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STEEL

ESTABLISHED 1882

Contents

Volume 110—No. 7 February 16, 1942

PRODUCTION • PROCESSING • DISTRIBUTION • USE

HIGHLIGHTING THIS ISSUE OF STEEL

■ THERE still is a certain degree of smugness in the attitude of industry toward war production, declares Donald M. Nelson who warns (p. 35) that industry is on trial; three more companies have been closed down because of violating priority orders. . . . Wilfred Sykes (p. 31) sees 98,000,000 ingot tons as the maximum steel capacity in sight based on practical considerations; R. E. McConnell says that the shortage of engineers is "the greatest shortage of all". . . . Tin plate makers feverishly are searching for substitute coatings (p. 33) in order to conserve tin supplies. . . . Canada is to have the same priority treatment as United States industry (p. 45).

♦ ♦ ♦

Fighting inflation threats, Leon Henderson warns (p. 30) the War Labor Board against awarding substantial and blanket wage increases; that body has given some indications (p. 29) it may be of similar mind; STEEL's editors find the demanded increase in steel wages would, if granted, come principally out of the taxes now collected by Uncle Sam; general changes in steel prices are not expected in second quarter but a meeting is to be held shortly to consider long-range policy on steel prices; minimum wage is in sight for the structural steel fabricating industry. . . . Small boron additions (p. 117) increase hardenability of steel.

Uncle Sam Will Pay

♦ ♦ ♦

Limitation on production of cooking appliances has been amended (p. 42); price order on flashlights, batteries and bulbs has been revoked; prices on domestic refrigerators and fuel oil storage tanks have been frozen. . . . Tin can production, number of sizes, are to be drastically cut (p. 43); additional electrotinning lines have been ordered. . . . OPA revises further the scrap price schedule (p. 119); WPB asks blast furnace operators so to schedule relining during 1942 as to prevent too large a number of furnaces from being idle at one time. . . . WPB (p. 40) appoints a steel casting industry advisory committee. . . . Vanadium output will be nearly doubled (p. 135). . . . American Rolling Mill Co. (p. 35) orders a dry blast unit. . . . Rules now cover over-quota production of nonferrous metals (p. 44); three new plants will prepare used tin cans for precipitation of copper. . . . Certain limitations in "P" orders have been removed (p. 39); corundum is under allocations; copper and copper alloy scrap dealers now must report to Bureau of Mines instead of WPB Copper Branch.

Refrigerator Price Frozen

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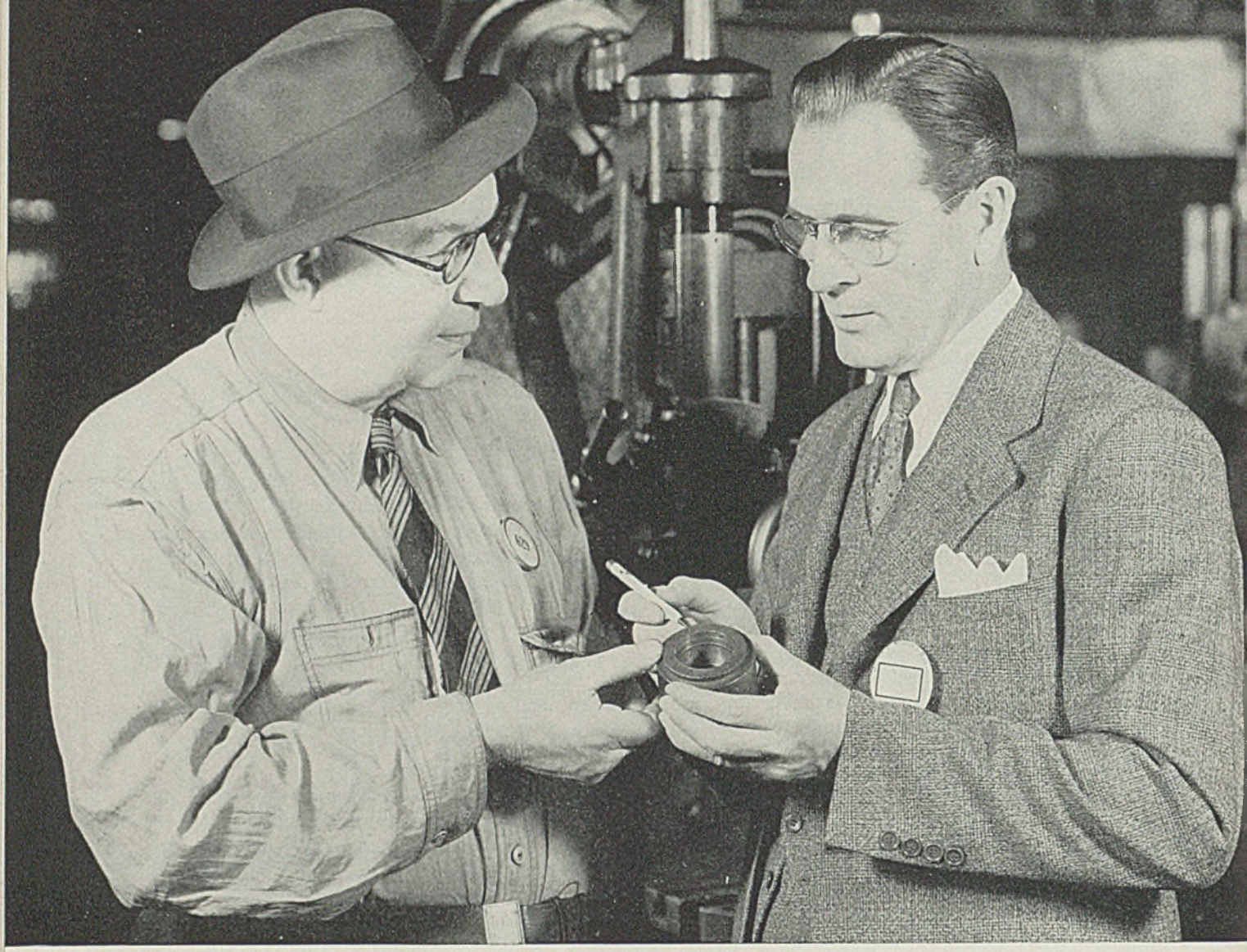
Professor Macconochie discusses crystal structure and the effect of hot and cold work (p. 66) in the second section of STEEL's series on forgings, forging practice and forging equipment. . . . A well-known steelmaker is now charging (p. 77) such low grade material as tin and terneplate scrap in an endeavor to utilize all available supplies. . . . Some unusually effective handling equipment (p. 85) is incorporated in production furnaces for heating and heat treating work in a prominent spring plant. . . . Oxyacetylene machine cutting speeds now can be increased 20 to 30 per cent simply by replacing torch tips with a new design which eliminates turbulence.

Effects of Working Steel

♦ ♦ ♦

Steel specification numbers of the American Iron and Steel Institute and the Society of Automotive Engineers Inc. have been revised so same chemical analyses bear same numbers in both systems, eliminating the cause of some confusion that has existed. Data on more than 90 per cent of all steel being shipped is given (p. 64). . . . E. W. P. Smith concludes (p. 72) his presentation on when, where and how to weave the welding electrode in Section 12 of his series. . . . J. D. Campbell and J. R. Taylor tell (p. 78) how a tandem mill is rolling strip at 3900 feet per minute. . . . A direct-fired catenary furnace (p. 96) cuts fuel costs 20 per cent, eliminates muffle maintenance.

New AISI-SAE Steel Numbers



"Swing Over" Production is Made Easier with the Help of Inland Metallurgists

In these critical days one manufacturer after another must learn, often from scratch, how to make radically new products, how to operate new equipment, how to adapt old machines to new uses, and how to control new processes. They are in the throes of a "swing over" from peacetime manufacturing to wartime production.

Inland metallargists are familiar figures in many of these plants, where for years they have been applying their expert knowledge of putting steel to work for others.

Today, Inland metallurgists are continuing that valuable work. Their technical and practical experience in the selection of steel, in latest fabrication methods, and in speeding up output are helping manufacturers produce for victory.

If you have a problem in the use of steel, call for an Inland metallurgist.

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38 S. Dearborn Street, Chicago • Sales Offices: Milwaukee, Detroit, St. Paul, St. Louis, Kansas City, Cincinnati, New York

Uncle Sam To Be Largest Loser If Labor Unions Win Big Wage Increases

✦

Tax revenues will be reduced if costs are advanced . . . Levies on steel industry now 50 per cent greater than net income . . . War Labor Board holds workers cannot expect to escape war sacrifices

✦

IF NEW wage increases are forced upon steel and other metal-working industries, it appears Uncle Sam will foot a major portion of the bill. It will be deducted from the tax revenues with which he is seeking to finance the $140 billion war program.

Effect of the present federal income and excess profits levies is to drain away profits above a certain moderate level. They permit most efficiently operated steel companies —at peak production—to show a net income in the neighborhood of 6 to 7 per cent on investment. To raise above this level becomes progressively difficult even though income before taxes is substantially increased. On the other hand a decrease in income before taxes results in an disproportionate decrease in taxes paid.

For example, seven leading producers representing nearly 75 per cent of total ingot capacity, in 1941 reported net profits totaling $231,223,344. They provided for federal income and excess profits taxes totaling $316,077,165.

In 1940, the same producers had aggregate net income of $217,481,916. Federal tax provisions totaled only $76,633,851.

From 1940 to 1941 net income advanced only slightly; federal taxes were more than four times as great.

Income before federal taxes advanced from $294,115,767 to $547,300,509. The bulk of the increase was drained into the federal treasury. These computations consider only federal income and excess profits taxes; exclude state, local and social security levies.

The straight $1 a day increase

William Green, left, president, American Federation of Labor, shakes hands with Philip Murray, president, Congress of Industrial Organizations, after the first conference of the "combined labor war board" with President Roosevelt. Board was formed at the President's request to make labor's war contribution "most effective", and, incidentally, to sidetrack John L. Lewis' recent AFL-CIO merger proposal, widely interpreted as an attempt by Mr. Lewis to regain power in organized labor. Anna Rosenberg, associate member of the War Labor Board, smiles encouragement to the apparent reconciliation of the rival union heads

which has been asked of some steel producers by the Steel Workers Organizing Committee would raise the industry's annual wage bill by approximately $225,000,000, assuming employment and operations continue at 1941 levels.

With prices of steel products frozen and no immediate likelihood of revision, there is little possibility steel producers can increase income before taxes this year. Rather it is likely the need for greater repairs, due to continuous operations, greater difficulty in assembling raw materials, and other factors will tend to lower the level.

An increase of $225,000,000 in labor costs then would be deducted from federal taxes and net profit. Obviously the loss in tax revenue to the government would be heavy.

Nor would the government recover much of the loss from personal income taxes on the steelworkers. Average steel wage earner's income in 1941 was slightly above $2000. Personal and dependency exemptions make this level income a negligible source for tax revenue.

WLB To Hear SWOC Demands Against "Little Steel" Feb. 24

Demands by SWOC for a closed shop and $1 a day wage increase from Bethlehem Steel Co., Republic Steel Corp., Youngstown Sheet & Tube Co. and Inland Steel Co. will be placed before a fact-finding panel of the War Labor Board on Feb. 24. Panel will include Arthur Meyer, New York Mediation Board; Cyrus Ching, United States Rubber Co.; and R. T. Frankensteen, United Automobile Workers-CIO.

OPA Chief Warns Against Blanket Wage Increases

Leon Henderson, federal price administrator, last week cautioned the War Labor Board against awarding substantial and blanket wage increases in cases coming before it for determination.

Henderson, who opposed a ceiling over wages in the emergency price control bill, appeared before a full session of the board to oppose general wage increases which would add to the inflation peril. He did not ask the board to refuse all requests of raises, but took a strong stand against such demands as the SWOC-CIO has posed to the steel industry for a straight $1 a day advance.

CIO President Philip Murray and George Meany, AFL secretary-treasurer, attacked Henderson's stand during a conference with President Rooseveit.

The War Labor Board, in a rather indecisive and not unanimous statement, last week ruled labor should not expect wages to keep up with all changes in the increase in living costs. In this connection it was pointed out by public board members that all Americans must sacrifice some lowering in living standards during the war.

OPA Plans No Steel Price Changes in Second Quarter

OPA does not now foresee general changes in the prices of steel mill products affecting deliveries during the second quarter of 1942, it was announced last week. This announcement was made in response to inquiries from the Navy Department resulting from its desire to obtain firm commitments on direct purchases of steel.

Consideration of longer run policy with reference to pricing of steel products will be discussed fully with a meeting of industry representatives to be called by the OPA in the immediate future.

Harvester Company, Unions Agree on No-Strike Clause

International Harvester Co., Chicago, and representatives of AFL and CIO unions have reached tentative agreement on a no-strike clause in contract negotiations affecting 26,000 workers in eight plants. Announcement of the agreement was made Feb. 6 at the conclusion of nine days of hearings before representatives of the National War Labor Board.

Other points at issue, involving the union shop, wage increases and minimum rates of pay, and overtime rates, will be laid before WLB in Washington. A week's paid vacation after a year's employment and two week's after five years also was tentatively agreed upon.

According to the Office of Emergency Management, the unions are asking a minimum wage of 85 cents per hour for men and 75 cents for women, and a 12½-cent per hour general increase, retroactive to last Sept. 16.

Hearing Scheduled on Structural Steel Fabricating Wage Levels

Hearings will start Feb. 26 before the Public Contracts Board in room 3229, Department of Labor building, to take testimony and evidence on the prevailing minimum wages in the structural steel fabricating industry.

Wage data collected by a committee representing the industry will be presented at the hearing. Other data will be offered by the International Association of Bridge, Structural and Ornamental Iron Workers.

Portable Cableway Transports Armored Cars

■ Armored reconnaissance car is transported across a small lake at Fort Bragg, N. C., on a new device known as the Lord portable cableway. It consists of a cable, with slings, suspended between two towers and is capable of carrying loads up to 8 tons any distance up to 600 feet. Entire cableway may be transported on a single truck. NEA photo

Mining, Metallurgical Engineers Canvass America's Resources

Inland Steel president predicts country's steel production will approach 100,000,000 tons by 1944 . . . Few dangerous shortages in materials noted

NEW YORK

■ THAT mining and metallurgical engineers are moving swiftly in the war effort was indicated at the 156th general meeting of the American Institute of Mining and Metallurgical Engineers, here, Feb. 9-12.

The meeting was the occasion for a review of ore resources, methods and men. In most instances it was stated the supply of materials and trained men were not as large as desired, but in few there are shortages which cannot be remedied within reasonable time.

Many technical sessions of primary interest to the steel and metalworking industries were held. The Iron and Steel Division held symposiums on carbon and alloy steel, nucleation and diffusion, cohesive strength and creep and steelmaking. The Institute of Metals Division held sessions on physical metallurgy, effect of rolling copper and brass, structure and properties of copper and brass, and diffusion.

Dr. John Johnston, director of research, United States Steel Corp., New York, delivered the Howe Memorial lecture on the subject "Time As a Factor in the Making and Treating of Steel." W. R. Webster, chairman, Bridgeport Brass Co., Bridgeport, Conn., presented the twenty-first annual Institute of Metals lecture, entitled "Notes on the History, Manufacture and Properties of Wrought Brass."

Outlook in Steel

Discussing the outlook in steel, Wilfred Sykes, president, Inland Steel Co., Chicago, expressed the belief that the industry will reach an annual production rate of 98,000,000 net tons of ingots, possibly 100,000,000 by 1944—and that that will probably be the maximum in this war.

Should the industry try to get beyond that figure, which he regarded as a reasonable limit, it would run into many difficulties. He doubted if the war will last long enough to permit the industry to do all of the things that might be necessary to expand production much beyond 98,000,000 tons. New ore bodies would have to be opened, new shipping facilities developed, new expansions made in various other directions.

He estimated production this year will be close to that of last year—which was 83,000,000—and in 1943 about 93,000,000. By that time new blast furnaces now under way will be operating.

He saw some temporary improvement in the scrap situation, but he thought the industry will have to rely mainly for its added requirements on iron ore, and, in turn, the blast furnaces.

The speaker pointed out that during the past decade 25,000,000 tons of scrap were shipped abroad, most of it to Japan, but that "nothing, of course, can be done about that now."

Dr. Andrew Leith, technical consultant, WPB, Washington, said there is no present shortage of manganese or chrome ore. Today this country has more chromium than a year and a half ago and far more manganese than at that time. It is the possibility of a potential shortage that the country has to concern itself with, and that shortage may never come. He was confident, with the plans now operating, this country will never lose the war because of an inadequate supply of chrome and manganese. "There should be no loose talk about shortages in these materials," he said.

The steel industry, he pointed out, started conserving manganese from the beginning of the emergency and is now saving a pound of ferromanganese for every ton of steel made. It has gone some way in cutting specifications, he said, but can only go so far. However, there is enough manganese in this country to last for a long time, and he pointed out there has been no mandatory action by Washington to curtail use of manganese.

On the other hand, such action has been necessary in the case of chrome. Today, he said, there is none available except for the A-1 priorities, and additional restrictions may be necessary before the emergency is over.

Relative to manganese, he saw developments in sight which might make the country self-sufficient, but warned his listeners that it takes much equipment to develop properties adequately. He also said that plans call for beneficiation plants on every property sufficiently rich in ore to support them.

Dr. Zay Jeffries, of the advisory committee on metals and materials, National Academy of Science, spoke of a general philosophy of conservation, which started first with the conservation of supplies already on hand and of products already produced—whether the product be a shovel or a machine tool. He emphasized the importance of conserving human beings, by utilizing each according to training and ability best suited to the war effort. In normal times the individual works to live; today he must live to work—"and work like a mule, if necessary"—in a position where he is most effective.

Discussion of Prices

Paradoxically conservation calls for great quantities of metals, and metals of high quality, he said. Such expenditures are necessary to shorten the war, and thus save life and materials.

Donald H. Wallace, assistant director, OPA, Washington, discussing prices as a factor in metal supply, said he regarded prices in wartime as a "conditioning" or "facilitating element," which should be high enough to permit efficient production but no higher.

Speaking specifically of steel, he said he could not foresee any general price increase in the second quarter. Later, in answer to a question, he declared it was the best judgment of OPA that higher prices for scrap would not greatly stimulate collection. He said that last fall they experimented with an increase on the Pacific Coast and this proved disappointing. Likewise, somewhat disappointing, he asserted, was the response to the more recent advance in No. 2 scrap and bundles.

R. E. McConnell, engineering consultant, WPB, and chairman, Engineers Defense Board, declared that "the greatest shortage of all" is the shortage of engineers. During the first World war, seven men were required to support each man at the front; today, he said, 17 men are required. He estimated that

there is a shortage of 1,000,000 engineers and technically trained men, and urged that the present force be used as effectively as possible. He outlined the activities of the Engineers Defense Board, which he said is comprised of representatives of six technical societies.

At another session, Edward H. Burdick, consulting engineer and geologist, Salt Lake City, said he believed that by adding $5 to the present market price of about $25 per short ton unit, sufficient tungsten could be developed in this country to meet war requirements.

He pointed out that in 1937 the United States produced 3500 tons of tungsten and consumed about 9027 tons. That year the world's production total was 41,814 tons. In 1938 and 1939, the United States produced 3044 and 3603 tons, respectively. In 1940 the world's production was nearly 50,000 tons, of which the United States produced about a tenth, although its requirements had been stepped up enormously.

He stated world production increased seven-fold from 1932 to 1940, a period coinciding with the Nazi rule to Germany, whereas the output of the United States increased but slightly. He presented figures showing that in 1937 China produced 20 per cent of the world's tungsten; Burma 14 per cent; United States 8½ per cent; North America 8½ per cent; South America (Bolivia and Argentine) 8 per cent; and Europe 6 per cent.

In 1940 the United States produced 5120 tons, against a consumption of 20,000 tons. He emphasized that there was an adequate supply of tungsten bearing ore in the United States although much of it was of too low a grade to be mined economically.

New Officers and Directors

Eugene E. McAuliffe, Omaha, was introduced as the new president at the annual banquet of the institute in the Waldorf Astoria, Wednesday, Feb. 11. Mr. McAuliffe is president of Union Pacific Coal Co., the Washington Union Coal Co. and the Southern Wyoming Utilities Co. He succeeds John Roberts Suman as head of the institute. Chester A. Fulton, president, Southern Phosphate Corp., Baltimore, and L. E. Young, vice president, Pittsburgh Coal Co., Pittsburgh, are new vice presidents.

New directors are: Charles Camsell, deputy minister of mines, Dominion of Canada; C. A. Garner, vice president, Jeddo-Highland & Noble Brook Coal Co., Jeddo, Pa.; William B. Heroy, vice president and chief geologist, Pilgrim Exploration Co., Houston, Tex.; Wilbert Judson, vice president, Texas Gulf Sulphur Co., New York; Leo F. Reinartz, works manager, American Rolling Mill Co., Middletown, O.; and Francis H. Thomson, president, Montana School of Mines and director, Montana Bureau of Mines and Geology, Butte, Mont.

Eugene E. McAuliffe
Coal and utilities executive, Omaha, Nebr., elected president, American Institute of Mining and Metallurgical Engineers

Earle C. Smith
Chief metallurgist, Republic Steel Corp., Cleveland, elected chairman, Iron and Steel Division

Carl E. Swartz
Metallurgist, Cleveland Graphite Bronze Co., new chairman, Institute of Metals Division

Earle C. Smith, chief metallurgist, Republic Steel Corp., is newly elected chairman of the Iron and Steel Division, and Carl E. Swartz, metallurgist, Graphite Bronze Co., Cleveland, new chairman of the Institute of Metals Division.

Medal Awards

At the annual institute banquet, Arthur S. Dwight, president, Dwight & Lloyd Co., 19 Rector street, New York, was presented the James Douglas gold medal "for his contribution to the art of smelting nonferrous ores, and pioneer work in developing equipment and technique for sintering such ores and metallurgical products."

Dr. Harold K. Work, manager of research, Jones & Laughlin Steel Corp., Pittsburgh, was presented the Robert W. Hunt award for 1942, for his paper on "Photo-Cell Control for Bessemer Steel Making;" and Louis F. Sattele, superintendent of pipe mills, National Tube Co., Pittsburgh, the J. E. Johnson Jr. award for 1942 for his work in applying fundamental slag data to practical blast furnace operation, resulting in the economical use of low-alumina ores and in the production of low silicon iron.

At the Institute of Metals Division dinner, Roosevelt hotel, Thursday evening, Feb. 12, Frederick N. Rhines, assistant professor of metallurgy, Carnegie Institute of Technology, Pittsburgh, received the eighth annual award of that division for his paper entitled "A Metallographic Study of Internal Oxidation in Alpha Solid Solutions of Copper."

In his Howe memorial lecture, Dr. Johnston discussed the influence of time on long sequence of processes and operations, from raw materials to the finished product. He pointed to significant factors in modern steelmaking, such as new devices for measurement of temperatures which have contributed much toward making better steel by the bessemer process, a much quicker process than the open-hearth process, and of great advantage now that time is important in war preparations.

He remarked that bessemer has been regarded as inferior to open-hearth steel, but thought this was due mainly, if not entirely, to a belief that bessemer has been less uniform from batch to batch. This lack of uniformity, in his opinion, has been due in large measure to an over-emphasis on finishing each batch in the shortest possible time, with the consequent impracticability of stopping each blow at precisely the proper endpoint.

To obtain a reproducible indica-

(*Please turn to Page* 117)

Pittsburgh Steel Engineers Discuss Growing Problem of Tin Plate

PITTSBURGH

■ CONDITIONS in the tin plate industry are serious due to lack of tin. Because of Japanese control of the tin areas, tin plate manufacturers will have to look for new sources for coating material. These substitutes will not carry the whole burden.

These facts were presented at the Pittsburgh sectional meeting of the Iron and Steel Engineers, William Penn hotel, Feb. 11, by C. E. Brown, metallurgist, Jones & Laughlin Steel Corp., Pittsburgh. The problem, he stated, centers around the conservation of tin and lead. He expressed the opinion that terne plate is not adequate for packing food stuffs. Electrogalvanizing might be suitable for some purposes, but zinc is scarce and there is some question concerning the soldering. While investigation has been conducted on the use of silver as a coating the process has been found too expensive. Corronizing appears to have some merit for some purposes. He explained that a composition composed of either nickel-zinc or nickel-tin is applied to the base metal, previously heat treated. The difficulty is that these elements are limited in supply.

Lithographing or lacquering provide only a limited amount of coverage, he stated. Colored decorations have been applied over rust spots, but this practice is not recommended. While enameling shows some promise, the process has not found much favor for general line cans. Enameling involves three factors: 1. Means must be provided for rust protection before coating. 2. Underfilm corrosion must be eliminated. 3. Enameling must be of good quality.

Bonderized Films for Cans

Mr. Brown said bonderized films seem to be satisfactory for cans. The process appears to meet rust conditions, though elaborate equipment is required. He pointed out that lacquering on both sides is necessary and that soldering is difficult, if not impossible. Bonderized material is highly suitable for products with mildly corrosive properties. Mr. Brown also mentioned that phosphoric acid treatment is less attractive than bonderizing. Stainless or clad steel may be all right, but the emergency will not permit its use at the present time. Mr. Brown drew attention to the fact that tremendous quantities of cans are to be handled this year. Some idea of the can requirement for 1942 may be had from the following comparison:

Pack	Million Cases 1941	1942 (Estimated)
Tomatoes	29	44
Beans	10	14
Peas	28	42
Corn	23	25

While glass and other types of packages have expanded their use, each will have its limitations compared with tin. "Paint and varnish manufacturers will have a job to supply the necessary protective coatings for the year just ahead."

In commenting on Mr. Brown's paper, C. H. Manion, chief engineer and vice president, Follansbee Steel Corp., Follansbee, W. Va., warned that there would be a peculiar market condition when the present emergency is over. Steel is in question, he stated. Substitutes remain poor substitutes just as long as there is an adequate supply of tin. Whenever the tin supply is curtailed, then research is accelerated.

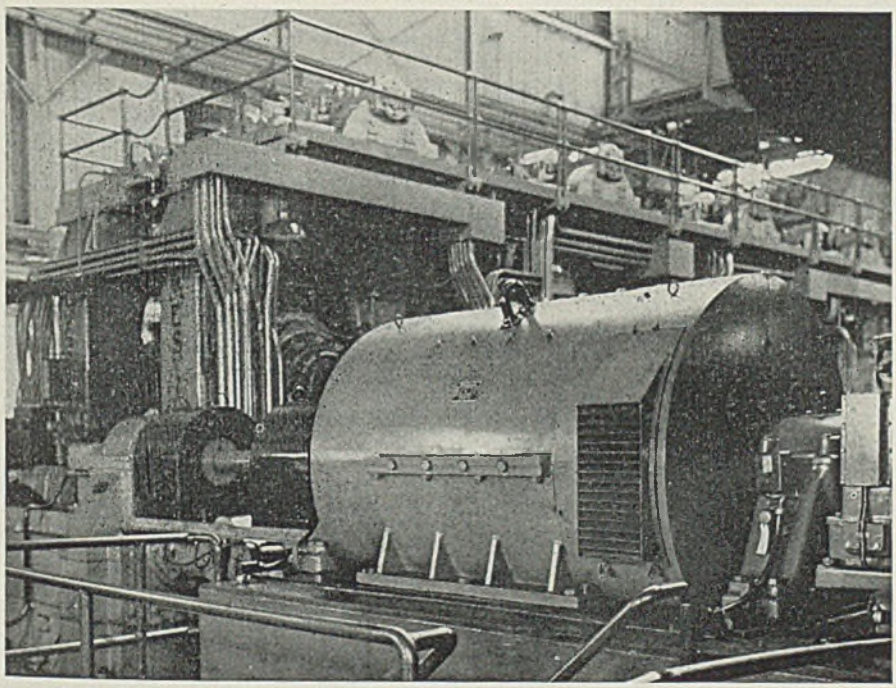
"You hear it said that we have always been accustomed to the use of tin plate and it will come back when the present emergency is over," he said. He questioned this attitude and cited cosmetic manufacturers as using caps of tin for their containers. During the last two years they have stipulated that these caps be made to look like plastics. He stated tin plate makers are liable to wind up with a process of coating that may not be the best method of protection.

Challenge to Engineers

He cited the 2-high hand mill for rolling black plate having been replaced by the mechanized mill. This latter, he pointed out, was merely a stop-gap for the oncoming continuous mill for rolling tin plate. At present, he stated, a good job is being done by electrotinning lines, but this isn't a stop-gap, like the mechanized mill. Nonmetallic black plate may take the place of tin plate and this is a challenge to engineers. Not only must they meet the present emergency but the future emergency as well.

Further discussion brought out the fact that a lapex mixture has been proposed for the side seam of cans, but it was also stated that with light gage tin plate the strength of solder is needed to prevent the side seam from springing open.

Tension Winding Motor for Cold Strip Mill



■ To roll intermediate gage enameling and galvanizing sheets a 54-inch, four-stand tandem cold reduction strip mill has been installed in an Ohio plant. The mill was designed for normal operating speeds up to about 2100 feet per minute. Pictured is the Westinghouse 600-horsepower 200-700 revolutions per minute direct current motor, driving the mill's tension winding and reel. Motor is designed for rapid acceleration, without excessive variations in tension which might strain or rupture the strip

Steel Founders Hear How War Has Aided Adoption of Castings

CHICAGO

■ ANNUAL meeting of the Steel Founders' Society of America in Edgewater Beach Hotel, here, Feb. 11 and 12 attracted the largest attendance in the history of the society. More than 200 executives participated in discussions of problems which the war has brought to the producers of steel castings. Wednesday was dedicated to the Army; Thursday to the Navy.

The opening session was devoted to remarks by the new president of the society, Oliver E. Mount, American Steel Foundries, Chicago, and to the reports of Merrill G. Baker, executive vice president, and Raymond L. Collier, secretary-treasurer of the organization. Reports of the following committees also were made: Advertising, occupational classifications, raw materials, specifications, statistic reports, and technical and operating.

The luncheon on Wednesday noon featured the address of President Mount, a short talk by General Cummins of the Sixth Corps area, and an address by Josh Lee, United States senator from Oklahoma. Senator Lee pleaded for confidence and understanding in this time of emergency between government and the people of the country.

Scrap Supply Discussed

L. C. Wilson, Reading Steel Casting Division, American Chain & Cable Co., and chairman of the technical and operating committee of the Steel Founders' Society, presided at the technical session Wednesday afternoon. Edwin C. Barringer, executive secretary, Institute of Scrap Iron and Steel, Washington, discussed "The Steel Foundry Scrap Problem," and indicated the difficulties which members of his organization have encountered in endeavoring to supply a steady flow of scrap. Mr. Barringer suggested that complete allocation of scrap would be the most satisfactory solution to all concerned, but pointed to the difficulties encountered in such an operation. He discussed the necessity of determining if a plant is confronted with an emergency as far as scrap is concerned, and indicated that a three weeks' supply surely would not come within that category. If an emergency exists, the matter should be directed to the attention of Alex Miller of the Scrap Division, Raw Material Section, Iron and Steel Branch, War Production Board, Washington.

Mr. Barringer stated that industry also should back up efforts to obtain more scrap from farms and the automobile graveyards. He stated that a large amount of scrap is available in this country and the proper steps must be taken to get it into the hands of the foundries and steel mills.

E. R. Young, Climax Molybdenum Co., Chicago, presented an instructive technical discussion, "Molybdenum in the Defense Program". Mr. Young indicated the amount of molybdenum available for war work and discussed the essential and optional uses of molybdenum in steel castings. He also gave specific instances where that alloy should not be used to obtain certain properties and indicated that every effort should be made not to employ alloys where the use of such materials cannot be justified metallurgically or practically. He presented a number of slides showing how molybdenum in small amounts, usually in conjunction with other alloys, may be used to obtain certain metallurgical and physical properties.

"Use of Aluminum in Steel Castings" was discussed by Walter Bonsack, National Smelting Co., Cleveland. Mr. Bonsack pointed out that in many war operations where aluminum scrap is produced, this scrap is contaminated with steel to such an extent that the secondary products cannot be returned as raw products to the same war industries. However, this type of material provides an excellent source for metallurgical aluminum. The speaker discussed the four grades of metallurgical aluminum as provided in the 1941 A.S.T.M. specifications.

War Speeds Progress

In the final paper which was prepared by Howard F. Taylor and Edward A. Rominski, Naval Research Laboratories, Washington, on the subject, "Atmospheric Pressure and the Steel Casting—A New Technique in Gating and Risering", Mr. Taylor discussed in detail the blind risering method and showed a large number of slides illustrating work which has been done in that direction.

An inspirational talk, "The Role of the Steel Foundry Industry in the War," by S. Wells Utley, president, Detroit Steel Casting Co., Detroit, opened the Thursday morning session. Mr. Utley pointed out that during normal times the greatest job of the producers of steel castings is to convince the engineering world of the superiority of steel castings. In his opinion more progress related to the technical developments of steel castings has been made during the past ten years than in any previous decade in the history of the industry. Although steel castings have been thoroughly dependable during all of these years, this progress has made them even more so today.

The battle of mechanized warfare has succeeded in selling engineers on the fact that steel castings are a superior product to meet war needs. Ordinarily a number of years would have been required to accomplish the selling job that has resulted quickly from the tremendous demand for production of war machines. Mr. Utley suggested that the industry should not accept orders for steel castings where it is known that particular provisions of the specifications cannot be met in a technical and practical way. Effort should be made to have such specifications changed before the work is undertaken.

Chauncey Belknap, legal counsel of the Steel Founders' Society of America, in a paper, "Latest Developments of Interest to the Industry", discussed the price control act and the recent amendment No. 1 to price schedule No. 41 for steel castings. Henry M. Busch, professor of socioligy, Western Reserve University, Cleveland, was the final speaker on the morning program. In discussing "America's Stake in the War" Professor Busch considered many of the factors which have complicated the situation today and indicated where America's dangers lie.

The luncheon meeting featured a talk by Gus W. Dyer, professor of economics, Vanderbilt University, Nashville, Tenn., on "American Business Will Not Retreat." Several naval officers were at the speakers' table and Admiral Cluverius, Navy Public Relations Department, Washington, spoke briefly.

As part of the luncheon program the Lorenz memorial medal of the society was presented to Donald C. Bakewell, vice president, Union Steel Castings Division, Blaw Knox Co., Pittsburgh, and an immediate past president of the society, for his unselfish services to the progress of the steel castings industry.

■ War Production Board last week directed the freezing of all tin and tin bearing materials in the hands of manufacturing jewelers, who are prohibited from processing it in any way, under an amendment to the order M-43-a. The order is expected to affect about 1,000,000 pounds of tin in the hands of jewelry manufacturers.

Nelson Urges Greater Use of Machines; "Industry Lazy on Subcontracting"

WASHINGTON

■ INDUSTRY must convert more equipment to war work and it must make better use of its present facilities by operating second and third shifts, Donald Nelson told business paper editors and publishers and advertising executives at a conference here last Friday.

Industry has co-operated within the scope that it has seen the problems involved, but there is evidence of certain smugness, he said. Industry is on trial. He said further, with the country encountering the most gigantic problem ever faced by any country, we must do in two years what others have done in ten.

It is entirely possible to lose this war, Mr. Nelson said. The only thing that will prevent it is the placing of equipment in the hands of our armed services. Further, we must supply Britain, Russia, China and the Dutch East Indies. At the same time we must keep our own civilian economy functioning as well as those of the Latin American nations.

Stressing the gravity of the situation, he said, "We cannot win if Britain falls." We have lost a lot of time because industry has been fearful of what would happen after the war, he said. We have wasted "golden" months when we could have been expanding vital industries, such as steel, chemical, copper and others. The year 1942 is the critical year. We have ten "silver" months ahead in which to hold the enemy.

Mr. Nelson said the United States is turning out more equipment than in 1918, but it is "not nearly enough." He laid particular stress on two points. First, that industry must get more out of its present equipment by operating second and third shifts, although he said it was difficult to obtain and train additional workers. Second, more equipment must be converted to production of war goods. This equipment must be taken off work now being done, he said. Machine guns are needed more than typewriters and adding machines, as examples. Even the government will be rationed on such office equipment. "If necessary, we can write letters in long hand."

On the matter of subcontracting, he said that industry has been "lazy." "Industry must help in subcontracting work. The government can do no more than a small part of it."

As a suggestion for manufacturers, he said that pool arrangements between manufacturers in handling prime contracts would help but he emphasized that this is a management job.

Products of Team Work Demonstrated to Employes

■ To give employes a clear understanding how parts they make contribute to complete machine—a symbol of their share in the Victory program—Caterpillar Tractor Co. recently exhibited cutaway cross sections of diesel motors and tractors, operated by electric motors. They were shown during lunch hours and at shift changes, explanations being given by members of the sales development staff. So much interest was manifest that the company decided on more demonstrations

Scrap Chapter Cites Members for Violations

■ Disciplinary action against two members of the Chicago chapter of the Institute of Scrap Iron and Steel Inc., for alleged violation of its quality standards, which are identical with specifications set by OPA, was voted by the executive committee of the chapter.

Complaints against the two unnamed firms were investigated by a special group and after hearing evidence the executive committee adopted a resolution declaring the firms suspended from the privileges of the Chicago chapter with the recommendation that the national organization take action at its convention to be held in Chicago, Feb. 21-22. The committee stated:

"Our industry is doing everything in its power to help win the war. This includes adherence to price and grade schedules adopted by our government. We cannot and will not permit our whole industry to be condemned in the public mind for the acts of one or two."

It was stated that the firms had shipped compressed bundles containing foreign matter to a Chicago steel mill.

Three Companies Cited For Priorities Violations

Suspension orders have been issued against three companies which received or delivered aluminum scrap in violation of priority orders. They are: National Pressure Cooker Co., Eau Claire, Wis.; New England Metals Co., Providence, R. I.; A. B. C. Pattern & Foundry Co., Chicago.

All persons are forbidden to deliver aluminum to, or accept deliveries from, any of the three companies while the suspension orders are in effect without express authorization from the director of industry operations.

Armco To Air Condition Ashland Blast Furnace

■ American Rolling Mill Co. has placed an order with Blaw-Knox Co. for a dry blast unit to increase pig iron output from its new 1000-ton blast furnace at Ashland, Ky.

FINANCIAL

Allegheny Ludlum's Income Equal to $3.86 Per Share

■ Allegheny Ludlum Steel Corp. reports a 1941 consolidated net profit of $5,062,709, after all charges and provision of $9,700,000 for federal income and excess profits taxes. This is equivalent to $3.86 per common share, after providing for dividends on the preferred stock.

This compares with a net profit of $3,722,107, or $2.78 per common share for the year 1940, after provision of $2,633,157 for federal income and excess profits taxes.

For the fourth quarter of 1941 net profit was $1,073,473, after all charges and provision of $2,809,802 for federal income and excess profits taxes, equivalent to 82 cents per common share, after providing for dividends on the preferred stock.

For the fourth quarter of 1940 net profit was $940,822, after provision of $1,091,116 for federal income and excess profits taxes, equivalent to 70 cents per common share, after providing for dividends on the preferred stock.

Crucible Steel Earns 5.8 Per Cent of Sales

Crucible Steel Co. of American reports 1941 net profit of $7,439,480, or 5.8 per cent of record total sales of $127,753,667, compared with net of $6,230,175, or 8 per cent of sales during 1940.

Net income last year amounted to $12.95 a common share, against $10.24 a share in 1940. Sales rose 64.4 per cent during 1941.

Federal income and excess profits tax provisions totaled $14,797,787 last year, against $3,636,193 in 1940.

F. B. Hufnagel, chairman, stated that at the close of the year only an "insignificant" percentage of the company's products was entering civilian channels.

Continental Steel's Income $1,225,674 in 1941

Continental Steel Corp. reports for the year ended Dec. 31, 1941, net profit was $1,225,674 after taxes, other charges, and preferred dividends, equal to $5.46 a common share.

This compares with net profit of $778,738 in 1940, or $3.23 a common share.

Set Aside Stock Purchase Fund

Republic Steel Corp. directors have authorized the setting aside, on April 1, of $300,000 to the Purchase Fund for the purchase of 6 per cent cumulative convertible preferred stock, in accordance with the company's certificate of incorporation, as amended.

Pittsburgh Coke & Iron Income $1.48 Per Share

Pittsburgh Coke & Iron Co.'s net last year totaled $1,015,210, or $1.48 a common share, compared with $1,000,624, equal to $1.45 a share earned in 1940. December quarter profit was $311,524, against $258,566 in preceding period and $412,546 in final 1940 quarter.

Monarch Shipments Doubled in 1941

■ Shipment of lathes in 1941 by Monarch Machine Tool Co., Sidney, O., were valued at $15,219,219, compared with $7,137,375 in 1940, according to company's annual report. Taxes for 1941, federal, state, local and social security, were $4,631,322, against $1,550,040 in 1940. Net earnings in 1941 were $1,500,424, or $7.14 per share, up from $5.63 in 1940.

Wendell E. Whipp, president, stated a contract has been completed whereby the company will lease $695,000 worth of tools from the government through Defense Plant Corp., and by "compressing present machine layout" these tools will be absorbed in present buildings.

Ingot Output Sets New Record for January

■ Steel production in January established a new record for that month, with 7,129,351 net tons of open-hearth, bessemer and electric furnace ingots and castings, the American Iron and Steel Institute reports.

The total was nearly 3 per cent larger than that of the prior January record, 6,928,085 tons, established in 1941, but was slightly below the December, 1941, total of 7,163,999 tons. The January output was fourth largest for any month in the industry's history. The record for a single month, 7,242,683 tons, was made in October.

The steel industry operated at an average of 94.7 per cent of capacity during January. This is based on revised annual producing capacity of 88,570,000 tons, as of Jan. 1, 1942. Details of the new capacity figures appear on Page 58 of this issue. The January rate compares with 96.9 per cent for January, 1941, computed on the smaller capacity at the beginning of that year, and with 98.1 per cent for December, 1941, based on the capacity as of July 1, 1941.

Steel output averaged 1,609,334 tons per week in January, compared with 1,620,814 tons per week in December and 1,563,902 tons per week in January, 1941.

STEEL INGOT STATISTICS

	Estimated Production—All Companies								Calculated weekly production, all companies Net tons	Number of weeks in month
	—Open Hearth—		—Bessemer—		—Electric—		—Total—			
	Net tons	Per cent of capacity	Net tons	Per cent of capacity	Net tons	Per cent of capacity	Net tons	Per cent of capacity		
Based on Reports by Companies which in 1940 made 98.43% of the Open Hearth, 100% of the Bessemer and 85.82% of the Electric Ingot and Steel for Castings Production										
Jan. ..	6,332,628	95.4	490,864	86.0	305,859	96.3	7,129,351	94.7	1,609,334	4.43
Based on Reports by Companies which in 1940 made 98.43% of the Open Hearth, 100% of the Bessemer and 85.82% of the Electric Ingot and Steel for Castings Production										
1941										
Jan. ..	6,276,429	99.1	451,637	76.0	200,019	91.0	6,928,085	96.9	1,563,902	4.43
Feb. ..	5,673,289	99.2	378,330	70.5	186,281	93.9	6,237,900	96.6	1,559,475	4.00
Mar. ..	6,461,936	102.0	460,169	77.4	209,536	95.4	7,131,641	99.7	1,609,851	4.43
1st quar	18,411,654	100.1	1,290,136	74.8	595,836	93.4	20,297,626	97.8	1,578,353	12.86
Apr. ..	6,135,941	100.0	395,009	68.6	225,999	106.2	6,756,949	97.6	1,575,046	4.29
May ..	6,365,172	100.5	444,361	74.8	243,705	110.9	7,053,238	98.7	1,592,153	4.43
June .	6,103,767	99.5	458,242	79.6	238,721	112.2	6,800,730	98.2	1,585,252	4.29
2nd qtr	18,604,880	100.0	1,297,612	74.3	708,425	109.8	20,610,917	98.2	1,584,237	13.01
1st half	37,016,534	100.1	2,587,748	74.5	1,304,261	101.6	40,908,543	98.0	1,581,312	25.87
July ..	6,089,859	96.6	489,239	85.0	242,584	87.4	6,821,682	93.4	1,543,367	4.42
Aug. .	6,243,100	96.6	495,523	85.9	262,334	94.4	7,000,957	95.7	1,580,351	4.43
Sept. .	6,058,731	97.0	500,687	89.8	260,288	96.9	6,819,706	96.4	1,593,389	4.28
3rd qtr	18,391,690	96.0	1,485,449	86.8	765,206	92.9	20,642,345	95.2	1,572,151	13.13
9 mos.	55,408,224	98.7	4,073,197	78.6	2,069,467	98.2	61,550,888	97.0	1,578,228	39.00
Oct. ..	6,427,977	99.4	532,862	92.3	281,843	101.4	7,242,683	99.0	1,634,917	4.44
Nov. ..	6,198,368	99.0	488,986	87.5	282,633	105.0	6,969,987	98.3	1,624,706	4.29
Dec. ..	6,395,387	99.2	481,706	83.6	286,906	103.4	7,163,999	98.1	1,620,814	4.42
4th qtr	19,021,732	99.2	1,503,555	87.8	851,382	103.2	21,376,669	98.5	1,626,839	13.14
Total..	74,429,956	98.8	5,576,752	80.9	2,920,849	99.6	82,927,557	97.4	1,590,479	52.14

The percentages of capacity operated in the first six months of 1941 are calculated on weekly capacities of 1,430,102 net tons open hearth, 134,187 net tons bessemer and 49,603 net tons electric ingots and steel for castings, total 1,613,892 net tons; based on annual capacities as of Dec. 31, 1940 as follows: Open hearth 74,565,510 net tons, bessemer 6,996,520 net tons, electric 2,586,320 net tons. Beginning July 1, 1941, the percentages of capacity operated are calculated on weekly capacities of 1,459,132 net tons open hearth, 130,292 net tons bessemer and 62,761 net tons electric ingots and steel for castings, total 1,652,185 net tons; based on annual capacities as of June 30, 1941 as follows: Open hearth, 76,079,130 net tons, bessemer 6,793,400 net tons, electric 3,272,370 net tons.

The percentages of capacity operated in 1942 are calculated on weekly capacities of 1,498,029 net tons open hearth, 128,911 net tons Bessemer and 71,682 net tons electric ingots and steel for castings, total 1,698,622 net tons; based on annual capacities as of Jan. 1, 1942 as follows: Open hearth 78,107,260 net tons, Bessemer 6,721,400 net tons, electric 3,737,510 net tons.

Landis Machine Co. Adds Manufacturing Capacity

■ Landis Machine Co., Waynesboro, Pa., has completed additions covering about 25,000 square feet of floor space to increase manufacturing capacity. Several departments are being relocated to minimize parts handling. Additions include an erecting floor and shipping department 60 x 350 feet with a wing 50 x 80 feet, housing a box and crate manufacturing department and lumber storage. A second building 30 x 60 feet is divided into three compartments for storage of chips and cuttings according to their physical analysis.

The additional space will provide facilities for manufacture of the new precision thread grinder recently announced as an addition to the company's line of thread-cutting machines, die heads and collapsible taps.

Otis Steel, J. & L. Merger Considered

■ Merger of the Jones & Laughlin Steel Corp. and the Otis Steel Co. again is under consideration. If agreement can be reached, stockholders of Otis Steel will be offered J. & L. shares in exchange for their holdings.

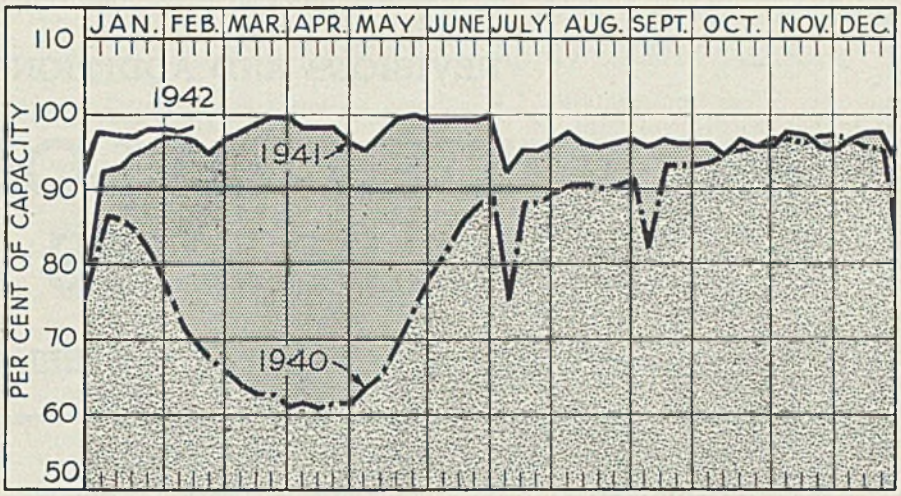
While details have not yet been finally decided upon, the proposal has been submitted to the Department of Justice at Washington for consideration, although the two companies are declared not competitive. If the anticipated favorable decision results, stockholders will be notified and approval of the merger will be requested.

Both H. E. Lewis, president of J. & L., and E. J. Kulas, president of Otis Steel, admit discussions have been going on over consolidation for some time, but they have not progressed far enough to warrant further statement.

Jones & Laughlin Steel some years ago purchased a site of some thousands of acres in the Calumet district of Chicago but never has developed it.

The consolidated corporation would have capacity for producing 4,921,000 net tons of steel ingots yearly, making it the fourth largest producer in the United States.

■ American railroads abandoned 1509 miles of unprofitable lines in 1941, 210 miles more than in 1940. This is the eleventh time since records have been compiled and the tenth consecutive year that the figure has exceeded 1000 miles. Mileage of new lines built during the year totaled 1455 miles, less than the mileage put out of service.



PRODUCTION . . . . Up

■ PRODUCTION of open-hearth, bessemer and electric furnace ingots last week advanced 1 point to 97 per cent. Six districts advanced, two declined and four were unchanged. A year ago the rate was 96½ per cent; two years ago it was 69 per cent, based on capacity as of those dates.

Cincinnati—Low scrap inventory at one mill reduced production 3 points to 84 per cent. Four open hearths are idle.

Chicago — Shifts in equipment caused a drop of ½-point to 102½ per cent. Two producers increased and four declined slightly. Lack of scrap is the only bar to higher output.

Buffalo—Steady at 79½ per cent, with promise of continuance if scrap is sufficient.

Detroit—Gained 6 points to 91 per cent on slightly better scrap supply.

Pittsburgh—Advanced 1½ points to 96½ per cent.

Wheeling—Regained part of the previous week's loss, rising 6½ points to 90½ per cent.

New England—Up 8 points to 100 per cent. Half the open hearths in the district have operated unusually long without repairs.

Cleveland—Lighting of a repaired open hearth by Otis Steel Co. caused a rise of 2 points to 86½ per cent.

St. Louis—Unchanged at 78 per cent.

Birmingham, Ala. — Production continued at 90 per cent, a rate which has been steady since the beginning of the year.

Youngstown, O.—With 70 open hearths and three bessemers in production the rate advanced 1 point to 89 per cent. Republic Steel Corp. added one open hearth at the beginning of the week and another at the end.

Central eastern seaboard — Continued at 90 per cent for the fourth week.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended Feb. 14	Change	Same week 1941	Same week 1940
Pittsburgh ...	96.5	+ 1.5	96.5	66
Chicago	102.5	— 0.5	99.5	68.5
Eastern Pa.	90	None	96	68
Youngstown ..	89	+ 1	90	43
Wheeling	90.5	+ 6.5	100	86
Cleveland	86.5	+ 2	90	66.5
Buffalo	79.5	None	90.5	70
Birmingham ..	90	None	100	90
New England..	100	+ 8	100	63
Cincinnati	84	— 3	95	61
St. Louis.....	78	None	93	68
Detroit	91	+ 6	92	92
Average	97	+ 1	96.5	69

January Gear Sales Index Up 18.5 Per Cent

■ Industrial gear sales in January were 18.5 per cent above those of December, and 11.2 per cent above January, 1941, according to the American Gear Manufacturers Association, Wilkinsburg, Pa.

Comparative index of sales, based on 1928 as 100, was 288 in January. This compared with 243 in December and 259 in January, 1941. Compilation by the association applies only to industrial gears.

■ American Steel & Wire Co. has placed in service at its plant at Cleveland a 500-gallon fire engine built by Buffalo Fire Appliance Corp., Buffalo. The engine is of the type used by city fire departments and its installation is for added protection in case of air attack.

REVISIONS AND ADDITIONS TO

PRIORITIES—ALLOCATIONS PRICES

as published in Section Two of STEEL of Jan. 12, 1942

"M" ORDERS

M-9-a (Amendment): **Copper**, effective Feb. 6, 1942. Prohibits sale of copper and copper products by mills, warehouses or foundries except on ratings of A-10 or higher.

M-9-b (Amendment): **Copper and Copper Alloy Scrap**, effective Feb. 12, 1942. Dealers required to report on Form PD-249 by the 10th of each month to Bureau of Mines, Washington, instead of on PD-120 to the Copper Branch, WPB.

M-21-e: Tin Plate, Terne Plate, Long Ternes, effective Feb. 3, 1942. Reduces amount of tin per base box of tin plate from 1.35 pounds to 1.25. Limits use of tin plate, terne plate or long ternes in production of any item except as permitted by Orders M-43-a and M-38-c. Long ternes may not be used unless obtained on rating of A-10 rating or higher and used for purpose for which rating was assigned. Terne metal may be used only in production of terne plate or long ternes.

