	91
Chicago	103	+ 1.5	97.5	92
Eastern Pa.....	87	None	95	85
Youngstown ...	92	None	91	91
Wheeling	91	— 3	98.5	85
Cleveland	94½	+ .5	86.5	87.5
Buffalo	79	None	93	79.5
Birmingham ..	95	+ 5	97	94
New England..	84	None	100	89
Cincinnati	95	+ 4	87	82
St. Louis.....	91	— 5	87.5	77
Detroit	90	None	96	90
Average	97.5	None	95	90.5

Steelmaking Operations To Be Maintained Christmas Day

PITTSBURGH

All steelmaking operations will be maintained on Christmas day by most steel companies, with workers being paid time and a half regardless of whether or not they are employed on continuous operations which are exempted from holiday overtime by union contracts. Certain primary mills will operate, although finishing mills generally will be idle.

MEN of INDUSTRY

■ **T. M. GIRDLER,** chairman, Republic Steel Corp., Cleveland, will accept the position of chairman and chief executive officer of Vultee Aircraft Inc. and Consolidated Aircraft Corp. He will continue as chairman of Republic, but will spend such time as may be necessary in heading the aircraft companies.

♦

H. R. Coward has been appointed manager of conduit sales, Steel and Tubes Division of Republic Steel Corp., Cleveland, effective Jan. 1. He succeeds **H. H. Benfield,** who has joined the Bull Dog Electric Products Co., New York. Mr. Coward joined Steel and Tubes in 1932, working out of Kansas City, Mo., and in 1937 was transferred to the Chicago office as assistant Midwest sales manager in charge of conduit sales.

♦

Henry B. Duffus, formerly supervisor of safety and plant protection at the East Springfield, Mass., works of Westinghouse Electric & Mfg. Co., has been appointed mechanical safety engineer in the headquarters medical department at East Pittsburgh, Pa. His duties will include safety work at the 24 plants and 33 district manufacturing and repair departments of Westinghouse throughout the country.

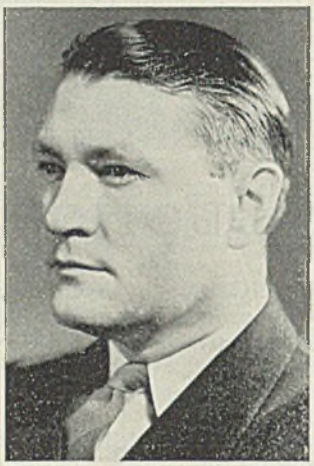
♦

T. Lane Watson has been appointed manager of sales, Cincinnati district, Carnegie-Illinois Steel Corp., succeeding **William P. Andrews,** who has become manager of sales, Cleveland district. Mr. Watson has a continuous record of service with United States Steel Corp. subsidiaries since 1910, when he was employed at Pittsburgh. Since April, 1938, he has been assistant manager of sales, Chicago district.

♦

Jay T. Osler has been elected chairman of the board, Continental Roll & Steel Foundry Co., East Chicago, Ind., to succeed the late Albert Pack. He will continue as president. **John W. Hubbard,** chairman, Hubbard & Co., Pittsburgh, has been elected a director to succeed Mr. Pack.

Other newly elected directors include **G. N. Herman,** vice president in charge of sales; **M. G. Sternberg,** vice president in charge of operations, and **G. D. Patterson,** partner in the law firm of Winston, Strawn & Shaw, Chicago.



H. R. Coward

Henry B. Duffus

T. Lane Watson

♦

Walter Geist, vice president and general representative, Allis-Chalmers Mfg. Co., Milwaukee, has been elected a director, York Ice Machinery Corp., York, Pa.

♦

R. G. Webb, since Feb. 1 assistant division superintendent, Chicago, Milwaukee, St. Paul & Pacific railroad, Lewistown, Mont., has been appointed superintendent of air brakes, with headquarters at the carrier's Milwaukee shops.

♦

Elliott Harrington, the past year sales manager, air conditioning and commercial refrigeration department, General Electric Co., Bloomfield, N. J., has been named manager of sales, induction motor section of the G-E motor division at Schenectady, N. Y.

♦

Paul O. Christy, since Feb. 16 superintendent of equipment, Illinois Central railroad, Chicago, has been named head of the mechanical department to succeed his brother, **George C. Christy,** who is retiring after 42 years' service.

J. N. Fox has been made superintendent of equipment to succeed Mr. Christy. **W. L. Jones** has succeeded Mr. Fox as master mechanic in Jackson, Tenn.; **D. L. McMillan** succeeds Mr. Jones as master mechanic at Champaign, Ill., and **J. W. Martin** has become assistant master mechanic at Markham yard, Chicago, succeeding Mr. McMillan.

♦

W. J. Calnan, H. D. Tietz and **E. A. Turner** have been appointed assistants to **J. F. McNamara,** Monel sales manager, International Nickel Co. Inc., New York. **H. E. Searle,** formerly an assistant to Mr. McNamara as manager, engineering sales, Monel department, has been transferred to the nickel sales department under **R. L. Suhl,** sales manager. **C. J. Bianowicz** becomes head of the chemical section of Monel sales to succeed Mr. Turner.

The titles of manager, engineer-

ing sales, and of manager, sales promotion, the latter held by Mr. Tietz, have been abolished.

♦

Judson F. Stone, for many years a director, International Harvester Co., Chicago, has been elected chairman of the board, to succeed the late Harold F. McCormick. Mr. Stone has been associated with the company 50 years. **J. L. McCaffrey,** vice president in charge of sales, has been elected second vice president and a director. He will continue to exercise direct supervision over sales.

♦

Leigh Willard, president, Interlake Iron Corp., Chicago, has been elected a director, American Iron and Steel Institute, New York.

Bool Retires as Pickands, Mather & Co. Partner

■ Pickands, Mather & Co., Cleveland, last week announced the retirement of Samuel E. Bool from the partnership as of Dec. 31, 1941, after an active association of 54 years.

Mr. Bool was born in Hailsham, England, April 3, 1870. With his parents, he came to the United States in 1872 and attended the Collamer public school, Shaw Academy and Spencerian Business College in Cleveland.

A day before his sixteenth birthday, he was employed by Detroit & Cleveland Navigation Co. as an office boy and soon was promoted to billing clerk.

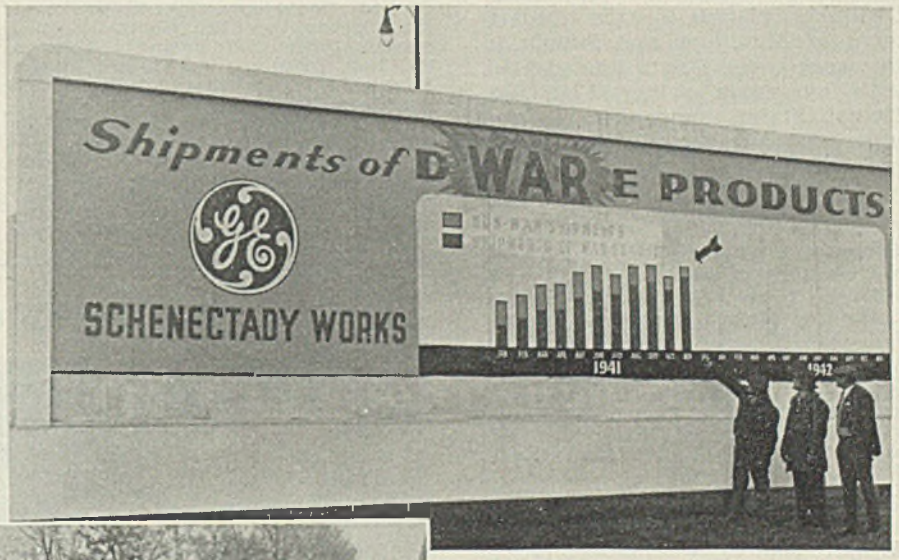
Dec. 8, 1886, he went into the offices of George H. and S. P. Ely in the Mercantile Bank building at Bank and Superior streets, Cleveland. The Messrs. Ely were agents for the Minnesota Iron Co., whose "Minnesota Y," "Minnesota" and "Red Lake" iron ores were taken from mines at Tower, Minn. Mr. Bool's principal duties consisted of obtaining ore cards, showing shipments, consignee, car number and weights from the railroads; entering these data in the ore register; and at the end of the month preparing invoices, etc. He also was charged with handling considerable correspondence, all letters being written in long hand. The typewriter had not yet been accepted for general use, although a machine called the Calligraph was used in some offices.

In 1887, a large stock interest in the Minnesota Iron Co. was purchased by Chicago investors. Among them was J. C. Morse, then president of Illinois Steel Co. and a partner in Pickands, Mather & Co. The agency for the Minnesota company, and with it Mr. Bool and the ore register, were taken over by Pickands, Mather & Co., Dec. 15, 1887.

After serving Pickands, Mather & Co. in many capacities, including bookkeeper, cashier and auditor, Mr. Bool was admitted as a member of the firm in 1923. He has devoted most of his time to financial affairs of the company and its affiliates.

He is a director of several Pickands, Mather enterprises, and also of the Great Lakes Towing Co., Central National Bank, Penton Publishing Co., and other Cleveland companies. He will continue to have his headquarters in the offices of Pickands, Mather & Co.

Industries Keeping in Touch with Public



■ Painters have replaced "Defense" with "War" on this sign outside General Electric Co.'s plant in Schenectady, N. Y., which tells 32,000 workers there and the public of their progress on the industrial front. Darkest portion of each column shows percentage of output for war each month since Jan. 1

■ Left, "Timkenettes", Timken Roller Bearing Co., factory girls, costumed in red, white and blue outfits sold $36,417 worth of Defense Savings Stamps in the commercial and residential district of Canton, O., assisted by a four-day publicity campaign—which earned them a special news release with photo by the Treasury Department, Washington

Canada To Build Magnesium Plant; Output Will Be Allocated to Britain

TORONTO, ONT.

■ CONSOLIDATED Mining & Smelting Co. Ltd., Montreal, has made an agreement with the Canadian government whereby the company will construct and operate a government-owned plant for the production of magnesium. Location of the plant, which is to have an annual capacity of 5000 tons and will be operated without profit to the company, has not been decided.

Plants have been built and are in operation by the company at Trail, B. C., and Calgary, Alta., under similar agreements. The new magnesium plant is expected to be in operation within ten months. It will be built on account of the British government, and production will be allocated to Great Britain.

Chrysler Corp. of Canada Ltd., Windsor, Ont., has been given an order for more than 6000 army trucks, to be delivered early in 1942, according to J. H. Berry, director general of automotive production. Contracts placed by the Department of Munitions and Supply in the week ended Dec. 2 totaled 5450, with aggregate value $17,974,842. United States companies received orders totaling $33,181. The awards included:

Land transport: International Harvester Co. of Canada, Ltd., Ottawa, Ont., $39,750; General Motors Products of Canada, Ltd., Oshawa, $58,524; Chrysler Corp. of Canada, Ltd., Windsor, $7183.

Aircraft: British Aeroplane Engines, Ltd., Montreal, Que., $72,900; Canadian Car & Foundry Co., Ltd., Montreal, $8302; Canadian Wright, Ltd., Montreal, $6915; Drummond, McCall & Co., Ltd., Montreal, $57,844; Railway & Power Engineering Corp. Ltd., Montreal, $6588; Canadian Wm. A. Rogers, Ltd., Toronto, Ont., $5760; Dunlop Tire & Rubber Goods Co., Ltd., Toronto, $14,259; McQuay-Norris Mfg. Co. of Canada, Ltd., Toronto, $30,780; Standard Tube Co., Ltd., Woodstock, $28,011; Prairie Airways, Ltd., Moose Jaw, Sask., $7889.

Instruments: Neptune Meter Co. Ltd., Toronto, Ont., $5720; Research Enterprises, Ltd., Toronto, $630,000.

Electrical equipment: John Hay & Co., Ltd., Eastview, Ont., $6277; Canadian Line Materials, Ltd., Ottawa, $6233; Northern Electric Co., Ltd., Ottawa, $17,917; Canadian Wire & Cable Co. Ltd., Toronto, $12,880; Rogers-Majestic Corp., Ltd., Toronto, $10,536; Federal Wire & Cable Co. Ltd., Guelph, Ont., $20,700.

Machinery: Northern Machine Works, Bathurst, N. B., $6750; Boyles Bros. Drilling Co., Ltd., Vancouver, B. C., $57,740.

Munitions: Allied Brass, Ltd., Montreal, Que., $53,310; Chemicals, Ltd., Montreal, $5700; Dominion Arsenals, Ottawa, Ont., $45,562; Renfrew Electric & Refrigerator Co., Ltd., Renfrew, Ont., $214,425; Canadian Wm. A. Rogers, Ltd., Toronto, $7379.

Metals: Aluminum Co. of Canada, Ltd., Montreal, Que., $116,500; F. Bacon & Co., Reg'd., Montreal, $15,128; Consolidated Mining & Smelting Co., Ltd., Montreal, $7890.

Ordnance: National Research Council, Ottawa, Ont., $30,000; Ford Motor Co. of Canada, Ltd., Windsor, $1,775,147.

Chemicals: Dominion Tar & Chemical Co., Ltd., Montreal, $252,000.

War construction projects: Fundy Construction Co., Halifax, N. S., $126,000; W. E. Emerson & Sons, Ltd., St. John, N. B., $121,900; Stewart Construction Co., Sherbrooke, Que., $119,840; E. G. M. Cape & Co., Ltd., Montreal, Que., $265,000; Connolly & Twizell, Reg'd., Montreal, $78,800; S. F. Bowser Co., Ltd., Toronto, Ont., $137,500; Dominion Construction Corp., Ltd., Toronto, $1,528,000; Tomlinson Construction Co., Ltd., Toronto, $138,000; Armstrong Bros. Construction Co., Brampton, Ont., $164,888; Canadian Bridge Co., Ltd., Walkerville, Ont., $100,000; Fraser, Macdonald Co., Ltd., Winnipeg, Man., $96,466; Bird Construction Co., Ltd., Winnipeg, $603,423; Henry Borger & Son, Ltd., Winnipeg, $214,330; Claydon Co., Ltd., Winnipeg, $470,998; Carter-Halls-Aldinger Co., Ltd., Winnipeg, $177,000; Poole Construction Co. Ltd., Edmonton, Alta., $260,000; W. C. Wells, Ltd., Wilkie, Sask., $223,326.

Miscellaneous: General Steel Wares, Ltd., Ottawa, Ont., $95,260; Hy-Grade Metal Products Co., Guelph, $9589; Viceroy Mfg. Co., Ltd., Toronto, $191,489; Office Specialty Mfg. Co. Ltd., Ottawa, $6706; National Electric Refrigerator Co. Ltd., Montmagny, Que., $8392; Northern Electric Co. Ltd., Montreal, Que., $73,134; Universal Plumbing & Heating Co., Ltd., Toronto, Ont., $15,900; Anthes Foundry, Ltd., Winnipeg, Man., $7873; Assiniboia Engineering Co., and Dutton Bros. & Co., Winnipeg, Man., $38,954; Wismer-Kester Sheet Metal Works, Saskatoon, Sask., $11,215; G. E. Baynes, Vancouver, B. C., $16,000; Sterling Construction Co., Windsor, Ont., $12,000; New Idea Furnace, Ltd., Ingersoll, Ont., $11,000; Dominion Construction Co., Winnipeg, Man., $46,000; McEachren & Strachan, Ltd., Amherst, N. S., $21,000; Enterprise Foundry Co. Ltd., Sackville, N. B., $9000; Magloire-Couchon, Ltd., Quebec, Que., $5000; Partridge-Halliday, Ltd., Winnipeg, Man., $8000; Moncton Plumbing & Supply Co., Moncton, N. B., $16,000; Municipal Spraying & Contracting Co., Ltd., Halifax, N. S., $92,000.

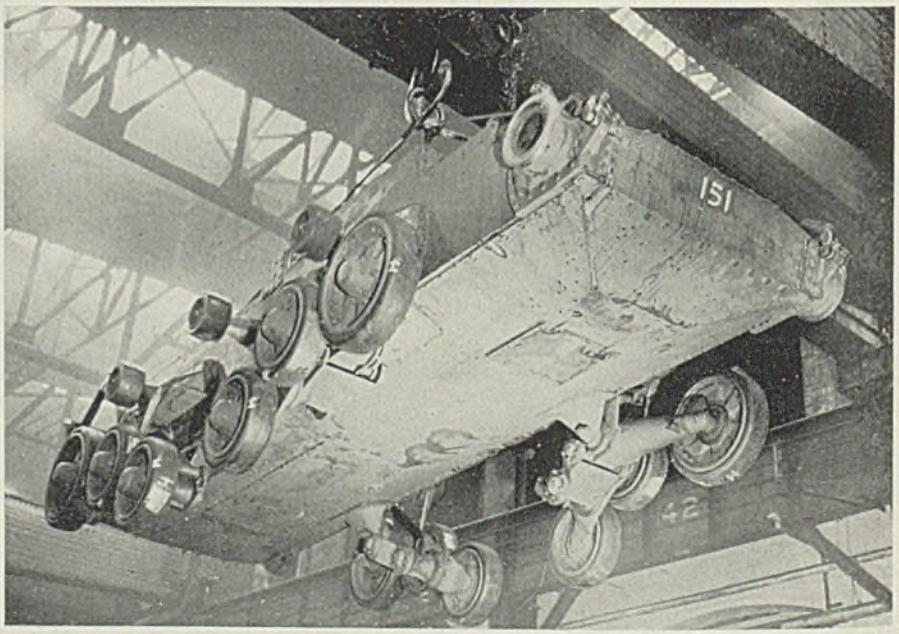
Regulation of Metal Civilian Goods Production Ordered

Order providing regulation or elimination of production of a large number of civilian goods in an effort to conserve steel and other metals for war requirements was issued last week, effective immediately, by Alan H. Williamson, Canada's controller of supplies.

Specifically designated is production of items as bicycles, tricycles, joycycles, children's wagons and cars made of metal. Ice skates, roller skates, metal beds and other furniture, novelties, electric broilers, fans, grilles, irons, mixers, percolators, toasters, electric tea kettles, waffle irons and other electrical appliances for household use are also included.

Other articles affected by the order: Toys, in which metal of any kind other than precious metals is the component material of greatest volume or value, commercial laundry and dry cleaning machinery, metal signs, metal wastepaper baskets, trays, smoking stands, ornaments, metal lockers, metal fencing, metal coffins, all metal furniture, all sewing machines, metal trunks, and many other articles of which

Looking Up at a Valentine



■ Belly of a "Valentine" tank comes into view as it is hoisted by crane on the assembly line in Angus Shops, Montreal. Public Information photo, passed by Canadian censor

metal is the principal component.

J. H. Berry, motor vehicles controller, also issued an order forbidding use of any metal finish or body trim containing copper, nickel, chrome or aluminum in production of passenger cars and trucks and in replacement parts and accessories. Order becomes effective Jan. 15, 1942. Sole exception to the ruling will be plating of bumpers and bumper guard assemblies.

1941 Nickel Consumption, Production at New Peak

■ World nickel production and consumption in 1941 are at an all-time high, according to Robert C. Stanley, chairman and president, International Nickel Co. of Canada Ltd., Copper Cliff, Ont. Sharp increase in demand arising from the joint allied war effort, he said, has required nickel production far beyond anything experienced in the past.

United States consumed more than two-thirds of the world's total nickel output in 1941, compared with an average annual consumption of about one-third in recent years. It is estimated steel mills in United States are consuming about 70 per cent of refined nickel imports. Foundries are reported taking 7.3 per cent, brass mills 6.5 per cent, heat resisting and electrical resistance alloys 4.6 per cent, electroplaters 2.5 per cent, with the rest used in a wide variety of other products.

All International Nickel mines and smelters have operated at capacity this year. To increase its nickel production 50,000,000 pounds annually over its 1940 rate, the company has undertaken an expansion program involving expenditure of approximately $35,000,000.

United States Contract Opportunities . .

■ More subcontract opportunities, not heretofore published in STEEL, were issued last week by district offices of the Contract Distribution Division, OPM. All qualified manufacturers possessing the necessary facilities for efficient performance of the work offered, and who are not already engaged to capacity upon war orders, are asked to participate to the best of their ability.

Additional information concerning any specific item reported here may be obtained either from the office which issued the opportunity notice or from the prospective subcontractor's nearest district office. Samples or drawings of most of the desired articles are available for personal examination at the district offices. The opportunities:

Division of Contract Distribution, OPM, Union Commerce building, Cleveland, is seeking subcontractors for the following work:

72-1211: Manufacturer wishes to subcontract machining and heat treating of parts made of chrome molybdenum, chrome nickel forgings and bar stock. Equipment indicated requires heavy and medium duty turning and boring, milling horizontal and vertical, light and medium drill press, short arm radial press, broaching, external, internal, plain and rotary type surface grinders, 2-inch bar boring mill. Tolerances medium and close. Blueprints are in this office.

Minneapolis office, Division of Contract Distribution, Rand Tower, reports the following subcontracting opportunities:

S.O. 140: Local manufacturer requires available capacity on the following machines: No. 2 and No. 3 millers; surface grinders; turret lathes; vertical boring mills.

S.O. 141: Cedar Rapids, Iowa, manufacturer requires subcontracting in heavy metals industry, including fabrication, machine shop, assembly and welding facilities. Requires milling machines, turret lathes, drill presses for machine shop. Fabrication requires bending brakes and rolls, flame cutting and hand forging equipment.

S.O. 142: Minneapolis prime contractor requires subcontracting assistance on the following: Small to medium size hand screw machine products from ⅜ to 3 inches, both bar feed and chucking; hand milling machines and small to medium power milling machines; sensitive drill press; accurate tapping for class 3 fits; forgings. Material is brass, bronze, aluminum, stainless steel and various alloys. Tolerances 0.0004 to 0.005 inch. Quantities in multiples of 5000.

Chicago office, Division of Contract Distribution, 20 North Wacker drive, reports the following subcontracting opportunities:

NEW-A-1212: A large manufacturer of precision timing equipment requires 250 special machines to be built in 19 types. Work is suited for precision machine and tool shops accustomed to small and medium-size work. Priority rating is A-1-a. Contact this office for information and examination of prints.

CAT-N-1202: A prime contractor desires to subcontract long screws in substantial quantities. Equipment required includes automatic screw machine to turn lengths starting at 7 13/16-inch over-all, through a step range to approximately 12 inches; drill press with ½-inch capacity in steel, and Landis bolt threader or equivalent. Heat treating equipment desirable but not essential. Average stock requirements ¾-inch square SAE 1045.

Pittsburgh office, Division of Contract Distribution, OPM, Federal Reserve Bank building, is seeking contractors for the following work:

CBC-43: Local prime contractor is interested in finding sources equipped to produce the following items: Cylinder head, connecting rod, crankshaft, base, cylinder block, fuel pump plunger, fuel pump cylinder. Requires lathes, planers, boring mills, capable of holding tolerances of plus or minus 0.001-inch required. Drawings available at this office.

RAE-40: Aircraft engine parts requiring precision machining to close tolerances. Include connecting rods in quantities of 6000 to 30,000; crankshaft bearings in quantities of 2000 to 10,000; camshafts, 300 per month; valve springs, 6000 to 15,000. Drawings available at this office.

YC-41: Following operations on ordnance items required: Planing, thread milling, shaping, broaching, milling, profiling, gear shaping, slotting, finish grinding of forgings. Parts to be completely finished include sleeves, 2.27-inches long and 2.28 outside diameter; bushings, .654-inch long, 1.524 outside diameter. Drawings available at this office.

NTC-42: Pittsburgh company requires time on large turret lathes and automatic screw machines. Bar stock 2½-inch diameter. Material is cold rolled steel and steel forgings. Latter have maximum diameter of 6½ inches.

2000 Attend Priorities Clinic at Chicago

CHICAGO

■ Two thousand manufacturers in this district attended the priorities clinic at Palmer House, Dec. 18, under sponsorship of the Chicago Association of Commerce. Five OPM executives from Washington spoke at the opening luncheon and four of them answered questions at group sessions.

Mason Manghum, head of the industrial contact unit, presided at the luncheon. H. K. McCook, chief priorities specialist, materials branch, discussed the restrictions imposed on the distribution and uses of raw materials and the methods for securing these materials to meet essential requirements.

Mr. McCook said manufacturers may expect: A general trend toward the allocation system; allocations to industrial groups, or industries; a much tighter use of raw materials; drastic curtailment in use of essential materials for other than army and navy needs; and more rigorous enforcement of priorities.

A. L. Williams, chief administrator, production requirements plan, explained the new and "streamlined" order to replace the Defense Supplies Rating Plan. To qualify, one must file PD-25A. Discussion of this order included instructions for answering questions on the form and the advantages which will be derived from the flexible and easily-used P-90 preference rating order.

Dr. Harvey Anderson, conservation section relating to scarce materials, spoke also. His remarks paralleled those made at a priority clinic in Cleveland, Nov. 26, and reported in STEEL for Dec. 1.

William Hays, assistant chief administrator, repairs, maintenance, and supplies orders, pointed out that priority aid under these orders is available to many business concerns, in some cases merely by being in businesses defined in the order and in other cases upon application.

Foundry Equipment Sales Index Up in November

■ Foundry Equipment Manufacturers' Association, Cleveland, reports index of net orders closed on new equipment in November was 417.4, compared with 414.2 in October and 372 in September. Index for repairs was 381.7, compared with 327.2 in October and 339.2 in September. Total sales index was 408.5 in November, 403.8 in October, 363.8 in September.

Indexes are percentages of monthly averages of sales to metalworking industries, 1937-39.

"Get in the Scrap," Regardless of Quantities, Urges OPM Chieftain

WASHINGTON

■ ALL-OUT support for a scrap metals salvage program sponsored by OPM was asked of the nation last week by William S. Knudsen, OPM director general. Mr. Knudsen urged that all old metals, regardless of how small the quantities, be collected and returned to the market and thence into military production.

The OPM director's statement:

"In this shooting war our planes, tanks, ships and guns have an enormous appetite for metal. This appetite must be satisfied.

"The drain on our raw materials must be supplemented in every way possible. Most important at this time is the quick return to the market of every pound of scrap metal we can find.

"This scrap, of which there can be a great harvest in industry, must be gathered up and sold at once.

"Every industry, large and small, must get in the scrap.

"Obsolete machinery, old boilers, old gears, pulleys, discontinued patterns, molds, scraps of rods and bars and other steel shapes can be found in thousands of shops and factories.

"Don't think because you only find a hundred pounds or so that it is not important. Get it all back into the market—by the pound, the ton or carload.

"Your country needs it!

"OPM's Bureau of Industrial Conservation has started the wheels turning on an industrial salvage program. I want those wheels to spin!"

Mr. Knudsen suggested the following steps be taken:

"1. Act now.

"2. Appoint a salvage man to ferret out 'dormant' scrap and sell it promptly.

"3. Give him the necessary authority to do a real job.

"4. Bring this problem to the attention of every man in the plant. Encourage this participation.

"5. Make this a continuing program.

"6. Make this your problem.

"You can return to our mills the additional scrap needed to boost production of tanks, guns, planes and ships.

"I expect every shop and factory to see that this scrap gets back into the market to help us do the job we all want done."

Scrap Meeting Deferred

Institute of Scrap Iron and Steel Inc. has postponed for at least 60 days its convention set for Jan. 6-8 at Chicago. A new date will be chosen soon. Meanwhile members "will continue efforts to obtain scrap from all possible sources to relieve the shortage." Test collections from farms in Butler county, Ohio, indicate an average of 500 pounds per farm. This average would bring out 1,500,000 tons from farms of the entire country.

Industrial plants that have scrap but do not fabricate steel are being called on "in an all-out effort to keep the steel mills and foundries going at capacity."

Henderson Cites Another "Scrap Price Violator"

A third important midwestern scrap dealer has been publicly cited by Leon Henderson, administrator of Office of Price Administration, for "frequent persistent violations" of OPA iron and steel scrap price schedule, following a field investigation by OPA. The firm named by Mr. Henderson is the Fort Dodge, Iowa, Iron & Metal Co., several partners of which have been asked to Washington "to explain their actions."

The OPA announcement stated that although the violations are admitted the firm refused to refund the excess and refused to comply with the schedule.

Army Tin Can Scrap To Build 80 Tanks Monthly

■ Sufficient steel to manufacture 80 small tanks each month, or other ordnance in proportion, is being produced from heretofore unusable scrap made available to steel mills by members of the Institute of Scrap Iron and Steel Inc. in co-operation with the War Department. Approximately 1600 tons of scrap is coming from monthly accumulation of food and beverage containers at Army camps. Special [illegible] move the cans and special treatment of the material is being provided by scrap dealers on appeal from the War Department, to help remove the cans, which were piling up inconveniently.

Although tin cans are an inferior grade of scrap which can be utilized only in making steel where specifications are not too exacting, some mills can melt limited quantities compressed into bundles.

The institute reports that scrap consumption declined slightly in November, due to the shorter month and Thanksgiving holiday. Melt for the month is estimated at 4,482,000 gross tons, compared with 4,649,000 tons in October and 3,922,000 tons in November, 1940.

In 11 months this year total consumption of scrap, both home and purchased, has been 48,989,000 tons, an increase of more than 25 per cent over 37,737,000 tons melted in the comparable period in 1940. In the same months in 1939 the total was 28,821,000 tons. Assuming December consumption will at least equal that of November, the 1941 total will exceed 53,500,000 tons. The previous record was 41,687,000 tons in 1940.

Reprints Available

Reprints of the Bill of Rights, appearing this week on page 4, will be made available free of charge in small quantities to readers of STEEL, or at nominal cost for 5 or more copies. They will be printed on heavy stock suitable for framing or for posting on your bulletin boards. Address your request to STEEL, Readers Service Department, Penton Building, Cleveland.

Act To Stabilize Prices of Coke Oven By-Products

Action to stabilize first quarter prices of benzol, toluol, xylol and solvent naphtha obtained from by-product coke ovens has been taken by OPA.

OPA has requested producers that no sales of these products be made during the first three months of 1942 at prices more than 1 cent per gallon over the prices that prevailed during the last three months of 1941. Several of the largest producers had indicated their intention of raising first quarter prices an average of 1½ cents a gallon on a delivered basis.

Benzol is used chiefly to make synthetic phenol and aniline. Toluol, which is under rigid priority control, is the starting point for the manufacturer of T. N. T. and also is used industrially as a dyestuff intermediate. Xylol is used as a dyestuff intermediate and as a solvent. Naphtha is a widely-used solvent.

OPA request is directed only to those producers who recover these chemicals from by-product coke oven "light oil." Chief among these are the large steel plants and gas companies.

OPM Asks Tool Builders To Increase 1942 Output by 50 to 100 Per Cent

■ BETWEEN $1,250,000,000 and $1,750,000,000 will be spent for machine tools in 1942, William H. Harrison, director of the OPM Production Division, told representatives of about 40 tool building companies in a conference in Washington last week.

The conference was called to inventory present facilities and discuss means of further stepping up machine tool production. One result of the meeting is expected to be substantial increase in the number of man-hours worked each month.

OPM Director General Knudsen pointed out that the new goal represents an increase of from 50 to 100 per cent over 1941 output.

Report Machine Tool Price Ceiling May Be Established

Proposed maximum prices on new machine tools have been circulated in the trade and a formal order is expected to be issued soon. It is reported prices will be set at about levels prevailing in May.

Prices of standard machine tools in November were fractionally higher on the average than in October due to small advances in prices reported by two companies for radial drills and the smaller sizes of punch presses. The Bureau of Labor Statistics' November index of machine tool prices was 119.7 per cent of the August, 1939, level as compared with 119.4 per cent in October. This index, which is nearly 20 per cent higher than the prewar level, is based on data reported to the bureau by machine tool manufacturers.

Average prices for radial drills rose 2.3 per cent and punch presses advanced 0.5 per cent. No price declines were reported.

Metals Reserve Co. To Acquire All Forward Tin

Jesse Jones, federal loan administrator, has announced the Metals Reserve Co. will arrange to acquire all forward pig tin made available as a result of import restrictions on this commodity being imposed by the OPM.

Government Takes Over Tin Stocks, Will Allocate Sales

The government moved last week to take charge of all tin supplies in the United States, including tin afloat, under General Preference Order M-33. The order provides:

All supplies of tin shall be subject to specific allocation by the Director of Priorities. No tin may be sold or delivered without specific permission of the Priorities Division, future imports of tin may not be sold except to Metals Reserve Co. or to a governmental agency and tin now afloat may not be sold except by special permission of Director of Priorities.

The only exception provides that a distributor may deliver to his regular customers less than 5-ton lots subject to Priorities Regulation No. 1. Provisions of regulation No. 1 will be invoked and no deliveries of tin or tin products will be made to fabricators who have ample stocks on hand.

Approximately one year's supply of tin at normal demand levels is now on hand in the United States and careful conservation is expected to make this supply last through any possible emergency period.

A conservation plan limiting the uses of tin and tin lined cans will be issued within a few days. Salvage operations involving the detinning of cans may be undertaken if necessary.

Lower Grade Chrome Ores To Be Utilized

Ferrochromium manufacturers have agreed in collaboration with OPM officials to specification changes to permit use of lower-grade chrome ores as a means of conserving the higher grades. Present specifications calling for 68 to 69 per cent chromium, 4 to 6 per cent carbon and 1 to 2 per cent silicon will be changed to 60 to 63 per cent chromium, 6 to 8 per cent carbon and 4 to 6 per cent silicon.

Change will affect steels running to 3 per cent chromium. Stainless and heat resisting steels containing greater percentage of chromium are not affected. New specifications are practically the same as those in effect during the first World war.

Bomber from Parts Made by Auto Manufacturers Nears Completion

■ FIRST Army bomber assembled from parts fabricated by the automobile industry will roll from the production line of a new $11,000,000 plant at Kansas City, Mo., shortly after the first of the year, several months ahead of schedule.

Tentative plans had been made for a ceremony to mark the beginning of production in the plant that will make the B-25 two-engine bomber. But the urgent need for pushing forward time schedules and working as many man-hours as possible in the aircraft industry has caused the cancellation of the ceremonies.

Time that would have been devoted to preparing for opening exercises will be spent in assembling the first plane and it is expected to be finished ahead of the day set for its coming-out party.

Built and partly equipped by the government, the plant will be managed by North American Aviation Inc. Special jigs and tools were supplied by the company which has its main plant in Inglewood, Calif.

Under the Midwestern bomber assembly program, wing, tail and other subassemblies will be fabricated in plants operated by automobile companies and assembled in other plants managed by aircraft companies.

Subassemblies for the Kansas City plant will be made in the Fisher Body plants at Detroit and Memphis, Tenn. These parts will be shipped to Kansas City for final assembly. About 35 per cent of the parts, however, will be made from raw materials in the plant there.

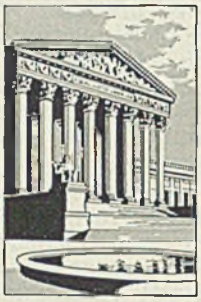
Meanwhile, work is being speeded on other plants included in the program under construction at Tulsa, Okla., Ft. Worth, Tex., Omaha, Nebr., and Willow Run, Mich. Production is scheduled to begin in 1942.

Four-engine Consolidated B-24 bombers will be assembled in the Tulsa plant. Douglas will be in charge of operation and Ford will furnish the parts. Ford also will make parts for the B-24's to be assembled at the Ft. Worth plant under the management of Consolidated, and for the Ford plant at Willow Run.

Chrysler and Goodyear will supply parts for the Omaha plant where the Martin two-engine B-26 bombers will be assembled under the management of Glenn L. Martin.

Windows of WASHINGTON

New maintenance and repair plan issued; P-22 revoked . . . Brainard succeeds Britton as head of OPM Tools and Equipment Section . . . All inventory reports and other requests for information must be filed promptly, Priority Division insists . . . Production of cooking units limited . . . Ceiling prices established for zinc oxides . . . Plate consumers still must file PD-73s



By L. M. LAMM

Washington Editor, STEEL

WASHINGTON

■ DIVISION of Priorities last week issued preference rating order P-100, replacing the Repair and Maintenance Order P-22, which is revoked.

The new order has the same purpose as P-22, to extend priority assistance to manufacturers and producers in maintaining production and essential equipment, but makes a number of liberalizations and clarifies the previous order.

One important modification withdraws the former restriction on acceptance of materials for inventories of maintenance, repair or operating supplies by producers and now permits inventories in stores not exceeding 110 per cent of the maximum dollar volume of such purchases during the corresponding calendar quarter of 1940, in place of the previous limit of 100 per cent.

The same restriction in previous order has been changed to permit withdrawals from inventories of stores up to 110 per cent of the dollar volume of such withdrawals for the preceding corresponding quarter of 1940, or up to 27½ per cent of the dollar volume for 1940.

George C. Brainard

Producers whose aggregate purchases of materials for maintenance, repairs and operating supplies do not exceed $5000 in a calendar quarter or whose withdrawals do not exceed $5000 in the same period are now exempt from restrictions on purchases and withdrawals.

Brainard Succeeds Britton as Tools and Equipment Chief

Mason Britton, chief of the OPM Tools and Equipment Section, has resigned effective Jan. 1, to return to his position as vice president of the McGraw-Hill Publishing Co., New York. He will be succeeded by George C. Brainard, president, General Fireproofing Co., Youngstown, O.

Mr. Brainard is a director, Youngstown Sheet & Tube Co.; director, Addressograph - Multigraph Corp., Cleveland; chairman, Federal Reserve Bank of Cleveland, and has been active in the Contract Distribution Division.

Amory Houghton, Corning, N. Y., glass manufacturer, has been named assistant deputy director of the OPM Division of Materials.

Harry A. Rapelye, Kansas City, Mo., is new chief of the Nickel Branch. Mr. Rapelye replaces Louis Jordan, who has been acting chief. Mr. Jordan will continue on a part-time basis with the branch, devoting the rest of his time to the Research Council of the National Academy of Science.

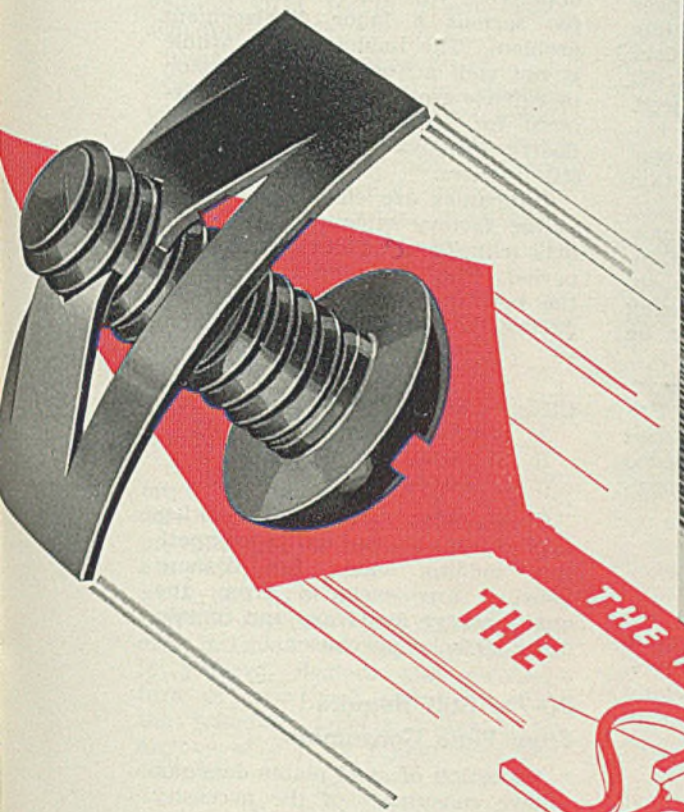
Thomas G. Spates, director of industrial relations for General Foods Corp., has been appointed director of personnel for the OPM.

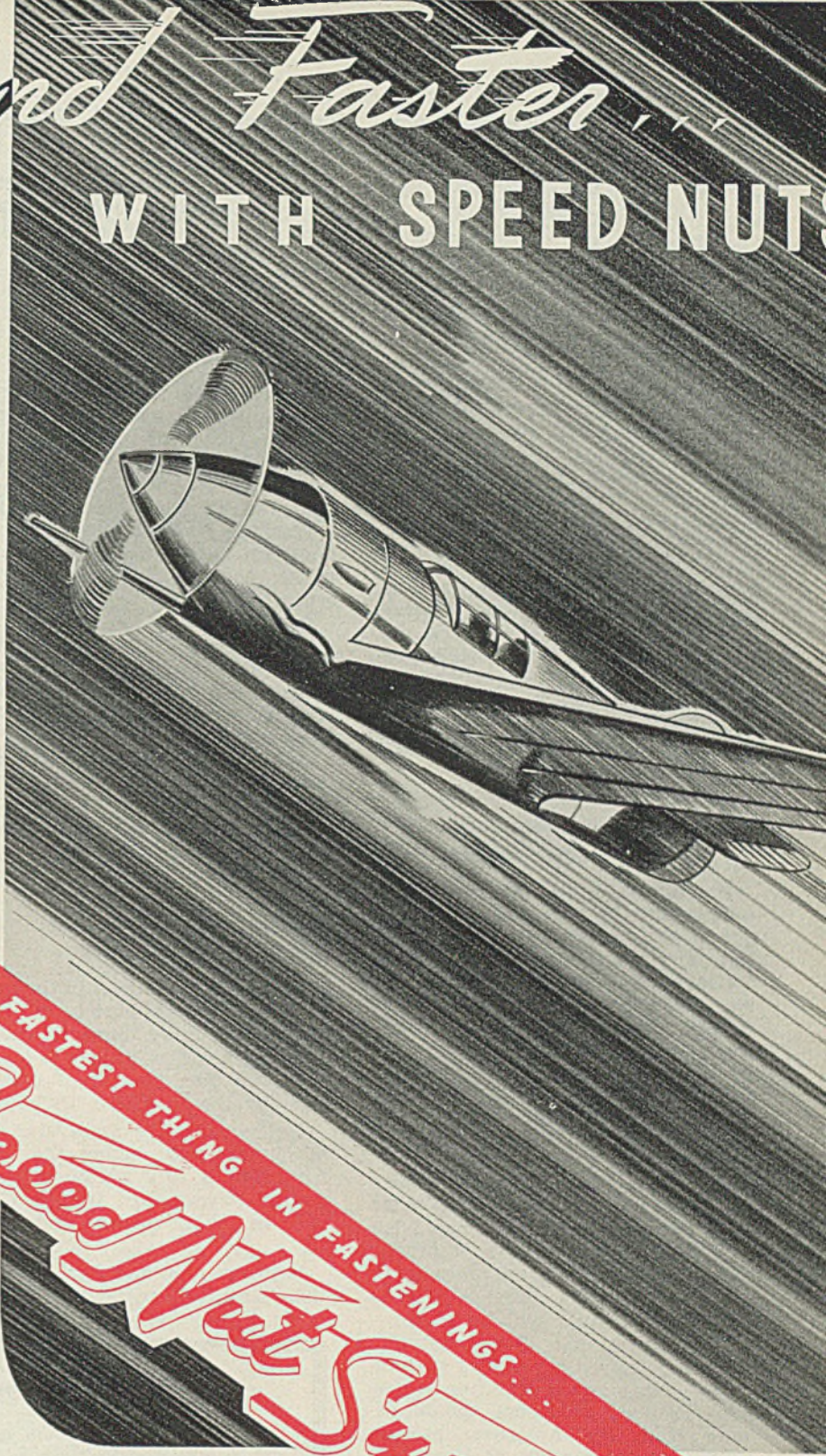
Alden C. Brett, treasurer and comptroller of the Hood Rubber Co., Watertown, Mass., has been appointed acting chief of the Contracts Clearance Branch of OPM, succeeding Hiram Brown, who has resigned to return to private busi-

Highspots of the Week's Washington News

LIGHTER and Faster . . .

WITH SPEED NUTS





THE FASTEST THING IN FASTENINGS . . .

THE Speed Nut System

PATENTED.

. . . answers Weight Reduction Demands

• Every pound saved in aircraft assembly devices assures definite gain in miles per hour.

Amazing as it may seem, the fact is that SPEED NUTS and SPEED CLIPS are saving from 80% to 90% of the former fastening's weight. Think of it! One thousand 8-32 SPEED NUTS weigh a total of only 11 ounces!

What is more, actual aircraft factory vibration tests have proved SPEED NUTS are four times tougher in resistance to vibration-loosening. Time saved in application of SPEED NUTS frequently exceeds 50% and the actual cost per thousand shows savings as high as 70%.

Over 800 shapes and sizes—used on bolts, screws, rivets, studs, tubes, moldings, cables, etc. Send us your assembly details and we will mail samples and engineering data promptly.

TINNERMAN PRODUCTS, INC.

Manufacturers of Patented SPEED NUTS

2039 FULTON ROAD, CLEVELAND, OHIO

IN CANADA:
Wallace Barnes Co., Ltd., Hamilton, Ontario

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Simmonds Aerocessories, Ltd., London

OVER A BILLION IN USE—OVER 800 SHAPES AND SIZES

ness. Robert J. DeCamp, Stamford, Conn., has been named assistant chief of the branch, succeeding Col. H. B. Hayden, who has been transferred to the Office of Co-ordinator of Inter-American Affairs.

Announce First Refund Under Nickel Scrap Price Ceiling

First refund under action taken to enforce maximum ceiling prices on nickel scrap was announced last week by OPA.

A New Jersey dealer has agreed to refund amounts received in excess of the maximum prices on monel metal (nickel) scrap established in Price Schedule No. 8. This dealer sold scrap to a consumer, who needed it for defense orders, on a contract made at the speculatively high price levels prevailing before establishment of the ceiling on June 2. No permit had been sought or obtained for completing the contract at the inflated prices it called for.

Zinc Oxide Producers Asked To Observe Ceiling Prices

Producers of all grades of zinc oxides have been asked by OPA to agree to ceiling prices, effective Jan. 1, as follows:

Lead-free American process oxide, 7.25c; leaded zinc oxides containing 35 per cent or more lead, 6.75c; leaded zinc oxides containing less than 35 per cent, 7.125c; lead-free French process oxides other than USP made from slab zinc or secondary metal, 9.50c; all prices per pound.

Prices for French process oxides is maximum for all grades other than USP and producers may wish to sell less select grades at proper differentials below the maximum suggested by OPA. French process USP oxide ceiling will be 10.50c.

In determining the maximum prices for any other oxides customarily selling below lead-free American process, producers should deduct from the American process price a differential at least as large as prevailed Oct. 1.

One-quarter cent a pound may be added to these prices for less than carload lots. West coast sellers may add a half-cent to maximums on l.c.l. shipments. Oxide sold in barrels commands a quarter-cent more than the maximums.

Industrial Solvent Producers Asked Not To Quote 1942 Prices

Producers of industrial alcohol, butanol, and acetone, essential industrial solvents now covered by OPA ceilings, have been asked by Price Administrator Leon Henderson to refrain from quoting prices for delivery after Jan. 1, 1942, until further word from his office.

The administrator said this action was taken pending completion of steps necessary to insure stability in the market for these products in the light of new conditions created by war.

Priorities Division Insists Reports Be Filed Promptly

Exigences of war make it more important than ever that business and industry comply immediately and wholeheartedly with all orders and requests for information, the Priorities Division has announced.

Warning resulted from a few isolated refusals to report on inventories, needs and uses of certain critical materials.

One firm, which had delayed making a requested report, wired Donald M. Nelson declining to do so, stating that a national emergency was no time to be asking for or filing reports.

In his reply, ordering that the report be made immediately, the Priorities Director said: "Your refusal is unwarranted and has impeded the proper administration of the priorities system."

Curtail Use of Iron, Steel In Stove Manufacture

Use of iron and steel in the manufacture of a wide variety of stoves, ranges and other domestic cooking appliances will be curtailed sharply beginning Jan. 1 under an order issued by the Priorities Division.

Order calls for an average cut of 35 per cent during the period from Jan. 1 to April 30 below the monthly average of iron and steel used in the 12 months ended June 30.

Between now and Jan. 1, use of these critical materials will be frozen at the level of average daily use during the 12-month base period.

Producers affected by the order, numbering about 200, used approximately 500,000 tons of iron and steel in the year ended June 30. The initial curtailment is designed to result in savings of about 58,000 tons in the first quarter of 1942.

Curtailment is based on size of firms, so that many smaller manufacturers located in little southern towns where no defense work is obtainable will not be faced with too serious a labor displacement problem. The industry as a whole is not well adapted for conversion to defense work, lacking the equipment for precision work. The industry employs approximately 60,000 workers.

Companies are classed according to the factory sales value of products manufactured during the base period. The following table shows the percentage cut for each class during the first quarter of 1942:

Class	Factory Sales Value	Percentage Cut
A	$3,000,000 or more	42
B	$1,000,001 to $3,000,000	36
C	$1,000,000 or less	30

Government purchases of cooking appliances obtained on a competitive bidding basis for defense housing are excluded from the quota, as are lend-lease and certain other defense purchases.

PD-73s Still Required From Plate Consumers

Allocation of steel plates does not relieve consumers of the necessity of filing PD-73 forms with suppliers and with the OPM.

In addition to the fact PD-73s are required by law, the information contained in them is necessary in working out allocations, it was explained.

Ceiling Prices Established for All Warehouse-Quantity Steel Resales

WASHINGTON

■ ALL RESALES of iron and steel products in quantities normally handled by jobbers, dealers and distributors have been brought under a price ceiling at levels prevailing April 16, in a new price schedule issued by OPA.

With Price Schedule No. 6, which applied to sales by primary producers, OPA's action means that maximum prices now have been established for iron and steel products at virtually every stage of distribution — mills, warehouses, jobbers, distributors, dealers, exporters, agents, or brokers.

"Object of the new schedule is to end the profiteering which has developed in certain quarters of the steel distribution trade and which is threatening to disrupt the entire steel price structure," OPA Administrator Henderson stated.

Both schedules, No. 6 and the latest, No. 49, use the same ceiling date, April 16, and the same list of iron and steel products. New schedule also covers seconds, rejects, and used products.

While the maximum resale prices are intended to apply primarily to jobbers, dealers and distributors of iron and steel products, the schedule forbids a resale by anyone at a price higher than the ceiling.

Scope Extended

This provision extends the scope of the schedule over various businesses which distribute iron and steel products in the course of their general operations. Plumbing supply houses, hardware jobbers and dealers, industrial supply firms, oil field suppliers and mail order houses are in this category.

To exclude resales of small quantities by hardware stores and other retail outlets, the schedule provides that the maximum prices do not apply to sales of iron and steel products by retail merchants in quantities smaller than those which jobbers, dealers or distributors normally deal in or quote prices on.

For example, sale by a hardware store of a few pounds of nails out of an open keg, or of a short length of pipe, or of a small amount of wire fencing out of a broken bundle are exempted from the maximum prices. However, should the needs of a customer of this same hardware store call for a full keg of nails, a standard length of pipe, or an unbroken bundle of fencing, the store must not price the sale at more than the OPA schedule allows.

Individuals or companies possessing stocks of steel must conform to the price ceiling upon any resale.

Schedule uses the price lists for heavy line and merchant wire products circulated by leading distributors in 23 cities.

A seller located in *any* city or free delivery area may not charge more for an iron or steel product than he charged on April 16. However, sellers in listed cities whose April 16 prices were below those of the published listed prices applicable to such listed cities may apply to OPA for permission to adjust their prices upward to the listed prices.

Some Extras Allowed

Provisions are made to calculate maximum prices for sales in places other than the listed cities; for sales by persons having no prices on April 16; and for "dislocated tonnage." "Dislocated tonnage" is a term applied to sales in areas not normally served by a particular distributor, but which he is now serving because of the emergency.

In the case of resales in the Pacific coast states of California, Oregon and Washington, the schedule permits the addition of 35 cents per hundredweight to the April 16 prices for a restricted list of products. This is designed to overcome transportation problems created by the shipping shortage. Pacific coast sellers are required to file with OPA information on tonnage received both by rail and by water for the first and third quarters of 1941. Forms will be provided for this purpose.

For less-than-carload lots the seller may charge the mill carload price after deducting the regular jobber allowance of 15 cents per hundredweight plus (a) carload freight from mill basing point to warehouse and (b) one of the following: for standard wire nails, 50 cents per hundredweight; for annealed smooth wire, 60 cents per hundredweight; for galvanized smooth wire, 68 cents per hundredweight.