M-38-c: Lead, effective Feb. 10, 1942. Sets February lead pool at 15% of refiners' production in December, 1941, for allocation by Director of Industry Operations.

M-39 (Amended): **Cobalt**, effective Feb. 7, 1942. Places cobalt in all forms under allocation. Previously, only metallic cobalt and chemicals to be processed into metal were allocated. M-39-b prohibits use of cobalt in all pigments after May 1, restricts its use until that time to 40% of amount used first six months of 1941. Consumption for other purposes from Feb. 1 to April 1, 1942 limited to 23% of amount used first six months of 1941; quarterly consumption after April 1 cut to 35% of use in first six months of 1941. Excepted are government orders, orders with A-1-j or higher rating, ground coat frit used in production of enameled steel and other specified exemptions.

M-68-1: Material for Oil, Gas Industry, effective Feb. 13, 1942. Lifts ban against construction of new natural gas wells to permit drilling of new wells under certain restrictions in Kentucky, New York, Ohio, Pennsylvania and West Virginia.

M-81: Tin Plate and Terne Plate Conservation, Distribution, effective Feb. 11, 1942. Regulates types of products permitted to be packed in cans, sizes of cans which may be used and amount of tin and tin plate allowed for can manufacturing. Small-size cans generally eliminated. No limitation placed on production of cans for packing fruits and vegetables of primary importance. Those of secondary importance allotted same amount of tin plate as required for 1940 pack. Production of cans for packing important medical, chemical, dental and industrial products in general limited to 100 per cent of 1940 consumption. All products not specifically listed, such as beer, tobacco, dog food, petroleum products, etc., may use 50% of tin plate and terne plate consumed in corresponding 1940 period until March 1, none thereafter. Permits use of tin plate with tin coating of 1.5 pounds per base box for cans for packing certain acid-type foods. Orders bearing rating higher than A-2 exempted from these restrictions.

M-85: Kapok, effective Feb. 4, 1942. Restricts consumption to military and a few essential civilian uses.

M-89: Corundum, effective Feb. 7, 1942. All deliveries made subject to authorization by Director of Industry Operations who allocates supplies. Sellers required to file PD-293 with WPB by Feb. 20, 1942 and by 10th of each succeeding month.

M-96: Agar, effective Feb. 9, 1942.

"P" ORDERS

P-100 (Amended): **Repairs, Maintenance and Operating Supplies**, effective Feb. 10, 1942. Adds persons using tools or equipment to repair or maintain farm machinery, and Canadian firms buying war or essential civilian materials in the United States to those entitled to priority assistance.

P-106: Material for Repair, Maintenance and Operation of Copper and Brass Mills, issued Feb. 7, 1942. Provides A-1-a rating to delivery of material for repair in event of actual breakdown of plant; A-1-c for material to make reasonable provisions to avert immediately theratened breakdown; A-3 to deliveries of other material for repair, maintenance and operation, and to deliveries to sub-suppliers under any of above ratings. Use of A-3 rating to obtain "other material" limited to quantities obtained during 1941. Authorization of WPB necessary to use A-1-a or A-1-c ratings. Ratio of current operations to inventory of repair, maintenance and operation material must not exceed average for 1938, 1939 and 1940.

P-115: Canning Plant Maintenance and Expansion, effective Feb. 11, 1942. Assigns A-1-a rating to plants canning fruits or vegetables, for emergency repairs to avert spoilage of food in event of actual breakdown. WPB must be advised when rating is used. A-3 rating granted for other material for replacement, addition or expansion. Excludes construction of new buildings or plants; also new production lines, except for the canning of peas and tomatoes.

"L" ORDERS

L-1-c (Amendment). **Motor Trucks**, effective Feb. 12. Ban on sales of new medium and heavy trucks and truck trailers extended from Feb. 11 until Feb. 28.

L-3-e (Amendment): **Light Motor Trucks**, effective Feb. 12. Ban on sales of new light trucks extended from Feb. 11 until Feb. 28.

L-23 (Amendment): **Domestic Cooking Appliances**, effective Feb. 7, 1942. Permits use of existing stocks of bright metal finish or trim containing copper, nickel, chromium or aluminum but prohibits fabrication of additional parts. Original order banned their use after Feb. 1.

L-40: Vitamin A, effective Feb. 10, 1942.

L-42: Plumbing and Heating Products, effective Feb. 11, 1942. Simplifies various items manufactured by plumbing and heating industry. Schedule 1 establishes pressure ratings for iron, brass and bronze valves. After Feb. 28 all valves produced or sold (except those in stock) must conform to standards established.

MISCELLANEOUS ORDERS

Priorities Regulation No. 5, effective Feb. 5, 1942. Reproduction of all priority forms and orders permitted, with following exceptions: PD-1-c,, PD-3, PD-3A, P-25-a through P-25-e, P-26-a through P-26-e, and P-35 may be reproduced only for purposes of information and when marked "Specimen Copy;" P-3, P-4, P-9-a through P-9-g, P-13, P-15, and P-52 may be reproduced only by or for producers (not suppliers) operating under said orders. Reproduction of P-41 is limited to persons entitled to apply the rating.

Priorities Regulation No. 6, effective Feb. 11, 1942. Abolishes Priorities Critical List of Army and Navy Munitions Board as limitation upon application of ratings assigned by various preference orders.

PRICE SCHEDULES

No. 3 (Amendment): **Secondary Zinc and Scrap**, effective Feb. 2, 1942. Secondary slab zinc, in cents per lb., carlots, E. St. Louis, revised to 8.25 for prime western and poorer grades, 8.35 for selected, 8.50 for brass special, 8.75 for intermediate and higher. Quantity extras charged by producers: 0.15c for 20,000 lbs. to carload; 0.25c for 10,000-20,000 lbs.; 0.40c for 2000-10,000 lbs.; 0.50c for less than 2000 lbs. Other sellers may charge 0.65c, 0.75c, 1.00c and 1.50c for respective quantities.

No. 4 (Amendment): **Iron and Steel Scrap**, effective Feb. 10, 1942. Maximum shipping point price for No. 1

For additional revisions and additions please see STEEL of Jan. 19, p. 30, Jan. 26, p. 31, Feb. 2, p. 29 and Feb. 9, p. 30.

Steel at Boston fixed at $15.05. Unprepared scrap defined to exclude graveyard autos and other objects requiring dismantling. When scrap is delivered by motor vehicle other than public carrier, charges computed on basis of rail carload rate need not fall below $1 a gross ton (minimum formerly was $1.50). Certification required for delivery of cast iron solely by motor vehicle must be executed on OPA Form 104:15. Purchases of unprepared remote scrap limited to rail carload lots. Bundles containing not over 50% tin-coated material fixed at $5 a ton under Open Hearth Grades; with more than 50% tin-coated material, $8 below Open Hearth Grades.

No. 6 (Revised): Iron and Steel Products, effective Feb. 4, 1942. Permits mill to use established basing point at or nearest place of production or of origin of shipment only in event emergency demands of war program cause shipments to be made to a place outside the producer's usual market area. Extras may be charged only if they had been charged in whole or in part on April 16, 1941, or during the two years prior thereto. Extras published but not charged April 16, 1941, or in the two preceding years must be approved by OPA before they may be charged. Contracts drawn prior to Schedule prices may be continued un- April 16, 1941, at prices other than til March 15, 1942.

No. 20 (Amendment): Copper and Copper Alloy Scrap, effective Feb. 27, 1942. Enlarges original schedule to cover 30 different items but continues major grades at former prices. Prices apply to scrap sales only to consumers. Premium of ½-cent per pound allowed if 40,000 pounds or more sold at one time in lot containing not more than one general grouping; ¼-cent premium allowed if lot contains not more than three groupings. Premium for copper scrap prepared in crucible shape is 1 cent, for copper alloy scrap ¾-cent when bought by brass foundry. Schedule does not include brass mill scrap.

No. 46 (Amendment): Relaying Rails, effective Feb. 7, 1942. Permits completion of contracts entered into prior to effective date at prices not exceeding $1.60 per 100 lbs., f.o.b. warehouse, for quantities of 25 gross tons and over, provided deliveries completed by March 15, 1942.

No. 48 (Revocation): Flashlights, effective Feb. 4, 1942. Emergency schedule imposed Dec. 10 on prices of flashlights, batteries and bulbs revoked.

No. 69 (Amendment): Primary Lead, effective Feb. 2. Defines primary lead as "lead in the form of pigs, ingots and other special shapes made from ores, concentrates or bullion, even though other material is mixed therewith, provided such other material accounts for 50% or less of the lead content thereof."

No. 70 (Amendment): Scrap and Secondary Lead, effective Feb. 2, 1942. Defines secondary lead as material more than 50% of lead content of which is obtained from scrap. Requires weight of shipments of battery lead plates to be figured at the time the assay sample is taken and assay to be used to determine maximum price.

No. 75 (Amendment): Dead-Burned Grain Magnesite, effective Feb. 9, 1942. Permits Westvaco Chlorine Products Corp. to sell from its Patterson plant to regular customers in California at maximum price of $32, f.o.b. Chewelah, Wash., with regular additions for delivered prices and sales in bags or sacks.

No. 81 (Amendment): Primary Slab Zinc, effective Feb. 2, 1942. Defines primary slab zinc as material made from ores or concentrates, even though other material is mixed therewith, provided such other material accounts for 50 per cent or less of the zinc content, and must be produced by a process of distillation or by electrolysis.

No. 88: Petroleum and Petroleum Products, effective Feb. 2, 1942. Maximum prices are those posted for crude petroleum and the lowest quoted for petroleum products on Oct. 1, 1941.

No. 89: Bed Linens, effective Feb. 2, 1942.

No. 90: Rayon Waste, effective Feb. 3, 1942.

No. 96: Domestic Fuel Oil Storage Tanks, effective Feb. 20, 1942. Typical prices for carload shipment of 26-inch, 16-gage steel, 275-gallon capacity tank are $17.35 in the East, $17.70 in the Midwest, $31.95 in the Far West.

No. 97: Southern Hardwood Lumber, effective Feb. 20, 1942. Cuts prices $2 to $5 a thousand feet from previous levels.

No. 98: Titanium Pigments, effective March 1, 1942. Prices are those prevailing Oct. 1, 1941. Regular grade, 20 tons or more, delivered in bags in eastern territory, 14½c per pound. Deliveries in western territory ¼-cent higher.

No. 99: Acetyl Salicylic Acid (aspirin), effective Feb. 16, 1942.

No. 100: Cast Iron Soil Pipe and Fittings, effective Feb. 20, 1942. Prices established in terms of minimum discounts from standard revised price list. Minimum discount for 2-6 inch extra heavy pipe 52½-10-10 for carload shipments by rail or ten ton or greater shipment by truck, 52½ for less carload by rail or less than ten tons by truck.

No. 101: Citric Acid, effective Feb. 16, 1942.

No. 102: Mechanical Household Refrigerators, effective Feb. 9, 1942. Maximum prices for manufacturers whose 1942 model prices were approved by OPA are net prices in effect Feb. 2, 1942. Prices of all new models must be approved by OPA.

No. 103: Salicylic Acid, effective Feb. 16, 1942.

No. 104: Vitamin C, effective Feb. 16, 1942.

Form PD-1-A Available

Form PD-1-A which is to be used under Priorities Regulation Number 3 has been released.

Copies of this form may be obtained from local WPB offices or from STEEL, Readers Service, at the following prices:

5 sets and under, 20c each.
6 to 15 sets, 15c each.
16 to 25 sets, 10c each.
25 sets, $2.
50 sets, $4.
100 sets, $6.
200 sets, $9.

This form is available for immediate shipment from STEEL, Readers Service Department, Penton Building, Cleveland.

If your order originates in Ohio, please include 3 per cent additional to cover sales tax.

Preference Ratings May Apply to All Materials

■ Limitations imposed by reference to the priorities critical list of the Army and Navy Munitions Board in a number of preference rating or "P" orders have been removed by issuance of Priorities Regulation No. 6.

A number of general preference orders which were written prior to August, 1941, when the critical list was amended, provided that the ratings assigned by such orders shall not be applied except to items which appear on the list. The regulation issued today removes this limitation and allows the ratings assigned by any "P" order to be used on deliveries of any material otherwise covered by the order. It does not, however, remove any special restrictions or special materials lists which may be specifically included in the terms of any order.

Copper Scrap Dealers To Report to Bureau of Mines

Change in reporting procedure for copper and copper alloy scrap dealers has been announced by the WPB Copper Branch.

Under Order M-9-d, dealers have been required to report by the 10th of each month on Form PD-120 to the Copper Branch.

Hereafter, they will report on Form PD-249 to the Bureau of Mines, Washington. No change has been made in the report date, merely in the form and the recipient of it.

Price Ceilings Fixed on Gears, Pinions, Sprockets

Prices for gears, pinions, sprockets and speed reducers have been frozen at Oct. 15 levels by OPA in Price Schedule 105, effective Feb. 18. OPA explained the action was necessitated by a sharp increase in demand, exceeding doubled production, and price increases made during 1941.

Corundum Placed Under Allocations System

To avert a possible shortage of corundum, stocks of this abrasive material have been placed under an allocations system with the issuance of General Preference Order M-89.

The order provides that corundum used in manufacturing some civilian products may be curtailed, and that suppliers of corundum will make deliveries only when specifically authorized by the director of industry operations. The director will periodically allocate corundum and specifically direct the manner and quantities in which deliveries shall be made.

Windows of WASHINGTON

Texas tin smelter to have capacity of at least 52,000 tons annually. Granted A-1-a preference rating for construction materials . . . Ban on sale of trucks extended to Feb. 28 . . . OPA granted authority to ration recapped tires and retreading material at wholesale as well as retail . . . Segregation of all aluminum scrap required . . . Morgenthau to ask Congress to take lid off national debt ceiling

By L. M. LAMM
Washington Editor, STEEL

WASHINGTON

■ UNITED STATES tin smelter now under construction in Texas will be rushed to completion with the assistance of an A-1-a rating for materials, J. S. Knowlson, director of industry operations, announced.

An amendment to the builder's serial number, under Order P-19-a, was issued raising the preference rating for the project from A-1-b. This will permit more rapid delivery for certain necessary items which have been ordered but are not yet delivered. Delivery dates on these items are protected.

The plant, which was started as an 18,000-ton smelter, has been increased to 52,000 tons capacity and may be increased further. It will process Bolivian tin ore, as well as concentrates from Malaya and the Netherlands East Indies received since the outbreak of hostilities in the Pacific.

While Bolivian ore is not expected in sufficient volume to keep the smelter in full operation over a long period it has a large supply of ore on hand and any further reshuffling of military forces around the world may result in concentrates from other areas reaching the United States.

Prohibition of Truck Sales Extended to Feb. 28

The ban on sales of 1942 model light, medium and heavy trucks and truck trailers was extended last week from Feb. 11 until Feb. 28.

Rationing plans for these vehicles have not been completed. The extension of the present sales ban, issued as amendments to Limitation Orders L-1-c and L-3-e, prohibits the retail sale, lease, trade, loan, delivery, shipment or transfer of any new light, medium or heavy truck or truck trailer.

The restrictions do not apply to sales or deliveries by a distributor or dealer to another distributor or to another dealer nor to persons exempted under Amendment 1 to the original "freeze" order including the Army and Navy and certain other persons.

The WPB announced, however, that some vehicles will be released on individual appeal by letter or telegram prior to the issuance of the rationing plan if both the purchaser and manufacturer or dealer certify that a particular vehicle has been constructed to specifications such as to make it not adaptable for any use other than that of the specific purchaser.

Steel Castings Industry Advisory Committee Named

An industry advisory committee for the steel castings industry has been appointed by the WPB. Members include: Herbert Farrell Jr., Farrell-Cheek Steel Co., Sandusky, O.; D. C. Blackwell, vice president, Union Steel Castings Co., Pittsburgh; William E. Butts, vice president, General Metals Corp., Oakland, Calif.; Burtner Fleeger, president and general manager, Oklahoma Steel Casting Co., Tulsa, Okla.; T. H. Harvey, vice president and secretary, Ohio Steel Foundry Co., Lima, O.; Oliver E. Mount, secretary-treasurer, American Steel Foundries, Chicago; Frank M. Robbins, Ross Meehan Foundries, Chattanooga, Tenn.; C. L. Snowdon Jr., vice president, Reliance Steel Casting Co., Pittsburgh; Charles J. Symington, president, Symington Gould Corp., New York; Charles P. Whitehead, vice president, General Steel Casting Corp., Eddystone, Pa.; and William H. Worrilow, Lebanon Steel Foundry, Lebanon, Pa.

Henderson's Rationing Authority Extended

WPB Chairman Nelson has delegated to the OPA authority to ration retreaded or recapped tires and retreading or recapping materials at wholesale as well as retail levels.

Mr. Nelson issued Supplementary Directive 1B, which gives OPA the right to ration the "use, sale, transfer or other disposition of retreaded or recapped tires or of recapping and retreading materials by or to any person engaged in retreading or recapping tires or otherwise dealing in such materials."

Segregation of All Scrap Aluminum Alloy Required

Segregation of all grades of aluminum alloy scrap generated by plants is required in Order M-1-d.

Order is not intended, it was said, to interfere with the normal and useful functions of the scrap dealer, but to center responsibility for proper segregation in the plant generating the scrap.

Collection of scrap outside of plants continues to be a function of the dealer. They also may purchase mixed plant scrap from plants, and segregated scrap coming from plants which generate less than 1000 pounds per month. The order requires, however, that the dealer sell all such scrap to a producer or approved smelter. If he does not collect sufficient scrap in the regular course of business to make it practicable to sell directly to a producer or approved smelter, he may resell to another dealer.

Morgenthau To Ask Congress To Remove Federal Debt Lid

Secretary of the Treasury Henry Morgenthau Jr. last week said he soon will ask Congress to lift the national debt limit to at least $110,000,000,000, or possibly to eliminate the ceiling entirely. Present limit is $65,000,000,000.

Observers noted the discussion of raising the debt limit is largely aca-

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Accelerates Assembly — Speed Nut System (PATENTED) — Lowers Net Cost

OVER A BILLION IN USE — OVER 1,000 SHAPES AND SIZES

demic in view of current expenditures and revenues.

By June, 1942, the federal debt will amount to at least $71,000,000,000. A year later, even with $7,000,000,000 raised in new taxes, the debt will have risen to more than $110,000,000,000.

Cost of the currently contemplated war program will exceed $140,000,000,000 for the 1941-43 period, more than $1000 for every man, woman and child in the country. However, the program is subject to frequent and tremendous expansion proposals, none of which are now likely to be denied.

"Bright Work" Already Fabricated May Be Used on Domestic Stoves

Limitation order restricting production of domestic cooking appliances has been amended by substituting a prohibition against fabrication of "bright work" parts using copper, nickel, chromium, or aluminum for the previous flat prohibition against the use of any such parts even if already fabricated.

Limitation Order L-23, which restricts use of iron and steel in the manufacture of a wide variety of stoves, ranges and other domestic cooking appliances during the period Jan.1-April 30, banned the use after Feb. 1 of any "bright work," metal finish or trim containing copper, nickel, chrome or aluminum.

Many of these parts already have been fabricated, and could serve no useful purpose elsewhere if manufacturers were denied the right to use them. In lifting the ban so that inventories can be exhausted, WPB ruled that no critical materials can be processed to increase these inventories, except for purely functional parts where the use of less critical materials would seriously impair operation of the product.

Truck, Bus Fleet Operators To Be Aided by Tire Program

Plans are being drafted by OPA to provide truck and bus fleet operators with emergency ration certificates so that essential long-haul trucks and buses will be able to replace blown tires and tubes on the road without undue delay.

The program, which also will apply to federal, state, county and large municipal fleets, will not broaden the existing eligibility list, as outlined in section 404 of the tire rationing regulation, nor will national tire and tube quotas be raised.

Under the plan as presently contemplated, OPA will arrange for the issuance through local rationing boards of a supply of emergency certificates to operators of fleets of 20 or more trucks or buses equal to a fixed percentage of the number of tires and tubes now in active use on the road on eligible vehicles. Fleet operators, upon obtaining a number of emergency certificates limited to the needs of their vehicles could purchase the permitted quantities of tires and tubes at once and place them at convenient points along their routes, or could retain the certificates for use as needed.

OPA Revokes Price Ceiling For Flashlights, Accessories

Emergency schedule of Dec. 10 which set maximum prices for flashlights, flashlight batteries and flashlight bulbs has been revoked.

OPA explained that the panicky buying which came with the threat of air-raids on the West coast and sent flashlight prices soaring had subsided and that orderly marketing conditions prevailed at present.

Domestic Refrigerator Prices Frozen at Current Levels

Existing prices for mechanical household refrigerators have been established as the maximums that may be charged by manufacturers in a new OPA price schedule.

The new schedule formalizes existing arrangements whereby all mechanical refrigerator manufacturers, excepting General Electric Co. and the Frigidaire Division of General Motors Corp. had received OPA approval of their 1942 model price lists. General Electric and Frigidaire had agreed with OPA to continue to sell at 1941 prices until required data for 1942 model prices were given to OPA for approval.

The schedule adopts as maximum prices the manufacturers' list prices in effect on Feb. 2, excepting in the case of General Electric and Frigidaire, as noted above. The 1942 price lists of these two manufacturers are expected to be submitted for OPA approval in the near future.

Price Ceilings Fixed for Fuel Oil Storage Tanks

Maximum prices for domestic fuel oil storage tanks, indispensable to domestic oil burner installations, are established by Price Schedule No. 96. Schedule becomes effective on Feb. 20, 1942.

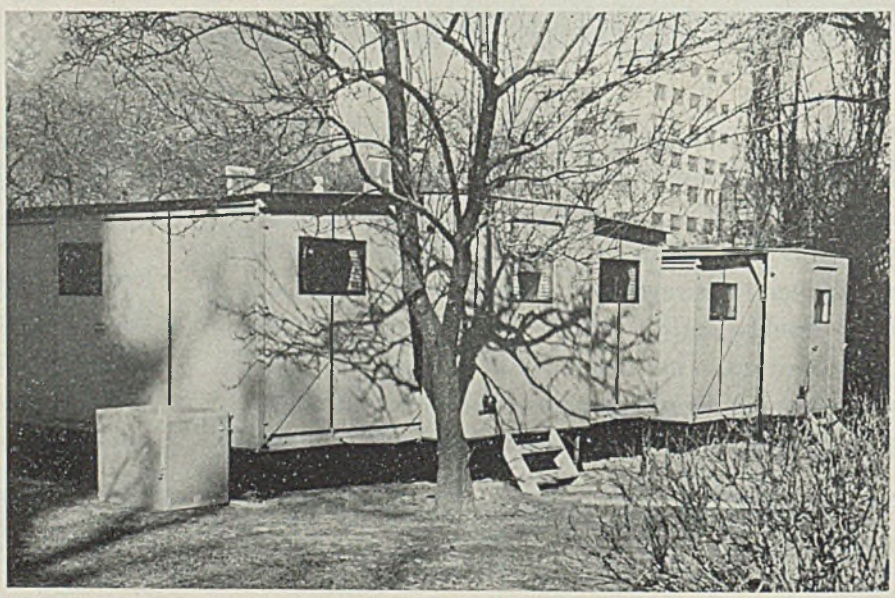
Ceiling prices apply to all sales of tanks in which the seller does not install the tank by connecting it with an oil burner.

Maximum prices for tanks delivered in the East are delivered prices and include lugs. Prices for tanks delivered in the Mid West and Far West are f.o.b. factory prices, and in the Far West include lugs.

Typical prices for a carload shipment of 26-inch, 16-gage steel, 275-gallon nominal capacity tank, are $17.35 in the East, $17.70 in the Mid West and $31.95 in the Far West.

The schedule requires every manufacturer to affix to tanks produced by him durable labels setting forth the name of the manufacturer, the size and capacity of the tank and the gage of steel used. These labels will enable purchasers to compute the maximum prices applicable to all tanks.

Defense Housing Division Feels Capital Pinch



■ Even the Division of Defense Housing is feeling the pinch in crowded Washington. Members of the division are operating from these trailers parked in the garden of the famous Porter estate—one reason why the administration would like to move "parasites" from the national capital. NEA photo

Can Output Limitation Designed To Conserve 15,500 Tons of Tin

■ DRASTIC reduction has been ordered in the manufacture, sale, delivery and use of tin cans by WPB, effective March 1 on sizes, and effective immediately on quantities.

Action is embodied in conservation order M-81 intended to save 40 per cent of the amount of tin used by the canning industry in 1941.

Simultaneously WPB granted preference rating order P-115 granting high priority ratings to canners for repairs, maintenance and operating. Emergency repairs are given A-1-a; other repairs, A-3.

Last year more than 40,000 tons of tin were used in the manufacture of tin plate for cans and it is estimated the new order reduces 1942 consumption to 24,500 tons, exclusive of lend-lease figures for both years.

Order applies both to canner and manufacturer. It places cans in four categories: Primary, secondary, special products, not essential.

Small Cans Eliminated

Part of the order lists products which are excepted from the ban on tin plate coating of more than 1.25 pounds per box of tin plate. A thickness of 1.5 pounds is permitted, assuring acid resistance, for certain types of commodities. For some products varying amounts both of tin plate and terne plate are allowed. To others all tin plate is permitted; still others, all terne plate, or alternately one or another. Detailed schedule will be made public later.

In general, small sized cans are eliminated, resulting in a saving of about 7 per cent. Bulk of saving results from curtailment and elimination of use of tin cans as containers for products which can be packed in cans of other materials or which do not have to be canned at all and from thinning the thickness of the tin plate coating on virtually all cans.

None of the restrictions apply to purchase orders bearing a higher than A-2 rating. Such orders may be filled through packing all required quantities of foodstuffs packed in tin, even though the product (such as dried beans) is in the nonessential category. In general, this is intended to meet armed services and lend-lease requirements.

The order prohibits any canner from buying, accepting delivery of, manufacturing, or using for packing, cans requiring more tin, tin plate, or terne plate for any particular product than is permitted under the order.

It prohibits a can manufacturer from manufacturing, selling, or delivering any cans except pursuant to contracts or orders validated by affidavits from canners as specified in the order.

Can manufacturers are ordered to co-operate with tin plate mills in "effectuating as rapidly and as completely as possible" a program of reducing the thickness of the tin coating on cans. Both by hot-dip coating and by electrolytic coating; and canners are required to accept such cans.

These cans, with the exception just listed, will be limited to tin coating with a pot yield thickness of not more than 1.25 pounds per base box.

Can manufacturers are ordered further to concentrate "to the greatest extent practicable" on the larger size cans; to substitute, to the extent feasible and practicable, containers made of other materials for containers made of tin plate and terne plate; and to use a minimum amount of solder having the minimum tin content for sealing cans.

Both can manufacturers and canners are prohibited from ordering from steel mills more tin plate or terne plate than is needed to produce the cans permitted by the order. If orders have already been placed in excess of such amounts, such excess must be cancelled.

Can Manufacturers Told To Fill Army, Navy Orders First

Can manufacturers who, on Jan. 27, were given quotas for uses to which cans may be put, have been ordered by J. S. Knowlson, Director of Industry Operations, to fill Army and Navy orders first and to ask for more tin or terne plate for this purpose, if necessary.

Steel Companies Adopt Electrolytic Plating Lines To Conserve Tin

■ To conserve tin and to help meet canmakers' war-time demands, United States Steel Corp. subsidiaries are installing three additional electrolytic tin plating production lines and six supplemental production lines for chemically treating black plate, Benjamin F. Fairless, president, announced last week. Both the electrolytic tin plate and chemically treated black plate will, in certain applications, be used as a substitute for hot-dip tin plate.

The new facilities will cost about $5,500,000 and are to be located in subsidiary plants in the Chicago, Pittsburgh, and Birmingham districts. One electrolytic tin plate line and two black plate treatment lines will be installed in each district.

The new lines for the production of the electrolytic tin plate will have a total annual capacity of approximately 225,000 tons which tonnage under normal conditions would require the use of 3375 tons of pig tin by the conventional hot dip method compared with 1125 tons under the new process.

Facilities will supplement the original installation of an electrolytic line at the Gary tin mill.

Bethlehem Installing Two Lines

Two new electrolytic lines for producing of tin plate, with annual capacity of about 2,500,000 base boxes are expected to be placed in operation by Bethlehem Steel Co. late this summer at the Sparrows Point plant.

Bethlehem also is installing at the same plant two bonderizing units with a total annual capacity of approximately 1,200,000 base boxes. These units will be in operation by early summer. The mill black plate so treated can be used after lacquering for some sanitary can ends, and also some general line can tops, bottoms, rings and plugs.

Price-Making Policies Studied by Brookings

■ Brookings Institution, Washington, has issued the first in a series of studies of price-making in a democracy. The initial issue is entitled, "Between Automatic and Authoritarian Price-Fixing," by Dr. E. G. Nourse, director of the Institute of Economics.

The conclusion is that advantages in material well-being are to be derived from continuation or restoration of private enterprise after the war, as compared with a planned economy, in which prices are fixed by the state. Later pamphlets growing out of this study will examine particular problems of administrative price-making as a characteristic of American business life.

Plan Three Plants To Prepare Used Tin Cans for Copper Precipitation

WASHINGTON

■ PLANS were announced last week for the construction of three plants in the Southwest, where used tin cans will be prepared for a leaching process in the precipitation of copper from mines. Defense Plants Corp., subsidiary of the Reconstruction Finance Corp., has allocated $175,000 for construction of the plants in the vicinity of Dallas and Houston, Tex., and Kansas City, Mo.

In order that the new plants will be assured of a plentiful supply of tin cans, the Bureau of Industrial Conservation has urged the mayors of the three cities where the plants will be built, as well as heads of many neighboring municipalities, to launch local can collection campaigns.

Process whereby the cans are actually converted into copper is not new, although it is a technical one with which the general public is not familiar. Paul C. Cabot, deputy chief of the Bureau of Industrial Conservation, emphasized that it has no bearing on detinning of cans for the reclamation of tin and steel.

New plants, which are expected to be ready for operation by the middle of the coming summer, will clean and shred the tin cans, after which the metal will be shipped to copper mines. There mine waters, containing copper sulphate, flowing over the shredded metal, produce copper equal in amount to the quantity of metal used. It is estimated that the mines using the processed cans will produce approximately 2000 tons of copper per month.

In his letters to the mayors of the cities and towns in the Southwest, after explaining the plans of the RFC for erecting new plants, Mr. Cabot wrote:

"Experience has shown that the best method of collecting cans is for the housewife to segregate them in containers apart from other wastes, and for the cities to collect the cans every two weeks or so instead of every two or three days, as is the case with spoilable waste.

"Specifically, we request that at the present time you do the following: Urge the householders in your municipality to segregate their tin cans as indicated above, and arrange for the collection of these cans and their removal to a central depot."

At the same time that he outlined the proposed can collection of the Southwestern cities, Mr. Cabot announced that similar collections would be inaugurated in the immediate future in the Pittsburgh and Sewaren, N. J. areas. In both those sections, it was explained, there are de-tinning plants, which process the cans and reclaim both tin and steel. The general public in those areas will be urged to save used cans, which will be collected at regular intervals by municipal trucks and moved to the de-tinning plants, which will buy the collections from the municipalities.

Rules Established for Payment for Over-Quota Nonferrous Production

Rules and regulations by which United States mine operators may obtain premium prices for over-quota production of copper, lead and zinc were announced last week by WPB and OPA.

Premium prices of 17 cents per pound for copper, 11 cents for zinc, and 9¼ cents for lead will be paid by the Metals Reserve Co., for a period of 2½ years beginning Feb. 1, 1942. Should the emergency end before the termination date, Metals Reserve Co. has reserved the right to terminate this arrangement on equitable terms.

Premiums will apply to all over-quota production after Feb. 1, 1942, regardless of when tonnage quotas are announced and actual payments begin. By continuing meanwhile to ship through ordinary channels, producers will be assured premium prices for over-quota production.

Quotas will be established by mines or groups of mines, rather than by companies, in order to avoid any possibility that expenditures for expansion of one property might be deterred by uncertainties as to future production from one mine or group of mines of the same company.

Companies which own two or more properties must account for any material decrease below quota of any one property. If it shall appear that such a decrease was due to avoidable circumstances, quotas of all properties of the company will be combined and premiums paid only to the extent that total production exceeds the total company quota.

In general, quotas will be fixed to include all output that can reasonably be expected at established market prices for the metals of 12 cents per pound for copper, 8.25 cents for zinc and 6.50 cents for lead.

Three regular classes of quotas are set up with two others to take care of special cases. The regular quotas are "zero," "intermediate" and "100 per cent." All are based upon 1941 production.

In special cases, quotas of either less or more than 100 per cent may be established, depending upon what is considered reasonable production rates. Mines which were not operating in 1941, but for which plans to operate had been made, also may receive special quotas.

In the regular classes, zero quotas apply to properties which had no production, or production of less than 200 tons in 1941; intermediate quotas to production of 200 to 600 tons, and 100 per cent quotas to production of more than 600 tons.

Quotas are established on a monthly basis. Premium prices will be paid for all production over monthly quotas. If a property fails to produce its quota in any month or months, premiums will not be paid until the deficit is made up. Methods for relief are provided in case of catastrophes such as fires or floods, which make quota attainment impossible. Once quotas are set, they shall not be raised during operation of the plan.

Copper Mills Granted Aid In Obtaining Repair Parts

Mills which roll, draw or extrude copper or copper-base alloys have been given special priority assistance to obtain repair, maintenance and operating supplies by Preference Rating Order P-106.

Order assigns emergency ratings of A-1-a and A-1-c to deliveries of material necessary to repair or avert a breakdown or suspension of operations, and a rating of A-3 to deliveries of material which will be used for repair, maintenance or operation of brass or wire mills.

The priority assistance granted by Preference Rating Order P-106 may be used only by mills to which a copy of the order has been specifically addressed, with a serial number, or by suppliers of such mills who have executed the required form of acceptance. Mills desiring to take advantage of terms of the order should apply for its use on Form PD-258, to be forwarded to the War Production Board, Ref: P-106.

Canadian Manufacturers Granted Same Priority Aid as U. S. Firms

WASHINGTON

■ FURTHER steps toward co-ordinating the war efforts of the United States and Canada have been taken. WPB Division of Industry Operations adopted procedures to make priority assistance available to Canadian firms on substantially the same basis as United States applicants.

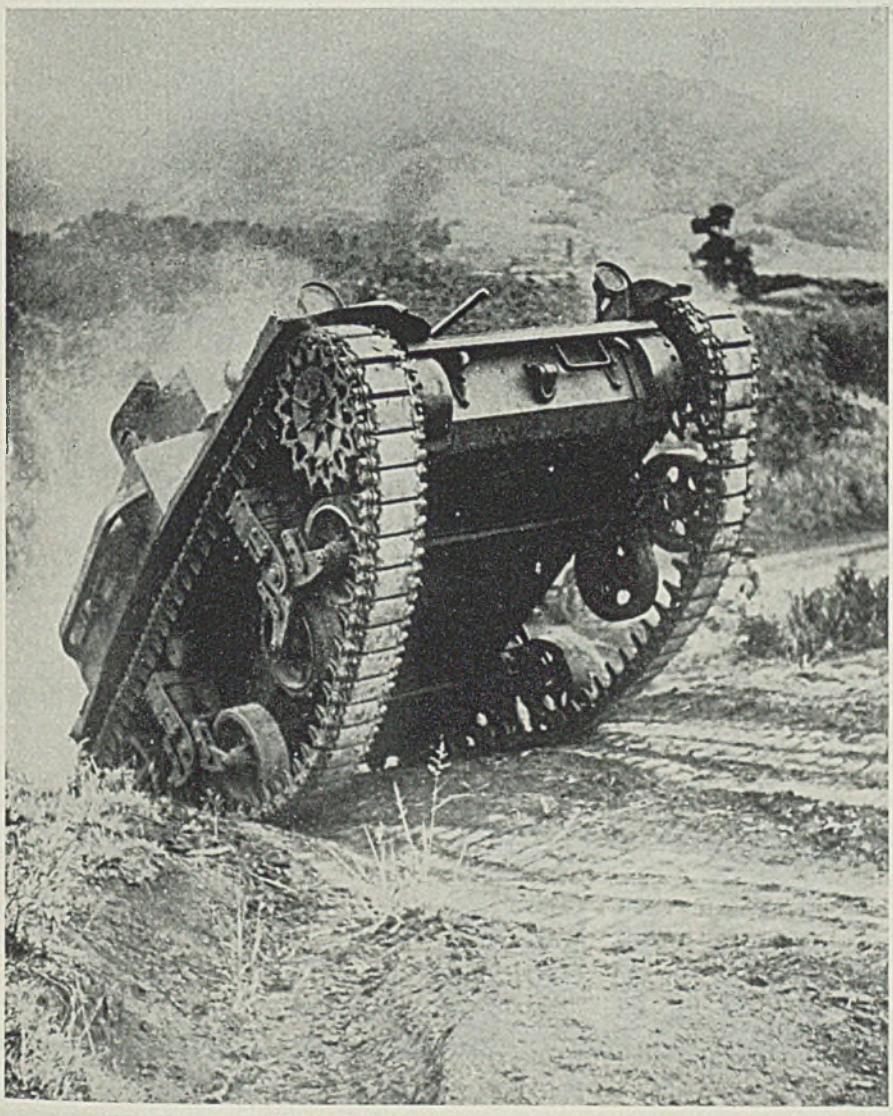
Hereafter, Canadian firms purchasing materials or manufactured products in the United States for war or essential civilian use may apply priority ratings in accordance with the terms of all appropriate general preference rating orders, or may submit individual applications for priority assistance which will be handled in Washington exactly as if they came from applicants in the United States. Priority ratings on orders addressed to United States firms will be granted only when the material or product is unobtainable in Canada.

Canadian firms wishing to apply the ratings assigned by general preference orders must first make application through the Canadian Department of Munitions and Supply, which will forward the applications to Washington. If use of the ratings is approved, they may be applied by the Canadian firm in accordance with the terms of the order in each case.

To facilitate handling of individual Canadian applications for priority assistance, a United States priorities specialist has been appointed, to be located at the office of the Department of Munitions and Supply, Ottawa, Ont.

Amendment to the repair and maintenance order, P-100, has been issued to permit Canadian firms to take advantage of its provisions, upon application, when a copy of the order has been specifically issued in their name with a serial number. Any Canadian firm to whom a copy of the order is so issued may then use the A-10 rating on purchase orders placed with United States suppliers for repair, maintenance or operating supplies not procurable in Canada. The rating will be applied by a specified endorsement on purchase orders in which the serial number assigned to the Canadian firm is included.

Arrangements are being made between the United States and Canadian governments to insure that substantially the same enforcement and compliance controls are in effect, and that substantially the same restrictions are placed on the use of scarce materials in both countries. Canadian firms using United States priority ratings will be subject under Canadian law to penalties for submitting false or misleading information or failure to comply with the terms of any preference orders used by them.



■ Hawaii's defense forces, under new unified command, are alert and equipped to meet any new enemy thrust. Here an American light tank negotiates the islands' uneven terrain. NEA photo

Canada's Ship Output To Nearly Equal Britain's

TORONTO, ONT.

■ Canada's output of merchant ships this year is expected to total almost as much in tonnage as that of British shipyards. C. D. Howe, minister of munitions and supply, announces that submarine sinkings have forced Canada to switch shipbuilding from naval to merchant vessels. Arrangements with the United States for ship steel have enabled the program to be enlarged and at the same time Canadian plate mills have increased output.

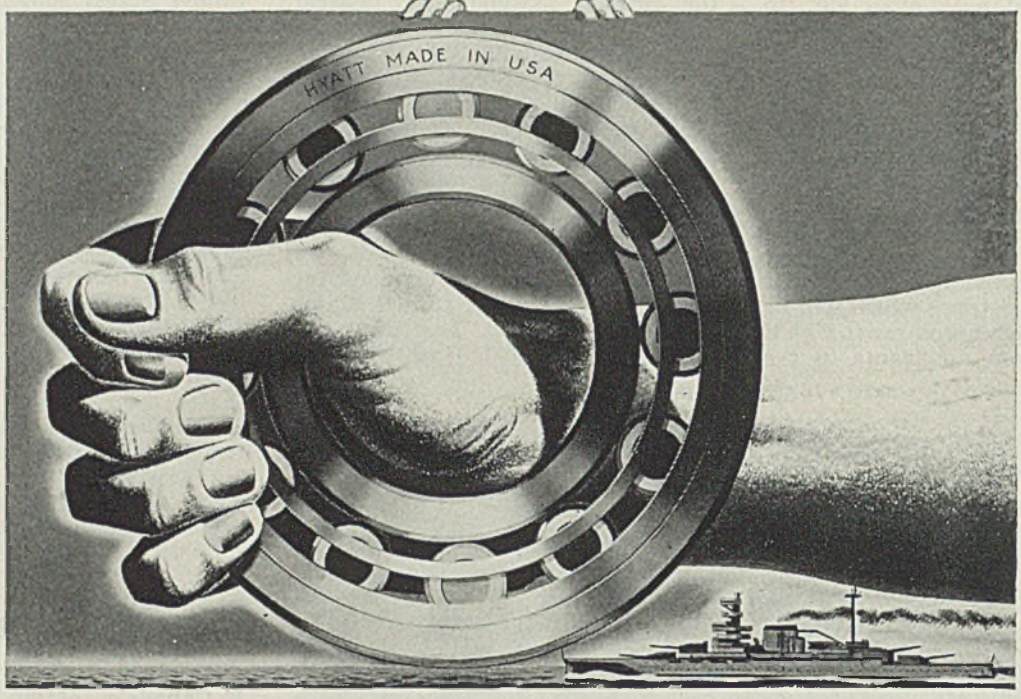
Steel Co. of Canada Ltd., Hamilton, Ont., is making close to 18,000 tons of plates monthly, compared with former rated capacity of 15,000 tons. Dominion Steel & Coal Corp. Ltd., Sydney, N. S., has its new plate mill almost ready.

Mr. Howe also announced that munitions production in 1941 was valued at more than the entire production for the last war. Output in 1942 is expected to be two and one-half times that of 1941.

A plant will be built at Sarnia, Ont., end of the petroleum pipe line from the United States, for production of synthetic rubber.

Dominion Magnesium Ltd. has been formed to establish a plant for production of magnesium metal by a new process, with initial output of 2 tons daily. The process utilizes either dolomite or brucite, large deposits of both being available.

BUSY ON AMERICA'S ★ ★ ★ BIG JOB ★ ★ ★



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ROLLER BEARINGS

QUIET

Mirrors of MOTORDOM

Acres of machinery and equipment in auto plants being moved out to make way for war production . . . Tank projects being rushed to completion . . . Chevrolet plans assembly of new combat car . . . Technical talent being spread thin, with overwork claiming some victims . . . Auto industry committed to operating rate three times peak level of 1929 . . . Unions resist training programs in jobbing tool shops

By A. H. ALLEN
Detroit Editor, STEEL

DETROIT

■ SNOW is piling up on acres of special-purpose tools, ranging all the way from small bench equipment to large presses, which literally have been ripped from their moorings in the automobile plants in this district and rolled into vacant property to make way for the new and different tools required in the production of war equipment. Tanks and guns have taken over where coupes and sedans were the business yesterday.

Some of the stored machinery is being covered with canvas, some may be moved shortly to other plants which may have need for it. All has been listed in the census of metalworking equipment which the industry's war council is making.

From a Fisher Body plant in Flint the first all-welded M-4 tank is expected in a few weeks. It will be more or less of a pilot model to permit technicians to "get the feel of the thing" and to try out new jigs and fixtures preparatory to installing them in the new Fisher tank arsenal which is going up nearby. The arsenal will be ready in June, but long before this parts and subassemblies will be moving from Chevrolet, Buick and Fisher plants in the district. The General Motors version of the M-4 tank will be powered by a diesel engine, to be made by the corporation's diesel division. The Ford version will be powered by a Ford V-8 engine developing around 65 horsepower per cylinder. The present Chrysler-built M-3 tank, prototype of the M-4, uses a 450-horsepower radial engine, but this may be changed shortly, it is said.

First of the giant M-1 tanks, weighing around 60 tons, will be started by General Motors this week. Meanwhile Cadillac in Detroit is getting set to produce a 14-ton tank, while Chevrolet in Flint is equipping two buildings for assembling a new and secret type of armored combat vehicle, somewhat heavier than a light tank.

Distinctive feature of the new M-4 tank will be its all-welded construction and relocating of the heavy gun on the full-swing center turret. Armor plate welding is said to be accomplished by an adaptation of the Linde Unionmelt process. Fisher Body is training about 1000 welders at three schools in Flint, Mich.

Key Personnel a Problem

In the face of the terrific expansion of industrial activity for war production one of the most serious problems to develop so far is the matter of key personnel. This group includes designers, engineers, metallurgists, X-ray men, chemists and others in similar fields who cannot be trained in the space of a few weeks or months the way it is possible to train machine operators, for example. Personnel in this category is becoming spread exceedingly thin and is being worked almost to the limit. They are next to impossible to replace at any salary.

An equipment supplier notes that in recent weeks several of his company's designers actually have fainted at their work from sheer exhaustion or heart trouble induced by overwork. So great has the strain become on this company's engineering department that they are forced to refuse jobs requiring completely new designs.

In the aluminum field, X-ray operators drawing $175 a month a year ago are now earning close to $400 and it is still impossible to find enough men. Broad expansion in production of aluminum parts for aircraft, which require 100 per cent X-ray inspection, has made this type of operator a much sought-after individual.

Another subject on which early government decision would be helpful is the matter of overtime for labor. The country has been definitely committed to a policy of the 40-hour week, and a change to three-shift operation on a 7-day basis is going to mean some sharp increases in costs and the invocation of escalator clauses in war contracts, if the War Labor Board upholds the demands of unions for time-and-a-half for overtime and double time on Sunday work.

On top of this is the demand of the UAW-CIO for $1-per-day increase in wages, similar to demands made on the steel industry and now in the hands of the labor board.

Unprecedented was the recent conference here between the UAW-CIO and officials of General Motors Corp. at which C. E. Wilson, president of GM, spoke for two hours to an audience of union officials and men, explaining how the corporation hoped to have 185,400 men back at work by June of this year, and 272,000 by year-end. The all-time peak for GM was 235,000 in June, 1941. The spirit of co-operation which prevailed at the meeting was in contrast to the bitterness evident at meetings in the sitdown era of 1937.

Twelve Billion Dollars

Speaking at a Society of Automotive Engineers meeting in Detroit last week, George Romney, local manager of the Automobile Manufacturers Association, said that present war contracts in the hands of the automobile industry translate into an annual production rate at peak of 12 billion dollars, the equivalent of producing 15 million cars and trucks in one year, or three times the size of the industry in 1929, its peak year. One-fifth of all the country's war production will come from the automotive industry which last year alone shipped about a billion dollars worth, or the equivalent of all contracts placed with it during World War I.

Personnel of the Automotive Council for War Production is not generally known. As now constituted, it is as follows: Chairman,

Alvan Macauley, Packard; vice chairmen, C. W. Avery, Murray Corp., C. C. Carlton, Motor Wheel Corp., and Paul G. Hoffman, Studebaker; treasurer, George W. Mason, Nash-Kelvinator; John W. Anderson, Anderson Co.; I. B. Babcock, Yellow Truck & Coach; A. E. Barit, Hudson; R. F. Black, White Motor; W. P. Brown, Briggs; E. A. Clark, Budd Wheel; A. T. Colwell, Thompson Products; Charles Davis, Davis Tool & Engineering; Edsel Ford, Ford Motor; J. W. Frazer, Willys-Overland; K. T. Keller, Chrysler; H. W. Knapp, McQuay-Norris Co.; P. V. Moulder, International Harvester, and C. E. Wilson, General Motors.

Mr. Romney gave some details as to the steps taken to obtain machines needed for a war job. As new projects are undertaken, machine lists are developed as promptly as possible covering specific requirements of the project broken down into (1) pilot line requirements, (2) 50 per cent balanced production rate machine requirements, and (3) 100 per cent balanced production rate machine needs.

Five more steps then are taken:

1. The organization holding the contract for the project tries to locate competent contractors which have machine tools available that will fit pieces or assemblies of the project.

2. The company reviews its own available machine tools and assigns to the new project every machine reasonably adaptable.

3. If other plants or organizations are a part of the company, a review is made of the parent company's available machine tool list and assignments made of every reasonably adaptable machine to the new project.

4. The Automotive Council's list of available machine tools is reviewed to obtain assignments of adaptable tools.

5. Only machines still remaining on the project list after the above processes have been completed must be acquired outside the industry.

The larger automobile manufacturers, incidentally, have operated similar surplus machinery listing services for their widely separated plants for many years. In one company records show that over a ten-year period 50,000 machines went through this central interplant clearing house. Defense work naturally intensified this exchange. During 1941, 1243 machines were checked into this company service; while 1350 were taken out and put to work.

The problem of tool shop capacity is complicated by the resistance of union committees in jobbing shops to the training and upgrading of apprentices. At present, the available skills of all the 450 shops in the Detroit area are being utilized on the basis of 10 hours per shift, 7 days a week. Most shifts are undermanned and some shops are capable of working only one shift.

Larger toolrooms, such as those in the big three motor companies, have been training and promoting men for some time and are meeting no resistance from unions because union committees are largely production workmen and are ambitious to be elevated to toolroom work. The reverse is true in the job shops which are manned almost exclusively by toolmakers who naturally guard their trade.

Four more men have been added to the staff of Ernest Kanzler, head of the automotive branch of the WPB. One is C. B. Hartner, for 25 years active in engineering and production work with Ford Motor Co. and retired since 1932. A second is Fred L. Flanders, associated with the automotive industry for 25 years in Muskegon Motor Specialties, White Motor and Houdaille-Hershey. He left the latter company in 1934, at which time he was executive vice president and general manager. A third is E. C. Brandt of Pittsburgh, for 37 years with Westinghouse and recently consultant for the machine tool and equipment division of the WPB. The fourth is William C. Klann, for 20 years associated with Ford Motor Co. and later with Murray Corp., Studebaker, Cadillac and from 1934 to 1940 with Hudson.

The new Ford armor plate mill will have some record-size machinery and equipment, including four heating furnaces 7 feet wide and 200 feet long, and four draw furnaces the same width and 330 feet long. Reported to be the largest furnaces of this type ever built, they will require some 40 carloads of brick alone in their construction. Heating furnaces have atmosphere-control equipment; draw furnaces are direct fired.

Automobile Production

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

	1939	1940	1941
Jan.	356,962	449,492	*524,073
Feb.	317,520	422,225	509,326
March	389,499	440,232	*533,878
April	354,266	452,433	*489,856
May	313,248	412,492	545,355
June	324,253	362,566	546,278
July	218,600	246,171	*468,897
Aug.	103,343	89,866	*164,793
Sept.	192,679	284,583	248,751
Oct.	324,689	514,374	*401,364
Nov.	368,541	510,973	373,892
Dec.	469,118	506,931	302,518
Year	3,732,718	4,692,338	5,108,992

*Revised.

General passenger car production has been discontinued and the automotive industry is being converted to full war production. In the future output will be primarily trucks and items in military classifications. Weekly production figures no longer will be available.

■ Last of the 1942 model Chrysler cars, deglamorized trim and all, comes off the assembly line. Onlooking officials are, left to right, S. W. Munroe, general sales manager; D. A. Wallace, president; C. L. Jacobson, vice president in charge of sales; A. M. Fleming, general works manager and H. V. Hilborg, superintendent of car assembly. The car is No. 34,325, as against total domestic production of 115,718 in the preceding year's model

The working efficiency of Molybdenum high speed steels is a matter of record in hundreds of shops. The following is an example of what a changeover to a Molybdenum high speed steel accomplished in one plant.

Operation: Drilling holes 1⅛" diameter by 7" deep.

Material: Manganese steel (1320).
Hardness: 32 Rockwell "C".

The Molybdenum high speed drills on this job increased production between regrinds 100%.

Your supplier can help you select the type of Molybdenum high speed steel best fitted for meeting your production requirements.

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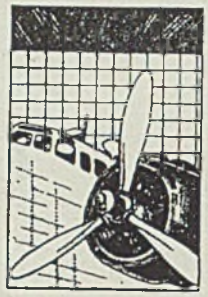
Climax Mo-lyb-den-um Company
500 Fifth Avenue · New York City

MOLY

WING TIPS



Concepts of military aviation changing as result of war, throwing additional load on research activity as well as on production . . . See output of 140 million horsepower in air engines for year. Still more plants proposed for radial engine production . . . Advisory committee has three laboratories, 183 technicians, working on research projects in co-operation with industry and services

WASHINGTON

■ WARTIME capital of the world, Washington is likewise the focal point for aviation news as well as for fan dancers, parasites and stenographers who stay out too late evenings. But anyone journeying to Washington to find out what is doing in the aviation industry might as well stay home, because the sources for such news just are not talking these days, and when they do they close the doors, draw the shades and speak in whispers.

Nevertheless it is no military secret to point out that the nation's capital does control the strings that fan out to the hundreds of airplane plants dotting the country. Army Air Forces, the navy's Bureau of Aeronautics, the National Advisory Committee for Aeronautics and the Aeronautical Chamber of Commerce are four hubs around which aviation development turns. The first two are closely tied in with determination of what the services need in terms of aircraft, the third is the government's aviation research center which has been functioning since 1915, the fourth is the trade association headquarters of the airplane manufacturing industry.

Aircraft Take Top Position

The staggering achievements of military and naval aircraft in this war—both in Europe and in the Far East—have brought aviation to a pre-eminent position in the services. Hard-bitten admirals in the navy department were dumfounded when a few Jap aircraft sent two of Britain's finest warships to the bottom in the space of a few hours. This incident meant an entire recasting of the airplane-ship picture. The navy alone jumped its aircraft procurement by some 25,000 units, realizing that naval strength becomes immobilized without both defensive and attack aircraft.

The goal of 60,000 airplanes which has been set for the industry by the President is being attacked confidently and conservative estimates are to the effect that it will not be missed by much more than 10,000 units. The projected total includes something over 20,000 training planes, compared with 11,000 trainers built in 1941, but the percentage of such craft to the total built will drop from about 55 per cent to 35 per cent.

Engine output for the current year will approximate 120,000 units, according to reliable estimates, or some 140,000,000 horsepower. This does not sound like many engines when placed alongside the 5,000,000 automobile and truck engines produced in 1941, totaling perhaps 400,000,000 horsepower, but when you consider it takes from ten to 20 times the man-hours to build an airplane engine as are required by the average automobile engine, the full weight of the air engine program can be realized.

Extensions to radial engine production, beyond those now in the works, are in prospect. Pratt & Whitney engines, now being built by Ford, Jacobs, Buick and shortly by Chevrolet, will be built by Nash-Kelvinator as well, and preliminary plans are under way for three new plants to be operated by Pratt & Whitney itself, each with several hundred thousand square feet of space.

Wright radials, now being built in the East and at Lockland, O., by the Wright company, and on the verge of production at three Studebaker plants, will be built eventually by Chrysler in a new plant near Chicago, employing a mere 25,000.

Add to these the resources of the Allison plant, now well past its December goal, and the Packard Rolls-Royce plant which despite enormous difficulties is beginning to get the British engine clicking, and the outlook for engines is promising.

Bottleneck in aluminum for airplanes is again becoming serious. In December the Aluminum Co. of America is reported to have built up a backlog of 30,000,000 pounds of metal for airplane supplies. The accelerated production program has eaten up this inventory and orders are out now virtually excluding aluminum from "anything that does not fly." In the months just ahead, the outlook for expanded production of metal is fairly good, and Alcoa alone is expected to be producing at a rate of one billion pounds a year by December.

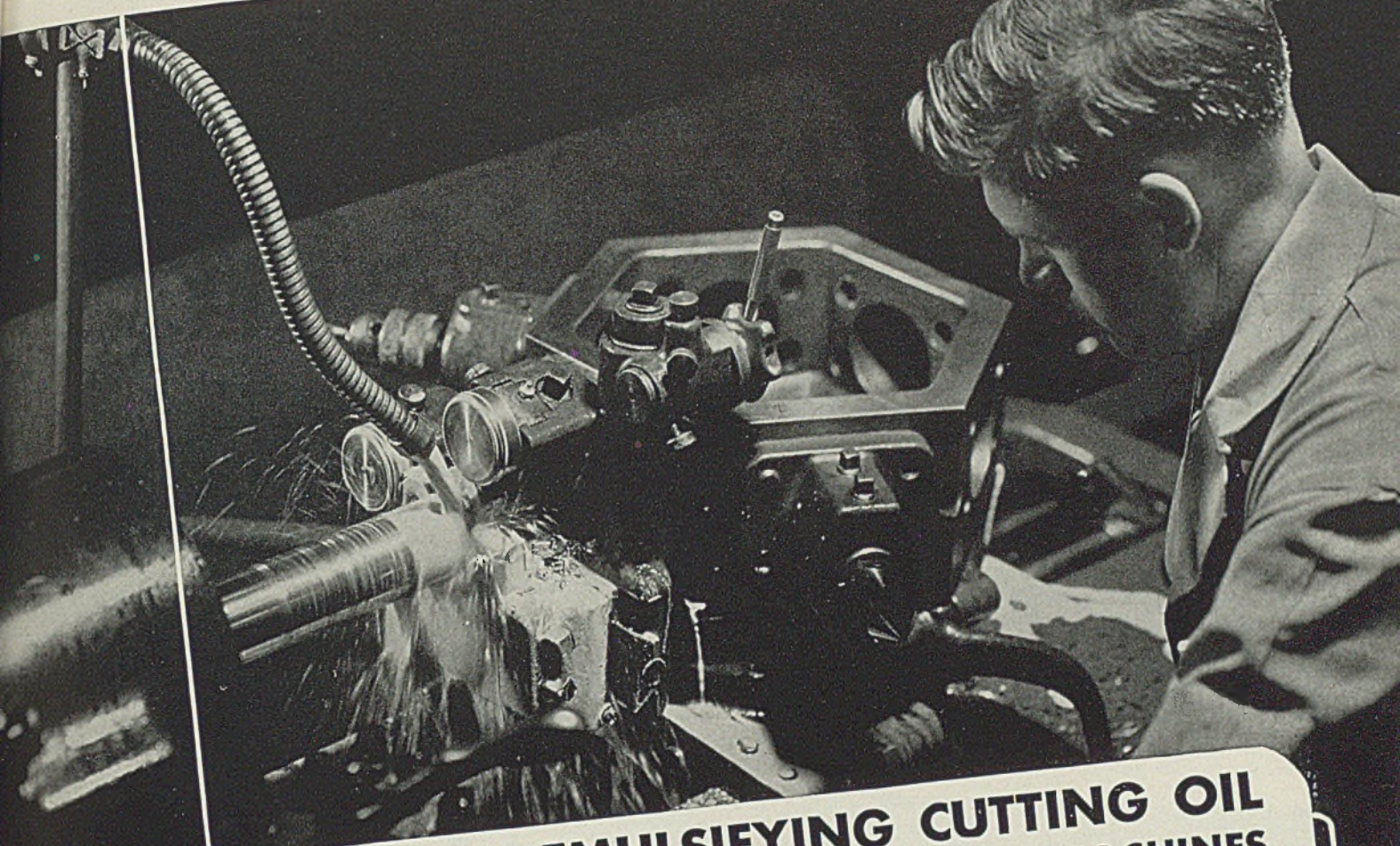
Dean of aeronautical research organizations, the National Advisory Committee for Aeronautics has oriented its activities to conform to the needs of the hour and has extended its operations to include a new aerodynamic research station in California—the Ames Aeronautical Laboratory at Moffett Field—and a new station for fundamental research on aircraft engine problems at Cleveland. At the same time facilities at Langley Field, Va., have been greatly extended. New wind tunnels are now in operation at both Ames and Langley stations.

Speed Greatest Factor

The committee's report for 1941 was its twenty-seventh, and was entirely divested of technical details for obvious reasons. However, it is pointed out that "in connection with fighter aircraft a speed of 400 miles per hour and as much more as is practicable is an obvious necessity. Factors involved include not only clean aerodynamic design, but the discovery of new principles and facts whose application in design leads to real improvements. It is not enough merely to increase horsepower and to smooth the surfaces."

This calls to mind studies which have been current for several years on the use of "jet propulsion" for aircraft. This is the term used to describe the power derived from explosive or other types of jets in moving a plane through the air. Such power, as it has been hitherto conceived, would be added to the power of the propeller, but recent reports have told of a new type of Italian plane which flew some distance at high speed without any

Keep 'em Cutting...Longer...Faster



SUNOCO EMULSIFYING CUTTING OIL PERMITS HIGHER P-Q* FOR PRESENT MACHINES

This is no time to worry over priorities on machine tools. Your urgent job is to set and maintain a higher P-Q* (Production Quota) with present equipment . . . and SUNOCO EMULSIFYING CUTTING OIL will help you do it!

SUNOCO has long been the choice of the leaders in the metal working industry. They know SUNOCO's high lubricating and heat absorbing qualities permit more pieces per tool grind . . . enable machine tools to operate at rated capacity plus . . . make possible finer finishes, closer tolerances, fewer rejects.

Let SUNOCO help you set a higher Production Quota. Call in a SUN "Doctor of Industry" — a metal working expert. Let him prove the merits of SUNOCO for stepping up production in your own shop . . . under your own operating conditions. Write today to SUN OIL COMPANY, Philadelphia, Pa.

*Production Quota

LET'S GO! U.S.A. KEEP 'EM FLYING!

PERFORMANCE DATA

OPERATION—Turning 3½" bar

MACHINE—Warner & Swasey 2-A Universal Heavy Duty Turret Lathe

CUTTING LUBRICANT—1 part Sunoco to 20 parts water

SUNOCO

SUN PETROLEUM PRODUCTS HELPING INDUSTRY HELP AMERICA

engine or propeller, apparently using jet propulsion altogether—something like the fictional rocket ship.

It is evident that the ceiling is being reached on the amount of engine power which can be translated through the propeller into movement of an airplane, and naturally research is going beyond this ceiling. The early two-blade propeller has long since been superseded by the three-blade propeller on military craft, and on the new Republic P-47 pursuit ship a four-blade propeller is standard. Next step may be combination of "pusher" and "puller" propellers on the same shaft, or even counter-rotating propellers on the same shaft.

Other ideas still in the design and test stage include the "canard" or tail-first plane; the "flying wing"; outboard propellers with inboard engines; completely new wing forms.

Continuing the summary of NACA activities, the committee notes "it has been necessary to develop a new wing section of low-drag type, to obtain accurate data in a low-turbulence wind tunnel of its lift and drag, to determine the effect of various types of flaps for increasing lift, and the action of normal and other lateral control devices."

Re-examination of the method of cowling and cooling both air-cooled and liquid-cooled engines likewise has been a part of the program. Special cowlings are required to handle the air needed to cool the engine, the oil radiator, the intercooler and the radiator of liquid-cooled engines. This work has been based on theoretical analysis and proved in tunnel and flight tests.

One of the latest developments in connection with cooling is the rubber "cuff" around the shank of each blade of a propeller, provided to facilitate engine cooling which in turn permits a smaller opening in the front of the engine cowling and improves the streamlining of high-speed radial power plants.

Millions for Research

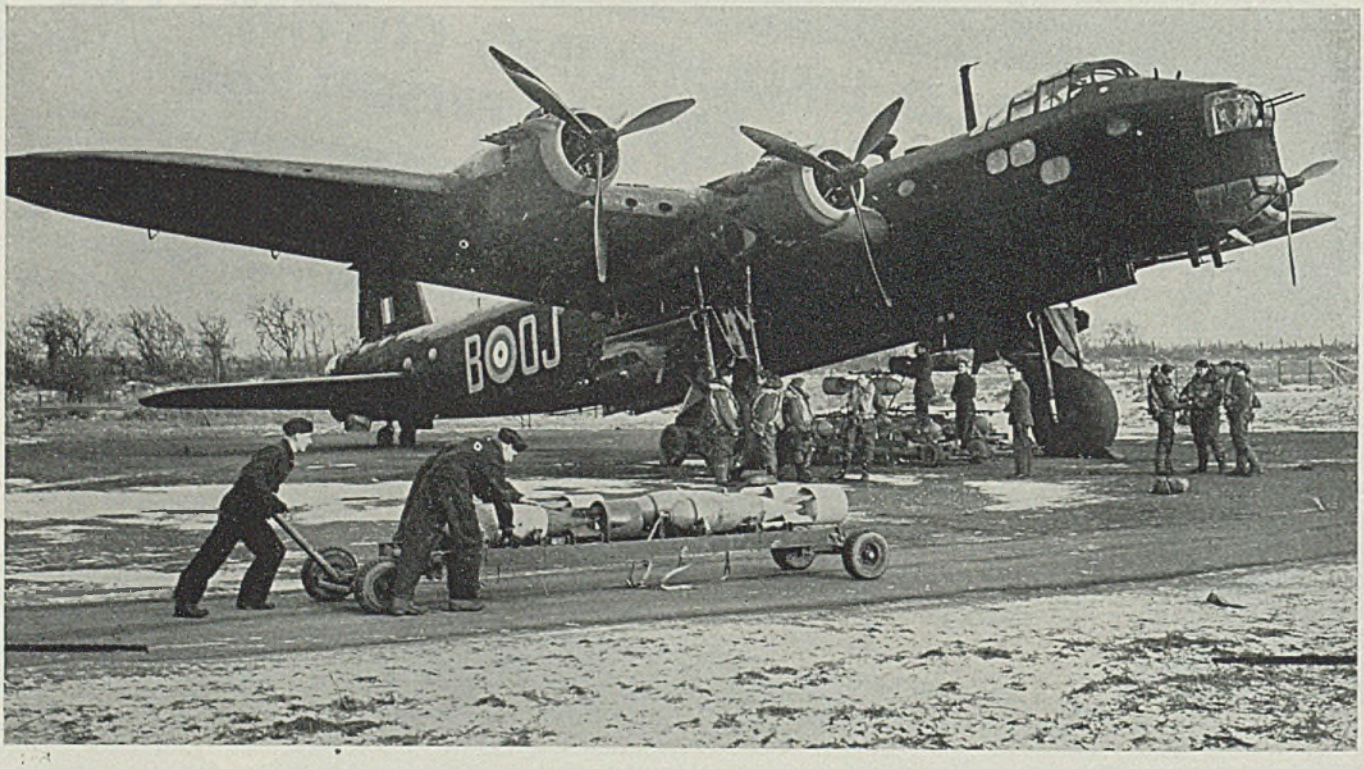
The NACA comprises 15 members appointed by the president and serving without compensation. Dr. Jerome C. Hunsaker is chairman, Dr. George J. Mead vice chairman, Dr. George W. Lewis director of research, John F. Victory secretary. Others include Dr. Orville Wright, Dr. William F. Durand, Dr. Vannevar Bush, Dr. Edward Warner, plus the heads of the Weather Bureau, Bureau of Standards, Civil Aeronautics Authority, Bureau of Aeronautics, and Smithsonian Institution. Quartered for many years in the Navy Building in Washington, the committee last fall moved to offices in an old mansion at 1500 New Hampshire Avenue.

Its technical committees comprise 183 experts and cover such general subjects as meteorological problems, lightning hazards, vibration and flutter, propellers, rotating-wing aircraft, de-icing problems, supercharger compressors, fuels and lubricants, exhaust-gas turbines and intercoolers, aircraft metals, welding problems, etc.

For the fiscal year of 1941 the committee came within $12 of spending its budget of $2,775,000, although other appropriations were provided for new activity, such as the Cleveland engine laboratory. Appropriation for the current fiscal year was increased to $4,567,890, plus additional funds for the new laboratories, bringing the total authorization for all of the committee's activities to $13,601,910. However, since the first appropriations for 1942 were made, deficiency and supplemental appropriation acts have furnished still more funds, principally for the California and Cleveland stations. The Ames Laboratory will cost over 16 million, the Cleveland plant over 13 million.

In war, air superiority depends not alone on numbers of planes. It requires above all performance—speed, altitude, range, rate of climb, fire power and armoring. These factors must look to research for their solution and the NACA, co-operating with the aircraft industry, the military services and the civil aeronautics authority, is well along the road to 'round-the-clock research.

British "Flying Freight" Takes on Cargo for Germany



■ Four-engine Stirling bomber, developing a total of 5600 horsepower, takes on a load of eight tons of bombs at a Royal Air Force station in preparation for a long distance raid on the continent. Plane has a wing spread of almost 100 feet, is 22 feet high. NEA photo

Government Inquiries

The following prime contracts are pending, with closing dates for bids as indicated. QR refers to quantity required. Bidding forms on these items can be obtained only by wiring, mentioning schedule number, to the Procurement Branch of the service heading the list of requirements. Field offices of Contract Distribution Branch, WPB, generally have available for inspection and examination, schedules, invitations, specifications and drawings (where required) concerning these contracts.

BUREAU OF SUPPLIES, ACCOUNTS NAVY DEPARTMENT, WASHINGTON

123—Adjustable wrenches, box, engineers' and pipe, QR-large. Bids Feb. 12.

311—Pipe and tubing, brass and copper, misc. sizes, QR-large. Bids Feb. 17.

315—Corrosion resisting steel, plates, sheets, strips, bars, rods, forgings and structural shapes, QR-Large. Bids Feb. 19.

327—Portable tools, power actuated, misc. types, QR-Moderate. Bids Feb. 17.

334—Coke, Grade B, size 3, QR-25 tons; Grade A, size 1, QR-2615 tons; Grade B, size 1, QR-2250 tons; Grade C, size 4, QR-60 tons. Bids Feb. 19.

335—Acetylene gas cylinders, 225 cu. ft. capacity, QR-9600. Bids Feb. 24.

340—Galley tubs, steel clad, 18 x 21 x 24", seamless construction, without covers, QR-6000. Bids Feb. 19.

342—Cable straps, steel, galvanized, or cadmium plated, 0.0625" thick, QR-1500 to 25,000 ea. of 246 sizes and types. Bids Feb. 17.

345—Welding sets, arc, 400 ampere capacity, portable, mounted on outdoor type steel wheels, with meters, accessories, and instruction books, QR-12. Bids Feb. 17.

347—Steel, round and square, ¾" to 12", QR-large. Bids Feb. 19.

361—Electric cable, QR-large. Bids Feb. 24.

363—Wire bread baskets, QR-27,000; coffeeboilers, cap. 8 qts. QR-24,000; dredge boxes, 3 x 3¾", QR-5800; milk cans with bail handles, 2 qts. cap. QR-5200; 6½ qts. cap. QR-6800; colanders, corrosion-resisting steel, capacity 11 qts. QR-15,400; cover, beating-bowl, boiler, and stock pot, QR-540; extractors, fruit juice, type A, hand type, QR-18,800; hooks, meat, steel, with wooden handles, approx. 8½" long, QR-23,600; tea kettles, QR-8450; ladles, galley, corrosion-resisting steel, QR-72,200. Bids Feb. 20.

GENERAL PURCHASING OFFICER PANAMA CANAL, WASHINGTON

5961—Sewer pipe, and fittings, brass melting crucibles, warehouse trucks, garbage cans, asphalt prepared roofing, asphalt saturated roofing felt, compressed corkboard, cork pipe covering, foundry nails, steel cement compound, ladders and foundry coke, QR-Moderate. Bids Feb. 19.

5963—Pipe fittings (elbows, tees, couplings, flange unions, etc.—black and galvanized), floor flanges, railing fittings, soil pipe fittings, closet bends, traps (coil pipe and steam), angle valves, faucets (hose and plain blbb), pipe hangers, pipe straps, hose clamps, lavatories, urinals (cast iron and vitreous china), water closets, laundry trays and water closet seats, QR-Large. Bids Feb. 17.

5969—Junction boxes, disconnect switches, pipe fittings for switchboard, conduit fittings, battery renewals, fuses, fish wire, insulating tape, lighting fixtures, glassware, lighting fixtures (marine), transmission system parts, marine switches and receptacles, lighting fixtures (household), knife switches, toggle switches, lamp sockets, cable terminals, attachment plug parts, relays, carbon brushes, electric drills, terminal tubes, distribution transformers, watthour meters, floodlight projectors, connectors and panelboards, QR-Misc. Bids Feb. 18.

5972—Brass (sheets, strips and rods), bar copper, nickel copper alloy rods, blocks (tackle and snatch), chain hoists, machine bolts, and hose (pneumatic, gasoline, oil, steam and water), QR-Moderate. Bids Feb. 20.

JEFFERSON QUARTERMASTER DEPOT, JEFFERSONVILLE, IND.

431-42-NEG-131—Butchers' saw blades, tinned dippers, cast iron griddles, tin lipped measures, bake and roasting pans, muffin and cake pans, retinned stock pots, butcher saws, dough testing thermometers, butchers' cleavers, frying pans, and pie plates, quantity ranges from approx. 10,000 to 200,000 on 24 items. Bids Feb. 17.

WAR DEPARTMENT, AIR CORPS WRIGHT FIELD, DAYTON, O.

42-1945—Drill, radial, 13" column, 4' arm for operation on A.C. 220 V., 3 phase, 60 cycle, current, QR-7; 9" column, 3' arm, QR-29. Bids Feb. 19.

42-1947—Welder, electric, spot, for aluminum alloys and stainless steel, QR-18. Bids Feb. 18.

42-1950—Kit, battery, servicing, QR-740. Bids Feb. 17.

42-1965—Machine, pipe cutting and threading, ½" to 2" pipe capacity, QR-6. Bids Feb. 18.

Sub-Contract Opportunities

Data on subcontract work are issued by local offices of the Contract Distribution Branch, WPB. Contact either the office issuing the data or your nearest district office. Data on prime contracts also are issued by Contract Distribution offices, which usually have drawings and specifications, but bids should be submitted directly to contracting offices as indicated.

New York office, Contract Distribution Branch of WPB, 122 East Forty-Second street, New York, reports the following subcontract opportunities:

S-44: New York city firm building tanks in 1000 lots wants subcontractors to furnish steel castings weighing 3 to 150 pounds.

S-45: Several firms building tanks are seeking subcontractors who can cut steel gears. Machines needed are 24 to 26 inch Gleason spiral bevel gear cutters. Gear blanks will be furnished by prime contractor.

S-46: New York city manufacturer of aircraft instruments is seeking subcontractors who can furnish bronze gears, as well as other small screw machine products. Gears measure up to 1-inch diameter, 2-inch length, tolerance .001. Quantity is large.

S-47: Pontoon bridge manufacturer requires steel castings. Company wants quotations on castings rough or machined. Parts include head cap 7⅝ inches long, 4-4½ inches in diameter column foot 5⅜ inches long, 4½-inch diameter; column foot bearing 3⅜ inches high, weight 30 pounds. Material is cast steel quantity 350 each. Prime contractor will furnish master patterns, subcontractor to build own fixtures.

S-48: Long Island builder of aircraft engines is seeking sources of small steel and aluminum parts. These include slotted couplings, plugs, plug caps and cups in quantities of 500 to 2500. All but couplings require hand screw machines or turret lathes. Couplings require universal milling machines, turret lathe, broaching machine.

S-49: New York manufacturer of relay housings wants subcontractors to furnish left hand No. 1 acorn dies for cutting stainless steel. Quantity, 100. Material, high speed steel. Requires lathe, tap, milling machine, heat treating equipment, grinders.

Newark, N. J., office, Contract Distribution Branch, Production Division, WPB, 20 Washington Place, reports the following subcontract opportunities:

No. 117: A large prime contractor is seeking facilities for fabricating steel condenser shells. Steel forgings for flanges and nozzles, ⅝-inch steel shells, welded construction per A.S.M.E. code for unfired pressure vessels. This is a production job. Prints available.

No. 118: Prime contractor requires for machining a part that will be provided in a semi-finished state. Small turret lathes required. Quantities will run from 200,000 to 300,000 per month for the duration. Prints available.

No. 119: Prime contractor seeking facilities for finishing small parts requiring small turret lathes and hand screw machines. Not a great quantity involved, but ability to work to close tolerances required. Some heat treating required. Prints available.

No. 120: Prime contractor seeking facilities for boring large condenser tube heads. Head approximately 6 feet x 13 feet. Over 6000 tube holes per head, besides flange holes. Facilities can be kept busy for months. Prints available.

Cleveland office, Division of Contract Distribution, WPB, Union Commerce building, is seeking contractors for the following:

84-26: Subcontractor to machine complete and heat treat trunnions. Equipment indicated: Lathes, horizontal boring, drilling, spotfacing, threading, heat treating, external grinding, sandblast, and magnaflux inspection. Material furnished by prime contractor. Quantities 150 each of two parts. Tolerances close. Prints on file in this office.

85-26: Subcontractor to machine complete 29 medium sized parts from bar stock and forgings S.A.E. 1030, 1045, 4335, 4640. Equipment: Automatic screw machines; mill; drill presses; broach; heat treating and annealing; chucking lathes; surface, internal, external grinders. Limits close. Quantities 250 per month of each part. Tool dies and fixtures to be designed and built by subcontractor. Blueprints on file in this office.

86-26: Foundry capacity to furnish approximately 1000 steel castings, ranging in weight from 1¼ pounds to 420 pounds. Total weight of entire requirement approximately 35 tons. Delivery at once. Pattern equipment available. Blueprints on file in this office.

MEN of INDUSTRY

■ **E. E. ALDOUS** has been elected president and a director, Scully Steel Products Co., Chicago, a United States Steel Corp. subsidiary. Mr. Aldous, formerly manager of sales for United States Steel subsidiaries at Houston, Tex., has been associated with corporation subsidiaries many years in various capacities.

L. B. Worthington, who has spent his entire business career with Carnegie-Illinois Steel Corp., since August, 1941, as manager of sales, bar strip and semifinished materials at Pittsburgh, has been elected vice president and a director of Scully, while **Charles B. Vernooy** has become controller, secretary and a director. Mr. Vernooy formerly was staff assistant of the procedure section, American Steel & Wire Co., Cleveland.

♦

Walter Geist, vice president, Allis-Chalmers Mfg. Co., Milwaukee, has been placed in charge of the newly created centralized sales administrative department, established to coordinate the company's sales policies.

♦

E. W. McNeill, secretary-treasurer; **H. C. Mayer,** works manager, and **Aaron Waines Jr.,** sales manager, Ohio Seamless Tube Co., Shelby, O., have been elected directors of the company.

♦

F. W. McChesney and **Neal L. Parker,** industrial department, General Electric Co., Schenectady, N. Y., have been appointed assistant managers of sales, industrial manufacturers section and machinery manufacturers section, respectively. Mr. McChesney joined the company in 1918, while Mr. Parker has been associated with the company since 1920.

E. E. Aldous

L. B. Worthington

N. L. Parker

♦

W. Everett McLaine has been appointed director of public relations, and **Edward C. Myers,** assistant director of public relations, United States Steel Corp. subsidiaries, in the Pittsburgh district, with offices at 436 Seventh avenue, Pittsburgh.

Walter E. Camp, formerly director of public relations, Pittsburgh district, Carnegie-Illinois Steel Corp., has become assistant to **J. Carlisle MacDonald,** assistant to chairman, United States Steel Corp., New York, who, for the chairman of the board, exercises general direction of the public relations activities of the corporation and its subsidiaries. The appointments are effective Feb. 16.

Mr. McLaine, heretofore has been in charge of public relations activities in the Washington office of subsidiary companies, while Mr. Myers has been on the public relations staff of the United States Steel Corp. of Delaware in Pittsburgh.

♦

V. A. Chern, 15 Gramercy Park, South, New York, has been appointed sales and service representative in the New York area for Progressive Welder Co., Detroit.

♦

Richard J. Mulroney, the past seven years sales engineer, Lehon Co., Chicago, has been appointed Northwest railroad representative, Buda Co., Harvey, Ill., with headquarters in St. Paul.

♦

John A. Stephens, director of industrial relations, and **Roger M. Blough,** general solicitor, United States Steel Corp. of Delaware, Pittsburgh, have been elected members of the board of directors and the executive committee.

♦

N. E. Donnelly, district manager, has been placed in charge of the Washington office of Buda Co., Har-

F. W. McChesney

vey, Ill. He will be assisted by **V. D. Lake,** the past three years sales engineer. Headquarters of the Washington office are at 1460 Church street.

Col. H. H. Frost, vice president, formerly in charge of Buda's Washington office, has returned to active duty in the United States Army.

♦

John W. Sheffer, associated with American Car & Foundry Co., New York, 34 years, has been appointed general electrical engineer. He joined the company's Berwick, Pa., plant in 1908, as electrical engineer, later becoming assistant to the general superintendent and plant engineer. Interested in welding, he was responsible for the development of the Berwick electric rivet heater. In 1926 Mr. Sheffer was transferred to New York and since that time has been occupied with improvement and development problems in the several plants.

♦

Edward E. Butler has been elected executive vice president, Vinco Corp., Detroit, manufacturer of gages and machine tools. The past several years Mr. Butler has been in charge of production for A. M. Kidder & Co., member of the New York Stock Exchange.

♦

R. S. Hudgins, 965 Farmington avenue, West Hartford, Conn., and **Charles E. Washburn,** 258 Park Square building, Boston, have been appointed sales representatives in the eastern district by McKenna Metals Co., Latrobe, Pa. They will operate under **J. A. Deakin Sr.,** eastern sales manager, 50 Church street, New York.

♦

Walter P. Southard, sales representative of the Cleveland office of Trundle Engineering Co., Cleveland, has been appointed vice president, and will be in charge of the New York sales office. Mr. Southard, whose headquarters will remain in

John W. Sheffer

Cleveland, will assume the duties formerly performed by **A. Dangler,** who has resigned. Mr. Southard has been associated with Trundle Engineering since 1936.

♦

Frank E. Shurts has been elected president, American Swiss File & Tool Co., Elizabeth, N. J., succeeding the late Paul F. Reichhelm. **R. D. Macdonald** has been elected vice president and treasurer, and **Philip Schaeffer,** secretary. Mr. Shurts has been identified with the company since 1919, before which he was engaged in shop and engineering work many years. Mr. Macdonald joined the company in 1930.

♦

Harmon S. Eberhard has been elevated to a vice presidency of Caterpillar Tractor Co., Peoria, Ill., as announced in STEEL, Feb. 9, p. 28. **C. G. A. Rosen,** heretofore assistant chief engineer in charge of diesel research, has been placed in charge of the newly created research department. **G. E. Burks** has been promoted to chief engineer. Since 1938 he had been assistant chief engineer in charge of engine design. **J. R. Munro,** who has been appointed general factory manager, formerly was factory manager, tractor and engine divisions, while **Charles A. Woodley,** heretofore assistant factory manager, has become factory manager, tractor division.

♦

Albert A. Hanford has joined the sales department of Manning, Maxwell & Moore Inc., Bridgeport, Conn., to extend its program of training for company salesmen. He formerly was assistant to the director of dealer relations, Johns-Manville Corp., New York.

♦

Donald T. McDonald has been appointed manager of sales promotion and publicity, Crocker-Wheeler Electric Mfg. Co. Inc., New York. Before joining the company in 1941, he was associated with Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., in advertising and promotional activities.

♦

George A. Mohlman has been elected president, Package Machinery Co., Springfield, Mass., succeeding **Roger L. Putnam,** who becomes chairman of the board. Mr. Mohlman has been associated with the company as vice president since 1919.

♦

Thomas N. Wynne, operating vice president, Indianapolis Power & Light Co., for 18 years, and the past ten years a consulting mechanical engineer, Indianapolis, has been appointed acting manager, Chicago office, contract distribution branch, War Production Board. He succeeds **Thomas S. McEwan,** resigned.

♦

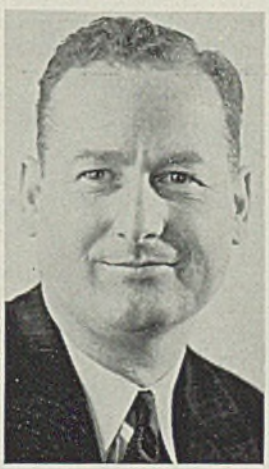
Mathias Klein, manufacturing superintendent, propeller division, Curtiss-Wright Corp., Indianapolis, has been appointed chief production engineer of the division. Mr. Klein became associated with Curtiss-Wright in 1938, after a long association with Pierce-Arrow Motor Car Co., Buffalo.

♦

Robert A. Lambeth, treasurer,

Harmon S. Eberhard

Charles A. Woodley



G. E. Burks

C. G. A. Rosen

J. R. Munro

North American Aviation Inc., Inglewood, Calif., has been named vice president and treasurer. **Raymond H. Rice,** chief engineer, has been promoted to vice president in charge of engineering, and **J. S. Smith,** to vice president in charge of manufacturing.

♦

Roy J. Wensley, formerly assistant general manager, I-T-E Circuit Breaker Co., Philadelphia, has been promoted to general manager. Prior to joining the company in 1935, Mr. Wensley had served about 18 years in engineering capacities with Westinghouse Electric & Mfg. Co.

♦

Arthur T. Cox Jr. has been elected vice president, Lincoln Electric Railway Sales Co., with headquarters in Chicago. Mr. Cox was formerly sales manager, Bettendorf Co., Bettendorf, Iowa, prior to which he was a district sales manager in the Industrial Sales Division of Lincoln Electric Co.

Arthur T. Cox Jr.

♦

A. W. Thorson, the past two years assistant fuel service engineer, Chesapeake & Ohio Railway Co., has been appointed assistant to **Robert E. Doherty,** president, Carnegie Institute of Technology, Pittsburgh. He will assist President Doherty in securing financial support for the Coal Research Laboratory and will also aid **Dr. H. H. Lowry,** director of the laboratory, with its general business operations.

♦

D. E. Ralston has been named executive assistant to the general manager, Oldsmobile division of General Motors Corp., Lansing, Mich. He formerly was in charge of Oldsmobile's automotive operations. **R. J. Wilkins** has become manager in charge of guns, shells, cannon and all other production at the Oldsmobile plant. **R. E. Griffin,** production manager of all departments, now has supervision over the division's contracts, subcontracting, buying, expansion of all ordnance production, schedules and methods, while **John Dykstra,** factory manager, during the automobile production era, now becomes factory manager in charge of all the division's gun plants.

Roy J. Wensley

♦

Donald C. Bakewell, vice president, Blaw-Knox Co., Pittsburgh, was awarded the Lorenz medal for 1941 by the Steel Founders' Society of America at its annual meeting in Chicago last week. The medal is awarded to the individual in the industry considered to have performed the outstanding service for the steel castings industry during the preceding year. Mr. Bakewell served the society as president the past two years.

MEETINGS

Quiz Program Scheduled for Purchasing-Sales Meeting

A question-and-answer period will feature the second annual Purchasing-Sales meeting, sponsored by the Chicago Sales Executive Club and the Purchasing Agents' Association of Chicago, at a dinner in Hotel Sherman, Chicago, Feb. 19. Questions to be answered by experts are in three groups: Relation Between Buyer and Seller; Making Sales and Sales Calls More Effective; War Program.

The program is in charge of V. C. Logan, branch manager of Systems Division, Remington-Rand Inc., and H. L. Brueggemann, director of purchases, Acme Steel Co., Riverdale, Ill.

Safety Convention Aims to Promote Greater Output

Greater New York Safety Convention and Exposition will be held in Hotel Pennsylvania, New York, March 3-6. Program includes two sessions on traffic control for national defense, and a discussion of "Guarding for Production."

Conference To Study New Marketing Difficulties

A conference sponsored by the marketing division, American Management Association, to discuss wartime problems of selling organizations in the industrial and consumer fields, will be held in Hotel Roosevelt, New York, March 4-5.

Charter Chapter of Tool Engineers in Washington

A new chapter of the American Society of Tool Engineers, known as the Potomac chapter, has been chartered in Washington. It is the forty-eighth in the society and has been formed in time to send delegates to the annual convention in St. Louis, March 26-28. R. C. Harbst, chief tool and gage designer, U. S. Navy Gun Factory, Washington, is chairman.

Convention Calendar

Feb. 21-22—Institute of Scrap Iron and Steel Inc. Annual convention, Hotel Sherman, Chicago. Date changed from Jan. 6-8. E. C. Barringer, Normandy building, 1626 K street, Washington, D. C., is executive secretary.

March 2-4—American Road Builders' Association. Defense Highway Congress at Peabody hotel, Memphis, Tenn. Charles M. Upham, 914 National Press building, Washington, D. C., is managing director.

March 2-6—American Society for Testing Materials. Thirteenth spring meeting and 1942 ASTM committee week. Hotel Cleveland, Cleveland. C. L. Warwick, 260 S. Broad street, Philadelphia, is secretary.

Anaconda, Aluminum Co. Co-operate in War Need

Co-operation of business in war production is illustrated in recent action by Aluminum Co. of America and Anaconda Wire & Cable Co. Following declaration of war on the Axis the Aluminum Co. faced immediate diversion of most of its aluminum to airplane manufacture, resulting in idleness for its machinery for manufacture of electrical wire and cable.

At the same time Anaconda found its facilities overloaded to supply increased war demand for copper electrical wire and cable. Harold V. Engh, executive vice president of Anaconda, and R. R. Stevenson, general superintendent of the Aluminum Co., made an agreement by which the idle cabling machinery was turned over to Anaconda for a figure substantially under its original cost.

Production Pools Unite; Ask Better WPB Support

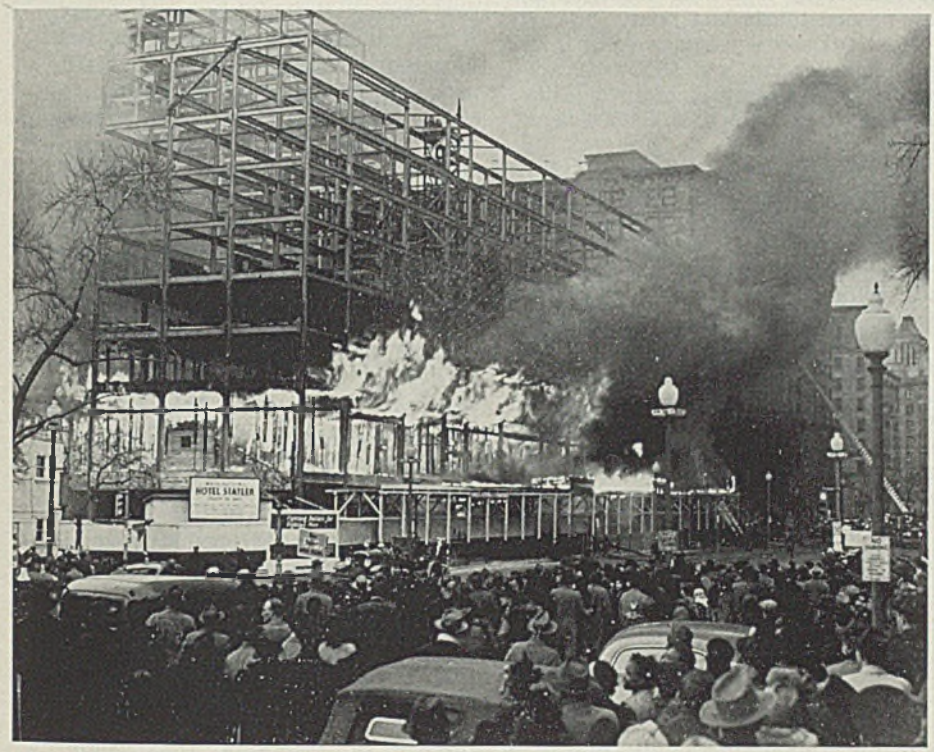
CHICAGO

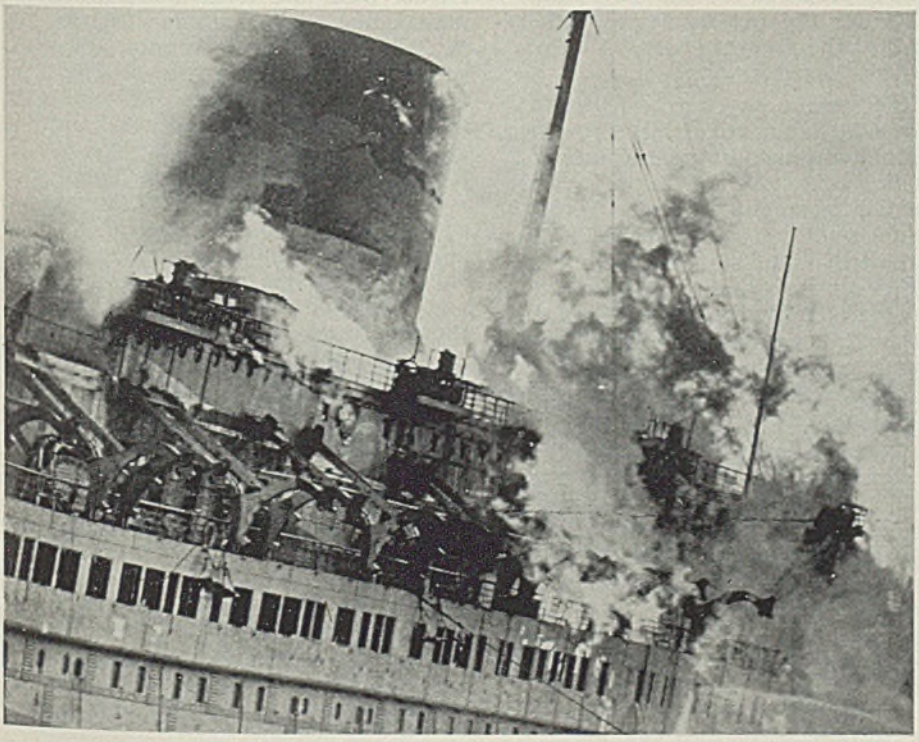
■ Representatives of production pools in Chicago, Kewanee, Peoria, Elgin, Mattoon, Woodstock and Bloomington, Ill., and Elkhart, Ind., met in the office of the Metal Fabricators Institute, a production pool, and formed a federation of pools known as Associated Midwest Groups. Ellsworth H. Johnson, executive secretary of the institute, was named temporary chairman.

Purpose of the organization is to carry the pool theory a step farther by uniting experience and ideas of the component groups.

The major proposal was that the War Production Board and other officials be urged to "give some real authority to administer the pool plan and to act officially as a liaison between the armed forces and organized small business." Consensus was that no one has authority to do anything except give advice and carry out the purely engineering side of pool organization.

None of the groups in the new organization has received contracts as a group from any of the armed forces, and although they have been organized for several months, many have not received official certification by WPB nor legal clearance by the Department of Justice. The group represents 210 companies, employing 32,000.





Plans Completed for Traffic Allocation

CHICAGO

■ To insure an uninterrupted movement, no congestion and speedy handling, the nation's war traffic will be allocated among the various transportation agencies, declared Joseph B. Eastman, director, Office of Defense Transportation, Washington, in speaking before 1200 industrialists, shippers and transportation executives here Feb. 5. Meeting was sponsored by the Traffic Club.

Shortage of facilities for emergency demands of the armed forces, the war industries and civilian population is almost certain, Mr. Eastman declared.

The No. 1 problem, he contended, involves the materials situation. "If the carriers are to function effectively and well, plainly they must have materials necessary to keep their equipment and facilities in good working order; they must be able to replace worn equipment and must have whatever new equipment and facilities that may be necessary to meet the demands of an increasing traffic."

1,500,000 Cots Awarded

■ Orders for 1,400,000 folding steel cots have been distributed to 22 bedding manufacturers in 12 states by the Chicago Quartermaster Depot. Contracts totaled more than $4,500,000 and lots ranged from 3000 to 150,000 cots. Contracts also were placed for 132,400 canvas folding cots costing nearly $500,000.

✦

Fires Aid Axis

■ Fire struck two projects that would have helped in United States' war effort early last week. Above, the new Statler hotel in Washington, counted upon to relieve the capital's housing shortage, is shown as flames swept through the wooden forms used for setting up the concrete floors. The fire will cause much delay in completing the structure. Below, the former French luxury liner NORMANDIE, taken over by the United States and being converted for naval use, caught fire when sparks from a worker's torch ignited a life preserver, causing damage estimated at $5,000,000. NEA photos

Steel Capacity Up 4,418,000 Tons to 88,570,000; Pig Iron, 60,394,000 Tons

■ ANNUAL steel producing capacity in the United States was increased by 4,418,000 net tons last year to a new record total of 88,570,000 tons, according to American Iron and Steel Institute, New York. At the beginning of 1941 the nation's steel capacity was rated at 84,152,000 tons.

Since Jan. 2, 1940, installations of new equipment have raised steel capacity by 6,950,000 tons. The increase in the last six months of 1941 was 2,421,000 tons. Further expansion in capacity is under way.

Last year's increase in steel capacity brought the total over 21 per cent above the 1929 capacity of 72,985,000 tons.

The gain last year was accounted for by large increases in open hearth and electric furnace capacity for making steel. Additional open hearth capacity totaled 3,542,000 tons, bringing the total of such capacity to 78,107,000 at the beginning of 1942.

Electric furnace capacity was increased by 1,151,000 tons to a new peak of 3,738,000 tons. This represented a gain of nearly 45 per cent last year in the capacity of electric furnaces. Such capacity has advanced nearly 99 per cent from the total of 1,883,000 tons at the beginning of 1940.

Bessemer steel capacity declined slightly last year from 6,997,000 tons to 6,721,000 tons.

Pig iron and coke capacity of the steel industry was also enlarged to new record totals last year.

Blast furnaces producing pig iron had a total capacity of 60,394,000 net tons at the beginning of 1942. This represented a gain of 2,784,000 tons last year.

The increase in pig iron capacity last year reflected the addition of five new blast furnaces, and the return to service of five long idle furnaces which have been rebuilt. Several million tons are being added to pig iron capacity this year.

Coke capacity was increased to 54,532,000 tons as of Jan. 1, 1942. This was a gain of 1,564,000 tons over the capacity of 52,968,000 tons on June 30, 1941, when this compilation was issued by the institute for the first time.

Bureau of Mines Proposes Domestic Manganese Program To Fill All Needs

WASHINGTON

■ PROGRAM designed to provide sufficient manganese from domestic sources to produce 87,000,000 tons of steel annually has been developed by the Bureau of Mines, Secretary of Interior Harold L. Ickes said last week.

Mr. Ickes said the bureau's program would free the steel industry from dependence on manganese imports within a year. It contemplates the utilization of low-grade domestic ores, made possible through the development of several processes which have been tested by the bureau in laboratories and in pilot plants in the West.

The bureau reported that in order to obtain rapid use of the program it is prepared to:

1. To make available its knowledge, experience, technical personnel, and processes to industry so that industry can benefit from the work the bureau has done, and to supervise operations if industry so requests.

2. If industry is unable to undertake the production rapidly, the bureau is prepared to assume responsibility for the necessary production itself at the request of the War Production Board.

The specific program provides for the establishment of eight mills, three hydrometallurgical plants including one electrolytic unit, and one matte smelting plant. The 12 plants would be established in 10 locations in eight states. The states are Arizona, Arkansas, Minnesota, Montana, Nevada, New Mexico, South Dakota and Utah. All these plants can be in operation at the end of one year, and many at the end of nine months.

Careful calculations indicate that a capital investment of less than $38,000,000 in mining operations and processing plants will be required to produce the amount of manganese specified. At prices only slightly above the present price of $75 per ton for pure metallic manganese in nodulized concentrates at Butte, Mont., the whole capital cost can be amortized in three years. After amortization, the price is expected to be 20 per cent below the present price. A minimum of 526,000 tons of metal annually is provided for in the program with a maximum of approximately 560,000 tons. This includes 12,000 tons of electrolytic manganese which is of special value in low carbon steels, for shells, and in certain types of stainless steels. Approximately 11,500,000 tons of domestic ores can be processed annually.

The program proposed by the bureau is divided into two steps. Six custom mills and one hydrometallurgical plant can be established first, using the higher grade ores. After careful consideration of the larger resources available and the methods of treatment suitable to each ore, the following locations were proposed: Customs concentrators at Deming, N. Mex.; Batesville, Ark.; Parker Dam, Ariz.; Philipsburg, Mont.; Delta, Utah; Garfield, Utah; and Las Vegas, Nev., where a leaching plant and electrolytic plant can be established. These plants could produce a minimum of 213,620 tons of manganese metal equivalent annually, and would require an investment of $14,100,000.

The second step in the program includes plants at Artillery Peak, Ariz., on the Cuyuna range, Minnesota, and at Chamberlain, S. Dak. These plants could produce a minimum of 312,175 tons of manganese metal equivalent annually, and would require an investment of $24,000,000.

Fifty different ore bodies could be used in the program, including properties in the Batesville-Cushman District in Arkansas, the Aquila, Parker Dam and Wickenburg areas in Arizona, the Paymaster District in California, Granite county, West Butte and Wickes areas in Montana, Drum Mountain, Simpson Mountains, Kanab, Maryville and Tintic districts of Utah, the Caliente, Ely, Pioche, Battle Mountain, Valmy areas of Nevada; Three Kids, Annex and Las Vegas-Wash areas of Nevada, the Cleveland area in Idaho, the Cuyuna Range area of Minnesota and the South Dakota area near Chamberlain.

Several of these ore beds could be exhausted, during the war period, but others could with the new processes, be used to supply the nation's steel needs for many years. The largest deposit, although of very low-grade ore, is at Chamberlain, S. Dak.

Program proposed by the bureau includes the advance purchase of ores during the period of construction of the mills and hydrometallurgical plants so that full operation could be obtained rapidly.

Mining Steel Mill Slag Dumps for Metal Scraps Discarded Years Ago

YOUNGSTOWN, O.

■ THERE'S "gold"—thousands of tons of precious scrap—in the hills of open-hearth slag in the Youngstown district. "Scrap mining" has become profitable.

"Scrap miners" employed by Republic Steel Corp. are digging monthly 1000 to 1500 tons of scrap—$20,000 to $30,000 worth of it at current prices—in a 20-year-old slag pile at the company's Warren plant. Mining operations are being greatly expanded, as this scrap from slag piles is helping to prevent a more serious decline in Youngstown district steelmaking operations.

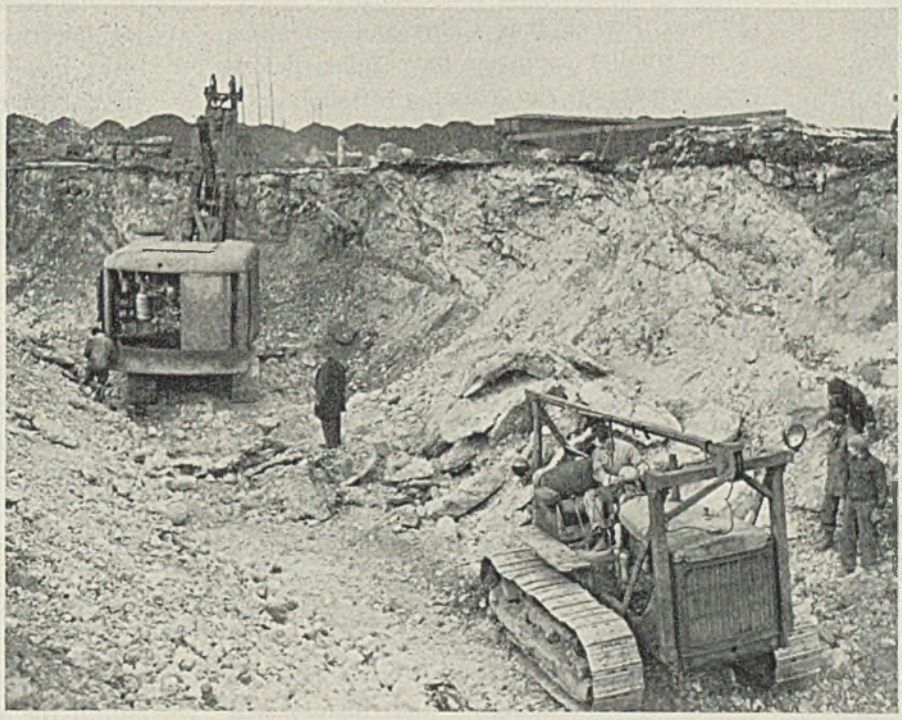
Baffled by the scrap shortage and swamped with war orders, Republic some months ago cast about for supplies to augment dwindling receipts from regular sources. The company bought all it could, wherever it could. Then it sorted out spare parts in mill yards and storage piles. Republic's Youngstown plant unearthed 3000 tons of scrap monthly for three months in its own yards—even picking up old steel plate floors in some mills and replacing them with concrete floors.

One executive recalled how metal was spilled from open-hearth ladles and that "skulls" which "froze" in the ladles were dumped on slag piles, because they were too expensive to pick up, while scrap was cheap and plentiful.

So Republic bought some bulldozers and diesel-powered shovels and dug into the slag piles dumped by the Warren open-hearths when they were owned by the old Trumbull Steel Co. This was one of those companies merged to form the Republic Iron & Steel Co., later Republic Steel Corp.

Batteries of searchlights were erected. Laborers picked up the smaller pieces uncovered by a power shovel. Tractors working in pits 18 to 20 feet deep dragged out "skulls" by means of chains.

"Skulls" were sent to the "skull crackers" for breaking off slag crust. Some old chunks which had been "frozen" in the thimbles were cut up with oxygen lances or dynamited to size suitable for open-hearth charging boxes.



■ "Scrap mine" at Republic Steel Corp.'s Warren, O., plant where a slag dump 20 years old, once used by Trumbull Steel Corp., is being worked. Below: Long-buried "skull" dragged to open hearths

"If it were not for waste in the old days, we certainly would not be in such a favorable position today," said a Republic official. "There would be more open hearths closed down for lack of scrap."

The scrap is chiefly heavy-melting grade, worth $21.50 a ton in this district at OPA prices.

The scrap recovery operation has been so successful here that Republic recently leased from the New York Central railroad the right to "mine" another old dump near Fowler. The railroad once was paid for hauling the slag away from the Youngstown mills. The railroad now is putting in a siding and operations will begin soon. Several thousand carloads of freight are expected from that dump.

Republic is exploring other old slag dumps in this vicinity. It is "mining" dumps near its Gadsden, Ala., and Butler, Pa., plants.