To arrive at maximum selling prices for less-than-carload quantities of these products at any other place, the seller is instructed to use the lowest delivered price that is the result of the less-than-carload price (as computed above) of any seller located in any listed city plus the less-than-carload freight from such listed city.

Maximum delivered prices for all other merchant wire products shall be computed on basis of April 16 prices. Jobbers and dealers shall charge the same extras on merchant wire products as regular published mill extras in effect on April 16 and shall grant customary deductions on the same basis. A special form will be sent to dealers in merchant wire products on which they shall file required price information.

Separate methods are set forth in the schedule for calculating ceiling prices for the following pipe and tubular products: Standard pipe, seamless pipe, water well casing, large O. D. pipe, line pipe, wrought iron pipe, oil country tubular goods, boiler and other pressure tubes, and cold drawn seamless and other mechanical tubing.

Tool steel ceiling prices are based upon those listed in the April 16 price list of Crucible Steel Co. of America.

Schedule provides that prices in excess of mill prices established in Price Schedule No. 6 (Iron and Steel Products) shall not be charged for direct mill shipments of any quantity of iron or steel products; for shipments of any quantity diverted from delivery to warehouse; or for shipments of any quantity not put through the operation commonly known as "warehousing."

Carload shipments out of warehouse stock made up of a variety of items shall not be sold above the maximum delivered price for a 500-pound quantity, minus a discount of not less than $7 per ton.

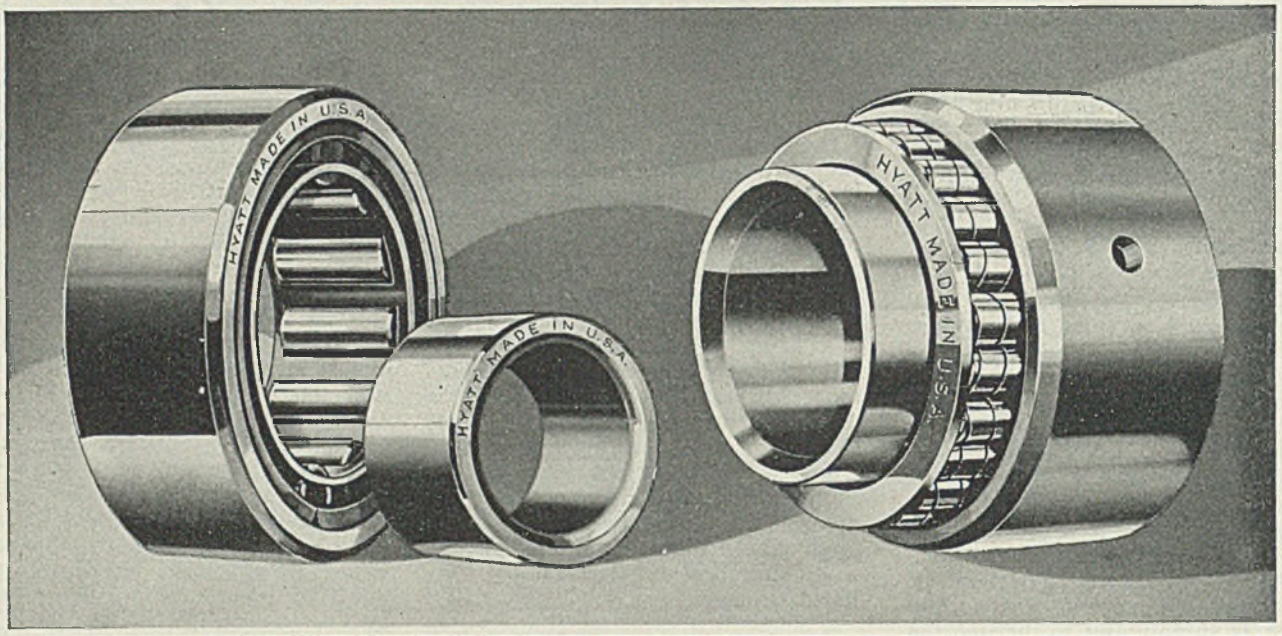
Sales Records Must Be Filed

Mixed carloads of merchant wire products, however, cannot be sold above the published mill base prices set forth in Price Schedule No. 6, but sellers in this case are allowed to retain the regular jobber allowance given by mills. A similar provision is made for sellers of mixed or straight carloads of pipe and tubular products, with a special exemption for sellers of oil country tubular goods.

Records on any sales of 40,000 pounds or more of any wire or steel products to a single customer in any calendar month must be filed with OPA on or before the 15th day of the following month. This record must include a sworn statement giving the names and addresses of the buyers, the product and quantity sold, and the price for each quantity.

Commissions in effect on April 16 may continue to be collected by brokers, agents, etc., except that such commissions must not increase the selling price above the OPA ceiling.

KEEP THEM GOING WITH HYATTS



NO MATTER WHAT THE APPLICATION

Precision built... great in capacity... Hyatts are helping to lighten the loads of all mechanized defense equipment.

Meanwhile, Hyatts still are serving in their regular, and now more essential than ever, role of keeping free from bearing wear and care the machinery which produces this defense equipment.

Therefore remember, today as always, that where the loads are heavy and the going is tough you can depend on Hyatt Roller Bearings for any application.

Hyatt Bearings Division, General Motors Sales Corporation, Harrison, N. J., Chicago, Detroit, Pittsburgh, and San Francisco.

HYATT

ROLLER BEARINGS

QUIET

Mirrors of MOTORDOM

Further curtailment in December passenger, light truck automobile output halts assembly lines. Production to be resumed on "deglamorized" models after New Year . . . Motor industry still faced with herculean task of greater conversion to war manufacture . . . Michigan car plants devoted 14.4 per cent of working time to armament fabrication in October . . . Ford pushing completion of bomber plant

DETROIT

■ AUTOMOBILE assembly lines came to a standstill last week. They will resume after the first of the year on the deglamorized models but at a slow pace which will be in sharp contrast to the swift tempo of early 1941. Detroit, of course, will continue the world's motor capital, but in coming months that role is destined to fade in importance before the rising production in this area of planes, guns, ammunition, tanks and military vehicles.

How to produce the required volume of ordnance quickly and with minimum dislocation of plants and workers now is the industry's headache. Surprise and no little confusion attended the latest cut by OPM in car and light truck output quotas. Production already had reached 125,000 cars for December when the industry was told the month's quota had been reduced from 204,848 units to 153,636. Hence only a few days were required last week to reach the month's maximum figure.

First Major Industrial Casualty

The 50 per cent slash in the January quota from the original peak of 204,848 cars and 24,169 light trucks, plus virtual certainty of a further retrenchment in February, made it evident the automobile was to be the first major industrial casualty of the war. Orders for parts and materials necessarily have been revised or canceled. Advertising has been suspended—but only temporarily—to permit adjustments to meet the new conditions.

How extensive will be the eventual unemployment resulting from the curtailed output is anybody's guess. It will depend primarily upon the rapidity with which not only the motor companies but also their suppliers are furnished war contracts and are able to adapt manufacturing facilities to filling them. In some instances the transition will not prove unduly painful. Steel, the automobile's principal raw material, naturally will not suffer from an overall production standpoint.

To convert even 50 per cent of automotive plant capacity to war production is a tremendous task; a state survey shows that in October, Michigan motor car plants were devoting only 14.4 per cent of their working time to war orders, not including cars and trucks for the armed forces. At the same time 10 of 16 selected major industries were working more than 50 per cent on war orders and five others were using more than 25 per cent of their working hours for ordnance output.

This does not indicate as serious an unemployment problem under the abbreviated quotas as appears at first glance, because the new ordnance plants already built or nearing completion will absorb tens of thousands of workers made idle by the war's blacking out of most of the expected passenger car output.

Nevertheless, these figures support the belief that the government's decision to limit car assemblies more than was originally planned is intended not so much as a move to save critical materials, but as a step preparatory to converting additional plant facilities to filling military needs. This is in line with the recent announcement by Floyd B. Odlum of the Contract Distribution Division, OPM, of plans for adapting a large part of the durable goods industry to war production. Details of just how such a program will be applicable to the automotive industry, and its ultimate size, have yet to be disclosed.

Proud of Record to Date

Motor car interests are proud of their record to date in filling government contracts and, through the Automobile Manufacturers Association, have declared their intention of going along with whatever plans are developed for intensifying war work. However, some observers express surprise that automobile production quotas have been scaled down further so long as operations have not prevented the industry from meeting requested schedules for ordnance output.

Few here look seriously for complete suspension of passenger car production, although quotas beyond January have not been established. It is realized that the motor car is too essential for civilian use in carrying out the war program to cut off the replacement supply completely. Parts manufacturing also must be continued to maintain operation of existing vehicles. Nevertheless, the new order seems likely to result in numerous changes in

Mirrors' Writer Injured

A. H. Allen

■ A. H. Allen, Detroit editor, STEEL, is recovering in St. Joseph Mercy hospital, Pontiac, Mich., from injuries sustained in an automobile accident Dec. 11. Mr. Allen has been analyzing and reporting the news of the motor capital through Mirrors of Motordom since 1937.

During Mr. Allen's convalescence, W. G. Gude, associate editor, Cleveland, will be in charge of STEEL's Detroit office.

original plans for 1942 model production, because costs will be thrown out of line by the reduced schedules.

Obviously, a large part if not all the profit will be taken out of automobile manufacturing which is limited to a monthly output of 114,500 cars and trucks—the January quota—when selling prices are predicated on larger schedules. The natural reaction would be to consolidate manufacturing facilities wherever possible and concentrate on fewer models. It has been suggested that companies like Chrysler, Ford and General Motors might find it desirable to discard makes by all of their various divisions and settle upon one line of cars sponsored by the parent organization—a so-called "Victory" model. Such a step is not in immediate prospect but remains a possibility, dependent upon the extent to which war work eventually absorbs plant facilities.

Employment Lag in Change from Auto to War Work Inevitable

Meanwhile, a certain amount of unemployment is inevitable in this area, because ordnance manufacturing is taking workers more slowly than they are being released by the curtailment in auto output. Complicating the situation are the additional training required by workers starting on certain types of war work and the fact that some of the new jobs are becoming available in localities other than those where motor car output has been cut.

The Detroit area eventually will have the country's largest diversified capacity for producing war implements, and therein lies the principal answer to this unemployment problem. But the process will take time. Discussing the new tank building program by Cadillac and Fisher Body, Alfred P. Sloan Jr. of General Motors recently pointed out that "it must be kept in mind that preparation for highly technical and entirely new production work normally requires a period approaching a year, even though there is no undue delay in procurement of tools and special facilities, and that between the time that production can start and the point of maximum productivity, still further time must elapse."

Ford undoubtedly is setting some sort of a record in the speed with which it is pushing its huge Willow Run bomber plant to completion and into full production. When the latter is accomplished it is expected to employ 60,000 workers. This figure, plus labor requirements of the plant making Pratt & Whitney aircraft engines and the facilities to be devoted to tank building and other ordnance work, would mean no loss in employment compared with the company's former automobile payroll. Incidentally, the CIO claims the bomber plant employment next July will be no more than 20,000.

The Ford bomber plant is being built on a 24-hour daily basis. Roofing now covers a large part, walls are going up and a few more weeks will see the structure practically completed. Some machinery is in place and manufacture of parts has begun, but the enormous job of tooling up the plant and training workers likely will defer the start of mass production until spring.

Automobile Production

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

	1939	1940	1941
Jan.	356,962	449,492	524,058
Feb.	317,520	422,225	509,326
March	389,499	440,232	533,849
April	354,266	452,433	489,854
May	313,248	412,492	545,355
June	324,253	362,566	546,278
July	218,600	246,171	468,895
Aug.	103,343	89,866	164,792
Sept.	192,679	284,583	248,751
Oct.	324,689	514,374	401,360
10 mos.	2,895,059	3,674,434	4,432,551
Nov.	368,541	510,973	. . . . .
Dec.	469,118	506,931	. . . . .
Year	3,732,718	4,692,338	. . . . .

Estimated by Wards Reports

Week ended:	1941	1940†
Nov. 22	76,820	102,340
Nov. 29	93,495	128,783
Dec. 6	90,205	125,690
Dec. 13	95,990	125,625
Dec. 20	65,875	125,350

†Comparable week.

Ford Conducts Preliminary Bomber Planning, Engineering

To speed up production of these bombers, Ford is carrying on preliminary engineering and production planning at the Dearborn plant which formerly produced the old trimotor transport planes. Jigs and dies, already installed, will be used to build ten complete bombers. Classes to train students for jobs in the bomber plant are in progress. This preliminary program is directed by the more than 200 Ford engineers, draftsmen and production experts who spent months at the Consolidated Aircraft plant at San Diego, Calif., working out production methods. This preparatory work is counted on to speed operations materially when the Willow Run plant is ready.

Ford already is delivering Pratt & Whitney engines, but production of the medium tank is not expected to start for about 12 months. These tanks, the M-4, 30-ton model, will be assembled at Highland Park, with fabrication of parts and subassemblies carried out at the Rouge plant. Production of armor plate for these tanks at the Ford steelworks is thought likely. The new steel foundry, to be completed early next year, also will furnish tank as well as airplane parts.

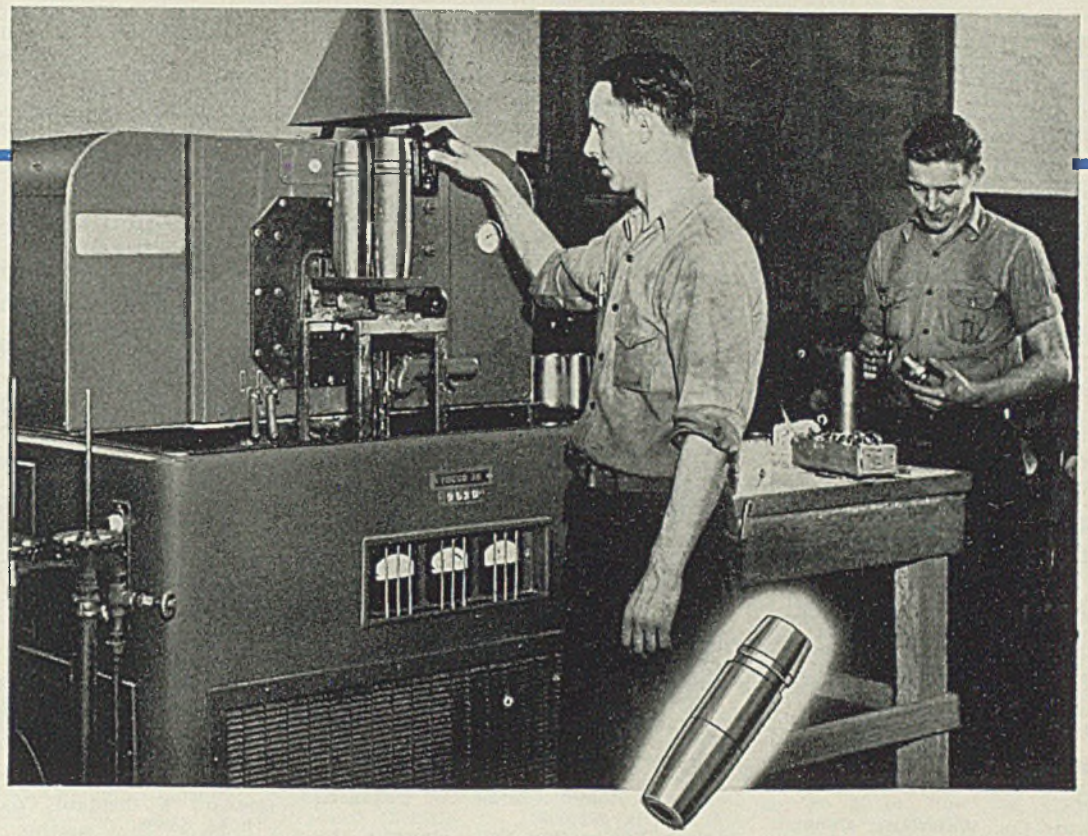
As was discovered long ago, only a limited amount of existing metalworking equipment of automotive plants can be adapted to ordnance production, and then only in the case of certain types of implements. For instance, Chrysler required 1400 machine tools for building Bofors antiaircraft guns. Of this number, the company was able to utilize 400 from its regular automobile production equipment. While 11 different Chrysler plants are contributing to the manufacture of this gun, it was still necessary to build two entirely new parts factories.

There has been no concerted rush by the public to buy new automobiles before the supply dwindles further, although start of declared war probably has been a factor in the indifference reported among buyers in a number of sections, principally in coastal areas. Auto sales departments are stressing the maintenance of reliability of the cars to be built after Jan. 1 shorn of their brightwork, and are striving hard to build up the desirability of the more subdued models. Chrysler publicity went down pretty deep to come up with this one: The new cars will contribute to the safety of their occupants in event of a bombing attack—they won't be so conspicuous to enemy airmen.

Certify Export Products Not Lend-Lease Steel

■ Forestalling criticism is an advertisement of Rolls Razor Ltd., London, England, in the Dec. 14 issue of a New York newspaper. The advertisement certifies all material used in the razor is of British origin and was purchased prior to passage of the lend-lease act.

Considerable comment has been aroused concerning shipments to the United States from Great Britain of articles such as razors, bicycles, and cutlery, simultaneously with imports of lend-lease steel from this country. Britain's explanation is that these articles, though of high unit value, really comprise very small tonnages of steel. They are being shipped here to help liquidate the huge commitments for war materials made here on a cash basis before passage of the lend-lease act.



TOCCO BRAZES SHELLS 12 TIMES AS FAST!

● Armstrong Cork Company, Pittsburgh, Pa., is silver-soldering adapters to noses of 75 m. m. chemical shells at a rate of 25 seconds per shell per operator by TOCCO induction heating. Former methods would require at least 5 minutes per shell per operator . . . 12 times as long as induction heating!

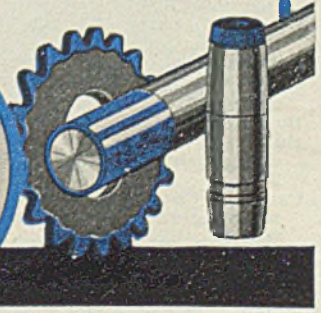
Other TOCCO advantages on this important Defense job: Cost is fraction of that of other methods. Localized heating permits safe handling of shells with bare hands; eliminates fire hazard. Uniform heating assures perfect bond; rejects are nil. No scaling. Operation is clean. Requires floor space only 4 ft. x 3 ft.

Why not investigate the SPEED, ECONOMY, QUALITY of TOCCO for *your* hardening or heating problems.

HOW TOCCO CAN HELP SOLVE YOUR PROBLEMS

1. Cuts heat-treating hours to seconds.
2. Simple push-button operation.
3. Eliminates 5 to 10 operations.
4. Hardens wearing surface only
5. —to any depth—any area
6. —every job uniform.
7. Retains ductility of core.
8. No distortion. No scaling.
9. Safe. Clean. Compact.
10. For hardening or heating wide variety of parts.

SPEEDY ELECTRIC HEAT IS GENERATED WITHIN THE PART OR SECTION TO BE HEAT-TREATED



THE OHIO CRANKSHAFT COMPANY
Cleveland • Ohio

TOCCO
World's Fastest, Most Accurate Heat Treating Process

Ordnance Department Orders in Week Lead Army's $65,000,000 Total

■ CONTRACTS reported last week by the War Department totaled more than $65,000,000. Ordnance department awards again were most numerous, with many of the individual orders for comparatively small amounts. Distribution of the war contracts has been noticeably broader in recent weeks, with more manufacturers sharing in the work. Among orders reported last week were the following:

Ordnance Department Awards

Abel, Robert, Inc., Boston, material for overhead crane and hoist system, $8519.

Acme Bronze Powder Co., New York, flaked aluminum, $2680.

Addressograph-Multigraph Corp., Cleveland, ammunition, $277,332.

Ahlberg Bearing Co., Chicago, tapers, rollers, cups, bearings, $4542.

American Brake Shoe & Foundry Co., American Forge Division, Chicago, forgings, $575,360; Brake Shoe & Castings Division, New York, castings, $3238.

American Brass Co., Waterbury, Conn., phosphor bronze tubing, bronze, $8161.

American Car & Foundry Co., New York, miscellaneous tank parts, $25,806.

American Hardware Corp., successor to P. & F. Corbin Co., New Britain, Conn., ammunition, $140,000.

American Locomotive Co., Schenectady, N. Y., forgings, $23,500.

Atlas Mfg. Co., New York, barrel covers, $23,801.

Autocar Co., Ardmore, Pa., ratchet wrenches, $16,154.

Bakewell Mfg. Co., Los Angeles, tapping machines, $3888.

Baldwin Locomotive Works, Baldwin Southwark Division, Philadelphia, pumps, $13,475.

Barbour-Stockwell Co., Cambridge, Mass., tachometer heads, drills, $14,000.

Barker Tool Die & Gauge Co., Detroit, gages, $9205.

Barwood Co., Philadelphia, gages, $6614.

Bath, John, & Co. Inc., Worcester, Mass., gages, $3007.

Bausch & Lomb Optical Co., Rochester, N. Y., metallographic research equipment, $3197.

Bay State Tool & Machine Co., Springfield, Mass., gun parts, $4926.

Belmont Smelting & Refining Works Inc., Brooklyn, N. Y., copper ingots, $2624.

Bendix Aviation Corp., Eclipse Machine Division, Elmira, N. Y., ammunition, $220,000; Eclipse Aviation Division, Bendix, N. J., electric starters, hand crank housings, and equipment for tanks, $46,245.

Binks Mfg. Co., Chicago, paint spray booths, $5057.

Braeburn Alloy Steel Corp., Braeburn, Pa., steel, $9761.

Briggs & Stratton Corp., Milwaukee, fuzes, $46,620.

Brown & Sharpe Mfg. Co., Providence, R. I., cutters, grinders, milling machines, tools, $61,575.

Budd Wheel Co., Detroit, ammunition, spare parts, $947,567.

Buffalo Forge Co., Buffalo, shears, $7998.

Buffalo Foundry & Machine Co., Buffalo, crystallizing kettles and drives, $437,229.

Canister Co., Phillipsburg, N. J., assembling and crimping machines, $53,300.

Champion Co., Springfield, O., ammunition, $177,320.

Chase Brass & Copper Co., Waterbury, Conn., time train rings for fuze, $354,000.

Chattanooga Stamping & Enameling Co., Chattanooga, Tenn., mines, $64,800.

Chemurgic Corp., Richmond, Calif., ground signals, $100,651.

Chicago Electric Mfg. Co., Chicago, percussion primers, $56,400.

Cincinnati Milling Machine & Cincinnati Grinders Inc., Cincinnati, O., grinding and milling machines, $72,651.

Cincinnati Milling Machine Co., Cincinnati, grinders, $8495.

Cleveland Hardware & Forging Co., Cleveland, forgings and dies, $66,016.

Coleman Lamp & Stove Co., Wichita, Kans., ammunition chests, shells, $492,250.

Colt's Patent Fire Arms Mfg. Co., Small Arms Division, Hartford, Conn., gun components, $44,010.

Columbus Auto Parts Co., Columbus, O., forgings, $1,317,500.

Continental Can Co., New York, packing cans, $2952.

Continental Tool Works, Detroit, tools, $3890.

Crescent Electric Supply Co., Davenport, Iowa, lighting fixtures, $10,715.

Dean Machinery Co. Inc., Chicago, lathes, $56,429.

Defiance Automatic Screw Co., Defiance, O., shells, $73,000.

Denison Engineering Co., Columbus, O., presses, $1,221,304.

Disston, Henry, & Sons Inc., Philadelphia, armor plates, $30,824.

Dravo Corp., Cleveland, furnish and install boiler for power plant, $89,814.

Duff-Norton Mfg. Co., Pittsburgh, forgings, jacks, $535,545.

du Pont, E. I., de Nemours & Co. Inc., Wilmington, Del., powder, $114,064.

Durham Mfg. Co., Muncie, Ind., mines, $61,800.

Easy Washing Machine Corp., Syracuse, N. Y., percussion primers, $84,864.

Electric Auto-Lite Co., Toledo, O., steel cartridge cases, $89,400.

Electric Motor Repair Co., Springfield, Mass., controls, $13,512.

Emerson Electric Mfg. Co., St. Louis, boosters, $117,810.

Engstrom, O. L., New York, punches and dies, $4413.

Everedy Co. Inc., Frederick, Md., practice mines, $78,150.

Farquhar, A. B., Ltd., York, Pa., mortars and mounts, $5855.

Federal Products Corp., Philadelphia, gages, $4680.

Flannery Bolt Co., Bridgeville, Pa., closing plugs, $44,080.

General Motors Corp., Cadillac Motor Car Division, Detroit, tanks, $65,000; Delco Brake Division, Dayton, O., fuzes, $286,200; Detroit Division, bolts, $291,630.

General Tool & Mfg. Co., Irvington, N. J., dies, $33,750.

Gessell, Wm., Mfg. Co., New York, fuzes, $73,242.

Getty, Fred I., Jennings, La., finishing gun tubes, $240,000.

Gibson, G. M., Co., Bellevue, Iowa, oil cans, oil gun caps, $40,914.

Glascock Mfg. Co., Muncie, Ind., mines, $66,000.

Globe Forge & Foundries Inc., Syracuse, N. Y., forgings, $2809.

Goddard & Goddard Co. Inc., Detroit, hobs, $3688.

Greenfield Tap & Die Corp., Greenfield, Mass., gages, $14,002.

Hamlin Metal Products Co., Akron, O., practice mines, $85,500.

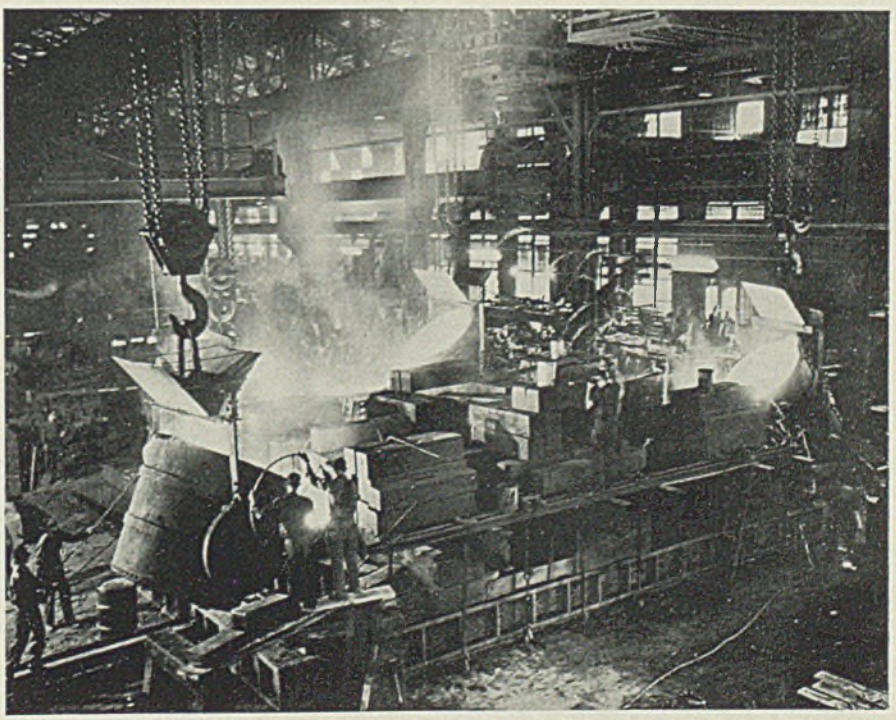
Hanson Whitney Machine Co., Hartford, Conn., milling cutters, taps, thread

War Gives Plane Engine Builders New Incentive

■ General attitude of the nation toward Japan and other Axis powers is illustrated by this and similar signs posted by workers throughout the airplane engine factory of the Ford Motor Co. plant in Detroit. Workmen here, as in many other plants, have made it plain they are working full blast that the Axis may be "smashed." NEA photo

milling hobs, $4215.
Hanssen's, Louis, Sons, Davenport, Iowa, parts for gun carriages, $10,714.
Harding Machine Screw Co., East Liberty, O., percussion primers, $86,000.
Hatfield Wire & Cable Co., Hillside, N. J., wire, $3175.
Hayes, Charles E., Co., Springfield, Mass., fluorescent fixtures, $2953.
Hebard, W. F., & Co., Chicago, cranes, $7935.
Heekin Can Co., Cincinnati, containers, $31,779.
Herper-Wyman Co., Chicago, percussion primers, $34,096.
Hoe, R., & Co. Inc., New York, gun recoil mechanisms, $1,900,876.
Howard Clock Products Inc., Waltham, Mass., pinions, $3750.
International Harvester Co., Chicago, truck tractors and semitrailers, $5696.
Johnson & Dealaman Inc., Newark, N. J., trailers, $4962.
Johnson-Claflin Corp., Marlboro, Mass., gages, $3673.
Johnson Metal Products Co., Erie, Pa., ammunition chests, $452,960.
Kearney & Trecker Corp., Milwaukee, milling machines, $197,884.
Kilby Steel Co., Anniston, Ala., shell machining, $83,993.
Kilgore Mfg. Co., International Flare-Signal Division, Tipp City, O., signal cartridges, $3379.
La France, Ward, Truck Corp., Elmira, N. Y., trucks, $827,049.
Lenox Instrument Co., Philadelphia, boroscopes, $4290.
LeTourneau Co. of Georgia, Toccoa, Ga., shells, $6000.
Lincoln Park Tool & Gage Co., Lincoln Park, Mich., gages, $11,962.
Lindsley Mfg. Co., Milford, Conn., tools and fixtures, $276,011.
Linderme Tube Co., Euclid, O., burster tubes, $195,323.
Line Material Co., Milwaukee, shells, $280,448.
Lite Mfg. Co., New York, cleaning patches, $4620.
Logansport Machine Co. Inc., Logansport, Ind., hydraulic presses, $579,875.
Lundquist Tool & Mfg Co., Worcester, Mass., cable and plug assemblies, $6808.
Lux Fire Equipment Co., Boston, fire protection equipment, $2749.
Machined Metals Co., Philadelphia, rear band assemblies, $93,975.
Madison-Kipp Corp., Madison, Wis., pin assemblies, $79,527.
Magnus Tool & Die Co., Newark, N. J., tools and fixtures, $221,098.
Mercury Mfg. Co., Chicago, trucks, $3975.
Merz Engineering Co., Indianapolis, gages, $9894.
Metal Goods Corp., St. Louis, seamless brass tubing and brass rods, $5913.
Metal Specialty Co., Cincinnati, mines, $62,700.
Midvale Co., Philadelphia, ammunition, $202,000.
Midwestern Tool Co., Chicago, gages, $9214.
Mills, H. W., & Co., Paterson, N. J., drills, $2562.
Mills Novelty Co., Chicago, shells, $267,776.
Modern Tool & Die Co., Philadelphia, gages, $24,606.
Mueller Brass Co., Port Huron, Mich., percussion primers, $61,320.
Murray Co., Carver Cotton Gin Co. Division, East Bridgewater, Mass., dummy projectiles, $22,740.
National Brass Co., Grand Rapids, Mich., percussion primers, $61,101.
National Pneumatic Co., Rahway, N. J., ammunition, $4,977,264.
Nelson, Herman, Corp., Moline, Ill., mud guards, head lamps, $43,367.
Niles-Bement-Pond Co., Pratt & Whitney Division, West Hartford, Conn., reaming machine, comparators, gages, barrel drilling machines, gage blocks, $37,280.
Noblitt-Sparks Industries Inc., Columbus, Ind., mines, $56,911.
Norco Metal Products Co., Philadelphia, punches, $8650.
Northern Sales Co., Philadelphia, machine screws, $2985.
Norton Co., Worcester, Mass., grinding machines, $75,156.
Onsrud Machine Works Inc., Chicago, routers, $3478.
Otis Elevator Co., New York, gun mechanisms, castings, $1,934,557.
Parent Metal Products Inc., Philadelphia, tables, $3514.
Patterson Foundry & Machine Co., East Liverpool, O., agitating equipment, $4794.
Pennsylvania Tool & Mfg. Co., York, Pa., gages, $3438.
Perry-Fay Mfg. Co., Elyria, O., shells, percussion primers, $149,630.
Philadelphia Bronze & Brass Corp., Philadelphia, castings, $31,403.
Pipe Machinery Co., Cleveland, gages, $3540.
Pittsburgh Motor Heater Corp., Pittsburgh, ammunition, $232,475.
Porter, H. W., & Co. Inc., Newark, N. J., pipe insulation, $2196.
Precise Tool & Mfg. Co., Farmington, Mich., gages, $5280.
Precision Mfg. Co., Philadelphia, gages, $12,697.
Prentiss, Henry, & Co. Inc., Boston, grinders, hobbing machines, profilers, milling machines, $149,952.
Producto Machine Co., Bridgeport, Conn., routing machines, $15,650.
Quality Tool & Die Co., Indianapolis, gages, $2412.
Rau Fastener Co., New York, plates, socket, studs, $3754.
Reliance Steel Casting Co., Pittsburgh, castings, $10,900.
Remington Arms Co. Inc., Bridgeport, Conn., gun barrels, $150,835.
Republic Electric Co., Davenport, Iowa, cable, $4891.
Republic Steel Corp., Hartford, Conn., steel, $2831.
Robertshaw Thermostat Co., Youngwood, Pa., percussion primers, boosters, $113,431.
Rose, Frank, Mfg. Co., Dutton Lainson Co. Mfg. Division, Hastings, Nebr., accessories and electrical parts, $2935.
Saco-Lowell Shops, Biddleford, Me., drilling gun barrels, $15,000.
St. Louis Steel Products Co., St. Louis, arming wire assemblies, $60,350.
Schlueter Mfg. Co., St. Louis, mines, $65,250.
Schoenberger, W. J., Co., Cleveland, percussion primers, $61,320.
Schuylkill Forge Co., Philadelphia, forgings, $2697.
Sheffield Corp., Dayton, O., gages, $3215.
Shuler Axle Co., Louisville, Ky., forgings, $7235.
Sipp-Eastwood Corp., Paterson, N. J., tools and fixtures, $308,500.
Smith, H. A., Machinery Co., Syracuse, N. Y., rigidmils and equipment, lathes, $80,275.
Smith, L. C., & Corona Typewriters Inc., Syracuse, N. Y., percussion primers, $173,912.
Standard Container Inc., Bloomfield, N. J., containers, $39,895.
Standard Gage Co. Inc., Poughkeepsie, N. Y., gages, $7353.
Stedfast & Roulston Inc., Boston, indexing station machines, $30,786.
Sterling Alloys Co., Woburn, Mass., castings, $8494.
Stewart Warner Corp., Chicago, heaters, $98,245.
Stokes, F. J., Machine Co., Philadelphia, conversion of machines, $7500.
Suburban-Essex Machinists Inc., Orange, N. J., gages, $24,298.
Summerill Tubing Co., Bridgeport, Pa., seamless steel tubing, $32,960.
Superior Sheet Steel Co., Canton, O., terne plates, $94,672.
Superior Steel Products Co. Inc., Muncie, Ind., ammunition, $231,000.
Texas Washer Co., Houston, Tex., fin assemblies for shells, $81,225.
Timken Roller Bearing Co., Canton, O.,

Five Ladles Pour 130,400-Pound Turbine Base



■ Five large ladles spill molten iron into a mold at the Trafford, Pa., Foundry of the Westinghouse Electric & Mfg. Co. to form a 130,400-pound base for an 80,000 kilowatt turbine. Completed turbine, ordered by the Philadelphia Electric Co., will increase the output of electricity for war manufacturers. Five weeks were required to prepare the mold; only five minutes to pour the metal. The turbine base is 29 feet long, 12 feet 2 inches high and 9 feet wide. NEA photo

roller bearings, $7565.
Timken-Detroit Axle Co., Wisconsin Axle Co. Division, Oshkosh, Wis., drives and cases, gun parts, $24,613.
Titan Metal Mfg. Co., Bellefonte, Pa., time train rings for fuze, brass rods, $288,923.
Tools & Gages Inc., Cleveland, gages, $22,838.
Tri-Clover Machine Co., Kenosha, Wis., shell, $86,195.
Triplex Machine Tool Corp., New York, hydraulic presses, $3850.
Truscon Steel Co., Buffalo, reinforcement rods, $10,660.
Union Twist Drill Co., Athol, Mass., grinders, end mills, cutters and reamers, $4742.
Unique Specialties Inc., New York, sleeves, housings and punches, $2355.
United Drill & Tool Corp., Whitman & Barnes Division, Detroit, drills, $2319.
U. S. Motors Corp., Oshkosh, Wis., parts for generating units, $2910.
United Wire & Supply Corp., Cranston, R. I., brass tubing, $2250.
Universal-Cyclops Steel Corp., Titusville, Pa., steel, $2322.
Universal Lubricating Systems Inc., Oakmont, Pa., shells, $80,263.
Valley Steel Castings Co., Bay City, Mich., castings, $8973.
Van Dyck Churchill Co., New York, drills, $23,983.
Veit & Young, Philadelphia, dies and punches, $63,250.
Vinco Corp., Detroit, gages, $3510.
Wadell Engineering Co., Newark, N. J., tools, drawbars, belts, $94,635.
Wagner Electric Corp., St. Louis, shells, $86,095.
Warren Telechron Co., Ashland, Mass., percussion primers, $51,830.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., machines, $69,455.
Watson-Stillman Co., Roselle, N. J., presses and fixtures, $293,737.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., switchgears, gearmotors, and control equipment, gas generators, $38,630.
Westinghouse Electric Supply Co., Davenport, Iowa, cable, $6623.
Wheeling Stamping Co., Wheeling, W. Va., percussion primers, $52,531.
Wiedemann Machine Co., Philadelphia, gages, $3650.
Williams, J. H., & Co., Buffalo, forgings and dies, $6410.
Wright Machine Co., Worcester, Mass., boosters, $187,200.
Yale & Towne Mfg. Co., Philadelphia, lifting trucks, $11,247.
Yellow Truck & Coach Mfg. Co., Pontiac, Mich., cars, $85,000.
Zipit Corp., Philadelphia, gages, $2970.

Signal Corps Awards

Bendix Aviation Corp., Bendix Radio Division, Baltimore, radio parts, $784,256.
Graybar Electric Co., New York, wire, $44,176.
Kellogg Switchboard & Supply Co., Chicago, microphones, $42,623.
Ulmer, A. J., New York, lamp fixtures, $3217.
Weston Electrical Instrument Corp., Philadelphia, analysers, oscillators, $5049.

Medical Corps Awards

General Electric X-Ray Corp., Chicago, X-ray machines, $4234.
Liberty Foundry Co., St. Louis, tables, $29,112.
Ransom & Randolph Co., Toledo, O., burs, $11,155.
Simmons Co., New York, metal chairs, $36,892.
Sklar, J., Mfg. Co., New York, forceps, $6027.

Quartermaster Corps Awards

American Seating Co., Grand Rapids, Mich., metal folding chairs, $3485.
Bauer-Smith Dredging Co., Port Lavaca, Tex., diesel driven steel ferry boats, $49,540.
Brownsville Shipbuilding Corp., Brownsville, Tex., boats, $374,000.
Bucyrus-Erie Co., South Milwaukee, Wis., material for conversion of barge crane to a live boom crane, $8860.

Changing the Guard at Soo Locks

■ Locks at Sault Ste. Marie, vital to Great Lakes shipping, are guarded constantly by United States troops to prevent any act of sabotage designed to close them. Above, changing of the guard. NEA photo

Chrysler Corp., Parts Division, Highland Park, Mich., parts for trucks, $242,064.
General Motors Sales Corp., Chevrolet Division, Detroit, parts for trucks, $288,439.
General Motors Truck & Coach Division, Yellow Truck & Coach Motor Co., Pontiac, Mich., parts for trucks, $100,920.
Harnischfeger Corp., Milwaukee, crawler cranes, $35,220.
Mack Mfg. Corp., Plainfield, N. J., parts for trucks, $359,049.
Submarine Signal Corp., Boston, fathometers, $3950.

Chemical Warfare Service Awards

Carey Machinery & Supply Co., Baltimore, wet grinders and bending rolls, $3361.
Crown Can Co., Philadelphia, chemical container assemblies, $30,162.
Firestone Tire & Rubber Co., Akron, O., gas mask canisters, $11,141.
Milwaukee Stamping Co., Milwaukee, canister outer bodies, chemical containers and inlet valve seats, $45,443.
Pennsylvania Pump & Compressor Co., Easton, Pa., air compressors, $14,918.
Revere Copper & Brass Inc., Rome, N. Y., inner tube nozzles, $12,463.
Stevens Metal Products Co., Niles, O., drums, $10,800.

Air Corps Awards

Aro Equipment Corp., Bryan, O., propeller hubs, $442,017.
Aviation Mfg. Corp., Williamsport, Pa., parts for aeronautical engines, $974,397.
Bardco Mfg. & Sales Co., Dayton, O., gasoline engine generator units, $122,995.
Bendix Aviation Corp., Eclipse Aviation Division, Bendix, N. J., generator assemblies, $258,570.
Blackhawk Mfg. Co., Milwaukee, jack assemblies, $1,344,306.
Biederman Motors Corp., Cincinnati, truck-tractors, $1,996,860.
Boeing Aircraft Co., Seattle, parts for airplanes, $74,684.
Curtiss-Wright Corp., Curtiss Propeller Division, Caldwell, N. J., parts for propellers, $164,409.
Fanco Machine Co., Racine, Wis., presses, $16,400.
Federal Motor Truck Co., Detroit, truck-tractors, $5,641,420.
General Motors Corp., New York, hardware, $450,129.
Greenerd Arbor Press Co., Nashua, N. Y., presses, $3560.
Hayes Industries Inc., Jackson, Mich., parts for Hayes type equipment, $175,058.
Heil Co., Milwaukee, trailers and trailer converter dollies, $10,109,640.
Lamson & Sessions Co., Cleveland, bolts, $51,276.
Larkin, M. D., Co., Dayton, O., presses, $15,655.
Lawson Mfg. Co., Pittsburgh, stand assemblies, engine overhaul, radial engines, $167,487.
Line Material Co., East Stroudsburg, Pa., lamp assemblies and color screens, $92,726.
Packard Motor Car Co., Detroit, parts for engines, tool kit assemblies, $1,355,908.
Plomb Tool Co., Los Angeles, wrenches, $594,370.
Standard Steel Works, North Kansas City, Mo., semitank trailers and trailer converter dollies, $9,441,490.
Vickers Inc., Detroit, pump assemblies, $29,600.
Wilson, K. R., New York, presses, $39,448.
Yale & Towne Mfg. Co., Stamford, Conn., pumps and motors, $487,734.

Engineers Corps Awards

American Bridge Co., Pittsburgh, steel pontoons, $18,000.
American Hoist & Derrick Co., New York, stiff leg derrick and parts, $3994.
American Safety Razor Corp., Brooklyn, N. Y., safety razors, $26,349.
Anderson, Dorsey C., Philadelphia, electric arc welders, $61,440.
Baker-Raulang Co., Cleveland, electric

trucks, $6450.
Bennett-Rafkin Machine Tool Co. Inc., New York, machine shop equipment and tools, $4544.
Bethlehem Steel Export Corp., Bethlehem, Pa., tool steel, $23,486.
Booksby, E. J., & Co., Philadelphia, boring bars, crank pin turning machines and parts, $7376.
Buffalo Bolt Co., North Tonawanda, N. Y., drift bolts, $4553.
Capitol Steel Corp., New York, steel reinforcing bars, $11,164.
Carnegie-Illinois Steel Corp., Pittsburgh, steel sheet piling, $206,964.
Caterpillar Tractor Co., Peoria, Ill., tractors, $55,112.
Chain Belt Co., Milwaukee, rotary distributors, $3690.
Clamshell Bucket Sales Corp., Long Island City, N. Y., parts for clamshell and dragline buckets, $9627.
Consolidated Steel Warehouse Co., Philadelphia, structural steel, $38,716.
Engineering Contractors Inc., San Antonio, Tex., permanent heating system and steam plant, airplane repair dock, Duncan field, San Antonio air depot, San Antonio, Tex., $11,390.
English Bros. Machinery Co., Kansas City, Mo., riveting machines, $8955.
Fargo Motor Corp., Detroit, emergency repair chassis, $32,955.
Fuchs Machinery & Supply Co., Omaha, Nebr., punches, dies, $8238.
Gillette Safety Razor Co., South Boston, Mass., safety razors, $34,510.
Gurley, W. & L. E., Troy, N. Y., engineers' transits, $298,007.
Hall, Melville B., Inc., St. Louis, copper wire and cable, $4398.
Harnischfeger Corp., Milwaukee, parts for shovels, draglines and crane attachments, $9759.
Industrial Electrical Works, Omaha, Nebr., punches, dies, $8965.
Kearney & Trecker Corp., Milwaukee, milling machines and parts, $53,358.
Kelley, E. B., Co. Inc., Long Island City, N. Y., parts for centrifugal pumps and engines, $2285.
Kewanee Boiler Corp., Kewanee, Ill., riveted firebox boilers, $9421.
Kohler Co., Kohler, Wis., generating sets, fuel tanks, $17,560.
Landis Tool Co., Waynesboro, Pa., hydraulic universal grinders, $5061.
Mahoney-Clarke Inc., New York, construction equipment and supplies, $2955.
Mallory, P. R., & Co. Inc., Indianapolis, portable rectostarters, $4320.
Marion Steam Shovel Co., Marion, O., shovels and parts, $86,017.
McDonald, A. Y., Mfg. Co., Dubuque, Iowa, deep well pumping sets, $2468.
Mine Smelter Supply Co., Denver, structural steel, $3572.
Pacific Refrigeration Co., Los Angeles, quench tank refrigeration system, $2786.
Palmer Mfg. Corp., Phoenix, Ariz., evaporative cooling systems for temporary buildings, Luke field, Phoenix military airport, Arizona, $30,003.
Price Bros. Co., Dayton, O., bottom dump wagon hauling units, $15,232.
Republic Steel Corp., Cleveland, shelving units and drawer units, $23,765.
Revere Copper & Brass Inc., Baltimore, brass sheet, $10,601.
Rhodes Equipment Co., St. Louis, underfeed stokers, $3779.
Roeblings, John A., Sons Co., Trenton, N. J., wire rope, $2575.
Ryerson, Joseph T., & Son Inc., Jersey City, N. J., iron staybolts, bending rolls, spring forming machine, $21,522.
Sheldon, E. H., & Co., Muskegon, Mich., laboratory furniture, $3577.
Smith, David, Steel Co. Inc., Brooklyn, N. Y., steel sheeting, bars and plates, $14,097.
Uptegraff, R. E., Mfg. Co., Scottdale, Pa., transformers, $6426.
Whiting Corp., Harvey, Ill., cupola and accessories, railroad pit drop tables, $26,378.
Wickwire Spencer Steel Co., New York, chain link fence, $6502.

Due to United States' entry into the war, the War Department, Washington, has discontinued reporting contract awards. The Navy discontinued the practice months ago. The accompanying list from the War Department is the last of contracts released prior to the new order.

Farm Implement Plants Slowed by Shortages

CHICAGO

■ International Harvester Co. has reduced its work week from five to four days in anticipation of an OPM order to cut output of farm equipment to 80 per cent of 1940. Production lines will be closed Friday, Saturday and Sunday of each week, and approximately 30,000 workers will be affected. Plants at work on armaments will continue at full capacity seven days a week.

Among International Harvester plants whose farm equipment departments will be affected are the tractor, McCormick and West Pullman works in Chicago; plants in Rock Island, East Moline, Rock Falls, and Canton, Ill.; Milwaukee; Auburn, N. Y.; Chattanooga, Tenn.; and Richmond, Ind.

Production of dairy equipment will not be reduced, nor will that of crawler-type tractors and industrial power units.

Allis-Chalmers Mfg. Co., Milwaukee, reports that its production of farm equipment already has been slackened by materials shortages, but the work week has been maintained at five days. Current output is about 80 per cent of the 1940 level and a limitation order will not require serious adjustment of working schedules.

Deere & Co., Moline, Ill., reports its assembly lines have been stopped at various plants for several days at a time as the supply of materials has been exhausted.

Heavy Army Rifles on Way To Guard Pacific Coast

■ Heavy Army rifles are moved by rail to strategic points on the Pacific coast to "welcome" any attempted invasion. They can be moved in adequate numbers to any threatened point. NEA photo

STEEL

Let's Have Action on Scrap—NOW!

■ NOW that the United States is engaged in a declared war, industry's job is clearly defined.

From the standpoint of the iron, steel and metalworking industries, the task is one of unrestrained production for war. We may not know at this moment whether the heavy emphasis will be on ships, guns, planes, tanks, bombs or shells. We do know, however, that whatever form of equipment or supplies is required, the industrial resources of the nation will be taxed to the limit.

• • •

This means that production schedules must be speeded up all along the line. Programs which called for specific outputs of certain war goods next summer or fall must be revised to make some of these articles available in the spring. War has the effect of forcing a nation to do first things first.

Among the industries to feel the impact of the new order immediately is the iron and steel industry. Its output is the keystone to the entire structure of wartime production.

The production of steel ingots in 1941 will be approximately 82,500,000 net tons. In spite of the fact steelmaking capacity as of Dec. 31, 1941, will be in excess of 88,000,000 net tons annually, experts only two weeks ago were doubting whether the 1941 output could be matched in 1942. Some authorities openly predicted that next year's production would fall short of the 1941 total by as much as 2,000,000 tons.

Obviously, this nation cannot afford to countenance a reduction in steel output under present conditions. Circumstances present a clear-cut challenge to everybody concerned to not only prevent a letdown in steel production but to increase steel tonnage in 1942 to the amount required.

The only way to meet this challenge is to quit fooling with the scrap problem and to give it preferential attention and action. Assistance from plant expansion cannot be counted upon in a substantial way until late next year. New blast furnaces, openhearths, etc. will help considerably in 1943 or 1944. In 1942, therefore, chief hope for increased steel output rests upon our ability to make more scrap available.

Everybody who has studied the problem knows that there is enough potential scrap in the country to meet 1942 requirements. The only question involved is whether or not we can organize effectively enough to bring this potential scrap out into the open, to convert it into commercial scrap and to distribute it to consuming points.

• • •

Thus far almost every effort to get down to realities on the scrap problem has been blocked by inhibitions in regard to price, method, agency, etc. What amount shall consumers be permitted to pay? How shall scrap be lured to consuming points? Who shall be permitted to collect scrap?

Quibbling over what, how and who has taken precedence over the basic problem of getting out more scrap.

Inasmuch as scrap now is the determining factor in steel output during the next six to nine months, it behooves Washington to cut through every ribbon of entangling red tape and to move immediately toward an intelligent effort to convert the tens of millions of tons of potential scrap into usable scrap.

It must be done and it can be done!