STEEL

Time To Quit Fooling

IN a few days the 900th day of the present war will be upon us. The record to date is predominantly in favor of the Axis powers. Germany, Italy and Japan thus far have had the best of the argument.

During this period Poland, Denmark, Norway, Belgium, Netherlands, Luxemburg, France, French Indo China and numerous other smaller countries have fallen before the might or the cunning of the Axis nations.

Concurrently the United Nations have suffered the humiliation of reverses at Dunkirk, Crete, Pearl Harbor, Guam, Wake island, Hong Kong, Manila, numerous points in the East Indies—and now Singapore.

• • •

Throughout this agonizing series of calamities the people of Great Britain and the United States have bolstered their spirits by means of a curious faith in the ultimate superiority of their resources.

In the British Isles, people have been comforted by the historical record that "England manages to lose every battle but the last one," and they excuse early disasters on the assumption that history will repeat.

In our own country, we have been lulled into complacency by the dangerous belief that because we are potentially strong and rich, we cannot fail to win in the final reckoning.

Today the score of war is so decidedly against us that we can no longer cling to outmoded concepts of superiority—actual or potential. We have wasted our "all-out" admonitions on so many futile gestures that we have no potent expressions left to define accurately our present dire predicament.

All of us, from President Roosevelt down to the humblest citizen—with the possible exception of a few realists like General MacArthur—are guilty of fat-headed, pompous, stuffed-shirt negligence, apathy and complacency. We have failed to realize that the decency of democratic instincts is no weapon against the practical barbarism of the dictators.

Now that diplomacy, government policy, etc., have failed to check the outlaw nations, the hope of ultimate victory for free people rests almost entirely upon the ability of American industry to supply the enlightened world with the material things necessary for waging effective war.

The day of bluffing, or of "talking" a good war is past. We are down to the naked truth that planes, ships and tanks are about the only things that count.

If we will take this last sentence literally and make it our national objective we will win the war. If we continue to take liberties with it, we will go down to defeat.

Planes, ships and tanks are all that count!

• • •

That means "good bye" for the duration to all the silly attributes of soft living. It means curtains for rhythmic dancing for children, fancy commissions for pets and proteges, excessive profits for anybody or any enterprise, work-week restrictions and double pay for overtime, soft berths for bureaucrats, gravy for labor racketeers, multiple jobs for inept politicians, government clinics for social experimenters and government havens for pink-hued ne'er do wells.

"Planes, ships and tanks" mean concentration on the sordid, hard-boiled, man-killing business of industrial production at its ultimate capacity.

He-men: Two paces forward! Panty-waists: To the rear! . . . . M-A-R-C-H!!

E. C. Shaner

EDITOR-IN-CHIEF

Feb. 16, 1942

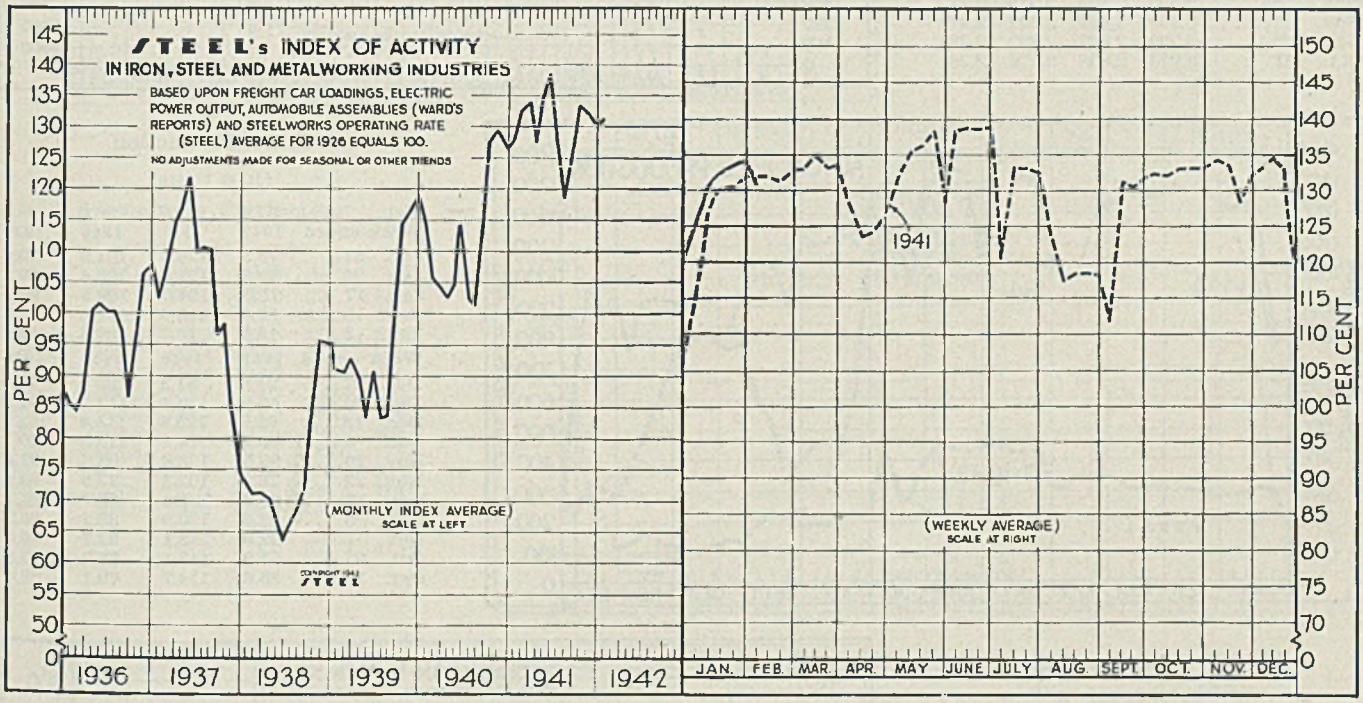
The BUSINESS TREND

Index of Activity Declines 2.7 Points

■ DECLINE in steelmaking operations, automobile production and revenue freight carloadings during the week ended Feb. 7 forced a decline of 2.7 points in STEEL's index of activity to 131.2. This compares with 132.7 level recorded by the index in the corresponding 1941 week and with the peak attained last year of 138.8 registered during the week ended June 28.

Electric power consumption reached a new all-time peak of 3,474,638,000 kilowatts during the latest week. This is 16.2 per cent above the comparable 1941 weekly total, and compares with 2,616,000,000 kilowatts in the same week of 1940.

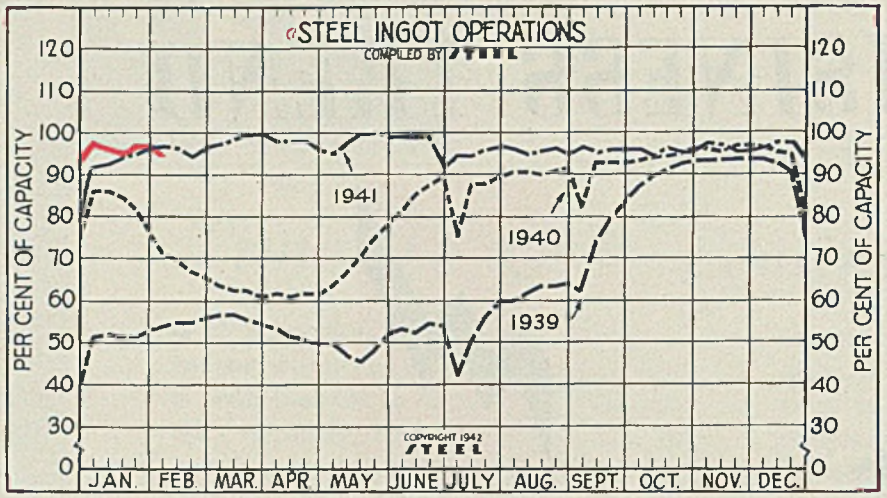
The national steel rate declined one point to 96 per cent of capacity. Automobile production totaled 37,125 units, another sharp drop from the 73,305 units produced in the preceding week, and compares with 96,000 weekly output in 1940. Revenue freight car loadings eased off slightly to 810,000 cars during the week ending Feb. 7 compared with 816,000 cars in the preceding week and 710,000 cars in the comparable week of 1940.



STEEL'S index of activity declined 2.7 points to 131.2 in the week ended Feb. 7:

Week Ended	1941	1940
Dec. 6	133.4	132.5
Dec. 13	134.8	132.6
Dec. 20	132.9	132.4
Dec. 27	120.5	107.5
Week Ended	**1942**	**1941**
Jan. 3	124.7	114.5
Jan. 10	131.2	128.2
Jan. 17	133.1	130.8
Jan. 24	133.7	130.7
Jan. 31	133.9	132.0
Feb. 7	131.2	132.7

Mo. Data	1942	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931
Jan.	131.3	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1
Feb.	.....	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5
March	.....	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2	80.4
April	.....	127.2	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0
May	.....	134.8	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6
June	.....	138.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1
July	.....	128.7	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3
Aug.	.....	118.1	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4
Sept.	.....	126.4	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3
Oct.	.....	133.1	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2
Nov.	.....	132.2	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4
Dec.	.....	130.2	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3



Steel Ingot Operations

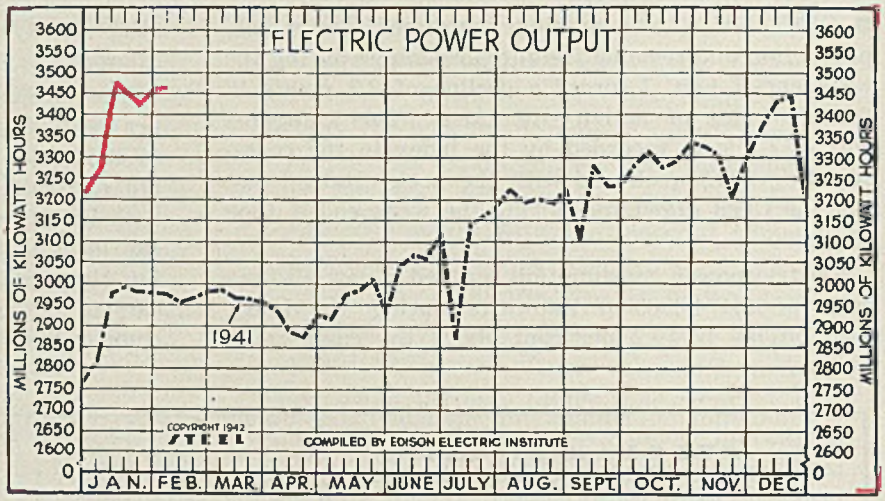
(Per Cent)

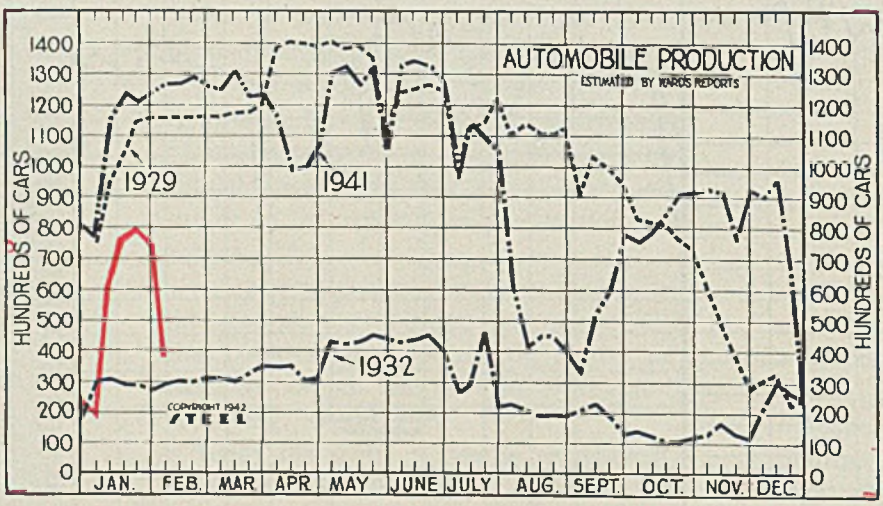
Week ended	1942	1941	1940	1939
Feb. 7	96.0	97.0	71.0	54.0
Jan. 31	97.0	97.0	76.5	53.0
Jan. 24	97.0	95.5	81.5	51.5
Jan. 17	96.0	94.5	84.5	51.5
Jan. 10	96.5	93.0	86.0	52.0
Jan. 3	97.5	92.5	86.5	51.5
Week ended	**1941**	**1940**	**1939**	**1938**
Dec. 27	93.5	80.0	75.5	40.0
Dec. 20	97.5	95.0	90.5	52.0
Dec. 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

Electric Power Output

(Million KWH)

Week ended	1942	1941	1940	1939
Feb. 7	3,475	2,973	2,616	2,315
Jan. 31	2,468	2,978	2,633	2,327
Jan. 24	3,440	2,980	2,661	2,340
Jan. 17	3,450	2,996	2,674	2,342
Jan. 10	3,473	2,985	2,688	2,329
Jan. 3	3,287	2,831	2,558	2,239
Week ended	**1941**	**1940**	**1939**	**1938**
Dec. 27	3,234	2,757	2,465	2,175
Dec. 20	3,449	3,052	2,712	2,425
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





Auto Production

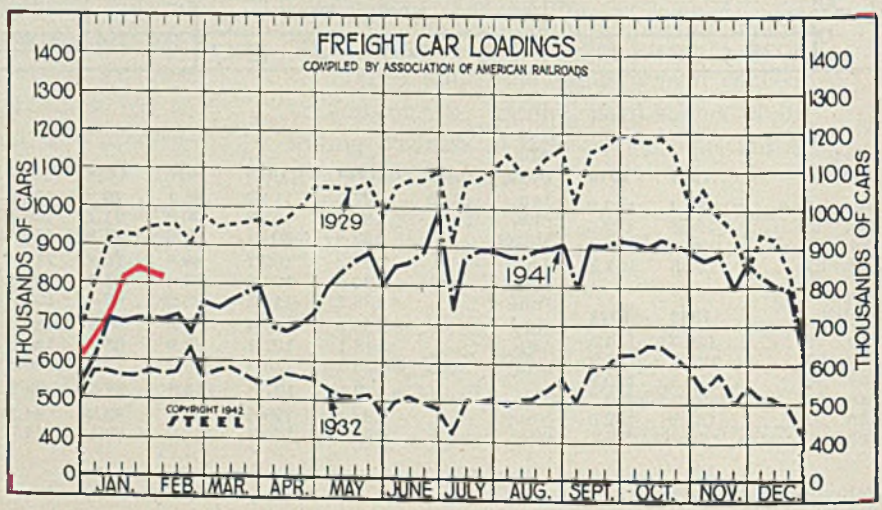
(1000 Units)

Feb. 7	37.1	127.7	96.0	84.5
Week ended	**1942**	**1941**	**1940**	**1939**
Jan. 31	73.3	124.4	101.2	79.4
Jan. 24	79.9	121.9	106.4	89.2
Jan. 17	75.0	124.0	108.5	90.2
Jan. 10	59.0	115.9	111.3	86.9
Jan. 3	18.5	76.7	87.5	76.7
Week ended	**1941**	**1940**	**1939**	**1938**
Dec. 27	24.6	81.3	89.4	75.2
Dec. 20	65.9	125.4	117.7	92.9
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

Freight Car Loadings

(1000 Cars)

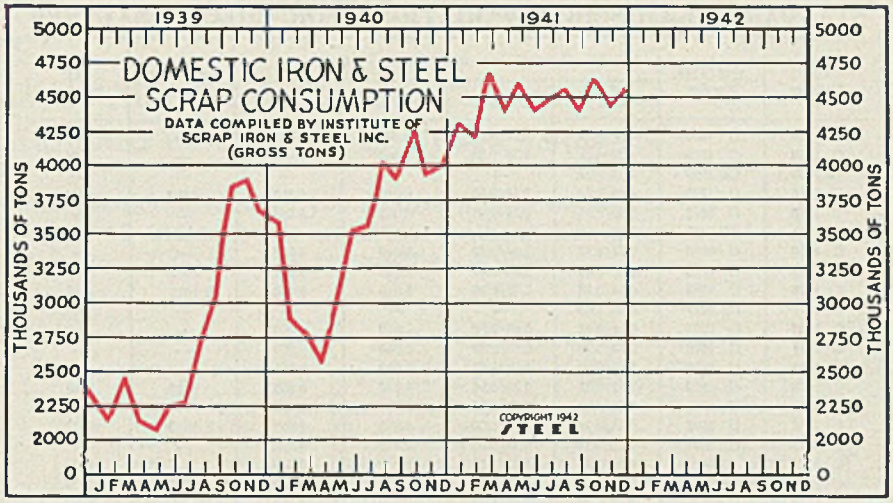
Week ended	1942	1941	1940	1939
Feb. 7	810	710	627	580
Jan. 31	816	714	657	577
Jan. 24	818	711	649	594
Jan. 17	811	703	646	590
Jan. 10	737	712	668	587
Jan. 3	674	614	592	531
Week ended	**1941**	**1940**	**1939**	**1938**
Dec. 27	607	545	550	500
Dec. 20	799	700	655	574
Dec. 13	807	736	681	606
Dec. 6	833	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

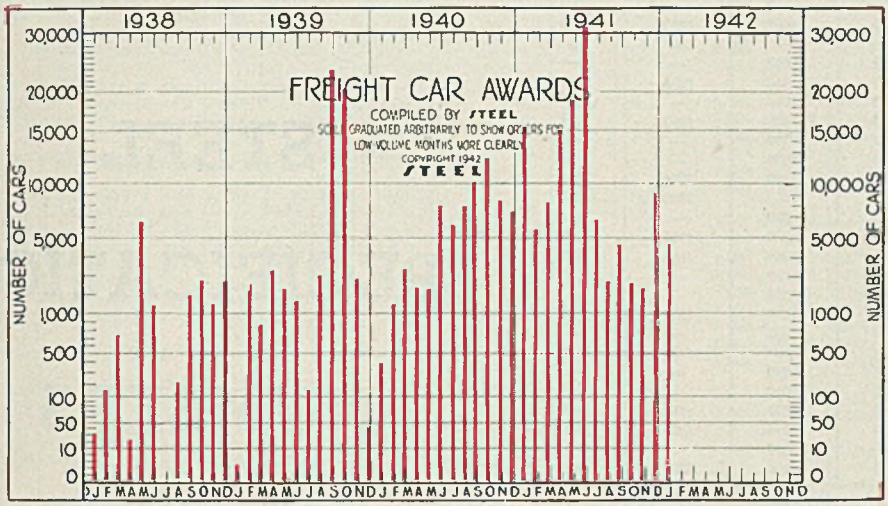


Iron and Steel Scrap Consumption

(Gross Tons)

	1941	1940	1939	1938
		(000 omitted)		
Jan.	4,278	3,581	2,257	1,331
Feb.	4,172	2,812	2,124	1,306
Mar.	4,662	2,728	2,419	1,543
Apr.	4,406	2,548	2,114	1,477
May	4,609	3,061	2,079	1,387
June	4,406	3,482	2,221	1,257
July	4,415	3,526	2,247	1,520
Aug.	4,518	3,968	2,675	1,953
Sept.	4,392	3,876	3,018	2,218
Oct.	4,649	4,233	3,809	2,393
Nov.	4,482	3,922	3,858	2,732
Dec.	4,634	3,950	3,613	2,411
Total	53,625	41,687	32,434	21,528
Mo. Av.		3,474	2,703	1,794





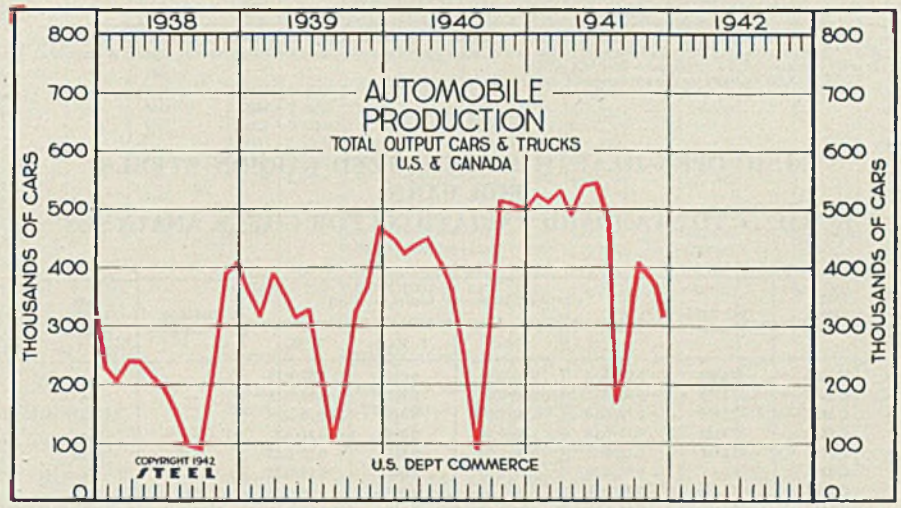
Freight Car Awards

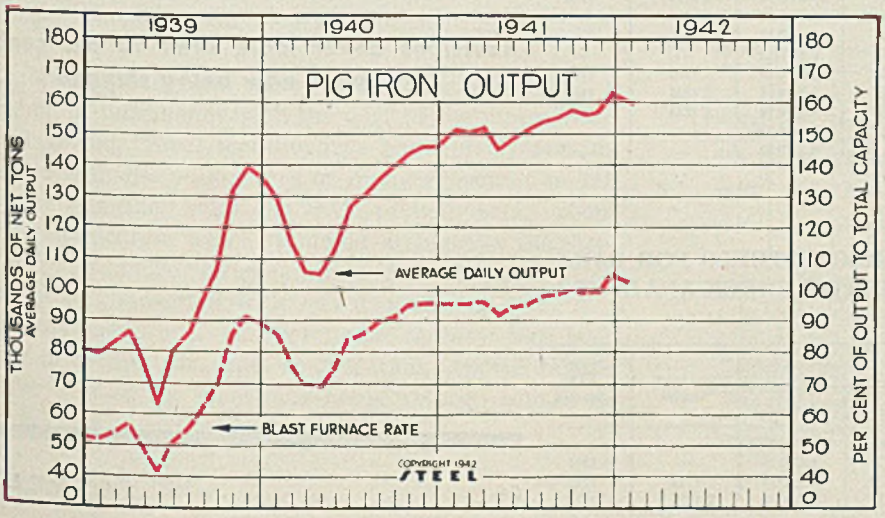
	1942	1941	1940	1939
Jan.	4,253	15,169	360	3
Feb.	.....	5,508	1,147	2,259
March	.....	8,074	3,104	800
April	.....	14,645	2,077	3,095
May	.....	18,630	2,010	2,051
June	.....	32,749	7,475	1,324
July	.....	6,459	5,846	110
Aug.	.....	2,668	7,525	2,814
Sept.	.....	4,470	9,735	23,000
Oct.	.....	2,499	12,195	19,634
Nov.	.....	2,222	8,234	2,650
Dec.	.....	8,406	7,181	35
Total	.....	121,499	66,889	57,775

Automobile Production

(Unit: 1000 Cars)

	1941	1940	1939	1938	1937
Jan.	524.1	449.3	357.0	227.1	399.2
Feb.	509.3	421.8	317.5	202.6	383.9
March	533.9	440.2	389.5	238.6	519.0
April	489.8	452.4	354.3	238.1	553.4
May	545.3	412.5	313.2	210.2	540.4
June	546.3	362.6	324.2	189.4	521.1
July	468.8	246.2	218.5	150.4	456.9
Aug.	164.8	89.9	103.3	96.9	405.1
Sept.	248.8	284.6	192.7	89.6	175.6
Oct.	401.4	514.4	323.0	215.3	338.0
Nov.	373.9	511.0	370.2	390.4	376.6
Dec.	302.5	506.9	469.0	407.0	346.9
Ave.	.....	391.0	311.0	221.3	418.0





Pig Iron Production

	Daily average (000 omitted) —Net Tons—			Blast furnace —Rate (%)—		
	1942	1941	1940	1942	1941	1940
Jan.	160.0	150.5	129.8	102.9	95.5	85.4
Feb.	.....	150.2	113.9	.....	95.3	75.0
Mar.	.....	151.7	105.5	.....	96.3	69.5
Apr.	.....	144.7	104.6	.....	91.8	68.9
May	.....	148.3	112.8	.....	94.1	74.2
June	.....	151.7	127.1	.....	95.7	83.6
July	.....	153.7	131.0	.....	97.0	86.1
Aug.	.....	154.3	136.6	.....	97.4	89.9
Sept.	.....	157.4	139.1	.....	99.3	91.5
Oct.	.....	156.8	143.2	.....	98.9	94.2
Nov.	.....	156.9	146.6	.....	99.0	96.4
Dec.	.....	161.8	146.5	.....	104.1	96.4
Ave.	.....	153.2	128.1	.....	97.0	84.3

TABLE I

BASIC OPEN-HEARTH AND ACID BESSEMER CARBON STEELS FOR BARS—SUBJECT TO STANDARD PERMISSIBLE VARIATIONS FOR CHECK ANALYSES

1942 AISI Number	1941 AISI Number	Chemical Composition Limits, Per Cent				1941 SAE Number	1942 SAE Number
		C	Mn	P, Max.	S, Max.		
C 1006	C 1006	0.08 max.	0.25/0.40	0.040	0.050	—	—
C 1008	C 1008	0.10 max.	0.30/0.50	0.040	0.050	—	1008
CB 1008	CB 1008	0.10 max.	—	—	—	—	—
C 1010	C 1010	0.08/0.13	0.30/0.50	0.040	0.050	1010	1010
C 1012	C 1012	0.10/0.15	0.30/0.50	0.040	0.050	—	—
CB 1012	CB 1012	0.15 max.	—	—	—	—	—
C 1014	C 1015	0.13/0.18	0.40/0.60	0.040	0.050	—	—
C 1015	C 1014	0.13/0.18	0.30/0.50	0.040	0.050	1015	1015
C 1016	C 1016	0.13/0.18	0.60/0.90	0.040	0.050	X 1015	1016
CB 1017	CB 1017	0.10/0.25	—	—	—	—	—
C 1017	C 1017	0.15/0.20	0.40/0.60	0.040	0.050	—	—
C 1018	C 1018	0.15/0.20	0.60/0.90	0.040	0.050	—	—
C 1019	C 1019	0.15/0.20	0.70/1.00	0.040	0.050	—	—
C 1020	C 1020	0.18/0.23	0.30/0.50	0.040	0.050	1020	1020
C 1021	C 1021	0.18/0.23	0.40/0.60	0.040	0.050	—	—
C 1022	C 1022	0.18/0.23	0.70/1.00	0.040	0.050	X 1020	1022
C 1023	C 1023	0.20/0.25	0.30/0.50	0.040	0.050	—	—
C 1024	—	0.20/0.26	1.35/1.65	0.040	0.050	—	1024
C 1025	C 1025	0.22/0.28	0.30/0.50	0.040	0.050	1025	1025
C 1026	C 1026	0.22/0.28	0.40/0.60	0.040	0.050	—	—
C 1029	C 1029	0.25/0.31	0.60/0.90	0.040	0.050	—	—
C 1030	C 1030	0.28/0.34	0.60/0.90	0.040	0.050	1030	1030
CB 1032	CB 1032	0.25/0.40	—	—	—	—	—
C 1033	C 1033	0.30/0.36	0.60/0.90	0.040	0.050	—	—
C 1035	C 1035	0.32/0.38	0.60/0.90	0.040	0.050	1035	1035
C 1036	—	0.32/0.39	1.20/1.50	0.040	0.050	—	1036
C 1040	C 1040	0.37/0.44	0.60/0.90	0.040	0.050	1040	1040
C 1042	C 1042	0.40/0.47	0.60/0.90	0.040	0.050	—	—
C 1043	C 1043	0.40/0.47	0.70/1.00	0.040	0.050	—	—
C 1045	C 1045	0.43/0.50	0.60/0.90	0.040	0.050	1045	1045
C 1050	—	0.48/0.55	0.60/0.90	0.040	0.050	1050	1050
C 1052	—	0.47/0.55	1.20/1.50	0.040	0.050	—	1052
C 1055	C 1055	0.50/0.60	0.60/0.90	0.040	0.050	1055	1055
C 1060	—	0.55/0.65	0.60/0.90	0.040	0.050	1060	1060
C 1061	C 1061	0.54/0.65	0.75/1.05	0.040	0.050	—	—
C 1064	C 1064	0.60/0.70	0.50/0.70	0.040	0.050	—	—
C 1066	C 1066	0.60/0.71	0.80/1.10	0.040	0.050	X 1065	1066
C 1068	C 1068	0.65/0.75	0.50 max	0.040	0.050	—	—
C 1070	—	0.65/0.75	0.70/1.00	0.040	0.050	1070	1070
C 1074	C 1074	0.70/0.80	0.50/0.70	0.040	0.050	—	—
C 1078	C 1078	0.72/0.85	0.30/0.50	0.040	0.050	—	—
C 1080	—	0.75/0.88	0.60/0.90	0.040	0.050	1080	1080
C 1085	C 1085	0.80/0.93	0.70/1.00	0.040	0.050	1085	1085
C 1086	C 1083	0.82/0.95	0.30/0.50	0.040	0.050	—	—
C 1095	C 1095	0.90/1.05	0.30/0.50	0.040	0.050	1095	1095
B 1008	B 1008	0.10 max.	0.30/0.50	0.11	0.060	—	—
B 1011	B 1011	0.13 max.	0.50/0.70	0.11	0.060	—	—

NOTE 1: When silicon is specified in standard basic open-hearth steels, silicon may be ordered only as 0.10 per cent maximum; 0.10 to 0.20 per cent; or 0.15 to 0.30 per cent. In the case of many grades of basic open-hearth steel, special practice is necessary in order to comply with a specification including silicon.
NOTE 2: Acid bessemer steel is not furnished with specified silicon content.

TABLE II

BASIC OPEN-HEARTH SULPHURIZED CARBON STEELS FOR BARS SUBJECT TO STANDARD VARIATIONS FOR CHECK ANALYSES

1942 AISI Number	1941 AISI Number	Chemical Composition Limits, Per Cent				1941 SAE Number	1942 SAE Number
		C	Mn	P, Max.	S, Max.		
C 1109	C 1109	0.08/0.13	0.60/0.90	0.045	0.08/0.13	—	—
C 1110	C 1110	0.08/0.13	0.60/0.90	0.045	0.10/0.15	—	—
C 1112	C 1112	0.10/0.16	1.00/1.30	0.045	0.08/0.13	—	—
C 1113	C 1113	0.10/0.16	1.00/1.30	0.045	0.24/0.33	—	—
C 1115	C 1116	0.13/0.18	0.70/1.00	0.045	0.10/0.15	1115	1115
C 1116	—	0.14/0.20	1.10/1.40	0.045	0.16/0.23	—	—
C 1117	C 1117	0.14/0.20	1.00/1.30	0.045	0.08/0.13	X 1314	1117
C 1118	C 1118	0.14/0.20	1.30/1.60	0.045	0.08/0.13	X 1315	1118
C 1120	C 1120	0.18/0.23	0.60/0.90	0.045	0.08/0.13	—	—
C 1121	C 1121	0.18/0.23	0.70/1.00	0.045	0.08/0.13	—	—
C 1122	C 1122	0.17/0.23	1.35/1.65	0.045	0.08/0.13	—	—
C 1132	C 1132	0.27/0.34	1.35/1.65	0.045	0.08/0.13	X 1330	1132
C 1137	C 1137	0.32/0.39	1.35/1.65	0.045	0.08/0.13	X 1335	1137
C 1141	—	0.37/0.45	1.35/1.65	0.045	0.08/0.13	X 1340	1141
C 1144	—	0.40/0.48	1.35/1.65	0.045	0.24/0.33	—	—
C 1217	—	0.14/0.19	0.70/1.00	0.09/0.13	0.20/0.29	—	—

NOTE 2: Sulphurized steel is not subject to check analysis for sulphur.

TABLE III

ACID BESSEMER SULPHURIZED CARBON STEELS FOR BARS SUBJECT TO STANDARD VARIATIONS FOR CHECK ANALYSES

1942 AISI Number	1941 AISI Number	Chemical Composition Limits, Per Cent				1941 SAE Number	1942 SAE Number
		C	Mn	P, Max.	S, Max.		
B 1110	B 1110	0.13 max.	0.60 max.	0.11 max.	0.045/0.075	—	—
B 1111	B 1111	0.08/0.13	0.60/0.90	0.09/0.13	0.10/0.15	—	1111
B 1112	B 1112	0.08/0.13	0.60/0.90	0.09/0.13	0.16/0.23	1112	1112
B 1113	B 1113	0.08/0.13	0.60/0.90	0.09/0.13	0.24/0.33	X 1112	1113

NOTE 1: Sulphurized steel is not subject to check analysis for sulphur.
NOTE 2: Acid bessemer steel is not furnished with specified silicon content.

Table IV—Open-Hearth Alloy and Electric Furnace Alloy Steels Subject To Standard Variations For Check Analyses

The ranges shown below are restricted to sizes 100 square inches or less or equivalent cross-sectional area 18 inches wide or under with a maximum individual piece weight of 7000 pounds irrespective of sizes

1942 AISI Number	1941 AISI Number	Chemical Composition Limits, Per Cent									1941 SAE Number	1942 SAE Number
		C	Mn	P	S	Si	Ni	Cr	Mo	V		
A 1330	A 1321	0.18/0.23	1.60/1.90	0.040	0.040	0.20/0.35	—	—	—	—	—	1320
A 1330	A 1330	0.28/0.33	1.60/1.90	0.040	0.040	0.20/0.35	—	—	—	—	1330	1330
A 1335	A 1335	0.33/0.38	1.60/1.90	0.040	0.040	0.20/0.35	—	—	—	—	1335	1335
A 1340	A 1340	0.38/0.43	1.60/1.90	0.040	0.040	0.20/0.35	—	—	—	—	1340	1340
A 2317	A 2317	0.15/0.20	0.40/0.60	0.040	0.040	0.20/0.35	3.25/3.75	—	—	—	2315	2317
A 2330	A 2330	0.28/0.33	0.60/0.80	0.040	0.040	0.20/0.35	3.25/3.75	—	—	—	2330	2330
A 2335	A 2335	0.33/0.38	0.60/0.80	0.040	0.040	0.20/0.35	3.25/3.75	—	—	—	—	—
A 2340	A 2340	0.38/0.43	0.70/0.90	0.040	0.040	0.20/0.35	3.25/3.75	—	—	—	2340	2340
A 2345	—	0.43/0.48	0.70/0.90	0.040	0.040	0.20/0.35	3.25/3.75	—	—	—	2345	2345
E 2512	E 2512	0.09/0.14	0.45/0.60	0.025	0.025	0.20/0.35	4.75/5.25	—	—	—	—	—
A 2515	A 2514	0.12/0.17	0.40/0.60	0.040	0.040	0.20/0.35	4.75/5.25	—	—	—	2515	2515
E 2517	E 2517	0.15/0.20	0.45/0.60	0.025	0.025	0.20/0.35	4.75/5.25	—	—	—	—	—
A 3045	A 3045	0.43/0.48	0.75/0.95	0.040	0.040	0.20/0.35	0.60/0.80	0.60/0.80	—	—	—	—
A 3115	A 3115	0.13/0.18	0.40/0.60	0.040	0.040	0.20/0.35	1.10/1.40	0.55/0.75	—	—	3115	3115
A 3120	A 3120	0.17/0.22	0.60/0.80	0.040	0.040	0.20/0.35	1.10/1.40	0.55/0.75	—	—	3120	3120
A 3130	A 3130	0.28/0.33	0.60/0.80	0.040	0.040	0.20/0.35	1.10/1.40	0.55/0.75	—	—	3130	3130
A 3135	A 3135	0.33/0.38	0.60/0.80	0.040	0.040	0.20/0.35	1.10/1.40	0.55/0.75	—	—	3135	3135
A 3140	A 3140	0.38/0.43	0.70/0.90	0.040	0.040	0.20/0.35	1.10/1.40	0.55/0.75	—	—	3140	3140
A 3141	A 3141	0.38/0.43	0.70/0.90	0.040	0.040	0.20/0.35	1.10/1.40	0.70/0.90	—	—	X 3140	3141
A 3145	A 3145	0.43/0.48	0.70/0.90	0.040	0.040	0.20/0.35	1.10/1.40	0.70/0.90	—	—	3145	3145
A 3150	A 3150	0.48/0.53	0.70/0.90	0.040	0.040	0.20/0.35	1.10/1.40	0.70/0.90	—	—	3150	3150
A 3240	A 3240	0.38/0.43	0.40/0.60	0.040	0.040	0.20/0.35	1.65/2.00	0.90/1.20	—	—	3240	3240
E 3310	E 3310	0.08/0.13	0.45/0.60	0.025	0.025	0.20/0.35	3.25/3.75	1.40/1.75	—	—	3312	3310**
E 3316	E 3316	0.14/0.19	0.45/0.60	0.025	0.025	0.20/0.35	3.25/3.75	1.40/1.75	—	—	—	—
A 4023	A 4023	0.20/0.25	0.70/0.90	0.040	0.040	0.20/0.35	—	—	0.20/0.30	—	—	4023
A 4024	A 4024	0.20/0.25	0.70/0.90	0.040	0.035/0.050	0.20/0.35	—	—	0.20/0.30	—	—	—
A 4027	—	0.25/0.30	0.70/0.90	0.040	0.040	0.20/0.35	—	—	0.20/0.30	—	—	4027
A 4028	A 4027	0.25/0.30	0.70/0.90	0.040	0.035/0.050	0.20/0.35	—	—	0.20/0.30	—	—	—
A 4032	A 4032	0.30/0.35	0.70/0.90	0.040	0.040	0.20/0.35	—	—	0.20/0.30	—	—	4032
A 4037	A 4037	0.35/0.40	0.75/1.00	0.040	0.040	0.20/0.35	—	—	0.20/0.30	—	—	4037
A 4042	A 4042	0.40/0.45	0.75/1.00	0.040	0.040	0.20/0.35	—	—	0.20/0.30	—	—	4042
A 4047	A 4047	0.45/0.50	0.75/1.00	0.040	0.040	0.20/0.35	—	—	0.20/0.30	—	—	4047
A 4063	A 4063	0.60/0.67	0.75/1.00	0.040	0.040	0.20/0.35	—	—	0.20/0.30	—	—	4063
A 4068	—	0.64/0.72	0.75/1.00	0.040	0.040	0.20/0.35	—	—	0.20/0.30	—	—	4068
A 4119	A 4119	0.17/0.22	0.70/0.90	0.040	0.040	0.20/0.35	—	0.40/0.60	0.20/0.30	—	—	4119
A 4120	A 4120	0.17/0.22	0.70/0.90	0.040	0.040	0.20/0.35	—	0.60/0.80	0.20/0.30	—	—	—
A 4125	—	0.27/0.28	0.70/0.90	0.040	0.040	0.20/0.35	—	0.40/0.60	0.20/0.30	—	—	4125
A 4130	A 4130	0.28/0.33	0.40/0.60	0.040	0.040	0.20/0.35	—	0.80/1.10	0.15/0.25	—	X 4130	4130

1942 AISI Number	1941 AISI Number	Chemical Composition Limits, Per Cent									1941 SAE Number	1942 SAE Number
		C	Mn	P	S	Si	Ni	Cr	Mo	V		
E 4132	E 4132	0.30/0.35	0.40/0.60	0.040	0.040	0.20/0.35	—	0.80/1.10	0.18/0.25	—	—	—
A 4134	A 4134	0.32/0.37	0.40/0.60	0.040	0.040	0.20/0.35	—	0.80/1.10	0.15/0.25	—	—	—
E 4135	E 4135	0.33/0.38	0.70/0.90	0.025	0.025	0.20/0.35	—	0.80/1.10	0.18/0.25	—	—	—
A 4137	A 4137	0.35/0.40	0.70/0.90	0.040	0.040	0.20/0.35	—	0.80/1.10	0.15/0.25	—	—	4137
E 4137	E 4137	0.35/0.40	0.70/0.90	0.025	0.025	0.20/0.35	—	0.80/1.10	0.18/0.25	—	—	—
A 4140	—	0.38/0.43	0.75/1.00	0.040	0.040	0.20/0.35	—	0.80/1.10	0.15/0.25	—	4140	4140
A 4142	A 4142	0.40/0.45	0.75/1.00	0.040	0.040	0.20/0.35	—	0.80/1.10	0.15/0.25	—	—	—
A 4143	A 4143	0.40/0.45	0.75/1.00	0.040	0.040	0.20/0.35	—	0.80/1.10	0.30/0.40	—	—	—
A 4145	—	0.43/0.48	0.75/1.00	0.040	0.040	0.20/0.35	—	0.80/1.10	0.15/0.25	—	—	4145
A 4150	—	0.46/0.53	0.75/1.00	0.040	0.040	0.20/0.35	—	0.80/1.10	0.15/0.25	—	4150	4150
E 4150	E 4150	0.48/0.53	0.70/0.90	0.025	0.025	0.20/0.35	—	0.80/1.10	0.20/0.27	—	—	—
A 4317	A 4317	0.15/0.20	0.45/0.65	0.040	0.040	0.20/0.35	1.65/2.00	0.40/0.60	0.20/0.30	—	—	—
A 4320	A 4320	0.17/0.22	0.45/0.65	0.040	0.040	0.20/0.35	1.65/2.00	0.40/0.60	0.20/0.30	—	4320	4320
A 4337	A 4337	0.35/0.40	0.60/0.80	0.040	0.040	0.20/0.35	1.65/2.00	0.60/0.80	0.30/0.40	—	—	—
E 4337	E 4337	0.35/0.40	0.60/0.80	0.025	0.025	0.20/0.35	1.65/2.00	0.70/0.90	0.23/0.30	—	—	—
A 4340	—	0.38/0.43	0.60/0.80	0.040	0.040	0.20/0.35	1.65/2.00	0.70/0.90	0.20/0.30	—	X 4340	4340
E 4342	E 4340	0.40/0.45	0.60/0.80	0.025	0.025	0.20/0.35	1.65/2.00	0.70/0.90	0.23/0.30	—	—	—
A 4608	A 4608	0.06/0.11	0.40 max.	0.040	0.040	0.25 max.	1.40/1.75	—	0.15/0.25	—	—	—
A 4615	A 4615	0.13/0.18	0.45/0.65	0.040	0.040	0.20/0.35	1.65/2.00	—	0.20/0.30	—	4615	4615
E 4617	E 4617	0.15/0.20	0.45/0.65	0.025	0.025	0.20/0.35	1.65/2.00	—	0.20/0.27	—	—	—
A 4620	A 4620	0.17/0.22	0.45/0.65	0.040	0.040	0.20/0.35	1.65/2.00	—	0.20/0.30	—	4620	4620
E 4620	E 4620	0.17/0.22	0.45/0.60	0.025	0.025	0.20/0.35	1.65/2.00	—	0.20/0.27	—	—	—
A 4621	A 4621	0.18/0.23	0.70/0.90	0.040	0.040	0.20/0.35	1.65/2.00	—	0.20/0.30	—	—	—
A 4640	—	0.38/0.43	0.60/0.80	0.040	0.040	0.20/0.35	1.65/2.00	—	0.20/0.30	—	4640	4640
E 4640	E 4640	0.38/0.43	0.60/0.80	0.025	0.025	0.20/0.35	1.65/2.00	—	0.20/0.27	—	—	—
A 4645	—	0.43/0.48	0.60/0.80	0.040	0.040	0.20/0.35	1.65/2.00	—	0.20/0.30	—	—	—
A 4815	A 4815	0.13/0.18	0.40/0.60	0.040	0.040	0.20/0.35	3.25/3.75	—	0.20/0.30	—	4815	4815
A 4820	A 4821	0.18/0.23	0.50/0.70	0.040	0.040	0.20/0.35	3.25/3.75	—	0.20/0.30	—	4820	4820
A 5045	A 5045	0.43/0.48	0.70/0.90	0.040	0.040	0.20/0.35	—	0.55/0.75	—	—	—	—
A 5120	A 5120	0.17/0.22	0.70/0.90	0.040	0.040	0.20/0.35	—	0.70/0.90	—	—	5120	5120
A 5130	A 5130	0.28/0.33	0.70/0.90	0.040	0.040	0.20/0.35	—	0.80/1.10	—	—	—	—
A 5140	—	0.38/0.43	0.70/0.90	0.040	0.040	0.20/0.35	—	0.70/0.90	—	—	5140	5140
A 5145	A 5145	0.43/0.48	0.70/0.90	0.040	0.040	0.20/0.35	—	0.70/0.90	—	—	—	—
A 5150	A 5152	0.48/0.53	0.70/0.90	0.040	0.040	0.20/0.35	—	0.70/0.90	—	—	5150	5150
A 5152	A 5150	0.45/0.55	0.70/0.90	0.040	0.040	0.20/0.35	—	0.90/1.20	—	—	—	—
E 52095	E 52095	0.90/1.00	*0.30/0.50	0.025	0.025	0.20/0.35	—	0.45/0.65	—	—	—	—
E 52098	E 52098	0.90/1.05	*0.30/0.50	0.025	0.025	0.20/0.35	—	1.00/1.25	—	—	—	—
E 52099	E 52099	0.90/1.05	*0.30/0.50	0.025	0.025	0.20/0.35	—	1.30/1.65	—	—	—	—
E 52100	E 52100	0.95/1.10	*0.30/0.50	0.025	0.025	0.20/0.35	—	1.20/1.50	—	—	52100	52100**
E 52101	E 52101	0.95/1.10	*0.30/0.50	0.025	0.025	0.20/0.35	—	1.30/1.65	—	—	—	—
E 52107	E 52107	1.00/1.15	*0.30/0.50	0.025	0.025	0.20/0.35	—	1.35/1.65	—	—	—	—
A 6120	A 6120	0.17/0.22	0.70/0.90	0.040	0.040	0.20/0.35	—	0.70/0.90	—	0.10 Min.	—	—
A 6145	—	0.43/0.48	0.70/0.90	0.040	0.040	0.20/0.35	—	0.80/1.10	—	0.15 Min.	—	—
—	—	0.48/0.53	0.65/0.90	0.040	0.040	0.20/0.35	—	0.80/1.10	—	0.15 Min.	6150	6150
E 6150	E 6150	0.47/0.53	0.70/0.90	0.025	0.025	0.20/0.35	—	0.80/1.10	—	0.15 Min.	—	—
A 6152	A 6152	0.48/0.55	0.70/0.90	0.040	0.040	0.20/0.35	—	0.80/1.10	—	0.10 Min.	—	—
NE 8024	—	0.22/0.28	1.00/1.30	0.040	0.040	0.20/0.35	—	—	0.10/0.20	—	—	—
NE 8124	—	0.22/0.28	1.30/1.60	0.040	0.040	0.20/0.35	—	—	0.25/0.35	—	—	—
NE 8233	—	0.30/0.36	1.30/1.60	0.040	0.040	0.20/0.35	—	—	0.10/0.20	—	—	—
NE 8245	—	0.42/0.49	1.30/1.60	0.040	0.040	0.20/0.35	—	—	0.10/0.20	—	—	—
NE 8339	—	0.35/0.42	1.30/1.60	0.040	0.040	0.20/0.35	—	—	0.20/0.30	—	—	—
NE 8442	—	0.38/0.45	1.30/1.60	0.040	0.040	0.20/0.35	—	—	0.30/0.40	—	—	—
NE 8447	—	0.43/0.50	1.30/1.60	0.040	0.040	0.20/0.35	—	—	0.30/0.40	—	—	—
NE 8547	—	0.43/0.50	1.30/1.60	0.040	0.040	0.20/0.35	—	—	0.40/0.60	—	—	—
NE 8620	—	0.18/0.23	0.70/0.95	0.040	0.040	0.20/0.35	0.40/0.60	0.40/0.60	0.15/0.25	—	—	—
NE 8630	—	0.27/0.33	0.70/0.95	0.040	0.040	0.20/0.35	0.40/0.60	0.40/0.60	0.15/0.25	—	—	—
NE 8724	—	0.22/0.28	0.70/0.95	0.040	0.040	0.20/0.35	0.40/0.60	0.40/0.60	0.20/0.30	—	—	—
NE 8739	—	0.35/0.42	0.75/1.00	0.040	0.040	0.20/0.35	0.40/0.60	0.40/0.60	0.20/0.30	—	—	—
NE 8744	—	0.40/0.47	0.75/1.00	0.040	0.040	0.20/0.35	0.40/0.60	0.40/0.60	0.20/0.30	—	—	—
NE 8749	—	0.45/0.52	0.75/1.00	0.040	0.040	0.20/0.35	0.40/0.60	0.40/0.60	0.20/0.30	—	—	—
NE 8817	—	0.15/0.20	0.70/0.95	0.040	0.040	0.20/0.35	0.40/0.60	0.40/0.60	0.30/0.40	—	—	—
NE 8949	—	0.45/0.52	1.00/1.30	0.040	0.040	0.20/0.35	0.40/0.60	0.40/0.60	0.30/0.40	—	—	—
A 9255	A 9255	0.50/0.60	0.70/0.90	0.040	0.040	1.80/2.20	—	—	—	—	—	—
A 9260	A 9260	0.55/0.65	0.70/0.90	0.040	0.040	1.80/2.20	—	—	—	—	9260	9260
A 9262	A 9262	0.55/0.65	0.70/0.90	0.040	0.040	1.80/2.20	—	—	—	—	—	—
A 9263	A 9263	0.55/0.65	0.70/0.90	0.040	0.040	1.80/2.20	—	—	—	—	—	—

* These steels may be specified to either 0.30 to 0.45 per cent or 0.35 to 0.50 per cent manganese, but it is recommended that the full range be allowed wherever possible.

** Electric Furnace.

NOTE 1: The lowest standard maximum phosphorus or sulphur content for acid open-hearth or acid electric furnace alloy steel is 0.05 per cent each.

NOTE 2: The lowest standard minimum silicon content for acid open-hearth or acid electric furnace alloy steel is 0.15 per cent.

NOTE 3: For steels ordered to the above ranges, below the size and weight restriction, the average of all the chemical checks must be within the limits specified subject to check analysis variations given in Table IV.

NE denotes National Emergency Standard Steel; designation promulgated by the Office of Production Management.

■ Here are presented the "Combined Standard Steel Lists of American Iron and Steel Institute and Society of Automotive Engineers Inc." as finally set up on Jan. 21, 1942.

As will be seen, there has been some renumbering of specifications of both bodies to make them coincide with the same chemical analysis ranges. Merging of the two lists came about as a result of numerous conferences between committees representing the two groups.

Informed observers regard this development as a triumph of unselfishness on the part of the many interests involved. Steel metallurgists particularly are impressed with the willingness of many consumer metallurgists identified with the SAE to help bring about this simplification which is aimed at making the steel industry a more efficient producer—extremely important in connection with our war effort.

In the meantime, vast progress already has been made in getting consumer co-operation. Approximately 90 per cent of the steel now being shipped comes under the new specifications.

Crystal Structure in Steel And the EFFECT OF HOT

(Section II in a Series on Forgings, Forging Practice and Forging Equipment)

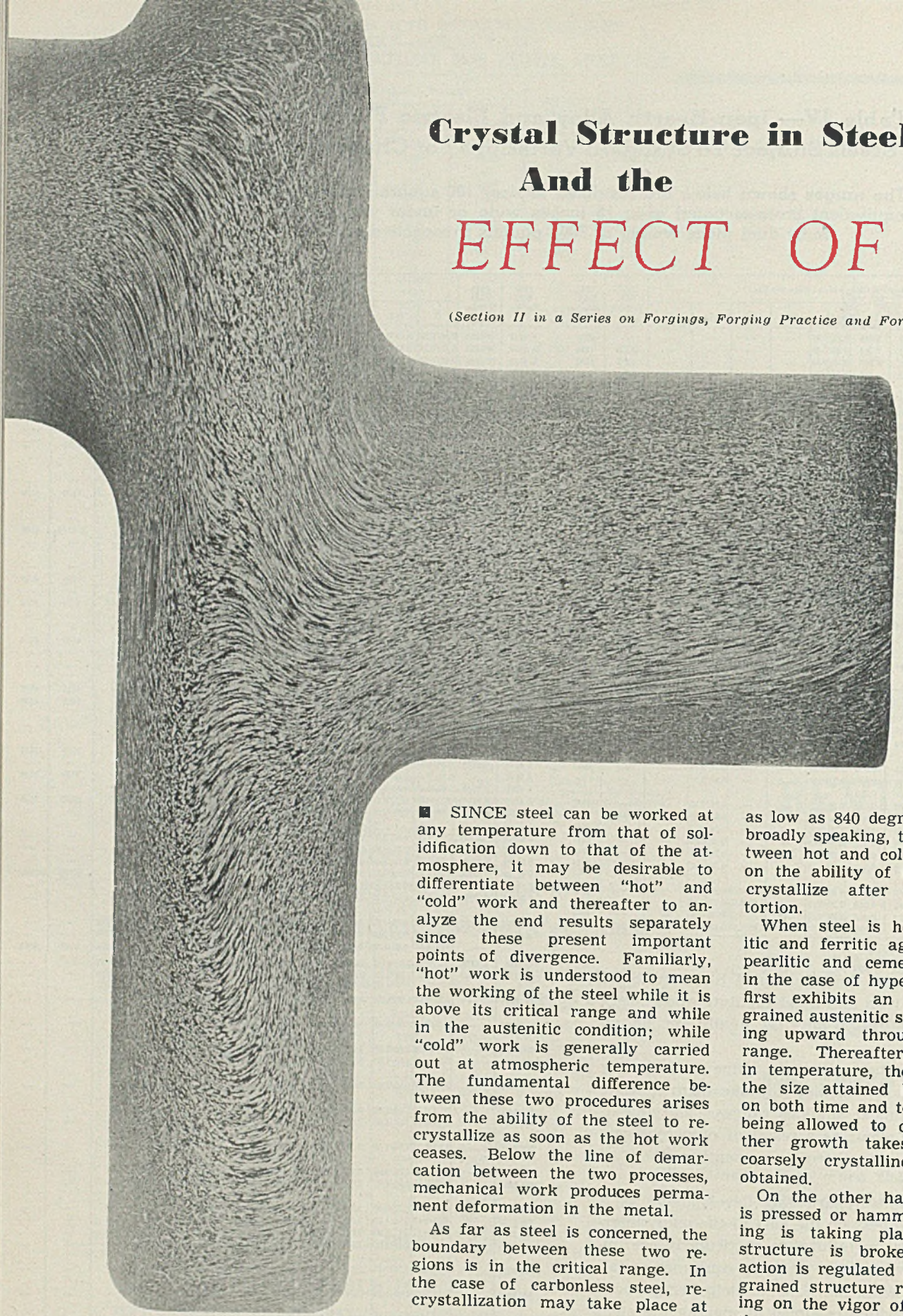


Fig. 1—Macroetch of the longitudinal section of a shaft of a radial engine such as those used in training planes. Note the "end" grain at right where grain flows toward the observer, thus showing the grain "ends". This section of the forging is made in the closed end of the die, open end of die is at left. There the metal is free to flow. Wyman-Gordon Co. photo

■ SINCE steel can be worked at any temperature from that of solidification down to that of the atmosphere, it may be desirable to differentiate between "hot" and "cold" work and thereafter to analyze the end results separately since these present important points of divergence. Familiarly, "hot" work is understood to mean the working of the steel while it is above its critical range and while in the austenitic condition; while "cold" work is generally carried out at atmospheric temperature. The fundamental difference between these two procedures arises from the ability of the steel to recrystallize as soon as the hot work ceases. Below the line of demarcation between the two processes, mechanical work produces permanent deformation in the metal.

As far as steel is concerned, the boundary between these two regions is in the critical range. In the case of carbonless steel, recrystallization may take place at as low as 840 degrees Fahr. Thus, broadly speaking, the distinction between hot and cold work is based on the ability of the metal to recrystallize after mechanical distortion.

When steel is heated, the pearlitic and ferritic aggregate (or the pearlitic and cementitic aggregate in the case of hyper-eutectoid steel) first exhibits an extremely fine-grained austenitic structure on passing upward through the critical range. Thereafter, with increase in temperature, the crystals grow, the size attained being dependent on both time and temperature. On being allowed to cool slowly, further growth takes place and a coarsely crystalline aggregate is obtained.

On the other hand, if the steel is pressed or hammered while cooling is taking place, the crystal structure is broken up. If the action is regulated properly, a fine-grained structure results. Depending on the vigor of the action and the range over which forging is continued, a fine to moderately fine grain results, crystallization beginning again as soon as the work stops.

In order to secure the highest degree of grain refinement, work should be continued with the great-

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And
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and COLD WORK

■ IN THIS second section of a series on forging, Professor Macconochie discusses the distinction between "hot" and "cold" work, control of grain flow, forms of crystal structure, behavior of the atom during crystallization, slippage, work hardening, effect of cold work on crystal structure, fatigue failure. For details on properties and structure of forgings, see Section I of this Series, STEEL, Feb. 9, 1942, p. 56.

est vigor right down to the upper limits of the critical range. These principles are exemplified in Figs. 1 and 2. Note that near the outer portions of the forging where the penetration of hammer work has been most intense, the grain shows a high degree of refinement. Near the center of the parts, the structure is coarser and the segregates less well distributed. Thus where the stress in the shaft is highest, the beneficial effects of mechanical work are most apparent. This is one of the important and valuable results of the extensive hot work during forging.

In Fig. 2, the beneficial effects of mechanical work on the relatively thin web of the connecting rod are clearly seen.

In general, the greater the amount of reduction during working the better the quality of the piece. But there are exceptions to this rule. For example, in a gun tube, the physical properties in a circumferential direction are more important than is the direction of flow of the metal during forging.

The structure and characteristics of forgings (hot-worked steel) were discussed in the first section of this series, see STEEL, Feb. 9, 1942, p. 56. By reference there it will be noted that one of the principal characteristics of hot-worked steel is the directionality induced; that is, the difference in the physical properties crosswise as contrasted with those lengthwise the grain or fiber of the part.

It may be of interest to consider a case in which a "cross" grain structure is desired rather than a fibrous structure. As was previously suggested, the effect of imparting directional characteristics to a forging may be likened to the behavior of grain in a piece of wood when split with an axe. Any attempt to chop at right angles to the grain meets with little success, whereas the wood splits readily when attacked endwise.

Now consider a die block for a drop hammer. Here the stresses are frequently concentrated in such a manner that the block would split in much the same fashion as the wood held up on end if the grain ran vertically in the block. If oriented in a horizontal direction, the action might be compared to driving the blade of the axe into the wood with its edge at right angles to the grain. But this might induce failure in the opposite direction. Thus there is no recourse but to work the block on all six faces in order to secure maximum structural distortion and minimum fiber structure in the completed piece. By working on all faces in this manner, any original directional properties of the material are destroyed and no new ones are developed. It has been found by experience that resistance to wear is increased—or at least the block wears more uniformly when forged in this manner. As far as increasing the resistance to wear is concerned, it is not difficult to see how grooving might occur in the direction of the grain if the block possessed directional properties.

The "Hardtem" die block manufactured by the Heppenstall Co., Pittsburgh, is made from an alloy steel containing 0.55 per cent carbon, 0.85 manganese, 1.00 chromium, 0.45 molybdenum and 0.10 vanadium. To relate the influence of these special elements on the final result would take us rather far afield from our immediate objective. Suffice it to note that in the casting of the ingot the walls of the mold initiate directional properties by the formation of nu-

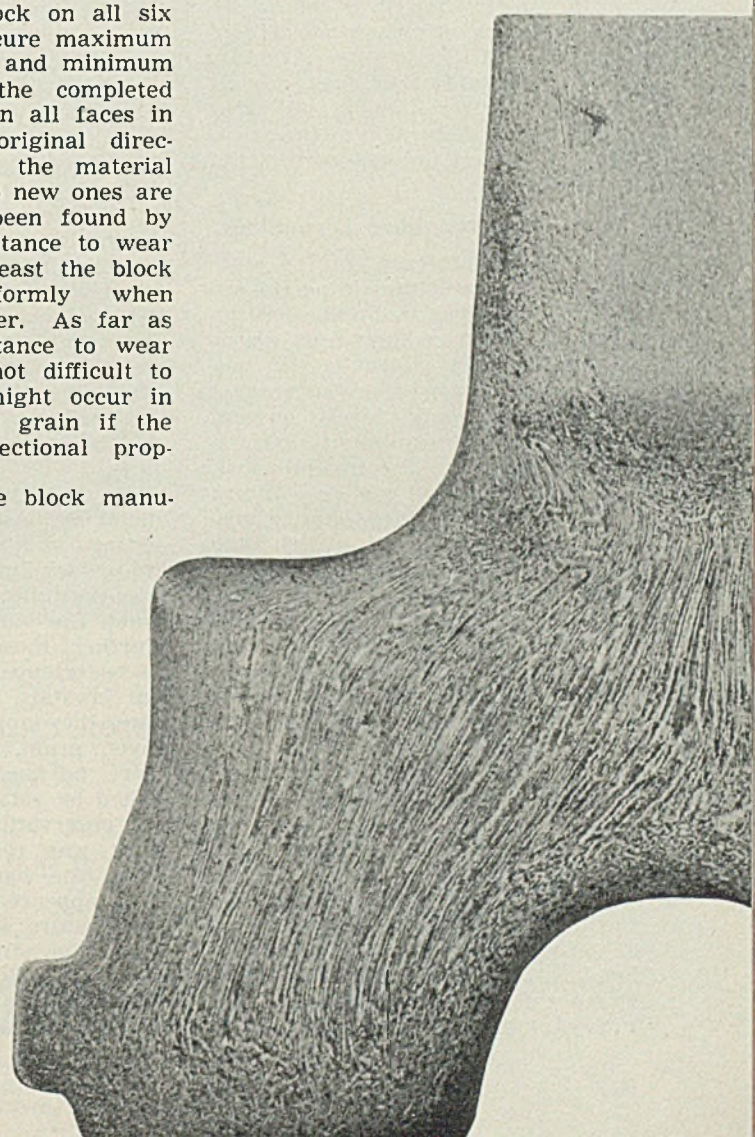
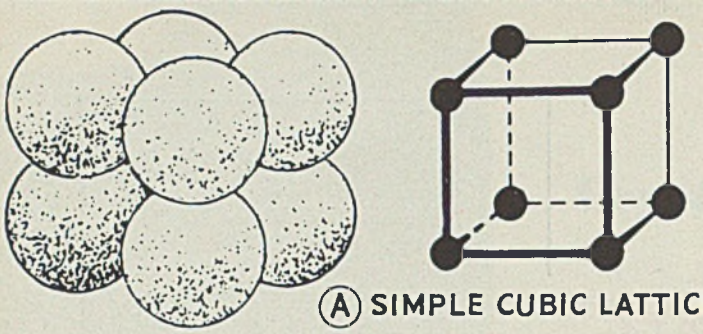
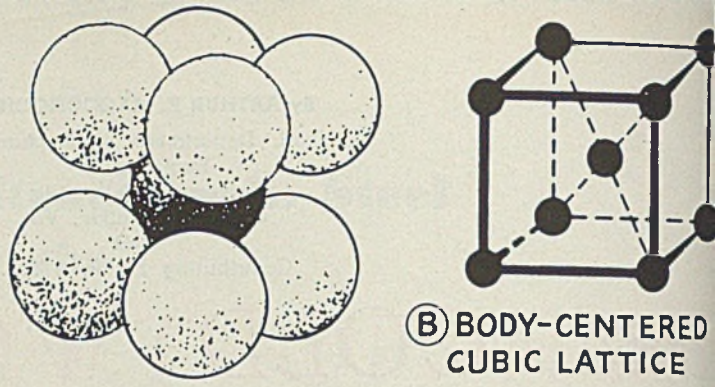


Fig. 2—Portion of longitudinal section through forged connecting rod showing difference in grain in the web (top of part here) as compared with the head (bottom). More work was done on the former since it is forged to a thinner section. This illustration affords a vivid impression of the variation in grain size with the penetration of the work. Also a Wyman-Gordon Co. Photo





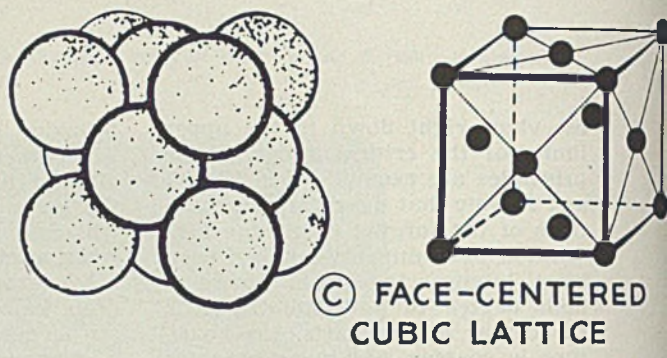


Fig. 3—Space lattice types of atom structures. Here **A** is a simple cubic lattice, **B** is body-centered cubic lattice and **C** is the face-centered cubic lattice

clei near the cooling surfaces. These nuclei tend to grow in all directions, but since the walls themselves and the mutual obstruction of their neighbors permit only one avenue of development, long crystals form in a direction perpendicular to the walls of the mold. These long crystals are destroyed, along with any original directional properties, by working on all faces of the ingot. Such die blocks may weigh as much as 16,000 pounds.

Hammer rams, made by the same company, also are made from an alloy steel which is completely upset forged to prevent the concentration of directional stresses and resultant failure. After being forged, the blocks are normalized, quenched and tempered to a selected hardness range.

The effect of cold work upon steel differs greatly from that of hot work. Cold work, being done on the steel when it is below the critical range, produces permanent distortion of the crystal structure since recrystallization does not occur. To better understand what occurs, some discussion of the structure of the crystalline grain itself is in order.

Cubic Most Common Formation

When steel freezes from a state of fusion, the atoms tend to arrange themselves in numberless individual patterns known as *space-lattice* units, a characteristic possessed by many other substances and giving many lovely crystal forms of an almost infinite variety. Fortunately for the metallurgist, the most important metals conform in their habits to three simple geometrical systems, of which the cubic is the most common. Hexagonal and tetragonal are the other two arrangements. A crystal built of a large number of these tiny bricks may be likened to a house whose architecture is dominated by the shape of the materials of which it is built.

In the simple cubical unit, an atom will be found at each corner and perhaps one in the center, or in the center of each face—forming the simple cubic lattice, the body-centered cubic lattice or the face-centered cubic lattice (see Fig. 3). These atoms are not at rest but in a state of constant agitation. Furthermore, their influence is mutually embracive, linking them to each other with the most powerful bonds. Why atoms behave in this way is only dimly perceived, but it is known that the atoms of any particular metal tend toward the condition of lowest potential energy and lowest electrostatic attraction. Thus the resistance to the increase in the distance between atomic centers has its counterpart in the resistance to their closer approach.

Each atom possesses a "sphere of influence" around it comparable to a material ball. See Fig. 3. Whether this be a valid analogy or not, those metals which solidify in the face-centered cubic system or in the closely packed hexagonal system have an atomic arrangement which corresponds to the closest packing of a group of spheres. Since any element consists of innumerable groups of atoms, those atoms at the corners of a body-centered unit, for example, also are common to neighboring lattices.

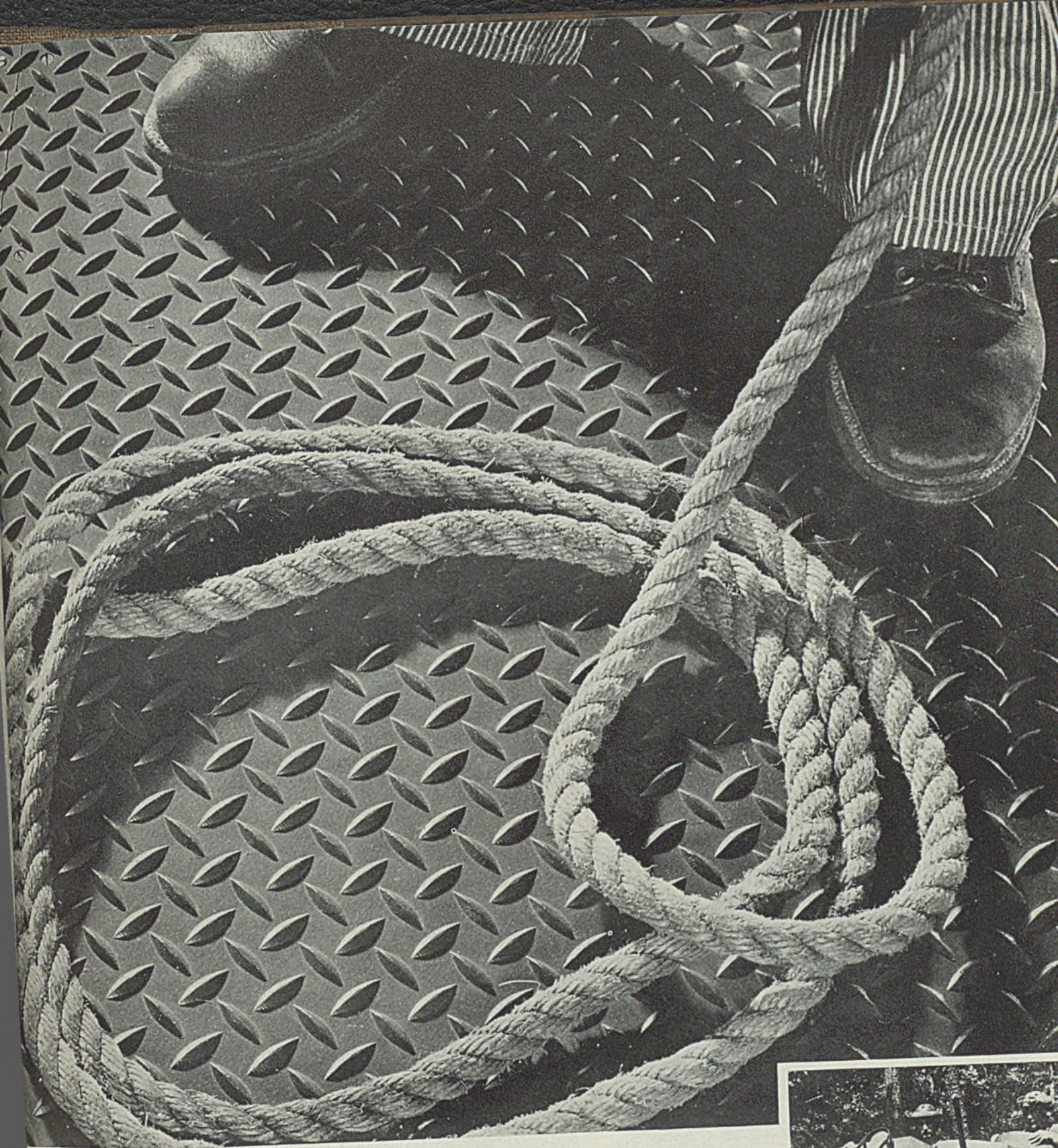
By taking a polished sheet of metal and straining it gradually, Ewing and Rosenhain discovered that black lines were seen to cross the crystalline grains of the steel when the yield point was reached. Further, these lines were observed to be oriented differently in different crystals. But at first, at any rate, they appeared parallel in any given grain. The fact that these were no mere cracks was established by rotating the specimen under observation so that the incident light was reflected more brightly from the bands which previously had appeared dark. Thus their true nature was established.

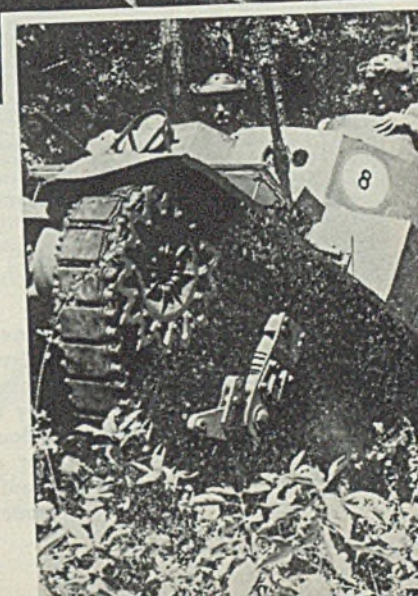
As the stress increases beyond the yield point, slippage along certain planes within the crystal takes place, producing a stepped surface. We are all familiar with cleavage in other crystalline material such as mica, from which lamina after lamina can be peeled. Similar cleavage planes, or planes along which movement takes place more readily than in other directions, exist in the crystal grains of steel, although not perhaps as well defined. (Of course, slip planes and cleavage planes are not necessarily the same.)

Much of our knowledge concerning the nature of the deformation which takes place when metal is straining beyond the limit of elasticity has been obtained by watching the behavior of a single crystal, zinc being preferred for the purpose. Such crystals may be obtained by maintaining the molten bath precisely at melting temperature and touching the surface with a tiny crystal fragment. Growth then takes place downward. Slow withdrawal from the melt results in an elongated mass whose atoms are arranged in a single crystallographic system.

If such a crystal in the form of a cylindrical wire be stretched, a line appears that is comparable in every way to the slip bands of the Ewing and Rosenhain experiment. If the stress is raised another appears and so on, indicating first that readjustment has taken place as a result of movement under a shearing stress and next that the resistance to such movement tends to increase. If the action be continued, the inclination of the original slippage planes will increase, until the piece assumes a ribbon-like form and fracture finally occurs. Slippage thus revolves the individual crystal components so the crystal itself can elongate in the direction of applied stress.

In any part under tension, such





In the plants—in the tanks . . . U. S. Army tanks, rolling and rumbling to defeat the attackers of America, protect their crews against slipping and falling accidents with "A. W." Rolled Steel Floor Plate. It's the same skid-proof safety that speeds production wherever men work. With "A.W." Floor Plate, there are no slippery surfaces. Fire-proof, crack-proof.

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as the zinc wire of the above experiment, it can readily be shown that the plane of maximum shear is inclined at 45 degrees to the axis. But slippage of the crystal elements takes place over those planes in which the shear stress exceeds the resistance to movement. Thus their inclination may have any value, provided that the shear component of the longitudinal stress is of sufficient intensity to cause slippage.

Just why certain planes in a crystal should oppose lowered resistance to shearing forces is not particularly clear. It is known, however, that these cleavage planes are surfaces of greatest atomic density and thus it is possible to predict in which directions they will lie in many types of crystals. If there are several directions in which the atomic density is at the same maximum, several possible slip systems may exist.

Among the more remarkable of the phenomena associated with the plastic deformation of cold worked metals is the increasing resistance to movement as the action proceeds. Further, this is not confined to the actual plane over which the action starts since it is found that the load on the single zinc crystal must be increased in order that plastic flow may continue. For many years it was supposed that differential movement of the crystal elements resulted in the transition of a portion of the crystalline material into an amorphous state, i. e. into a non-crystalline condition. This amorphous cement was supposed to bind the moving parts more securely together, thereby accounting for the greater strength and brittleness of cold-worked stock.

However, there appear to be insurmountable objections to the acceptance of this explanation in the light of more recent discoveries concerning the intimate nature of the crystal grain. X-ray investigations show that soon after deformation begins the lattice shatters and the planes of slip rotate toward the direction of the applied force without further crystal breakup. These phenomena, according to one of the more ingenious theories which attempt to explain the hardening induced by mechanical work, are associated with an increasing irregularity of the atoms of one slip plane with respect to the atoms of adjacent planes. However, no generally accepted solution exists.

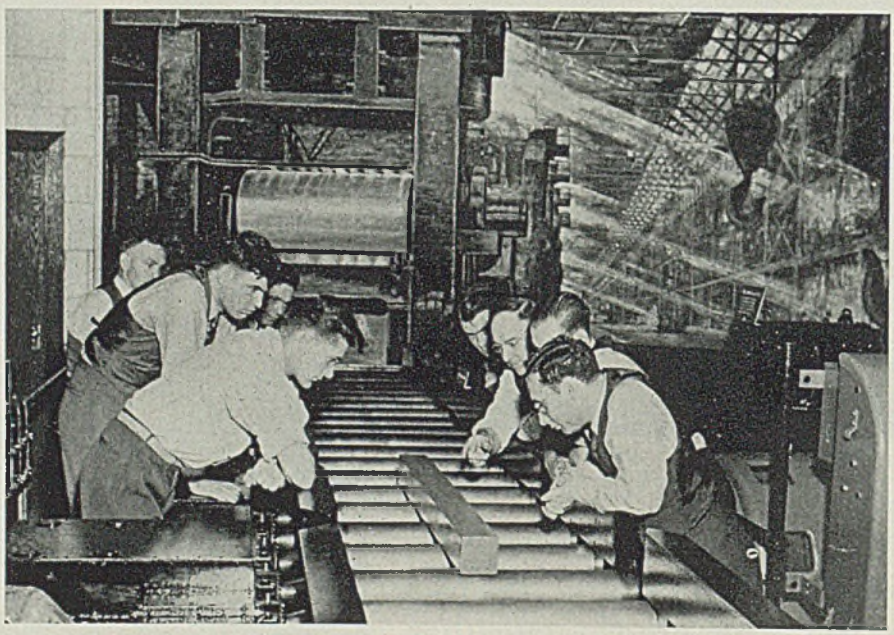
If a section of polycrystalline material (such as steel wire which has been drawn severely through dies) be examined under the microscope, the aggregate will exhibit distortion resulting from the stretching or elongation of its crystalline particles in the direction of drawing, such distortion involving a decrease in ductility, an increase in strength and finally extreme brittleness which only an annealing operation at a temperature permitting recrystallization will remove. Accompanying these effects are an increase in density and a diminution in magnetic permeability.

If the wire be tested immediately after deformation, it will be found to have no elastic limit. But if it be allowed to rest for several weeks at normal temperature, or for a day or so at from 200 to 300 degrees Fahr., it will be found to have regained some of its elasticity, but the elastic limit will be much higher than it was before. This might be explained on the supposition that the atoms, having a certain vibratory motion, are able to rearrange themselves to some extent even at atmospheric temperatures. It is not hard, therefore, to understand why restoration in part of the original physical characteristics takes place with greater ease as the temperature rises. These changes affect the ferrite only, the pearlitic grains retaining their elongated form. Only a full anneal at a temperature in excess of the critical range will relieve all strains.

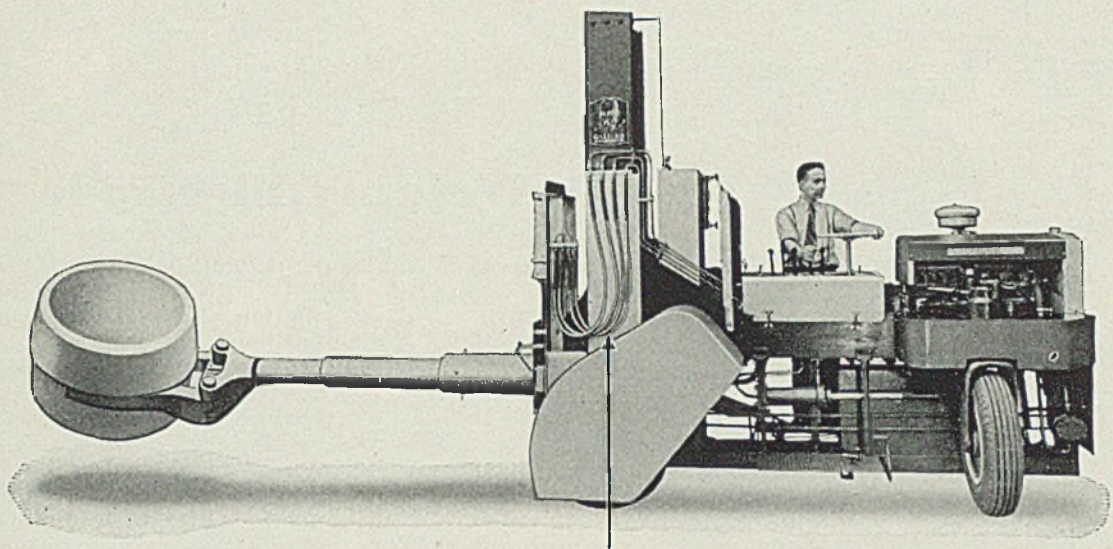
Closely associated with the intentional work hardening undertaken to raise the strength and elastic limit of the piece is the inadvertent and localized work hardening which results from oft repeated stresses. Most familiar is the stress cycle which involves a complete reversal from a maximum value in tension to a numerically equal compressive stress. Twice, therefore, in each cycle the part suffers maximum deformations which apparently are not reversible in their effects since a certain amount of work hardening is produced exactly analagous to that produced by mechanical pressure. The cumulative effects of this microscopic block movement culminate in a degree of localized brittleness which can no longer resist the cyclic deformation and a tiny crack forms. Such a crack functions as a stress raiser just as the scratch made by a diamond on the surface of a sheet of plate glass enables the operator to break the piece with a twist of the wrist. Thus the evil is self-perpetuating, the crack tending to spread from the surface of the part where it usually starts until the diminished area resisting the load can no longer support its burden. This phenomenon is generally referred to as failure by fatigue.

(*Please turn to Page* 114)

World's Fair Model Trains Students for War



■ Transferred from the Westinghouse exhibit and the glittering surroundings of the World's fair, this model steel mill manipulator table is now at work at Buffalo's Seneca Vocational high school training men for "behind-the-lines" jobs. Students are shown with instructor as they study construction and operation of machine. Mural in background shows position of table to other mill equipment. According to Dr. Elmer S. Pierce, organizer and principal of the school, enrollment has reached 1500 men and boys in regular courses. Two thousand more are registered in special night courses

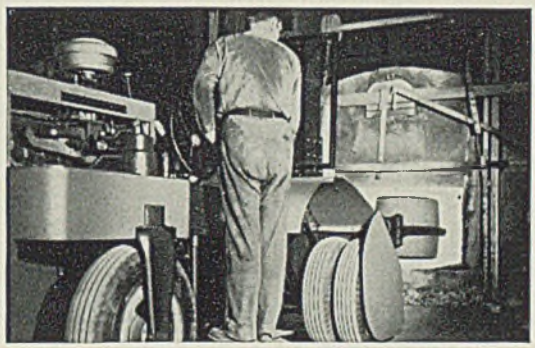


The "muscles" for this mechanical arm have to be more than strong

AMERICAN Seamless Flexible Metal Tubing, carrying hydraulic fluid to actuate the arm of this huge industrial truck, comes in for a tough assignment.

The truck cruises up to furnaces whose temperature is 2600°F., scoops up a molten mass of glass and transports it to rolling mills. The "muscles" are American Seamless —which conveys fluid at 1800 p.s.i. to lower and raise the heavily laden arm while being subjected to the high temperatures at the furnace mouth.

This rigorous service is typical of the jobs that industry has found for tough, pressure-tight connectors of American Seamless, and is typical also of the jobs Uncle Sam has selected for all the products of American Metal Hose. In fact, our government is currently using the major part of our production and will probably continue to do so until victory is assured.



Better Sight for Better Defense—In the famous Bausch & Lomb plants, essential optical instruments for defense work and for defense workers begin in flaming furnaces like this one. Here, a Howell industrial truck with arm actuated through sturdy American Seamless, quickly and efficiently handles molten glass, later to be converted into research instruments, lenses, etc. 42175

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WHEN, WHERE and HOW TO WEAVE

The Welding Electrode

(Section 12 in a Series on How To Get the Most from Arc Welding)

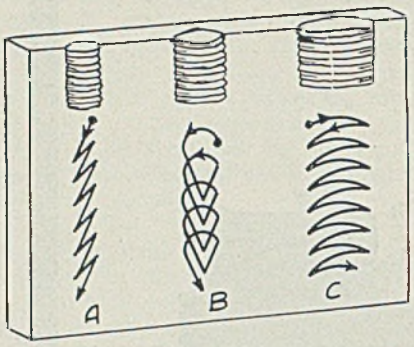
By E. W. P. SMITH
Consulting Engineer
Lincoln Electric Co.
Cleveland

(Concluded from Last Week)

■ ELECTRODES exceeding $\frac{5}{32}$-inch in diameter are not generally used for vertical or overhead welding and are not recommended, although they have been used in some cases. There are two ways of making vertical welds. One is to start at the bottom and weld up, called *welding up.* The other is to start at the top and weld down, called *welding down.*

To *weld down,* strike an arc at the top of a plate set in a vertical position. The electrode should point up at an angle of about 60 degrees with the plate. Now draw the electrode down in a straight line. The result will be a thin bead. An even speed should be maintained. In studying these various weaves, the operator may wish to practice them carefully to become familiar with the various manipulations involved.

The next step is to use the above described technique, but with a slight weave, as shown in A of Fig. 6. This gives a narrow bead but one which is well proportioned. When this operation is perfected, practice making a much wider bead using a wider weave such as C, in Fig. 6.



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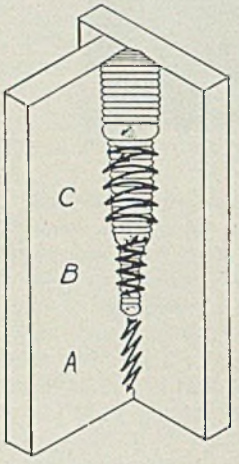

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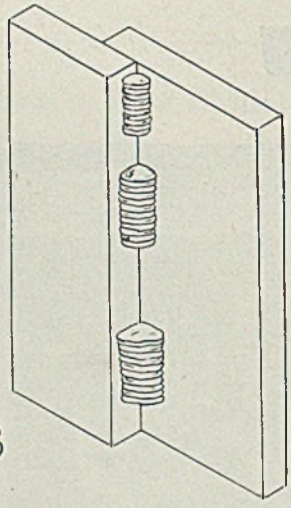

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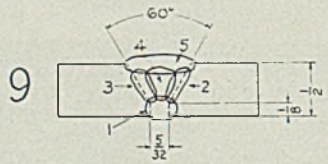
Fig. 6—Weaves employed for making a vertical bead on vertical plate, welding in a down direction
Fig. 7—Different weaves for different beads of multilayer vertical fillet welds
Fig. 8—Same techniques as shown in Fig. 7 may be employed for vertical lap welds
Fig. 9—Sequence for making vertical V-butt welds, welding down
Fig. 10—Weave patterns for making vertical beads, welding up
Fig. 11—Weaves of Fig. 10 applied to making lap welds, welding up
Fig. 12—Weaves of Fig. 10 applied to making fillet welds, welding up



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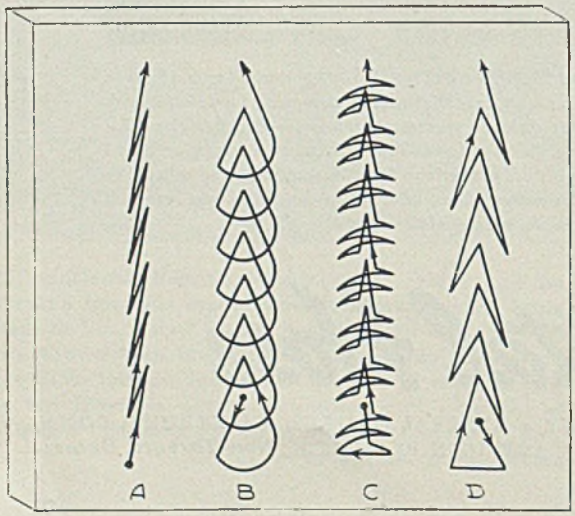

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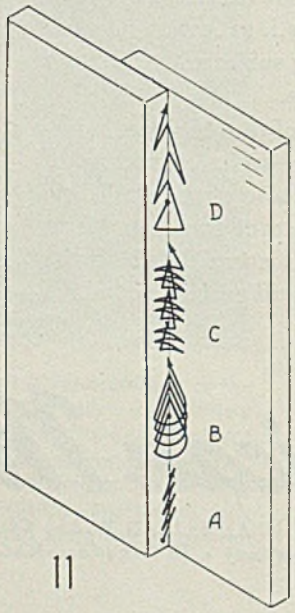

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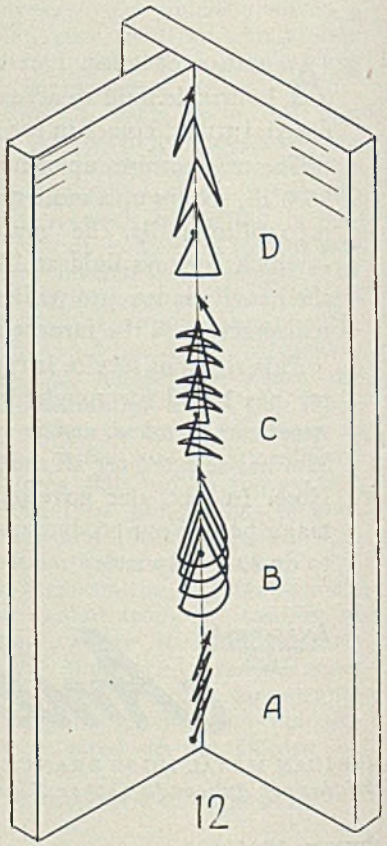

12

A SEARCH FOR FINER TOOL STEEL THAT BEGAN 87 YEARS AGO

The first crucible saw steel ever made in America was cast at the plant of Henry Disston in 1855.

Convinced that he could produce better steel than he was importing from Europe, Henry Disston built his own furnace, mastered the art of crucible making and so began the long history of his firm's achievements in the manufacture of fine tool steel.

Again in 1906 Disston pioneered by casting the first commercial heat of electric tool steel ever made in this country. This historic event has led, today, to Disston's modern electric processes, with accurate metallurgical controls which produce precisely made alloy and carbon steels with predetermined grain size, exceptional soundness and unusual cleanliness.

Many new and better steels have marked Disston progress. One of special note is Disston 6-N-6 High Speed Steel—a remarkable high speed steel, combining toughness and extraordinary wear resistance and having an excellent response to heat treatment.

Now that tool steels must *last longer and work faster:* Call in a Disston engineer to help select the best steel for the maximum "mileage" per tool. And if you want facts on forging, annealing, hardening, drawing and other operations, write today for your *free* copy of the illustrated 73-page catalog, "Disston Tool Steels". Henry Disston & Sons, Inc., 226 Tacony, Philadelphia, Pa., U. S. A.

6-N-6 High Speed Steel proves its mettle

Disston Tool Steels have to prove their merit on duty right in the Disston plants. 6-N-6 High Speed Steel was subjected to a two year run in file cutting chisels in the Disston File Division, cutting 1.60% carbon steels at speeds up to 420 cuts per minute. The extreme toughness and resistance to fatigue and wear in this test—and in general machine shop practice—proved that 6-N-6 is a match for the best 18-4-1 steel in most high speed applications.

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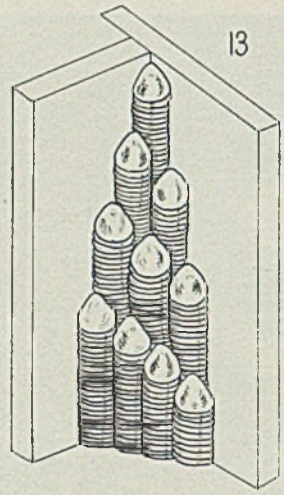
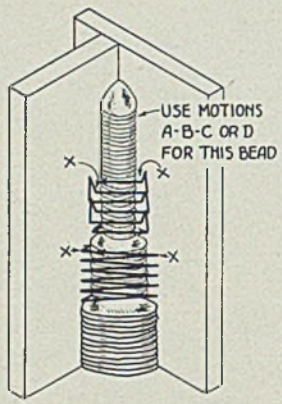
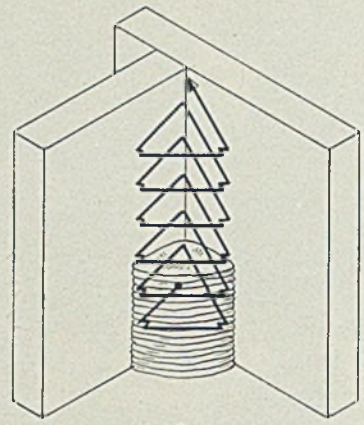
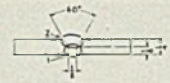
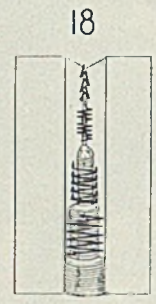
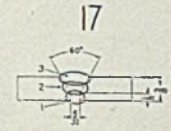












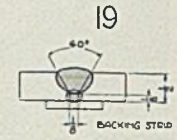


Fig. 13—Multiple stringer beads for heavy fillet welding, welding up
Fig. 14—Heavy fillet welds made up by full-width multilayer beads, welding up
Fig. 15—Triangular weave can be used with rods giving a built-up bead, for making heavy fillets
Figs. 16 and 17—Setups for vertical V-butt welds. Use weaves shown in Fig. 18
Fig. 18—Weaves for vertical V-butt welds, welding up
Fig. 19—Backing strip facilitates making vertical V-butt welds in vertical position with only two beads

Considerable work on all these weaves may be necessary to master them.

Lap and fillet welding in the vertical position are very similar. The same motions and weaves may be used. To practice them, tack two plates together to form a lap joint, then place in a vertical position. Using weave A, Fig. 7, start at the top, strike the arc and weld down with the electrode pointing up at about 45 degrees to the plates in the vertical plane. In other words, the electrode will point directly into the corner of the joint. Otherwise the technique, current, rate of travel and other elements are just the same as for regular vertical welding (Fig. 6).

Make Sure Penetration Good

A weave such as is shown at B in Fig. 7 will result in a slightly larger bead. For laying a second bead over the first, use the weave shown in C, Fig. 7. In practicing these weaves, break the plates apart frequently to be sure that good penetration is being obtained at the bottom of the weld without porosity—the weld metal must be solid and homogeneous.

A vertical fillet or T-weld may be made employing the same general techniques just described. Such a weld is shown in Fig. 8.

To make vertical *welds down* with heavier plate, a bead sequence such as that shown in Fig. 9 is frequently used. For beads No. 1, 2, 3 and 4 (Fig. 9) use motions A and B (Fig. 7) and for bead No. 5 (Fig. 9) use weave C (Fig. 7). A current of 150 amperes is used with all five passes in ½-inch plate, employing 5/32-inch vertical type electrode.

If prepared plate is not available, the butt joint may be approximated by tacking two plates together leaving a 60-degree angle between the abutting surfaces as shown (Fig. 9) for downhand welding, then welding the joint in a vertical position.

To practice *welding up* on a vertical plate, set ¼-inch plates in a vertical position on the welding table. Start at the bottom with a 5/32-inch electrode, strike the arc and draw the electrode upward in a straight line. A smooth, even motion should be employed.

Other variations that may be employed to advantage on certain work are motions A, B, C and D in Fig. 10.

Lap and fillet welds may be made by *welding up,* of course. To do this, set up the plates as shown in Fig. 11. Use weaves A, B, C and D (Fig. 10) by starting at the bottom and working up. Check the quality of the welds by breaking them to be sure of complete penetration and sound metal.

In making heavy lap (Fig. 11) or fillet (Fig. 12) welds, two general procedures may be followed. One is to build up the weld by a number of small stringer beads with a motion such as A, B, C or D (Fig. 10). The other consists of using multiple layers of beads which are applied with a wide weaving motion. The welder should be familiar with both types.

To make a heavy fillet, *welding up,* multiple stringer beads with very little weaving in any of the beads may be used as shown in Fig. 13.

Fig. 14 illustrates the second method. The first bead should be put in using a slight weaving motion. The second and third beads should be put in using the weave shown in Fig. 14. Additional beads can be applied, using the weave shown in Fig. 14. In using these weaves, a slight pause in the motion should be made at the points marked X in Fig. 14. This pause should be somewhat longer for the weave used for the third and fourth beads than for the second bead. These pauses are for the purpose of filling up any undercuts in the parent plate. The triangular weave shown in Fig. 15 may be used with electrodes giving more of a built-up bead.

To learn to weld a scarfed or V-type of vertical butt joint, set up in a vertical position plates prepared as shown in Fig. 16. Using a motion similar to A, Fig. 10, start from the bottom and lay the first bead. The second bead should be applied by the use of weaves B, C or D, Fig. 10. Use a 5/32-inch vertical type electrode for this bead with sufficient motion to fill in the V.

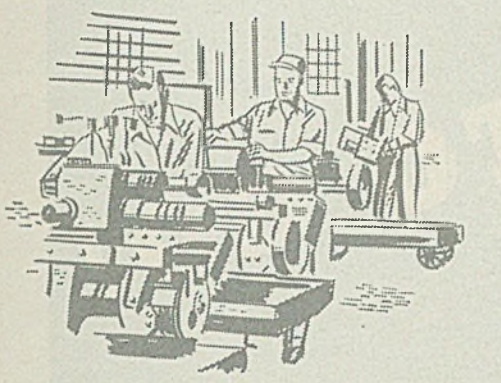
Now set up ⅜-inch plates in a vertical position to make the weld shown in Fig. 17. Weld up, putting in the first bead with a ⅛-inch or 5/32-inch electrode using motion A, Fig. 10. Put in the second and third beads with a 5/32-inch vertical-type electrode using motion shown in Fig. 18.

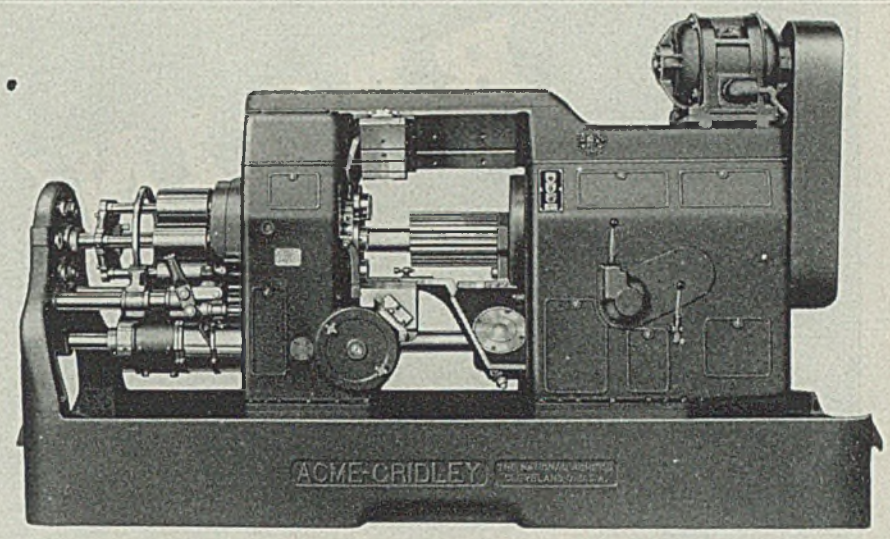
Frequently, fairly heavy welds are made in this position with only two beads. See Fig. 19. To do this, the first bead is put in as before but using a backing strip. The second bead must be laid in heavily, using a weave such as that shown for the second bead in Fig. 14. If a rod giving a good built-up bead is available, the triangular weave, Fig. 20, may be used.

Fillet and lap welds in the overhead position are so similar that instructions need only be given in detail for the fillet weld. Place two plates tacked together for a T-weld in the overhead position, Fig. 21, so that the underside may be reached readily with the electrode.

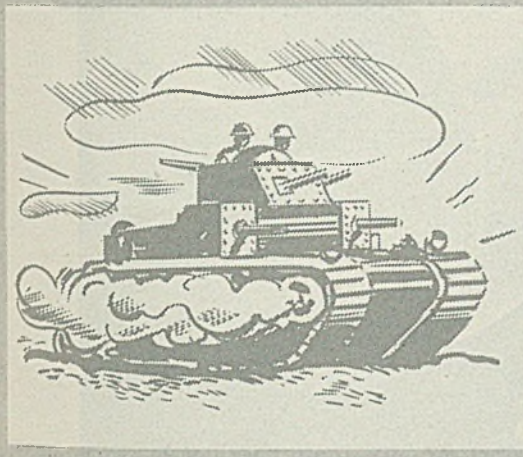
Practice first on making a good

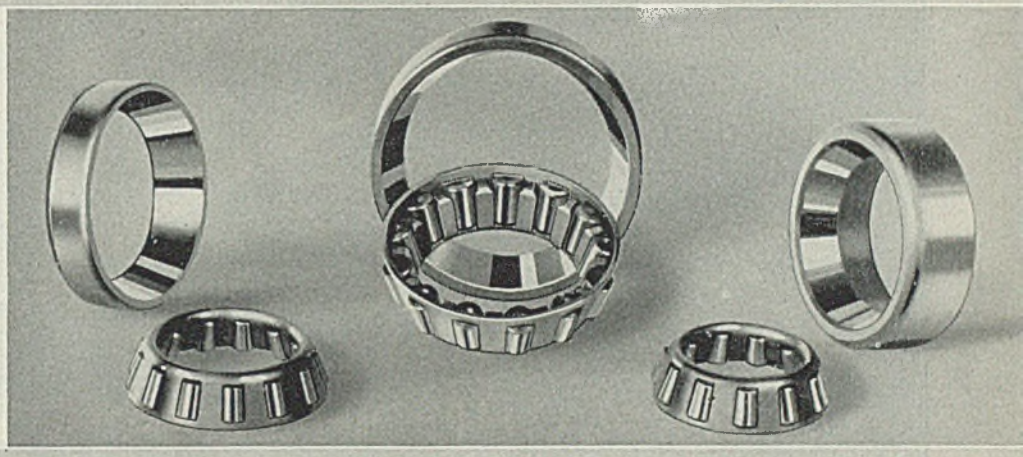
FROM PRODUCTION LINE





TO FIRING LINE





Ohio Seamless Tubing serves on BOTH FRONTS

This is a war of strength, speed, precision — from start to finish. That's why you'll find Ohio Seamless Tubing in action all the way — from production in the factories to offensives in the field.

Ohio Quality Tubing is used for many machine parts that require high load-bearing and fatigue strength, precise machining . . . like the collets, pushers, spindles in the machine shown above. Uniform workability, accuracy to size and gauge, bright, non-oxidized surfaces both inside and out — these qualities of Ohio Seamless Tubing help to speed production. When finished units go into action, the inherent structural strength and close tolerance in parts made from Ohio Tubing contribute to fast, steady production of precisely machined parts. Many of these, too, are made from Ohio Tubing — precision bearings for multi-ton tanks, shell parts of exacting strength, accuracy, smoothness for air, land and sea projectiles . . . other military essentials.

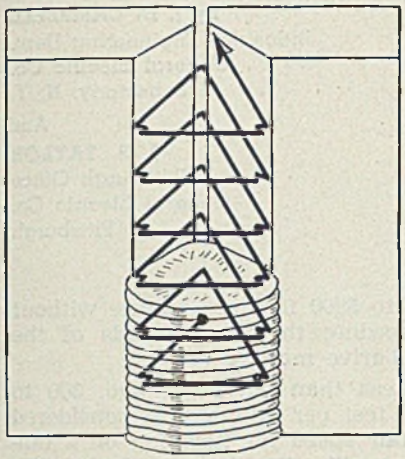
Today's emphasis on strength, speed and precision reflected in the increased demand for Ohio Seamless Tubing in war industries, indicates how well it will meet your peacetime requirements.

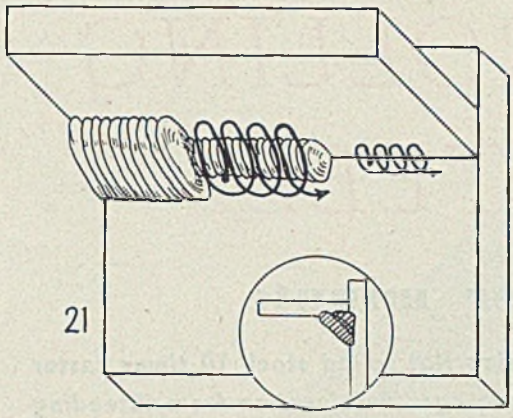
ACME GRIDLEY MULTIPLE SPINDLE AUTOMATIC

Helps speed mass production of hundreds of essential war products cut from metal bars or tubing . . . shell casings and other bullet parts, precision parts for armored trucks, tanks, depth charge bombs, many others. Ohio Seamless Tubing is used in the manufacturing of this machine . . . in many products it produces.

THE OHIO SEAMLESS TUBE COMPANY

SHELBY, OHIO





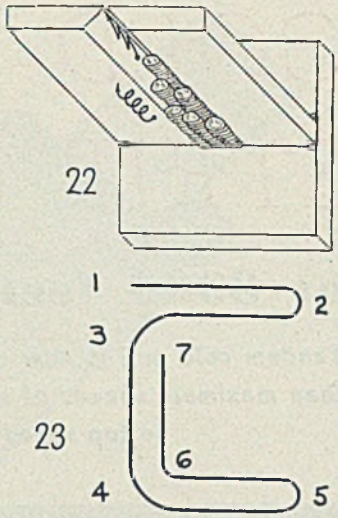


Fig. 20—Weave for laying in heavy bead to make weld in Fig. 19, requires electrode that gives built-up bead similar to that used for bead in Fig. 15
Fig. 21—Overhead fillet and lap welds can be made using this type of weave
Fig. 22—Use multiple stringer beads for overhead V-butt welds
Fig. 23—Multiple layer overhead beads can be placed with this weave, but it's not an easy task

smooth single bead in the corner, testing the weld frequently by breaking and examining. When this has been perfected, a multiple stringer bead weld may be tried. Then make multiple beads with weaving, first making the stringer or corner bead as shown in Fig. 21. After cleaning the bead, lay the second bead, using the weaving motion shown. To lay a third bead is a rather difficult procedure, but it can be done using the same weaving motion as for the second bead but somewhat wider. To make lap welds in the overhead position, follow the same general procedure as that used for fillet welds.

To make overhead butt welds, place two ¼-inch plates with a small opening between their square edges. Tack them and set them up for easy access to the bottom of the joint. Strike an arc with a $\frac{5}{32}$-inch electrode and run a bead along the opening, fusing the two plates together.

For plates up to ¼-inch in thickness, a bead can be run on the opposite side for a joint of approximately 100 per cent strength. Try the same type of overhead butt welding with two heavier plates, scarfed or prepared for a V-butt weld. Follow the same general procedure shown in Fig. 22, but make the welds with slight motions.

In making the first bead in a weld of this type, some difficulty may be encountered, and a backing-up strip will assist materially. However, in much construction work such a backing-up strip cannot be used so the operator should also learn to make the weld without the strip. Refer to what was said before as regards "hot" and "cold" electrodes as the type of electrode may make the difference between success and failure in much work of this difficult nature. See first part of this article in STEEL, Feb. 9, 1942, p. 76.