E. L. Shaner

EDITOR-IN-CHIEF

Dec. 22, 1941

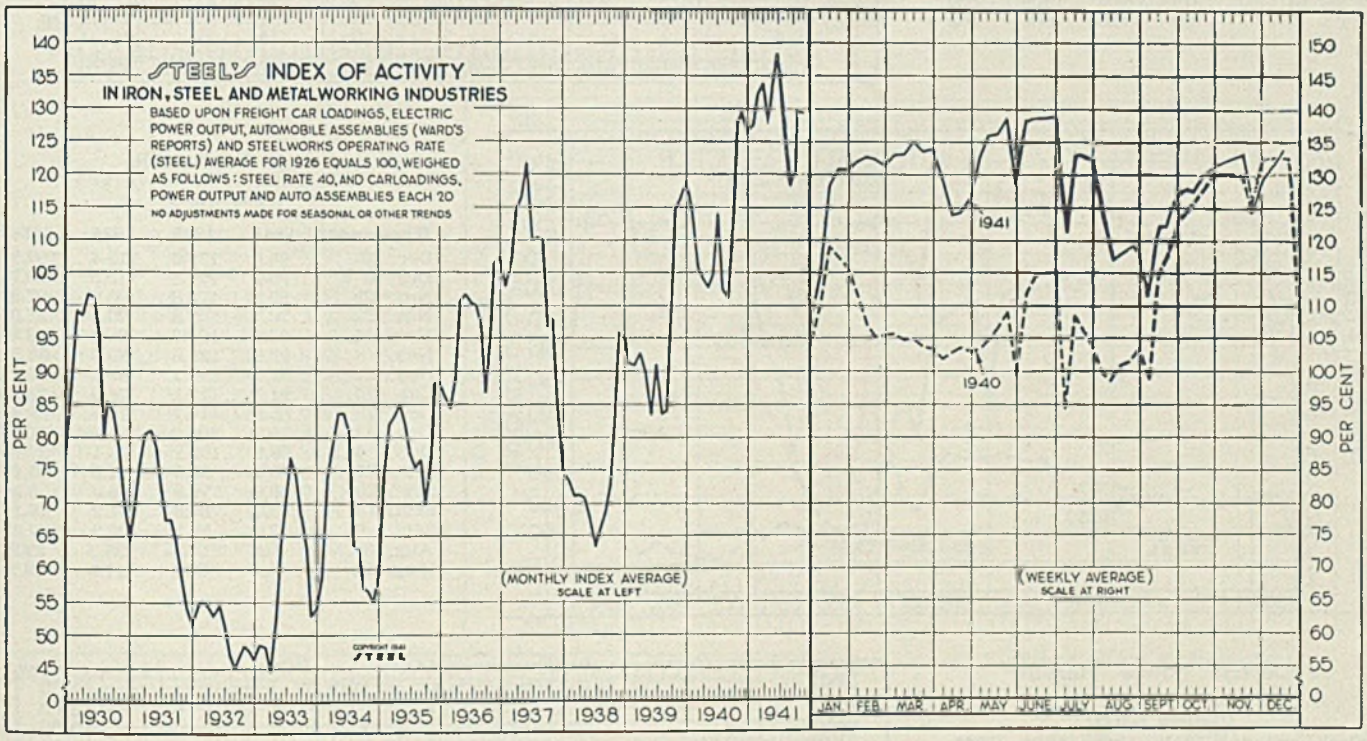
The BUSINESS TREND

Index of Activity Edges Upward

■ HEAVY forward buying which reached record-breaking proportions during the first half of this year has subsided in recent weeks. Excessive inventories in some instances have undoubtedly been accumulated with the result that the raw material shortages are magnified. Over stocking has not only hampered output of civilian goods but in some instances it has impaired the war effort. The main reason for the slackening in forward buying resulted from the inability of most consumers to place orders. Producers are either booked up or supplies have been already allocated.

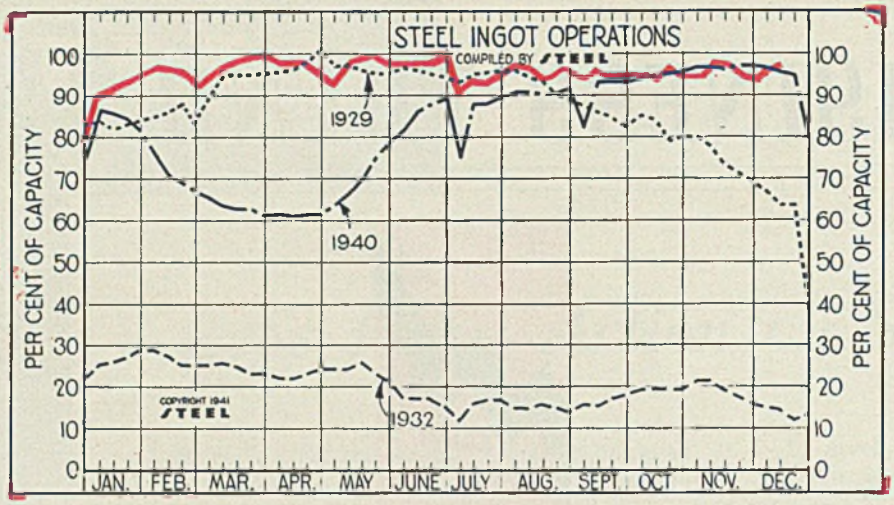
During the week ended Dec. 13, STEEL's index of activity advanced 2.3 points to 133.2, reflecting gains in three of the four industrial indicators composing it. A year ago the index stood at 132.6, while the peak this year was 138.8 recorded during the week ended June 28.

Electric power consumption during the latest period reached an all time peak of 3,431,328,000 kilowatts. Steelmaking operations advanced 1 point to 97.5 per cent and automobile production climbed to the highest level of the new model year, totaling 95,990. Freight carloadings declined to 807,255.



STEEL'S index of activity gained 2.3 points to 133.2 in the week ended Dec. 13:

Week Ended	1941	1940	Mo. Data	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930
Sept. 27	127.5	122.8	Jan.	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6
Oct. 4	128.0	124.4	Feb.	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2
Oct. 11	127.9	126.0	March	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2	80.4	98.6
Oct. 18	130.2	128.3	April	127.2	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0	101.7
Oct. 25	131.4	129.9	May	134.5	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6	101 2
Nov. 1	131.9	130.2	June	138.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1	95 8
Nov. 8	132.3	130.3	July	128.7	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3	79.9
Nov. 15	131.8	130.3	Aug.	118.1	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4	85.4
Nov. 22	124.1	124.7	Sept.	121.1	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3	83.7
Nov. 29	129.7	132.6	Oct.	129.9	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2	78.8
Dec. 6	130.9	132.5	Nov.	129.7	129.5	116.2	95.9	84.1	106.4	85.1	54.9	52.8	47.5	54.4	71.0
Dec. 13	133.2	132.6	Dec.	.....	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3	64 3



Steel Ingot Operations

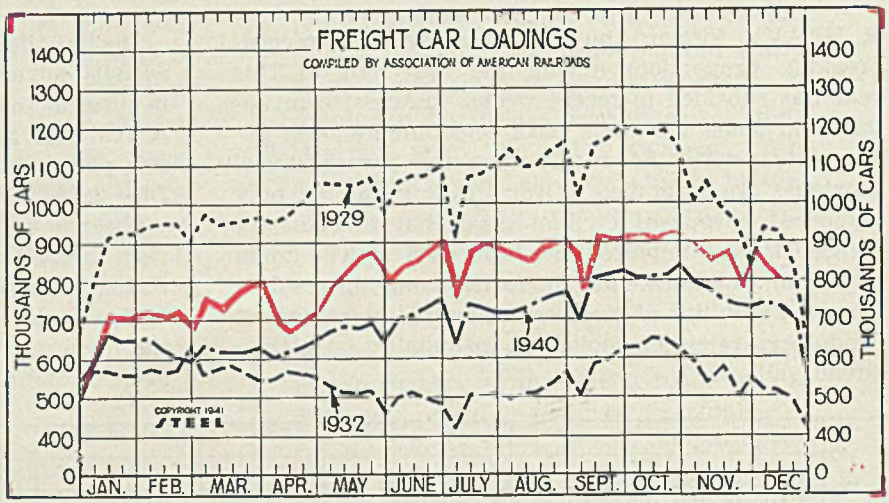
(Per Cent)

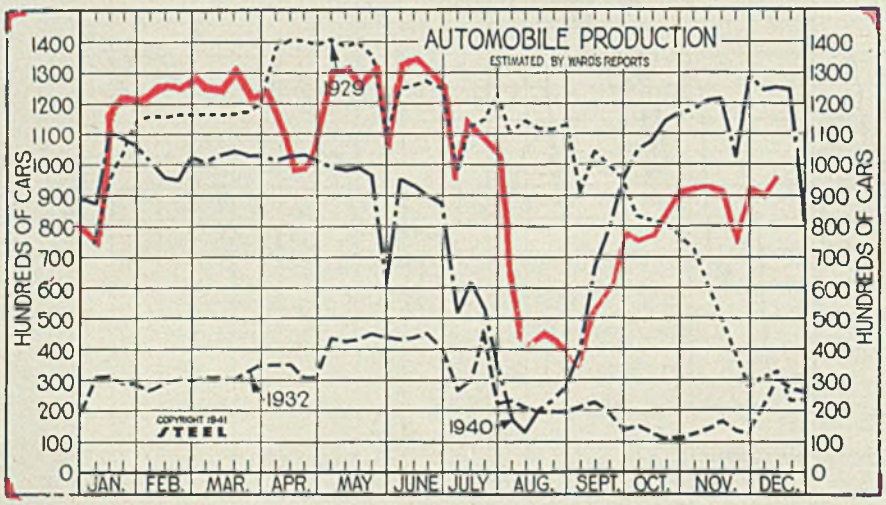
Week ended	1941	1940	1939	1938
Dec. 13	97.1	95.5	92.5	58.0
Dec. 6	96.5	96.5	94.0	61.0
Nov. 29	95.0	97.0	94.0	61.0
Nov. 22	95.5	97.0	93.5	62.0
Nov. 15	97.0	96.0	93.5	63.0
Nov. 8	97.5	96.5	93.0	61.5
Nov. 1	95.5	96.5	93.0	57.5
Oct. 25	95.5	95.5	92.0	54.5
Oct. 18	96.5	95.0	91.0	51.5
Oct. 11	94.5	94.5	89.5	51.5
Oct. 4	96.0	93.5	87.5	48.5
Sept. 27	96.0	93.0	84.0	47.0
Sept. 20	96.0	93.0	79.5	48.0
Sept. 13	96.5	93.0	74.0	46.0
Sept. 6	95.5	82.0	62.0	41.5
Aug. 30	96.5	91.5	64.0	44.5
Aug. 23	96.0	90.5	63.5	43.5

Freight Car Loadings

(1000 Cars)

Week ended	1941	1940	1939	1938
Dec. 13	807	736	681	606
Dec. 6	833	738	687	619
Nov. 29	866	729	689	649
Nov. 22	799	733	677	562
Nov. 15	884	745	771	657
Nov. 8	874	778	786	637
Nov. 1	895	795	806	673
Oct. 25	914	838	834	709
Oct. 18	923	814	861	706
Oct. 11	904	812	845	727
Oct. 4	918	806	835	703
Sept. 27	920	822	835	698
Sept. 20	908	813	815	676
Sept. 13	914	804	806	660
Sept. 6	798	695	667	569





Auto Production

(1000 Units)

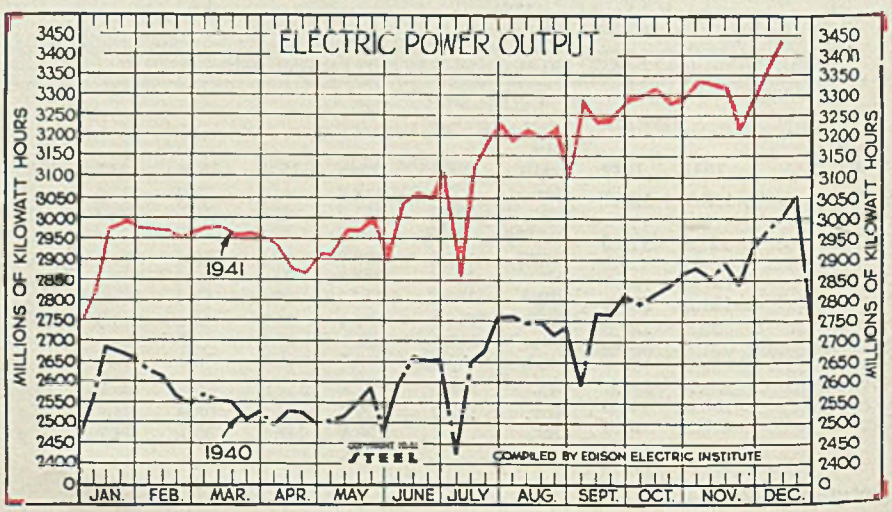
Week ended	1941	1940	1939	1938
Dec. 13	96.0	125.6	118.4	102.9
Dec. 6	90.2	124.8	115.5	100.7
Nov. 29	93.5	128.8	93.6	97.8
Nov. 22	76.8	102.3	72.5	84.9
Nov. 15	93.0	121.9	86.7	96.7
Nov. 8	93.6	120.9	86.2	86.3
Nov. 1	92.9	118.1	82.7	80.0
Oct. 25	91.9	117.1	78.2	73.3
Oct. 18	85.6	114.7	70.1	68.4
Oct. 11	79.1	108.0	75.9	50 5
Oct. 4	76.8	105.2	76.1	37.7
Sept. 27	78.5	96.0	62.8	25.4
Sept. 20	60.6	78.8	54.0	20.4
Sept. 13	53.2	66.6	41.2	16.1
Sept. 6	32.9	39.7	26.9	17.5
Aug. 30	40.0	27.6	25.2	22.2
Aug. 23	45.5	23.7	17.5	18.7

Electric Power Output †

(Million KWH)

Week ended	1941	1940	1939	1938
Dec. 13	3,431	3,004	2,674	2,390
Dec. 6	3,369	2,976	2,654	2,377
Nov. 29	3,295	2,932	2,605	2,335
Nov. 22	3,205	2,839	2,561	2,248
Nov. 15	3,304	2,890	2,587	2,325
Nov. 8	3,339	2,858	2,589	2,277
Nov. 1	3,339	2,882	2,609	2,271
Oct. 25	3,299	2,867	2,622	2,284
Oct. 18	3,273	2,838	2,576	2,281
Oct. 11	3,315	2,817	2,584	2,251
Oct. 4	3,290	2,792	2,554	2,229
Sept. 27	3,233	2,816	2,559	2,208
Sept. 20	3,232	2,769	2,538	2,211

†New series: Includes additional governmental and power generation not previously reported.

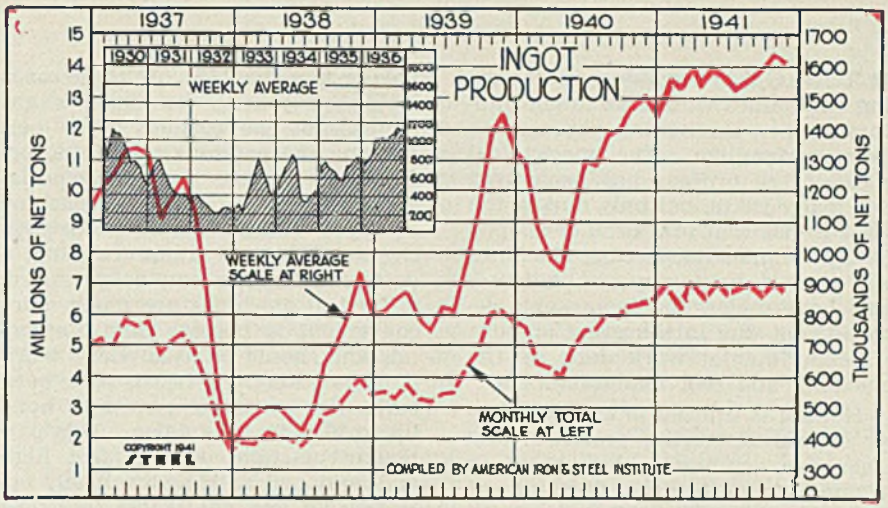


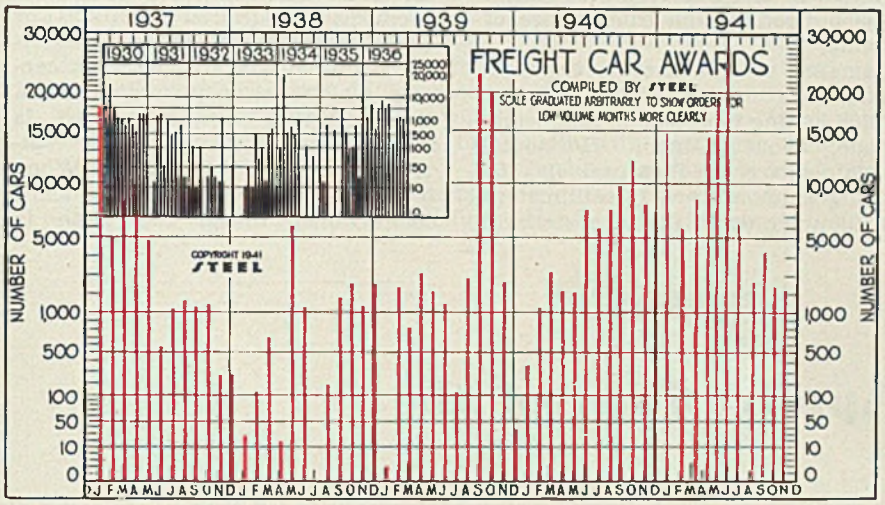
Steel Ingot Production

(Unit 100 Net Tons)

	Monthly Total		Weekly Average	
	1941	1940	1941	1940
Jan.	6,928.8	5,764.7	1,563.9	1,301.3
Feb.	6,237.9	4,525.8	1,559.5	1,093.2
Mar.	7,131.6	4,389.2	1,609.9	990.8
Apr.	6,756.9	4,100.5	1,575.0	955.8
May	7,053.2	4,967.8	1,592.2	1,121.4
June	6,800.7	5,657.4	1,585.3	1,318.8
July	6,821.7	5,724.6	1,543.4	1,295.2
Aug.	7,001.0	6,186.4	1,580.4	1,396.5
Sept.	6,819.7	6,056.2	1,593.4	1,415.0
Oct.	7.242.7	6,644.5	1,634.9	1,499.9
Nov.	6,970.0	6,469.1	1,624.7	1,507.9
Dec.	.....	6,495.4	.....	1,469.5
Total	.....	66,981.7	.....	1,281.2†

†Weekly average.



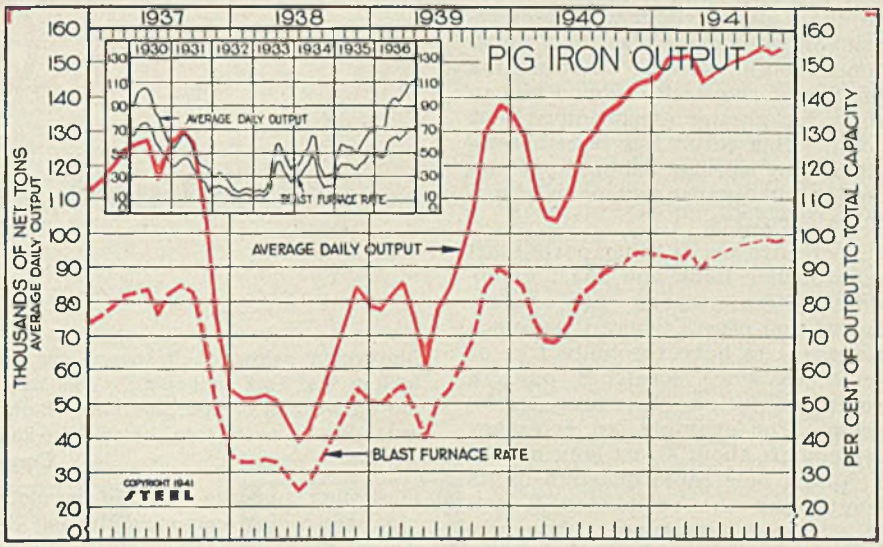


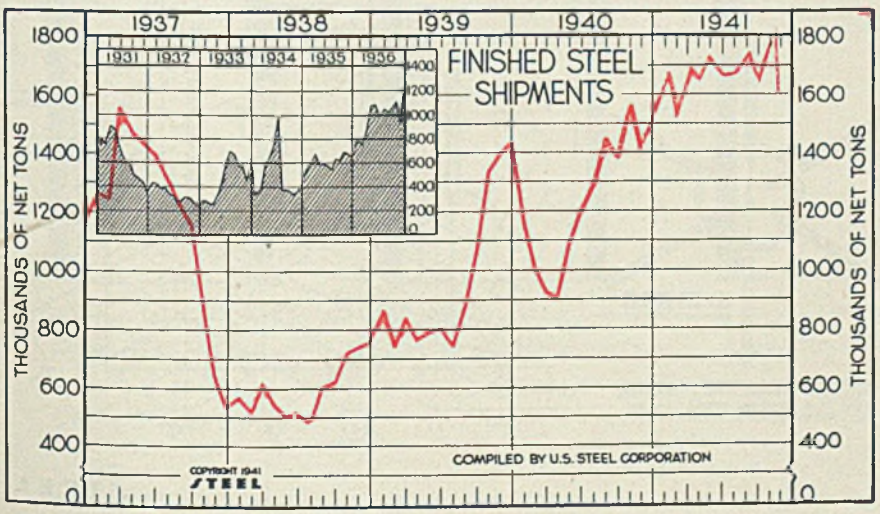
Freight Car Awards

	1941	1940	1939	1938
Jan.	15,169	360	3	25
Feb.	5,508	1,147	2,259	109
March ...	8,074	3,104	800	680
April	14,645	2,077	3,095	15
May	18,630	2,010	2,051	6,014
June	32,749	7,475	1,324	1,178
July	6,459	5,846	110	0
Aug.	2,668	7,525	2,814	182
Sept.	4,470	9,735	23,000	1,750
Oct.	2,499	12,195	19,634	2,537
Nov.	2,222	8,234	2,650	1,232
11 mos....	113,093	59,708	57,740	13,822
Dec.	.....	7,181	35	2,581
Total ...	.....	66,889	57,775	16,303

Pig Iron Production

	Daily average —Net Tons—			Blast furnace —Rate (%)—		
	1941	1940	1939	1941	1940	1939
Jan.	150,524	129,825	78,596	95.5	85.4	51.0
Feb.	150,244	113,943	82,407	95.3	75.0	53.5
Mar.	151.707	105,502	86,465	96.3	69.5	56.1
Apr.	144,685	104,635	76,732	91.8	68.9	49.8
May	148,262	112,811	62,052	94.1	74.2	40.2
June	151,701	127,103	79,125	95.7	83.6	51.4
July	153,749	130,984	85,121	97.0	86.1	55.0
Aug.	154,343	136,599	96,122	97.4	89.9	62.4
Sept.	157,378	139,085	107,298	99.3	91.5	69.7
Oct.	156,775	143,152	131,053	98.9	94.2	85.2
Nov.	156,906	146,589	138,883	99.0	96.4	90.3
Dec.	.....	146,544	136,119	....	96.4	88.5
Ave.	.....	128,128	86,375	..	84.3	62.6





Finished Steel Shipments

U. S. Steel Corp.

(Unit 1000 Net Tons)

	1941	1940	1939	1938	1937
Jan....	1682.5	1145.6	870.9	570.3	1268.4
Feb....	1548.5	1009.3	747.4	522.4	1252.8
Mar...	1720.4	931.9	845.1	627.0	1563.1
Apr....	1687.7	907.9	771.8	550.5	1485.2
May ..	1745.3	1084.1	795.7	509.8	1443.5
June ..	1668.6	1209.7	807.6	525.0	1405.1
July...	1666.7	1296.9	745.4	484.6	1315.3
Aug. ..	1753.7	1455.6	885.6	615.5	1225.9
Sept. ..	1664.2	1392.8	1086.7	635.6	1161.1
Oct....	1851.3	1572.4	1345.9	730.3	876.0
Nov. ..	1624.2	1425.4	1406.2	749.3	648.7
Dec....	.....	1544.6	1444.0	765.9	539.5
Tot.†.	.....	14976.1	11707.3	7315.5	14097.7

†After year-end adjustments.

Applications of the HONING

■ TO A GREAT many manufacturing companies who have taken military orders, the honing process has been unfamiliar. The mechanical idea of the process has been used for many years, but only during the past 15 has that idea been developed into a commercial process. Machines and tools began to appear about 1925 and have undergone remarkable development due to the great amount of experimental work done by the machine and tool manufacturers.

Honing is utilized in a wide variety of manufacturing processes and has been commonly thought of in connection with final finishing of cast iron cylinders. However, with the development of improved machines, tools and abrasives, it became possible to hone soft as well as hardened steels of the various alloys. With the development of the airplane engine came first the honing of cylinders, then the finishing of various bearings and pin holes such as crank and piston pin holes of radial engine main rods. It also was found highly advantageous to hone the articulating rod pin holes in the main rods as damaging scratches are removed and practically a 100 per cent pin bearing area afforded. Formerly the hone was required to produce holes accurate in diameter, round and free from taper. With the coming of the radial engine with aluminum heads shrunk on their steel cylinders, a requirement in some cases was for a finish honed bore several thousandths smaller at the head or blind end to allow for greater expansion at that point. This result has been accomplished by special honing tools together with proper technique in machine operation.

There are many other parts such as propeller hubs and shaft extensions where accurate fits are required and others where it becomes necessary to have the holes free of scratches since scratches offer a point for fatigue fractures to develop. For example, an accessory drive shaft about 4 feet long having a ¾-inch hole three quarters of its length and the remainder ⅞-inch in diameter fractured frequently when the hole was reamed. But these fractures were reduced to zero after the honing process was adopted.

Honing has made possible the proper functioning of the landing gear of airplanes. The shock cylinders as well as those needed for retracting the landing gear and many other cylinders for operating various devices of a war plane are now being honed.

It frequently becomes necessary to hone to the bottom of a blind hole or to a shoulder. In these cases it is the practice to leave slight recesses at the bottoms when performing the previous machining operations. By the use of a special hone and by having the machine equipped with a mechanism for positive stopping and timed dwelling, a uniform diameter can be produced.

Vertical machines are much more convenient to operate than horizontals and should be used where work is not too long. Verticals have been built with an 8-foot stroke to hone up to 30 inches diameter. This particular machine was 32 feet high and equipped with hydraulically operated "in and out" table to afford ease of loading and convenience of gaging.

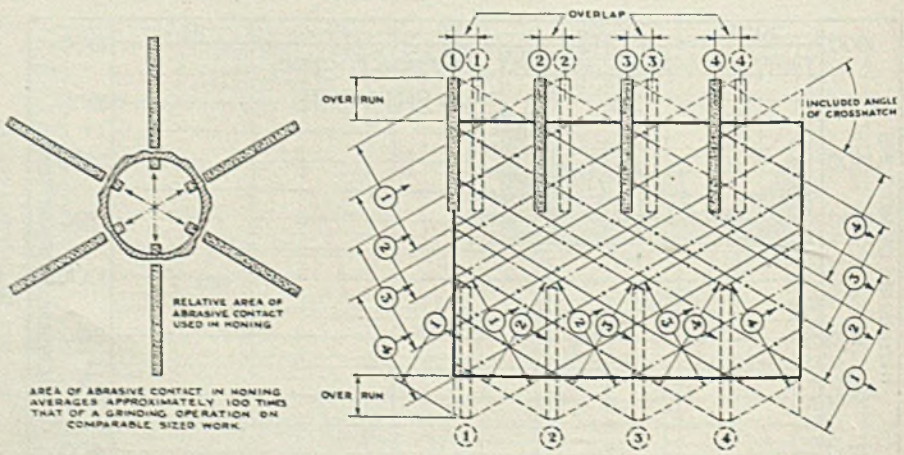
Smaller machines cover the field down to a minimum diameter for which honing tools can be practically made, about ¼-inch. Horizontal machines are used extensively for honing cannon from 20 millimeters in diameter up to the largest naval guns. Machines have been built for honing up to 30 inches in diameter and with a stroke of 75 feet.

Recuperator cylinders require a high degree of accuracy and finish, it being necessary with certain types to hone with a motion parallel to axis and nonrotating, except at ends of stroke, termed codirectional honing. This procedure is necessary to change the microscopic cross hatch lines into lines parallel with piston travel.

It is necessary to have accurate diameters and fine finishes on piston rods for recoil and recuperator cylinders, see STEEL, July 28, 1941, p. 52. Here again the honing process produces the desired results. For this purpose the work to be externally honed is rotated between centers which are reciprocated on a long carriage and the hone is mounted on a floating support attached to the machine frame. When it becomes necessary to produce a codirectional finish, the hone is

Illustration below: Left shows graphically the amount of area of abrasive contacting the work in honing. This averages 100 times the contact area in grinding on work of comparable size. Right shows weaving path of hone across work, over run at each side, spiral direction of hone travel. From Micromatic Hone Corp., Detroit

Illustration, opposite page: Accurately guided hones correct defects in surface as shown diagrammatically in this drawing by Micromatic Hone Corp., Detroit



From a paper presented at the St. Louis national defense meeting of the American Society of Mechanical Engineers, Sept. 9-11, 1941.

mounted on a lightweight carriage to facilitate rapid reciprocation and the piston rod is held between stationary centers and rotated a few degrees at end of each stroke.

Honing of gun bores proved advantageous both in time required for finishing and elimination of the hazard present with the finish boring method. Smoothness and accuracy are added advantages.

Ordinarily about 0.040-inch in diameter is left for the finish boring operation. When the honing process is employed, a lesser amount can be left for the final finish with practically no likelihood of scoring the tube to a depth that honing will not remove it. Honing up to the finish diameter leaves a smooth finish free from sometimes fatally damaging scratches and an accurate finish within extremely close tolerances. Thus it is well suited to finishing operations.

Most honing tools of the present day are expanded by hydraulic means. In the machine is built a mechanism for performing this function as well as for controlling the rate of expansion, this rate being timed to the enlargement of the honed hole and the wearing down of the abrasive sticks.

The important requisites of a honing machine are ruggedness and sufficient power, uniform rate of travel, extremely rapid deceleration and acceleration at ends of stroke, convenient fixtures for holding the work and ample quantities of a proper honing compound well filtered.

First, the machine must have sufficient stiffness in its frame. Even more important, its rotation driving train including gears, shaft and spindle must resist any tendency to set up torsional vibration. It is advantageous especially when honing large diameters to have the hone built with sufficient weight to afford ample flywheel effect, thus aiding the machine in producing a steady, vibrationless, rotary motion to the honing sticks; providing better cutting conditions and longer life to the abrasives.

Second, the machine must have sufficient power to drive the hone under varying conditions of roughing different materials both soft and hardened. Obviously the abrasive stick pressure against the wall is a measure of the power required, which is generally in proportion to the abrasive area acting on the surface, times the rotating speed in feet per minute.

Third, the rapid deceleration and acceleration at ends of stroke are important in preventing enlarged diameters at ends of holes. Also a quick reversal of reciprocation appreciably increases production as more passages of the abrasives can be made over the surface per unit of time.

The rate of reciprocation varies from 30 to 250 feet per minute, depending upon the material, revolutions per minute and diameter of hone. The cutting speed varies in surface feet from 100 to 225 feet per minute, again depending upon the kind and hardness of material.

It is necessary to have a copious supply of clean honing compound delivered to the hone to carry away the minute particles of material removed from the walls, to keep the abrasive sticks in a free cutting condition and to cool the work as much as possible.

There are several recommended kinds of coolant. Kerosene is used for honing cast iron and is used in connection with many other compounds. When honing soft steels, it is necessary to use a liquid which will prevent the particles of steel from imbedding themselves in the surfaces of the sticks, thus causing scores and scratches in surface. To prevent this condition a lubricant must be added. There are several on the market for this purpose under various trade names. One of the commonly used coolants on difficult jobs is a compound of oleic isad, turpentine and kerosene. Another is pure lard oil with certain percentages of kerosene.

The question probably foremost in many readers' minds is: "How fast can a hole be enlarged by the honing process?"

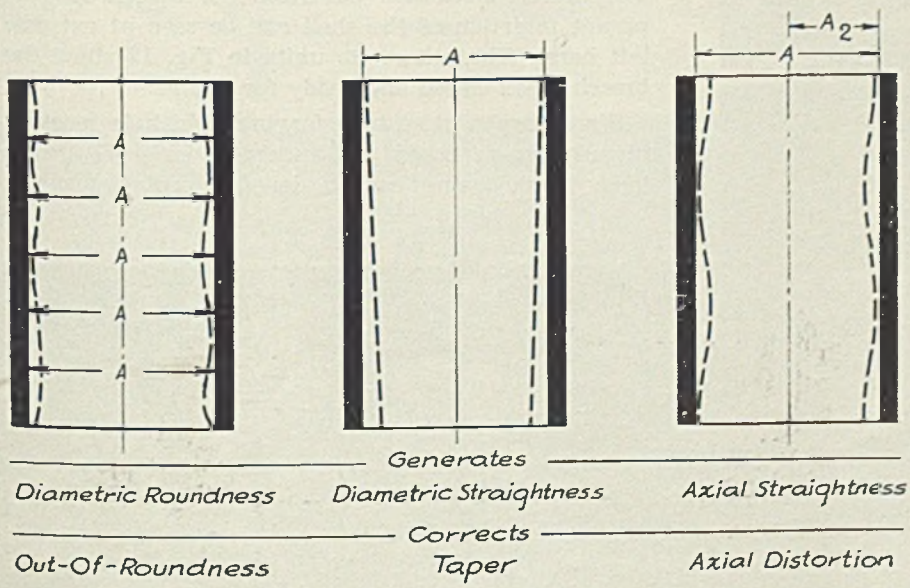
This is a difficult question to answer with any great degree of certainty as the working conditions as well as kinds and hardnesses of materials affect the honing time greatly. In general, probably good yardsticks would be the results as shown in the following experiences. A gun tube 5 inches in diameter and 23 feet long can be honed at the rate of about 0.014-inch from the diameter per hour. In another case, 0.018-inch of stock is removed from a gun

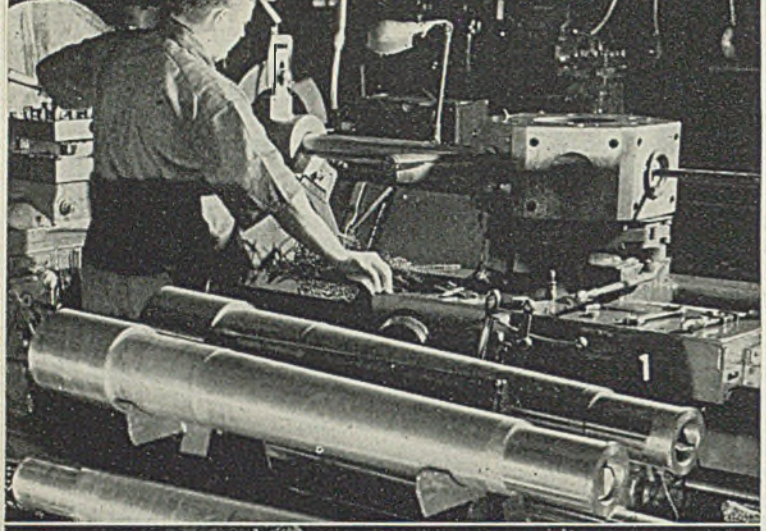
(Please turn to Page 72)

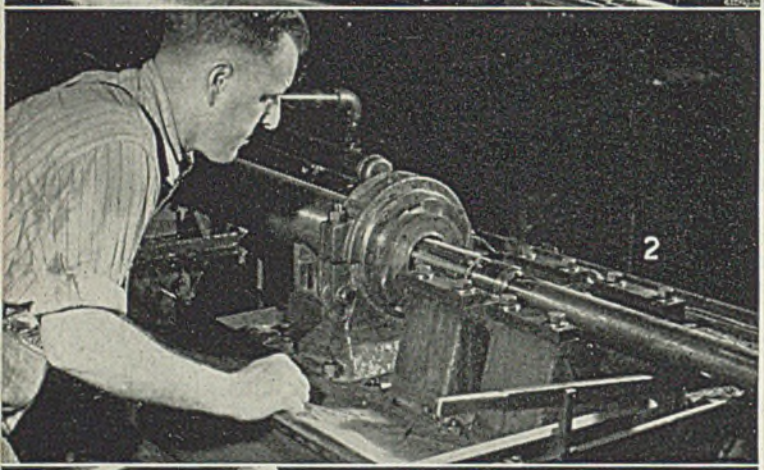
By A. M. JOHNSON
President
Barnes Drill Co.
Rockford, Ill.

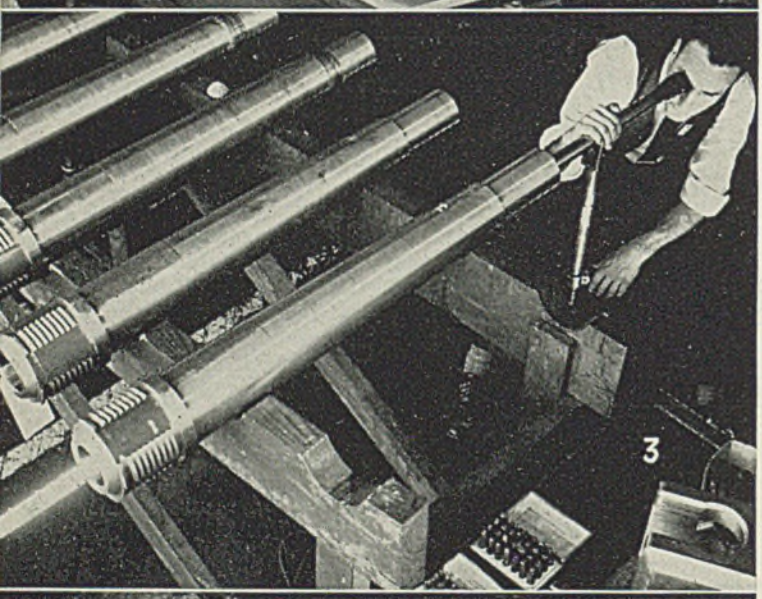
PROCESS

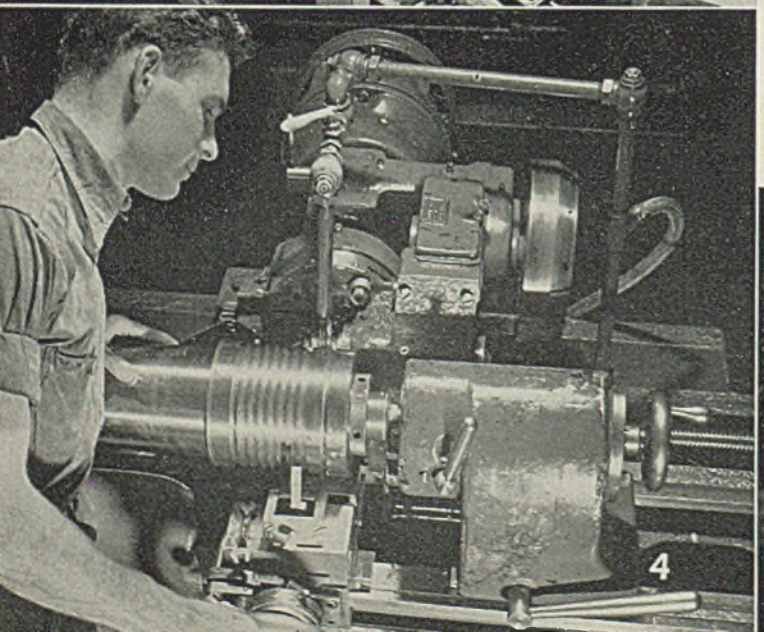
In Ordnance Production











PACK HOW

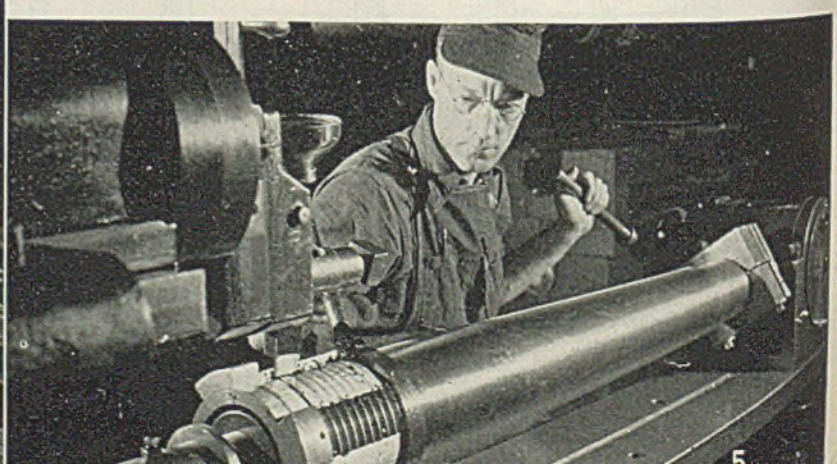
■ THE HOWITZER is a short-barreled cannon employed for high-angle fire. **Fig. A** shows an 8-inch model in action with smaller units alongside. One of the important models of this type of gun is the 75-millimeter pack howitzer which combines high striking power with maximum portability. While mechanized units have taken over the job of the army mule, the great portability assured by the fact that the 75-millimeter pack howitzer can be disassembled into parts that can be carried on muleback still is most important since it allows aircraft to carry these units to any point desired.

For instance, the gun tube assembled with its muzzle and breech hoops weighs only 221 pounds. Breech ring and breech block, including the breech mechanism, weighs only 121 pounds. Yet the 75-millimeter pack howitzer throws a projectile of over 14 pounds a distance of approximately 9500 yards—possibly the highest striking power for its weight of any Army gun.

The Erie works of General Electric Co. earlier this year was turning out these howitzers at the rate of 35 a month, which has been increased since then. Since the gun mount and recoil mechanism is not made at this plant nor is any forging done here, most of the facilities required were found already available for many of the heat treating, machining and finishing operations on the howitzer itself.

Diagrams **Fig. B,** courtesy *American Machinist,* shows the gun tube with the muzzle hoop and breech hoop in place. Also shown are the breech ring and the breech block which slides crosswise in the rear end of the breech ring. **Fig. 12,** p. 52, shows completed howitzer tube, breech ring and breech block, and other parts assembled and undergoing a firing test. The breech block slid out from the breech ring to permit insertion of the shell can be seen at extreme left here. The other two units in **Fig. 12** show the breech block closed and ready for firing.

Since carbon steel tube forging, which is received already rough bored and turned is only 47 inches long, finish boring can be done in ordinary turret



ITZER PRODUCTION

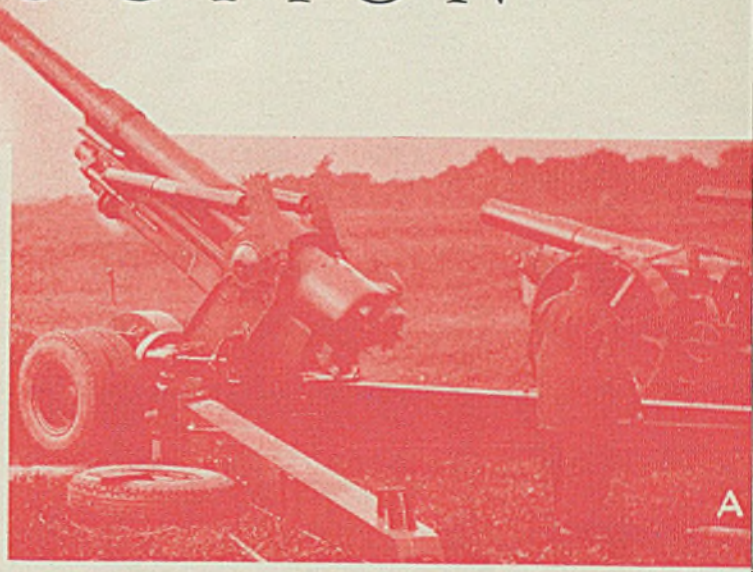
lathes. **Fig. 1** shows a standard turret lathe adapted to finish reaming the bore, roughing and finishing the powder chamber.

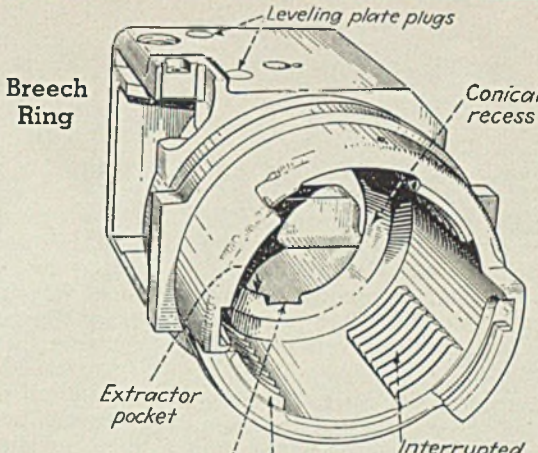
First step at Erie is to rough turn ends and bore the tube to approximate size. Next the tube is mounted on center plugs and turned on the outside diameters. After returning to turret lathes for rough and finish reaming, powder chamber is machined in the same setup and then is honed on a special machine shown in **Fig. 2.** Before and after honing, the bore is inspected visually with a borescope as shown in **Fig. 3.** Examination of the reflected image at a magnification of 20 diameters reveals any surface defects.

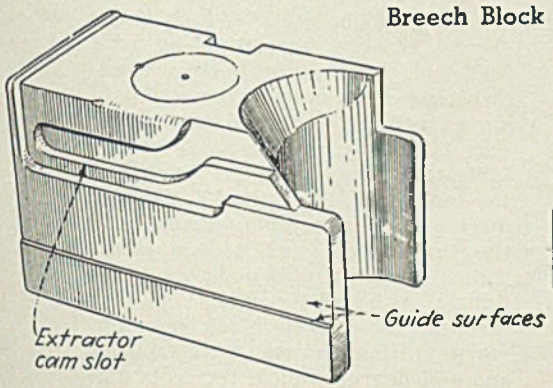
Then a 3-pointed star gage is used to take readings every inch of the bore length. The tube is again mounted on center plugs for machining shoulders and outside diameters in preparation for finish grinding. Straight as well as tapered surfaces then are rough and finish ground.

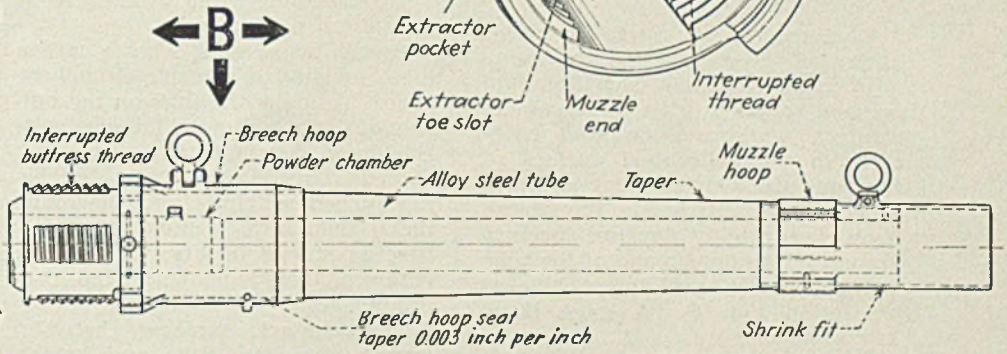
A special buttress-shaped thread on the breech ring is milled as shown in **Fig. 4,** and then the thread sectors are cut away on a shaper as shown in **Fig. 5.**

Rifling is done on a hydraulic machine, using 26 broaching disks which are pushed from the muzzle to the breech end in sequence. Fourteen grooves are

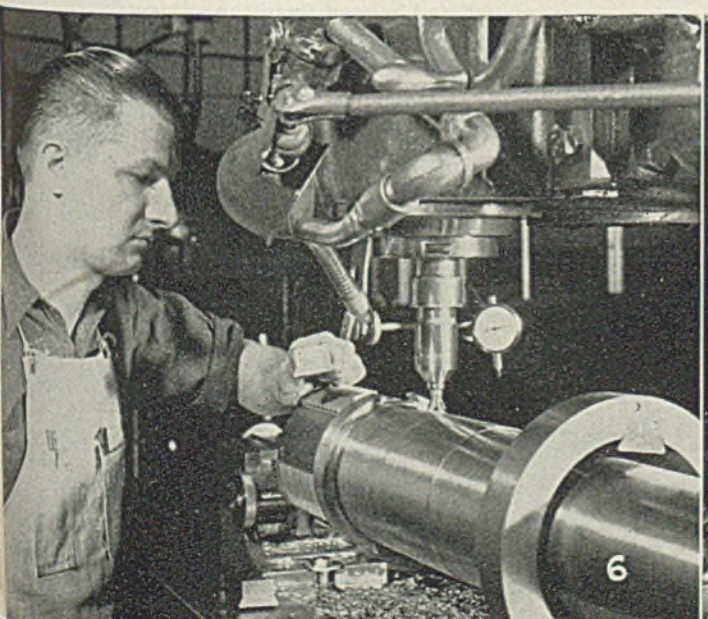


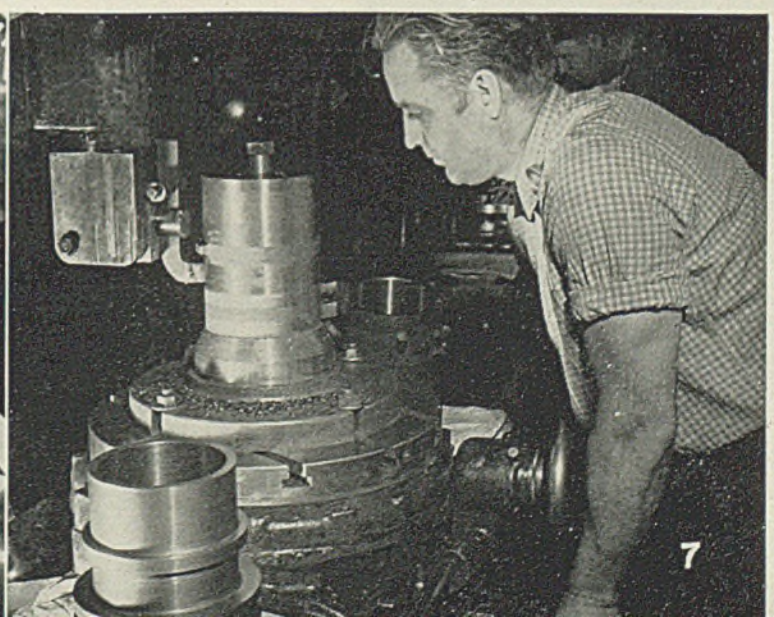


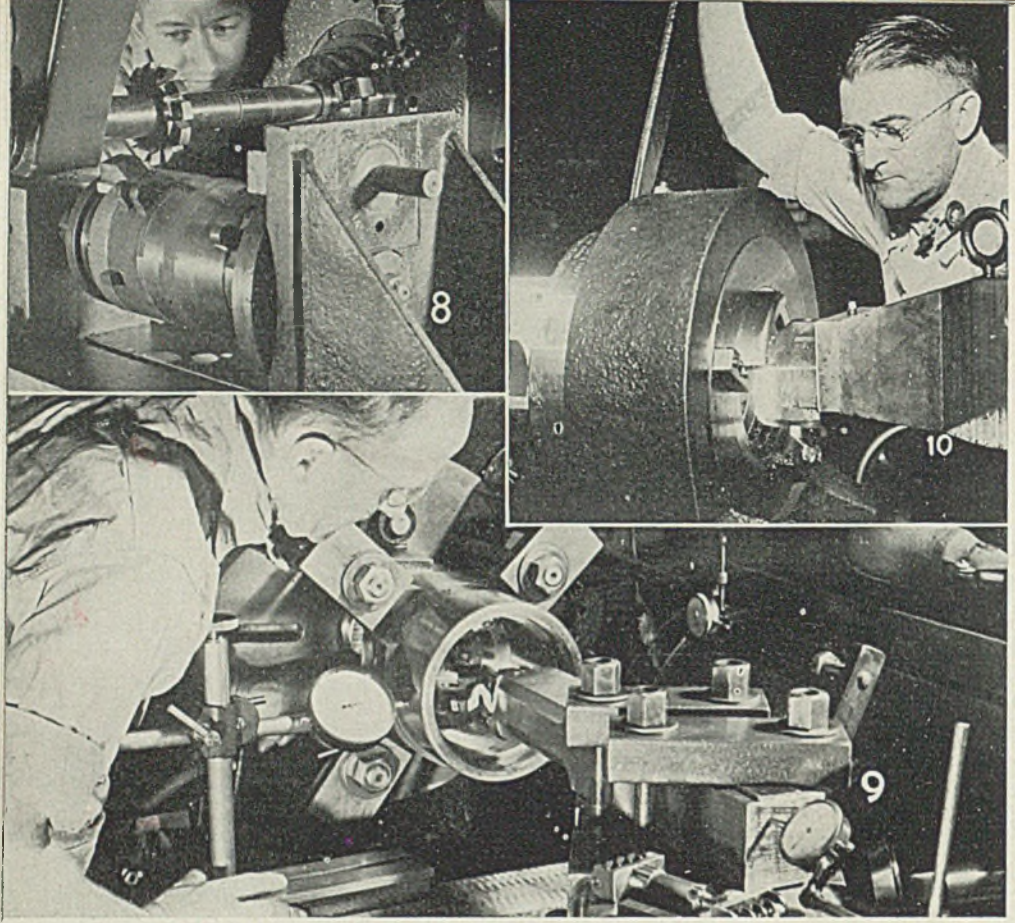




TUBE AND HOOPS







cut in the first series of operations, and then the additional fourteen to make a total of 28 are cut by indexing the tube and repeating. This assures ample power for operating the machine well below its rated capacity. During subsequent inspection, each pair of grooves is checked for size at 5-inch intervals along the tube length.