In overhead work it usually is much easier to make the welds with stringer bead procedure as shown. It is possible to lay successive beads in the overhead position using the weave in Fig. 23. However, this is rather difficult, and the operator may wish to make a weld using the stringer bead procedure for the first and second layer and the weave shown in Fig. 23 for the last layer.

Tin Can Bundles Used Discriminately In the Basic Open-Hearth Furnace

■ NO STONE is being left unturned by a well-known steel company in its effort to make maximum use of available scrap, even low-grade material such as tin plate and terne plate. "Tin can" bundles are being received on the basis of two cars of No. 1 bundles to one car of tin can bundles, the latter carrying a price of $2 a ton under No. 1 bundles, or $15.85 delivered. The sole reason for setting this 2 to 1 ratio is to prevent flooding the mill with excessive amounts of baled cans. This obviously is not the charging ratio, since other grades of scrap are used as well.

Baled cans are not burned before charging since, as detinners point out, practically no tin is removed from can stock simply by burning. However, the cans are being used discriminately and in restricted amounts to prevent the tin content of open-hearth heats exceeding about 0.10 per cent, generally considered the maximum to avoid rolling difficulties.

A metallurgical authority points out that this element is harmful in proportion to the percentage of carbon in the steel. If the carbon content is around 0.60 per cent and the tin content from 0.03 to 0.08 per cent, difficulty will be encountered in working the steel. However, if the carbon is 0.08 per cent it has been found that tin up to 0.20 per cent will not cause any harm.

Tests made with steel samples containing 0.10 per cent carbon and 0.30 per cent manganese and increasing amounts of tin, showed that the steel became hard with a tin content of 0.26 per cent. The steel was almost impossible to forge in one heat when the tin content exceeded 0.40 per cent. Bars with higher tin contents were redshort.

Scrap interests in some districts with baling machines are being deluged with tin cans and are busy baling them. Some material of this type is being shipped in from other districts. To date used sparingly, it is possible as research proceeds that higher percentages of this admitedly inferior material can be charged. The general policy is to make maximum use of available scrap material, whatever its form happens to be.

(*Please turn to Page* 114)

COLD ROLLING STRIP STEEL

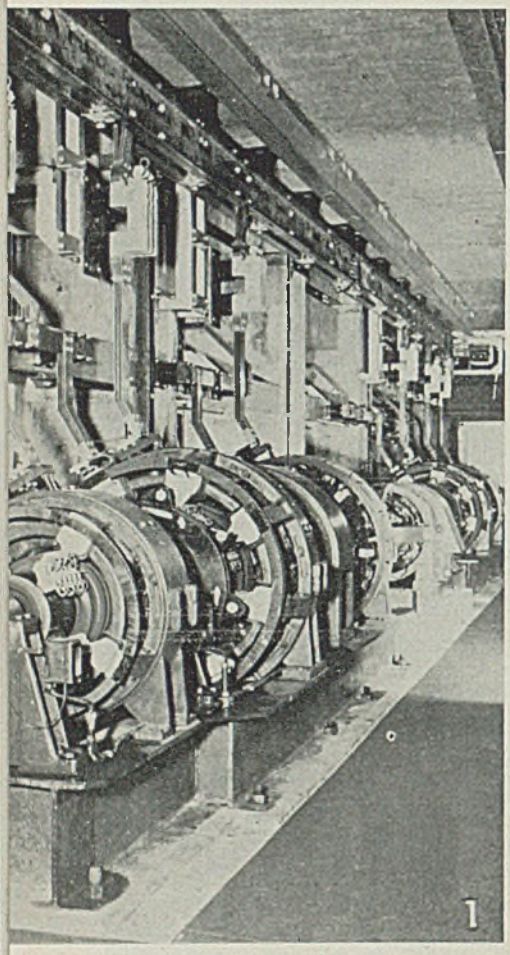
at 3900 feet per minute

Tandem cold mill is now delivering flat rolled stock 10 times faster than maximum speeds of a decade ago. Acceleration from threading to top speed is accomplished in 7 seconds

By J. D. CAMPBELL
Industrial Engineering Dept.
General Electric Co.
Schenectady, N. Y.

And

J. R. TAYLOR
Pittsburgh Office
General Electric Co.
Pittsburgh



FINISHING SPEEDS on the modern, continuous hot-strip mill, are determined largely by the slab and strip temperatures as well as by the desire for high-tonnage production. Fortunately, in cold rolling steel strip, the strip temperature does not affect directly the ultimate rolling speeds. In fact, the highest rolling speeds possible either practically or theoretically, on tandem cold-strip mills, have not been determined. Thus, the continuous trend toward higher finishing speeds on cold mills is prompted mainly by increased production rewards, taking into consideration the fixed and variable costs of rolling.

Carnegie-Illinois Steel Corp. placed in operation a 4-high, 5-stand, tandem cold mill at its Irvin works, Dravosburg, Pa., in May, 1941. The new mill is intended primarily for cold rolling steel strip, in widths up to 42 inches, to tin-plate gages of 0.007 to 0.012-inch. However, it also is being used for rolling steel to thicknesses greater than that usually classed in the tin plate range.

Outstanding in the features of the new mill is the high speed at which the strip emerges from the last stand and is coiled on the tension reel. Having a nominal rating of 3300 feet per minute, the mill already has been operated at speeds up to 3900 feet per minute without exceeding the rated speeds of the mill-drive motors.

Less than ten years ago, 300 to 400 feet per minute was considered a fair speed for finishing on a tandem mill. On the new Irvin mill, the strip normally is elongated to seven to ten times its original length, so that the entering speed on its first stand is comparable to the finishing speeds of the last stand on mills built a decade ago.

Converting 3900 feet per minute to familiar units gives a speed equivalent to over 44½ miles per hour. Strip emerging from the last stand of a tandem mill becomes literally a "flying carpet" of steel before it is wrapped on the tension reel. The mill will accelerate from a threading speed to top speed in approximately 7 seconds, representing an accelerating rate of more than 5 miles per hour per second. This last figure is approaching the maximum accelerating rate of a modern motor car. The decelerating time of the mill from top speed to threading speed averages 5 seconds.

Design of this mill involved many advanced problems of structural, mechanical, and electrical design. Available space for installation was that reserved for a 1750-foot per minute mill. Inertia of the main-drive rotors had to be reduced, closely matched, and co-ordinated. It was necessary to greatly expand all bearing and strip-lubricating systems. Since the delivery speed was to be twice that of mills designed several years ago, provision was made for extra flexibility of control

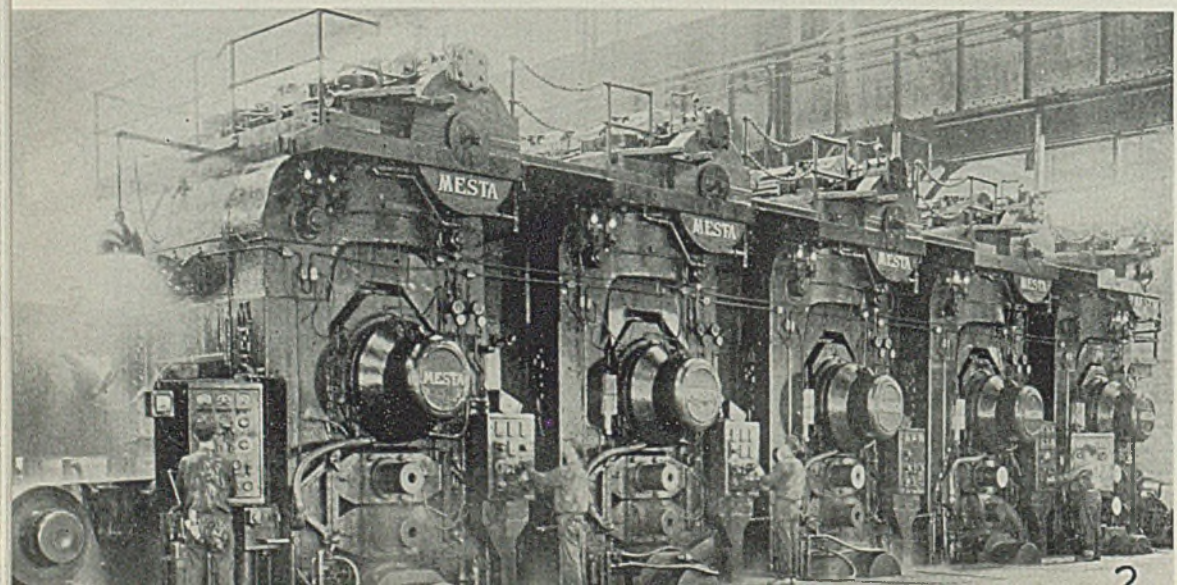
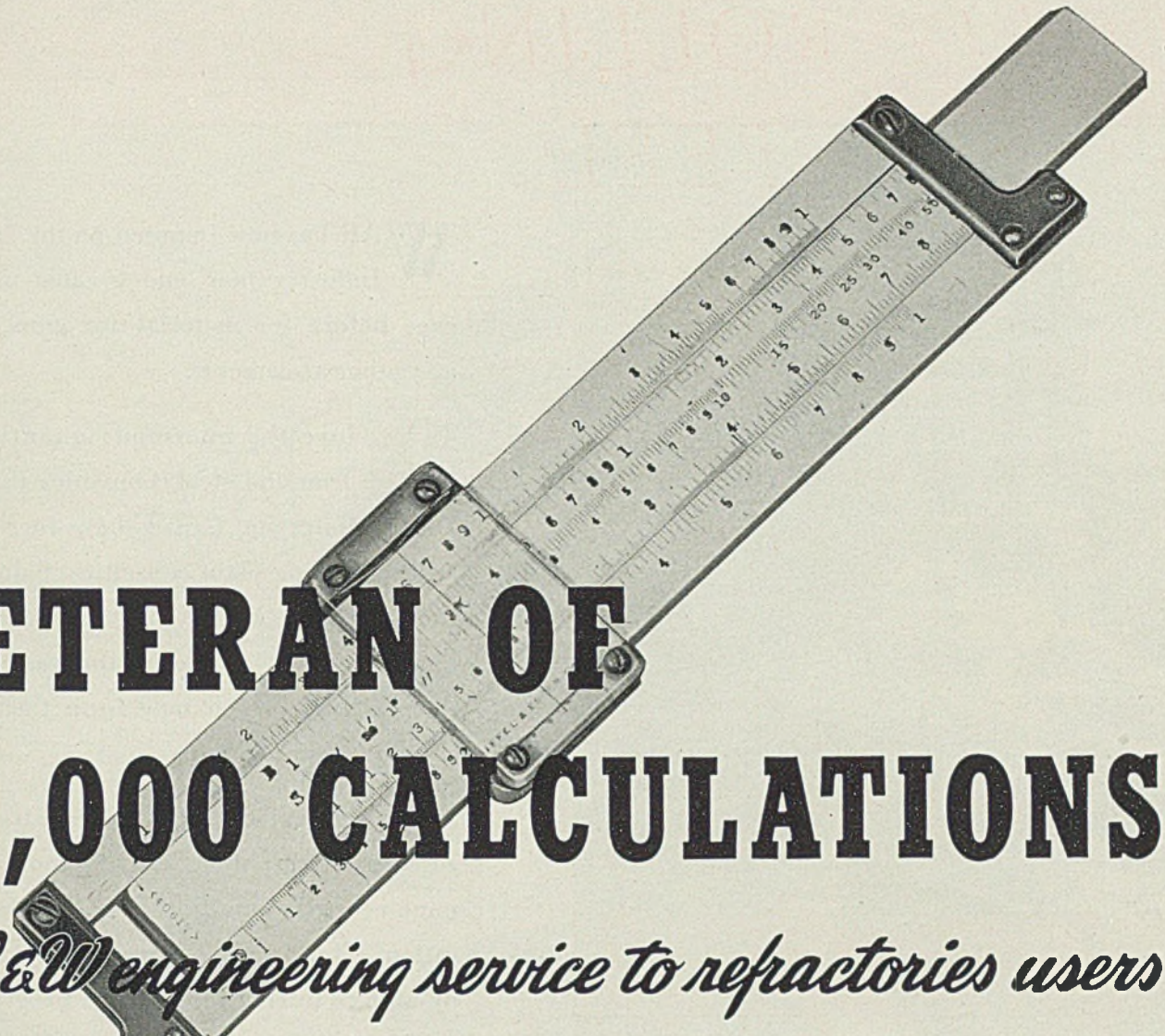


Fig. 1 — Mill motor and tension - reel booster - generators are conveniently located beneath main 750-volt negative bus

Fig. 2—Tandem mill at Irvin works with 18 and 53 x 42-inch rolls which may be operated at high speeds



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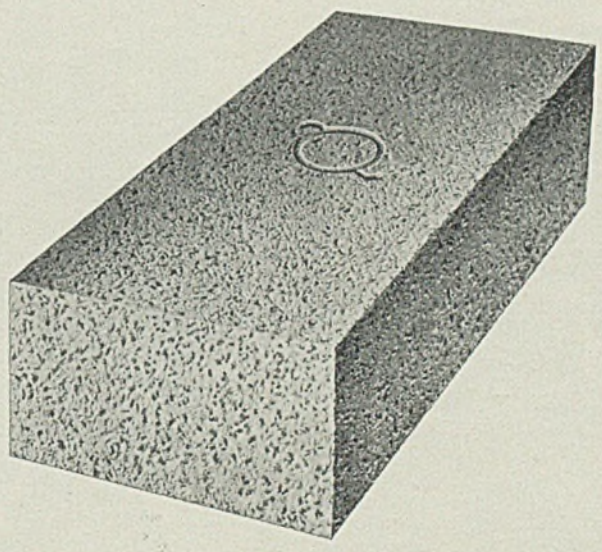
The making of practical suggestions for improving furnace efficiency is an important part of each B&W District Representative's job. And aid from a staff of engineers at the home office is available when he needs it.



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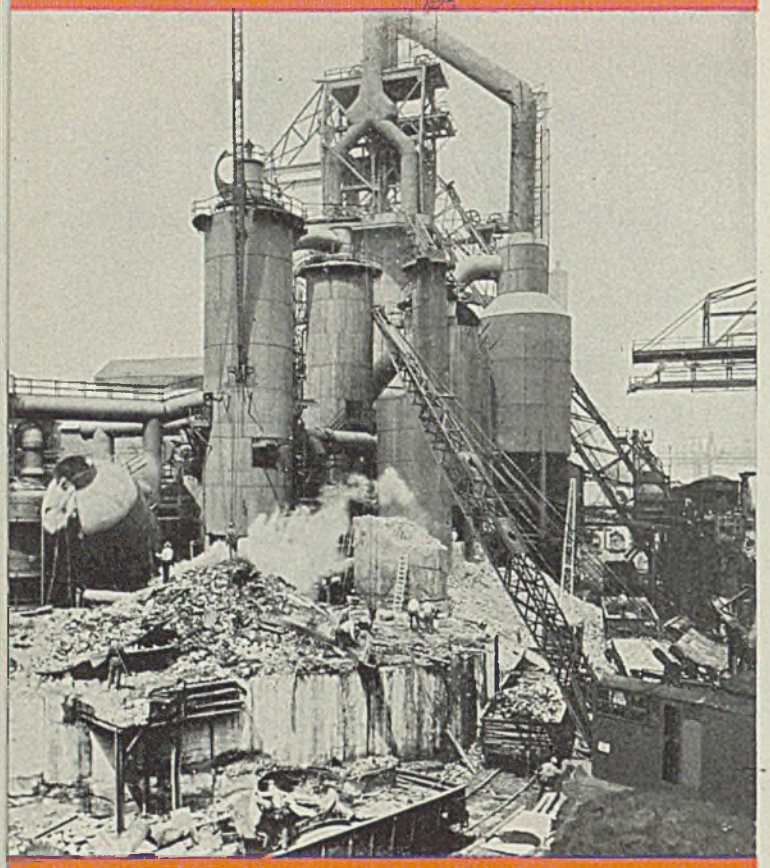
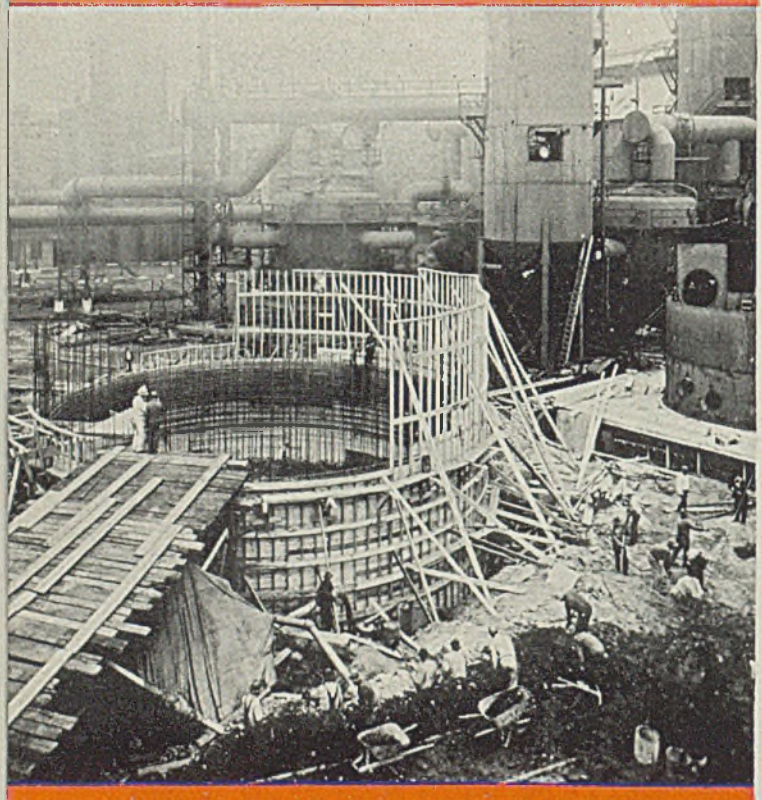
BABCOCK & WILCOX

McKee *again* increases iron and stee



tsmantling existing furnace in preparation for reconstruction.

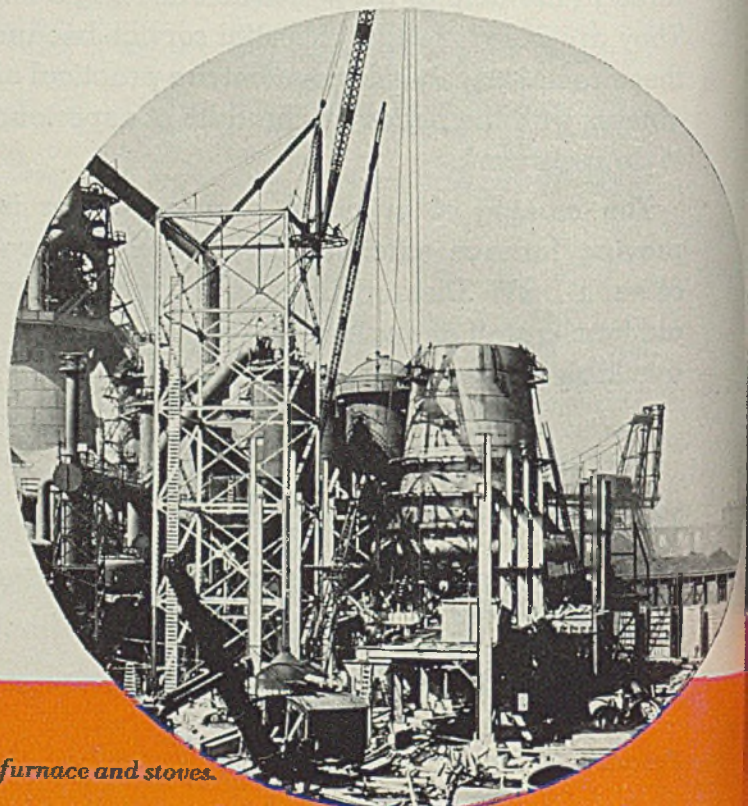


uilding furnace foundation and beginning of stove construction.

WAR has now imposed on the Iron and Steel Industry new and greater demands than ever before for material for guns, ships, tanks and other armaments.

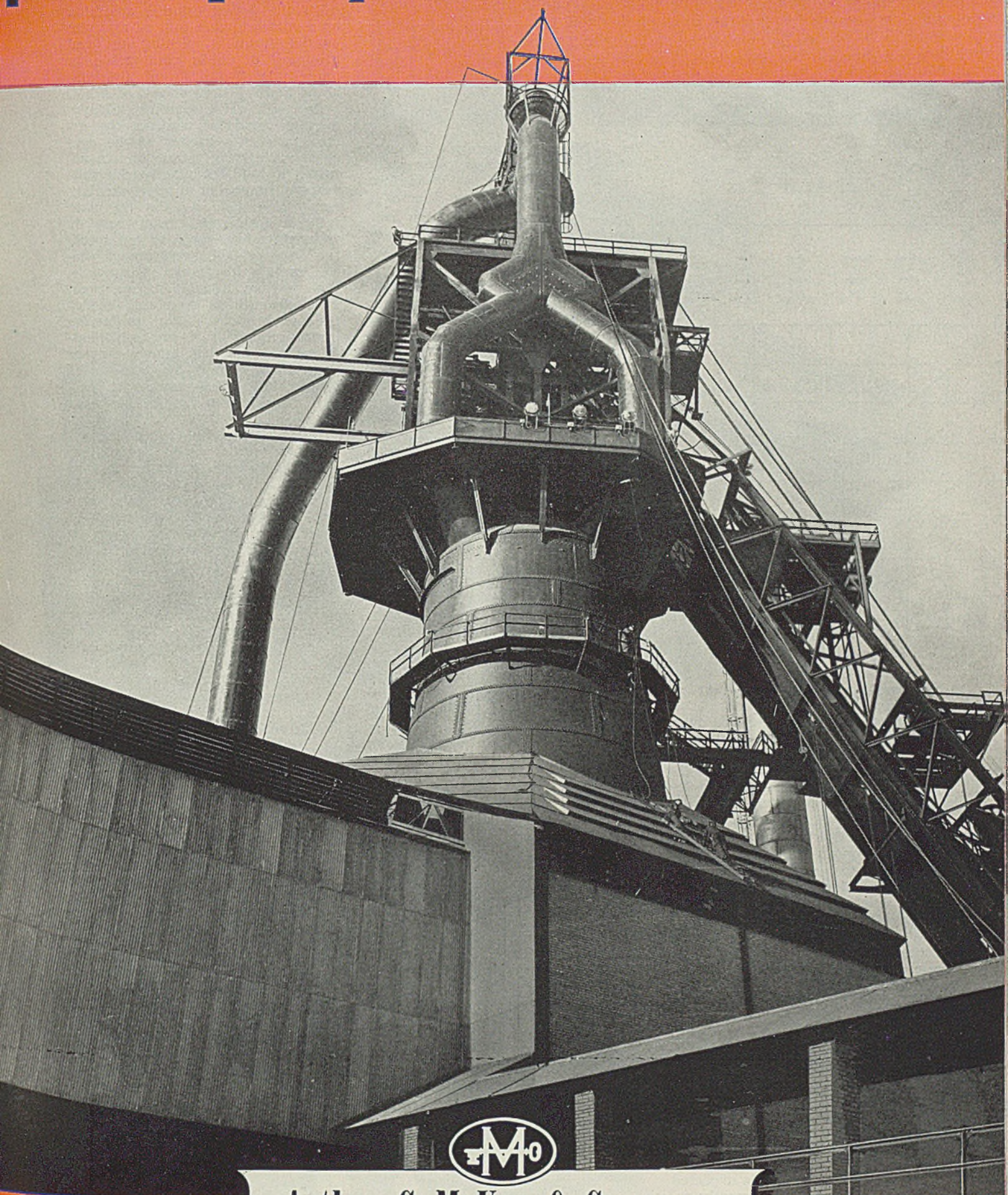
To produce the enormous quantities of steel needed, iron and steel companies throughout the United States and Canada have increased and are still increasing plant capacities. Side by side with them, Arthur G. McKee & Company are playing a major role in providing the vast, new production facilities which now form the very base of the nation's war effort.

Shown in various stages of construction in the accompanying photographs is another blast furnace recently completed by the McKee organization. This is one of many projects completed by McKee during the defense program to insure an increased and uninterrupted production of iron and steel to fight America's battles.



Erecting furnace and stoves.

plant capacity for America's Defense



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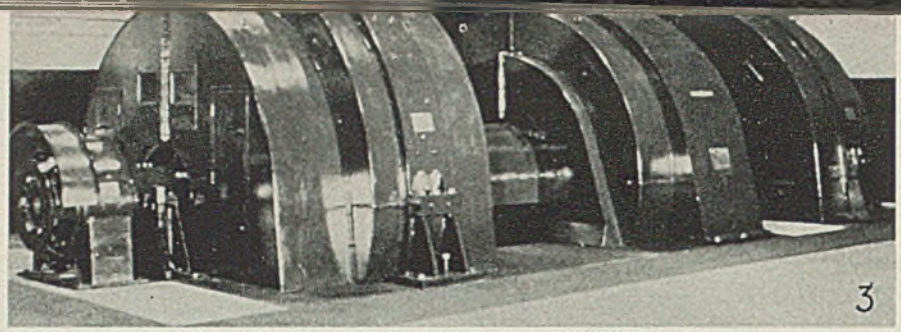


Fig. 3—Main d-c generators are each 4000 kilowatts, the largest ever built. Overall height of MG set above floor is 9 feet; length is 36 feet 7 inches

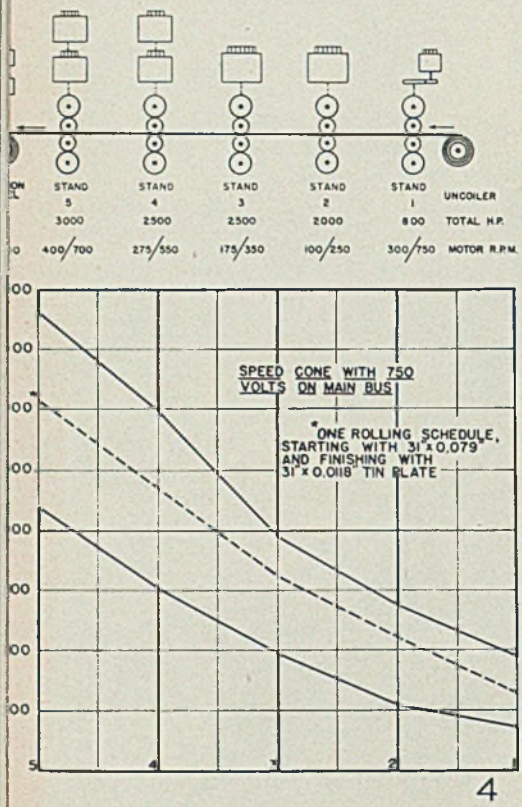


Fig. 4—Speed curve of tandem mill showing order of stands and motor ratings

including the IR drop compensation and tapered tension.

Main Motor-Generator Set: Power is supplied to the main-drive motors by a 4-unit 300-rpm motor-generator set, which includes a 12,000 horsepower, 6600-volt, 60-cycle synchronous motor, two 4000-kilowatt, 750-volt direct-current generators, and a 60-kilowatt exciter for the synchronous motor. This set weighs 167 tons and required seven freight cars for shipment.

The usual neutral reactor starting is employed but in addition "oil pressure starting" was installed which has so reduced starting torque requirements that the set is accelerated in 90 seconds with peak current slightly less than the rated full load current of 885 amperes. The latter equipment consists of a simple high-pressure pump for each of the four bearings. These pumps, driven by ¾-horsepower motors and mounted one at each bearing pedestal, take oil from the bearing oil wells and deliver it at high pressure through the bottom of their respective bearings to lift the shaft journals during starting. It is expected that this equipment will greatly reduce maintenance on heavily loaded bearings.

The 4000 kilowatt generators, it is believed, are the largest individual direct-current generator units ever built. They are paralleled through individual positive and negative breakers and connected to the main-mill motor controls by an aluminum channel bus 450 feet long. Two 10-inch aluminum channels reinforced by ½ x 8-inch aluminum bars and assembled in I-beam sections were used for each polarity. This type of section made it possible to employ space that had been reserved for a 5000-kilowatt, 600-volt bus and to use fewer heavy-duty bus supports. By delivering the bus to the site prefabricated, installation time was greatly reduced.

The motor-generator set is ventilated with an enclosed system that forces filtered air into the bottom of each main unit, from a common pressure chamber. Discharge is also from the bottom into a common outdoor stack.

The 12,000-horsepower synchronous motor is equipped with a reactive kilovolt-ampere regulator in order to maintain good voltage regulation over the entire range.

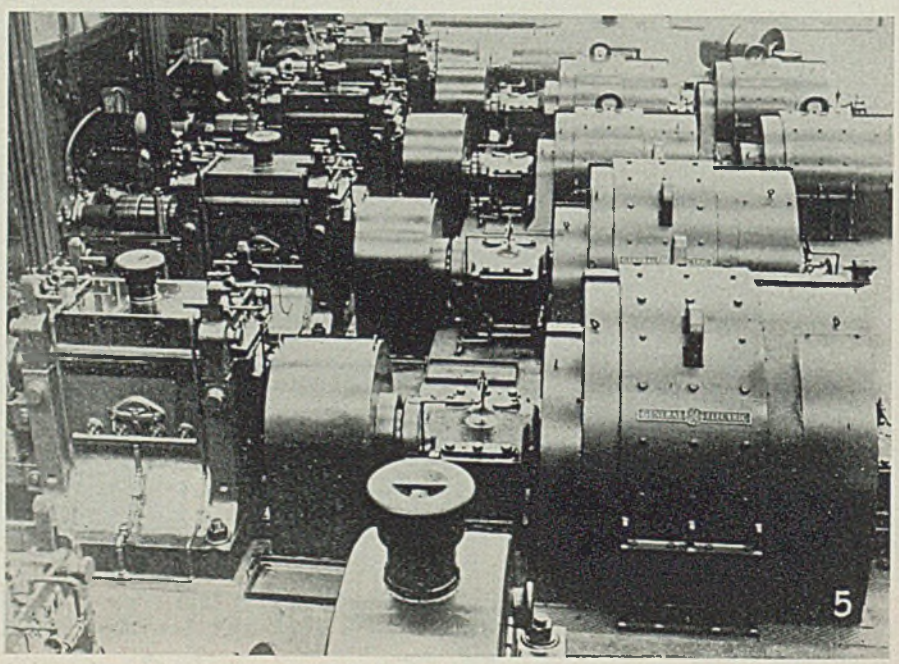
To the power system, operation of a cold-reduction mill of this size entails frequent picking up and dropping of loads comparable in magnitude to those of finishing stand motor-generator sets of a hot-strip mill. The reactive kilovolt-ampere regulator controls the excitation of the exciter of the synchronous driving motor and is adjusted to hold the reactive kilovolt-ampere component at approximately constant value. As the tin plate mill is accelerated from rest or from threading speed to top speed, the load on the synchronous motor rapidly increases. Meanwhile, the reactive kilovolt-ampere regulator strengthens the shunt field of the synchronous motor exciter, so that the motor draws only sufficiently higher reactive kilovolt-ampere from the 6600-volt, 30-phase power system to compensate for the voltage drop caused by its increased load.

During the mill accelerating period, the peak power demand on the 4000-kilowatt generators may be as high as 10,000 kilowatts. This power reaches its peak value in 5 or 6 seconds, so that the resulting block of kilovolt-ampere-hours is large for such a short period. If the reactive kilovolt-ampere regulator were not present, the synchronous motor would change the total kilovolt-ampere drawn from the line to such an extent that the 6600-volt system voltage would fluctuate considerably. In this way, the reactive kilovolt-ampere regulator minimizes the system voltage changes caused by wide fluctuations in load demand.

Mill and Motor Data: The 4-high

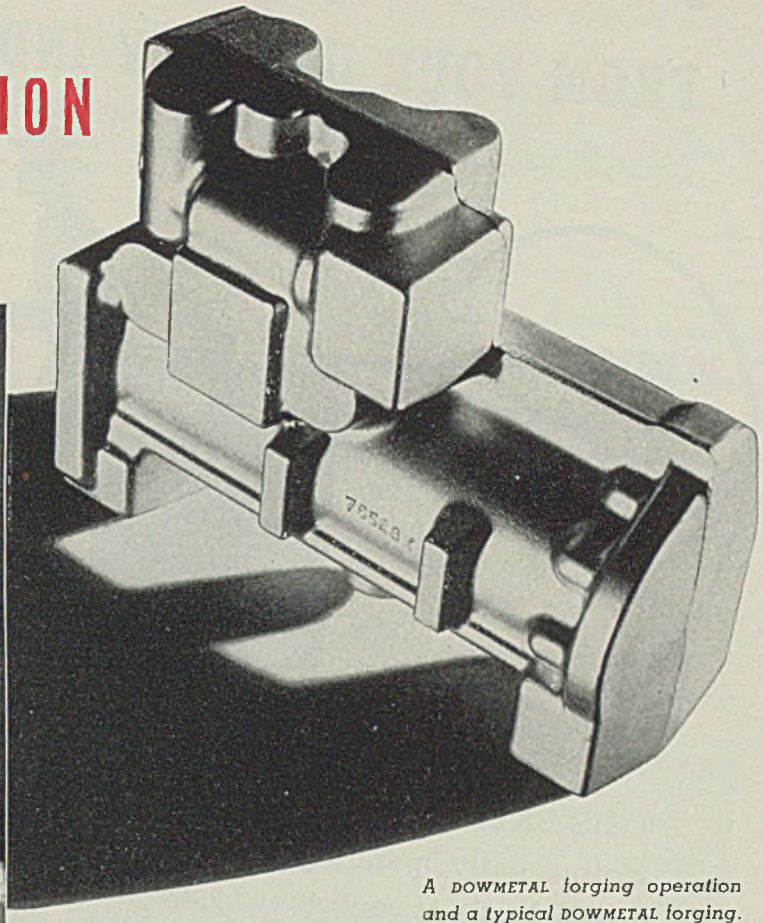
(*Please turn to Page* 115)

Fig. 5—High-speed cold mill driven by single-armature d-c motors on stands Nos. 1 to 3. Double-armature motors drive stands 4 and 5 and delivery tension reel



DOWMETAL MAGNESIUM

QUANTITY PRODUCTION FORGINGS!



A DOWMETAL forging operation and a typical DOWMETAL forging.

DOWMETAL* FORGINGS are favored for applications where it is especially desirable to attain maximum strength with the least possible weight. Problems of pressure lightness are eliminated. Quantity production is readily obtained. By reason of these combined advantages, DOWMETAL forgings are serving an important function as fittings and accessories in the construction of airplanes. DOWMETAL is fabricated by all the usual methods.

The Dow Chemical Company can supply press forgings of DOWMETAL made to standard specifications from controlled analysis extruded forging stock.

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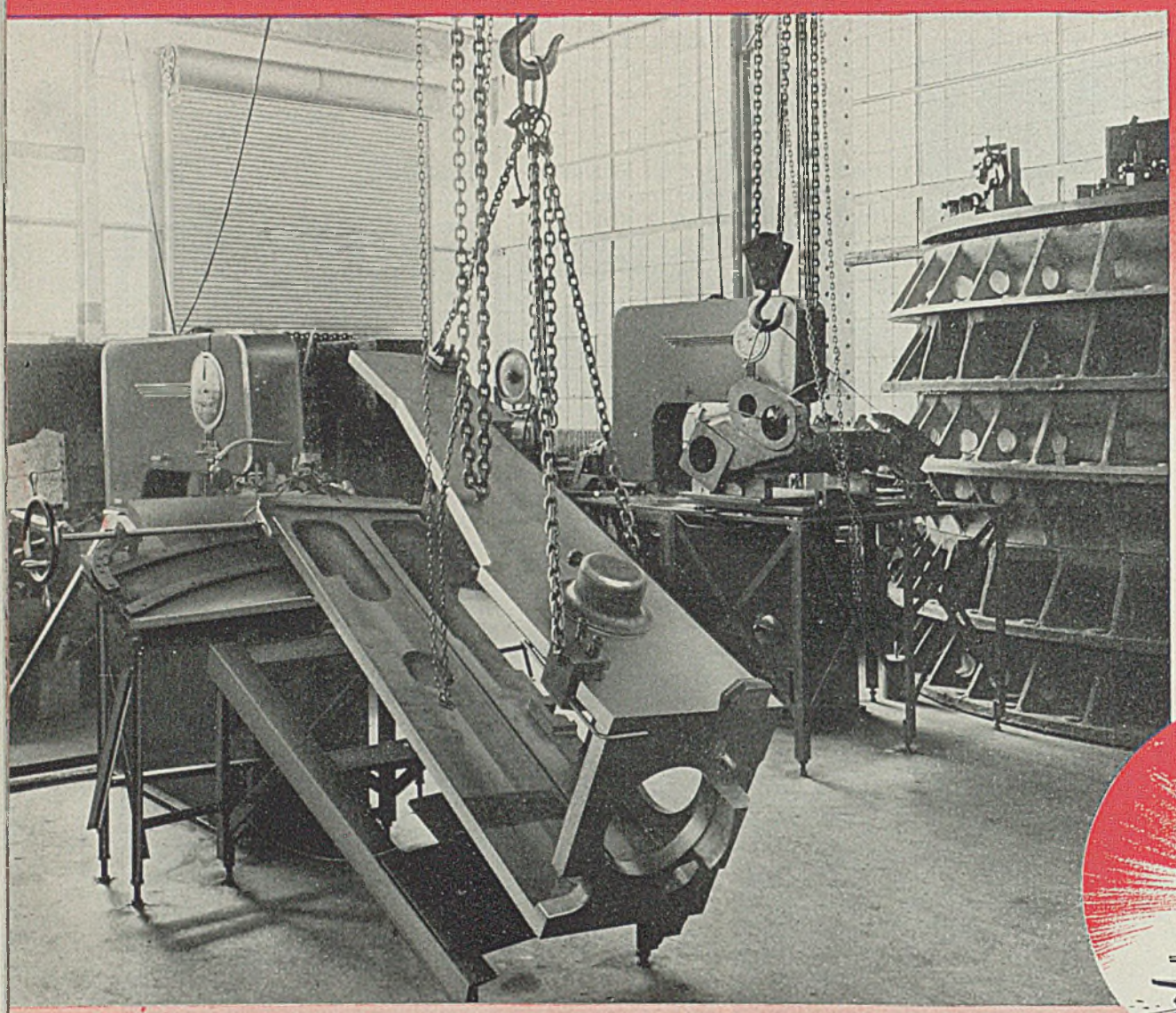

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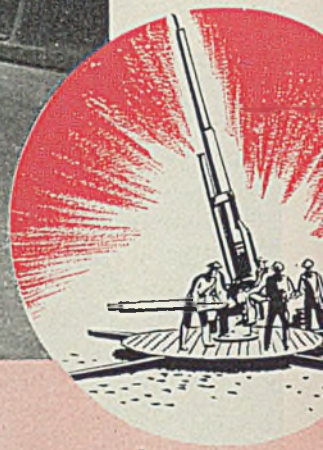

THEN—WHEN PEACE COMES...

Small and medium size plants, equipped with one or more DoAlls can accept profitable sub-contract defense orders for many parts. As soon as these orders stop, the DoAll can be immediately put to work catching up on shelved orders for civilian equipment for homes, shops and farms. The DoAll will not stand idle or have to be scrapped.

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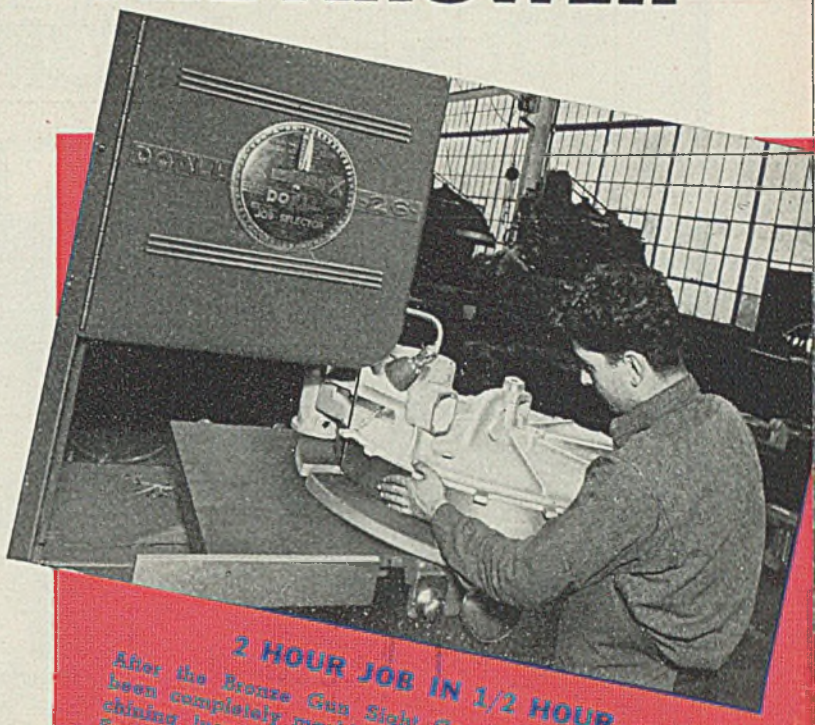
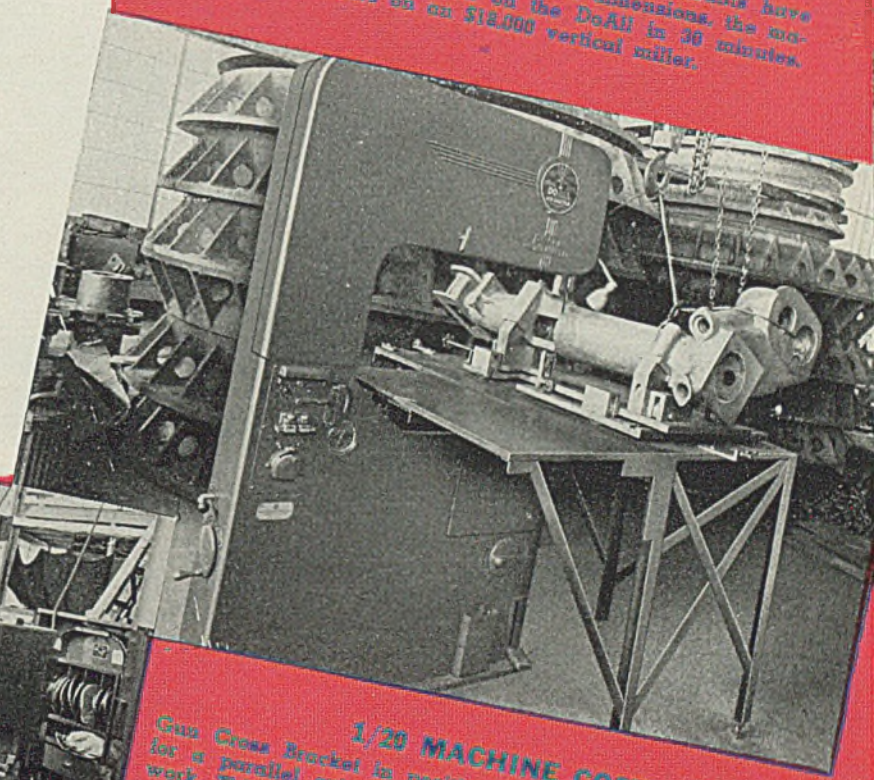
Batteries of DoAlls are used throughout the plant to do a lot of difficult operations on various parts for these guns. With the aid of special jigs, stands or hoists, the DoAll takes care of extra-heavy work formerly done on lathe, borer, broaching machine, drill torch, cutter, shaper, nibbler and milling machines.

Savings of time are sensational and $45,000 and $50,000 milling machines are left free for other work.



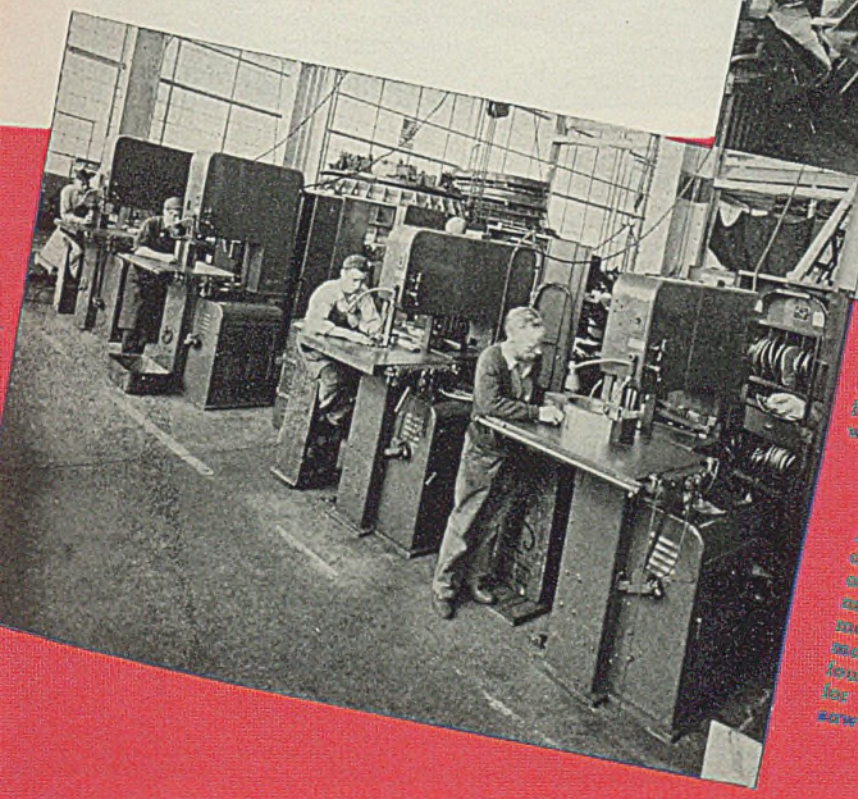
2 HOUR JOB IN 1/2 HOUR

After the Bronze Gun Sight Covers for gun mounts have been completely machined to required dimensions, the machining lugs are trimmed off on the DoAll in 30 minutes. Former time, 2 hours on an $18,000 vertical miller.



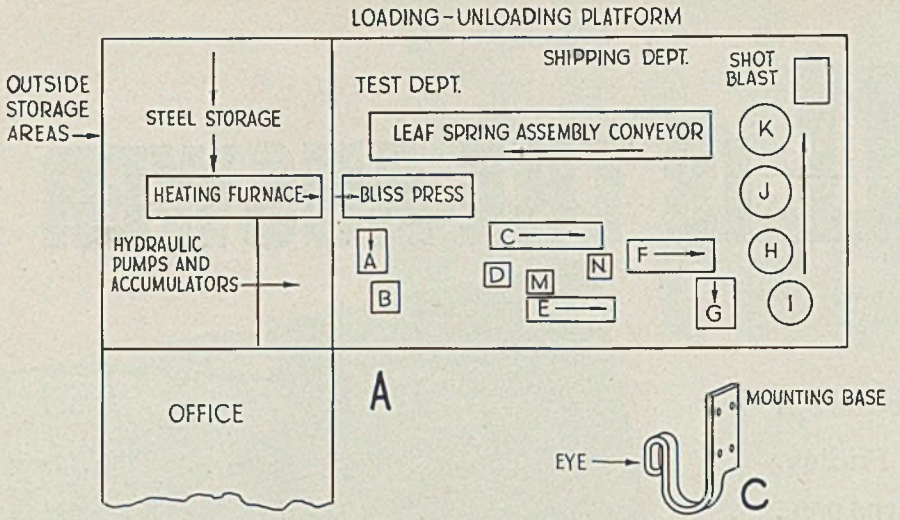
1/20 MACHINE COST

Gun Cross Bracket in position on 40"-throat DoAll, all ready for a parallel cut. Reinforced table and crane supports the work. This job was formerly done on a $50,000 milling machine.



DoAlls DOUBLE OUTPUT

At the first machine, four Trunnion Bearing Races are cut daily from a 4" thick drop forging. Outside contour shapes are sawed and filed and no further finish is required. Formerly, only two of these were done each day on a milling machine. At second machine, Feet Fixing Pedals for gun mounts are filed. At third and fourth machines, Control Valves for foot firing mechanisms are sawed and filed.



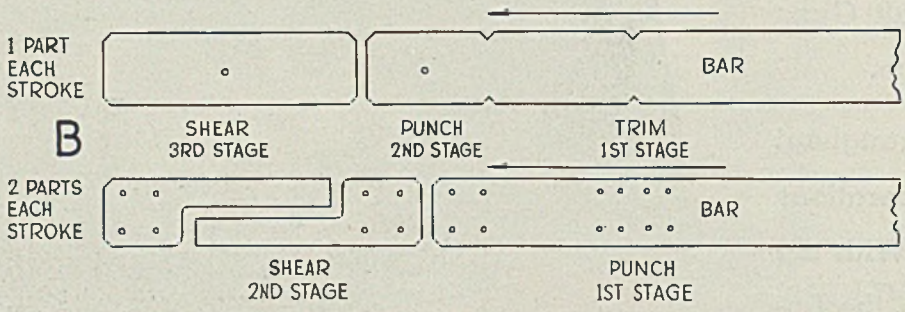


Fig. A—Rough plant diagram showing some of the principal pieces of equipment and production lines (not complete nor to scale). A, C and E are heating furnaces equipped with conveyors; B, D, M and N—coiling, punching and other press equipment; F—big chain conveyor heating furnace; G—volute winding machine and quench bath; H, I, J, and K—circular heat-treating furnaces

Fig. B—A typical 3-stage notch, punch and shear setup for producing spring blanks is shown in upper portion. Lower shows a 2-stage, punching in first, shearing in second. This is method utilized in making blanks for spring in Fig. C

Fig. C—Bumper suspension spring after forming to shape in press, Fig. 4

the storage area and is arranged to feed bars direct from the furnace through an opening in the wall partition to a large Bliss press shown in Fig. 1. This furnace as well as all the other heating and heat treating furnaces in the plant uses oil as fuel. Provision is made to remove a portion of the furnace roof to allow the bars to be placed in the heating chamber. Then bricks are laid back over the bars on supports to form the roof, thus conserving heat while the bar is being brought up to temperature.

In the same section of the plant are a number of hydraulic pumps with a large accumulator which furnishes power to presses and fabricating units in the plant. The hydraulic accumulator operates at a pressure of 1000 pounds per square inch and supplies oil to forming presses and other pieces of equipment. Accumulator has a 17-inch diameter piston.

Three shears are provided for handling the material either hot or cold. Two of these shears have a maximum capacity of 5 x ½-inch cross section material, the other handling up to 2½ x 5/16-inch material.

The big Bliss press shown in Fig. 1 has sufficient capacity to take care of the blanking and piercing of all items which go through this plant. Most work is handled on a set of 3-stage progressive dies in a mnaner similar to the upper diagram in Fig. B. It will be seen here that as the bar progresses from right to left, it is V-notched in the first stage, punched in the second stage and sheared off in the third stage to produce one part with each stroke of the press. A feed device connected with the press arm moves the bar forward the correct distance at each stroke. This is the setup employed to produce most of the various sized spring leaves for heavy-duty truck service.

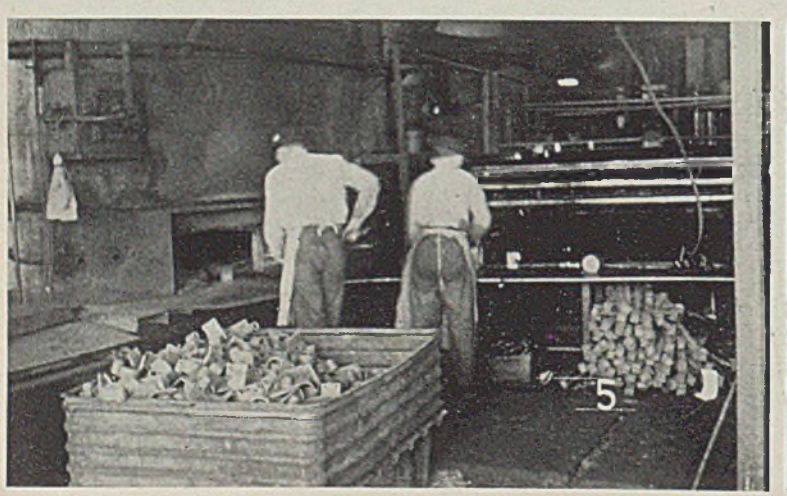
Certain other parts utilize a slightly different setup. For instance, spring support brackets for automobiles and trucks are made in a setup similar to that shown in the lower part of Fig. B. Here the work progresses from right to left also, a 2-stage progressive die being used to punch the bar in the first stage and shear off the work in the second. It will be noted that as many as eight holes are punched in the blank at the first station, while the shearing setup is designed to produce two complete parts with each stroke of the press as the parts are shaped to interlock as shown.