Next the tube is cut to length by facing off the muzzle end and shoulders as required. A sacrifice plug is used to keep drills and reamers straight while making stud holes through the cylindrical surface of the tube since these must be made at an angle. To locate the breech hoop accurately, dovetail pockets are cut in the breech end of the tube using a vertical milling machine as shown in **Fig. 6**. A gage block checks the cut made by the formed end mill while the ring gage at the right is used as a final test.

To straighten and size the bore and to remove any feather edges that may be formed in rifling, a small amount of stock is removed from the bore by honing the lands between the rifling grooves.

Muzzle hoop, after machining, is shrunk on the gun tube.

Breech hoop, made from a carbon steel forging, is a drive fit on the tube. To make the lugs on the outside of the breech hoop integral with the hoop forgings, they are machined from the solid block, first being turned as rings and the extra metal then being removed, by slotting as shown in **Fig. 7**. A hoop before slotting is shown in the foreground.

The contact surfaces between breech ring, gun tube and breech hoop are important since upon them depends the ability of the parts to be assembled and disassembled without the use of tools—one of the important requirements. To prevent jamming of the threaded and conical surfaces, stop lugs are placed on the breech hoop to match projections on the breech ring, limiting the rotation of the breech ring. An assembly pressure of only eight to ten pounds is desired in threading the breech ring onto the gun tube. If this threading is done slowly, locating points on the ring will be about ⅛-inch from the lugs on the hoop when the conical surfaces seat. A slight spin, however, will provide sufficient inertia to close this gap which then produces an 85 per cent bearing between the breech ring and tube at the conical surface, assuring a snug fit and yet allowing the parts to be disassembled by hand.

Faces of the stop lugs are machined in a horizontal milling machine with the breech hoop mounted on an arbor positioned with an indexing plate and pin as shown in **Fig. 8**. Proper lug angle is obtained by offsetting the work.

Breech ring is made from an alloy steel forging, faced, turned and bored on conventional lathes using a pot chuck to hold the work while muzzle end operations are performed. In order that the position of the threads in the recessed conical surface fits precisely to obtain the assembly described above, boring and counterboring the thread surface, cutting the 30-degree angular recess and cutting the thread itself, are the most exacting jobs on the breech ring. Since the lead of the buttress thread provides a ratio of 43 to 1 between longitudinal distance along axis and angular movement of the contact point when the breech ring is rotated, the angular location of the lugs will be off 0.043-inch if the thread is out of position by only 0.001-inch. Setup for boring, counterboring and conical recess finishing as well as the thread cut on this part is shown in **Fig. 9**. Note the indicator to position the work and the tool slides, the thread limit gage on top of the compound rest and the thread set gage at the lower right. Breech ring is positioned in a fixture which permits gaging through the breech block opening. Work is then bored, counterbored and a 30-degree conical recess is machined and located from the adjacent surface of the breech block opening, using a plug gage that fits the cone to a depth which brings it flush with the surface. A positioning gage locates the threading tool from the

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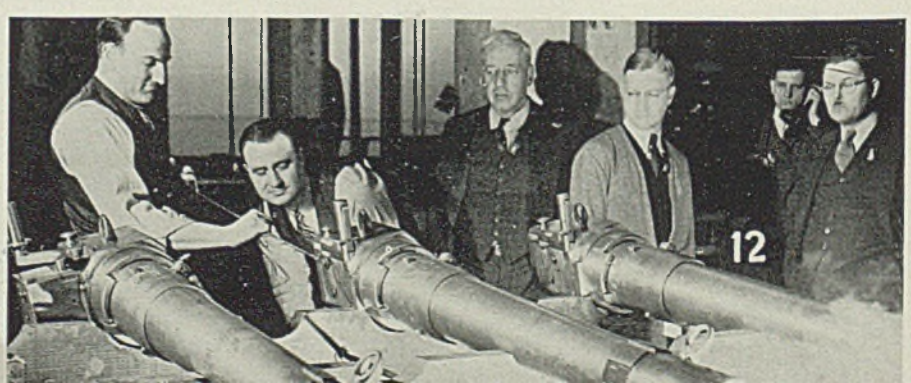

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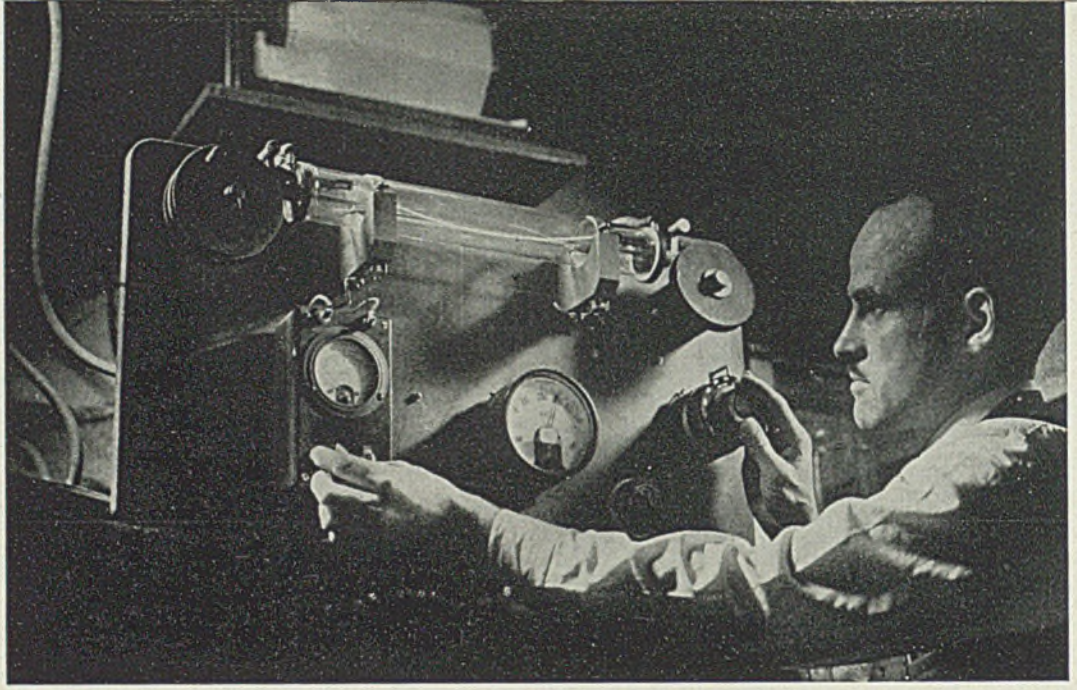


Fig. 1 — Early model of hot-wire gas analyzer to measure carbon pressure of furnace atmospheres

CARBON PRESSURE CONTROL

Of Furnace Atmospheres

. . . . enables the operator to preadjust the furnace atmosphere to that point where its carburizing power just matches the carbon-escaping tendency of the steel, thus neither carburizing nor decarburizing the steel surfaces being hardened

By JOHN R. GIER*
Westinghouse Research Laboratories
East Pittsburgh, Pa.

■ CARBON, being the most important single alloying element in steel and having such a profound effect on its strength and hardness, must be closely controlled in all heat treating operations. Such control is particularly vital at the surface of the steel since wear and high stresses often are concentrated there. Not only is this true in hardening cycles but also in carburizing and other heat treating cycles.

To get finished surfaces of good quality, the steel often is machined after hardening to remove the "skin" damaged by oxidation and decarburization, or heating must be done in a closely controlled atmosphere that does not rob the surface of carbon or add more than is desired.

Steels tend to lose carbon at the surface by chemical reaction with air or other gases in the furnace when the work is heated for hardening. This tendency, however, can be opposed by use of a suitable carbonaceous protective atmosphere. One of the greatest difficulties in the use of protective gases for steels is that of adjusting the relative amounts of active gas components so their combined net effect will be a chemical balance with the carbon in the steel (or whatever exact state of unbalance may be desired, such as in carburizing). Between the gas and the steel there is a natural tug-of-war that determines whether the steel will lose carbon to the gas or absorb carbon from it. For "clean hardening", the furnace atmosphere should be adjusted in composition so its carbon pressure just matches that of the steel, at which point no change in surface carbon content will occur. The term "carbon pressure" as applied to a gas mixture means its carburizing potential; carbon pressure of steel is the carbon fugacity, or carbon-escaping tendency.

*Now manager of Ferrotherm Co., Wilkinsburg, Pa.

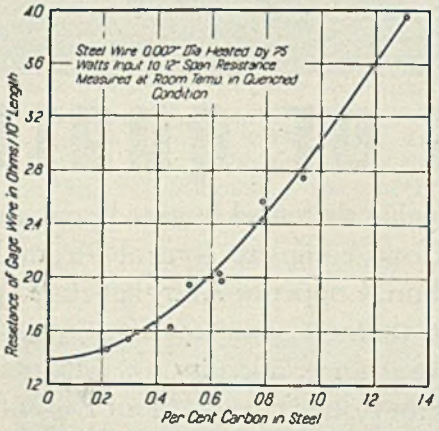


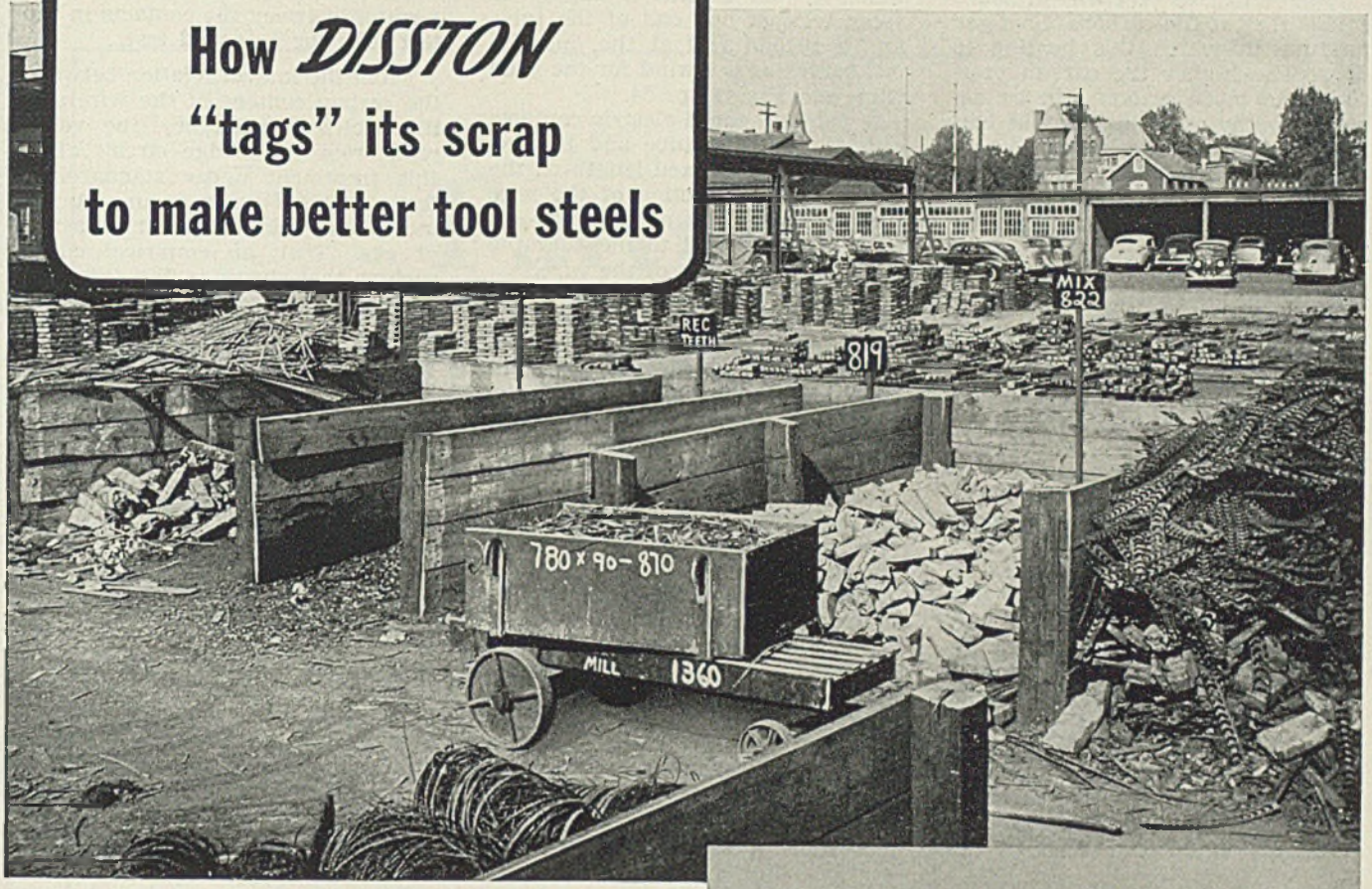
Fig. 2—This is the chart from which per cent carbon in the steel is read after the resistance of the wire has been determined by checking in the Wheatstone bridge circuit that forms part of the analyzer

It is evident that for accurate control of surface carbon in steels being hardened, a method of accurately determining carbon pressures would be extremely valuable in that it would permit testing the furnace atmosphere so its composition could be preadjusted to prevent carburization or decarburization of a steel surface being hardened.

The hot-wire gas analyzer makes it possible to measure the carbon pressure of a gas mixture and thereby aids in making a quick and accurate adjustment of the furnace atmosphere to suit requirements of the particular steel being treated. Since other types of gas analyzers measure such factors as amount of combustibles, amount of carbon dioxide, or thermal conductivity—factors which may have no fixed relation to the carbon pressure—it is evident their use is of limited value in predetermining the effect of a furnace atmosphere on the carbon in the steel.

Principle of Operation: When steel is heated above its critical range to temperatures from 1700 to 1800 degrees Fahr., the steel will absorb

How DISSTON "tags" its scrap to make better tool steels



If you were to visit the scrap yard of the Disston Steel Works, you'd see various analyses of steel scrap waiting to go into Disston's electric furnaces.

You'd notice how piles of scrap are separated from each other in carefully labeled bins . . . And you'd probably understand that Disston segregates and "tags" its scrap so that each electric melting charge will contain exactly the right raw materials.

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carbon until its carbon pressure equals that of the carbonaceous gas mixture in which this heating is done. The higher the carbon pressure, the more carbon will be absorbed because the amount of carbon that will be absorbed at a given temperature depends on the carbon pressure of the gas. This value thus can be used as a measure of carbon pressure.

Then the electrical resistance of steel suddenly cooled from a temperature above its critical range is a sensitive function of its carbon content. This means that the electrical resistance of the steel can be used to measure accurately the amount of carbon that has been absorbed. These characteristics are utilized in the hot-wire gas analyzer for measuring carbon pressure accurately.

Construction and Operation: A thin steel wire in a glass tube, see Fig. 1, is heated by an electric current to 1800 degrees Fahr. in an atmosphere of the gas to be tested, which is slowly passed through the tube. Temperature of the wire is estimated by the amount it sags from an initially taut position when cold, the wire being suspended horizontally between two spring contact electrodes in opposite ends of the tube. A reel carries a supply of fresh wire at one end of the tube, and a second reel at the opposite end serves as a rewind for the used wire, see Fig. 1, p. 54.

A pair of spaced electric contacts outside the glass tube and just below it engage a fixed length of the test wire. This section of the wire then is made part of a bridge circuit which is used to measure the electrical resistance of the wire.

In operation, the section of wire in the tube between the electrodes is heated to 1800 degrees Fahr. in a slow stream of the test gas from which it absorbs carbon until the carbon pressure of the wire equals that of the steel. This requires from 5 to 10 minutes. Then the wire is cooled suddenly by shutting off the electric heating current. The wire retains its carbon in a martensitic structure, the electrical resistivity of which varies widely with changes in carbon content. The wire's resistance is measured by drawing the treated portion of the test wire into position between bridge-circuit electrodes outside and just below the tube. The resistance of the test wire then can be read on a rheostat dial when the bridge is in balance. As the wire is drawn out of the test tube, a fresh length of test wire advances automatically into position between the contacts in the test tube for a second test.

From the known relation between the carbon content of the wire and its electrical resistance, the value read from the bridge circuit after this treatment under standardized test conditions serves as an accurate measure of relative carbon pressure of gas. Then an empirical curve such as that shown in Fig. 2 is utilized to read carbon pressure. This curve shows relation of wire resistance to equilibrium carbon content of the steel heated at a given temperature in the same gas. From this determination, the amount and direction of deviation of carbon pressure from the desired value can be determined and the gas adjusted accordingly.

This system enables heat treaters quickly to test a furnace atmosphere and to adjust its composition to the requirements of the work so no change occurs in the carbon content of the steel surface during the hardening operation. This same analyzer also is useful in controlling gas carburizing processes where it is desired to produce cases having carbon contents below the saturation point.

British Iron and Steel Institute Hears Latest on Segregates

■ AT THE autumn meeting of the British Iron & Steel Institute, London, Nov. 25, 1941, John Craig, chairman and managing director of Colvilles, Ltd., president of the institute, drew attention to the fact that many new American members had joined the institute during the year and that American membership of the British Institute at the present time constituted a record. The chairman announced that the council had nominated James Henderson, director of United Steel Companies Limited, for the office of president for the year 1942-43, and Dr. McCance, a director of Colvilles Limited, for one of the vacancies of vice-president. He also announced that the Carnegie scholarship award had been made to Dr. M. Balickie in connection with the continuation of his research work on the softening and recrystallizing phenomenon of cold worked mild steel.

The first paper presented was "Apparent Relations between Manganese and Segregation in Steel Ingots", by J. H. Whiteley of the Consett Iron Company Ltd.—one of the papers prepared by the committee on the Heterogeneity of Steel Ingots. It described examinations made of the relations of manganese to segregation in all the plain carbon steel ingots which had been examined and described by the committee on the heterogeneity of steel ingots. As a result, the following four tentative conclusions were reached:

The ratio of the manganese increase to that of the sulphur is as a rule higher in sound than in unsound ingots.

Carbon, phosphorus and sulphur may all carry some excess of manganese in segregating, their total atomic increments being directly proportional to the percentage increase of manganese in both sound and unsound ingots, although in the latter there is a lesser proportion of extra manganese, probably owing to gas evolution. The inference is drawn that all three elements exist largely as compounds of iron and manganese in the liquid steel near the freezing point.

In sound ingots a linear relationship appears to obtain between the ratio of the increment of manganese to the total increment of carbon, phosphorus and sulphur and the ratio of manganese to these elements at the base of the cavity in the ingot head.

Segregation is diminished as the ratio of the manganese to the carbon, phosphorus and sulphur in the steel is increased.

Discussion on this paper was opened by Dr. W. H. Hatfield, who mentioned that the ingot committee had been working for 18 years and had cut up about $500,000 worth of ingots. He mentioned that the committee met about eight times a year and that data had been accumulated to an extent that went beyond the possibility of one mind being able to grasp the whole. He also said that in more recent years the examination of ingots had become more and more complete and accurate. In regard to these facts Mr. Whiteley's paper was most helpful in throwing a considerable amount of light on a particular aspect of the research which was being carried out on the manufacture of sound ingots.

Another speaker pointed out that in work previously done and covering some of the same ground as that covered in the paper, segregation elements had been paired off and charted and it was found that there was little relation apparent when only two points were taken in one ingot; this he thought was of

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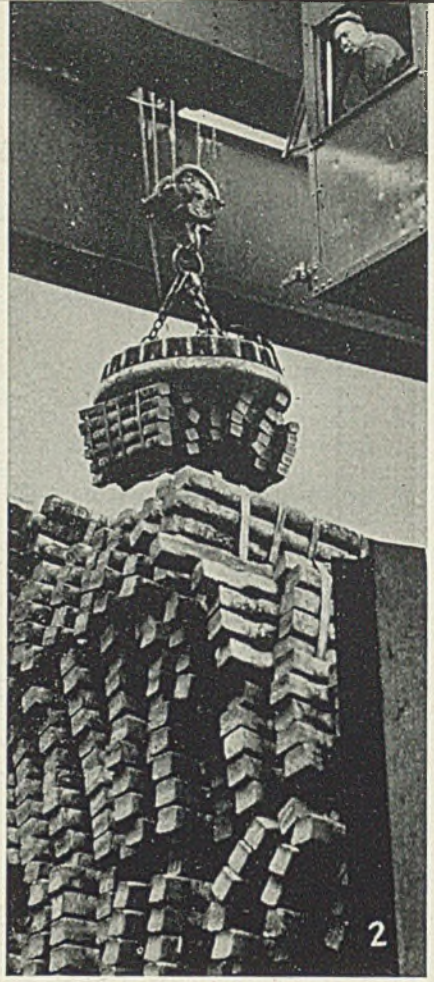
Metal Handling with MAGNETS in Steel Plants



Development of supermagnets for handling various shapes and sizes of iron and steel has reduced the idle time of carriers. In accompanying article the author discusses various phases, applications and types of lifting magnets employed in the steel industry to handling specific commodities

By A. E. LILLQUIST
Supervising Engineer
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Milwaukee

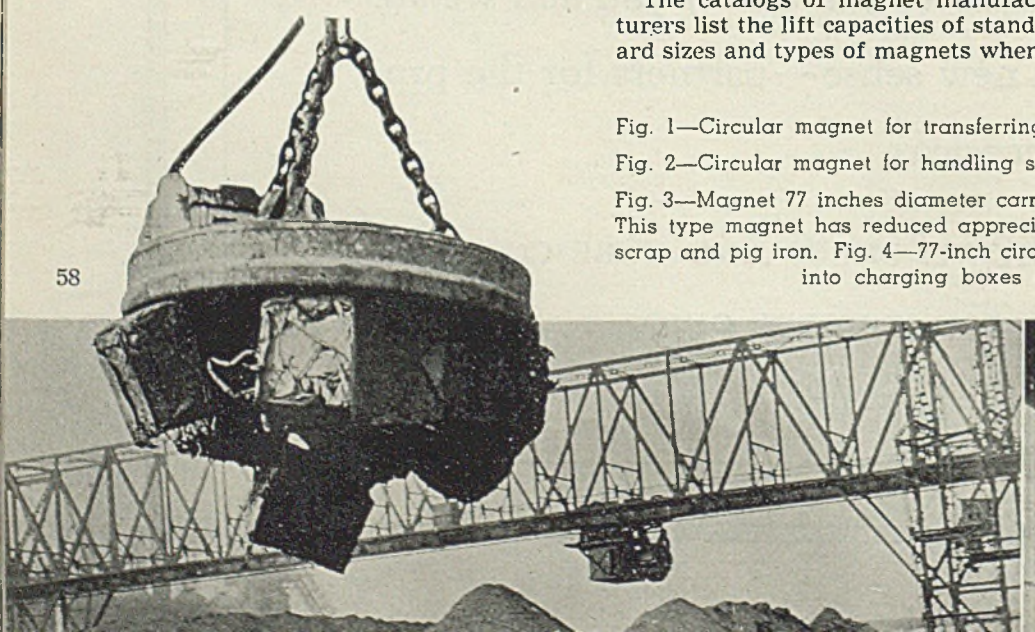
■ THE WAR effort has greatly increased the tempo of steel operations and a speed up of metal handling has become of increased importance. Lifting magnets are adapted to speedily handle innumerable shapes and sizes of iron and steel without the delays incurred when attaching slings or other holding devices to the part to be lifted. Magnets that facilitate transfer of iron and steel by reducing manual labor, thus relieving man power for other operations, are in great demand. Ships being unloaded at the dock and cars being loaded at a railroad siding don't pay dividends. They perform their useful function only when in transit. Super magnets have been developed to appreciably reduce the idle time of these types of carriers.

Magnets are often subjected to severe punishment. They are used in all kinds of weather and may have to handle cold or hot material. Some magnets are called upon to pick up steel from a frozen mass of ice and snow. Other magnets must carry metal at temperatures as high as 1100 degrees Fahr. Successful handling of hot metal has been made possible by the use of magnet impregnating compounds which do not soften or liquefy at high temperatures. Formerly the maximum permissible temperature of a magnet was limited by the impregnating compound, but now the maximum temperature is limited by the asbestos and mica insulation.

The catalogs of magnet manufacturers list the lift capacities of standard sizes and types of magnets when handling various classes of material. Sometimes the size of magnet is determined by actual pull tests on the material to be handled, and in those cases it is important to keep in mind the fact that the magnet selected should have excess capacity beyond the load it must handle because of voltage variations, heating of magnet coil, and the acceleration forces which may be encountered when the crane picks up the load.

Three general types of lifting magnets are used in the steel industry, and no one type is best suited for handling all classes of materials. These three types are the circular, the rectangular, and the bipolar magnets. In addition to the standard or conventional lines of magnets, special designs are available for unusual applications.

Circular magnets are notable for



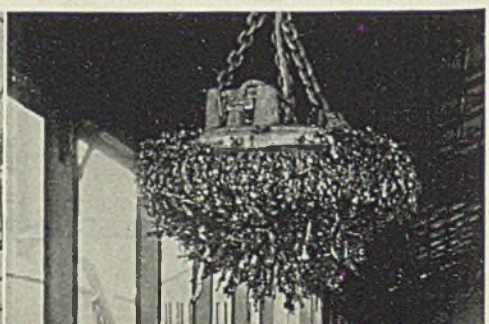


Fig. 1—Circular magnet for transferring kegs of rivets to stock

Fig. 2—Circular magnet for handling steel billets from stockpile

Fig. 3—Magnet 77 inches diameter carrying baled scrap from boat to gondola car. This type magnet has reduced appreciably the time required to load and unload scrap and pig iron. Fig. 4—77-inch circular magnet used for loading steel turnings into charging boxes at open-hearth stockhouse

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their deep penetration and rugged structure. They are, therefore, adapted to handle bulk material such as pig iron, scrap, billets, slabs, ingots, and crop ends. They are not suitable for transferring thin, long, flexible sheets and plates where there is considerable sagging and a tendency to peel off.

The circular magnet approaches most closely the requirements of a general utility magnet and, therefore, is preferred in a majority of applications. It can handle regular or irregular shapes. Circular magnets are frequently used where miscellaneous materials such as scrap, plate, pipe and slabs are to be handled in comparatively small quantities, so that the use of both a circular and a rectangular magnet is not warranted. Small billets are normally handled by rectangular or bipolar magnets, but the circular magnet, shown in Fig. 2, carrying a heavy load of bundled billets over a stock pile, is satisfactory. One advantage of a circular magnet, when handling this class of material from a pile not readily accessible to a ground man, is that the pole shoes are circular so the magnet can be placed on the load in any position. Rectangular and bipolar magnets must be so positioned that the inner and outer poles are across the billets. If the poles run lengthwise with the billet, the effective pull of the magnet is reduced, and load would not be properly handled.

Larger Magnets Demanded

The rapid expansion of the scrap industry during the past few years has resulted in a demand for larger magnets to expedite loading and unloading of boats and railroad cars. Fig. 3 shows a 77-inch circular magnet, the world's largest, ready to drop a load of baled scrap into a gondola car. This magnet, which is a recent development, will lift a load of baled scrap several times greater than the 65-inch size which was previously the largest circular magnet available. A number of 77-inch magnets are installed on ships on the Great Lakes to load and unload scrap and pig iron. Other magnets of this diameter are used in steel mills to handle similar materials.

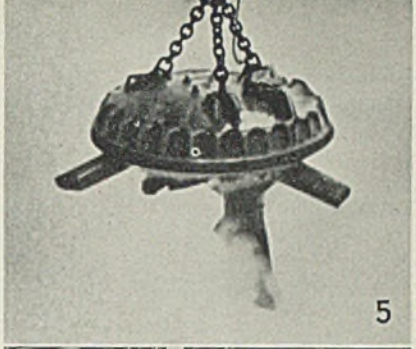
Lifting magnets successfully perform the hazardous operation of removing crop ends from cooling pits, as illustrated in Fig. 5, and transfering them to gondola cars. This service is an extremely severe test of a magnet's ruggedness for it is exposed to live steam and water, and is often severely battered because the operator cannot see through the screen of steam surrounding the crop ends. Some mills use special acid-resistant magnets to remove steel from pickling tanks after the acid has been drained from the upper portion of the pieces to be lifted. Such magnets are coated with an acid resistant paint in addition to the special precautions taken to make them as watertight as possible. For best results, magnets on this service should be periodically inspected, to insure that the terminal box and pole shoes are tight and that corrosion has not set in.

Duplex Magnets

Duplex magnets—two magnets on a common outer pole shoe—are sometimes found desirable on special applications such as turning slabs for scarfing operations. The magnet is placed on the side of the slab for moving the slab from one point to another. When it is desired to turn the slab to expose the opposite side for scarfing, the magnet is placed on the top side of the slab as before, but with the inner poles over-hanging the edge of the slab. The magnet and slab are then raised, and the magnet will tilt to hold on to the edge of the slab as shown in Fig. 10. It is a simple matter to then swing the magnet over and lower the slab with its opposite side on top. A single circular magnet of sufficient capacity to perform this turning operation would be large and hard to handle. Furthermore, it would have a pronounced tendency to hold on to the side of the slab rather than to tilt to contact the edge.

A considerable number of circular magnets, with special pole shoes designed to distribute magnetic flux for the most effective pull, are used to transfer coils of rolled strip. The magnets are used at various points in the continuous strip mill, starting with the loosely wound uneven coils from the hot mill to the tightly wound and banded coils with even edges from the cold reduction mill. Magnets for this service have flat bottoms to reduce damage to the edge of the strip. The magnets are called upon to pick up coils on the end or on the side.

Coiled strip handling is a difficult application, because the strip may be tightly wound and banded, or may be loosely wound so that adjacent turns are unsupported. The edges of the various turns in coils from the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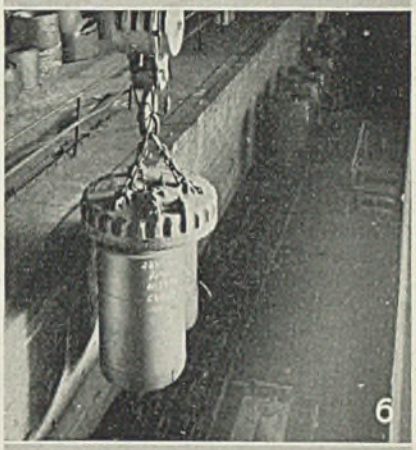
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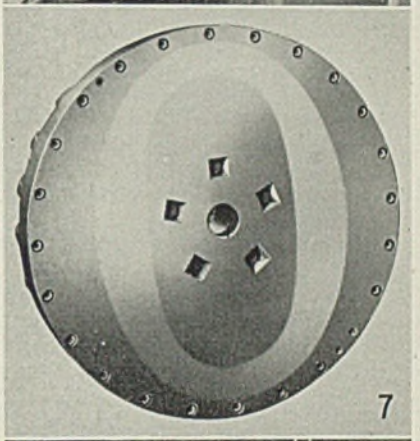
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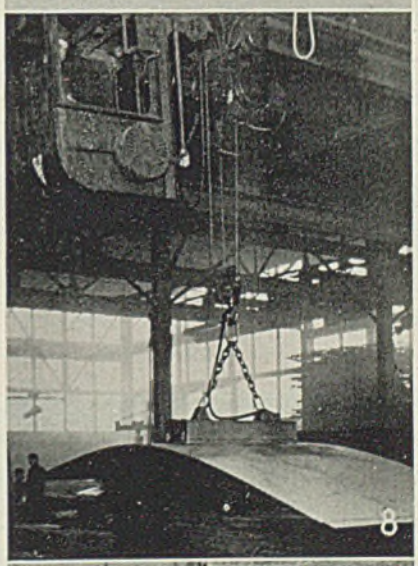
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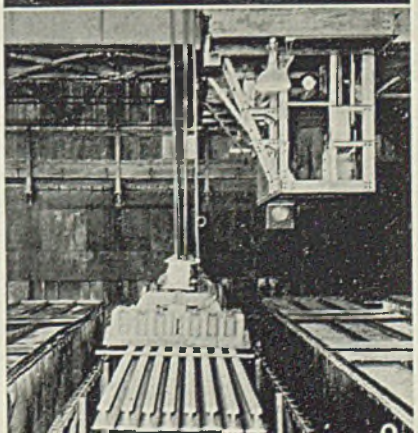


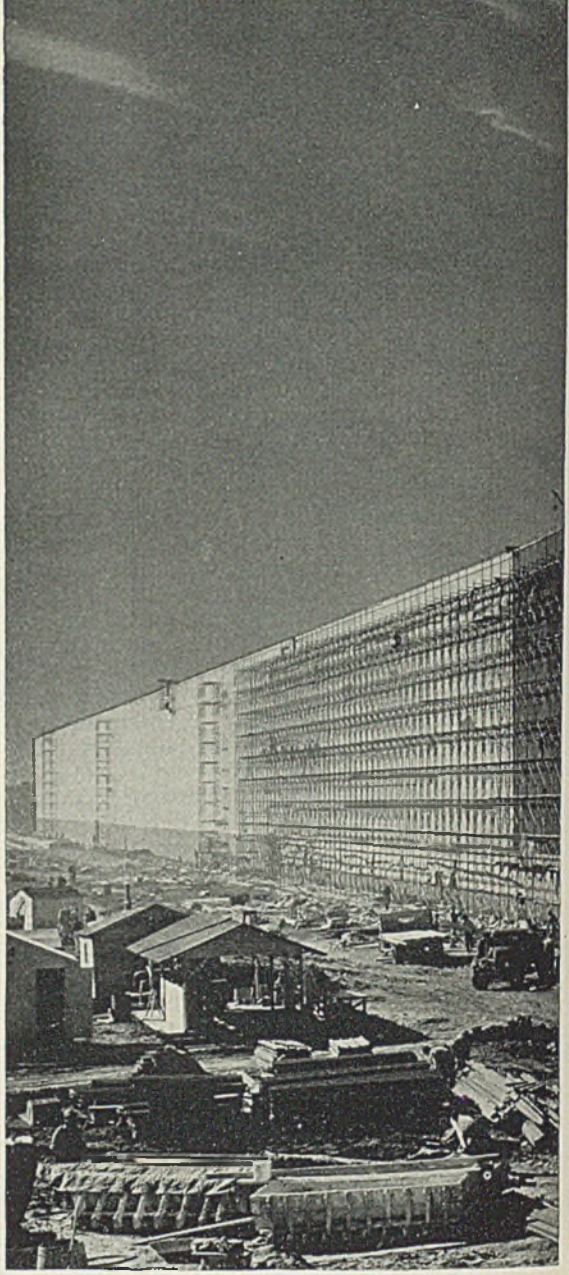
Fig. 5—Magnet removing hot crop ends from cooling pit. Presence of steam and hot water make this a hazardous application. Fig. 6—Coil handling magnet transferring two coils of strip from hot mill conveyor to storage. Fig. 7—Coil handling magnet 50 inches diameter with elongated inner shoe and flush bottom. Fig. 8—Rectangular magnet for handling large plates. Sag of the plate should not set up a stress beyond the elastic limit of steel. Fig. 9—Two rectangular magnets on spreader bar for handling rails from a cooling box

A *Steel-Encased* "BLACKOUT" PLANT

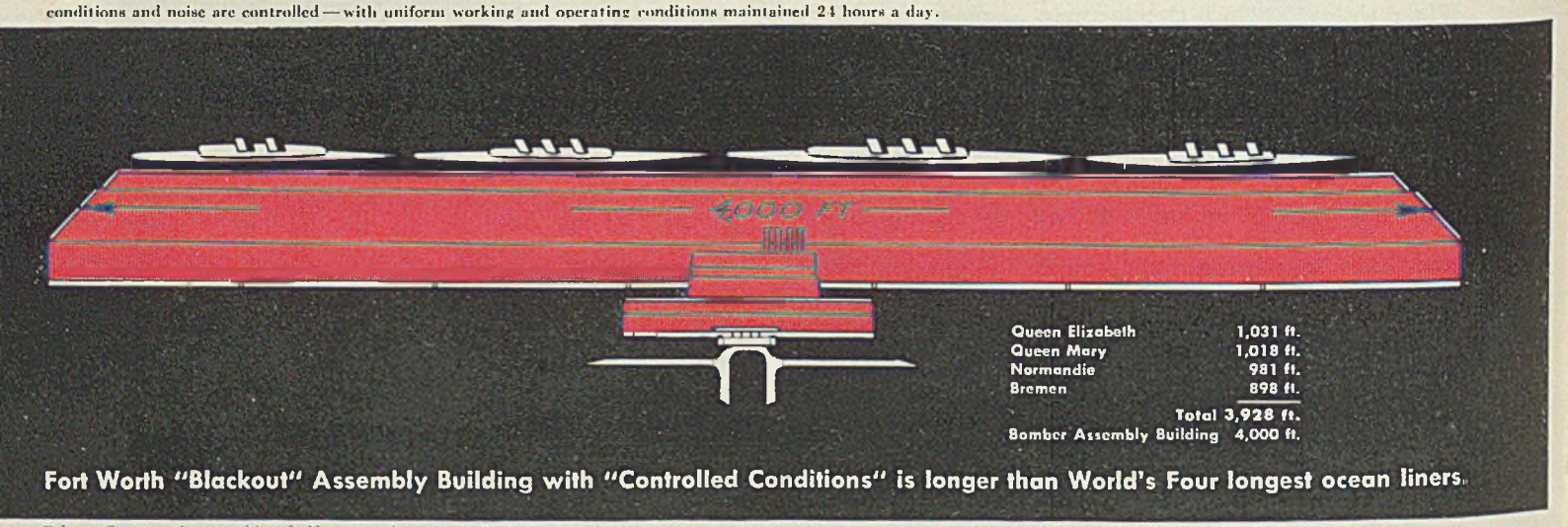
This mammoth Bomber Plant at Fort Worth, to be operated by Consolidated Aircraft Corp., is a noteworthy Defense Project because of new developments to be found in the design employed and because of its tremendous size . . . 4000 ft. long.

NEW TASKS FOR STEEL—For men in "steel" this plant has special interest because of the extent to which steel has been utilized in providing a shatterproof, splinterproof and incombustible type of construction with over 38,000 tons in structural members, in sidewalls and roof, in doors and as reinforcing.

STEEL TEAMS UP WITH GLASS—Unique in design is the sidewall and roof construction developed by Austin Engineers in which steel and glass have been effectually combined to provide insulation against heat and cold and to prevent condensation and resulting corrosion; also to control noise by absorbing 60 to 70% of sound.



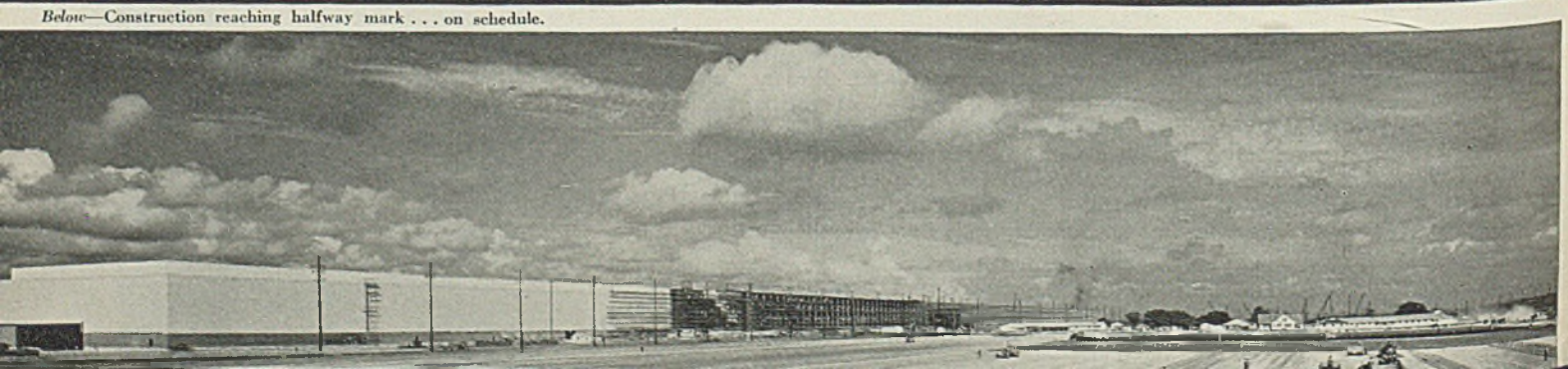
Right above—A "Controlled Conditions" Plant, one of 11 designed by Austin since 1930, in which light, atmospheric conditions and noise are controlled—with uniform working and operating conditions maintained 24 hours a day.

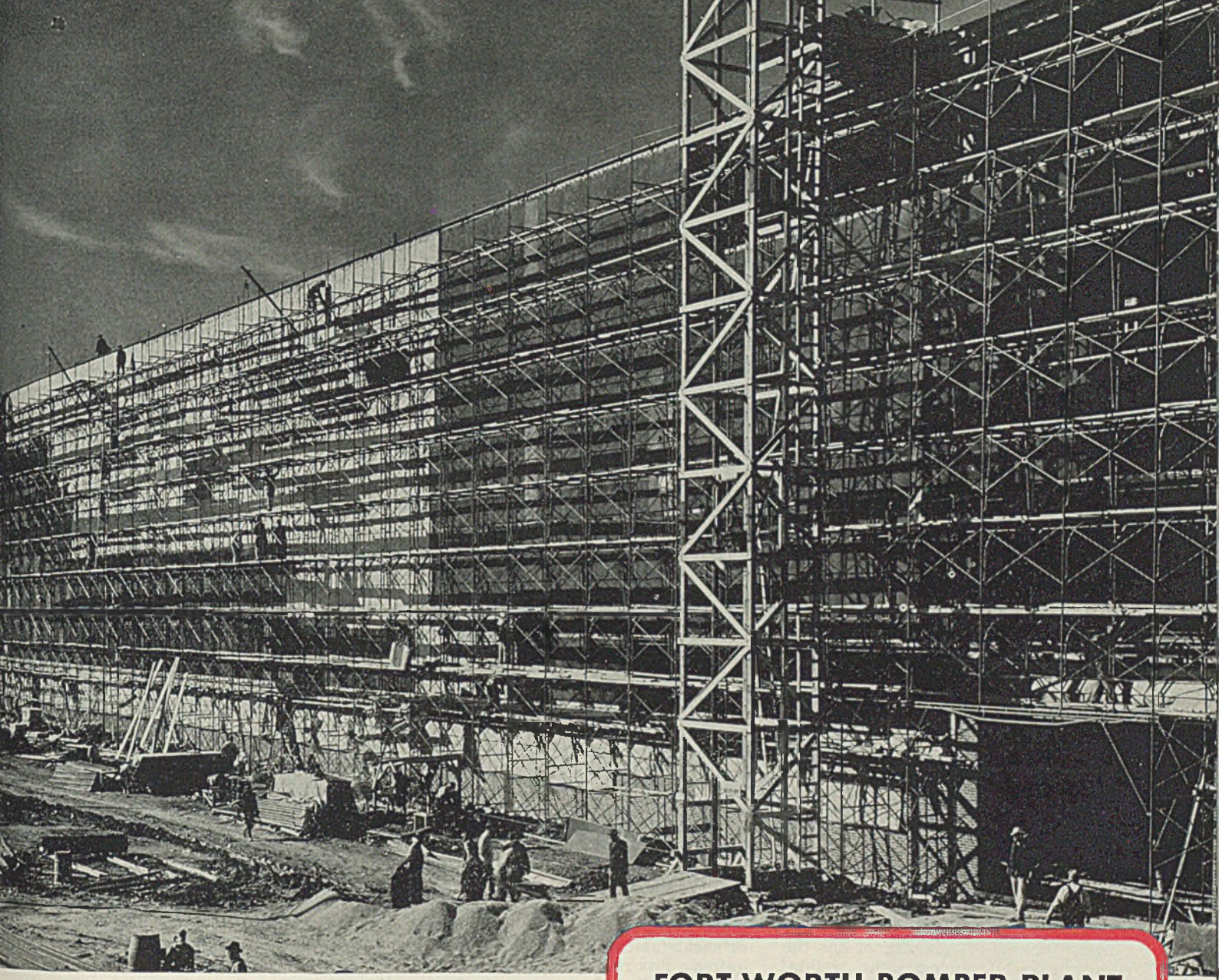


Queen Elizabeth	1,031 ft.
Queen Mary	1,018 ft.
Normandie	981 ft.
Bremen	898 ft.
Total	3,928 ft.
Bomber Assembly Building	4,000 ft.

Fort Worth "Blackout" Assembly Building with "Controlled Conditions" is longer than World's Four longest ocean liners.

Below—Construction reaching halfway mark . . . on schedule.





FAST SCHEDULES—Construction was pushed day and night 7 days a week, one result: 27,000 tons of structural steel were erected in 80 working days.

The Fort Worth Plant is being handled by Austin under contracts covering design, construction, installation of building equipment and in this case even installation of production machinery.

* * *

Austin will gladly furnish suggested designs and cost estimates promptly.

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FORT WORTH BOMBER PLANT

Where steel provides shatterproof, splinter-resistant and incombustible construction

Principal Buildings	
Assembly Building	320' x 4000'
Mezzanines, 16 Areas each	31' x 450'
Administration Building, 2-story	60' x 700'
Lobby	65' x 65'
Hangar	200' x 850'
Camouflage Building	150' x 300'
Maintenance Building, 2-story	80' x 350'
Cafeteria Building	125' x 150'
Boiler House	80' x 350'
Total Floor Space	1,926,500 sq. ft.

Steel Required	
Structural Steel	27,000 tons
Steel sheets in Walls and Roof	4,500 tons
Reinforcing Steel	6,000 tons
Steel in Doors	1,000 tons
Total	38,500 tons

Doors in Plant

9—200 ft. vertical lift doors
4—150 ft. vertical lift doors

Mezzanine Floors in Plant

In the 125 ft. side aisle, double deck mezzanine floors, 30 ft. wide, run the length of the building except for 50 ft. breaks at transfer points every 500 ft.

Below—All windows eliminated yet 203 carloads of fiberglas used for insulation.

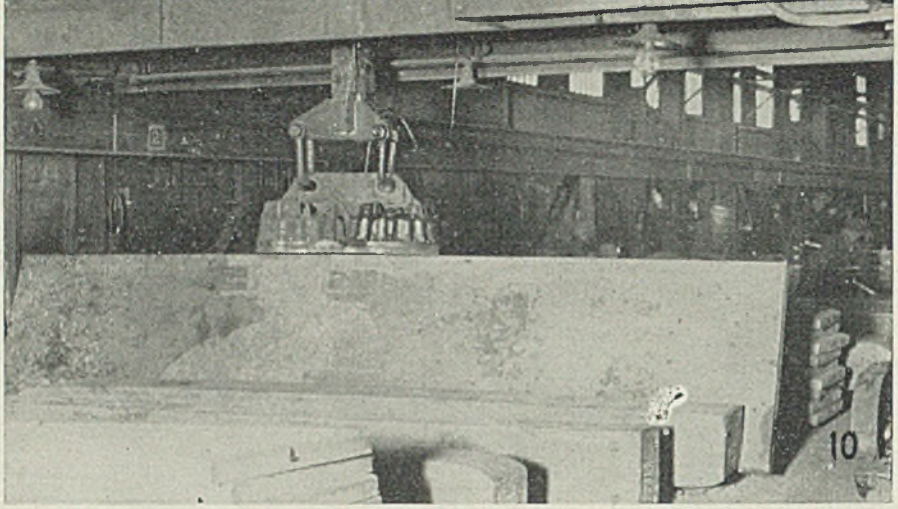


Fig. 10—Duplex type magnet turning slab in conditioning department for additional scarfing operation

hot mill may be jagged so that a poor magnetic section is exposed to the flux from the magnet poles. Sometimes the magnet must handle a single coil of strip, while at other times the magnet may be required to pick up a multiplicity of coils. Because of these variations in coils, the number of coils to be handled, and the position of contact with coils (that is, on the side or on the edge) various types of coil handling magnets have been designed. In general it has been found that a standard circular magnet with an elongated inner pole shoe and a special outer pole shoe, as shown in Fig. 7, is suitable for most installations, because the magnet is rugged and the distribution of flux is such that the magnet can lift coils on end or on the side.

The three coil, or clover leaf, magnet of Fig. 11 is primarily designed to handle single coils on end. The center poles of the individual magnets are spaced to come directly over the coil. This magnet has the advantage of being light weight. However, it has found limited use because it is not as well suited to handle several coils on end, or one coil on the side, as the circular magnet with the elongated inner pole.

Rectangular Magnets

Many designs of rectangular magnets are available most of which are distinguished by comparatively shallow flux penetration and uniform pull over almost full length. Rectangular magnets are adapted to handle sheet, plate, bar stock, pipe, slab and similar materials which offer a low reluctance path to useful magnetic flux, and where the pieces are straight and piled in regular layers. They are generally used in mills where they can be applied to this class of material exclusively. Rectangular magnets are relatively inefficient when handling scrap, pig iron, and other irregular shapes. In general magnets which handle sheet or plate need not be built as rugged as the circular magnets, so many rectangular magnets do not have renewable pole shoes because there is little wear on the bottom surface. However, magnets with renewable pole shoes are furnished for more severe applications, such as handling hot billets, slabs, ingots or rails.

Rectangular magnets may be used singly, or in groups of two or more mounted on a spreader bar. The number of magnets used to handle a particular size of sheet or plate is often determined not by the lifting capacity of the magnets themselves, but by the overhanging length or weight of the material. If the length of sheet is too great, excessive whipping action may result when the load is hoisted. The distance between magnets on a spreader bar should not be so great that the stress due to flexure exceeds the elastic limit of steel.

Rectangular magnets on spreader bars are sometimes used with special cranes to transfer single sheets or plates from stock piles to conveyors or shear tables. This application requires a flux regulating controller to vary the pull of the magnets for handling different thicknesses of material. Flux regulation may be obtained by varying the line voltage, or by inserting variable resistance in series with the magnets. It is usually not difficult to pick up single heavy plates or sheets, but when handling thin gage stock it has been found more satisfactory to pick up several sheets and to drop one sheet at a time. Successful operation depends also on the skill of the operator because of variations in thickness of sheet, in oil film between sheets, and in speed of load pickup.

Heavy rectangular magnets with exceptionally strong magnetic fields, renewable pole shoes, and generally rugged construction are used extensively to handle rails. They are provided with ventilating ducts through the body to permit free circulation of cooling air around the coil in order to reduce the amount of heat conducted from the hot rails to the coil. Rectangular rail handling magnets are used in connection with the controlled cooling process in rail manufacture because they can efficiently handle rails at high temperature. Fig. 9 shows a pair of rail handling magnets lifting rails from a cooling box.

Bipolar Magnets

Bipolar magnets have fairly deep penetration and reasonably uniform lift over full length. They therefore, are adapted to handle bar stock, pipe, rails, and structural steel, where the material is irregularly piled or crooked so that individual pieces may not come into close contact with the magnet poles. Bipolar magnets also are used where both the foregoing class of material and scrap or pig iron must be handled by the same magnet. This type of magnet has excessive flux leakage and requires greater weight per unit of lift than circular or rectangular magnets. For this reason bipolar magnets have been largely superseded by the more efficient heavy rectangular magnets.

Booklet for Inventors

■ Information bulletin No. 2, entitled "How Inventors Can Aid National Defense" is now available from the United States Department of Commerce, Washington.

Embodying some 22 pages, the publication is directed at inventors, engineers, scientists, technicians and others desirous of aiding the nation in the war effort.

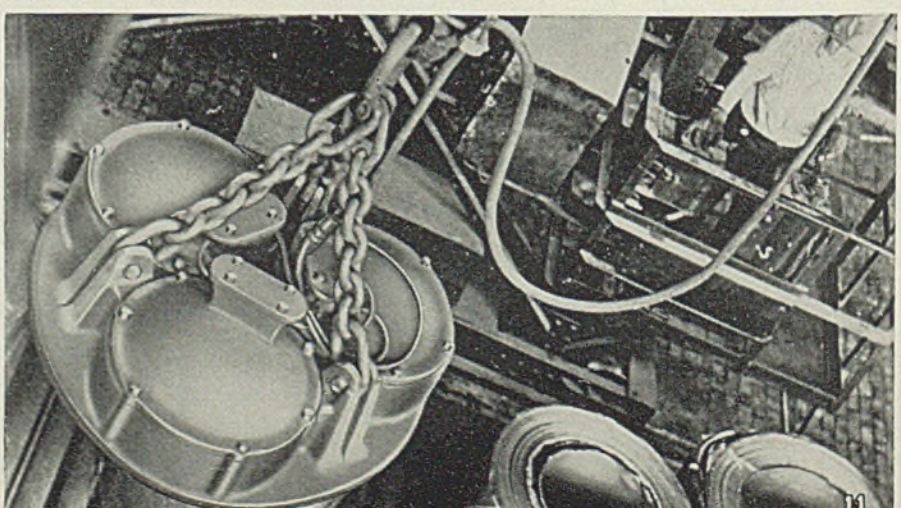
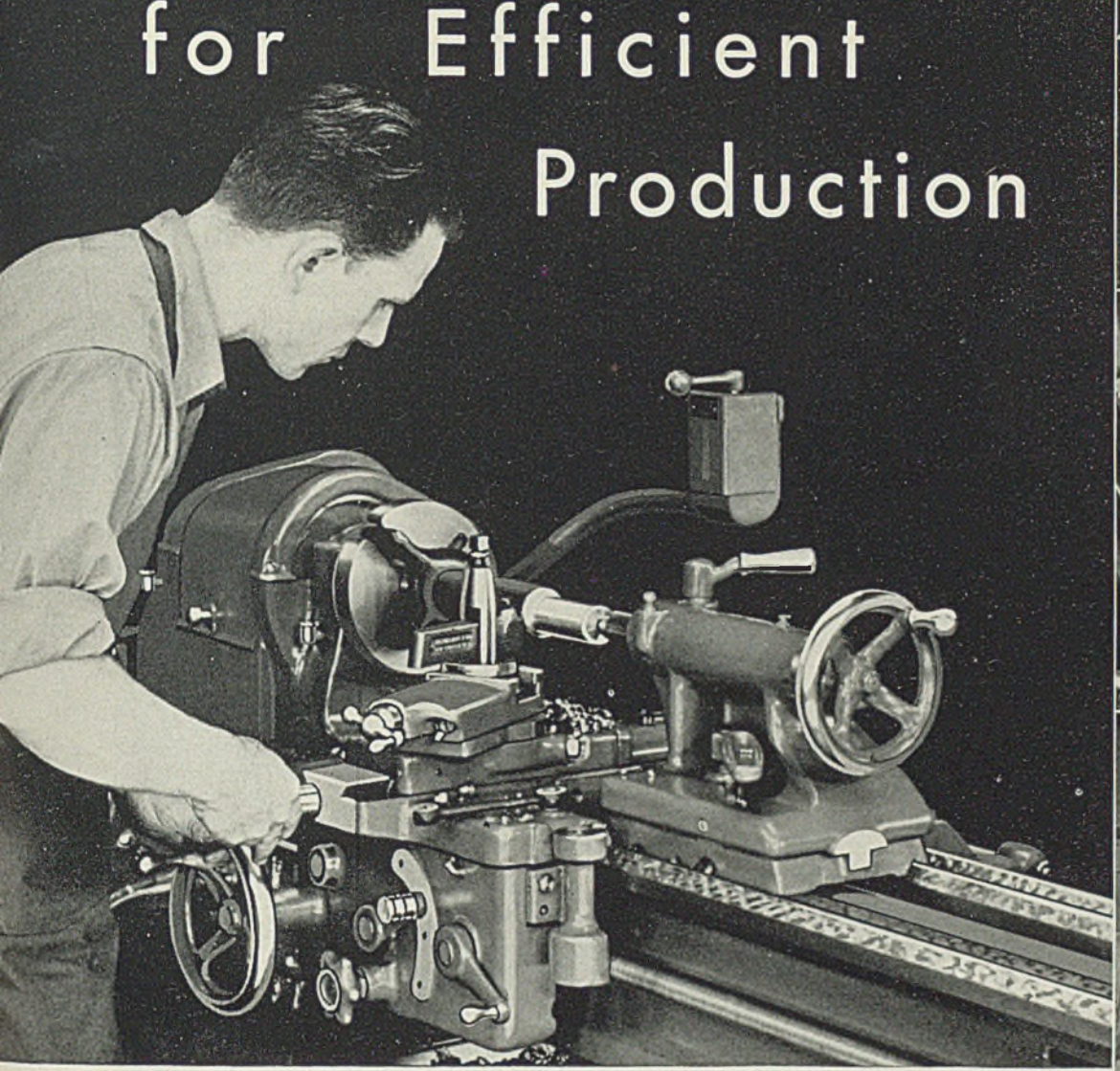
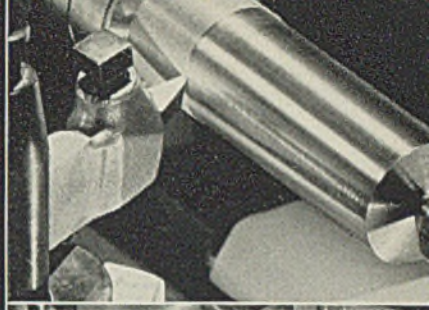
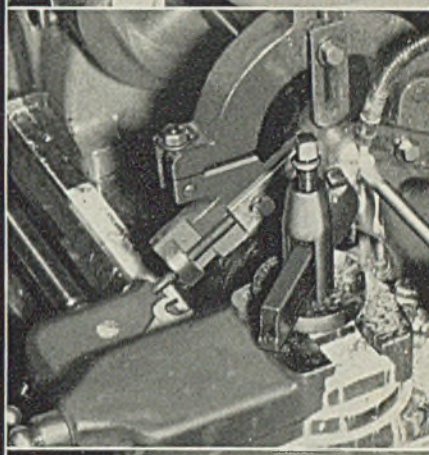


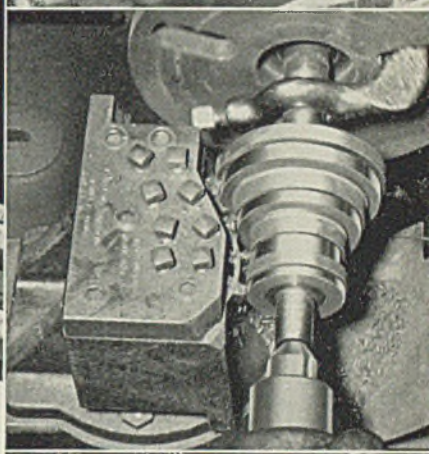
Fig. 11—Cloverleaf magnet carrying a coil of strip steel

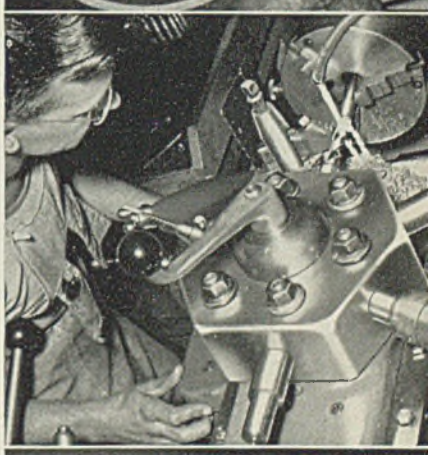
for Efficient Production

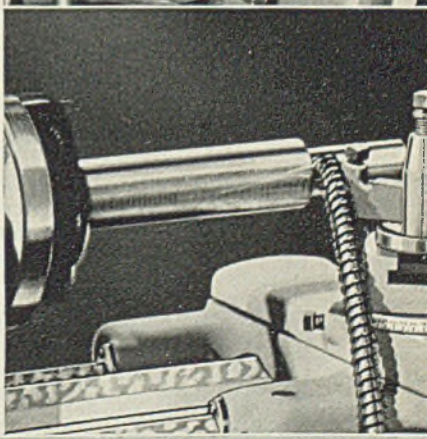












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Many features contribute to the efficiency of South Bend Lathes. A wide range of spindle speeds permits machining work with maximum cutting tool efficiency. Their versatility reduces set-up time to a minimum — lowers cost of change-over from one job to another. Smooth, vibration-free operation permits finish turning or boring with such precision that subsequent grinding, honing or lapping operations can often be eliminated. A convenient arrangement of controls makes for an ease of operation which reduces fatigue and lowers the possibility of error.

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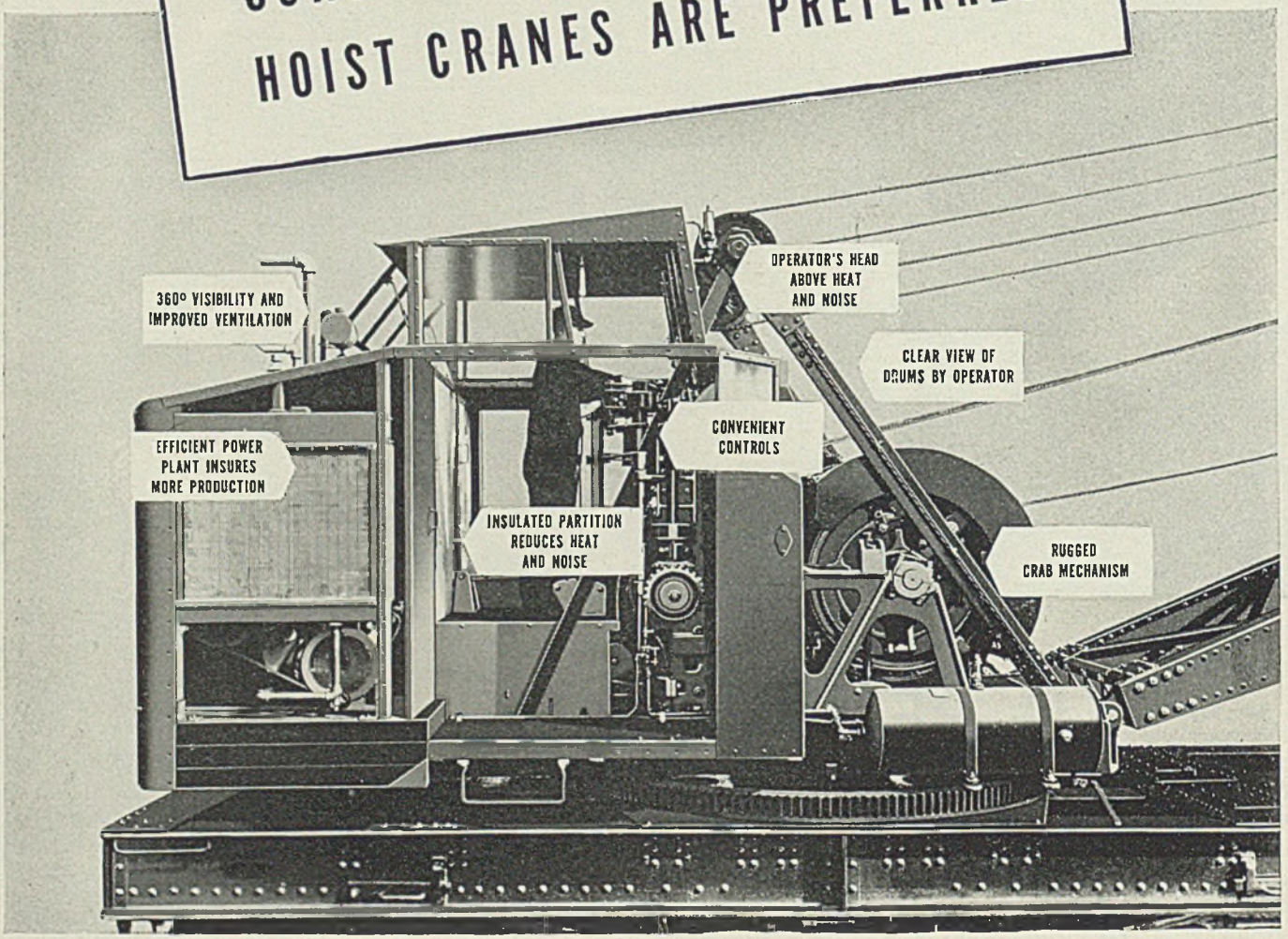
THERE ARE PLENTY OF REASONS WHY INDUSTRIAL BROWNHOIST CRANES ARE PREFERRED



A glance at this model No. 4 or 5 Industrial Brownhoist Crane with Monitor-Type Cab (powered with either gasoline or diesel engines and available in 20 or 25 ton capacities) reveals a few of the many reasons why Industrial Brownhoist cranes do a better, faster job of material handling.

360° visibility enables the operator to see clearly in every direction—with no effort whatsoever.

The insulated partition between the motor and the rest of the cab greatly reduces noise and heat in the operator's compartment.

Booms are constructed for maximum strength with a minimum of weight. Power plants develop more power and use less fuel than ever before.

In fact, from every standpoint, the Industrial Brownhoist cranes of today are designed and built to insure longer crane life, lower costs and greater efficiency.

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MECHANIZED HANDLING

Speeds Tractor Manufacture

. . . . when combined with carefully planned plant layout and supplemented by highly efficient auxiliary handling devices

■ THE FARMALL plant of International Harvester Co., located at Rock Island, Ill., produces all-purpose type tractors as its principal line. These are made in the medium and large sizes utilizing conventional spark ignited engines, and in the large size equipped with a diesel engine, namely the models H, M, and MD. In addition the plant turns out two sizes of orchard tractors, the 04 and 06; two sizes of conventional style tractors, the W4 and W6; a diesel counterpart of the W6, and WD6; two industrial tractors, the 14 and 16; engines for two power units, the U4 and U6; and transmission and drive units for road maintenance equipment, the IU4 and IU6. All diesel engines come from International's Milwaukee works.

The engines are assembled and most of the engine parts machined in one 4-story building approximately 500 feet long and 88 feet wide. The two sizes of engines are quite similar and are characterized by overhead valves and dry cylinder liners.

Cylinder blocks are machined and assembly is accomplished on the first floor to eliminate the necessity of handling the heavy pieces on elevators. Lighter parts are machined on the second and third floor, while the top floor is occupied by the machine repair and tool and die departments.

Conveyors Handle Blocks

Pistons are rough and finish turned by two automatic machines on the first floor and then sent to the second floor for grinding, washing, and final inspection. The cylinder heads are also machined and valves installed on the second floor. Also cylinder sleeves, connecting rods, flywheels, manifolds and crankcase front covers are machined on the second floor. These parts are delivered to the assembly line by either of two large freight elevators at the ends of the building or by a system of roller conveyors to a spiral roller conveyor and thence down to a live roller conveyor paralleling the main engine assembly conveyor.

The third floor has a line of automatic lathes running almost the full length of the building that turn out a large variety of pins, studs, etc. Also the hydraulic equipment for raising and lowering the various implements is machined and assembled here.

On the first floor the cylinder blocks enter at one end and travel on two more or less parallel roller conveyors from which they are lifted by power hoists to the various machines. After traveling the length of the building, the blocks are entirely machined and the cylinder liners are in place. They are then sent through a washer to start the return trip, after which they are blown off and inspected. They then proceed down a roller conveyor in an inverted position during which time the crankshaft and flywheel, oil seals, expansion plugs and water headers are all installed as well as other operations performed on the bottom of the engine. The engine is then turned over and the cylinder head studs installed.

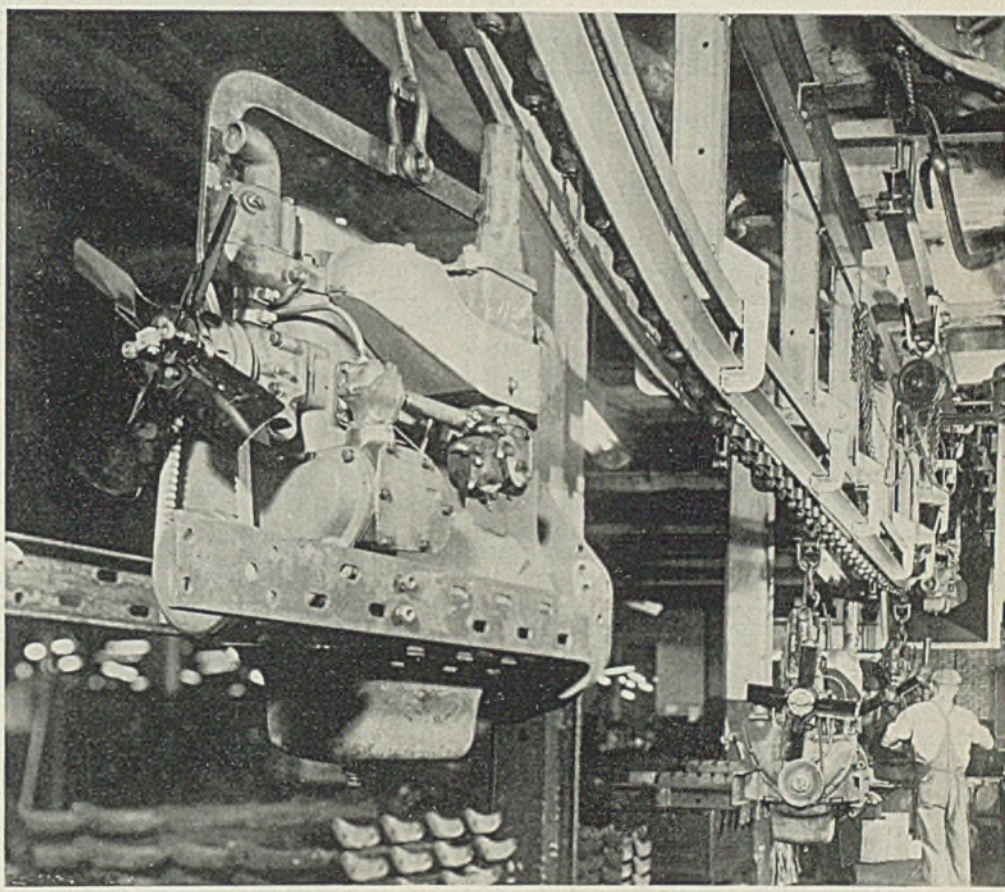

Fig. 1—Engines traveling on an endless conveyor from the motor room at the Farmall Works approach the beginning of the final assembly line

When these operations are complete the engine has again traversed the length of the motor building and is transferred to the main engine assembly conveyor. This conveyor is approximately 309 feet long and has a capacity of 55 engines. The engines are carried at a convenient working level, lying on their sides with the crankshafts parallel to the line of travel. At normal full production, this conveyor travels about 4 feet per minute. Both sizes of engines are accommodated on the same pallet by the simple expedient of turning over a pivoted T-bar.

With the engines on their sides, work may be done on both top and bottom of the engine simultaneously. For instance the oil pump and the cylinder head are installed at about the same station. Electric nut runners are suspended from feed rail by a cable wound on a spring return reel so the operator may easily follow the engine as the conveyor moves it along. When he is through with the tool the reel lifts it and holds it out of the way, at a convenient height.

When the engine reaches the end of the assembly line, it is lifted by a power hoist, suspended from an overhead track, and placed in an upright position on a pallet on a roller conveyor. The manifold, governor, valve housing and spark

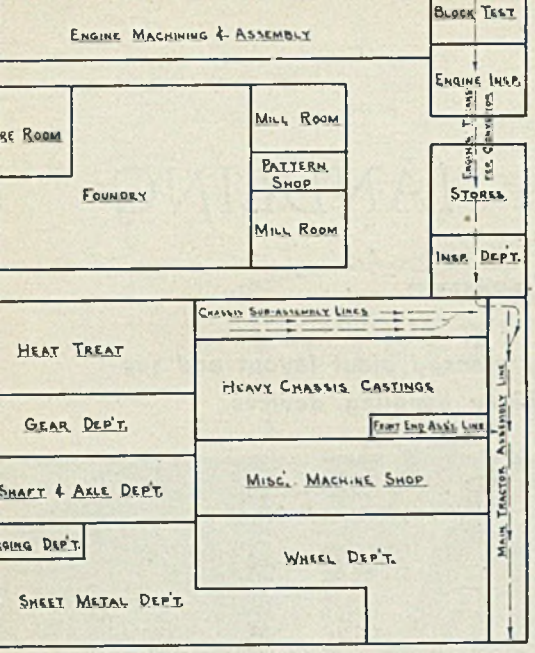

Diagram showing relative positions of various manufacturing departments at Rock Island, Ill., plant of International Harvester Co.

plugs are installed and the engine next rolls to the dynamometer test room.

The dynamometer test room has two rows of 20 stands each separated by the control cabinets and resistance banks. Each row of stands is served by a low clearance 2-ton crane for quickly and easily transferring the engines from the roller conveyors to the stands. Lifting fixtures have been developed for each size of engine. The fixtures have a hook that slips under the water pump housing on the front and a forked arrangement straddling the rear of the engine so that it is but a matter of a second or two to apply them to the engines.

Each test stand has a dynamometer in the middle with means for mounting an engine on each end so 80 engines can be mounted at one time. The engines are coupled to the dynamometers through a double roller chain passed around identical sprockets, one of which is fastened to the dynamometer shaft and the other to a short spline shaft running through the clutch on the engine. Lubricating oil is constantly drained and replenished from a well filtered and reconditioned supply so that any minute foreign particles are flushed away. Exhaust gases are drawn into a large tunnel and discharged to the outside. After the testing period the engines are transferred to the pallets on the roller conveyor and pass to the engine teardown room.

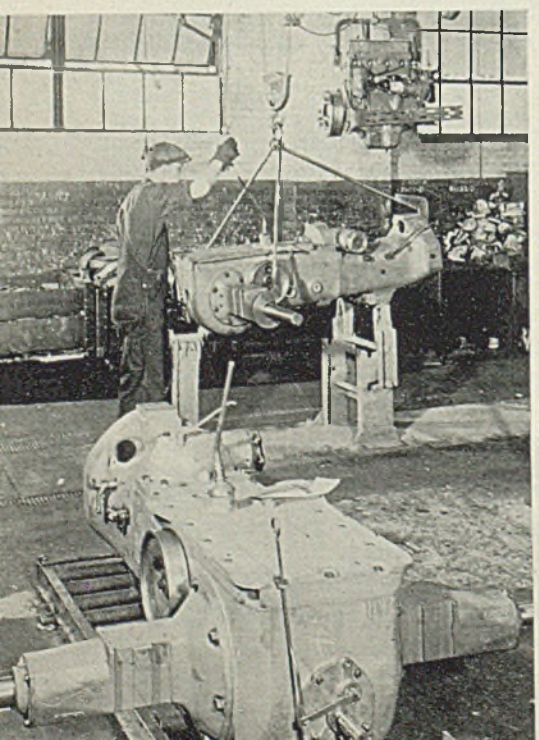

Fig. 2—The main frame of a Farmall tractor settles into position on the assembly line dolly. Frame for next tractor is seen waiting at end of subassembly line

At the engine teardown, the engines are transferred to roll-over stands consisting of two steel rings about 3 feet in diameter resting on two rollers each and connected by two heavy angles about 5 feet long to which the engines are securely clamped.

These stands make the top or bottom of the engine readily accessible for checking by merely unclamping the rings and rolling the engine over. The valve cover and pan are removed from the engine while it is in these stands and the various clearances carefully checked.

Travels on "Skyride"

After re-assembly, the engines are again transferred to the pallets on the roller conveyor and converge to a single conveyor which passes through a ventilated booth where the engines are washed with a spray of compressed air and kerosene to remove excess oil and grease which would subsequently interfere with painting. While still in this booth, lifting fixtures are put in place and the engines rolled under a dip in the engine transfer conveyor and hooked thereon.

This conveyor, dubbed the "skyride", carries the engines to the head of the main assembly line. It is of the overhead trolley type and is carried on track formed of two heavy angles. Fig. 1 shows this conveyor at a point close to the end where the engines are changed over to the main assembly line. Note that the conveyor has dipped down so that the channel side frames may be attached to the engine and that the engine in the foreground is rising to clear the head end of the main assembly line, after which it again dips down to the proper height so the engines may be attached to the chassis. The conveyor is approximately 720 feet long, has a capacity of 65 engines, and must move at a speed of about 7½ feet per minute at normal production.

The main frame of the Farmall tractor is a heavy casting which not only forms what we might call the backbone of the tractor but also serves as the housing for the transmission and differential gears. In addition, another casting, the clutch housing, forms an extension to the frame. Rear axle carriers are bolted to each side. A heavy cast cover forms the top. These castings fitted with the necessary shafts and gears form the chassis of the tractor as seen in Fig. 2.

Assembled on 733-Foot Line

The chassis subassembly lines, of which there are two main ones for the H and M models and shorter ones for the W series models, run perpendicular to the main assembly line near its starting end. See layout diagram, left. They consist of gravity roller conveyor lines pitched slightly so the units pass from station to station with a slight push.

At the beginning, the main frame casting is set in its normal position on a pallet so constructed of light structural angle that it will roll easily on the conveyor. See completed chassis on a pallet in Fig. 2.

The completed chassis is pushed to a steeper pitched conveyor which has enough length to allow a surplus of a few completed units to be built up. Both the M and H lines feed to this stretch of conveyor. About 10 feet before the end of the conveyor, there is a foot-operated stop which allows the operator transferring the chassis to the main line to release one as desired so it may roll to the end of the conveyor as shown in Fig. 2.

The main tractor assembly line is 773 feet long and accommodates 63 units at one time. It moves at an average speed of 7½ feet per minute. The conveyor proper is a 34-inch wide, flat pan type. It is supported on track formed of 25-pound rails. Pitch of the chain is 24 inches. The top of the conveyor consists of steel floor plate flush with the surrounding floor, which thus affords a safe convenient surface on which the workers may stand.

The tractors are supported at four points by short columns as shown in Fig. 2. Note that the front supports are constructed so that adjustment may be easily made to accommodate both size tractors on the same set of supports. Chassis are transferred to the main line by means of a power hoist suspended from a curved rail, one end of which lies parallel to the centerline of the end of the subassembly conveyor and the other end is parallel to the centerline of the main assembly.

(Concluded Next Week)

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There's A Balanced Lo-Hed Electric Hoist For Every Purpose

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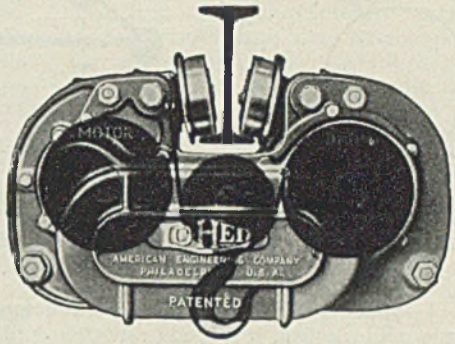
Look in your Classified Telephone Directory under "A-E-CO LO-HED HOISTS" for your nearest representative.



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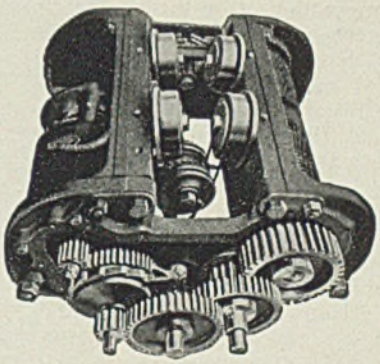

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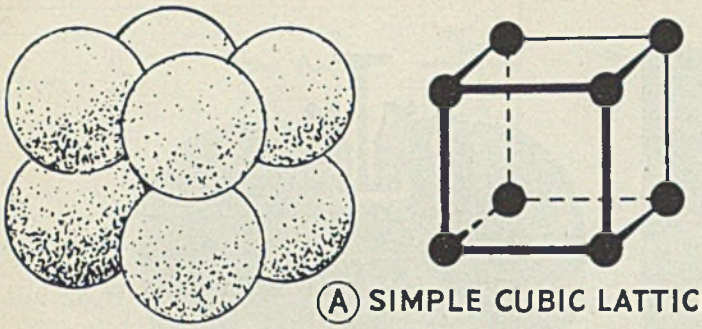

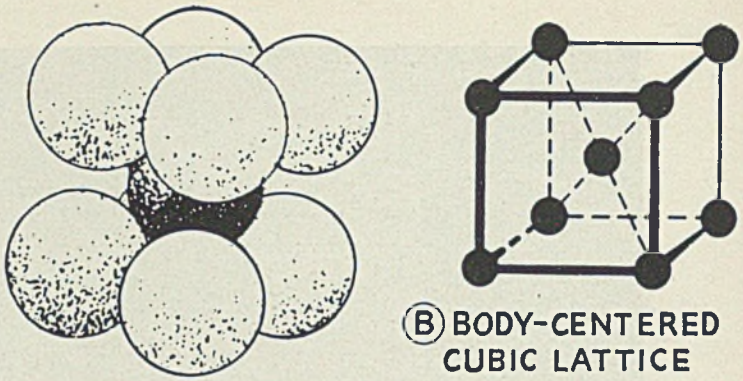

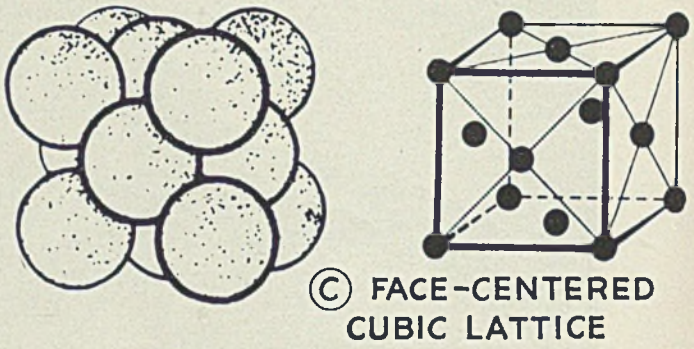

Fig. 1—Space lattice types of atom structures. Here **a** is simple cubic lattice, **b** is body-centered cubic lattice and **c** is the face-centered cubic lattice

X-RAY DIFFRACTION

. . . . as a method of identifying metal alloys

By L. L. WYMAN
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General Electric Co.
Schenectady, N. Y.

■ THE STUDY of metals concerns itself primarily with the relationship between the structure of the metal, its properties, and its chemical composition For instance, it is obvious that a piece of steel after proper hardening has the same chemical composition as it had in the soft condition; but the structure has been materially changed by the heat treatment. Likewise, a metal is chemically the same whether it is in a fully annealed condition or in a state of severe cold work, but again there are great differences between these two states from a structural standpoint.

This necessarily leads to the conclusion that it may be far more important to know HOW a material is present than to know merely it IS present. This may be emphasized by recalling that graphite and diamond are both made up (chemically) of carbon, and it is the difference in their atomic structure that gives the vast difference in properties.

In the past, the microscope has been the principal tool of the metallurgist by means of which he could observe the microstructure of a suitably prepared sample and by this means develop a correlation between the chemical composition, the microstructure, and the properties resulting therefrom. However, the structure which is observable under the microscope is rather gross and gives no information as to the fundamental atomic arrangements which gave rise to the microscopically visible structure.

The application of X-ray diffraction technique to problems of this kind has shown that this method of analysis is an essential complement to the microscopic analysis and takes its place as one of the most reliable tools of the metallurgist. The actual use of modern equipment of this kind does not require a personnel trained in either vacuum technique or electronics. As a matter of fact, the use of X-ray diffraction in metallurgical applications requires about the same amount of theoretical background as the average metallurgist finds necessary for the intelligent operation of the modern metallurgical microscope. In order to obtain some measure of understanding as to the characteristics of crystalline structure upon which such comparatively simple methods of analysis are based, it is but necessary to draw a few analogies to phenomena of rather common knowledge and thus clarify what might otherwise appear to be a complicated and wearisome explanation.

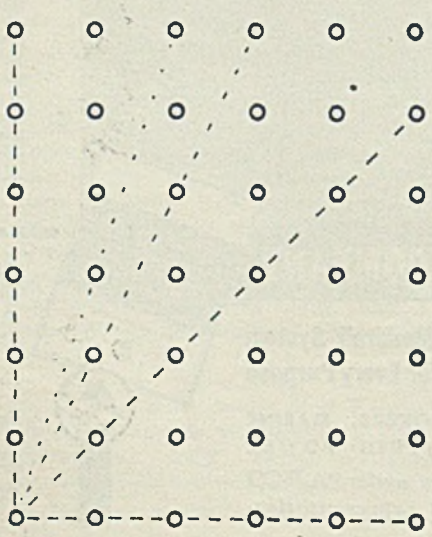


Fig. 2—Schematic of a two-dimensional lattice, showing "cornfield" pattern

In the first place, all crystalline materials are composed of atoms (of those chemical elements which are present) arranged in a very definite manner in a three-dimensional space lattice. Now, a regularly planted cornfield or a patterned wall paper represents certain figures in uniform repetition, thus forming a two-dimensional lattice; that is, possessing length and width. If this two-dimensional lattice has another placed in front of it, the distance between them being the same as the distance between the repeated units in the figure, a three-dimensional or space lattice is evolved.

Next, the atoms of which the elements are composed are not concrete particles which can be handled but are more nearly like spheres of influence, consisting of a core of positive charges around which are rotating an equal number of negative charges arranged in different orbits, much like the layers in an onion. The size of the atom depends on how many of these charges are present and in which layer they are located, these

variations being the reason for the difference between the chemical elements. The atomic number of an element tells how many of the positive charges there are in the nucleus of the atom and, consequently, the number of negative charges around the nucleus.

It is comparatively easy to simulate a model of a space lattice by arranging four tennis balls together in a square and then placing four more balls on the tops of the first set. This will represent an elementary cell of a simple cubic space lattice, Fig. 1a, for the centers of these atoms (or balls) may be considered as being located at the corners of a cube. This simple cubic lattice is typical of common table salt, sodium chloride. The sodium atoms alternate with the chlorine atoms at the corners of the cubes.

If one first arranges four balls as described above, then nests another ball into the center of these four, later replacing the top four balls, there results a cubic type of lattice with an atom at its center. This is the body-centered cubic structure, Fig. 1b. On the other hand, if on a bottom layer of five balls we place a second layer of four balls in such a manner as to be rotated 45 degrees and thus nest between them the two balls on each side of the bottom layer and then we place a top layer of five balls—we will have a configuration showing five balls on each face of the cube. This is the face-centered cubic structure, Fig. 1c.

In all, there are over a dozen basic geometric configurations which can be constructed in this manner and hundreds of variations of this subgroup, thus presenting a rather formidable array of structures. Even though the number may be large, it is the type of structure, the lattice type, which is one of the two main factors necessary for the identification of a material.

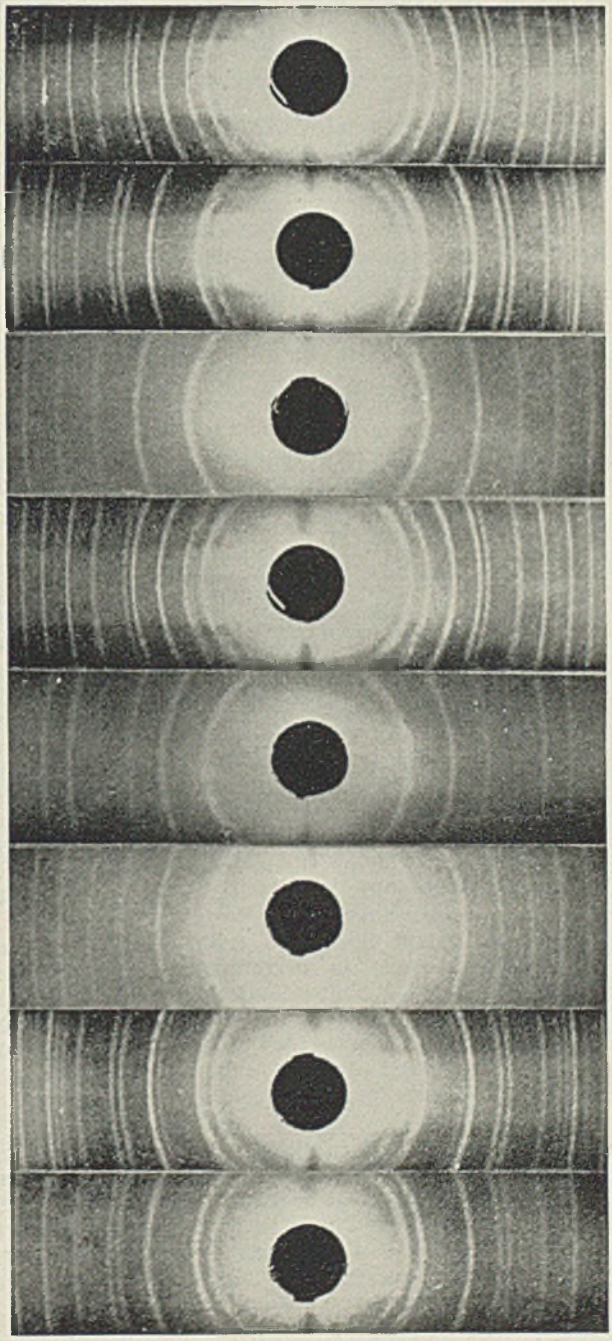
The lattice types which are encountered in studying the structures of metals are usually of the rather simple varieties such as the body or face-centered cubic or hexagonal close-packed arrangements. Most of the metallic elements fall into one of these classifications; but, when dealing with alloys of these metals, it is found that some of the intermediate phases and compounds may have quite complicated structures giving rise to the often-heard statement to the effect that metallic structures are either so simple that almost anyone can analyze them or so complicated that no one even cares to analyze them.

This latter statement might be somewhat disconcerting were it not for the previously mentioned fact that *the lattice type and size define the material.* Thus, if a material has been identified by other means, such as chemical analysis, for instance, the diffraction pattern and composition can be correlated empirically without going to the extent of a structure analysis.

The fact that different atoms have different sizes has already been mentioned; therefore, it must be apparent that if one were to build two atomic models of the same lattice type using ball bearings, one model made of large balls and the other model made of small balls, the effect of the size of the atom would be demonstrated. This shows the second important characteristic of the space lattice—the size, as measured between atom centers along a cube edge, for instance, in a cubic system.

Having considered the geometric arrangements of the atoms in these structures, some understanding of how the X-rays perform their diffraction duties may be gained by assuming that on some dark night one were to place mirrors on each "hill" in a field of young corn, the mirrors being aligned with the particular "row" of corn hills radiating from a central point, as in Fig. 2. If a strong beam of light is brought to bear on this field, then each "row" will reflect to a different point, depending on its angle to the base line.

Furthermore, as will be noted from Fig. 2, the number of hills in



(a) NaCl + KBr

(b) KCl + NaBr

(c) NaCl

(d) NaCl + KBr (=4a)

(e) KBr

(f) KCl

(g) KCl + NaBr (=4b)

(h) NaBr

Fig. 3—This shows method of identification of mixed salts—comparison system

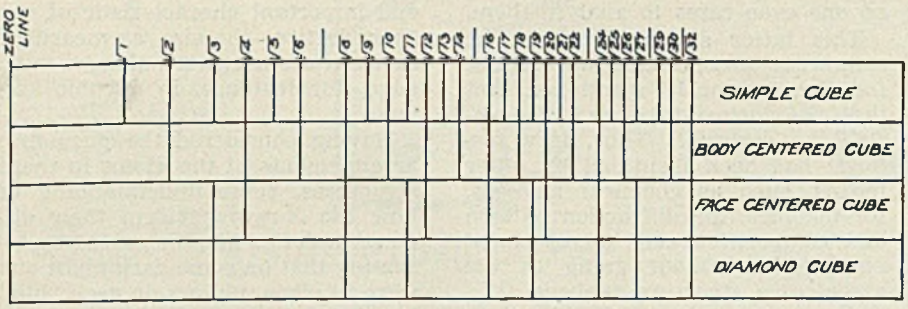


Fig. 4—Line positions in diffraction patterns of various lattices

a row is related to the angle of the row from the base line; thus the intensity at the point of reflection is a measure of the number of mirrors that are reflecting. Consequently, the position and the intensity of the reflection define the row itself.

This is the same principle that is involved when one observes all the windows of a house reflecting sunlight into one's eyes, whereas the windows of an adjoining house do not because it is in a different position with respect to the sun and the observer.

If this concept of simple reflection of ordinary light is carried over to a far smaller order of magnitude to where the regular arrangement of the atoms in a space lattice can act to diffract the extremely short waves of X-rays in a manner directly comparable to that in which a fine grating (even a fine screen or cloth) can diffract light and make it look like a rainbow, then there is a direct analogy to the manner in which X-ray diffraction operates.

Because of the fact that some planes are not in position to reflect, the diffraction pattern—that is, the geometric relationship of the positions of the diffraction lines on the film—is different for each type of structure as may be seen in Fig. 4. All diffraction patterns from a given type of lattice have the diffraction lines occurring in the same geometrical relationship to one another; thus the more common types of lattice can be recognized by inspection and the reflecting planes indexed.

The size of the lattice can be determined by measuring the angular distance on the film from the undeviated primary beam of X-rays to the individual lines and calculating the spacing in accordance with Bragg's law. This calculation is sometimes eliminated by constructing special rulers which, when used with specified cameras and radiations, will give the lattice spacing (size) directly.

From the above discussion, it can be readily understood that, given a structure made up entirely of atoms of the same kind—a pure metal, for example—this unit can be completely described by giving the *lattice type* and the *lattice size*. For instance, copper, silver, and gold all have a face-centered cubic type of structure (as have many other elements), but the lattice sizes are 3.608, 4.077, and 4.070 x 10^{-8} centimeters respectively and thus differentiate the materials.

In the event that copper should be alloyed with gold, the copper atoms replacing the gold atoms in the parent gold structure, it would be seen that, because of the fact that the copper atom is smaller than the gold atom, the SIZE of the new alloy lattice would be smaller than the gold lattice. Also, as expressed in Vegard's law (which in some cases in only approximate), the change in lattice size is directly proportional to the amount of copper dissolved. As a consequence of this, the measurement of a change in lattice size can be used to identify the extent to which the alloying (solution) has taken place.

The knowledge of solubility limits in alloy systems is essential in that the limiting ranges within which certain phases exist is often the determining factor in establishing suitable heat treatments.

When attempting to establish solubility limits, X-ray diffraction is a most useful tool because the accurate determinations of the lattice size are positive proof of the limit of existence of a particular phase. This is readily determined by plotting the lattice size against the composition, where it will be noted that there is a steady change of lattice size with changing composition until a limiting value has been reached, which shows that further additions of the solute metal are contributing to the formation of another phase. The diffraction pattern of the new phase may not be immediately detected because of the extremely small amount present. However, there will be a definite change in the parent lattice size when the second phase does precipitate out, thus giving a clear-cut indication of the change which is taking place. Thus, when both phases are present in sufficient amounts, both diffraction patterns are shown; and the strength of the pattern (line intensities) may be taken as a quantitative measure of the relative amounts of each phase present, provided this has been standardized by other methods.

This same procedure is used in the study of precipitation methods; but, in those instances where an intermetallic compound is being precipitated from the solid solution, the diffraction pattern will show a change in size and also in the shape of the diffraction doublet due to the stress caused by the atoms of the new phase arranging themselves in their new locations. By studying all of these factors, the segregating phase can be recognized in its formative condition.

Having established the principles of lattice type and size, it might be well to illustrate their application by means of a demonstrative experiment described by Burgers (1) in which four chemicals of the same kind (alkali halides) were mixed together in equivalent molecular quantities, and the presence of each can readily be observed in the diffraction patterns of these mixtures, Fig. 3. This is quite a contrast to the results from a chemical analysis; for, while such an analysis would tell how much of each element was present, it would be incapable of telling which halide is associated with what alkali metal—and the behavior of such a material may depend entirely on HOW the material is present. X-ray diffraction must be relied upon to solve this.

(*Concluded Next Week*)

(1) W. D. Burgers, Phillips Tech. Rev. 1936, 1, (5), 158.

Honing Process

(*Concluded from Page 49*)

tube 90 millimeters in diameter by 13½ feet long in 1½ hours. A gun tube 20 millimeters in diameter by 6 feet long is honed, removing 0.006-inch of stock at the rate of three pieces per hour. In another example, 0.050-inch of stock is removed from a recuperator cylinder 52 inches long, 4½ inches in diameter, in 45 minutes.

The time required to hone a certain piece is dependent upon the accuracy and amount of stock left by the preceding operation, upon the kinds and hardness of the materials, upon the tolerance allowed and upon the fineness of the finish required. Generally, the honing process is not a difficult one, but at the beginning of a job, considerable care should be given to the proper speeds, both rotating and reciprocating, to the intelligent choice of abrasive sticks, and to the best compound for that particular material. If these conditions are satisfied reasonably well, no trouble should be experienced in producing surfaces, both internal and external, conforming to close tolerances of size and finish.

Helpful Literature

1. Lubrication

Fiske Brothers Refining Co.—20-page illustrated bulletin, "The Lubriplate Film," No. 2-41 covers lubrication of equipment and machinery. Supplementary list names companies, equipment lubricated, applications and "Lubriplate" recommended.

2. Bearings

Ahlberg Bearing Co.—96-page illustrated catalog No. 440 gives dimensions, load rating tables and interchangeable numbers for complete line of ball bearings, roller bearings and pillow blocks. Design and application details are given on each type. Engineering data pertaining to bearings are included.

3. High Speed Steel

Allegheny Ludlum Steel Corp.,—4-page illustrated "Blue Sheet" titled, "DLB High Speed Steel", gives analysis, hardening data, tempering range, tempering instructions, and other pertinent information on "DLB" high speed steel. Micrographs show typical hardened, and typical hardened and drawn structures.

4. Colloidal Graphite

Acheson Colloids Corp.—6-page technical bulletin No. 270.5 covers utility of graphite surfaces. Such properties as lubricating, conductive, absorptive, reflective and pigmentary value of surfaces which are imparted by colloidal graphite are explained.

5. Bus Conductors

Anaconda Wire & Cable Co.—24-page illustrated bulletin No. C-25 (Second Edition) gives complete information on line of copper bus conductors in bars, tubes, channels, angles and cables. Performance curves permit interpolations for selection of conductor arrangement most suited to individual application.

6. Ball Mill Liners

American Manganese Steel Division, American Brake Shoe & Foundry Co.—8-page illustrated bulletin is entitled, "What is the Most Durable and Most Economical Metal for Ball Mill Liners." Complete data are given on use of manganese steel for this purpose.

7. Rolling Mill Practice

Allis-Chalmers Manufacturing Co.—36-page illustrated "Steel Mill Reference Book," No. 6197 is collection of current articles on modern rolling mill practices. Control of tinplate temper, modern cold rolling of steel, variable voltage versus motor field speed control for direct current drives and operation and maintenance of direct current machines are some of subjects covered.

8. Conveyor

Bullard-Dunn Process division, Bullard Co.—4-page illustrated bulletin describes station type conveyor for handling parts from various solution tanks in descaling, pickling, degreasing, plating, heat treating and other operations. Machine specifications are tabulated for two sizes which will handle total loads of 9000 and 3000 pounds, respectively. Photographs show typical work views.

9. Photographic Processing

Harry W. Dietert Co.—4-page illustrated bulletin is devoted to No. 2300 film developing machine, No. 2301 plate developing machine, No. 2325 film washer, No. 2350 film dryer, No. 2326 plate washer and No. 2351 plate dryer. Each machine is briefly described and specifications are tabulated.

10. Magnetic Equipment

Dings Magnetic Separator Co.—8-page illustrated bulletin No. 301 enlists line drawings and action photographs to show various advantages of rectangular suspended magnets, double gap magnets and medium duty separators for removal of contaminating magnetic materials from grain, coal, non-magnetic ores, food products and other materials.

11. Power Presses

E. W. Bliss Co.—32-page illustrated bulletin is entitled "Bliss In Defense." It contains series of photographs depicting various phases in company's business and industry of which it is a part. Some of action photographs shows production of shells, torpedo tail cones, aircraft parts and miscellaneous ordnance materiel on company's line of power presses.

12. Steel Wire

Johnson Steel & Wire Co.—16-page illustrated spiral-bound bulletin includes condensed list of steel wire products of company. Details of various types, as well as physical properties of wire, gages used in United States and other data are included.

13. Die Metals

Ampco Metal, Inc.—6-page illustrated folder, "Ampco Metal in Dies," shows typical dies as well as parts formed and drawn over "Ampco" dies. Discussion of features and advantages of dies constructed of this material is included.

14. Bronze Bearing & Bushings

Johnson Bronze Co.—36-page illustrated catalog No. L-3 contains information on composition, application and complete specifications on line of "Ledaloy!" self-lubricating bronze in standard stock sizes of bearings and bushings. Useful bearing engineering data are included.

15. Portable Cleaners

Ideal Commutator Dresser Co.—4-page illustrated folder is descriptive of "Ideal 3-in-1" portable cleaners which may be used to blow, spray or vacuum clean. Typical uses of this unit are shown in all types of industries. Portable cleaner attachments are available for every purpose.

16. Program Control System

Brown Instrument Co.—12-page illustrated bulletin No. 85-17 covers automatic program control systems for time and temperature. Typical applications include controlled rates of temperature rise or heating, controlled soak out temperature, controlled soak out time and controlled rates of cooling. Details of instruments are included.

17. Channel Flooring

Belmont Iron Works—24-page illustrated bulletin gives specifications, design details and application information on "Belmont" rolled structural steel interlocking channel floor which is used for bridges, roofs, floors and similar purposes.

18. Diesel Sets

Caterpillar Tractor Co.—18-page illustrated bulletin No. 6905 explains advantages of making one's own electricity with company's diesel sets. It shows numerous photographs of representative installations and briefly cites case history of each.

19. Milling Machine

C. C. Bradley & Sons, Inc.—4-page illustrated bulletin on improved "Briggs" production type milling machine explains features of this unit. Large illustration is used to show design details. Complete specifications are given.

20. Rolling Doors

Kinnear Manufacturing Co.—40-page illustrated catalog No. 28 gives complete information on line of steel rolling doors, labeled fire doors and shutters, metal rolling grilles, wood or steel "Rol-Top" doors, wood or steel folding doors, wood rolling partitions and door operating equipment.

21. Contour Cutting

Continental Machines, Inc.—6-page illustrated bulletin No. 2011-P lists line of attachments for "Doall" contour cutting machines. Described, pictured and priced are rip fence, cutoff and mitering attachment, disc cutting attachment, auxiliary work table, saw lubricator, adjustable table supports, band polishing and grinding attachments, etching pencil, saw guides and heavy work clamps.

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22. Grinding Helps

Carborundum Co.—8-page illustrated booklet entitled, "Causes and Correction of Common Grinding Errors," provides helpful guidance for proper use of grinding wheels for all types of operations. Chatter, scratching and spiral are covered as to indication, cause and method of correction.

23. Heavy Duty Lathes

Axelson Manufacturing Co.—8-page illustrated bulletin on 20-inch heavy duty lathes presents standard and supplementary specifications on this machine. Features of unit include 24-speed selective geared head, simplicity of design and convenience of control.

24. Tars & Chemicals

Tar & Chemical division, Koppers Co.—8-page illustrated folder No. X-1 summarizes important products, plants and services. List ranges from coke and coals to light oil plants and purification systems; from valves, castings, forgings, couplings and piston rings to roofing, tar-base paints and pressure treated timber products.

25. Heavy Metal Working

Buffalo Forge Co.—24-page illustrated bulletin No. 360 deals with combination slitting shears, punches and bar cutters. Four sizes are described from No. 0 which operates at speeds up to 36 strokes per minute to No. 2¾ machine which operates at 28 strokes per minute. Tables list complete specifications for all sizes.

26. Marking Stamps & Holders

M. E. Cunningham Co.—4-page illustrated folder shows variety of steel marking stamps and holders. Types are described for marking bars, small machine parts, hot billets and slabs, cold billets, heavy castings, rolls, molds, die sinkings, forging dies and other metal parts. Reproduced are various inspection and piece work symbols and date coding symbols that are available.

27. Self-Locking Nuts

Elastic Stop Nut Corp.—4-page illustrated bulletin No. L41-23 shows some of military equipment on which "Elastic Stop" nuts are being used to advantage. Principle, construction and operation are explained in text and with sketches.