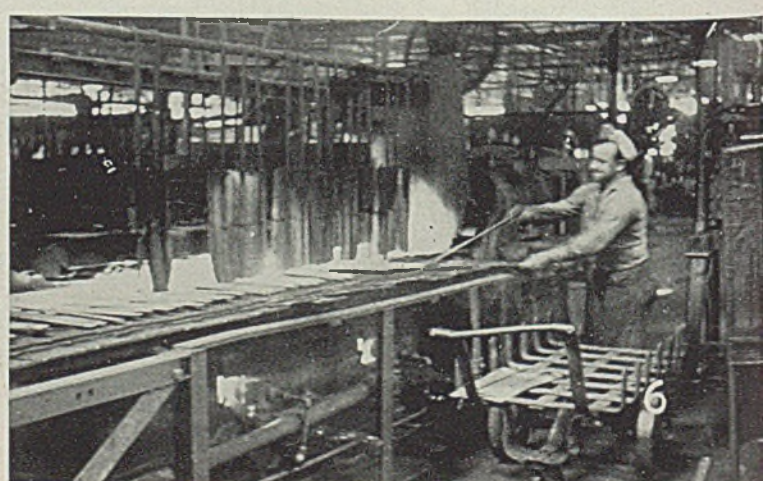
Such a part, from 12 to 14 inches long, may be blanked out from bar stock in this setup at rate of 7500 per 8-hour shift. It may be done either hot or cold as a heating furnace is directly in line with the press on the other side of the partition in the storage area and is equipped with a conveyor mechanism to feed the steel directly into the press.

(*Please turn to Page* 101)

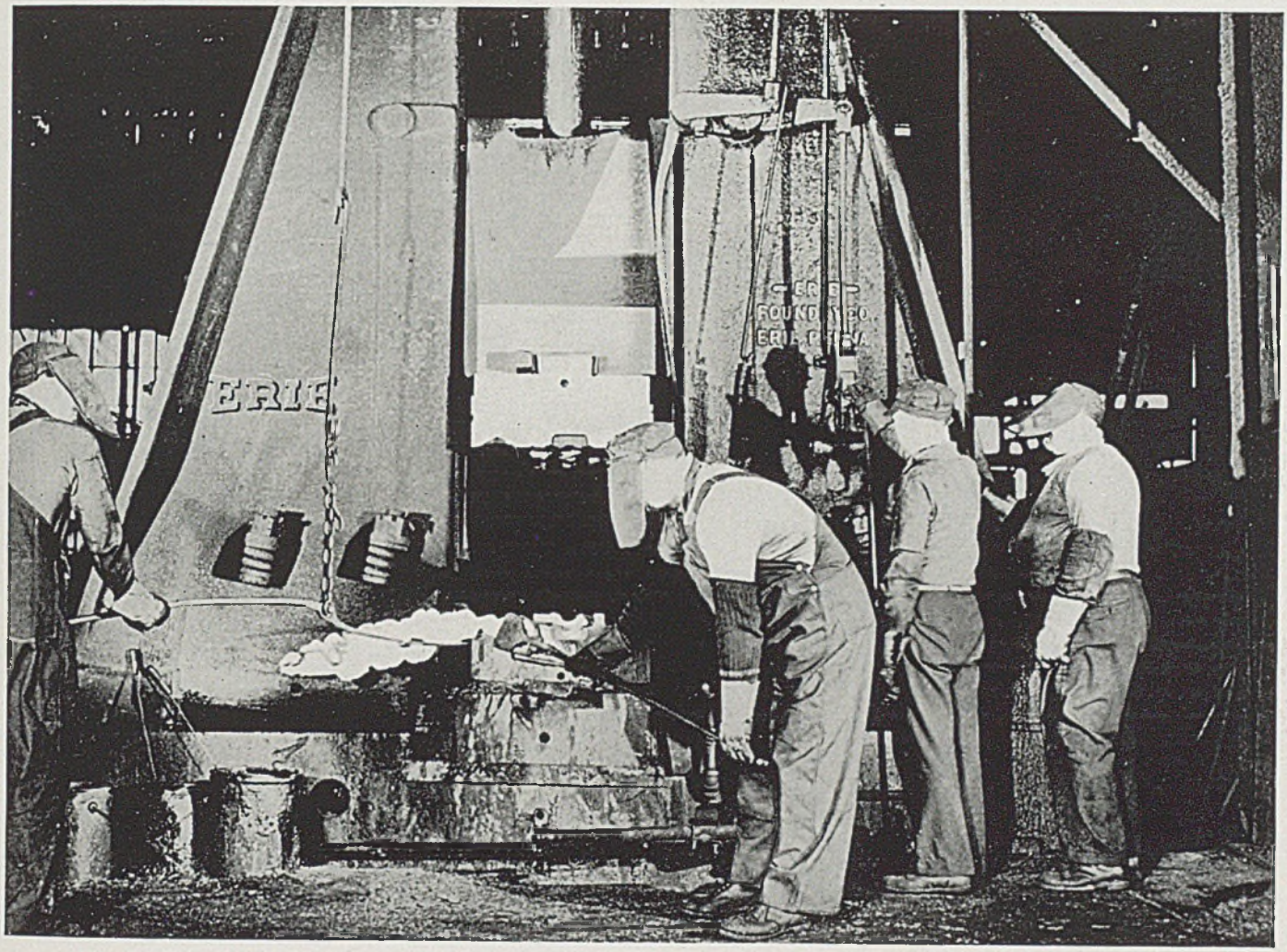
Fig. 5—From quench tank, springs are loaded into circular tempering furnace through one door, unloaded through adjacent door after making circuit of furnace

Fig. 6—One of the processing lines showing how work is taken from end of one reheating furnace conveyor, put through forming equipment and placed on conveyor of next reheating furnace to form continuous production line





Full Steam Ahead—
WITH ERIE HAMMERS ON THE JOB



THE thousands of Erie Hammers installed in the nation's aluminum and steel forging plants are pounding their mightiest for victory, hour after hour, without rest or let-up.

Similarly, the men and machines at the Erie Foundry Plant in Erie, Pennsylvania, are working their hardest day and night. Erie Steam and Board Drop Hammers and Trimming Presses are being built in increasing quantities to enable this country to produce more and more vital forgings.

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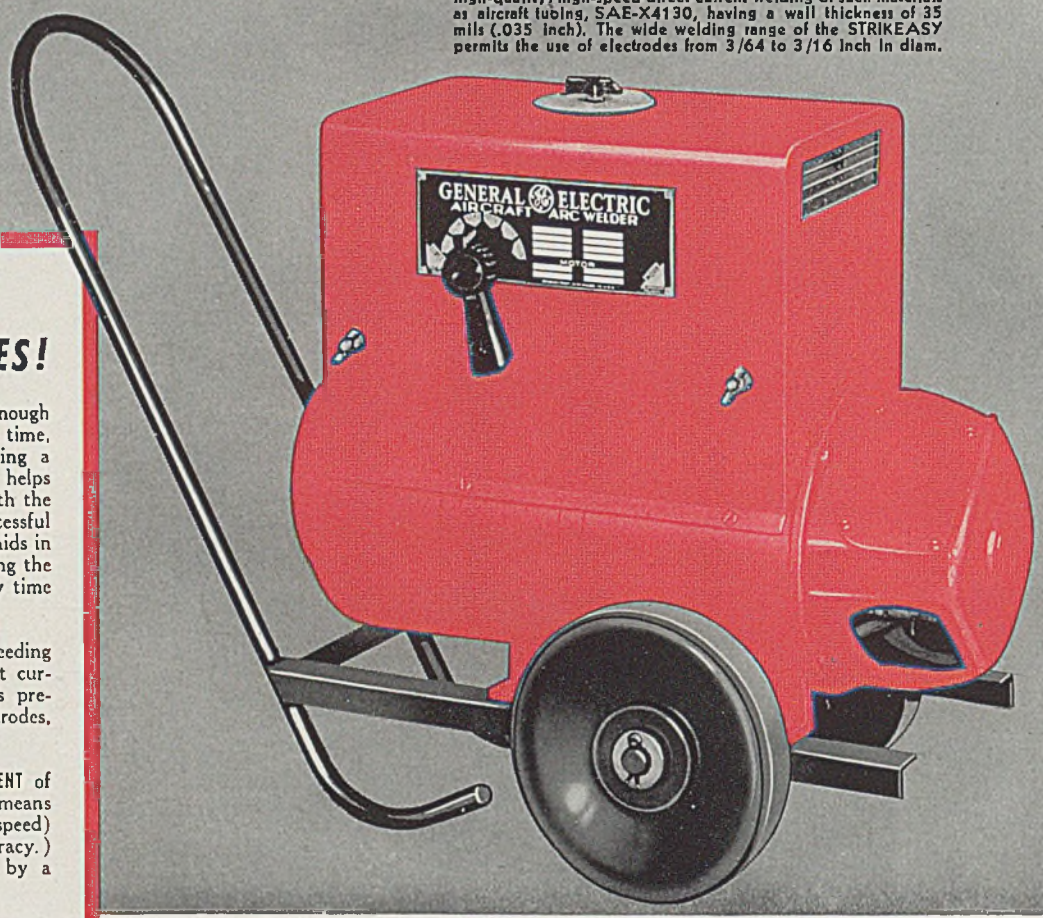
ERIE BUILDS *Dependable* HAMMERS

For Arc Welding All Thin-gage Metal

The NEW Strikeasy

The STRIKEASY arc welder is specially designed for easy, high-quality, high-speed direct-current welding of such materials as aircraft tubing, SAE-X4130, having a wall thickness of 35 mils (.035 inch). The wide welding range of the STRIKEASY permits the use of electrodes from 3/64 to 3/16 inch in diam.



LOOK AT THESE FEATURES!

INSTANT RECOVERY VOLTAGE high enough to make the arc strike *every* time, even on light-gage stock having a polished surface. This feature helps operator keep the arc going with the low heat required for successful welding of thin materials, and aids in avoiding spoiled work by making the arc strike the *first* time and every time attempted.

LIMITED CURRENT PEAKS never exceeding three times steady short-circuit current on any adjustment. This prevents undue spatter, saves electrodes, and helps avoid burn-through.

QUICK, EASY, ACCURATE ADJUSTMENT of welding current is provided by means of a six-point tap switch (for speed) and a field rheostat (for accuracy.) Welding current is indicated by a large, easily read scale.

SELF EXCITATION is provided by the well-known split-pole, cross-field design which removes necessity for separate exciter and avoids maintenance of an extra generating unit.

ISOTHERMIC OVERLOAD PROTECTION safeguards motor against excessive overload damage or phase failure, yet never interrupts service on harmless overload.

HORIZONTAL MOUNTING prevents excessive end thrust on bearings and assures efficient lubrication.

SELF-SEALED BALL BEARINGS—
EXTRA VENTILATION—
DYNAMIC BALANCE—

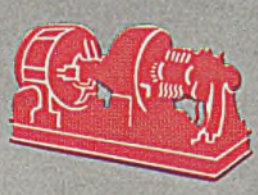
ARC welding thin-gage metals having a clean, bright surface requires a welder with extra refinements and extra performance.

For example, aircraft welding requires an arc that strikes the *first* time, and *every* time. If the arc fails to strike, the joint is likely to be ruined, and valuable time and production may be lost. Another important item is precise current adjustment. Weld-quality depends, to a great extent, on the amount of current used. One or two amperes more than are needed may cause burn-through, one or two amperes less than are needed may result in pile-up of the weld metal.

The STRIKEASY aircraft arc welder, *an entirely new product*, has been developed to meet these exacting demands. It always permits the operator to strike the arc *every* time—even at the lowest heat. Current is easily and accurately adjusted to meet any requirement. Full details in Bulletin GEA-3726. Phone or write for a copy today!

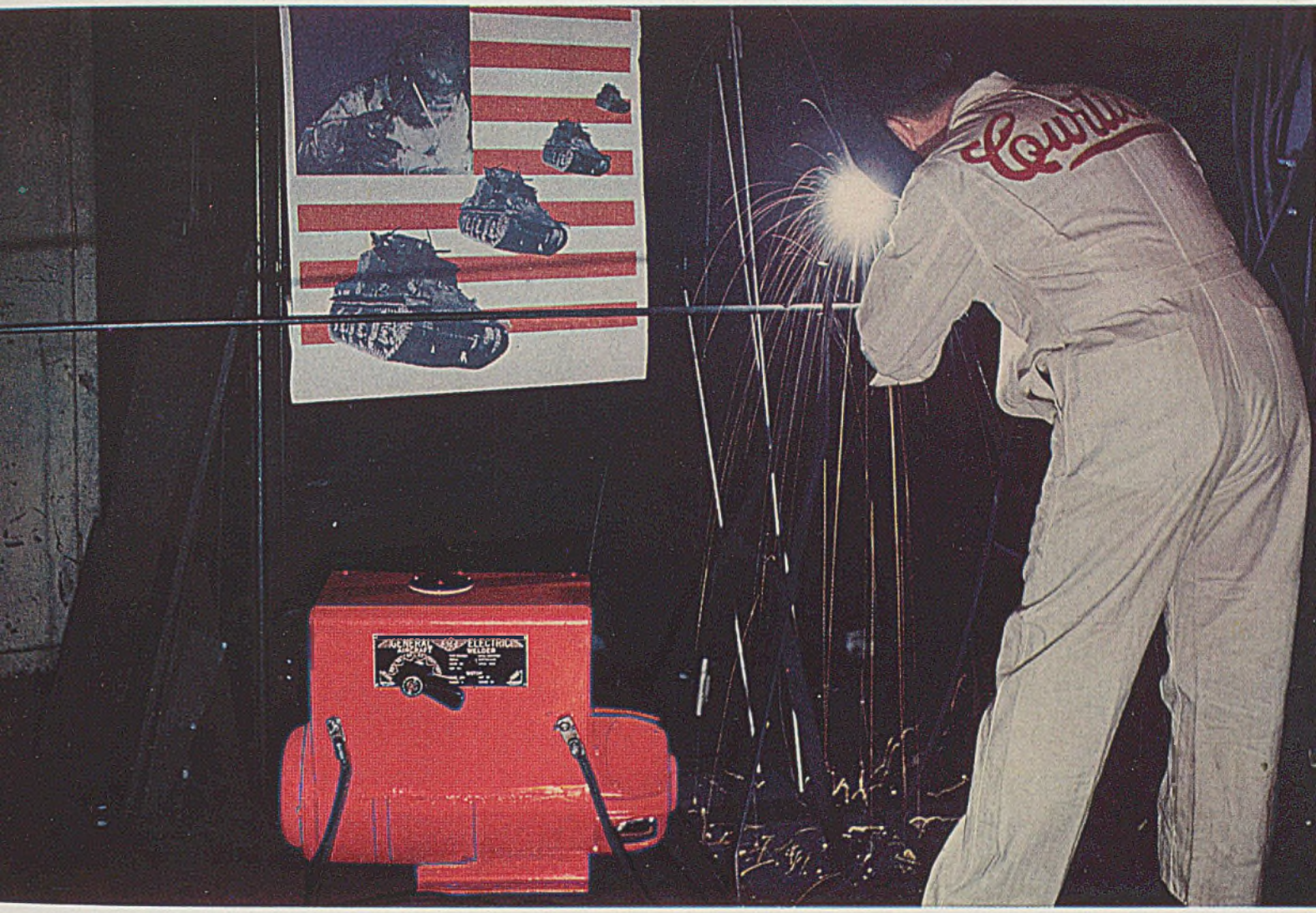
General Electric and its employees are proud of the Navy award of Excellence made to its Erie Works for the manufacture of naval ordnance.


FOR ALL YOUR WELDING NEEDS



CONSTANT POTENTIAL ATOMIC-HYDROGEN ELECTRODES & ACCESSORIES

Aircraft Arc Welder



WHY IT STRIKES THE ARC EASILY—Experience and research show that in order to provide easy striking of the arc on thin-gage metal, such as aircraft welding, the voltage produced by the welder must, regardless of open-circuit voltage, recover instantly after short circuit to a value at least as high as the arc voltage. To provide an extra margin of satisfactory performance, the STRIKEASY is designed to produce 40 to 60 volts instantly after short circuit. (Oscillographic measurements show that actually 42 to 64 volts are obtained.)

ELIMINATION OF WELD CRATER—can be accomplished by either lengthening the arc or by reducing welding current by means of a control device, such as the G-E CRATER-FILLER, which is specifically designed for operating with the STRIKEASY. The Crater-Filler is a portable, foot-operated, quick-acting, heat-control device. Control by a push button on the electrode holder is also obtainable by means of a "Stroco" Crater Eliminator designed particularly for the Strikeasy.

General Electric Company, Schenectady, New York.

GENERAL ELECTRIC

For every service in the Iron and Steel Industry there is a JOHNS-MANVILLE INSULATION specially designed to provide highest operating efficiency, long life and maximum fuel savings - - -

Listed below are brief facts on a few of the most widely used J-M Insulations. For full details, and for information on the free J-M Insulation Engineering Service, write Johns-Manville, 22 East 40th Street, New York, N. Y.

• • •

SUPEREX BLOCKS—The most widely used block insulation for temperatures to 1900° F. Combines high heat resistance with low thermal conductivity. Furnished 3" to 12" wide, 18" and 36" long, from 1" to 4" thick.

J-M INSULATING BRICK AND INSULATING FIRE BRICK—The new complete J-M line offers three types of insulating brick, four types of insulating fire brick. The insulating brick—Sil-O-Cel Natural Brick (for temperatures to 1600° F.); Sil-O-Cel C-22 Brick (for temperatures to 2000° F.); Sil-O-Cel Super Insulating Brick (for temperatures to 2500° F.). The insulating fire brick—JM-16 (for temperatures to 1600° F.); JM-20 (for temperatures to 2000° F.); JM-23 (for temperatures to 2300° F.); JM-26 (for temperatures to 2600° F.). All seven brick provide unusually light weight, low conductivity, ample strength and low cost. Furnished accurately sized in all standard 9" shapes of the 2½" to 3" series, as well as in special sizes.

SIL-O-CEL C-3 CONCRETE—Cast on the job from Sil-O-Cel C-3 aggregate and cement. Sets up into a strong, durable semi-refractory insulating concrete for temperatures up to 1800° F. Crushing strength: 1000 lbs. sq. in.

J-M 85% MAGNESIA BLOCKS AND PIPE INSULATION—Long recognized as the standard material for temperatures to 600° F. Maintains its high insulating efficiency through years of service. Often used in combination with Superex Blocks and Pipe Insulation at temperatures over 600° F. Blocks 3" to 12" wide, 18" or 36" long, 1" to 4" thick. Pipe Insulation in all standard sizes.

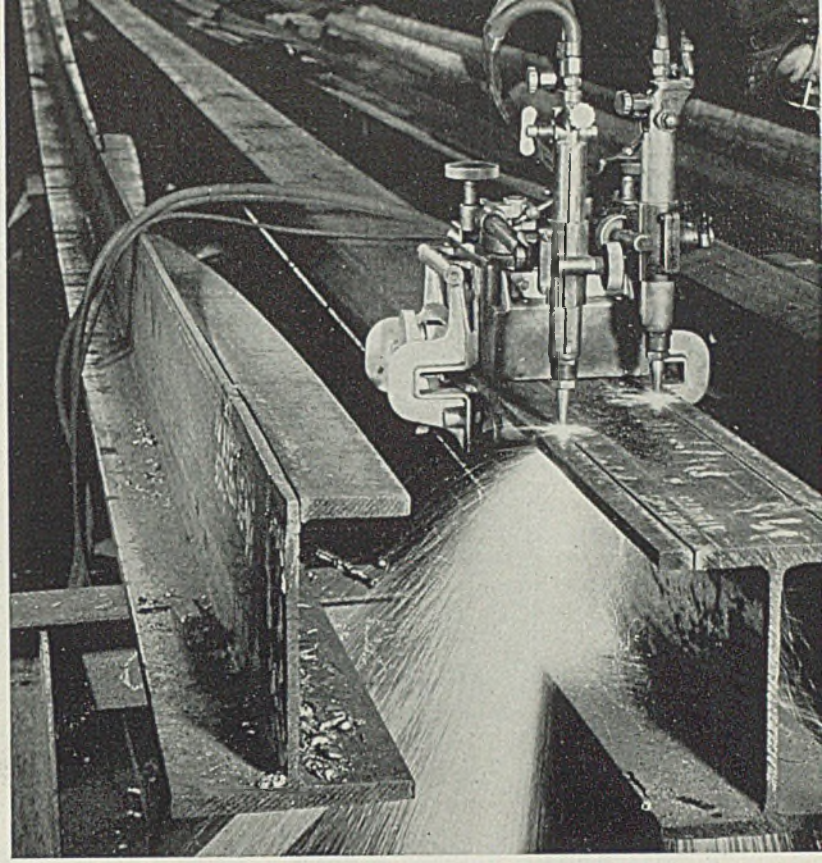
ASBESTO-SPONGE FELTED PIPE INSULATION—The most efficient and durable material for temperatures up to 700° F. Also used in combination with Superex Pipe Covering for higher temperatures. Specially suited to the severe conditions encountered in steel-mill service. Furnished in all standard sizes.

OXYACETYLENE MACHINE CUTTING

Speeds Upped 20 to 30 Per Cent

. . . . by new development in torch tip design which eliminates turbulence, thereby permitting higher velocity gas jet. No more oxygen is consumed at the increased speeds

By A. H. YOCH
Cutting Specialist
Applied Engineering Department
Air Reduction Sales Co.
60 East Forty-Second Street
New York



■ DURING the next two years, our victory program will require each month at least 50 merchant ships, 5000 tanks and 7700 planes. And a naval force twice the present size must be built. To accomplish this end, there must be more machines for fabricating ordnance, longer working hours for each machine, and greater production speed for each unit—in each day and in each hour.

Every factor that helps obtain greater output must be utilized to the fullest extent. Any new development which contributes to increased output, no matter how large or how small, is thus a boon to our war effort and must be adopted without hesitation.

Regardless of the ultimate usage, all steel must be fabricated to rough or finished form by the steel mill, with the oxyacetylene machine cutting torch carrying much of this burden. Billets are cropped, slabs are trimmed, shell stock blanks are cut or nicked, shell casings are trimmed, structural shapes are dimensioned and framed, plates are shaped—all with the oxyacetylene flame.

Therefore, any means whereby flame cutting can be speeded up is now of paramount importance. Such means is now available in the Airco "45" high-speed machine cutting tip recently developed by the Air Reduction Sales Co., 60 East Forty-second street, New York. With as many as 10 torches simultaneously cutting 10 to 40 identical parts with a single pass of the magnetic tracer around the contour of the templet, the greatest opportunity for speeding up production was to develop a speedier cutting tip. This now has been done.

The new tip provides a 20 to 30 per cent increase in speed as compared with standard cutting practice, yet without additional oxygen consumption. This higher speed is secured by cutting a narrower kerf. Obviously if less metal is removed, less oxygen will be required. Expressed in terms of distance, the same amount of oxygen will produce a greater length of cut.

Many earlier attempts to obtain a narrower kerf were tried using smaller orifices at higher oxygen pressures. The resulting turbulence, when the high-pressure oxygen expanded to atmospheric pressure upon leaving the nozzle, frequently caused kerfs to be wider and speed of cutting slower in these experiments than with standard cutting practice. Greater speed, therefore, depended upon eliminating this turbulence.

In the new tip the cutting stream

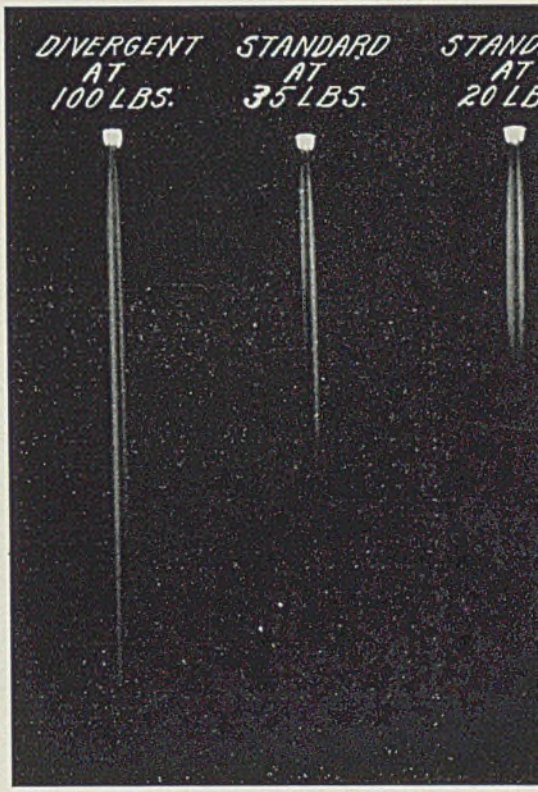


Fig. 1. (Top right)—Notice extremely narrow kerf left by these two Airco "45" tips. Job is being done in 25 per cent less time with same oxygen consumption as before

Fig. 2. (Center right)—Stream comparison with same discharge rate on all three tips of 45 cubic feet per hour. Divergent tip's high velocity stream is not impaired by turbulence so retains high oxygen content to greater depth

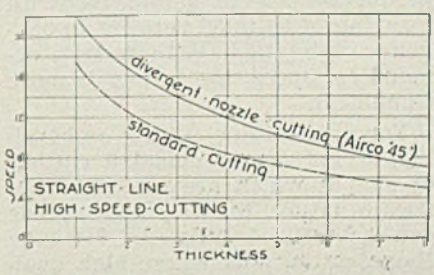


Fig. 3. (Below right)—Curves comparing speed of new and standard tips, maximum speeds. For highest quality cuts, both sets of curves are somewhat lower although divergent tip still retains its speed advantage to approximately same per cent

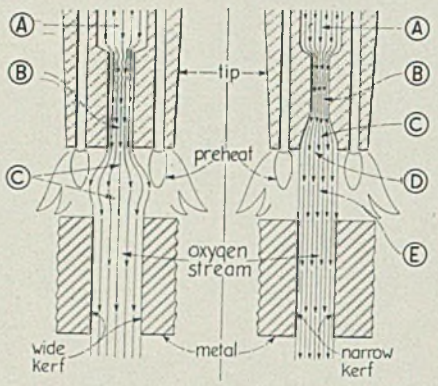


Fig. 4—This illustrates how new tip eliminates turbulence by allowing oxygen stream to expand within nozzle. Standard tip at left has 50 pounds per square inch pressure at A, 19.6 at B, repeatedly expands below and contracts above atmospheric pressure at C. Divergent tip at right has 100 pounds pressure at A, 46.1 at B, controlled expansion to atmospheric pressure at C, resulting in no turbulence at D and narrow stream at E

of oxygen passes through a divergent aperture, shaped to allow expansion of the gas to atmospheric pressure when a specified operating pressure is used. See Fig. 4. Consequently turbulence is eliminated, and the stream remains narrow throughout its full length. Also, because of the absence of turbulence, higher exit velocities can be utilized, thereby producing a longer effective cutting stream which maintains high oxygen content to a much greater depth.

Fig. 2 illustrates this characteristic by comparing the streams from the new divergent tip and standard cutting tips, each tip consuming oxygen at the same rate. The deeper penetration of high-purity oxygen accounts for much of the speed increase obtainable with the new tip. Field tests on actual production work have shown that it will cut a kerf as much as 30 per cent narrower than possible with standard cutting practice.

As a result of this development, the operator of the machine cutting torch now has a tool which gives him, in the few moments it takes to replace a standard cutting tip with the new Airco "45", a 20 to 30 per cent greater speed of cutting. Or, if conditions warrant, the cutting work can be done at the same production rate as before, but with a saving of 20 to 30 per cent in oxygen consumption. With today's demand for speed, the former is more significant.

For straight-line cutting or beveling, or for mass-production cutting of shapes which are not of an intricate nature, the new high speeds can be utilized fully. In intricate shape cutting and where high quality of cut is required, a somewhat slower speed is preferable just as in standard cutting practice. Such cuts are comparable in quality to those produced by the most precise standard tips.

These new tips are recommended for machine cutting only. No new or additional apparatus is required other than the tip itself, for it is designed to fit standard Airco machine-cutting torches. Generally, an inlet pressure of 85 pounds or over is required to secure the speed increase possible with these tips.

Describes Principles Of Planetary Milling

■ Principles and advantages of planetary milling are explained in a 2-color folder recently issued by Gordon-R Co., Royal Oak, Mich. Entitled "Just Push the Button" it details how this method of milling differs from conventional milling, and how it expedites thread milling and many types of form milling operations.

Offered gratis, the publication illustrates and describes typical fixtures to meet specific needs. The company also is offering special consultation services to manufacturers engaged in production for war.

Issues Booklet on Grinding Wheel Safety

■ Under the title "A Primer on Grinding Wheel Safety," Norton Co., Worcester, Mass., has brought out a 24-page booklet which is certain to be of decided value in conserving abrasive wheels, speeding up and improving their work and eliminating accidents.

This 5 x 7-inch booklet drives home the facts important to operators, by means of cartoon-type illustrations which require only a few words of explanation. Seventeen major points regarding selection of wheels, mounting, etc., are handled by means of brief questions and meaty answers. Here is a typical example.

Question: "What are some of the most common errors in mounting abrasive wheels which may cause trouble?"

Answers: "(1) Use of flanges of uneven diameter. (2) Use of washers instead of flanges. (3) Flanges without proper clearance or relief. (4) Excessive tightening causing flanges to bend. (5) Failure to clean all dirt and other foreign materials from sides of wheel and flanges. (6) Forcing a wheel onto an arbor where fit is tight. (7) Use of any loose washers or bushings, to try to make a wheel fit a machine for which it is not intended."

Copies of this book are available in reasonable numbers for use in operator instruction programs. Requests should be made on company letterhead by someone in a responsible position.

Publishes Steel Mill Reference Book

■ A comprehensive 36-page steel mill reference book, identified as B6197, representing a collection of articles currently written on modern rolling mill practice is announced by Allis-Chalmers Mfg. Co., Milwaukee. It includes articles on control of tin plate temper, modern cold rolling of steel, variable voltage versus motor field speed control for direct-current drives, operation and maintenance of direct-current machines and direct current flashover and bus short circuit protection.

Blackout Paint for Outside Application

■ Midland Paint & Varnish Co., 9110 Reno avenue, Cleveland, is offering a new blackout paint for outside application. Designated as formula P-40, it dries in 30 to 40 minutes after application to a self-leveling dull, flat surface that inhibits reflections or halations.

The paint is resistant to heat—unaffected by sun rays, or high heat from inside buildings. It also is unaffected by rain, sleet, snow or exhaust steam. A feature of the P-40 formula is that it may be removed easily from glass windows simply by wiping off with inexpensive solvent. The paint either can be brushed on as is, or sprayed after thinning to proper consistency.

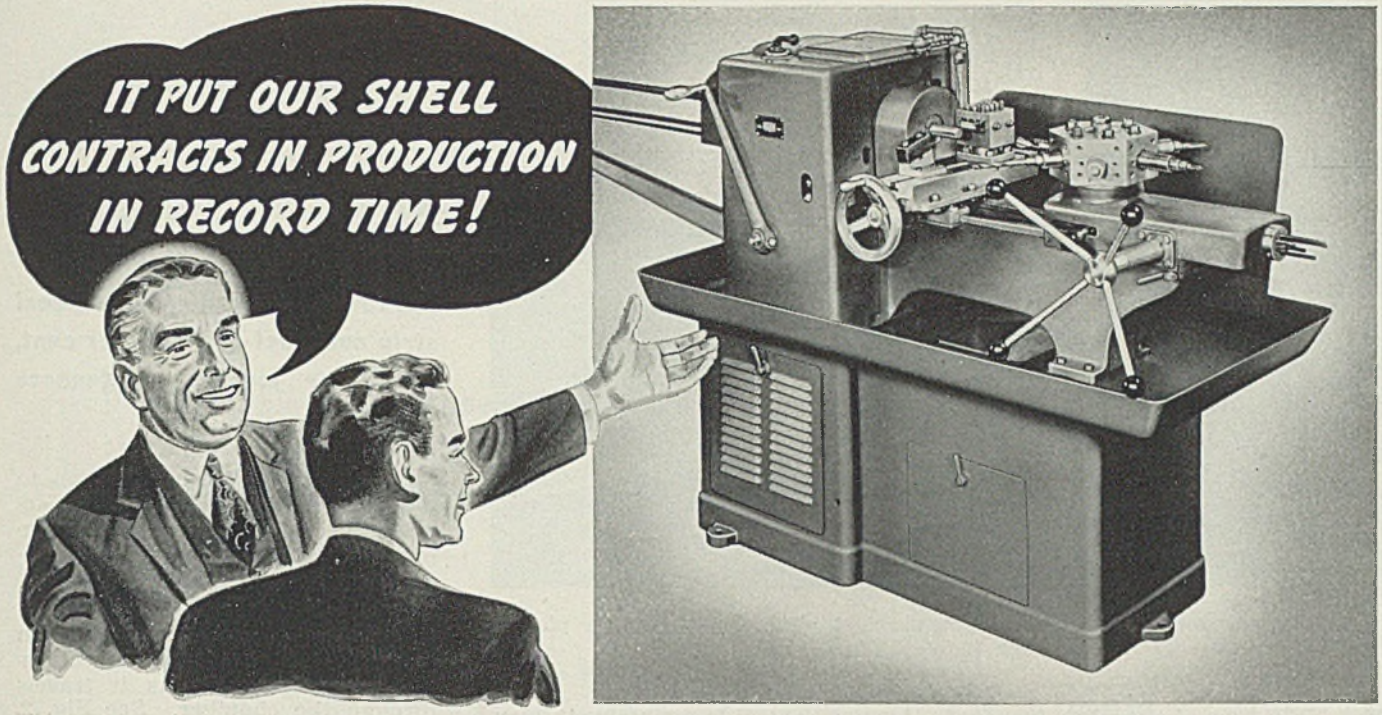
Carbide Fabricators Revises Price List

■ Additions to the line of standard cemented-carbide tools carried in stock, as well as a revised price list on all standard tools, is announced by Carbide Fabricators, division of Morse Tool Co., Berkley, Mich.

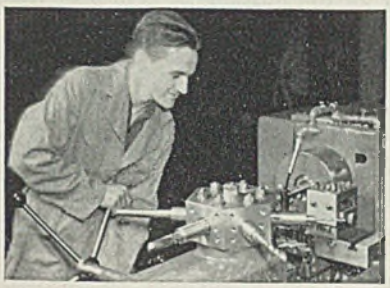
As these tools are produced in large volume, the pricing has been simplified so that the lowest possible unit cost prevails for tools purchased in any quantity. Thus, according to the company, no cost penalty is imposed on any concern whose orders are limited to only a few tools.

Tools are available for roughing and finishing nonferrous metals, cast iron, bronze, etc., and in steel cutting types for both roughing and finishing.

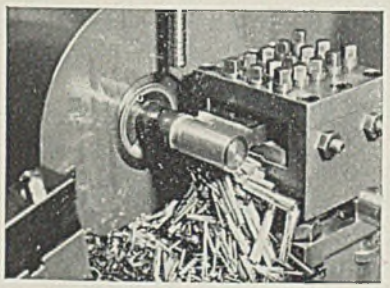
Carbide Fabricators are authorized suppliers of Carboloy, Firthite and Vascoloy-Ramet cemented-carbides.



OSTER NO. 601 *Simplified* TURRET LATHE performs 1st and 2nd operation work on 20, 37 and 40mm shells



Oster No. 601 equipped with six position turret having six tapped holes in each face for mounting a wide variety of tool holders.



Heavy forming cuts are made possible by the smooth flow of power supplied by the WORM DRIVE. (For high speed work on small diameters and with non-ferrous metals, No. 601 is available with DIRECT DRIVE.)

Holders of shell contracts in the 20, 37 and 40 mm range are using batteries of Oster No. 601 Turret Lathes for 1st and 2nd machining operations. New men are trained rapidly, due to the SIMPLIFIED design and operation of the No. 601. Brief description of the machine follows:

Motor driven. Equipped with hand operated, six position turret; or with plain saddle (where the machine is required for three or fewer operations in sequence). Two types of drive are optional: WORM DRIVE (with spindle speeds from 143 to 1034 R. P. M.) DIRECT DRIVE (with spindle speeds from 900 to 3000 R. P. M.)

Automatic chuck capacity: 1½" round bar. 1⅛" square bar; 1⅝" hex. bar. Swing over bed: 14". Swing over cross slide: 6½". Carriage travel: 11" when there is a cross slide on the 33" main ways. Maximum movement of screw feed cross slide is 6½" and of lever feed cross slide, 4½".

PRICE? *Under $2000 (less tools).* DELIVERY? *From 10 to 12 weeks from receipt of order and priority certificate.* Write for illustrated Catalog No. 27-A. An Oster Dealer is near you for quick cooperation.

OSTER

Let's GO!

THE OSTER MFG. CO. • 2037 East 61st St., Cleveland, Ohio

Rush, by return mail ..... copies of Catalog No. 27-A which contains full description and detailed illustrations of No. 601 Turret Lathe.

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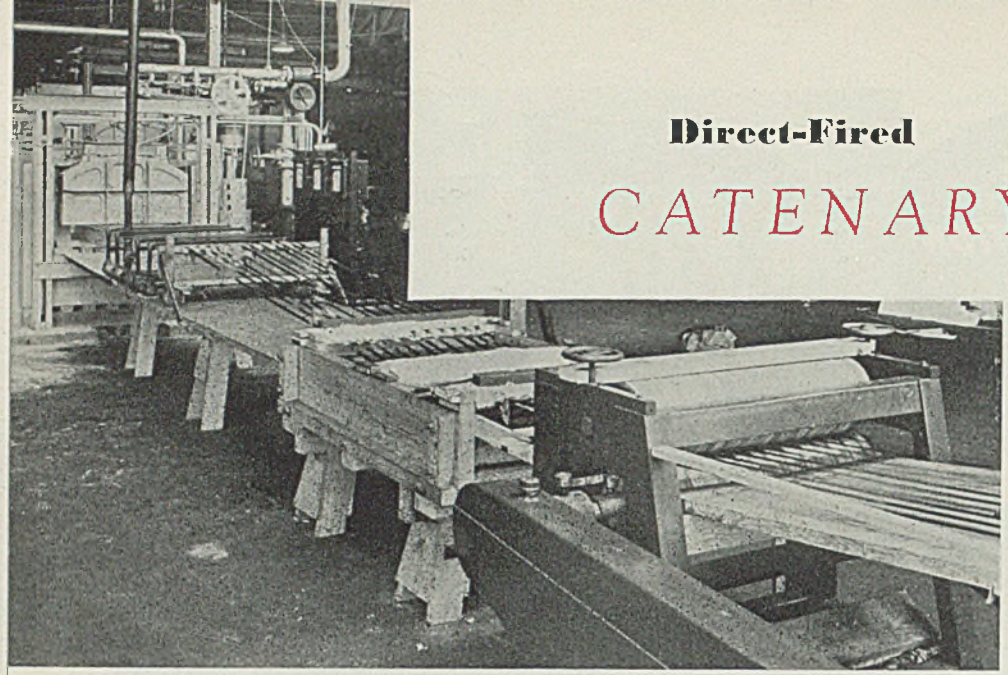


Fig. 1—Discharge end of furnace. Stainless strip is drawn through pickling tank before coiling

Direct-Fired

CATENARY FURNACE

. . . . for annealing stainless steel strip cuts fuel costs 20 per cent, eliminates muffle maintenance

■ A NEW type of annealing furnace installed recently in a Pennsylvania steel plant continuously anneals stainless steel strip by direct firing. Designed and built by the Selas Co., Philadelphia, the catenary-type furnace operates up to a maximum temperature of 2100 degrees Fahr. Capacity per hour is 1250 pounds of strip ranging up to 10 inches in width. As many as 12 strips of narrower sizes can be accommodated at one time. With appropriate feed and take-up provisions, more strands of stainless steel wire could be simultaneously processed. Fuel is manufactured gas.

Design of the furnace was influenced by experience gained by the maker during a previous conversion at this steel plant of a muffle-type furnace (also used for stainless steel annealing) to direct gas firing. It is estimated that a fuel saving of 20 to 25 per cent was obtained by use of direct firing instead of the muffle arrangement. In addition, the cost of muffle maintenance was eliminated. Fig. 2, lower section, shows arrangement of furnace parts.

Heating chamber of the furnace is 20 feet long and 48 inches wide. Doors at each end are 36 inches wide. Furnace lining consists of 9 inches of 2600-degree insulating brick, 2½ inches of 1600-degree insulating brick and 1½ inches of Superex. Firebrick is used only around the doors where abrasion is a factor.

The successful use of direct firing in this installation is credited to the type of burners employed (see Fig. 4) and the accuracy with which combustion control is maintained. Burners are of the refractory screen type which provide rapid but *complete* combustion with a multiplicity of short flames in each tunnel, thereby promoting uniformity of temperature throughout the heating chamber and avoiding hot spots, flame impingement, and blasts within the furnace chamber. Temperature is independently controllable in each of three separate zones or sections of the furnace. The first zone at the charging end has 12 burners, 6 on each side, while the second and third zones have 8 burners each. Burners in the first zone have larger ports in the refractory screen in order to compensate for the greater heat demands where the cold strip first enters the furnace.

The 28 burners are located on both sides of the furnace and are positioned above and below—rather than opposite—the catenary curve assumed by the strip as it travels through the chamber. See Fig. 2. This catenary results from the fact the material is supported only at either end of the furnace. The catenary sag is regulated by the pressure on the adjustable clamp at the entrance end, and the unit-weight of the stock being pulled through the furnace. To help promote uniformity of heat about the work, the burners are spaced so as not to be directly opposite those on the other sidewall.

Valves distributing the flow of gas-air mixture to the burners are of the full-proportioning type. A separate valve controls all of the

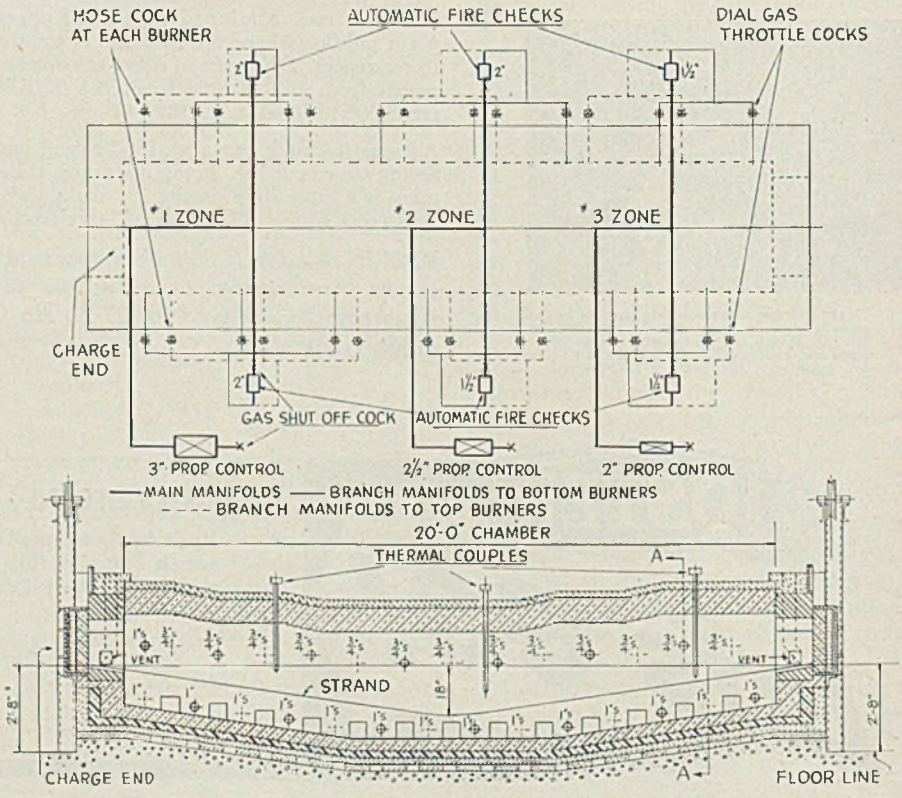


Fig. 2—Upper diagram shows gas feeders and lines, location of valves, etc. Lower diagram shows elevation view of furnace. Note furnace is over and under-fired with burners spaced alternately from side to side

BLAST FURNACE OPERATORS

Here's what you want in DRY BLAST

1. Delivery to blowing engines of cleaned air of constant temperature and moisture.

2. Ability to operate at any constant grain loading desired, from ONE GRAIN* upwards.

3. To have your dry blast plant operate at minimum cost with minimum maintenance expense.

BLAW-KNOX Can Furnish It

Blaw-Knox Absorption Type Plants, located pre-compression, give you these three vital points combined with other important engineering features. Write for information about Blaw-Knox Dry Blast Plants now operating and on order.

* For Pittsburgh atmospheric conditions, a blast furnace using 90,000 c.f.m. of dry blast will have less tons of moisture in the blast than if blown with atmospheric air by the following amounts:

Air conditioned to 3 grains - - 2100 tons less
Air conditioned to 2 grains - - 4100 tons less
Air conditioned to 1 grain - - 7500 tons less

BLAW-KNOX DIVISION *of Blaw-Knox Company*
PITTSBURGH, PA.

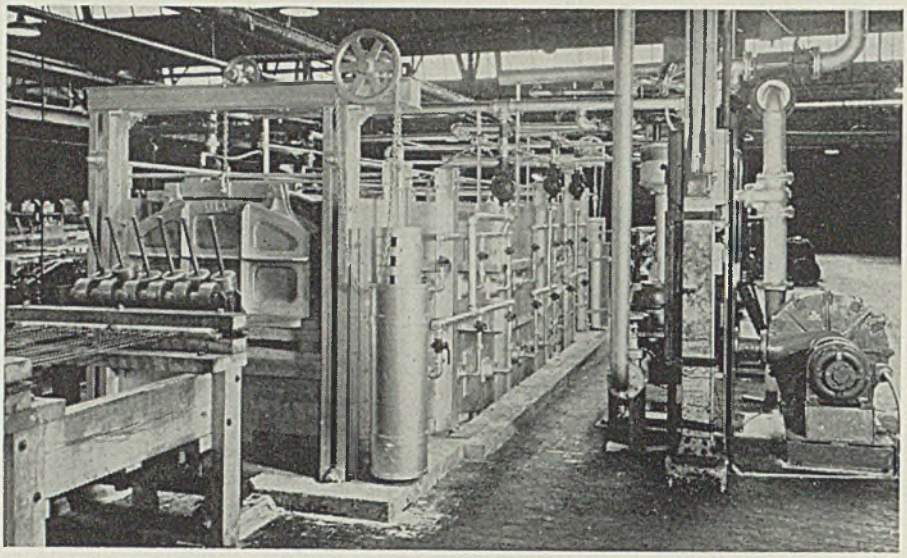


Fig. 3—Stainless steel strip is held under tension at the charging end of the furnace, no support being provided within the heating chamber. Turbo-blower and combustion controller at the right furnish a mixture with a constant gas-air ratio and at a steady pressure regardless of gas inlet or atmospheric pressure

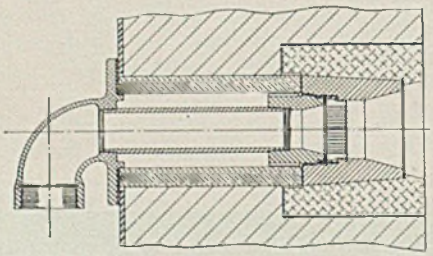
burners in each of the three zones. Proportioning valves are regulated from a central control station located beside the furnace. Recorders also located at this station make a continuous chart of the temperatures in each of the three heating zones as determined by thermocouples located in those areas. See upper section of diagram, Fig. 2, for details of piping system.

Pressure within the chamber is relatively slight but is sufficient to avoid cold air infiltration around the strip where it enters and leaves the furnace. Because of the complete combustion of the gas, it is unnecessary to make special provision for exhausting the products of combustion. At the same time, the temperature is uniform across the chamber within plus or minus 10 degrees Fahr.—so that the strips nearest the sidewalls experience exactly the same treatment as those at the center.

Fuel is provided by a Selas combustion controller of the turbo-blower type, which affords a constant gas-air mixture at a predetermined ratio and at a steady pressure, regardless of variations in gas inlet pressure, atmospheric pressure or furnace demand. See Fig. 3. Average requirement of the furnace is 30,000 cubic feet of mixture per hour, involving 5000 to 5500 cubic feet of gas. The furnace can be brought to full operating temperature within one hour after being lighted—a decided advantage in conserving production time and fuel.

After the strip leaves the furnace in a clean-annealed condition, it is given a light flash pickle, as shown in Fig. 1, to establish full brightness of surface before coiling.

Fig. 4—Diagram showing Refrak screen type burner that produces a multiplicity of short flames by combustion through perforated high-temperature refractory disk. Flame impingement and blast are minimized, turndown and controllability improved



Circulates Oil Heater Standard for Approval

■ National Bureau of Standards, United States Department of Commerce, Washington, announces that the recommended commercial standard recently adopted at the general conference on oil-burning space heaters in Chicago, is now being circulated throughout the industry for written acceptance. Approval of this standard, known as TS-3191, by most of the producers, distributors and users, will enable the bureau to issue printed copies, including a list of official acceptors.

Index for Analysis By X-ray Diffraction

■ A 4000-card file index of X-ray diffraction data for use in the Hanawalt method of chemical analysis by X-ray diffraction is being offered by the American Society for Testing Materials, 260 Bond street, Philadelphia.

Sponsored by a joint committee of the ASTM and National Research Council, under chairmanship of Prof. Wheeler P. Davey, Pennsylvania State college, the compilation includes not only Hanawalt's original material with his later corrections, but also additional data that have been contributed by the Aluminum Co. of America, New Jersey Zinc Co., together with data taken from technical literature in the English language.

The cards give all pertinent data found in the sources with provision for insertion of accessory data such as crystal structure, density etc. The index identifies the three strongest lines in the X-ray diffraction pattern of some 1300 crystalline compounds, the chemical names and symbols of which are as given by the various sources.

Copies of this index packed in finished container boxes may be obtained from the association headquarters at $50 per set.

Blackout Twins Eliminate Stray Light

■ Two new cold water paints, called Blackout Twins, for use on the interior and exterior sides of windows and skylights of plants engaged in war work is reported by Tamms Silica Co., 228 North La Salle street, Chicago. They are furnished in powder form, and are easily prepared for application with the addition of water.

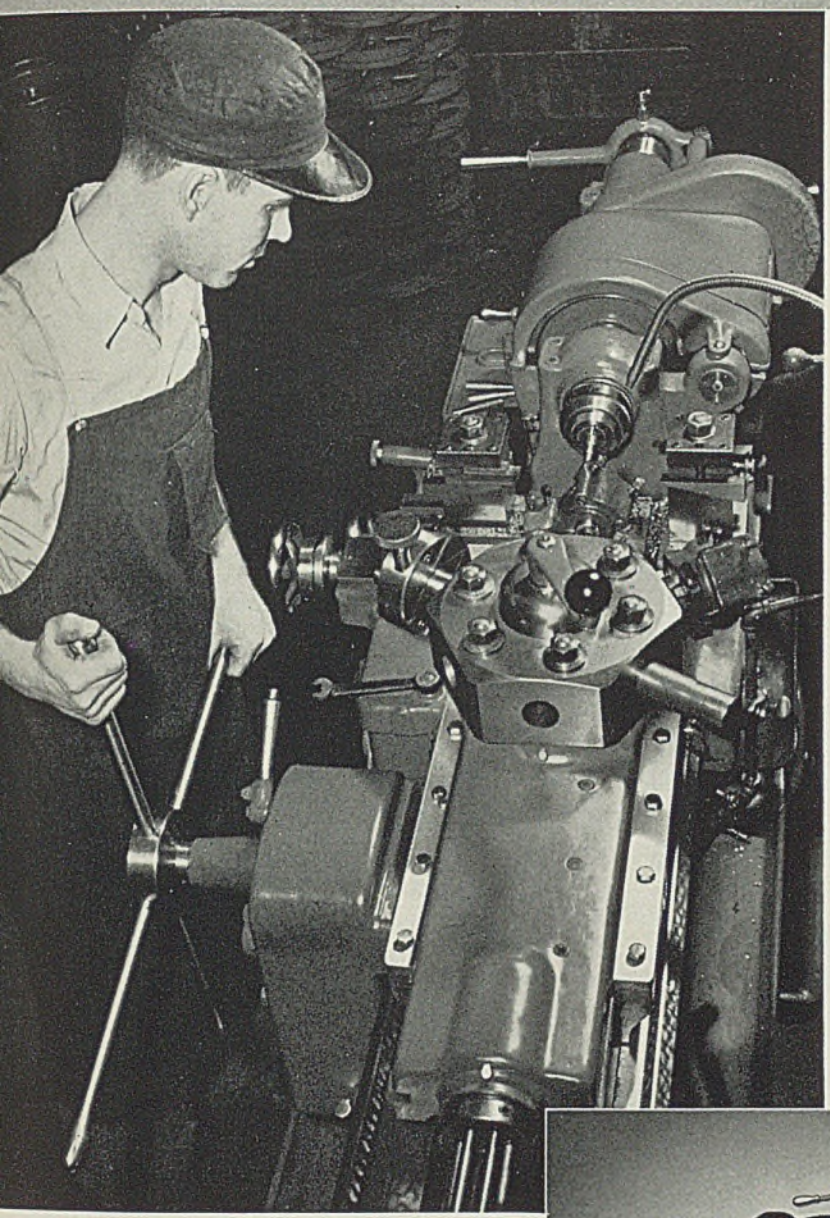
Applied with either brush or spray, the paints provide an intense black finish, minus gloss or glare. They can be removed at any time simply by washing with water. Five pounds of the powder is said to cover about 350 square feet of surface.