28. Glass Cleaner

Fort Pitt Chemical Co.—4-page folder outlines features of "Brytlite" instantaneous glass cleaner for efficient cleaning of windows and skylights in iron and steel mills, foundries, manufacturing plants, railroad shops and other locations where presence of encrusted dirt offers difficult cleaning problem.

29. Metal Cleaner

Pennsylvania Salt Manufacturing Co.—8-page illustrated bulletin No. 100 offers information on properties of "Orthosil" salt for heavy duty cleaning of ferrous metals, either in spray type power washers or electrolytic operations prior to painting. Series of graphs compare various properties of compound with unnamed competitive cleaners.

30. Refractories

General Refractories Co.—72-page illustrated catalog describes fireclay brick, high alumina brick, silica brick, acid-proof brick and tile, basic brick and high temperature cements, plastics, and castable refractory. Various shapes and sizes are tabulated. Tables offer information for figuring proper number and combinations of brick in firebrick construction.

31. Motor Control

General Electric Co.—8-page illustrated bulletin No. GED-972A describes "Thymo-trol" system for starting, stopping, protecting and accelerating direct current motors from alternating current power sources. Story of how it works is explained with line drawings and charts.

32. Open-End V-Belting

B. F. Goodrich Co.—2-page catalog section No. 2186 describes open end V-belting in long lengths which is used with fasteners for installations which are inaccessible for application of endless V-belts. Listed are standard sizes, minimum recommended pulley diameters, rules for application and fasteners and tools used.

33. Low Temperature Welding

Eutectic Welding Alloys, Inc.—32-page bulletin offers data on process of low temperature welding without melting base metal through use of "Castolin" eutectic alloys. Detailed information for working on cast iron, steel, aluminum and alloys, magnesium and alloys, for brass, bronze and copper, and for nickel and alloys.

34. Power Tools

Duro Metal Products Co.—56-page illustrated bulletin No. E-41-B completely describes and pictures table saws, jointers, drill presses, band saws, combination shaper-carver-router, flexible shafts, hand grinders, sanders, V-belts and pulleys, electric drills, motors and accessories. Prices are included.

35. Saws

Huther Bros. Saw Manufacturing Co.—120-page illustrated catalog No. 60 lists patent dado heads, milling saws, patent box board matcher cutters, lock corner cutters, concave saws, saw fitting machinery, special grooving saws, and standard circular saws. Photographs depict samples of work performed with some of company's line of cutters.

36. Heat Treating Furnaces

Mahr Manufacturing Co.—4-page illustrated bulletin No. 120-A is descriptive of standard heat treating furnaces. Specifications are given on line which includes car bottom, conveyor, pusher, batch, rotary and pit type furnaces for all operating temperatures; convection types for medium and high temperatures; and forging furnaces.

37. Wire Rope Slings

Macwhyte Co.—56-page illustrated catalog No. S-6 covers design, specifications and applications of all types of wire rope slings. Details are given on fittings and general information includes ordering instructions, sling types, typical assemblies, crane signals, strength and weight comparisons, sling load chart and details of wire rope.

38. Bearing Metals

National Bearing Metals Corp.—4-page illustrated bulletin contains general description of company's defense efforts. Tabulated are company's products and the essential defense industries which they are serving. Illustrations show several of these products.

39. Carburizers

Park Chemical Co.—4-page illustrated bulletin describes compounds for pack hardening and liquid carburizing. Several types are described with detailed information on physical and chemical characteristics of each.

40. Fluorescent Fixtures

Hygrade Sylvania Corp.—4-page illustrated bulletin No. M-208 deals with four sizes of fluorescent luminaires for continuous row industrial lighting. Complete specifications and illumination data are tabulated for all types.

41. Temperature Instruments

Foxboro Co.—8-page illustrated bulletin No. B-296 outlines advantages of company's line of temperature instruments for plating operations. Instruments and accessories are described for temperature control in chromium and nickel plating, in steel blacking and in anodizing.

42. Safety Machine Control

Prosperity Co., Valve division—4-page illustrated bulletin describes "Lok-Air" electro-pneumatic two-hand control for safe operation of power machines having manually operated controls. Features and operation of device are explained graphically and editorially with special emphasis on safety advantages.

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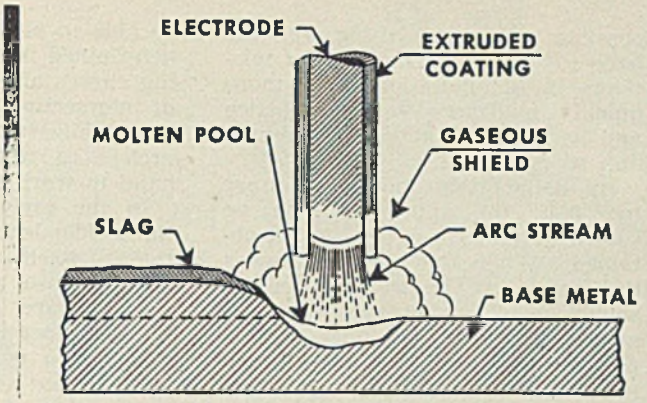
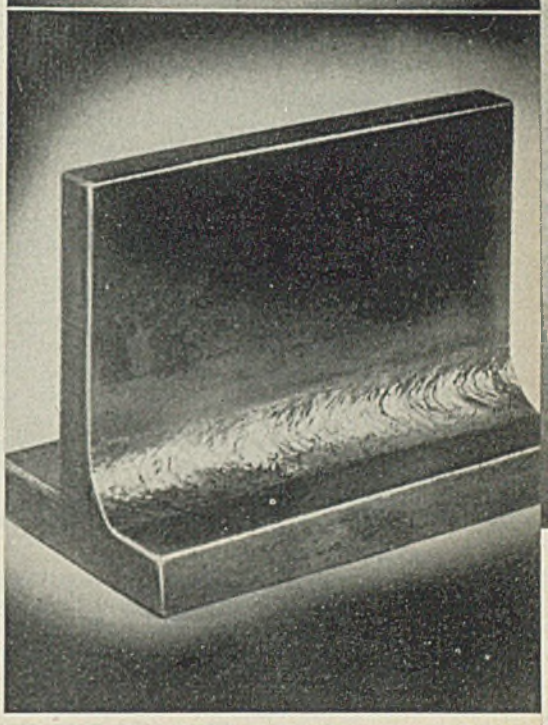


Fig. 1. (Immediate right)—Cross section sketch of a shielded arc electrode in operation

Fig. 2. (Far right)—Fillet welds in 3/8-inch plate made with 1/4-inch rod. Upper made with one plate vertical, lower with plate positioned so bead surface is horizontal



By E. W. P. SMITH
Consulting Engineer
Lincoln Electric Co.
Cleveland

How To TRAIN WELDING OPERATORS QUICKLY For Production Work

. . . operator training from the supervisor's or foreman's standpoint

Section X of a Series on How To Get the Most from Arc Welding

■ UNDER pressure of the war effort, thousands of apprentice welders are being trained throughout the country. A large number of manufacturers have found it necessary to instruct these men quickly but well in the art.

The object of this article is to aid such instruction by describing the steps necessary to train welders in the actual mechanical manipulation of the arc to enable the trainee to handle a particular job in production welding. Other details necessary to successful welding, such as current and voltage setting and rod selection, should in this stage be done by the supervisor. The rod size, current settings and all other factors should be selected by the supervisor for the particular job the operator is learning to do.

Selection of Lens by Operator: The electric arc emits three types of radiation: Ultra-violet, visible and infra red. In the selection of a lens for welding, the visual test alone is not enough because infra red and ultra violet are not visible and cannot be detected by the operator alone. However, the operator should make his own selection of approved high-grade lens. The selection should be based on the operator's ability to see—through approved lens—because some men use No. 10 easily, some require No. 8 and others, who can see with little illumination, use No. 12. The welder must be able to see the bead and scarfed plate edges in the vicinity of the arc to a radius of at least an inch, and preferably more. The visibility should not, of course, reach the glare point or point of fatigue because of the illumination. Any glare that hurts the eyes should be avoided.

A rough outline, subject to variation by the individual's requirements, follows:

Shades 3, 4, 5, 6—welding supervisory and inspection work (goggles).

Shades 6, 7, 8—acetylene welding.

Shade 10—normal electric arc welding.

Shade 12—carbon arc cutting and heavy metallic arc welding.

Proper Position for Welding: The position of the operator in relation to his work is of great importance, because improper position brings fatigue and fatigue brings reduced output. The work should be positioned so that the operator is comfortable and finds it easy to do his work. A strained awkward position also will reduce the quality and speed of the work done. There should be "no squat, no squint, no stoop".

In grasping the holder, the operator should not be tense. He should have a firm, yet relaxed, hold. The arm should be an elbow length from the body. Some operators sling the cable over the shoulder to take the weight off the holder. The operator's tenseness may be tested by noting his reaction when pushed. The holder should be as light as possible and should balance the weight of the cable.

Striking the Arc: A skilled welder must be able to strike the arc under all conditions.

If the electrode is merely touched to the work and not withdrawn, it will stick and no arc will form. Instead, the electrode will heat because of the "short circuit" and the rod eventually will melt. This "sticking of the arc" is a common trouble.

There are two ways of striking the arc. One is to move the electrode vertically toward the work and then withdraw it quickly with

a movement combining the touch and the wipe. The second method involves moving the rod in at an angle to the work. As it hits the work, it will bump or rattle along it, thus forming an arc. Then the electrode should be withdrawn to the proper arc length.

In application of either of these two methods, a beginner should uncover his face, by tipping the shield back, so as to be able to see clearly. He should move the tip of the electrode close to the plate, then let his shield down by a quick nod of the head. The electrode tip then is moved the final distance to strike the arc. Striking the arc is much like striking a match, except for the pressure and speed. The movement is usually an inch or two.

Holding the Arc: A good operator must be able to hold the arc for any given length of time without breaking it. This involves holding the electrode at the specified distance and then feeding it in as fast as it melts off. Thus the feeding of the electrode must be timed with the melting rate. To learn the combination of correctly striking and holding the arc at will takes about an hour's practice on the average and practice is the only method of attaining perfection in this. Proper holding of the arc is basic in arc welding. Therefore, considerable emphasis should be placed on this factor. *Practice,* as *Practice Makes Perfect!*

In the preliminary stages of training a welding operator, it is sometimes a good idea to have the student practice holding an arc in one position by manipulating the hand bearing the electrode to hold a steady arc. Then, the next step is to teach the apprentice how to hold a good arc while moving it along the work. Medium rods and fairly heavy currents should be used in practice. A good sized rod for practice is the 3/16-inch one, used with a current of 200 amperes and an arc voltage of 26 to 30 volts. Normally the current would be only 150 amperes, but a 200-ampere current is easier to handle.

Moving the Arc Along a Straight Line and Not Letting It Go Out: A good welder must be able to control the movement of the arc within comparatively close limits. After an apprentice has been taught to hold a good arc in one place he should attempt moving it along a flat plate. He must watch the arc length and learn to recognize a good arc by its appearance. With a 3/16-inch rod and 200 amperes current, the operator should be able to see ⅛-inch of the 3/16-inch total arc stream, the remaining 1/16-inch of the arc being covered by the coating that extends over end of the rod. It, therefore, is better to learn with a bare rod because it is possible to see everything, and the bare rod is more sensitive to mistakes in manipulation, thus more quickly evidences faulty practice and so leads to correct manipulation sooner.

By deliberately moving the arc too fast, the apprentice can be shown that a proper bead is not obtained. When the operator moves the arc at just the proper speed, he should be told to examine the bead and observe that it's just right—not too thin and not built up too much. The speed of travel very definitely affects the quality of the

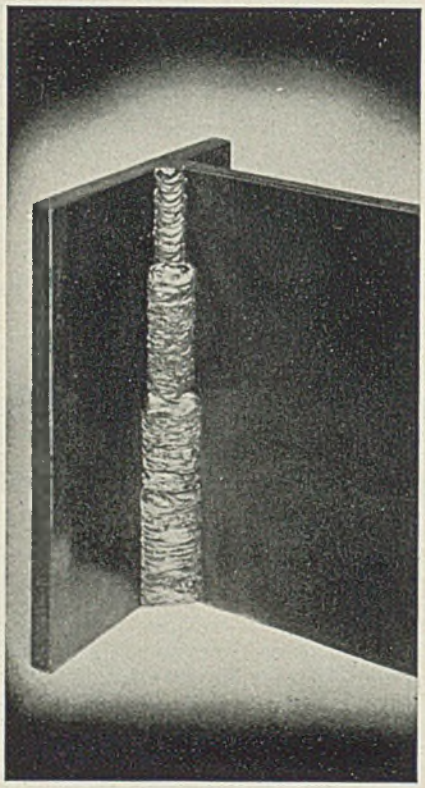


Fig. 3—Vertical fillet weld in ⅜-inch plate welded upward. Weaving was used in second and third passes

weld as well as production efficiency. A 6-inch bead should be run in no more than 30 or 40 seconds. A common fault is the failure to hold the speed of movement uniform. Inspection as the arc is being progressed, to assure a uniform bead, will regulate the speed of movement.

Ability to move the arc at the proper speed is vital. It possibly is more important and a more critical factor than holding the arc. It may take a short or long practice period, depending upon the operator's mechanical aptitude in learning the movement and upon his co-ordination in controlling it.

Moving the Arc Along a Predetermined or Marked Irregular Outline (All in Two Dimensions) and Not Letting It Go Out: Good coordination of hand and eye are essential. Since a good operator must be able to ply the arc along a predetermined irregular outline including curves and around the junction of intersecting lines, it is important that while learning, he follow exercises to train the eye and the hand to work together.

In the early stages of training, the welder learns to concentrate on the arc itself. Now he must learn to look also at objects and lines near the arc, meanwhile maintaining a proper arc. The apprentice must learn not only to watch the bead size but also watch for changes in direction of his guide lines.

In most instances, it is desirable to learn the manipulation necessary for actual positions the apprentice will use in production work. The supervisor however, may want the welder to learn manipulation first in downhand position on flat plate, followed by repeating in the actual position which will be followed in production. All the steps previously outlined should be mastered to give the apprentice sufficient skill.

The most difficult butt weld to make is the horizontal weld on a vertical plate. The next most difficult is the overhead, then the vertical, and finally the flat weld, which is the easiest. Of all the welds, the corner weld perhaps is the most difficult. As a result, it is frequently used as a test of the operator. The easiest weld to make is the positioned fillet weld.

A short arc is necessary when welding on a vertical plate. The learner should set up a vertical plate by tacking a piece of steel to another so that it stands in a vertical position. He should strike his arc at the bottom and work up. The beads sould be examined and the operation repeated until the apprentice has mastered the technique of consistently plying a good vertical bead.

Horizontal welds on a vertical plate present an entirely different problem than that of vertical beads on a vertical plate, as described above, because the travel is horizontal. There are more opportunities for the metal to be improperly placed. A short arc and a steady one must be used. Proper application of a weaving motion prevents the bead from sagging.

To practice overhead welding, a plate should be tacked horizontally above the apprentice in a comfortable position. The electrode is held almost at right angles to the plate. The knuckles of the hand are up, palm down, so that drops of metal will roll off the glove. In striking the arc overhead, there is no problem different from that in downhand welding. Better control and greater accuracy are required, however, and a very short arc is essential as it prevents the formation of

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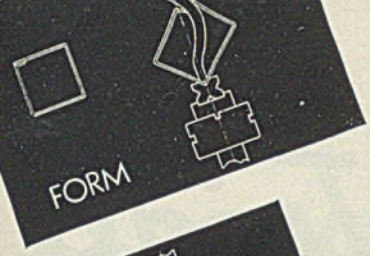

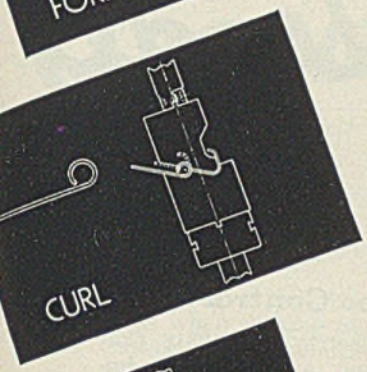

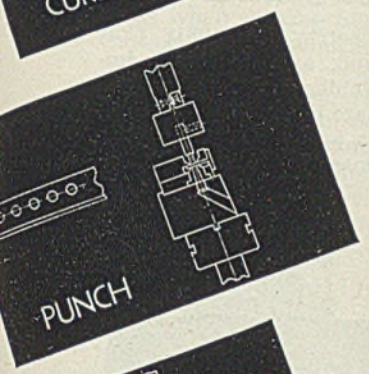

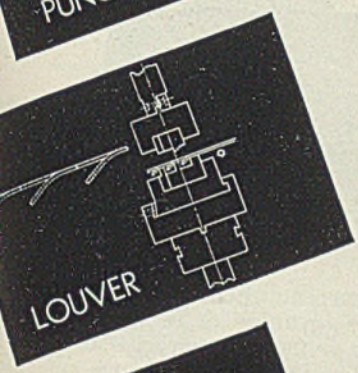

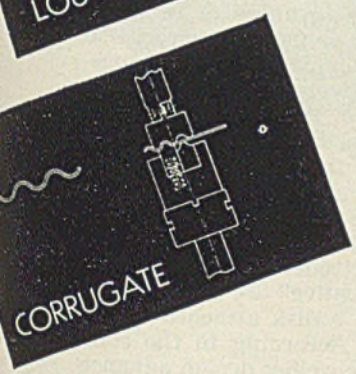

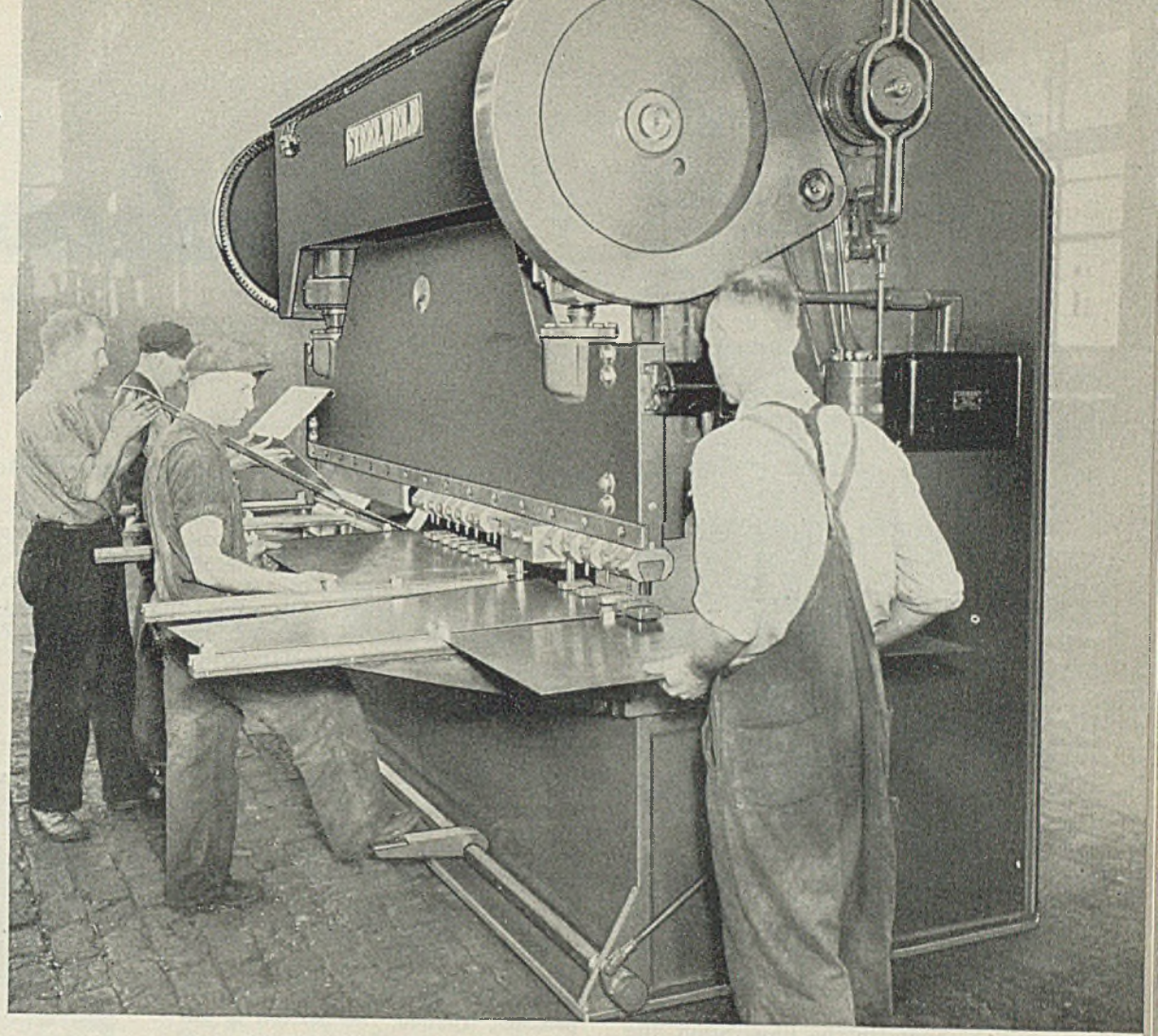

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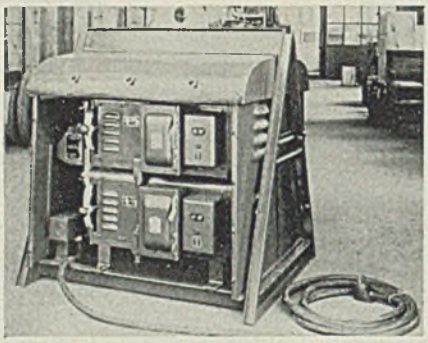
Industrial

Weather-Proof Cradle For Welders

■ Harnischfeger Corp., Milwaukee, announces availability of a special welding plant cradle for use in conjunction with its welders for service in shipyards. Specially developed for Harnischfeger by LeMaster-Conzett Co., Los Angeles, the cradle offers ease of handling for quick transfer to any job along the way and complete protection from weather conditions. By mounting four W. A. square frame welders

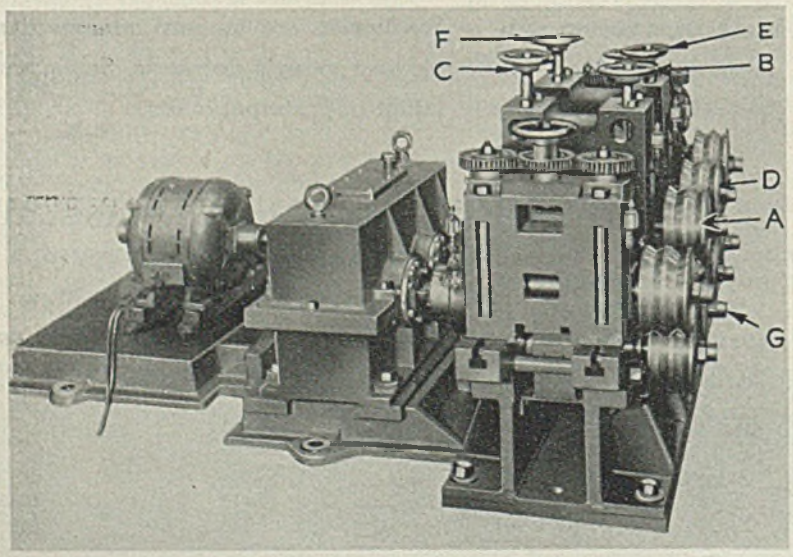


in the cradle, the unit can be turned into a 4-man 200-ampere welding plant or a 2-man 400-ampere outfit, the step up in amperage being made possible by parallel connection of two welders.

As shown in the illustration, the canvas sides roll down together with the removable metal top and ends to protect the complete unit from weather. Motors and fuse type disconnect switches are connected together with armored conduit wire and brought to one power input box, permitting use of all four motors with one 4-conductor power input cable.

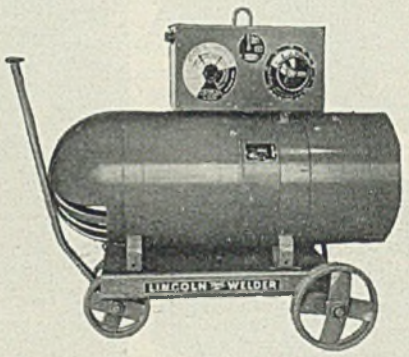
Straightening Machine

■ Sutton Engineering Co., Park building, Pittsburgh, has placed on the market a new No. 4 untwisting and straightening machine for removing twist and straightening all bars and shapes of ferrous and nonferrous material. Shown in the illustration, it has eight rolls. It can, however, be furnished with nine—five at the top and four at the bottom. Untwisting of material is accomplished by tilting roll A (note illustration) in one direction and roll D in the opposite direction. To tilt roll A in a clockwise direction, handwheel B is screwed down, and to tilt it in opposite direction handwheel B is screwed up. This same adjustment may be made by screwing handwheel C in the opposite direction, i.e., to tilt roll clockwise handwheel is screwed up, to tilt counterclockwise, handwheel C is screwed down. When rolls A and D are tilted in opposite directions and sufficient pressure applied, the section is untwisted over the intermediate bottom roll G. The machine is designed to stand up under mill conditions. Its gears are steel with cut teeth, except adjusting gears. It takes up 8 feet 5 inches by 8 feet 6 inches of floor space and weighs 14,100 pounds. The unit is powered by a 40-horsepower motor. Its capacity for flats is ½ x 5/16 to 4 x ¾ inches, for squares ½ to 2½ inches, hexagons ½ to 2½ inches, angles 1¼ x 1¼ x ¼ to 4 x 4 x ½ inches, and channels 1½ to 4 inches. It features a straightening speed of 260 feet per minute.



Arc Welder Control

■ Lincoln Electric Co., 12818 Coit road, Cleveland, announces an improved arc welder control which is said to eliminate the need for meters showing volts and amperes. It provides many possible combinations of



voltage and current. Being continuous, it can be advanced or retarded in increments as fine as desired. Use of this development makes it possible to positively reverse polarity. The location of the reversing switch on the control has been changed to the position formerly occupied by the meter, immediately above and between the self-indicating dials. Settings of the reversing switch for "Off," "electrode negative" and "electrode positive" are indicated by markings on a disk attached to the control box. According to the company, this arc welder design advance is responsible for a price reduction of $20 on the equipment.

One-Man Crane

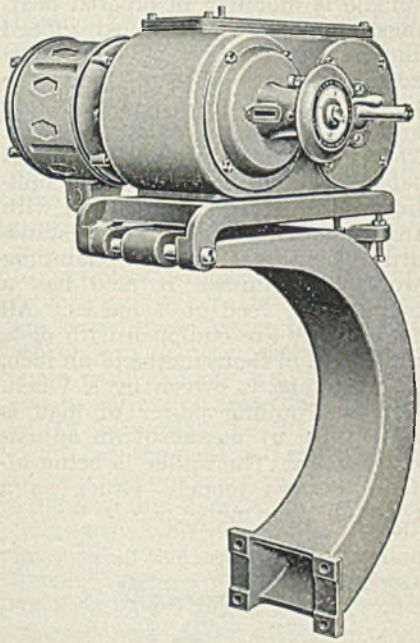
■ Osgood Co., Marion, O., has introduced a new model 205 WM, 6-ton, one-man controlled Mobilcrane for job to job duties. Powered by one motor, it has a wide range of speeds for traveling, and features hydraulic steering and mechanical hydraulic brakes on rear wheels. The main truck chassis of the crane is of I-beams and diaphragms, with welded joints. Roller-bearing mounted wheels are cast steel, and have one-piece brake drum and driving sprocket. The front axle is pivoted in the center to provide a 3-point suspension for the frame. Screw jacks on the rear bumper

Equipment

plate relieve the tire of excessive loads when making heavy lifts. The chassis transmission is mounted between the frame I-beams, and has a 3-point suspension to prevent operating strains from being imposed upon the case. Through this transmission, two additional speeds are available, giving a speed range from 0.86 to 10 miles per hour.

Machine Tool Drive

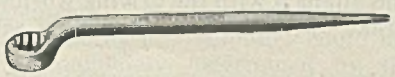
■ Reeves Pulley Co., Columbus, Ind., is offering a new motorized variable speed drive for machine tools which eliminates necessity of building a special support or bracket



to mount the control units. It utilizes either Vari-Speed Motodrive, or the countershaft type motor pulley. Motor and variable speed unit are mounted on a pivoting base at the top of a cast semisteel bracket. Jack screws in the bracket at the end opposite the speed control unit provide maintenance of proper belt tension. Two bracket sizes are available. With the Motodrive, capacities are from ¼ to 10-horsepower, depending on size of unit used, and speed ratios from 2:1 through 6:1 are available. Single reduction gear reducer is available if required. Using the Vari-Speed motor pulley, capacities range from ¾ to 7½-horsepower and cover speed ranges of either 2¾:1 or 3:1 ratio.

Box Pattern Wrench

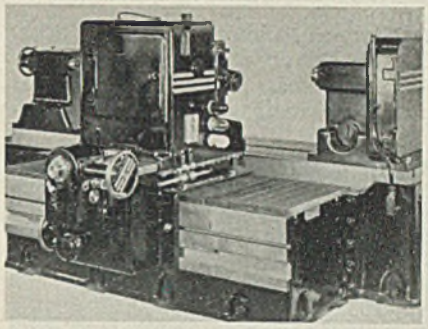
■ J. H. Williams & Co., 225 Lafayette street, New York, announces a new structural box pattern wrench



for structural work. Its 12-point box head insures a firm hold on the nut and the offset handle provides maximum clearance. The latter is of the type preferred by steel workers for lining up bolt holes. Wrenches are available in six sizes with openings of 1 7/16 to 2¾ inches.

Gear Machines

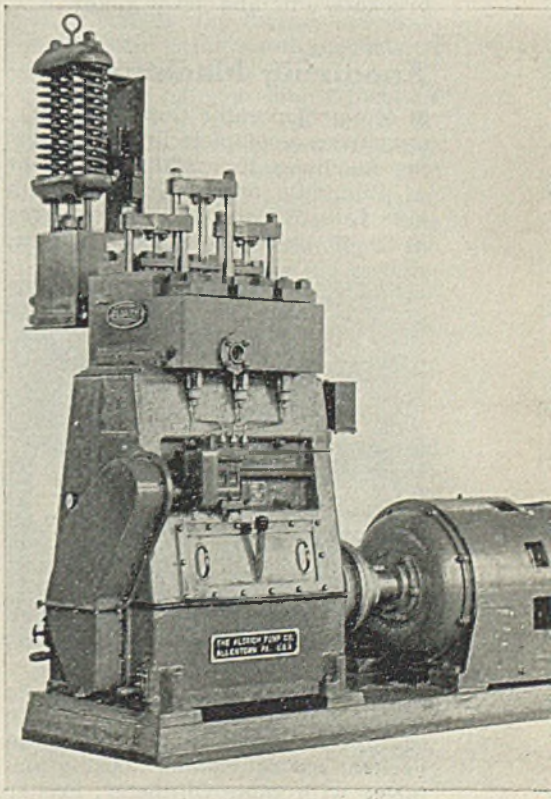
■ Michigan Tool Co., 7171 East McNichols road, Detroit, has introduced a new line of gear finishing machines making available the crossed-axis principle of gear shaving for large gears. Three sizes are included in the line—the largest suitable for finishing gears up to 4 feet in diameter and 20 inches face width. The three new sizes are capable of finishing gears up to 24, 36 and 42 inches, respectively, and are designated as the 862-24, 862-36 and 865-48, respectively. The minimum size of gear that can be shaved is 1 inch for the 862-24, 2 inches for the 862-36, and 4 inches for the 865-48. In the smaller machines a total of four spindle speeds is provided, ranging from 109 to 313 revolutions per minute. Feeds in the smaller machines range from 0.314-inch per minute to 9.485 inches per minute in 12 steps. In the largest machines the range is from 0.45 to 7.2 inches per minute in 6 steps. In the 24 and 36-inch sizes the method of operation is by cutter reciprocation. Operation of speeds and feeds is mechanical. Control of the largest machine throughout its operating cycles is entirely electrical. The machine column is equipped with lights to indicate various circuit conditions existing during operation. Cone drive units are embodied in all machines. In the 24 and 36-inch machines one unit is used. In the 48-inch machine three are employed in the various gear trains for feed and work rotation. In the 24 and 36-inch machines both cut-



ter drive and feed are operated by a single motor. In the 48-inch size a motor for the main work drive and one for the feed are used.

Power Pump

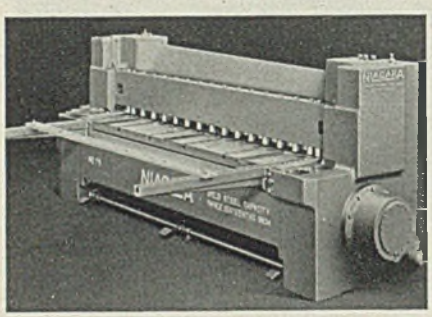
■ Aldrich Pump Co., Allentown, Pa., has introduced a new line of high pressure vertical triplex constant stroke pumps from 10 to 150 horsepower for pressures up to 9800 pounds per square inch and capacities up to 220 gallons per minute. Improved design of these units makes them particularly applicable to gear-head motors or speed reducer drives. Provision also has been made in the larger sizes for the use of built-in gearing, or belt drive direct to crankshaft. Pumps can be fitted with a synchronized



suction valve control, for services such as central hydraulic accumulator systems where several presses are in constant operation. For special process work the outboard plungers are sealed dust and weather tight with a removable cover.

Power Squaring Shears

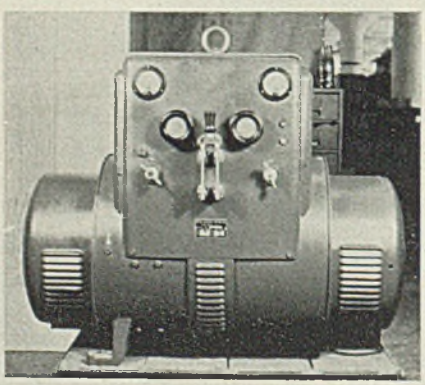
■ Niagara Machine & Tool Works, 637 Northland avenue, Buffalo, announces a new series No. 7 line of power squaring shears built in 4 to



12-foot cutting lengths and capacities from ¼ to 10 gage. These are of underdrive design with drive including flywheel, gearing, clutch, eccentrics and connections completely enclosed and operating in a bath of oil. A new degree of accuracy resulting from their advanced design provides straight shearing to within a few thousandths of an inch. Presses provide more working strokes per hour by their high operating speed of 60 strokes per minute. Self-measuring, ball bearing parallel back gage adjustable to increments of 1/128 inch is standard equipment, together with front gage with front brackets, side and bevel gages.

Anodizing Machines

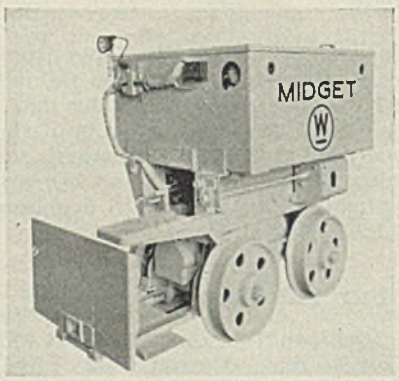
■ Motor Generator Corp., Troy, O., anncunces a complete line of anodizing machines for anodic treatment of aluminum and its alloys. Available from 125 through 875 amperes at 20, 40, or 50 volts direct current,



each machine is furnished complete with control cabinet. Units are equipped completely with separate exciter; control cabinet housing ammeter with shunt-voltmeter; exciter and generator field rheostats; double-pole, single-throw work circuit switch; positive and negative terminal studs; and across-the-line switch giving overload as well as undervoltage protection or release to the motor. Motor sizes range from 7½ through 55 horsepower generating from 5 to 35 kilowatts.

Tramming Locomotive

■ Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has placed on the market a new Midget storage battery tramming locomotive for use in coal, metal and nonmetallic mines. Weighing only 1.5 tons, it is operated by a 5-horsepower, 40-volt direct-current traction motor. Its chassis is of heavy one-piece cast steel construction. Power is transmitted through torsion ring coupling to worms driving worm gears. The rated drawbar pull of the locomotive is 400 pounds, and its coupling carries the weight of the armature and aligns it with the driving worms. Brake operation is by a handle set



at an angle to permit maximum braking with the least effort. A 3-position controller is arranged for series parallel control of the motor fields in either direction.

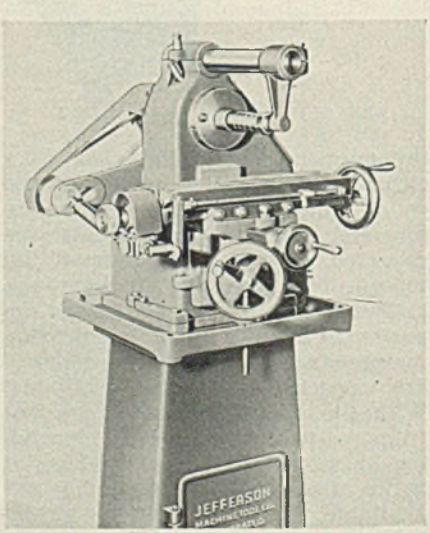
Infra-Red Lamp

■ Wabash Appliance Corp., 335 Carroll street, Brooklyn, N. Y., has introduced a new type of infra-red heat lamp construction of which is claimed to make possible and entirely practicable 100 per cent control of heating efficiency. The new bulb is designed to put to practical use for heating what is termed as "spilled heat" lost in many lamps today. It is distinguished by a ring lining of pure silver sealed inside the bulb at a point just below the focal point of the filament, as illustrated. This silver ring leaves a clear "bullseye" spot through which heat beams are projected from the filament direct to the heating area without spill or loss. All remaining heat rays, including what were formerly "spilled", are now gathered into the control area of the reflector by the silver ring lining, and projected down to the heating area. A special feature is the mechanical strap-in base made heatproof to keep the base from loosening up under the terrific heat developed in infra-

red tunnel installations. The lamp is available in the 250-watt size, tungsten filament only. It will fit the standard Edison screw socket, and is good for an average burning life in excess of 5000 hours.

Milling Machine

■ Jefferson Machine Tool Co., Fourth, Cutter and Sweeney streets, Cincinnati, has introduced a motor-driven bull-dog precision milling machine for such operations as die sinking, contour profiling, angular milling, jig boring and routing of ferrous and nonferrous metals. Its spindle is mounted in tapered bearings. Slides are dove-tailed, gibbed and hand-scraped. Unit's gibs are adjustable for take-up, and the power feed is furnished with an adjustable positive automatic stop. The 14 x 43/8-inch table has an equal capacity to that of many larger milling machines, and is equipped with three T-slots to accommodate standard T-bolts for tightly clamping work or fixtures. It also has a longitudinal feed of 7 inches. All feed screws are equipped with dials graduated in thousandths of an inch. The machine is driven by a V-belt. Constant pulling power of load is maintained by means of an adjustment lever. The miller is being offered in two models—either as a bench or floor model.



British Iron Institute

(*Concluded from page* 56)

some importance since the paper before the meeting depended very much on figures.

Dr. C. H. Desch of the National Physical Laboratory, said that whatever may be the explanation of the figures and diagrams given in the paper, these would certainly have to be taken into account in future work. Referring to the previous speaker who had suggested the formation of certain complexes in the segregating elements, Dr. Desch said that he did not agree that any such compounds were formed at high temperatures; he thought that it was mainly a question of differential solidification.

The second paper was "The Application of Spectrographic Methods to the Analysis of Segregates", by F. G. Parker, Dr. J. Convey and J. H. Oldfield, of the Bragg Laboratory of the Admiralty Inspection Department. This was another paper of the committee on the heterogeneity of steel ingots, and was submitted by the inclusions subcommittee. In this paper reference was made to preliminary experiments which showed the routine methods of spectrographic analysis were not applicable to the quantitative analysis of segregates without some modification. Further experiments made with standard graphite electrodes, silver electrodes of various shapes, and various spark gaps to reduce the area affected by sparking are described, also other variations in procedure which were found necessary to increase the line density of the spectrum to permit of estimations being made from a single exposure. Conditions are stated under which the elements silicon, manganese, nickel, chromium, molybdenum and vanadium can be estimated from one exposure of 15 seconds. The diameter and depth of the crater formed under these conditions are approximately 0.012-inch and 0.0007-inch respectively, and the weight of metal actually involved in the test is approximately 0.000005-gram. It is shown that tests on small bars of nickel-chromium-molybdenum steel give reproducibility of a satisfactory order, and that tests on specimens from large forgings of nickel-chromium-molybdenum and nickel-vanadium steel containing segregates give higher average values for all elements on the segregates than on the normal metal, the greatest percentage increase occurring for manganese, molybdenum and vanadium. Experiments in hand to obtain continuous spectrograms showing the variation in composition, if any, which exists within the segregates were also described. In giving his summary of the paper, Dr. Convey, who is a Canadian expert in spectrography, mentioned that the greatest source of error in spectrography was the heterogeneity of the materials tested.

In the discussion that followed the presentation of the paper it was suggested that observation would be easier if a condensing lens were placed between the source of light and the slit. One method was suggested which consisted of separating the segregates from a section of the ingot and obtaining them in small particles, then placing them in the core of the lower electrode which was designed in a special shape. This method had given quite accurate results that had been applied to light alloys, and it was suggested that it might be applied to steel.

Another speaker said that the beauty of the method was that it was only necessary to polish a small surface of the ingot without further preparatory work. J. H. Whiteley pointed out that the three principal elements in segregation—carbon, phosphorus and sulphur—could not be completely determined by the method described in the paper. Referring to the examination of the manganese and molybdenum, he pointed out that manganese is found in the form of sulphide and it was very probable that sulphide of molybdenum was also formed.

Dr. H. B. Van Hoesen, Brown University library, Providence, R. I., referred to a method employed in America in which a spark was used which only affected about one quarter of the surface referred to in the paper. There was, however, a drawback inasmuch as this might bring about reduction of the sensitivity of the apparatus in regard to impurities.

Howitzer Production

(*Concluded from Page* 52)

same breech block opening surface.

To be sure that the assembly between breech ring and tube is not started in the wrong position, cam paths are provided in the breech ring to fit over locating pins on the tube. As the ring is assembled to the tube, the cam paths follow the pins and guide the threads into engagement with those on the gun tube, assuring that the thread sectors will match. This also prevents butting the ends of the threads against each other during assembly. A special fixture is used on a horizontal milling machine to mill the rotating cam paths. The work is fed axially into the cutter and then rotated along a helical path using a special fixture shown in **Fig. 10.**

The breech block which slides crosswise in the breech ring is cut to length from forged steel bars, using a cold saw. The forged bars have been planed on four sides before being cut to length. One end of block is ground square with plane surfaces, and after a number of holes have been cut and counterbored, the blocks are normalized by heating to 1500 degrees Fahr. for two hours and quenching in oil. This is followed by reheating to 1300 degrees Fahr. for two hours and furnace cooling. This not only refines the grain but removes any strains from forging or rough machining.

Next the blocks are ground on sides and ends, bored, reamed and machined with a number of surfaces being ground to get exact finished dimensions. A profiler is used to form a recess clearance for the trigger and other irregular contours. Upon completion of machining operations, the block is pack hardened and then cleaned by mud blasting, reground on the outside surfaces and then hand polished for assembly.

A large number of small components also call for extreme accuracy in machining and assembly. These as well as the main parts are gone over carefully by hand. Every part is checked 100 per cent by Army inspectors before assembly, using a large number of gages, many of which are the flush pin type which permit a number of dimensions to be checked simultaneously. With the part seated in the fixture, the pins are pushed into contact with the work. If piece is accurate, outer end of each pin comes between two surfaces that form a go or no-go limit usually only 0.001 or 0.002-inch apart.

Breech rings are inspected by using a special gage which checks the conical recess, the thread, the stops and the cam paths simultaneously as shown in **Fig. 11, p. 52.**

Final test after assembly includes firing three primers which are inserted into the primer seat of empty shell cases and loaded into the breech just as if the gun were being used in service. See **Fig. 12.** This affords a check on functioning of the breech block as well as the striking position of the firing pin.

Makes Studies To Conserve Aluminum

■ A series of investigations aimed at the possible reduction of aluminum content in alloys Nos. XXIII and XXV in the American Society for Treating Materials "Specifications for Zinc-Base Alloy Die Castings" (B 86-38T) has been proceeding under the sponsorship of committee B-6 on diecast metals and alloys, according to the society.

Positive tests are now being made concerning possible manufacturing difficulties which may be encountered.

Training Operators

(*Concluded from Page* 76)

drops. This type of welding requires considerable practice.

Fill-In Crater in Starting a New Electrode: A finished weld, made by the use of many electrodes, must appear as if made by only one rod. There should be no craters left in the bead to indicate where the operator changed electrodes. The trick of filling the crater involved looping around the crater to reheat the metal and then going on with the weld. A common fault is not taking enough time to fill the crater and wash out the slag. Too many operators just fill the crater and this results in too big a ripple or an obvious overlap, which always indicates an improperly filled crater. There should be no craters left in the bead to indicate where the operator changed electrodes. Filling craters is important for appearance and the quality of the bead.

Terminating a weld is done by holding the rod just long enough to fill up the end of the bead and then drawing the rod away quickly.

Padding: Laying a series of adjacent beads, sometimes called padding, is good practice for the operator in the job of learning to weld.

The operator really should become skillful in the use of padding, whether it consists of a series of beads laid adjacent to each other, or whether they are in series. Each bead must be cleaned thoroughly by means of a wire brush and a roughing tool or chisel. The second layer should be laid at right angles to the first and so on. This is commonly called lacing.

Under proper supervision, it is possible to teach "green" men to pass the most severe tests in several weeks by following a practice sequence along the lines outlined here.

A St. Paul, Minn. plant recently obtained a contract under which they were to make several thousand practice bombs of formed plate stock and sections of thin sheet for the Navy. The concern decided to break in two of their own men on arc welding, rather than hire outsiders. These men never had done any arc welding.

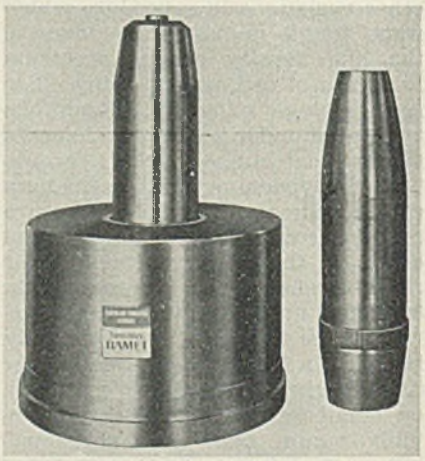
A welding machine was installed. A booth was set up with two fixtures, so that while the operator was welding in one fixture the other fixture could be loaded and reloaded. The fixture then was turned 180 degrees and the process repeated.

One man practiced during the day time and the other at night. Each man practiced for three days in the flat and vertical positions. Samples were made up similar to the No. 1 Navy test, which the welders would have to pass when they finished learning. Along with their plate welding, the men welded occasionally on 22-gage metal, using 3/32-inch and ⅛-inch electrodes with which they would have to weld on the job. At the end of two weeks, the jigs and the bomb assemblies were ready for welding. The men had passed the Navy test and were in full production, turning out between 70 and 80 pieces per hour. One man welded days and the other nights.

Naturally, these men had a rather specialized knowledge of welding at the end of this intensive training. They then enrolled in a local welding school, which they attended during their free time to broaden their knowledge further.

This example is only one of many which could be given to show how it is possible to train welding operators quickly in the mechanical manipulation of the arc so they may go into production work quickly. Obviously such a man is not a "welder", merely an operator, since all factors of supervision such as choice of proper rod, current and voltage settings, etc., are still unknown to him. Yet when these are handled by a qualified supervisor, who can oversee many "operators", it is possible to build quickly a production organization that will "click".

Huge Die



■ Shown above is a die built by Vascoloy-Ramet Corp., North Chicago, Ill., claimed one of the "largest" cemented-carbide dies ever made. It performs cold nosing operations on 105-millimeter artillery shell on a conventional vertical mechanical press at the rate of 120 shell per hour. The die has a tantalum-tungsten carbide insert, the inside of which is finished to the contour of the shell, firmly mounted in a steel casing. It is estimated to cold nose several million shell

Civilian Steel Users Give Way to War Needs

Full impact of military needs not yet felt. Warehouse price ceiling set. More scrap allocations as mills deplete reserves

MARKET IN TABLOID ★

Demand
Civilian pressure lighter.

Prices
Warehouse schedule frozen.

Production
Steady at 97½ per cent.

■ REACTION of steel consumers to a state of war is distinctly helpful and effort to obtain steel for non-essential purposes is disappearing. In addition, steelmakers are receiving requests to hold up shipments now on books or to cancel tonnages for which buyers have no outlet.

Curtailment of automobile and household appliance manufacture has caused numerous steel users to cancel previous bookings in order that war needs may be met more easily. This includes many steel products, notably wire and narrow cold-rolled strip. Pig iron requirements filed for January have been considerably less than for previous months in the case of numerous melters. This is attributed to an increase in foundry inventory, due to lessened demand for castings where their use was delayed by inability to obtain other materials.

In the Cleveland district steel mills have had requests from several customers to hold shipments until January on contracts scheduled and promised for December. The purpose is to co-operate fully with OPM in the effort to prevent accumulation of unreasonably large inventory.

Inquiry for many steel products is light, in some cases much below normal, in spite of war demand. Customers without priority are not seeking to place further tonnage as they already have orders on books without delivery promise.

Expected sharp increase in war demand has not appeared yet, but is in the making and will be felt soon. A quickening is apparent in some lines of ordnance manufacture and large orders may be placed soon. A number of bomb inquiries are before the trade. One involves several hundred tons of 30-gage sheets and another sheet tonnage is for bomb fins. Stovemakers, whose regular output has been limited, are figuring on contracts for bomb clusters.

Steel production last week was at 97½ per cent, the same as for the preceding week. Lack of scrap held back a higher rate at several points. Christmas observance probably will cut into output this week, but the decline probably will be less than usual. Chicago advanced 1½ points to 103 per cent, close to its all-time high. Birmingham was 5 points higher at 95 per cent, Cincinnati up 4 points to 95 and Cleveland advanced ½-point to 94½ per cent. St. Louis dropped 5 points to 91 per cent, Pittsburgh 2 points to 96 and Wheeling 3 points to 91. Unchanged rates were maintained at Buffalo, 97 per cent; Detroit, 90; Eastern Pennsylvania, 87; New England, 84; Youngstown, 92.

While complete scrap allocation has not been put in effect, awaiting detailed reports from the industry, a number of specific orders have been issued to divert supply to steelmakers nearing the point of shutting down. Following the order for shipment of 10,000 tons to Inland Steel Co. other Chicago mills have asked allocations, evidently fearing the effect of the Inland order on their sources of supply. Two melters in the St. Louis district have been given allocations to prevent severe interruption of steel output. Curtailment of automobile production in the Detroit area is expected to reduce materially the volume of scrap available to local mills. Munitions manufacture is not expected to make good this loss. A plan has been worked out for reclaiming empty tin containers from army posts, said to be about 1600 tons monthly.

An order by Office of Price Administration freezes prices on resale of steel and iron products by warehouses and other distributors at the level of April 16, 1941. The order includes seconds, rejects and used products. The only exception is in case of sales of less than standard packages or units at retail. Extras and discounts in effect April 16 will apply.

Navy and merchant shipbuilders are working on a plate standardization program, affecting weights, widths and lengths, in an effort to expedite shipments. Merchant shipbuilders are expected to find this an easier task than navy yards. One cause of delay in deliveries has been the large number of differing specifications for material used for essentially the same purpose.

Automobile production dropped to a new low last week, with 65,875 units assembled, compared with 95,990 the preceding week. This was to meet the restriction imposed by the government for December output. In the corresponding week last year production was 125,350 cars.

Price composites continue frozen: Finished steel, $56.73; semifinished steel, $36; steelmaking pig iron, $23.05; steelmaking scrap, $19.17.

COMPOSITE MARKET AVERAGES

	Dec. 20	Dec. 13	Dec. 6	One Month Ago Nov., 1941	Three Months Ago Sept., 1941	One Year Ago Dec., 1940	Five Years Ago Dec., 1936
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$54.66
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	35.45
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	22.32	19.48
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	21.40	17.05

Finished Steel Composite:—Average of industry-wide prices on sheets, strip, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania.

COMPARISON OF PRICES

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

Finished Material

	Dec. 20, 1941	Nov. 1941	Sept. 1941	Dec. 1940
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.47
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	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
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	2.55

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 ⅜-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron

	Dec. 20, 1941	Nov. 1941	Sept. 1941	Dec. 1940
Bessemer, del. Pittsburgh	$25.34	$25.34	$25.34	$24.95
Basic, Valley	23.50	23.50	23.50	23.10
Basic, eastern, del. Philadelphia	25.34	25.34	25.34	24.84
No. 2 fdry., del. Pgh., N.&S. Sides	24.69	24.69	24.69	24.29
No. 2 foundry, Chicago	24.00	24.00	24.00	23.75
Southern No. 2, Birmingham	20.38	20.38	20.38	19.38
Southern No. 2, del. Cincinnati	24.06	24.06	24.06	23.06
No. 2X, del. Phila. (differ. av.)	26.215	26.215	26.215	25.715
Malleable, Valley	24.00	24.00	24.00	23.60
Malleable, Chicago	24.00	24.00	24.00	23.75
Lake Sup., charcoal, del. Chicago	31.34	31.34	31.34	30.34
Gray forge, del. Pittsburgh	24.19	24.19	24.19	23.35
Ferromanganese, del. Pittsburgh	125.33	125.33	125.33	125.33

Scrap

Heavy melting steel, Pitts.	$20.00	$20.00	$20.00	$22.75
Heavy melt. steel, No. 2, E. Pa.	17.75	17.75	17.75	19.75
Heavy melting steel, Chicago	18.75	18.75	18.75	20.70
Rails for rolling, Chicago	22.25	22.25	22.25	25.00
No. 1 cast, Chicago	20.00	21.50	21.50	19.00

Coke

Connellsville, furnace, ovens	$6.25	$6.25	$6.25	$5.50
Connellsville, foundry, ovens	7.25	7.25	7.25	6.00
Chicago, by-product fdry., del.	12.25	12.25	12.25	11.75

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

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

Sheets, Strip

Hot-Rolled Sheets

Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 2.10c
Granite City base 2.20c
Detroit, del. 2.20c
Pacific ports 2.65c

Cold-Rolled Sheets

Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, B'ham., base 3.05c
Granite City, base 3.15c
Detroit, del. 3.15c
Other Mich. pts., del. 2.25c
Pacific ports 3.70c

Galvanized Sheets, No. 24

Pittsburgh, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c
Granite City, base 3.60c
Pacific ports 4.05c

Corrugated Galv. Sheets

Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, 29 gage, per square 3.31c
Granite City 3.38c
Pacific Ports 3.73c

Culvert Sheets

Pittsburgh, Gary, Birmingham, 16-gage, not corrugated, copper steel 3.60c, copper iron 3.90c, pure iron 3.95c.
Pittsburgh, 24-gage, zinc-coated, hot-dipped, heat-treated 4.25c.
Granite City, copper steel 3.70c, copper iron 4.00c, pure iron 4.05c.
Pacific ports, copper steel 4.25c, copper iron 4.55c, pure iron 4.60c.

Enameling Sheets

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 10 gage, base 2.75c
Granite City, base 2.85c
Pacific ports 3.40c
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c
Granite City, base 3.45c
Pacific ports 4.00c

Electrical Sheets, No. 24

	Pittsburgh Base	Pacific Ports	Granite City
Field gr.	3.20c	3.95c	3.30c
Armat.	3.55c	4.30c	3.65c
Elect.	4.05c	4.80c	4.15c

Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	.....
65	7.15c	7.90c	.....
58	7.65c	8.40c	.....
52	8.45c	9.20c	.....

Hot-Rolled Strip

Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c
Detroit, del. 2.20c
Other Mich. pts. del. 2.25c
Pacific ports 2.75c

Cold-Rolled Strip

Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c
Chicago, base 2.90c
Worcester, base 3.00c
Detroit, del. 2.90c
Other Mich. pts. del. 2.95c

Commodity C.R. Strip

Pittsburgh, Cleveland, Youngstown, base 3 tons and over 2.95c
Worcester, base 3.35c
Detroit, del. 3.05c
Other Mich. pts. del. 3.10c

Cold-Finished Spring Steel

Pittsburgh, Cleveland, base; add 20 cents for Worcester.
.26-.50 Carbon 2.80c
.51-.75 Carbon 4.30c
.76-1.00 Carbon 6.15c
Over 1.00 Carbon 8.35c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

TYPE	BARS	PLATES	SHEETS	H. R. STRIP	C. R. STRIP
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
304-20% clad	.....	*18.00	19.00	.....	.....
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
311	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
316	40.00	44.00	48.00	40.00	48.00
317	50.00	54.00	58.00	50.00	58.00
347	33.00	38.00	45.00	33.00	42.00
403	21.50	24.50	29.50	21.25	27.00
410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
430F	19.50	22.50	29.50	18.75	24.50
431	19.00	22.00	29.00	17.50	22.50
442	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00

*Includes annealing and pickling.

Tin, Terne Plate

Tin Plate

Pittsburgh, Chicago, Gary, 100-lb. base box $5.00
Granite City $5.10
Pacific ports, f.o.b. $5.75½

Tin Mill Black Plate

Pittsburgh, Chicago, Gary, base 29 gage and lighter 3.05c
Granite City 3.15c
Pacific ports, boxed 4.27½c

Long Ternes

Pittsburgh, Gary No. 24 unassorted 3.80c
Pacific Ports 4.55c

Special Coated Mfg. Ternes

Pittsburgh, Chicago, Gary, 100-base box $4.30
Granite City $4.40

Roofing Ternes

Pittsburgh base per package 112 sheets 20 x 28 in., coating I.C.

8-lb.	$12.00	25-lb.	$16.00
15-lb.	14.00	30-lb.	17.25
20-lb.	15.00	40-lb.	19.50

Steel Plate

Pittsburgh, Chicago, Gary, Cleveland, Birmingham,

Youngstown 2.10c
Coatesville, Sparrows Point, Claymont 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, Bethlehem, Chicago, Buffalo, Birmingham 2.10c
St. Louis, del. 2.34c
Pacific Coast ports 2.75c

Bars

Hot-Rolled Carbon Bars

Pittsburgh, Chicago, Gary, Cleve., Birm., base 20 tons one size 2.15c
Detroit, del. 2.25c
New York, del. 2.49c
Duluth, base 2.25c
Philadelphia, del. 2.47c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pac. ports, dock 2.80c
All-rail from Chicago.. 3.25c

Rail Steel Bars

Pitts., Chicago, Gary, Cleveland, Birm., base 5 tons 2.15c
Detroit, del. 2.25c
New York, del. 2.49c
Philadelphia, del. 2.47c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pac. ports, dock 2.80c
All-rail from Chicago.. 3.25c

Hot-Rolled Alloy Bars

Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size 2.70c
Detroit 2.80c

Alloy S.A.E.	Diff.	Alloy S.A.E.	Diff.
2000	0.35	3100	0.70
2100	0.75	3200	1.35
2300	1.70	3300	3.80
2500	2.55	3400	3.20
4100 .15-25 Mo.			0.55
4600 0.20-0.30 Mo.; 1.50-2.00 Ni.			1.20
5100 80-1.10 Cr.			0.45
5100 Spr. flats			0.15
6100 Bars			1.20
6100 Spr. flats			0.85
Carb., Van.			0.85
9200 Spr. flats			0.15
9200 Spr. rounds, squares			0.40
T 1300, Mn, mean 1.51-2.00			0.10
Do., carbon under 0.20 max.			0.35

Cold-Finished Carbon Bars

Pitts., Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs. 2.65c
Detroit 2.70c

Cold-Finished Alloy Bars

Pitts., Chicago, Gary, Cleveland, Buffalo, base 3.35c
Detroit 3.45c
Galveston, add $0.25; Pacific Coast, $0.50.

Turned, Ground Shafting

Pitts., Chicago, Gary, Cleveland, Buffalo, base (not including turning, grinding, polishing extras) 2.65c
Detroit 2.70c

Reinforcing Bars (*New Billet*)

Pitts., Chicago, Gary, Cleveland, Birm., Sparrows Point, Buffalo, Youngstown, base 2.15c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pacific ports, dock 2.80c
Detroit, del. 2.25c

Reinforcing Bars (*Rail Steel*)

Pitts., Chicago, Gary
Cleveland, Birm., base. 2.15c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pacific ports, dock 2.80c
Detroit, del. 2.25c

Iron Bars

Philadelphia, com. del. 3.06-3.50c
Pittsburgh, muck bar ... 5.00c
Pittsburgh, staybolt 8.00c
Terre Haute com., f.o.b. mill 2.15c

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 ties, (base C. L. column) .. 59
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 at Birmingham)

Bright bess., basic wire. 2.60c
Galvanized wire 2.60c
Spring wire 3.20c
Worcester, Mass., 10c higher on bright basic and spring wire.

Cut Nails

Carload, Pittsburgh, keg. $3.85

Alloy Plates (Hot)

Pitts., Chicago, Coatesville, Pa. 3.50c

Rails, Fastenings

(Gross Tons)

Standard rails, mill $40.00
Relay rails, base, 35 lbs. and over.....28.00-30.00
Light rails, billet qual., Pitts., Chicago, Bham. $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 4.75c
Do., heat treated 5.00c
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.....65½ off
Do., ⅝ and ⅝ x 6-in. and shorter .....63½ off
Do., ¾ to 1 x 6-in. and shorter .....61 off
1⅛ and larger, all lengths 59 off
All diameters, over 6-in. long .....59 off
Tire bolts .....50 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts .....56 off
Plow bolts .....65 off

Nuts

Semifinished hex.	U.S.S.	S.A.E.
½-inch and less.	62	64
⅝-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger..	56	

Hexagon Cap Screws

Upset 1-in., smaller .....60 off

Square Head Set Screws

Upset, 1-in., smaller .... 68 off
Headless, ¼-in., larger ..55 off
No. 10, smaller .....60 off

Piling

Pitts., Chgo., Buffalo .. 2.40c

Rivets, Washers

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

Structural 3.75c
⅞-inch and under .....65-5 off
Wrought washers, Pitts., Chi., Phila., to jobbers and large nut, bolt mfrs. l.c.l .....$3.50 off

Tool Steels

Pittsburgh, Bethlehem, Syracuse, base, cents per lb.

Carb. Reg. 14.00 Oil-hardening .. 24.00
Carb. Ext. 18.00
Carb. Spec. 22.00 High car.-chr. 43.00

High Speed Tool Steels

Tung.	Chr.	Van.	Moly.	
18.00	4	1	...	67.00
18.00	4	2	1	77.00
18.00	4	3	1	87.00
1.50	4	1	8.50	54.00
....	4	2	8	54.00
5.50	4	1.50	4	57.50
5.50	4.50	4	4.50	70.00

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
2¼" 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

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

In.	Steel Blk.	Steel Galv.
½	63½	51
¾	66½	55
1—3	68½	57½
Iron		
¾	30	10
1—1¼	34	16
1½	38	18½
2	37½	18

Lap Weld

	Steel	
2	61	49½
2½—3	64	52½
3½—6	66	54½
7 and 8	65	52½
Iron		
2	30½	12
2½—3½	31½	14½
4	33½	18
4½—8	32½	17
9—12	28½	12

Line Pipe, Plain Ends

	Steel
1 to 3, butt weld	68½
2, lap weld	63
2½ to 3, lap weld	66
3½ to 6, lap weld	65
7 and 8, lap weld	64

Seamless, 3 pts. lower discount.

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, Youngs., 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 ⅝-inch incl. (per 100 lbs.) $2.00
Do., over ⅝ to ⅞-in. incl. 2.15
Worcester up $0.10, Galveston up $0.25 and Pacific Coast up $0.50 on water shipments.

Skelp

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

Shell Steel

Pittsburgh, Chicago, base, 1000 tons of one size, open hearth

3-12-inch $52.00
12-18-inch 54.00
18-inch and over 56.00

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur... $6.00- 6.25
Connellsville, fdry.. 7.00- 7.50
Connell. prem. fdry. 7.25- 7.60
New River fdry. .. 8.00- 8.25
Wise county fdry. .. 7.50
Wise county fur. .. 6.50

By-Product Foundry

Newark, N. J., del... 12.60-13.05
Chicago, outside del. 11.50
Chicago, delivered .. 12.25
Terre Haute, del. .. 12.00
Milwaukee, ovens... 12.25
New England, del. .. 13.75
St. Louis, del. 12.02
Birmingham, ovens. 8.50
Indianapolis, del. .. 12.00
Cincinnati, del. 11.75
Cleveland, del. 12.30
Buffalo, del. 12.50
Detroit, del. 12.25
Philadelphia, del. .. 12.38

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol.... 14.00c
Toluol, two degree 27.00c
Solvent naphtha 26.00c
Industrial xylol 26.00c

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

Phenol (less than 1000 lbs.) 14.75
Do. (1000 lbs. or over) 13.00

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers 7.00c

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

Sulphate of ammonia $29.00

Pig Iron

No. 2 foundry is 1.75-2.25 sil.; 50c diff. for each 0.25 sil. above 2.25 sil. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$25.00	$25.50	$24.50	$26.00
Birmingham, Ala.§	20.38	.....	19.38	25.00
Birdsboro, Pa.	25.00	25.50	24.50	26.00
Buffalo	24.00	24.50	23.00	25.00
Chicago	24.00	24.00	23.50	24.50
Cleveland	24.00	24.00	23.50	24.50
Detroit	24.00	24.00	23.50	24.50
Duluth	24.50	24.50	.....	25.00
Erie, Pa.	24.00	24.50	23.50	25.00
Everett, Mass.	25.00	25.50	24.50	26.00
Granite City, Ill.	24.00	24.00	23.50	24.50
Hamilton, O.	24.00	24.00	23.50	.....
Neville Island, Pa.	24.00	24.00	23.50	24.50
Provo, Utah	22.00	.....	.....	.....
Sharpsville, Pa.	24.00–24.50	24.00–24.50	23.50–24.50	24.50–25.00
Sparrow's Point, Md.	25.00	.....	24.50	.....
Swedeland, Pa.	25.00	25.50	24.50	26.00
Toledo, O.	24.00	24.00	23.50	24.50
Youngstown, O.	24.00–24.50	24.00–24.50	23.50–24.50	24.50–25.00

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

Delivered from Basing Points:				
Akron, O., from Cleveland	25.39	25.39	24.89	25.89
Baltimore from Birmingham†	25.61	.....	25.11	.....
Boston from Birmingham†	25.12	.....	.....	.....
Boston from Everett, Mass.	25.50	26.00	25.00	26.50
Boston from Buffalo	25.50	26.00	25.00	26.50
Brooklyn, N. Y., from Bethlehem	27.50	28.00	.....	.....
Canton, O. from Cleveland	25.39	25.39	24.89	25.89
Chicago from Birmingham	†24.22	.....	.....	.....
Cincinnati from Hamilton, O.	24.44	25.11	24.61	.....
Cincinnati from Birmingham†	24.06	.....	23.06	.....
Cleveland from Birmingham†	24.12	.....	23.12	.....
Mansfield, O., from Toledo, O.	25.94	25.94	25.44	.....
Milwaukee from Chicago	25.10	25.10	24.60	25.60
Muskegon, Mich., from Chicago, Toledo or Detroit	27.19	27.19	.....	.....
Newark, N. J., from Birmingham†	26.15	.....	.....	.....
Newark, N. J., from Bethlehem	26.53	27.03	.....	.....
Philadelphia from Birmingham†	25.46	.....	24.96	.....
Philadelphia from Swedeland, Pa.	25.84	26.34	25.34	.....

Pittsburgh dist.: Add to Neville Island base, North and South Sides, 69c; McKees Rocks, 55c; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, 84c; Monessen, Monongahela City, $1.07; Oakmont, Verona, $1.11; Brackenridge, $1.24.

	No. 2 Fdry.	Malleable	Basic	Bessemer
Saginaw, Mich., from Detroit	26.31	26.31	25.81	26.81
St. Louis, northern	24.50	24.50	24.00	.....
St. Louis from Birmingham	†24.50	.....	23.62	.....
St. Paul from Duluth	26.63	26.63	.....	27.13

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50, base; $30.74 delivered Philadelphia.

Gray Forge		Charcoal	
Valley furnace	$23.50	Lake Superior fur.	$28.00
Pitts. dist. fur.	23.50	do., del. Chicago	31.34
		Lyles, Tenn., high phos.	28.50

Silvery

Jackson county, O., base, 6.00 to 6.50 per cent $29.50. Add 50 cents for each additional 0.25 per cent of silicon. Buffalo base $1.25 higher.

Bessemer Ferrosilicon†

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

Manganese differentials in silvery iron and ferrosilicon not to exceed 50 cents per 0.50 per cent manganese in excess of 1 per cent.

Refractories

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

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$64.60

First Quality

Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00

Second Quality

Pa., Ill., Ky., Md., Mo.	46.55
Georgia, Alabama	38.00
New Jersey	49.00

Ohio

First quality	43.00
Intermediate	36.10
Second quality	36.00

Malleable Bung Brick

All bases	$59.85

Silica Brick

Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30

Ladle Brick

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

Dry press	$31.00
Wire cut	29.00

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	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Washed gravel, duty pd., tide, net ton	nominal
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	$23.00
Do., barge	23.00
No. 2 lump	23.00

Ferroalloy Prices

Ferromanganese, 78-82%,

Carlots, duty pd., seab'd.	$120.00
Carlots, del. Pittsburgh	125.33
Carlots, f.o.b. So. f'ces.	145.00

Add $10 for ton, $13.50 for less ton, $18 for less than 200-lb. lots.

Spiegeleisen, 19-21%, gross ton, Palmerton $36.00

Manganese Briquets, Contract carloads, bulk freight allowed, per lb. 5.50c
Packed 5.75c
Ton lots 6.00c
Less-ton lots 6.25c
Less 200-lb. lots 6.50c
Spot ¼c higher.

Manganese Electro, 99.9+%, less car lots 42.00c

Chromium Metal, per lb. contained chromium

	Contract	Spot
98% Cr. ton lots	80.00c	85.00c
88% Cr. ton lots	79.00c	84.00c

Ferrocolumbium, 50-60% f.o.b. Niagara Falls, per lb. contained Cb on contract $2.25
Less-ton lots 2.30
(Spot 10c higher)

Chromium Briquets, per lb., freight allowed

	Contract	Spot
Carlots	8.25c	8.50c
Packed	8.50c	8.75c
Ton lots	8.75c	9.00c
Less-ton lots	9.00c	9.25c
Less 200 lbs.	9.25c	9.50c

Ferrochrome, 66-70%, freight allowed, 4-6% carbon, per pound contained (chrome)
Carloads 13.00c
Ton lots 13.75c
Less-ton lots 14.00c
Less than 200-lb. lots 14.25c

67-72%, low carbon, cts. per pound:

	Car loads	Ton lots	Less ton	Less 200 lbs.
2% C.	19.50	20.25	20.75	21.00
1% C.	20.50	21.25	21.75	22.00
0.20% C.	21.50	22.25	22.75	23.00
0.10% C.	22.50	23.25	23.75	24.00

Spot is ¼c higher.

Ferromolybdenum, 55-75%, per lb. contained molybdenum, f.o.b. furnace 95.00c

Calcium Molybdate (Molyte), 40-45% Mo., per lb. contracts, f.o.b. producers plant 80.00c

Molybdic Oxide Briquets, 48-52% Mo. per lb. contained, f.o.b. producers plant 30.00c

Molybdenum Oxide, (In 5 and 20 lb. mo. contained cans) 53-63 mo. per lb. contained f.o.b. producers' plants 80.00c

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

Ferrophosphorus, 17-19%, gross ton carloads, f.o.b. sellers' works, $3 unitage, freight equalized with Rockdale, Tenn. for 18% phos.
Contract $58.50
Spot 62.25
23-26%, $3 unitage, freight equalized with Mt. Pleasant, Tenn., for 24% phos.
Contract 75.00
Spot 80.00

Ferrosilicon, Gross tons, freight allowed, bulk

	Carloads	Ton lots
50%	$ 74.50	$ 87.00
Unitage	1.50	1.75
75%	135.00	151.00
Unitage	1.80	2.00
85%	170.00	188.00
Unitage	2.00	2.20
90-95%	10.25c	11.25c

(Above for contracts; spot ¼c higher)

Silicon Metal, Spot ¼-cent higher (Per Lb., Contracts):

	1% Iron	2% Iron
Carlots	14.50c	13.00c
Ton lots	15.00c	13.50c
Less-ton lots	15.25c	13.75c
Less 200 lbs.	15.50c	14.00c

Silicon Briquets, Contract carloads, bulk freight allowed, per ton $74.50
Packed 80.50
Ton lots 84.50
Less-ton lots, per lb. 4.00c
Less 200-lb. lots 4.25c
Spot ¼c higher on less ton lots; $5 higher on ton lots and over.

Silicomanganese,

Carbon	1½%	2½%
Carloads (contract)	$128.00	$118.00
Ton Lots (contract)	140.50	130.50

Freight allowed spot $5 above contract

Ferrotungsten, (All prices nominal) Carlots, per lb. contained tungsten $1.90

Tungsten Metal Powder, (Prices Nominal) 98-99 per cent, per pound, depending upon quantity $2.60-$2.65

Ferrotitanium, 40-45%, f.o.b. Niagara Falls, per lb. contained in ton lots $1.23
Less ton lots 1.25
20-25%, C. 0.10 max., in ton lots per lb. contained Ti 1.35
Less-ton lots 1.40
(Spot 5c higher)

Ferro-Carbon-Titanium, 15-20% Titanium,

	6-8% C	3-5% C
Carlots, contract, f.o.b. Niagara Falls, freight allowed to destinations east of Mississippi and north of Baltimore and St. Louis	$142.50	$157.50

Ferrovanadium, 35-40%, contract per pound contained vanadium $2.70-$2.80-$2.90
(Spot 10c higher)

Vanadium Pentoxide, Per lb. contained, contracts 1.10
Do., spot 1.15

Zirconium Alloy, 12-15%, carloads, contract, bulk $102.50
Packed 107.50
Ton lots 108.00
Less ton lots 112.50
Spot $5 a ton higher
35-40%, contract, carloads, bulk or package, per lb. alloy 14.00c
Do., ton lots 15.00c
Do., less-ton lots 16.00c
Spot is ¼-cent higher

Alsifer, Per lb., f.o.b. Niagara Falls.

	Contract	Spot
Carlots	7.50c	8.00c
Ton lots	8.00c	8.50c

Simanal, Per lb. of alloy, contracts, freight allowed (approx. 20% Si, 20% Mn, 20% Al)

Carlots	Ton Lots	Ton Lots
10.50c	11.00c	11.50c

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials. As of April 16, 1941

	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: S.A.E. 2300	Cold Drawn Bars: S.A.E. 3100
Boston	3.98	4.06	5.06	3.85	3.85	5.66	3.71	4.48	5.11	3.46	4.13	8.88	7.23
New York (Met.)	3.84	3.96	3.96	3.76	3.75	5.56	3.58	4.60	5.00	3.51	4.09	8.84	7.19
Philadelphia	3.85	3.95	4.45	3.55	3.55	5.25	3.55	4.05	4.65	3.31	4.06	8.56	7.16
Baltimore	3.85	4.00	4.35	3.70	3.70	5.25	3.50	....	5.05	....	4.05	....	....
Norfolk, Va.	4.00	4.10	....	4.05	4.05	5.45	3.85	....	5.40	....	4.15	....	....
Buffalo	3.35	3.82	3.82	3.62	3.40	5.25	3.25	4.30	4.75	3.52	3.75	8.40	6.75
Pittsburgh	3.35	3.60	3.60	3.40	3.40	5.00	3.35	...	4.65	....	3.65	8.40	6.75
Cleveland	3.25	3.50	3.50	3.40	3.58	5.18	3.35	4.05	4.62	3.20	3.75	8.40	6.75
Detroit	3.42	3.43	3.68	3.60	3.65	5.27	3.43	4.30	4.84	3.40	3.80	8.70	7.05
Omaha	4.10	4.20	4.20	4.15	4.15	5.75	3.85	5.32	5.50	....	4.42	....	....
Cincinnati	3.60	3.67	3.67	3.65	3.68	5.28	3.42	4.00	4.92	3.47	4.00	8.75	7.10
Chicago	3.50	3.60	3.60	3.55	3.55	5.15	3.25	4.10	4.85	3.50	3.75	8.40	6.75
Twin Cities	3.75	3.85	3.85	3.80	3.80	5.40	3.50	4.35	5.00	3.83	4.34	9.09	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	3.64	3.74	3.74	3.69	3.69	5.29	3.39	4.24	4.99	3.61	4.02	8.77	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	3.75	3.75	3.70	3.70	5.30	3.45	....	5.01	....	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	3.75	....	4.50	....	4.39	....	....
Tulsa, Okla.	4.44	4.34	4.34	4.49	4.49	6.09	4.19	....	5.54	....	4.69	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.93	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.	3.75	5.95	5.95	3.85	3.85	5.50	4.20	....	5.25	....	6.90	....	....
Seattle	4.00	4.00	5.20	4.00	4.00	5.75	4.00	6.50	5.25	....	5.75	....	....
Portland, Oreg.	4.25	4.50	6.10	4.00	4.00	5.75	3.95	6.50	5.00	....	5.75	....	....
Los Angeles	4.15	4.65	6.45	4.15	4.15	6.40	4.30	6.50	5.50	....	6.60	10.55	9.80
San Francisco	3.75	4.25	6.00	3.90	3.90	5.60	3.90	6.40	5.65	....	6.80	10.65	9.80

	S.A.E. Hot-rolled Bars (Unannealed): 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.28	7.75	6.05	5.80	7.90
New York (Met.)	4.04	7.60	5.90	5.65	....
Philadelphia	4.10	7.56	5.86	5.61	8.56
Baltimore	4.45	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.35	5.65	5.40	7.50
Pittsburgh	3.40	7.45	5.75	5.50	7.60
Cleveland	3.30	7.55	5.85	5.85	7.70
Detroit	3.48	7.67	5.97	5.72	7.19
Cincinnati	3.65	7.69	5.99	5.74	7.84
Chicago	3.70	7.35	5.65	5.40	7.50
Twin Cities	3.95	7.70	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.84	7.72	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	9.55	8.55	8.40	9.05
San Francisco	5.25	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; 300-9999 Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in B'ham., Memphis.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Omaha, Kansas City, St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 750-4999 in San Francisco; 300-4999 in Portland, Seattle; any quantity in Twin Cities; 300-1999 Los Angeles.

Galvanized Sheets: Base, 150-1499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 150-1049 in Los Angeles; 300-4999 in Portland, Seattle; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis, Tulsa; 3500 and over in Chattanooga; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; 25 to 49 bundles in Philadelphia; 750-4999 in San Francisco.

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.

EUROPEAN IRON, STEEL PRICES

Dollars at $4.02½ per Pound Sterling

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	BRITISH Gross Tons f.o.b. U.K. Ports	£ s d
Merchant bars, 3-inch and over	$66.50	16 10 0
Merchant bars, small, under 3-inch, re-rolled	3.60c	20 0 0
Structural shapes	2.95c	15 10 0
Ship plates	2.90c	16 2 6
Boiler plates	3.17c	17 12 6
Sheets, black, 24 gage	4.00c	22 5 0
Sheets, galvanized, corrugated, 24 gage	4.61c	25 12 6
Tin plate, base box, 20 x 14, 108 pounds	$ 6.20	1 10 9

British ferromanganese $120.00 delivered Atlantic seaboard duty-paid.

Domestic Prices Delivered at Works or Furnace—

		£ s d
Foundry No. 3 Pig Iron, Silicon 2.50—3.00	$25.79	6 8 0(a)
Basic pig iron	24.28	6 0 6(a)
Furnace coke, f.o.t. ovens	7.40	1 16 9
Billets, basic soft, 100-ton lots and over	49.37	12 5 0
Standard rails, 60 lbs. per yard, 500-ton lots & over	2.61c	14 10 6
Merchant bars, rounds and squares, under 3-inch	3.17c	17 12 0††
Shapes	2.77c	15 8 0††
Ship plates	2.91c	16 3 0††
Boiler plates	3.06c	17 0 6††
Sheets, black, 24 gage, 4-ton lots and over	4.10c	22 15 0
Sheets, galvanized 24 gage, corrugated, 4-ton lots & over	4.70c	26 2 6
Plain wire, mild drawn, catch weight coils, 2-ton lots and over	4.28c	23 15 0
Bands and strips, hot-rolled	3.30c	18 7 0

(a) del. Middlesbrough 5s rebate to approved customers. ††Rebate 15s on certain conditions.

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	12.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Chinese wolframite, net ton, duty pd.	$24.00
Brazil iron ore, 68-69%, ord.	7.50c
Low phos. (.02 max.)	8.00c

F.O.B. Rio Janeiro.

Scheelite, imp.	23.50-24.00
Chrome ore, Indian, 48% gross ton	.....

Manganese Ore

Including war risk but not duty, cents per unit cargo lots

Caucasian, 50-52%	.....
So. African, 50%	68.00-70.00
Indian, 50%	68.00-70.00
Brazilian, 46%	68.00-70.00
Chilean, 47%	68.00-70.00
Cuban, 50-51%, duty free	.....

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

OTHER THAN RAILROAD GRADES (a) (b)	Pittsburgh, *Wheeling, *Johnstown, Weirton, Steubenville	Youngstown, *Warren, Canton, Sharon	Chicago	Kokomo, Ind.	Bethlehem	*Eastern Pa.	Sparrows Pt.	Cleveland	Buffalo	Cincinnati, Ashland, Ky., Portsmouth, O. Middletown, O.	St. Louis	Detroit	Duluth	Alabama City, Atlanta, Birmingham	Los Angeles, San Francisco	Minnequa, Colo., Portland, Oreg.	Seattle, Wash.
No. 1 heavy melting	$20.00	$20.00	$18.75	$18.25	$18.25	$18.75	$18.75	$19.50	$19.25	$19.50	$17.50	$17.85	$18.00	$17.00	$17.00	$16.50(f)	$14.50
No. 1 hyd. comp. black sheets	20.00	20.00	18.75	18.25	18.25	18.75	18.75	19.50	19.25	19.50	17.50	17.85	18.00	17.00	17.00	16.50(f)	14.50
No. 2 heavy melting	19.00	19.00	17.75	17.25	17.25	17.75	17.75	18.50	18.25	18.50	16.50	16.85	17.00	16.00	16.00	15.50(f)	13.50
Dealer No. 1 bundles	19.00	19.00	17.75	17.25	17.25	17.75	17.75	18.50	18.25	18.50	16.50	16.85	17.00	16.00	16.00	15.50(f)	13.50
Dealer No. 2 bundles	18.00	18.00	16.75	16.25	16.25	16.75	16.75	17.50	17.25	17.50	15.50	15.85	16.00	15.00	15.00	14.50(f)	12.50
Mixed borings and turnings	15.25	15.25	14.00	14.25	13.50	14.00	14.00	14.75	14.50	14.75	12.75	13.10	. . .	12.25(d)	12.25	11.75(f)	9.75
Machine shop turnings	15.50	15.50	14.25	14.50	13.75	14.25	14.25	15.00	14.75	15.00	13.00	13.35	15.50	15.00(d)	12.50	12.00(f)	10.00
Shovel turnings	16.50	16.50	15.25	15.50	14.75	15.25	15.25	16.00	15.75	16.00	14.00	14.35	16.50	16.00(d)	13.50	13.00(f)	11.00
No. 1 busheling	19.50	19.50	18.25	17.75	17.75	18.25	18.25	19.00	18.75	19.00	17.00	17.35	17.50	16.50(d)	16.50	16.00(f)	14.00
No. 2 busheling	15.50	15.50	14.25	13.75	13.75	14.25	14.25	15.00	14.75	15.00	13.00	13.35	13.50	12.50(d)	12.50	12.00(f)	10.00
Cast iron borings	15.75	15.75	14.50	14.00	14.00	14.50	14.50	15.25	15.00	†15.25	13.25	13.60	13.75	12.75(d)	12.75	12.25(f)	10.25
Uncut structurals and plate	19.00	19.00	17.75	17.25	17.25	17.75	17.75	18.50	18.25	18.50	18.50	16.85	17.00	16.00(d)	16.00	15.50(f)	13.50
No. 1 cupola	21.00	21.00	20.00	20.00	22.50	23.00	22.00	22.00	20.00	21.00	20.00	20.35	19.00	20.00(e)	19.50	18.00(g)	18.00
Heavy breakable cast	19.50	19.50	18.50	18.50	21.00	21.50	21.00	20.50	18.50	19.50	18.50	18.85	17.50	18.50(e)	18.00	16.50(g)	17.00
Stove plate	19.00	....	17.00	16.00	18.00	18.50	18.00	18.00	19.00	17.50	17.00	14.10	16.00	17.00(e)	16.50	15.00(g)	14.00
Low phos. billet, bloom crops	25.00	25.00	23.75	23.75	23.25	23.75	23.75	24.50	24.25	24.50	22.50	22.85	23.00	22.00(e)	22.00	20.50(g)	19.50
Low phos. bar crops and smaller	23.00	23.00	21.75	21.75	21.25	21.75	21.75	22.50	22.25	22.50	20.50	20.85	21.00	20.00(e)	20.00	18.50(g)	19.50
Low phos. punch., plate scrap**	23.00(c)	23.00	21.75	21.75	21.25	21.75	21.75	22.50	22.25	22.50	20.50	20.85	21.00	20.00(e)	20.00	18.50(g)	17.50
Machinery cast cupola size***	22.00	22.00	21.00	21.00	23.50	24.00	23.50	23.00	21.00	22.00	21.00	21.35	20.00	21.00(e)	20.50	19.00(g)	19.00
No. 1 machine cast, drop broken, 150 pounds and under	22.50	22.50	21.50	21.50	24.00	24.50	24.00	23.50	21.50	22.50	21.50	21.85	20.50	21.50(e)	21.00	19.50(g)	19.50
Clean auto cast	22.50	22.50	21.50	21.50	24.00	24.50	24.00	23.50	21.50	22.50	21.50	21.85	20.50	21.50(e)	21.00	19.50(g)	19.50
Punchings and plate scrap†‡	22.00(c)	22.00	20.75	20.75	20.25	20.75	20.75	21.50	21.25	20.50	19.50	19.85	20.00	19.00(e)	19.00	17.50(g)	16.50
Punchings and plate scrap§§	21.00(c)	21.00	19.75	19.75	19.25	19.75	19.75	20.50	20.25	19.50	18.50	18.85	19.00	18.00(e)	18.00	16.50(g)	15.50
Heavy axle and forge turnings	19.50(c)	19.50	18.25	18.25	17.75	18.25	18.25	19.00	18.75	18.00	17.00	17.35	17.50	16.50(e)	16.50	15.00(g)	14.00
Medium heavy elec. furnace turnings	18.00(c)	18.00	16.75	16.75	16.25	16.75	16.75	17.50	17.25	16.50	15.50	15.85	16.00	15.00(e)	15.00	13.50(g)	12.50
GRADES ORIGINATING FROM RAILROADS																Kansas City	
No. 1 R.R. heavy melting steel	21.00	21.00	19.75	19.25	....	19.75	19.75	20.50	20.25	20.50	18.50	18.85	19.00	18.00(e)	18.00	17.00	15.50
Scrap rails	22.00	22.00	20.75	20.25	....	20.75	20.75	21.50	21.25	21.50	19.50	19.85	20.00	19.00(e)	19.00	18.00	16.50
Rerolling quality rails	23.50	23.50	22.25	21.75	....	22.25	22.25	23.00	22.75	23.00	21.00	21.35	21.50	20.50(e)	20.50	19.50	18.00
Scrap rails 3 feet and under	24.00	24.00	22.75	22.25	....	22.75	22.75	23.50	23.25	23.50	21.50	21.85	22.00	21.00(e)	21.00	20.00	18.50
Scrap rails 2 feet and under	24.25	24.25	23.00	22.50	....	23.00	23.00	23.75	23.50	23.75	21.75	22.10	22.25	21.25(e)	21.25	20.25	18.75
Scrap rails 18 inches and under	24.50	24.50	23.25	22.75	....	23.25	23.25	24.00	23.75	24.00	22.00	22.35	22.50	21.50(e)	21.50	20.50	19.00

*Johnstown, Pa., and Warren, O., not bases for railroad grades; Wheeling railroad only. Eastern Pa. includes Coatesville, Claymont, Conshohocken, Phoenixville and Harrisburg as bases only for "other than railroad grades"; Philadelphia and Wilmington are Eastern Pa. bases only for railroad grades. †Base price at Portsmouth and Ashland; Cincinnati, Middletown 25 cents less. **⅝-inch and heavier, cut 12 inches and under; ***may include clean agricultural cast; ‡‡under ⅝-inch to ¼-inch, cut 12 inches and under; §§under ¼-inch to No. 12 gage, cut 12 inches and under. (c) add $1.75 at Pittsburgh. (d) Bases at Alabama City and Birmingham only. (e) Bases at Birmingham only. (f) Minnequa only. (g) Portland only.

OTHER BASE PRICES: Machine shop turnings $17.60, Alloy, W. Va., $13.35 Toledo, O.; **Shoveling turnings,** $14.35 Toledo; **cast iron borings,** $13.60 Toledo; **No. 1 cupola cast,** $19 Minneapolis and St. Paul, $20.50 Chattanooga, $21 Radford, Va. and $22 Phillipsdale; Bridgeport and Worcester; Heavy **breakable cast,** $20.50 Phillipsdale, Bridgeport and Worcester, $17.50 Minneapolis and St. Paul; **Stove plate** $16 Minneapolis and St. Paul, $17.50 Chattanooga, $18 Radford, Va., $15.60 Toledo and $17.50 Phillipsdale, Bridgeport and Worcester; Machinery cast cupola size $21.50 Chattanooga, $22 Radford, Va. and $23 Phillipsdale, Bridgeport and Worcester; **No. 1 machinery cast, drop broken** $22 Chattanooga, $22.50 Radford, Va. and $23.50 Phillipsdale, Bridgeport and Worcester; **Clean auto cast** $22 Chattanooga, $22.50 Radford, Va. and $23.50 Phillipsdale, Bridgeport and Worcester.

(a) The grades specified are, except dealers' No. 1 and No. 2 bundles and uncut structural and plate scrap, as named and defined in the simplified recommendations R-58-36 of the Department of Commerce which shall be the governing specifications for iron and steel scrap hereunder (other than railroad grades). Dealers' No. 1 bundles shall consist of new, clean black sheet scrap, hydraulically compressed in the dealer's yard. Dealers' No. 2 bundles shall consist of old fender and body scrap, and shall in no case command a premium. (b) These grades (other than railroad grades) represent the major classifications of iron and steel scrap. The maximum prices of superior or inferior grades shall continue to bear the same comparable relationship to those major grade classifications as heretofore existed between the prices of such superior or inferior grades and the prices of the major grades.

Maximum price at shipping point: A shipping point is the point from which the scrap is to be shipped to a consumer. Maximum price at which a grade of scrap may be sold f.o.b. its point of shipment is the shipping point of such scrap. **For shipping points located within a basing point,** the shipping point price is determined by taking the basing point price and deducting actual transportation costs to the consumer's plant within the basing point. Exception: Shipping point price within the Cincinnati basing point, for all grades other than No. 1 cupola, heavy breakable, stove plate, machinery cast (cupola size), No. 1 machinery cast (drop-broken 150 lbs. and under) and clean auto cast, shall in no case exceed basing point prices minus 80 cents. **For shipping points outside a basing point,** the shipping point price is determined by taking the nearest basing point and subtracting the lowest transportation charge. (Example: No. 1 steel shipped from Toledo takes the Detroit base of $17.85 minus transportation of $1.52 or $16.33. This shipping point price is the same to all consumers wherever located.) **Exceptions:** Shipping point of any grade not listed as having a basing point in New England is the Johnstown base minus the all-rail freight from the shipping point to Johnstown. Shipping point prices for New York City, Brooklyn, New York and New Jersey must be computed on the basis of the Bethlehem base although nearer to Buffalo in terms of barge transportation.

Maximum prices to consumers: Maximum price at which any grade (other than railroad) may be delivered to a consumer wherever located is the shipping point price plus actual transportation charges. Where shipment is by water, not more than 75 cents per gross ton may be included for handling charges at dock. Maximum delivered price in no case shall exceed by $1 a ton the nearest maximum base price in terms of transportation charges. (Example: The $1 excess is the so-called "springboard" arrangement. Youngstown consumers can draw on the Cleveland area for No. 1 steel scrap by taking the Cleveland base of $19.50, subtracting the Cleveland switching charge of 65 cents and adding freight to Youngstown of $2.08. The resulting delivered figure of $20.93 is within the "springboard" limit of $1 over the Youngstown base of $20.)

Billet and bloom crops originating in the Pittsburgh district may be sold within or without the district at the Pittsburgh base price plus up to, but not more than $2.50 in transportation charges. Maximum prices for **unprepared scrap** shall be $2.50 a ton less than the maximums for corresponding grade or grades of prepared scrap. **Remote scrap** takes a maximum delivered price $5 above the nearest basing point price.

Railroad grades: Where a railroad operates in two or more basing points, the highest base applies to consumers anywhere on the line. (Example: New York Central Railroad uses the $21 Pittsburgh base on No. 1 steel since the P. & L. E. operates there). Exception: Switching charges of 84 cents a ton must be subtracted from prices on scrap originating from railroads operating in Chicago and sold for consumption outside Chicago. Where railroad scrap is shipped to an off-the-line consumer, the highest maximum on-the-line price or the nearest basing point price, whichever is higher, applies. For scrap rails and rerolling rails originating from mines, logging roads, etc., take the nearest basing point and subtract the lowest established transportation charge to determine shipping point price, which need not be less than $13.50 for scrap rails, $15 for rerollers.

Commissions: Brokers are allowed a commission up to 50 cents a ton above maximum prices to consumers, including export.

Export prices: Maximum on No. 1 heavy melting steel (other than railroad) is the domestic shipping point price plus lowest transportation charge to point of export. Maximum price to a domestic consumer on line of the originating railroad plus transportation to point of export applies on No. 1 railroad steel. Customary differentials apply on other railroad and non-railroad grades.

Sheets, Strip

Sheet & Strip Prices, Page 84

Sheet demand and production are undergoing considerable shifting from normal. Capacity of sheet and strip mills used in production of light plates has reduced output of their normal tonnage and trend of consumers to war work has increased the proportion of high-priority buying, at the same time tending to reduce inquiry for civilian consumption. Faced by reduced output and increasing demand for war purposes mills are unable to accept much tonnage for other than war purposes. However, some sellers plan to set aside some production in January for regular customers, some of whom have no priorities. Supply to these consumers are expected to be cut off later. In some instances as high as 72 per cent of output is for rated users.

Increased war orders for narrow cold strip are accompanied by requests to hold back or cancel orders by manufacturers of non-essential goods, including automobile and refrigerator builders. Shipments are in excess of bookings but with war inquiry increasing this spread may be narrowed. Demand for stainless strip is strong, all for defense and war.

Resulting from inability to secure sheets and strip without ratings, an increasing number of fabricators are taking on defense contracts. Shops normally making stoves, ranges and domestic cooking utensils are going into production on ammunition boxes, armament parts and defense subcontracts. An automobile accessory shop at Lowell, Mass., has taken orders for torpedo parts and instances of this kind are broadening. At New Britain, Conn., a hinge maker has taken a $97,443.67 order for the navy.

Plates

Plate Prices, Page 84

Shipbuilding continues the largest consumer of steel plates, with heavy allocations covering requirements. In addition to larger yards which have been in operation for a long time numerous smaller yards are reaching peak production, requiring light-gage plates in large quantity. Ship equipment is also taking considerable plate tonnage. B. F. Sturtevant Co., Boston, is low on forced draft blowers for eastern navy yards at $1,185,621, only one of numerous contracts for blowers, ventilating and miscellaneous equipment.

Storage tank requirements for defense in the East are heavy, 140 units of 4000-gallon capacity being bid to the signal corps. These are of 3/16-inch material, to be welded. Deliveries are at various points for underground gasoline storage.

Plate fabricating shops have a larger proportion of defense work, some having practically 100 per cent of that type. Boiler shops are also largely engaged on priority work. Shops with small propor-

tion of rated work have difficulty in obtaining material.

Wide plates are in heavy demand and allocations are being made at a rate that causes trouble in scheduling production. Mills capable of rolling wide material are heavily booked, practically all of defense and war character. Civilian users have little chance of obtaining delivery.

To expedite production of ship plates, shipyards, naval as well as merchant, are working out a standardization program affecting weights, widths and lengths. Merchant yards, it is said, are expected to find this task easier than navy yards.

PLATE CONTRACTS PLACED

7800 tons, fabricating only, 16 miles 40-inch pipe, Basic Magnesium Corp., Las Vegas, Nev., to Bethlehem Steel Co., Steelton, Pa.; material furnished by Youngstown Sheet & Tube Co.

1070 tons, 102-inch outlet pipe for Shasta Dam, Calif., specification 998, to Pittsburgh-Des Moines, Steel Co., Pittsburgh.

900 tons, pressure vessels for Standard Oil Co., Richmond, Calif., divided between Western Pipe & Steel Co., San Francisco, California Steel Products Corp., San Francisco and Southwest Welding & Mfg. Co., Alhambra, Calif.

630 tons, three 56,000-barrel tanks, water and power department, Los Angeles, for harbor steam plant at Wilmington, Calif., to Chicago Bridge & Iron Works, Chicago.

600 tons, 24 and 30-inch welded steel, ⅜-in. water pipe, Airport Way improvement, Seattle, to Hydraulic Supply Mfg. Co., Seattle, low at $88,213; 60 tons fittings and castings to Olympic Foundry Co., Seattle, $9142; valves to Rensselaer Valve Co., $13,846.

PLATE CONTRACTS PENDING

3400 tons, penstocks, Fort Peck dam, Montana; Fegles Construction Co., Minneapolis, low on general contract; bids to United States Engineer, Kansas City, Mo., Dec. 12.

288 to 874 tons, retorts, Basic Magnesium Corp., Las Vegas, Nev.; bids in.

Pipe

Pipe Prices, Page 85

Standard pipe sellers find difficulty in obtaining full quota mill shipments and galvanized pipe is practically unobtainable in the merchant market, only highest rated jobs being given consideration. Black pipe supply is small, in many cases due to lack of skelp, resulting from the tight plate situation.

Oil country goods are active and export demand is strong, much moving under lease-lend provisions. Much domestic demand is not been filled because of low ratings or none. Army demand for line pipe is heavy.

Boiler tube requirements for new locomotives and for repair, as well as for ships, are piling up. Cold-drawn tubes are most difficult to supply, though hot-rolled tubing deliveries are fair. Navy demand for cold-drawn tubing has been insistent because of the weight-saving factor. Even A-1 priorities are subject to delay. Hot-rolled tubes are available for almost any A rating.

CAST PIPE PLACED

950 tons, mostly 16-inch, Fort Lewis, Wash., cantonment project, to American Cast Iron Pipe Co.; L. Colucclo, Seattle, contractor.

Unstated, 35 miles 2 to 10-inch distribution pipe, 260 gate valves, 220 hydrants, 45 tons cast iron fittings and other items, Defense Public Works Lakewood and Tillicum improvements near Tacoma, Wash.; bids to 511 Alaska building, Seattle, Dec. 23; alternates for non-metallic materials; Parker & Hill, Smith Tower, Seattle, engineers.

CAST PIPE PENDING

1780 tons, 4 to 14-inch, Defense Public Works, Vallejo, Calif.; bids opened.

300 tons, 4 to 12-inch, Defense Public Works, Paso Robles, Calif.; bids opened.

188 tons, 4 and 6-inch, Defense Public Works, San Miguel, Calif.; bids opened.

Bars

Bar Prices, Page 85

Bar demand is strong, though consumers without war contracts are not pressing for further contracts, already having tonnage on books with delivery indefinite. Material for war use is being allocated increasingly. Inventories of consumers on war work continue to hold at about 40 to 50 days.

Drop forgers in general have back orders for six to eight months. In New England relatively little forging equipment is open for small tool non-defense production. Bar consumption in that area is at an all-time peak and even the smallest requirement is filled with difficulty unless bearing highest rating. Small arms account for most demand, with bolt and nut specialties, forgings and shipyard needs also heavy consumers. Machine tool builders, with high preference, are well supplied.

Wire

Wire Prices, Page 85

Considerable tonnage of wire booked for the automobile industry is being held up and some is being canceled as a result of reduction in car output. Wiremakers are diverting wire rods from this purpose to war orders with high priority. Supplies of rods, however, are short and are preventing capacity operations in some finishing departments.

Ratio of top-rated tonnage is increasing, war buying being on the increase and some tonnage previously booked with low or no priority is being reclassified at higher ratings.

Demand for welding wire is heavier, some producers receiving three times as much as a year ago. Coating operations tend to reduce production. Strong demand for wire rope is being met by stranding equipment at capacity. Nail machines and barbed wire equipment are producing at capacity and most are sold through late first quarter. Nail producers believe they will not be able to fill warehouse quotas this quarter.

Rails, Cars

Track Material Prices, Page 85

Buying of locomotives continues the high light of the railroad market, each week bringing an added number. The trend is strongly to diesel-electric, many being for switching service.

A Bolivian railroad has placed four 2-10-2-type steam locomotives. The Treasury Department has placed 2400 small flat cars for export. Preparing for enlarged iron ore movement next year the Chicago & North Western has bought 250 seventy-ton ore cars. The same road has placed 20 diesel-electric switch engines.

Placing of 1200 cars by the Elgin, Joliet & Eastern, a United States Steel Corp. subsidiary, brings domestic freight car awards for the year to about 115,500 units, by far the heaviest in recent years and the total for the year will not be much larger. Actual deliveries will be considerably below this number. Due to shortage of steel more attention is being paid to reconditioning of freight cars and steel for this purpose is expected to be made easily available.

Higher ratings are given steel for cars to be shipped abroad for war use, A-1-A covering most such cars and locomotives. A recent order for 200 locomotives for export was divided among three builders and will require about 18,000 tons of steel.

LOCOMOTIVES PLACED

Belt Railway of Chicago, four 1000-horsepower diesel-electric switch engines, two to American Locomotive Co., New York, and two to Electro-Motive Corp., La Grange, Ill.; in addition to one placed with Baldwin Locomotive Works, Eddystone, Pa., about a month ago.

Bingham & Garfield, one 1500-horsepower diesel-electric engine, to General Electric Co., Schenectady, N. Y., and one 1000-horsepower diesel-electric switch engine, to American Locomotive Co., New York.

Chicago & North Western, 20 diesel-electric switch engines; eight of 1000 horsepower to American Locomotive Co., and twelve of 660-horsepower to Electro-Motive Corp., La Grange, Ill.

F. C. Del Estado Villazon-Atocha, Bolivia, four 2-10-2 type steam locomotives, to Baldwin Locomotive Works, Eddystone, Pa.

Navy, delivery South Boston, Mass., one diesel-electric, to H. K. Porter Co., Pittsburgh.

New Orleans & Northeastern, four 2700-horsepower diesel-electric locomotives, to Electro-Motive Corp., La Grange, Ill.

Northeast Oklahoma, one 500-horsepower diesel-electric locomotive, to General Electric Co., Schenectady, N. Y.

CAR ORDERS PLACED

Chicago & North Western, 250 seventy-ton ore cars, to Bethlehem Steel Co., Bethlehem, Pa.

Elgin, Joliet & Eastern, 1200 freight cars, 500 fifty-ton light weight all-steel drop end gondolas each going to American Car & Foundry Co., New York, and General American Transportation Co., Chicago, and 200 flat cars to Ralston Steel Car Co., Columbus,, O.

Treasury Department, 4000 small cars for export, to Pressed Steel Car Co., Pittsburgh; list includes 2400 sixteen-foot flat cars and 1600 one-yard V-shaped hoppers.

CAR ORDERS PENDING

Navy, supply officer, Philadelphia, ten 50-ton flat-bottom gondolas; bids Dec. 29.

Treasury Department, approximately 4800 miscellaneous freight cars for delivery to Near East under lease-lend financing, bids asked; a number of passenger cars also are being figured for destination elsewhere.

Structural Shapes

Structural Shape Prices, Page 85

Buying of structural shapes has receded strongly but a sufficient number of large projects is being planned to assure a large increase within the next few weeks, when engineering work has been completed. These are entirely for defense and war work and involve some additions to plants already under way for which enlargement is necessary because of actual war conditions.

Private and nonwar construction is reduced to the minimum. Some highway bridges are being given priority on the ground they are necessary to defense in improving highways for military use.

Prompt repair of damage at Pearl Harbor is reflected in allocations of steel piling to Chicago mills for immediate shipment. Considerable tonnage of steel piling is on order for use in strengthening defenses on the Pacific coast.

SHAPE CONTRACTS PLACED

20,000 tons, bomb racks, proving ground, Savanna, Ill., for War Department, to Arthur J. O'Leary & Son Co., Chicago.

5500 tons, bauxite plant, Aluminum Co. of America, Alcoa, Ark., to Ingalls Iron Works, Birmingham, Ala.

2000 tons, state bridges, Potomac river, Sandy Hook, Md., to Harris Structural Steel Co., New York, on direct bids to state highway commission.

1800 tons, navy forging plant, Seattle, to be operated by Isaacson Iron Works, to Isaacson Iron Works, Seattle, low $321,023; steel sash to Soule Steel Co., Portland, low $8756.

1600 tons, shop, Bethlehem Steel Co. shipyard, Sparrows Point, Md., to Bethlehem Steel Co., Bethlehem, Pa.; Irwin & Leighton, Philadelphia, engineering contractors.

1177 tons, beach thorofare bridge and approaches, Atlantic City, N. J., to Bethlehem Steel Co., Bethlehem, Pa., through Ole Hansen, Ventnor City, N. J., contractor.

1070 tons, bridge superstructure, Park River interchange structure, Hartford, Conn., to Bethlehem Steel Co., Bethlehem, Pa., through Alexander Jarvis Co., contractor.

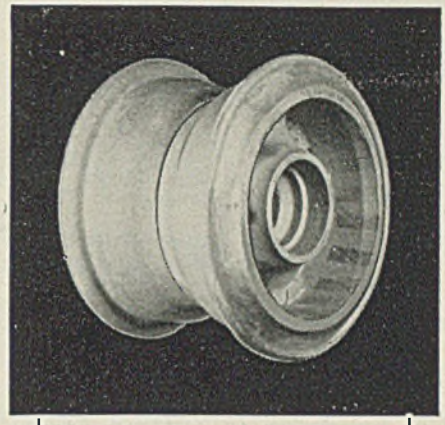
730 tons, plant, Bendix Aviation Corp., South Bend, Ind., to Mississippi Valley

SHAPE AWARDS COMPARED

	Tons
Week ended Dec. 20	35,993
Week ended Dec. 13	5,233
Week ended Dec. 6	16,661
This week, 1940	34,296
Weekly average, 1941	27,533
Weekly average, 1940	28,414
Weekly average, Nov., 1941	20,935
Total to date, 1940	1,433,499
Total to date, 1941	1,404,192

Includes awards of 100 tons or more.

A heat-treated aluminum airplane wheel



Structural Steel Co., Decatur, Ill.; Sollitt Construction Co., South Bend, Ind., contractor.

440 tons, additional buildings, Erie Proving Ground, O., to Niles Forge & Mfg. Co., Niles, O., through Steinle Wolfe Co., Fremont, O.

420 tons, state bridge, Felts Mills connection, Jefferson county, New York, to Phoenix Bridge Co., Phoenixville, Pa., through Mohawk Paving Co. Inc., Buffalo.

382 tons, Montrose exchange telephone building, Pacific Telephone & Telegraph Co., San Francisco, to Bethlehem Steel Co., San Francisco.

265 tons, shed No. 223, transit, for government, Oakland, Calif., to Columbia Steel Co., San Francisco.

230 tons, fixed wheel gates, spec. 1009, Shasta dam, Coram, Calif., for bureau of reclamation, to American Bridge Co., Pittsburgh.

200 tons, foot-bridges, naval depot, Bayonne, N. J., to Lehigh Structural Steel Co., Allentown, Pa., through Wigton-Abbott Co. and Mahone-Troast Co., New York, joint contractors.

179 tons, piers, Alaska, to Bethlehem Steel Co., Bethlehem, Pa. No report on award of 621 tons additional.

Unstated tonnage, state bridge over Lemon stream, Stark, Me., to American Bridge Co., Pittsburgh; bars to Bancroft & Martin Rolling Mills Co., Portland, Me.; C. W. McEachern, Greenville Junction, Me., contractor.

SHAPE CONTRACTS PENDING

5002 tons, extension to tank arsenal, Centerline, Mich., for Chrysler Corp.

4000 tons, Governor's Island shaft, Battery-Brooklyn tunnel, New York; indefinitely postponed on withdrawal of priority rating by OPM on entire project.

2750 tons, construction trestle, Bluestone dam, Hinton, W. Va., for government.

2700 tons, airplane repair shop, unit 2, Hill Field, Ogden, Utah, for War Department; Robert McKee, El Paso, Tex., low on general contract; bids Dec. 10.

2500 tons, steel sheet piling, Robins Dry Dock Co., Brooklyn.

2200 tons, supply building and hangar, quartermaster depot, Rome, N. Y.; Turner Construction Co., New York, contractor.

1500 tons, Brewster Aeronautical Corp., Hatboro, Pa.

1410 tons, bridges, various locations, for Atchison, Topeka & Santa Fe railway.

800 tons, laboratory building, Watertown, Mass., arsenal; J. J. Powers Co., Cambridge, Mass., low, bids Dec. 15 to Constructing Quartermaster, Harbor Defenses of Boston, spec. 9040-E.

561 tons, slab forms, navy yard, Brooklyn, N. Y.

560 tons, power house, Fort Peck dam; Montana; general contract; bids to United States Engineer, Kansas City, Mo., Dec. 12.

500 tons or more, steel towers and appurtenances, Longview-Rainier transmission line, Bonneville project; Bethlehem Steel Co., low, $98,228.

490 tons, state highway bridges, Montgomery and Livingston counties, New York; bids in Albany; 123 tons for bridge, Erie county, withdrawn.

400 tons, state highway bridges 1 and 2 RC-4156, Dansville, N. Y.

398 tons, power house, Apalachia dam, Smith Creek, Tenn., for Tennessee Valley Authority.

315 tons, state bridge, Livingston county, New York; Bero Engineering & Construction Corp., North Tonawanda, N. Y., low.

200 tons, bridge, River Junction, Minn., and repairs to 5 bridges, Chicago, for Chicago, Milwaukee, St. Paul & Pacific railroad.

190 tons, bulkhead and pier 5, Maryland Dry Dock Co., Baltimore.

175 tons, state bridge, Montgomery county, New York; Barletta Construction Co., New York, low.

147 tons, state bridge FAP-22, section B-1, Marion, Iowa.

111 tons, shapes and bars, bridge, Sayreville, N. J.; bids Dec. 29, state highway commissioner, Trenton.

100 tons, single span encased I-beam bridge, Station road, North Branch, N. J.; bids Dec. 29, state highway commissioner, Trenton.

Unstated, traveling cranes, Puget Sound navy yard; estimated cost $250,000; bids to navy yard Dec. 17; spec. 10,752.

Reinforcing Bars

Reinforcing Bar Prices, Page 85

Demand for reinforcing bars is heavy, practically all for war needs. Considerable work is expected to come out soon for some large projects now in the planning stage, new defense structures and additions to munition plants. Private projects are not being considered and relatively few inquiries are being received for this class of work, as consumers understand the futility of seeking place on mill books.

REINFORCING STEEL AWARDS

7800 tons, dry docks, Brooklyn, N. Y., navy yard, to Bethlehem Steel Co., Bethlehem, Pa., through contractors.

2500 tons, sewer, Jamaica district, Queens, N. Y., to Jones & Laughlin Steel Corp., Pittsburgh, through E. W. Foley Inc., Brooklyn.

1000 tons, Bureau of Reclamation, inv. A-33,422-A-1, Keswick, Calif., to Colorado Builders Supply Co., Denver.

818 tons, Bureau of Reclamation, inv. 38,091-A, Odair, Wash., to Carnegie-Illinois Steel Corp., Chicago.

715 tons, Bureau of Reclamation, inv. A-22,522-A-2, Mountain Home, Idaho, to Carnegie-Illinois Steel Corp., Chicago.

318 tons, Bureau of Reclamation, inv. D-38,158-A-1, Odair, Wash., to Bethlehem Steel Co., Seattle.

250 tons, navy forging plant, Seattle, to be operated by Isaacson Iron Works, to Seattle Steel Co., Seattle.

250 tons, U. S. Engineers Office, San Francisco, inv. 414-42-62, for Honolulu, to Missouri Rolling Mills Corp., St. Louis, Mo.

165 tons, Bureau of Reclamation, inv. 48,902-A, Friant, Calif., to Colorado Builders Supply Co., Denver, Colo.

165 tons, assembling shop, Aberdeen Proving Ground, Maryland, to Bethlehem Steel Co., Bethlehem, Pa.

153 tons, U. S. Engineers office, San Francisco, inv. 414-42-64, for Honolulu, to West Virginia Rail Co., Huntington, W. Va.

150 tons, Bureau of Reclamation, inv. 38,028-A-1, Odair, Wash., to Carnegie-Illinois Steel Corp., Chicago.

135 tons, Bureau of Reclamation, inv. F 23,140-B, Boulder City, Nev., to Carnegie-Illinois Steel Corp., Chicago.

125 tons, additional buildings, Erie Proving Ground, O., to Hausman Steel Co., Toledo.

110 tons, reinforcing and miscellaneous construction steel, additions, Stanolind Oil & Gas Co., Tulsa, Okla., to Capitol Steel & Iron Co., Oklahoma City;

CONCRETE BARS COMPARED

	Tons
Week ended Dec. 20	14,754
Week ended Dec. 13	13,244
Week ended Dec. 6	2,562
This week, 1940	13,096
Weekly average, 1941	13,947
Weekly average, 1940	9,661
Weekly average, Nov., 1941	11,379
Total to date, 1940	501,182
Total to date, 1941	711,310

Includes awards of 100 tons or more.

Waller-Wells Construction Co., Tulsa, contractor.

100 tons, office building, Illinois Bell Telephone Co., Rock Island, Ill., to Bethlehem Steel Co., Bethlehem, Pa.

REINFORCING STEEL PENDING

5000 tons, Pacific air base contractors, Alameda, Calif.; for delivery to Hawaii.

3850 tons, Invitation D-38212-A, Odair, Wash.; bids to Bureau of Reclamation, Denver, Dec. 23.

900 tons, power house superstructure, penstocks and surge tanks, Fort Peck dam, Montana; Fegles Construction Co., Minneapolis, low on general contract; bids to United States Engineer, Kansas City, Dec. 12.

500 tons, Panama, sch. 5818; bids Dec. 23, Washington.

404 tons, Beach Thorofare bridge and approaches, route 25 (Absecon Boulevard), section 1, Atlantic City, N. J.; Ole Hansen, Ventnor City, N. J., low, bids Dec. 12. Preference rating A-3.

273 tons, two bridges, route 28, sections 25 and 26, North Branch, Somerset county, New Jersey; bids Dec. 29, state highway commissioner, Trenton.

200 tons, concrete silos, Great Lakes Carbon Corp., Chicago; MacDonald Engineering Co., Chicago, contractor; bids Dec. 2.

185 tons, highway mesh, route 28, sections 24A and 25A, Whitehouse relocation, Hunterdon county, New Jersey; Franklin Construction Co., Newark, low, $296,966.45, bids Dec. 12. Preference rating A-4.

175 tons, building 87, packing plant, Morrell & Co., Ottumwa, Iowa; Stark Building Co., Cedar Rapids, Iowa, general contractor.

136 tons, state bridge 2270, Lebanon, Ind., R. L. Schutt, Indianapolis, low on general contract; bids Dec. 16.

Unstated tonnage, tank parts plant, American Steel Foundries, East Chicago, Ind.; Albert Kahn, Detroit, engineer; bids Dec. 30.

Unstated, foundry and pattern shop and building additions, Keyport naval station, Washington state; bids to Com. R. E. Thomas, Puget Sound navy yard, Jan. 7.

Pig Iron

Pig Iron Prices, Page 86

Pig iron sellers find most foundry customers are in comfortable position, allocations working out well, with minimum of complaint from melters. In some cases requests for January shipments filed early this month asked for less iron than previously. This is accounted for in part by the fact that some had more iron at the end of November than they had expected, due to falling off in orders from some customers unable to get other needed materials to carry on their work.

With emergency requirements expected to be stepped up and with possibility of scrap movement being adversely affected by winter weather, applications for January are expected to be larger despite these exceptional cases. Meanwhile, some steelmakers in the East have difficulty in obtaining sufficient iron, one being badly in need of bessemer iron for acid operations.

Allocations are expected to be more closely geared to defense and war needs and foundries affected by curtailment of stove and domestic heating equipment production are taking on additional contracts for castings carrying war ratings. Few melters have stocks for more than a few days operations.

In the Buffalo district one of the six Bethlehem Steel Co. blast furnaces has been blown out for relining, breaking the continued 100 per cent production of several months. Another stack is scheduled to be relined as soon as the first is blown in.

Scrap

Scrap Prices, Page 88

Reports on scrap stocks, consumption and other statistics are slow and not all October blanks have been filed at the time November reports are due. Failure to receive November blanks is a cause of delay in that month's filing. Bureau of Mines suggests preparation of figures on the basis of the October blanks, in readiness for filling in November forms as soon as received.

The allocation system based on these reports probably will not be in condition to operate fully for some time. Among those requesting blanks last month were several fairly large interests not previously on the bureau list.

Further allocations have been made in emergency cases, to prevent shutdowns where stocks are near depletion. Three brokers in the St. Louis district have been directed to ship 12,500 tons as soon as possible to Granite City Steel Co. plants. The company had reached a point where supply was sufficient for only a week at present 90-per cent production. Sheffield Steel Corp. has been allocated about 6000 tons for its St. Louis plant, to be supplied by several outside dealers.

St. Louis dealers charge present ceiling prices discriminate against its melters. Iowa, formerly furnishing about 50 per cent of scrap for that district, now ships most to Chicago and Memphis, Tenn., has been made a basing point and

Tool Steel Scrap

Cents per pound, to consumers f.o.b. shipping point

Tungsten Types

For each 1% tungsten contained

Solid scrap containing over 12%	1.80c
Solid scrap containing 5 to 12%	1.60
Turnings, millings containing over 12%	1.40
Turnings, millings, solids under 5%	1.25

Molybdenum Types

Solid scrap, not less than 7% molybdenum, 0.50 vanadium	12.50
Turnings, millings, same basis	10.50
Solid scrap, not less than 3% molybdenum, 4% tungsten, 0.50 vanadium	13.50
Turnings, millings, same basis	11.50

most scrap originating there is shipped east.

Buffalo supply has been greatly reduced by close of lake navigation and by snow, which has practically stopped collections in adjacent territory. To maintain or enlarge steel production allocations seem imminent.

Chicago mills, following an order for shipment of 10,000 tons to Inland Steel Co., have asked further allocations to their furnaces as supplies continue to shrink. No further orders have been issued up to this time. At present receipts are less than consumption. A possible source of about 38,000 tons of scrap is seen in the request of the Chicago & North Western for permission to abandon and dismantle about 180 miles of track. Whether this can be done in time to be of assistance is a question.

Curtailment in automobile production in the Detroit area causes some concern to scrap consumers as supply from that source will be reduced. Manufacture of war material in automobile plants will provide some scrap to offset this but the change is slow and in ordnance manufacture the return is comparatively small. Recovery from automobile graveyards is light although it is estimated this source could yield 400,000 tons from Michigan alone.

Warehouse

Warehouse Prices, Page 87

Office of Price Administration has placed a price ceiling on all resales of steel and iron products normally handled by warehouses, dealers and distributors. The maximum price is to be that prevailing April 16, 1941, including extras and discounts then in effect. A schedule of prices at 23 distributing centers has been formulated. The order covers seconds, rejects and used products in addition to new material. It applies also to all merchants who distribute steel and iron products in the course of their general operations, such as plumbing supply houses, hardware jobbers and dealers, industrial supply firms, oil well suppliers and mail order houses. Sales of quantities smaller than warehouses usually handle are not included in the order. This applies to sales of less than standard package units by retailers.

The order resulted from various abuses which had grown up outside legitimate warehouses and regulation is welcomed by those suppliers who have been adhering to published quotations. Some small dealers and brokers have been selling at prices sometimes double established levels. Most warehouses have not advanced prices since April 16.

Warehouses are unable to meet inquiry, notably for plates, shapes and alloy bars. Volume of high-rated business is larger than replacements under the blanket quota. Though receipts from mills are increasing in some instances, broken sizes continue to hamper filling of orders.

Metallurgical Coke

Coke Prices, Page 85

Negotiations are proceeding between OPA and beehive coke producers looking to establishment of a ceiling price. At the moment it seems likely a price of $6, ovens, will be set, with exceptions to high-cost operations for a higher price. Numerous producers have notified OPA that a $6 ceiling will not allow a profit and this is being taken into consideration. Output of marginal ovens is necessary and their costs much be taken into consideration in setting a ceiling.

Pacific Coast

Seattle—Declaration of war has served to quiet labor unrest in defense industries and production is now at maximum. Expansion of facilities is being rushed. Isaacson Iron Works, Seattle, was awarded the contract to fabricate 1800 tons of shapes for the forging plant here to be erected by the navy and operated by Isaacson, the successful bidder offering the best delivery. Bethlehem Steel Co. is low for 500 tons or more involved in the Longview-Rainier section of Bonneville Project's transmission steel tower line. Puget Sound navy yard will receive bids Dec. 17 for furnishing traveling cranes estimated to cost $250,000. Seattle Steel Co. will furnish 250 tons of reinforcing bars for the Isaacson plant.

Cast iron pipe inquiries are numerous but delay in obtaining materials has diverted some business to other materials. American Cast Iron Pipe Co. has an award for 950 tons, mostly 16-inch, for a cantonment project at Fort Lewis, Wash., L. Coluccio, Seattle, contractor. Bids will be opened by Defense Public Works office, Seattle, Dec. 23 for 35 miles of 2 to 10-inch water pipe for the Lakewood and Tillicum districts near Tacoma, also hydrants, valves and cast iron fittings. Alternates will be received for transite.

Receipts of steel scrap are increasing, as regulations are working more smoothly. Tonnages that have been frozen for weeks have been released. With Oregon declared remote territory material is moving from that area more freely. Cast scrap continues scarce and consumers are exploring every possible source of supplies. Local rolling mills report ample stocks of steel scrap.

San Francisco—United States Pipe & Foundry Co. took 3000 tons cast iron pipe, 16 and 18-inch for defense public works at San Diego, Calif. Awards aggregated 3017 tons. The total this year is 53,187 tons, against 49 041 tons last year. Pending business exceeds 5500 tons.

Steel Tank & Pipe Co. of Oregon, Portland, Oreg., took 1484 tons of plates and 990 tons of shapes for 128 pots each for aluminum plants at Spokane, and Troutdale, Oreg. McCulloch & Son, Portland, took 742 tons of plates and 490 tons of shapes for 128 pots for the plant at Troutdale. Awards totaled 2676 tons. The total to date is 579.757 tons against 194,541 tons a year ago.

Shape lettings aggregated 3305 tons. To date this year lettings are 595,635 tons against 368,737 tons last year. Pacific Car & Foundry Co., Seattle, took 600 tons for trash-racks and stop logs for Bonneville dam. American Bridge Co. secured 520 tons for transmission towers Kelso to Longview, Wash., for the same project and Bethlehem Steel Co., San Francisco, 500 tons for towers for Longview to Rainier, Wash., for the same project. Reinforcing bar bookings total 2268 tons.

Canada

Toronto, Ont.—The Canadian government has placed new restrictions on production of civilian goods in which steel or metals are used. It is estimated that these restrictions will reduce Canada's civilian consumption of steel and nonferrous metals by about 75 per cent. While the government has placed these restrictions it is stated that previous to the new order manufacturers of civilian goods were unable to get delivery of steel. More drastic action in curtailment in civilian production is planned for the coming year.

The government also has announced an enlarged program of war spending, the new program to result in speeding up in all lines of war materials production. In the current fiscal year Canada will spend approximately $2,350,000.000 for war and it is estimated that this will be increased bv about 50 per cent in the next fiscal year. Mill representatives report increasing orders for iron and steel materials of all kinds, practically all of which are directly associated with war production. Mills have withdrawn from the market on steel plates and no new bookings are reported, other than those directlv approved by the steel controller. Plate mills now are at capacitv production, but are several months behind in deliveries, the additional tonnage being met by imports from the United States.

Sheet mills are not accepting new orders from civilian consumers but on the contrary some large buvers not engaged in war production have been asked to cancel orders already placed as there is no prospect of delivery.

Conditions generally are unchanged in merchant bars. Practically all output is going direct to war industry with no surplus available for civilian consumers. Inquiries are numerous and even the small buyer finds it impossible to place orders with guarantee of any reasonable delivery.

Structural steel lettings have dropped sharplv following restrictions of use of steel in construction, other than direct war work, and even the latter are using wood whenever steel can be eliminated. Fabricators are operating at capacity on record backlogs.

Production of merchant pig iron is being increased with the object of providing urgently needed foundry and malleable iron for war materials production. A sharp increase in output of malleable iron is reported. Larger tonnages of basic also are being made available for merchant melters, chiefly for electric furnaces, to replace scrap.

No improvement is reported in the iron and steel scrap situation. Demand continues to increase, while supplies are dwindling and fall far short of meeting requirements. Dealers state that offerings are about the average for the past month or six weeks, but see no indication of improvement. Deliveries from the rural districts have been shut off, due to heavy snow.

Steel in Europe

Foreign Steel Prices, Page 87

London — (*By Cable*) — Steel demand in Great Britain is expanding, with forward buying to meet increasing war requirements. Production is at faster rate. The raw material and semifinished stock position is satisfactory. Demand is intense for special steels, shipbuilding material, tank and boiler plates and colliery material. Tin plate demand is more active, with sheets and galvanized sheets irregular.

Ferroalloys

Ferroalloy Prices, Page 86

Rehabilitation of the Chester, Pa., blast furnace formerly owned by Delaware River Steel Co., has been started. It will be operated by Pittsburgh Ferromanganese Co., subsidiary of Pittsburgh Coke & Iron Co. It will be blown in on pig iron and later put on ferromanganese. Coke will be supplied by new ovens being built by Philadelphia Electric Co. Reconstruction Finance Corp. is financing construction and ownership will be in Defense Plant Corp. Reconstruction is expected to require about six months.

Semifinished Steel

Semifinished Prices, Page 85

Semifinished steel supply constitutes a choke point in the case of numerous mills, preventing capacity output of finishing departments. It is believed mills not fully engaged on war work may be asked to supply semifinished to others with heavy war committments. One mill in the Middle West, ordered to ship semifinished steel elsewhere, finds it must reduce its rolling schedules, on some equipment as much as 50 per cent. This is a radical cut in working time for mill crews.

Wire finishing departments for some time have been hampered by short supply of rods.

Zirconium Ore Rate Cut

To place Boston on parity with New York, Baltimore and Philadelphia, New England Freight Association has reduced freight charges on imported zirconium ore, Boston to Niagara Falls, Buffalo and Suspension Bridge, N. Y., to $3.53 per net ton from the current sixth class rate, minimum weight 56,000 pounds.

Tin Plate

Tin Plate Prices, Page 34

Office of Production Management and representatives of the tin can manufacturing industry have discussed further limitation on the use of tin plate for containers. As a result it is probable only enough can will be produced in 1942 to pack essential foods. Limitations are probable on sizes, holding output to standardized types. Essential foods are expected to require more cans than in 1941. This action will curtail use of cans for nonperishable and nonessential materials.

Nonferrous Metals

New York—The federal government took charge last week of all tin supplies in the United States

and all tin afloat in order to conserve existing supplies. This action was a direct result of Far Eastern developments which at least temporarily have halted all shipments from that important producing section. OPM now has complete control over all the major nonferrous metals.

Copper — Production in Latin America this year has exceeded estimates but the entire output has not been shipped due to shortage of shipping space. Available supplies here have increased 80 per cent over the average supplies for recent years and yet demand has not been met fully. Refined output in this country should increase around 8000 tons monthly during 1942 as a result of programs undertaken by the industry and government.

Lead—Government officials and representatives of the leading companies in the industry are attempting to find a way to increase production to full capacity. Consensus in the trade is that maximum output cannot be obtained until adjustments in present marketing arrangements are made so that marginal mining companies can reopen their properties.

Zinc—OPA continues to control zinc prices through the formal ceiling on scrap, secondary metal and rolled zinc products as well as the informal agreement on primary slab zinc and on zinc oxide. Supplies are somewhat freer with producers offering forward metal

Tin — Under General Preference Order M-43 all tin supplies are subject to allocation by OPM and the purpose for which tin is used shall be specified; no tin may be sold or delivered without specific permission of OPM; future imports may not be sold except to the Metals Reserve Co. or other governmental agency; and tin now afloat may not be sold except by special permission of OPM. Loading of tin in the Far East for shipment to the United States has halted pending organization of a convoy system.

OPM Steel Unit Reports Iron Ore Supply Ample

■ No shortage of iron ore is in prospect, according to OPM's Steel Division.

Requirements of lake ore this year have totaled about 76,000,000 gross tons, in contrast with 80,116,360 tons shipped. Stocks on hand at furnaces and lower lake docks May 1, 1942, are expected to be approximately 2,500,000 tons greater than the 16,937,173 tons reported May 1, 1941.

Blast furnaces will require about 84,600,000 tons of ore next year. This tonnage, however, will be matched by the expected ore movement on the lakes of more than 82,500,000 tons.

Ore needs in 1943, increased by added blast furnace facilities, will be 90,000,000 tons, it is reported. The fleet's carrying capacity will also have been increased, to 88,700,000 tons. Sixteen of 25 ore vessels under contract are to be in service by 1943, and the remaining nine the following year.

Pig iron production, which determines ore needs, will be about 55,800,000 net tons this year; 1942 estimate is 58,100,000 tons; and 60,200,000 tons in 1943.

Additional 36 blast furnaces, including six already under construction, are needed to fill future pig iron requirements, according to a survey by OPM's Steel Expansion Unit. Clearances are already reported obtained for about half the remaining 30.

Equipment

Boston—Machine tool production is steadily being expedited by increase in work schedules, utilization of added facilities brought in during the last few months and more subcontracting, the latter notably in the Providence, R. I., area. Subcontracting would be heavier were more small shops better equipped to handle precision work. Heat-treating is a bottleneck at most plants. Nevertheless several plants, although they have booked heavy orders in recent weeks, are increasing production of finished machines to a point where deliveries are maintained and actually improved on some types of equipment. Much of the machinery for expanded armament programs is now under contract, although large lists remain to be placed and another wave of tool buying is expected to follow actual hostilities within the next few weeks. Among the first contracts for ammunition components placed with textile mills is one to a Hopedale, Mass., shop at $131,000. Shops producing gages in New England have booked further orders, enlarging already heavy backlogs.

New York—Large orders for machine tools are being superimposed on already heavy backlogs, with inquiry developing in greater volume for supplemental requirements for enlarged armament programs. Machine lists for arsenals are numerous, involving scores of tools, notably for Watervliet, N. Y. Contracts for aircraft engine construction are being expedited, to be followed by additional inquiry. Although the machine tool industry has expanded facilities greatly in the last 18 months and many of the new units are now in production, additional production facilities are being prompted by the government.

Seattle—Electrical and automotive equipment continues in good demand but stocks are low and priorities control the situation. Allis-Chalmers Mfg. Co., Milwaukee, is low to Bonneville Project at $8600 for furnishing 69-kv. oil circuit breakers for the Yakima substation, same firm and Westinghouse offering identical bids, $4750, for test chargers. Same agency in Portland opened bids Dec. 12 for 112 tons of copper ca-

Nonferrous Metal Prices

	Copper										
Dec.	Electro. del. Conn.	Lake, del. Midwest	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
1-19	12.00	12.12½	11.75	52.00	52.00	5.85	5.70	8.25	15.00	14.00	35.00

P.o.b. mill base, cents per lb. except as specified. Copper brass products based on 12.00c Conn. copper

Sheets

Yellow brass (high)	19.48
Copper, hot rolled	20.87
Lead, cut to jobbers	9.10
Zinc, 100 lb. base	13.15

Tubes

High yellow brass	22.23
Seamless copper	21.37

Rods

High yellow brass	15.01
Copper, hot rolled	17.37

Anodes

Copper, untrimmed	18.12

Wire

Yellow brass (high)	19.73

OLD METALS

Dealers' Buying Prices

No. 1 Composition Red Brass

New York	10.12½-10.25
Cleveland	10.25-10.50
Chicago	10.25-10.50
St. Louis	10.50

Heavy Copper and Wire

New York, No. 1	10.00
Cleveland, No. 1	10.00
Chicago, No. 1	10.00
St. Louis	10.00

Composition Brass Turnings

New York	9.37½-9.75

Light Copper

New York	8.00
Cleveland	8.00
Chicago	8.00
St. Louis	8.00

Light Brass

Cleveland	6.00
Chicago	6.00-6.25
St. Louis	6.25

Lead

New York	5.25-5.50
Cleveland	5.00-5.25
Chicago	4.75-5.00
St. Louis	4.75-5.00

Old Zinc

New York	5.00-5.25
Cleveland	4.00-4.12½
St. Louis	4.50-5.00

Aluminum

Mis., cast	11.00
Borings, No. 12	9.50
Other than No. 12	10.00
Clips, pure	13.00

SECONDARY METALS

Brass ingot, 85-5-5-5, l. c. l.	13.25
Standard No. 12 aluminum	14.50

ble for Sunnyside and Dec. 16 for circuit breakers for four substations. Central Cable Corp., Jersey Shore, Pa., is low at $8050, for furnishing 25 tons of copper cable. Bids are called Dec. 26 for crossarm fixtures and hardware for Ampere, Spec. 2450, and Dec. 27 for 26 instrument transformers for same station, Spec. 2455. United States engineer, Portland, will receive tenders Dec. 26 for circuit breakers for Bonneville power house. Tacoma has called bids Jan. 5 for four 110-S kv. and four 66-S kv. disc switches.

Construction and Enterprise

Ohio

CANTON, O.—Timken Roller Bearing Co., 1835 Deuber avenue, has remodeled the plant on Savannah avenue which it acquired 15 years ago and will utilize it for production of 37 MM shot for anti-tank shells. Machinery is being installed to increase output to approximately 15,000 per day.

CLEVELAND—Harris Seybold Potter Co. is erecting a $65,000 addition to factory at 4510 East Seventy-first street.

CLEVELAND—Master Metals Inc., 2850 West Third street, is improving its office by a $6000 addition.

CLEVELAND—Steel Fabricators, 1215 Main avenue, will erect a welding shop at 1252 Spruce avenue, at cost of $30,000. Victor L. Parker is president.

CLEVELAND—Cleveland Worm & Gear Co., 3249 East Eightieth street, will enlarge its factory with $100,000 addition. Howard Dingle is president.

CLEVELAND—B & S Screw Products Co., 1515 Colt road, is preparing plans for construction of factory and office building on Collamer road.

CLEVELAND—Star Machine & Tool Co., 9320 Woodland avenue, Southeast, will erect two buildings, 22 x 80 feet and 45 x 60 feet. E. G. Hoefler is engineer.

CLEVELAND—Steel Improvement & Forge Co., 960 East Sixty-fourth street, has started work on $15,000 addition to forge shop at 6411 Metta avenue.

CLEVELAND—Pioneer Mold Co., G. F. Langewier, manager, 4020 Broadway, has awarded contract to R. J. Platten Co., West Twenty-fifth street and Scranton road, for one-story 40 x 100-foot steel factory. Cost about $40,000.

WARREN, O.—Taylor-Winfield Corp., 1052 Mahoning avenue, Northwest, John D. Gordon, general manager, has purchased the old Warren City Tank & Boiler Co. plant on Griswold avenue, Northeast, containing 126,000 square feet of floor space. The company will manufacture parts for diesel engines for the Navy, including engine bases formerly sub-contracted, and also will produce welding machines.

Connecticut

BRIDGEPORT, CONN.—United Illuminating Co., 1119 Broad street, plans power and steam plant extensions, including installation of high pressure boilers. Cost over $40,000. Westcott & Mapes Inc., 139 Orange street, New Haven, Conn., engineer.

New York

BROOKLYN, N. Y.—H. M. Sushan, engineer, 367 Fulton street, has let contract for one-story 76 x 95-foot machine shop for Cameron Machine Co., 61 Poplar street, to T. L. Rubsamen, 9050 Parsons boulevard, Jamaica. Cost $40,000. (Noted Dec. 1).

BYRON, N. Y.—Haxton Canning Co., W. Walls, assistant secretary, Oakfield, N. Y., is rebuilding three-story canning factory at cost of $40,000.

NIAGARA FALLS, N. Y.—Vanadium Corp. of America will build one-story 50 x 180-foot and 50 x 405-foot plant buildings. Contract has been awarded to Walter S. Johnson Building Co., 2532 Hyde Park boulevard. Estimated cost $125,000.

WATERVLIET, N. Y.—Allegheny Ludlum Steel Corp., will erect an addition to its plant here.

New Jersey

NEWARK, N. J.—Federated Metals Division, 150 St. Charles street, will build one-story electric precipitation plant, costing $50,000.

TRENTON, N. J.—DeLaval Steam Turbine Co. has awarded contract for four-story industrial building, costing $52,000, to John W. Ferguson Co., 152 Market street, Paterson, N. J. (Noted Nov. 10).

Pennsylvania

BEAVER, PA.—Superior Steel Products Co., Monaca, Pa., will erect a $75,000 plant here.

FRANKLIN, PA.—Chicago Pneumatic Tool Co., 191 Howard street, will take new bids on factory here, estimated to cost $225,000. Previous bids rejected.

Additional Construction and Enterprise leads may be found in the list of Shapes Pending on page 92 and Reinforcing Bars Pending on page 93 in this issue.

TOWANDA, PA.—Claverack Electric Co-operative, Clarence E. Jakway, manager, has awarded contract to Miller-Baxter Co., Indianapolis, at $186,652 for construction of 228 miles of rural transmission lines. Gibbs & Hill, Harrisburg, Pa., consulting engineers.

UNION CITY, PA.—Borough council will take bids Dec. 29 for disposal plant addition. Plans are available from Hill & Hill, 24½ Main street, North-East, Pa., engineers.

Michigan

ANN ARBOR, MICH.—American Pattern & Foundry Co. has been formed to manufacture patterns. Correspondent, Buhr Machine Tool Co., 839 Green street.

BESSEMER, MICH.—City, C. W. Waters, clerk, is preparing plans for issuance of $208,000 bonds to finance installation of a third generating unit at its power plant.

DETROIT—Austin Co., Detroit, has contract for construction of a $30,000 factory building in Ferndale, Mich., for Eclipse Counterbore Co., Detroit.

DETROIT—Lester Tool & Engineering Corp., 4091 Beaufait avenue, has been organized to deal in scientific tools. Representative, Russell Lester, Imperial hotel.

DETROIT—Screw Machine Tool Co., 810 Ford building, has been organized to manufacture automatic screw machine tools. Michael J. Schlitters, 15613 North Park avenue, East Detroit, representative.

ONTONAGON, MICH.—Druar & Milinowski, 1411 Pioneer building, St. Paul, consulting engineers, have submitted report to city council, Dorothy G. Aubrey, clerk, on construction of sewage disposal plant.

Illinois

CAMP POINT, ILL.—Adams Electrical Co-operative, Dean Searle, superintendent, has let contract to C. A. Hooper Co., Madison, Wis., at $157,604 for construction of 215 miles of transmission lines. George D. Simpson & Co., Ferguson building, Springfield, Ill., consulting engineer.

CHICAGO—Aetna Ball Bearing Co., 4600 Schubert avenue, has let contract for one-story factory addition to William J. Scown, 54 West Randolph street. Cost about $40,000.

MT. VERNON, ILL.—Tri-County Electric Co-operative, B. H. Tuttle, superintendent, has let contract to Contracting & Material Co., Evanston, Ill., at $204,724 for constructing 274 miles of transmission lines. Michael Drazen & Associates, 4903 Delmar boulevard, St. Louis, consulting engineer.

Indiana

FORT WAYNE, IND.—Bass Foundry & Machine Co., recently purchased by Thomas Simmons, Los Angeles, will soon begin expanding its facilities.

Delaware

EDGE MOOR, DEL.—Edge Moor Iron Works Inc. has let contract to John E. Healey & Sons, 707 Tatnall street, Wilmington, for erection of factory to cost about $100,000.

Maryland

BALTIMORE—Cross & Blackwell, 6801 Eastern avenue, has let contract to Consolidated Engineering Co., 20 East Franklin street, for three-story 40 x 100-foot factory addition. Cost estimated at $40,000. L. R. White Jr., 10 West Chase street, architect.

FAIRFIELD, MD.—Maryland Dry Dock Co. will take bids soon on one-story 30 x 40-foot power house. J. E. Greiner Co., 1201 St. Paul street, Baltimore, engineer.

Georgia

MACON, GA.—Reynolds Corp., care of Capt. A. C. Lindloff, 200 Southern building, Washington, will build addition to machine shop at fuse plant here.

District of Columbia

WASHINGTON — Bureau of Supplies and Accounts, Navy Department, will open bids Jan. 6, schedule 9576, steel forgings and shafts, delivery Brooklyn, N. Y., and Mare Island, Calif.; schedule 9654, six motor-driven universal shapers, delivery Puget Sound, Wash.; schedule 9742, two turbogenerators, spare parts, tools and wrenches, delivery Washington; schedule 9744, turbogenerators, spare parts, tools and wrenches, delivery Philadelphia and Washington; schedule 9689, diesel generators and spare parts, delivered Mobile, Ala., Washington and Annapolis, Md.; schedule 9758, four motor-driven automatic screw machines, delivery Newport, R. I.; schedule 9710, motor-driven centrifugal pumps, spare parts, tools and wrenches, delivery Washington; Jan. 9, schedule 9702, 565 testing generators, delivery Brooklyn, N. Y., and Mare Island, Calif.; schedule 9706, 38 gasoline engine driven tractors; schedule 9712, motor-driven centrifugal pumps, spare parts, tools and wrenches, delivery Washington; schedule 9608, five motor-driven metal shapers; schedule 9721, diesel generator sets, spare parts and tools, delivery Brooklyn, N. Y., Philadelphia, and Norfolk, Va.; schedule 9741, four motor-driven geared head precision lathes; schedule 9757, two marine diesel engines, delivery Washington; schedule 9733, three

motor-driven universal, tool and cutter grinders, delivery Mare Island, Calif.; Jan. 13, schedule 9711, motor-driven centrifugal pumps, delivery Washington; Jan. 16, schedule 9713, motor-driven centrifugal pumps, delivery Washington.

North Carolina

WILMINGTON, N. C.—City voted $525,000 bonds for expanding water system.

South Carolina

YORK, S. C.—York County Electric Co-operative has let contract to Little Electric Co., Union, S. C., at $127,554 for construction of 186 miles of rural transmission lines to serve 529 customers. J. B. McCrary Engineering Corp., Marietta Street building, Atlanta, Ga., consulting engineer.

Louisiana

LAKE CHARLES, LA. — Petroleum Chemicals Inc., New York, plans construction of a $5,000,000 chemical plant here.

LAKE CHARLES, LA.—Continental Oil Co., Lake Charles, will build $5,000,000 chemical plant here to manufacture toluene, and a refinery addition, including two additional towers costing $375,000.

Virginia

NARROWS, VA.—Appalachian Electric Power Co. plans to increase its present output at the Glen Lyn power plant from 80,000 kilowatts to 160,000.

Arkansas

BERRYVILLE, ARK.—Carroll Electric Co-operative, Paul F. Arnold, superintendent, has awarded contract to Killoren Electric Co., Appleton, Wis., at $177,577 for construction of 200 miles of rural transmission lines to serve 614 customers. Midwestern Engineering & Construction Co., Tulsa, Okla., consulting engineer.

Oklahoma

LOCUST GROVE, OKLA.—City, Bill Willis, mayor, has filed application with DPW for grant to construct sanitary sewage disposal plant at cost of $248,469. Rex Collins, McAlester, Okla., consulting engineer.

Wisconsin

BRILLION, WIS.—Brillion Iron Works is enlarging its machine shop operations.

MILWAUKEE—C. M. Tool & Die Co. will build an addition, 30 x 60 feet, to its factory on West Vienna avenue. Slaby & Keymar, architects.

MILWAUKEE—Ampco Metal Co. will build an addition to its machine shop at West Burnham and South Thirty-eighth streets, 133 x 143 feet, to cost $18,000.

IRON RIVER, WIS.—Bayfield Electric Co-operative, Arvid Wentela, superintendent, has awarded contract to Hallett Construction Co., Crosby, Minn., at $161,995 for construction of 246 miles of rural transmission lines. Wisconsin Development Authority, Tenney building, Madison, Wis., consulting engineer.

Minnesota

BENSON, MINN.—Western Minnesota Co-operative is selecting engineers for construction of three power plants and connecting lines to cost $1,500,000, for which REA has allotted funds.

MOUND, MINN.—Village, L. V. Alvin, clerk, will hold a $50,000 bond issue election in January to finance construction of sewage disposal plant. Druar & Milinowski, 1411 Pioneer building, St. Paul, consulting engineers.

Texas

ATHENS, TEX.—New Era Electric Co-operative has let contract to Reinhart & Conovan Co., Oklahoma City, Okla., at $191,427 for constructing 310 miles of transmission lines. Beavers & Lodal, Smith Young tower, San Antonio, Tex., consulting engineers.

Iowa

KNOXVILLE, IOWA—Veterans Bureau, Washington, has approved project here for erection of water softening plant.

WAVERLY, IOWA—City, Ramon Clark, clerk, plans addition of a 1000-horsepower generating unit to its light plant, and general circulator, voltage regulator and circuits for new units. Estimated cost $90,000.

California

CULVER CITY, CALIF.—Linders Tool & Mfg. Co. is the firm name under which John F. Linder, A. F. Bostwick and Orval Thompson have obtained certificate to conduct business at 8635 Washington boulevard, Culver City.

LOS ANGELES—Hellyer Steel Parts Co., 109 East Thirty-first street, has been granted certificate to conduct business.

LOS ANGELES—Kunkel Metal Products Inc. has been organized with capital of $25,000 by Robert S. Smith, R. H. Hamilton and A. F. Wilson. Charles B. Stewart Jr., Los Angeles Stock Exchange building, is representative.

LOS ANGELES—Allied Defense Industries Inc. has been incorporated with capital of $25,000. Directors are: J. C. Argue, LaCanada, Calif.; M. A. Shewfelt and E. H. Feldman, Los Angeles. The new corporation is represented by Faries & McDowell, Subway Terminal building, Los Angeles.

OAKLAND, CALIF.—Oliver United Filters, 2900 Glascock street, plans plant addition costing about $40,000.

OAKLAND, CALIF.—J. W. Ferguson, 41 Rosemount street, San Leandro, Calif., has awarded contract for erection of machine shop here costing $40,000, including equipment.

POMONA, CALIF.—H. W. Load Machine Works is erecting an addition to its factory at 969 East Second street, 53 x 122 feet.

SAN FRANCISCO—Pacific Foundry Co., 3100 Nineteenth street, plans foundry expansion and storage units. Estimated cost $40,000.

WILMINGTON, CALIF.—Singer Steel Products Co., 1715 East Anaheim boulevard, has been organized by Phil C. Singer and Louis Singer.

Oregon

EUGENE, OREG.—Lane County Electric Co-operative, Ronald Buford, superintendent, has awarded contract to Max J. Kuney Co., Spokane, Wash., at $436,482 for construction of 375 miles of rural transmission lines to serve 1475 customers. John W. Cunningham & Associates, Spalding building, Portland, Oreg., consulting engineers.

Washington

ODESSA, WASH.—Odessa Trading Co. is erecting a tractor building, including repair and machine shop.

SEATTLE—Puget Sound Power & Light Co. will build a substation at 4400 Thirty-sixth avenue West.

SEATTLE—Defense Minerals has been incorporated with $50,000 capital by C. A. Tout and associates, 900 Insurance building, to operate oil drilling equipment, pipe lines, refinery, etc.

SPOKANE, WASH.—Universal Development Co. has been organized with capital of $99,000 by H. E. Majer and associates, 1208 Old National Bank building, to manufacture and market mechanical inventions and other machinery.

Canada

PORT MOODY, B. C.—Thurston Flavelle Ltd. will build plant addition here to cost about $60,000 with equipment. Work will include building additions, installation of equipment in lath mill; addition to boiler house; installation of 10-foot band saw.

SHUSWAP FALLS, B. C.—West Canadian Hydro Corp., 744 Hastings street West, Vancouver, B. C., has started work on new power development project to cost $650,000, including 60,000-volt high tension line to Vernon, B. C., to cost $300,000. Contract has been let to Hume & Rumble, 314 Water street, Vancouver.

VANCOUVER, B. C.—Dominion Rust proofing Co. Ltd., 856 Beatty street, will build plant addition and install new equipment to cost about $50,000, and has given general contract to Armstrong & Montieth Construction Co., 1883 Hornby street.

BRANTFORD, ONT.—Brantford Coach & Body Co. Ltd., 175 Pearl street, will erect plant on Mohawk street, to cost $100,000 and has given general contract to Schultz Construction Co. Ltd., 45 Albion street.

ELMIRA, ONT.—Naugatuck Chemicals Ltd. will build plant here to cost $25,000, without equipment, for which plans are being prepared by J. C. Klaehn, 49 King street East, Kitchener, Ont.

GALT, ONT.—Shurley-Dietrich-Atkins Co. Ltd., Globe street, maker of saws, machine knives, etc., has started erection of one-story, 118 x 220-foot plant addition, and has given general contract to G. H. Thomas & Son Ltd., 17 Globe street. Cost about $75,000 with equipment.

OTTAWA, ONT.—J. R. Booth Ltd., Booth street, will build paper mill addition to cost about $50,000, equipment extra, and has given general contract to Foundation Co. of Canada Ltd., 1538 Sherbrooke street West, Montreal, Que.

ST. THOMAS, ONT. — St. Thomas Bronze Co. Ltd., First avenue and Wellington street, maker of brass and bronze castings, will build plant addition to cost about $50,000, and has let general contract to Green Lumber Co., 3 White street.

TORONTO, ONT.—Mine Safety Appliance Co. of Canada Ltd., 637 Craig street, Montreal, Que., has started preliminary work on plant addition at 130 Kendal avenue here to cost $25,000, equipment extra, and has given general contract to Teagle & Son, 4 New street, Toronto.

WESTMOUNT, N. S.—Department of Munitions and Supply, Ottawa, Ont., has given general contract to Dominion Construction Co., Westmount, at $1,600,000, for construction of shipyards here, consisting of 22 buildings.

LAC A LA TORTUE, QUE.—Department of Munitions and Supply, Ottawa, C. D. Howe, Minister, is considering plans for construction of a munitions plant in this area to cost about $1,500,000.

LACHINE, QUE.—Harrington Tool & Die Co. Ltd., 201 First avenue, has had plans prepared by Brian R. Perry, 680 Sherbrooke street West, Montreal, and will call bids soon for construction of two-story plant addition to cost about $75,000 with equipment.

MONTREAL, QUE.—Engine Works & Trading Inc., 318 Ann street, will build plant addition to cost about $25,000 and has given general contract to Sutherland Construction Co. Ltd., 1440 St. Catharine street West.

MONTREAL, QUE.—Eagle Smelting & Refining Works Ltd., 400 Richmond street, has plans by Eliasoph & Greenspoon, 1403 Bleury street, and will call bids for construction of plant addition at Yonge and Wellington streets, to cost about $40,000 with equipment.

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35 KW Westinghouse, M.G. Set 125 volt D.C. generator, driven by 54 H.P. 220/440 volt, 3 phase, 60 cycle, 1200 RPM CS motor.
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230 volt DC 1800/2500 RPM with control panel.
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Hammers, 2-B & 3-B Nazel, M.D
Lathe, Roll 42"x20' United, M.D.
Press, No. 59-1/4 Toledo, 12" Stroke
Press, Forging 150 ton United Steam Hyd.
Pipe Machs. 2-4-6-8-12" Williams, M.D.
Shears, Gull. 2" sq. & 4" sq. B.D.
2 Testing Mach. 400,000 Lb. Riehle B.D.

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LATHES, 48"x22½' & 48"x26½' Johnson.
PLANERS, 30"x30"x8', 36"x36"x10' & 30"x36"x11'
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SHEARS, Plate, 96"x1" Mesta, 72"x1¼" United, 54"x3/16" Hyde Park, 36"x1/8" United.

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1—Steel Building, center bay 40′ wide, 23′ under truss with crane runway; one—bay 39′0″, one bay 29′6″, all 160′ long; also one building attached—two bays each 39′6″ by 100′, 15′ under truss.

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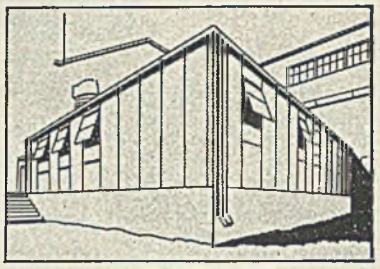
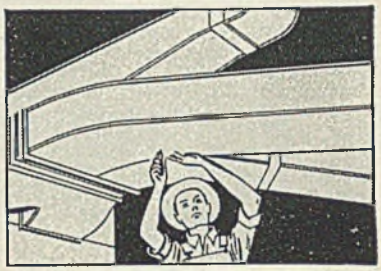
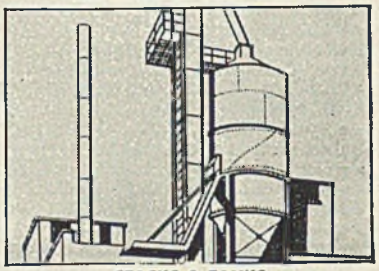


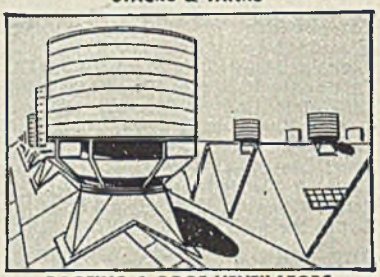
PLANT EXTENSIONS



ALL KINDS OF DUCT WORK



STACKS & TANKS



ROOFING & ROOF VENTILATORS

U·S·S COPPER STEEL SHEETS will save time and money for you in three *separate ways:*

They're easy to work with. You get true bends, tight seams and neat joints. They have 2 to 3 times the corrosion resistance of plain steel.

And the cost of U·S·S Copper Steel Sheets is so low that it makes little difference in the completed product or installation. Experienced builders and metal men have selected U·S·S Copper Steel Sheets, time and time again for all types of factory and plant expansion work—they're being used for roofing and sidings, smoke stacks, housings, heating and air conditioning ducts, ventilators, utility buildings of all kinds and various other equipment exposed to atmospheric and gaseous corrosion.

The small graph at the right shows the result of the A.S.T.M. tests over a period of 21 years—proving that Copper Steel lasts more than twice as long as other comparable materials.

Further information on U·S·S Copper Steel Sheets is available from any of the companies listed below.

This chart compiled from inspection reports of the Committee on Corrosion of Iron and Steel, A.S.T.M. Proceedings 1937, shows results of tests carried on at Annapolis, Md. from 1916 to 1936. After 21 years' exposure, 91% of COPPER STEEL sheets remained "sound" (unperforated). Other materials were decidedly inferior.

U·S·S COPPER STEEL SHEETS

CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
COLUMBIA STEEL COMPANY, *San Francisco*
TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham*

Scully Steel Products Company, Chicago, *Warehouse Distributors* · United States Steel Export Company, New York

UNITED STATES STEEL