Bearing Committee Adopts Oil Guide

■ A grease and oil guide for use in connection with lubrication of ball bearings has been recently compiled and adopted according to the Annular Bearing Engineers' Committee, 60 East Forty-second street, New York. It represents standards developed by the committee, which is composed of chief engineers of antifriction bearing manufacturers, from practical experience and careful analysis.

In its efforts to overcome the troubles experienced by the ball bearing industry with various lubricants, the committee also has developed a grease testing machine for determining the physical characteristics of greases. A number of the properties specified in the adopted standards are determined by this machine.

Production Plus Precision



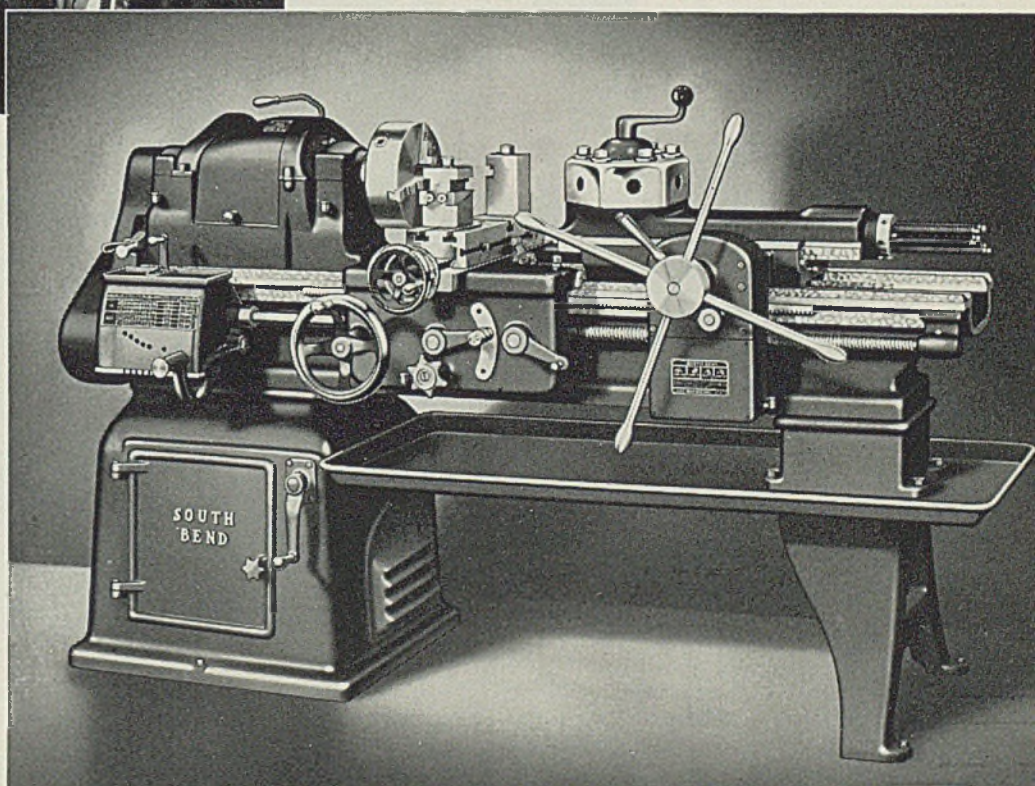
Modern in design, built with extreme precision, South Bend Turret Lathes are fast—accurate—versatile. They have the speed, power and rigidity for efficient quantity production of duplicate parts without sacrificing the precision accuracy or high quality finish usually considered possible only on small lots.

Features responsible for the outstanding performance of this new turret lathe include exceptionally rigid turret and carriage construction, a quick change gear box providing a wide range of power feeds for the universal carriage and the turret, complete thread cutting range through leadscrew and half-nut, and a wide range of spindle speeds.

SPECIFICATIONS

No. 2-H South Bend Turret Lathe

Hole through spindle	1 3/8"
Maximum collet capacity, round	1"
Swing over bed and saddle wings	16 1/4"
Spindle speeds, twelve	16 to 880 R.P.M.
Effective feed of turret slide	6 1/8"
Distance between spindle nose and turret	30 1/2"



Navy "E" for Excellence

Awarded to the South Bend Lathe Works for outstanding performance in the production of ordnance materiél for the United States Navy.

SOUTH BEND LATHE WORKS

856 E. Madison St., South Bend, Ind., U. S. A. *Lathe Builders For 35 Years*

Now, More than Ever ★ ★ ★ ★ ★

THE **WILL** TO MAKE GOOD STEEL

In peace time "the will to make good steel" was a matter of our pride. Now with our country in a bitter war "the will to make good steel" and to make the greatest quantity of it in the shortest time possible becomes a matter of plain duty.

The Copperweld Steel Company is producing especially for our country's war needs the following Aristoloy steels: RIFLE AND GUN BARREL QUALITY, GUN QUALITY, SHOT QUALITY, BULLET CORE AND AIRCRAFT QUALITY.

COPPERWELD STEEL COMPANY WARREN, OHIO

ARISTOLOY STEELS

CARBON TOOL STEELS
STAINLESS STEELS
AIRCRAFT QUALITY STEELS
ALLOY TOOL STEELS
NITRALLOY STEELS
BEARING QUALITY STEELS

"SPECIAL QUALITY" TOOL AND ELECTRIC FURNACE ALLOY STEELS

Spring Making

(*Concluded from Page 88*)

Second operation in producing the spring supports is to reheat the small end for rolling up an eye on this end. Fig. 2 shows a typical reheating furnace setup as employed here. It is positioned directly alongside the blanking press which discharges work into the loading box shown in the foreground of Fig. 2 by means of a conveyor attached directly to the press so the press can run, feed and discharge work automatically, once set up. The operator merely starts each piece of bar stock into the press.

Reheating furnace operator shown at right, Fig. 2, picks up piece, attaches it to a clamp resembling a pair of tongs which is laid on a conveyor in such a manner that the end of the piece to be heated overhangs the edge of the conveyor, extending into the heating zone of the oil-fired furnace while the conveyor carries it along. As will be seen in Fig. 2, some measure of protection against the heat is afforded the operator by means of chain screens and baffle plates hung over the conveyor. These also facilitate heating, confining the heat developed to the work zone. As the work travels through the furnace, it gradually assumes a temperature high enough for hot working.

As it reaches the end of the conveyor, the second operator picks up the heated work, places it in a press shown in Fig. 3 directly adjacent to the heating furnace, where an automatic machine rolls up the eye in a fast sequence of three operations In the first step, the square end of the work is bent down. In the second step, the eye is rolled rough. In the third step it is finish rolled to exact size.

From this point the work is passed on to one of the circular rotary-hearth hardening furnaces such as shown in Fig. 4. This furnace has two doors, the work being inserted through one and removed through the other as it comes opposite the door. The furnace requires about 25 minutes to make a revolution, which allows at least 10 minutes for soaking the work at full heat of 1650 degrees Fahr., the temperature at which the furnace is maintained. The atmosphere in the furnace is controlled so no scale is produced.

Another handling shortcut is also shown in Fig. 4. As the operator removes the work from the hardening furnace with his tongs, he places it immediately in a hydraulic press shown at the left. Tripping a foot valve actuates a press to produce the completely finish-formed bracket shown in Fig. C, using a simple set of dies.

The work is allowed to fall from the forming dies directly into an oil quench, the temperature of which is maintained within 120 to 150 degrees Fahr. by a circulating cooling system. This oil quench from the 1650-degree temperature produced a hardness ranging from 477 to 555 brinell.

After the work is checked, it is placed in another rotary furnace such as the one shown in Fig. 5. Two operators are employed here also, one loading the unit, the other unloading—on a continuous basis. The work usually remains in the tempering furnace at around 900 degrees Fahr. for a period of 40 to 50 minutes, although the furnace is provided with a variable-speed drive which gives speed of rotation ranging from 20 minutes to 2 hours per revolution. As the work comes from the tempering furnace, its hardness is down to within 387 to 444 brinell. After shot blasting and oil dipping or painting, the work is ready for assembly.

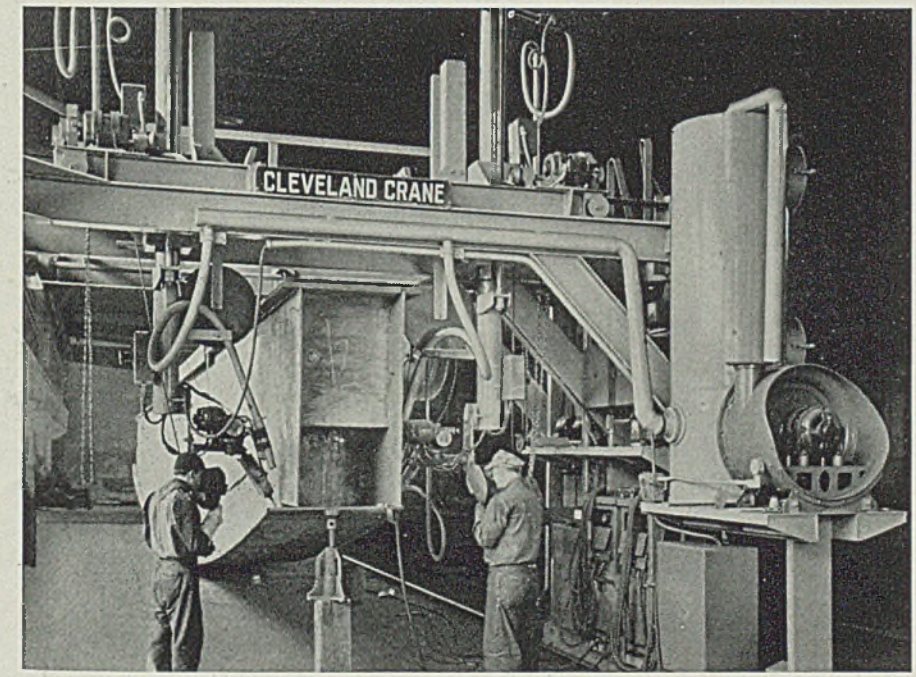
Materials handling aids are in evidence all over the shop. In the first place, equipment for the various fabricating lines is laid out for maximum efficiency in flow of material. The furnace units shown at A, C and E are a few of the reheating oil furnaces at this plant employing a conveyorized setup for handling work through the furnace. Fig. 6 is a typical view of one of these, the conveyor consisting of an endless series of plates or open grids from which the work extends into the adjoining heating zone.

In most instances the forming operations require that only a certain portion of one end of the bar piece be heated, so this is done by letting that portion of the bar overhang the side of the conveyor and extend into the heating chamber. Where the piece to be heated is not long enough to overhang and still remain stable on the conveyor or where more than, say, one-third of the length is to be heated, it is gripped in tongs or clamps which in turn are carried by the conveyor. This latter scheme makes it possible to heat almost the entire length of the work.

In Fig. 6 the pipes carrying fuel to the burners can be seen below the conveyor.

(*Concluded Next Week*)

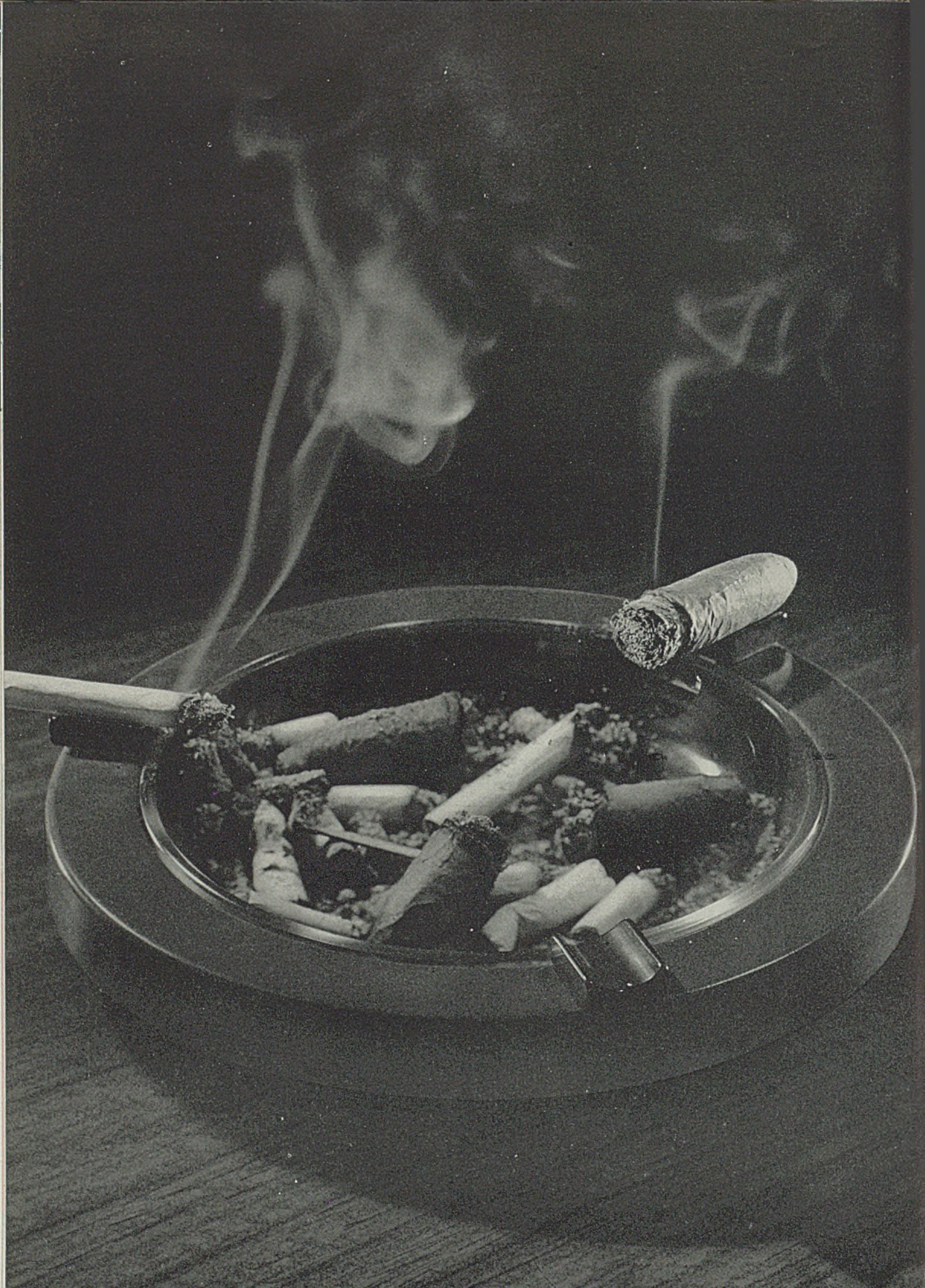
Welding Gantry for Structural Units



■ This all steel automatic welding gantry, capable of making continuous long welds of 1 to 120 feet, was recently built and installed in the structural department of The Cleveland Crane & Engineering Co., Wickliffe, O. It can be made to travel at any speed from 30 to 148 feet per hour, the welding rod being fed automatically to both sides of the work. The machine here is shown welding a 90,200-pound girder for a 150-ton crane

Packaging Material

■ A new waterproof vaporproof material for war-time packaging is reported by Reynolds Metals Co., Richmond, Va. Marketed as type B Victory stock, it is said to be especially valuable as a covering for fiber cans, or as liners, bags, box coverings, as well as for tite-wraps and cartons.



. . . AND THEN THEY CALLED IN

THE MAN FROM CARNEGIE-ILLINOIS

A bedspring manufacturer faces the job of producing machine gun clips. A staybolt maker converts his entire production to machine gun barrels. Armor piercing bullets in an endless stream are produced by a gear maker. Heavy caliber shells roll swiftly from a factory that formerly made linoleum rugs.

PICTURE what's been happening to the men in these plants. For them, this swing-over from peacetime manufacture to all-out war production has been one long succession of headaches. In most cases they have had to start from scratch to learn how to turn out, in huge quantities and quickly, a product entirely new and unfamiliar. Often they have had to master equally unfamiliar processes of manufacture.

Even when the tough problems of equipment and personnel had been solved, other questions just as important still remained to plague them: What steel to use? How to get the high physicals demanded? How to meet the exacting standards required? . . . It was then they wisely called in the man from Carnegie-Illinois.

In one plant after another, our steel metallurgists have been able to lend a helping hand. Drawing on their wide experience in the latest fabricating techniques, they have shown how to speed up forging, to save time in welding, to reduce machining schedules. Again and again their suggestions have lead to important modifications in manufacturing methods that have worked wonders in obtaining highly desirable physical properties formerly thought impossible.

This practical advice and cooperation are available to every user of Carnegie-Illinois steels and to every manufacturer of war materials.

CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago

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

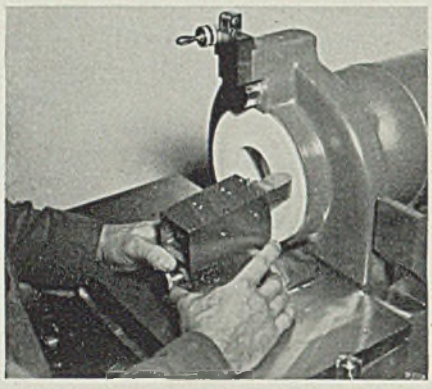
UNITED STATES STEEL

USS

Industrial Equipment

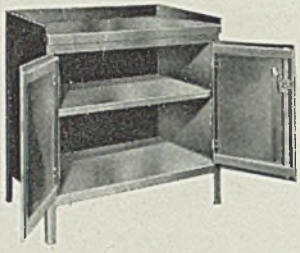
New Formula and Tool-Grinding Machine

■ James Donaldson Co., 230 Park avenue, New York, has developed a new formula and grinding machine which together serve to speed production and cut tool costs. The formula provides a method of establishing the precise relief and clearance angles that every single-point metal cutting tool should have for the work it is to perform. The machine makes possible the grinding in of the profile, reliefs or clearance angles, and in form tools, the necessary radii or curvature—all in one operation. When correct relief angles are established, generated and maintained by means of this development called the Bura-way, tool life is said to be increased approximately five times. While the formula is of no value without the grinder, the machine may, nevertheless, be used without the formula and can be operated by a boy or girl after a few hours instruction and practice. It will still provide constant relief angles in the direction of infeed even though tools are ground to empirical values. The form of the tool point is determined by a cam, which is attached to the tool holder and acts as a guide for the operator as he slides the tool holder on the table in a rotating motion while bringing the tool in contact with the wheel. The cam is made on the same machine, being developed with an attachment which transfers the form of a master tool to the cam which thereafter permits the exact duplication of the original tool in any desired quantities. This machine also makes it possible to salvage tools by various methods. For reasons of policy full details of the grinder are not available. The company, however, is offering demonstrations in its office to responsible citizens engaged in war work.



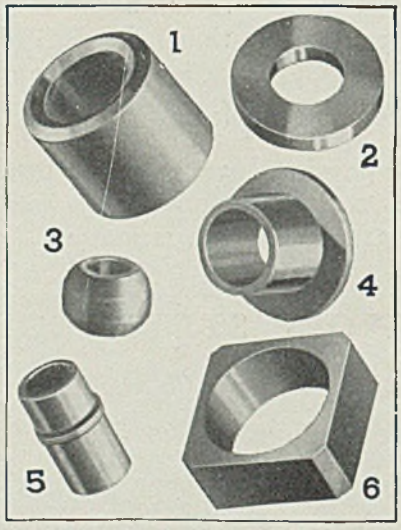
Machine Tool Cabinets

■ Lyon Metal Products Inc., Clark street, Aurora, Ill., has introduced new handy bench cabinets for machinists. These are said to offer a heavy gage working surface for small vises and grinders. Each cabinet has 12 square feet of enclosed storage area protected by full swinging triple latch doors equipped with padlock hasp or built-in flat key lock. In addition, its center shelf is adjustable on 1½ inch centers.



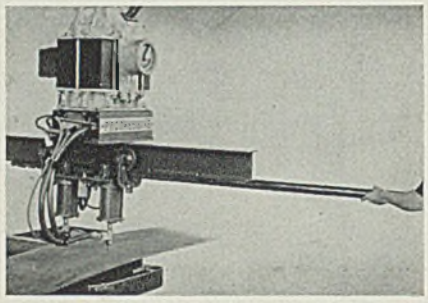
Iron Bearings

■ Keystone Carbon Co. Inc., 1935 State street, St. Marys, Pa., announces the addition of Selflube porous iron bearings to its line of self-lubricating bronze bearings. These are said to be interchangeable with the bronze bearings in most applications. The iron bearings are made from powdered iron saturated with oil. They have an average porosity of 25 to 35 per cent, enabling them to store a large amount of oil. They feature a low friction coefficient which, together with their self-lubricating qualities, prevents excessive temperature, speed reduction, noise and scoring of the shaft. The bearings are supplied in both standard and special shapes.



Strip Welder

■ Progressive Welder Co., 3050 East Outer drive, Detroit, has developed a low-cost installation for welding together ends of strips. Shown in the accompanying illustration, it consists of two simple air-operated series connected guns for spot welding, a notched bar to locate welds, and a control handle to move the gun along, the entire assembly being supported from an I-beam section above on which is located the welding transformer. To weld strips together, operator moves gun to the first notch. This trips a switch, causing another pair of welds to be made, etc., for as many welds as needed. A button on the control handle prevents closing of welding circuit when the gun is returned to starting position.



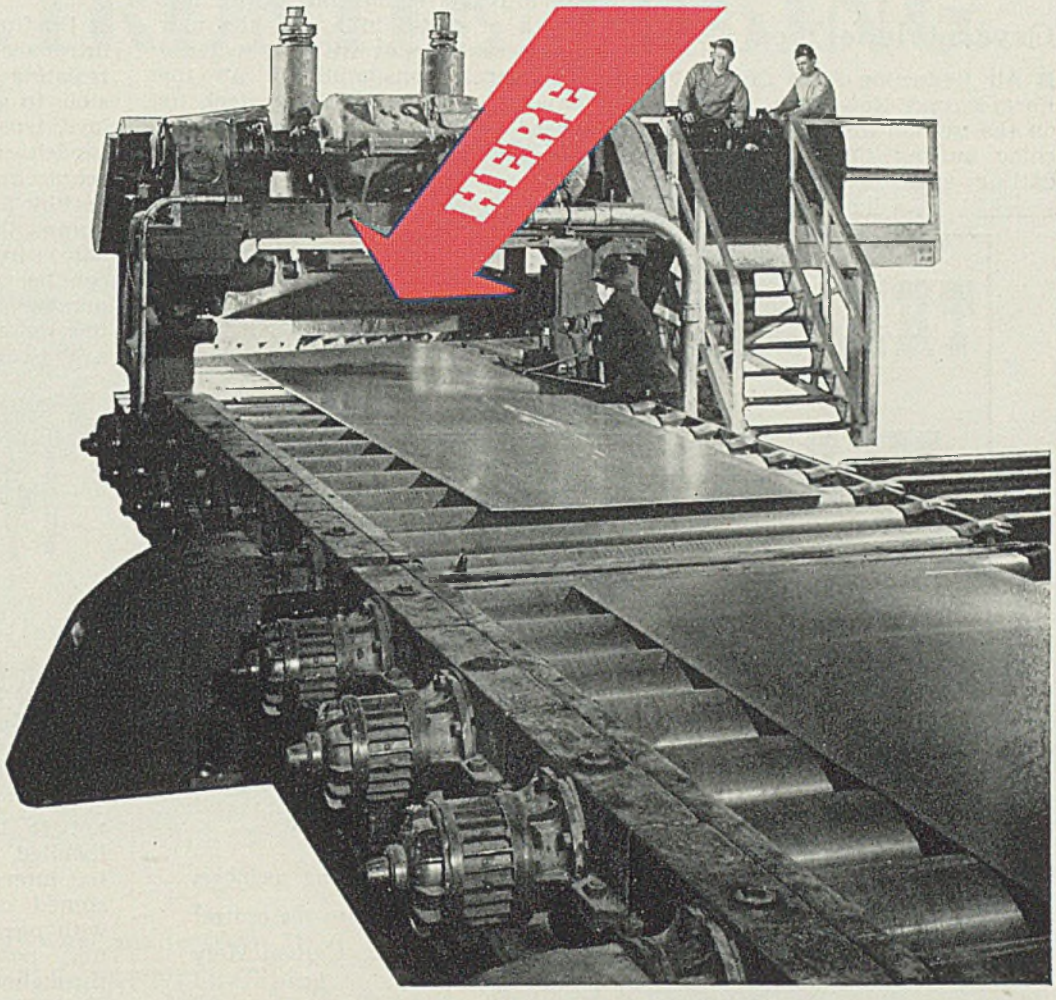
Switch Actuator

■ Micro Switch Corp., Freeport, Ill., has developed a new type M switch actuator in the form of a bracket for panel mounting. It is designed primarily for aircraft, but can be used for other applications. Three hex nuts used on the panel mounting bushing provide the mounting means. Two nuts position the switch on the panel or strut on which it is mounted and the third locks the assembly in place. The actuator can be mounted in holes 15/32 inches in diameter on panels up to 1⅜ inches thick. Units also are offered with different length plungers.

Reinforcement Machine

■ Fidelity Machine Co., 3908 Frankford avenue, Philadelphia, has introduced an entirely new type of horizontal hose reinforcement machine for producing tubing and hose for airplane controls as well as for other industrial uses. It is capable of knitting 4 to 6 feet of wire and fabric reinforcement per minute over synthetic rubber inner tubes on steel mandrels in one operation. Manual speed adjustment, controlled by tension applied to belt drive, governs rate of speed. Interchange-

Cut Shut-Down Time



with Heppenstall Shear Knives

You'll change knives less often if you use Heppenstall Shear Knives. They cut cleaner and stay in the shears longer between grinds, because they are made of the finest special analysis alloy steel in Heppenstall's own electric induction furnaces. Forging, annealing, machining, heat treating, and grinding are all done with meticulous care according to methods developed through more than fifty years of quality shear knife manufacture. • Let Heppenstall Service Engineers add their experience to yours and help you solve shearing problems. Call upon them without obligation. And next time you order, specify Heppenstall. Use knives that deliver more tons per grinding. Write for full information, Box S2, Heppenstall Co., 4620 Hatfield St., Pgh., Pa.

Heppenstall

PITTSBURGH DETROIT BRIDGEPORT

HEPPENSTALL H QUALITY

Forging Fine Steels for More Than Fifty Years

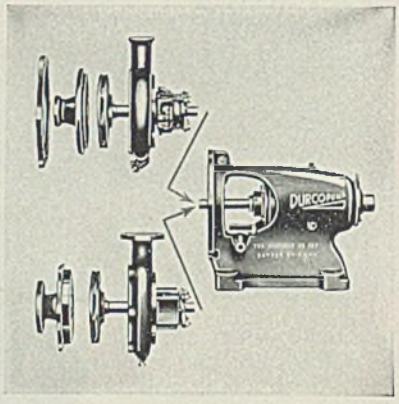
able knitting heads, easily removed and replaced, adapt the machine to hose or tube diameters up to 2 inches inside diameter. Other features of the unit include push button control, uniform speed of feed and take-off rolls, automatic stop motion and individual motor drive. The overall dimensions of the machine are 4 x 7 feet.

Oxyacetylene Tips

■ Air Reduction Sales Co., 60 East Forty-second, New York, has placed on the market an oxyacetylene machine cutting tip which increases cutting speed of machine torches by 20 to 30 per cent and assures cuts comparable to those obtained with standard tips. Called the Airco 45, it features a nozzle with a divergent exit portion—a design that makes it possible to eject a narrow, high velocity stream of oxygen practically free of exit turbulence, that burns a narrower path or kerf through the metal. As a result of burning away less width of metal in a cut, the new tip is said to cut with no increase in oxygen consumption. As the oxygen stream penetrates steel, its velocity is constantly dissipated. The divergent tip principle increases velocity of the oxygen stream, and provides a higher oxygen concentration of greater depths, increasing the oxidation rate of the metal being cut. The tips are available in sizes 0, 1, 2, 3, 4, 6, 8 and 10 for cutting metal thicknesses up to 8 inches They also fit standard machine cutting torches.

Convertible Pumps

■ Duriron Co. Inc., Dayton, O., has introduced a new series of corrosion-resisting pumps in which it is possible to get 480 combinations of alloys, types and sizes with heads and capacities to meet practically any requirements. These have a convertible feature. For example, Durcopumps that are made in the high-silicon irons, Duriron and Durichlor, can be converted to stainless steel pumps simply by substituting only the wet-end parts. This feature is said to be valuable where there is



apt to be changes in the liquids handled. Other features include the interchangeability of newly designed open and closed impellers with negative pressure on the stuffing box, oversize ball bearings throughout, and micro-adjustment of the impeller to obtain maximum efficiency.

Mercury Lamp

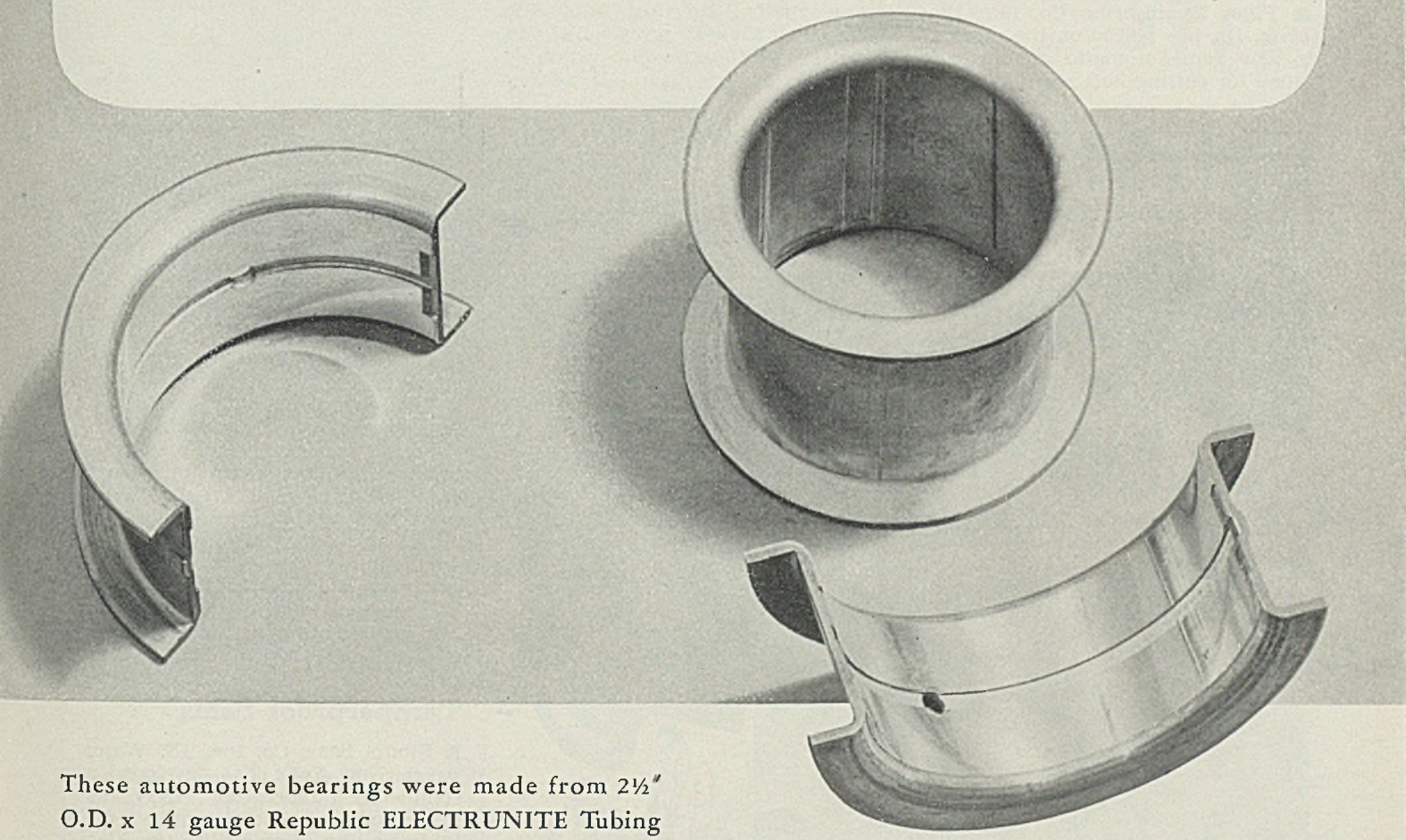
■ General Electric Co., Nela Park, Cleveland, announces a 3000-watt G-E Mazda AH-9 mercury lamp rated at 120,000 lumens for use in lighting of steel mills, foundries, erecting shops and for other large areas where lofty mounting heights of luminaires are required. Measuring 55 inches in length and a trifle more than 1 inch in diameter it is said to be eight times more powerful than a 400-watt mercury lamp.

In shape, construction and somewhat in principle, the new lamp resembles the 100-watt fluorescent lamp. Each is known as an electric discharge type lamp. Within the tube is a small amount of argon gas and free mercury. When electricity passes into the lamp, the mercury vaporizes. Then, an arc forms between the two electrodes, one at each end of the lamp. All of the

Step up production schedules

WITH EASY-TO-WORK

ELECTRUNITE TUBING



These automotive bearings were made from 2½" O.D. x 14 gauge Republic ELECTRUNITE Tubing —cut, flanged, machined and drilled as shown above.

This demonstration of workability should be of interest to you—because, with *Production for Victory* requiring the use of more and more tubing in the manufacture of armament and other necessary items, it is highly important to your rate of output and your costs that you select the easiest-to-work tubing.

ELECTRUNITE Tubing is highly uniform in diameter, wall thickness, concentricity, strength, weight, tolerance, ductility and scale-free surface—because it is made by the only process which insures these qualities consistently in every length—electric resistance welding. And it is in high-speed production of tubular parts that these features show to best advantage.

ELECTRUNITE engineers will be glad to assist you in stepping up production schedules. Just write us.

STEEL AND TUBES DIVISION
REPUBLIC STEEL CORPORATION
CLEVELAND • OHIO

Berger Manufacturing Division • Niles Steel Products Division
Union Drawn Steel Division • Culvert Division • Truscon Steel Company

Republic

ELECTRUNITE

Reg. U. S. Pat. Off.

ELECTRIC RESISTANCE WELDED TUBING

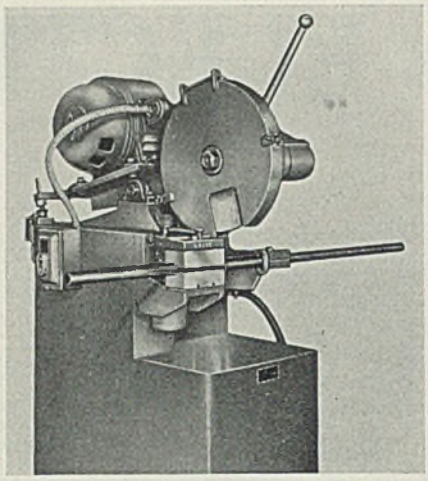
Also Boiler Tubes • • • Condenser and Heat Exchanger Tubes

REPUBLIC STEEL PRODUCTION FOR VICTORY

light from the AH-9 mercury lamp comes from the arc itself, operating under relatively high pressure. The fluorescent lamp, on the other hand, operating under low pressure, produces an arc giving little light but a wealth of ultraviolet. The AH-9, consequently, uses no powder on the inner surface of its glass tube, as does the fluorescent lamp to convert its invisible energy into visible light.

Cut-Off Saw

■ Pines Engineering Co. Inc., Batavia, Ill., has placed on the market a new semi-automatic cut-off machine for cutting butt steel and nonferrous materials. It can be used with either high-speed steel blades for cutting mild steel tubing, or with abrasive wheels for cutting high carbon or hardened rods, tubes or shapes. It is capable of cutting pieces in any lengths desired at high production rates with a tolerance of plus or minus five thousandths of an inch. Spindle of the machine is of high tensile alloy steel with 1¼-inch diameter arbor for the saw blade. It rotates in precision type ball bearings. Automatic clamping action is provided by an air-operated clamp. The clamp is actuated by means of a 4-way solenoid valve in the base of the machine. This latter is operated by movement of the saw carriage which actuates a limit switch at the start of the saw advance. Chucking, therefore, is done automatically as soon as the saw starts to move, being rapid and making possible high



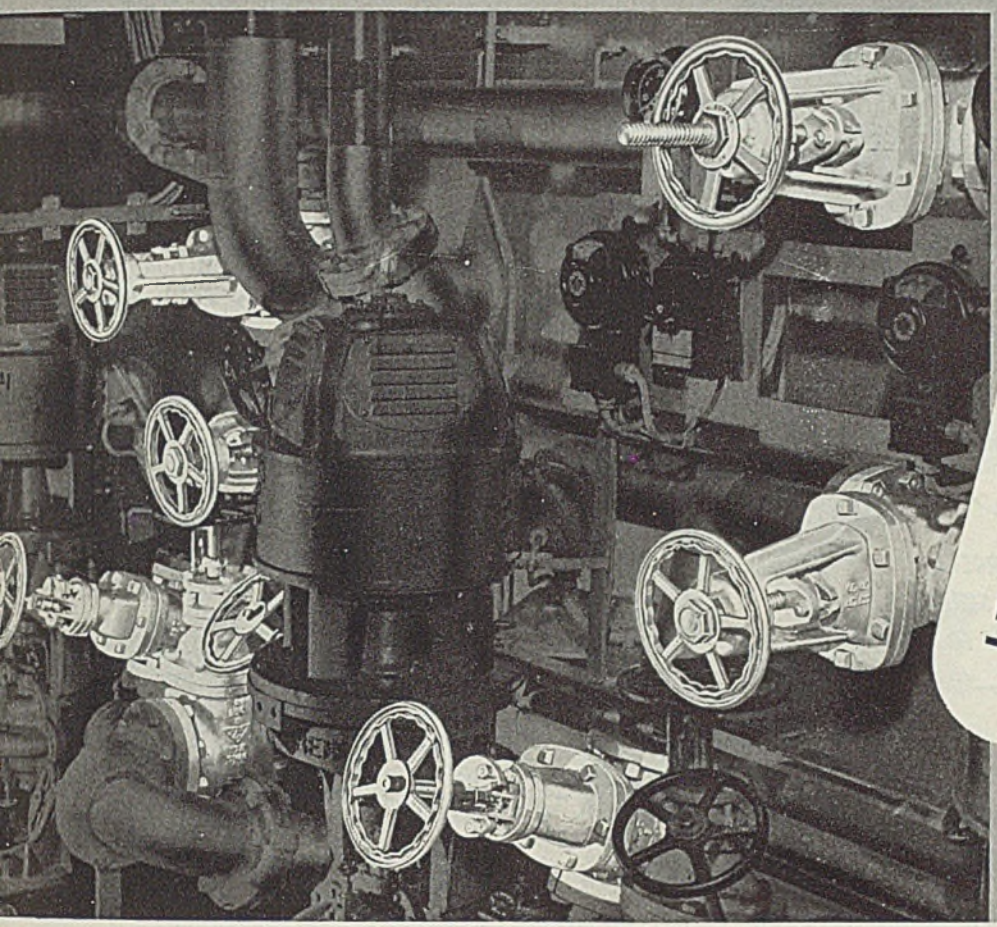
production rates. Motor of the machine is mounted directly on the swinging carriage that carries the saw spindle, the latter being driven directly by means of multiple V-belts provided with a take-up adjustment. The limit of travel of the carriage is controlled in both directions by means of adjustable stops. A guard mounted over the belts, pulleys and saw gives the necessary protection. The machine can be converted to a completely automatic unit by adding a separate drive for oscillating saw.

Tamperproof Seals

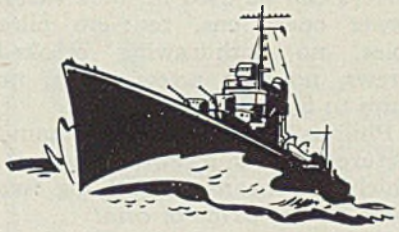
■ Stoffel Seals Co. Inc., 188 Water street, New York, has developed a completely tamperproof safety and inspection seal that also allows the incorporation of secret identification

markings. It consists of two components: A preshaped metal sealcup and an individual identification disk, multicolor printed. The multicolor disks serve as instant indicators of time element, process, location

AT *Crucial* POINTS



STEEL CASTINGS ARE DEPENDABLE



"The ships must get there" is the watchword, in these critical days, for both the Navy and the Merchant Marine. There is no time for breakdowns—for delays that may mean lives.

That's why marine engineers specify so many thousands of Cast Steel valves, for vital points where utter dependability is requirement number one.

Other industries — makers of almost everything mechanical—are in the habit of depending upon steel castings for service under extreme conditions.

Consider these important advantages of Steel Castings for *your product*. They stand up under high pressures and temperatures. They resist fatigue. They are easy and quick to repair. They can be hardened to suit the requirements of the job. A very wide range of mechanical properties is available.

Steel Castings make possible many economies in finishing and assembly schedules. Weight can be distributed exactly as needed, with little or no excess metal to machine off.

The result of taking advantage of these features is invariably a better product, and often, a lower cost of production.

Why not discuss with your own foundryman ways in which Steel Castings can help in improving and modernizing your own products—whatever you make? You'll find him anxious to cooperate, without obligation of course. Or if you prefer, write to Steel Founders' Society, 920 Midland Building, Cleveland.

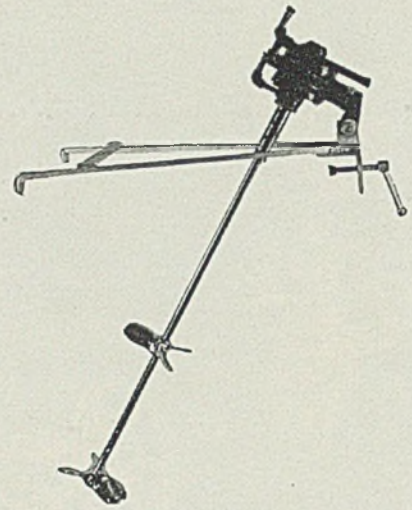
MODERNIZE AND IMPROVE YOUR PRODUCT WITH

STEEL CASTINGS

or priority of sealed object. Further markings such as inspector's number, department number, etc., can be incorporated in sealing pliers so that moment of closing pliers this number or mark is indented into identification disk. The seal can be permanently applied with string, thin cord or 2-ply wire. Once the two component parts are locked, the seal cannot be disturbed without immediate detection.

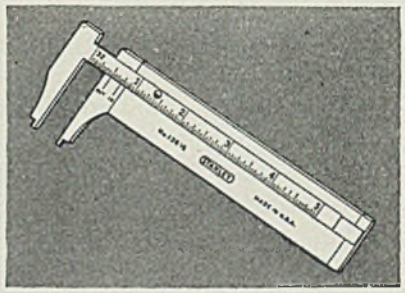
Mixer Brackets

■ Eclipse Air Brush Co., 400 Park avenue, Newark, N. J., recently has placed on the market two V-shaped brackets for use in holding its direct-drive air-motored agitators. These are offered in two sizes—to fit 30 and 50-gallon drums. A screw clamp at the side of the bracket allows for variations in drum sizes, and steadies the agitator. Use of the agitator with the new holder does not in any way change the operation of the mixer.



Pocket Caliper Rule

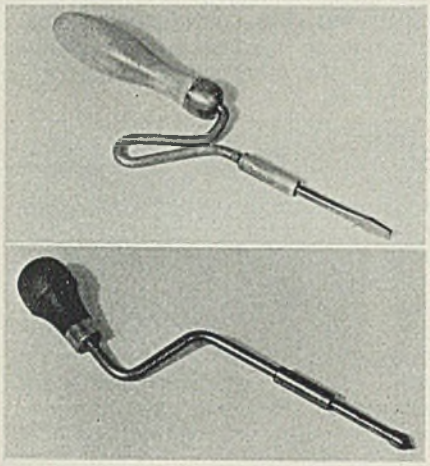
■ Stanley Tools, New Britain, Conn., is offering a new pocket size No. 136½ caliper rule for mechanics, engineers, draftsmen, estimators and stockmen. It is handy for measuring rods, tubing, squares, cable, rope, bolts, pipe, etc. The rule can be used for inside and outside measurements. Its caliper capacity permits measuring hole diameters from 7/32 to 5 inches



and widths or lengths up to 5 inches. Diameters of rounds up to 3 inches also can be measured. Made of boxwood, with brass caliper slide graduated by sixteenths and thirty-seconds, the rule is 5¾ inches long. Its back has vertical graduations in sixteenths for measuring up or down, right or left on straight surfaces.

Driving Tools

■ Products Engineering Co., 700 East Florence avenue, Los Angeles, is offering a new line of driving tools applicable to many production, fabrication and assembly jobs, especially for aircraft. Available in two styles, wrist and dog-leg ac-



tion, these Peco Speedrivers have five distinct tips for burring, countersinking and driving which may be snapped in or out in a second's time. The drivers are so balanced, according to the manufacturer, that a smooth, nonslipping action is assured at all times.

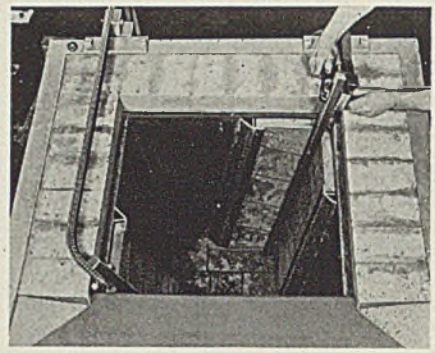
Control Center

■ Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., announces a new control center with interchangeable units for group control of alternating current industrial motors up to 100 horsepower. Available either in 76 or 90-inch heights, the centers consist of a 7-inch filler at the top for horizontal buses and cable trough, a 5-inch filler at bottom for cross cable duct, an 8-inch filler for master terminal boards, and multiple of the basic 14-inch starter unit heights. The interchangeable units are trim mounted 20 inches wide, permitting two to five control elements to be placed in a single section. Sections are 20 inches deep allowing sufficient depth to mount the units on each face. For operation on 3-phase, 220, 440 and 550-volt circuits, the motor starter units consist of a full voltage magnetic starter, thermal overload and low voltage protection. The disconnect switches may be unfused,

quick-make and quick-break, of the circuit breaker type with thermal inverse time overload and instantaneous short circuit protection.

Salt Bath Pot

■ Upton Electric Furnace Division, 7450 Melville at Green, Detroit, announces an improved design change in the method of insulating pots for electric salt bath furnaces, resulting in a decrease in the amount of bricks required. Example of the design change is shown in the pot illustrated which is designed for lower temperature work. For such work it does not require brick insulating except at the corners where the electrodes are placed. Thus, instead of lining the entire surface of the floor and walls of the pot with bricks, only the floor and the space immediately behind the electrodes require the insulating material. To keep the bricks in position, angle iron with a bracer strip, both of which are arc welded to the walls of the pot, hold the bricks. Sufficient space between the bricks and the angle is provided to allow for expansion under elevated operating temperatures. To renew bricks it is only necessary to slide them out at the top and replace the new bricking in the same manner. Another feature illustrated in the photo is the ease of handling electrodes. A single bolt connects each electrode with its respective water



cooled bus bar, permitting either electrode to be changed independently of the other without mechanical means.

Blackout Bulb

■ Wabash Appliance Corp., 335 Carroll street, Brooklyn, N. Y., has developed a new blackout bulb for lighting during air raids. It provides downlighting in a soft beam of blue light that is safe for indoor visibility. The bulb is lined inside with a pure silver reflector lining that hides all filament glare and projects the light downward. Light

leaks are eliminated by a black silicate coating that covers the bulb up to the extreme lighting end which is a deep blue.

Grinder Shields

■ Hisey-Wolf Machine Co., Cincinnati, announces two types of illuminated eye shields for use on grinding machines. As shown in the illustration, unit at left has a 4½-inch magnifying lens (2 power magnification, 10-inch focal length). Designated as 3LLM it also features two lights—one for each side of the wheel. The shield also is equipped with a protective glass to prevent pitting. Unit at right, known as the

No. 5 LL, features a 9 x 7-inch clear laminated shatterproof glass with a plain glass underneath it to elim-

inate pitting. It is designed for 12-inch or larger size grinders. It also is equipped with lights for lighting the area on both sides of the wheel.

Rheostat Cages

■ Ohmite Mfg. Co., Department 6G, 4835 Flournoy street, Chicago, is offering a variety of rheostat cages for use with rheostats. These are available as dust-proof, explosion-

proof units to house rheostats in tandem, ventilated, with one-half closed as splash guard, and as a laboratory, semi-enclosed table-top type. Various type terminals also are being offered with the cages.

Single-Unit Pump

■ Allis-Chalmers Mfg. Co., Milwaukee, announces the addition of a new 25-horsepower unit to its line of Electrifugal single-unit pumps. Built as one unit as the smaller sizes, its

design offers a 33 per cent saving in space at the same time providing more perfect shaft alignment, less vibration and lower pumping costs.

Effect of Hot Work

(*Concluded from Page 70*)

Summarizing the effects of mechanical work upon steel, we have seen that if carried out at ordinary atmospheric temperatures, the crystalline grains are elongated in the direction of working, giving rise to a fiber-like structure and raising the strength and elastic limit, the metal becoming increasingly brittle the while.

Hot work likewise deforms the grains but the strain produced is not persistent, the resulting grain structure being due to another cause; the factors responsible including nonmetallic inclusions and small bodies of segregates which appear in the finished material as ghosts or ghost bands. See Section I, STEEL, Feb. 9, 1942, p. 56, for other details. Blowholes likewise become elongated. If free from oxidation, they are welded up during processing.

When the forces applied to the part act in the direction of the grain, the physical properties (including tensile strength and resistance to impact) are those of the better elements of the steel. If the stress is applied across the grain, the characteristics of the inferior portions are emphasized. Where necessary, these directional differences in properties may be minimized by upsetting or cross rolling as, for example, in boiler plates. But in cases where the extension resulting from hot work takes place largely in one direction (as in a gun tube) it is almost impossible to secure uniformity of mechanical properties in all directions.

The field of application for forgings steadily expands with the growth of armament needs. The greater reliability of the forging, the ease and rapidity of manufacture of many parts of relatively simple form and the confidence which the application of heavy pressures engenders in the integrity of the finished part commend the forging to airplane designer and gun manufacturer alike.

In one particular type of large plane, the number of forgings (exclusive of engine parts) has risen within recent times from 317 to around 2000, most of these in the landing gear. Indeed the new necessities created by the recognition of the superiority of the forging has resulted in a rather serious hammer "bottleneck" especially in hammers of the largest size and ranging from 20,000 to 25,000 pounds.

Before this year's end, 167,000 tons of steel will have gone into war planes. Next year the figure will rise to over half a million, of which some 60 per cent will be forgings including engine parts and propellers but not armor. The remaining 40 per cent will include bars, strip, wire and the like. The hammer is essential for many of the heavy, tough forgings required today on account of the difficulty of pressing alloy steels which are not only tougher but cannot be raised with safety to the high forging heats of plain carbon steel.

Tin Can Bundles

(*Continued from Page 77*)

An open-hearth shop in the Great Lakes district is charging a small percentage of tin can scrap, including the regular collection of this material from the city in which it is located. It is not sufficiently high, however, to effect materially the tin content of the heats.

Another steelmaker even is investigating the possibility of a new type open-hearth refractory bottom of the chrome type which is understood to withstand the penetrating action of lead, this to permit the charging of terne plate scrap.

At a Canadian open-hearth shop there is possibly 5 tons of lead under each furnace. The lead seems to

come through the bottom in the form of a gas which solidifies as soon as it hits the air. The transition, however, does not appear to harm the bottom in any way.

A procedure followed at an Ohio shop to eliminate trouble as a result of lead in the scrap charge is to deliberately wash at least 6 inches out of the bottom and build it in again with fresh magnesite. At this shop it has been found that lead would not always come out in one heat but appeared several heats after the contaminated charge. It invariably would be discernible as a brownish fume.

It was also found that the ingots gave off the same brownish fume which was emitted by the furnace bottom after a heat containing lead was tapped out. Investigation showed that it was not always the metallic lead in the scrap which caused the trouble. A considerable part of it came from railroad bridge scrap which frequently had a ¼-inch lead oxide coating. This had the same effect as the metallic lead in the charge.

Quality troubles traceable to lead included small checks on the surface of the steel as well as a slight scabby condition. The later was duplicated by deliberately doping up the ingots merely by adding ½-pound of lead to an ordinary ingot when all the rest of the ingots in the heat acted normally. Little difference was noticed whether metallic lead or lead oxide was added. It was thought that the lead oxide would be reduced by the iron, throwing it back to metallic lead but instead the lead oxide was soluble in the steel. On the other hand a ½-pound of tin was added to an ingot without any bad effects.

Offers Hollywood Film For Welder Training

■ A Hollywood produced, all-color training picture which illustrates the techniques of arc control and electrode manipulation, and "actually shows what goes on inside the arc" during welding operations is now being offered by the Raphael G. Wolff Studios, 1714 North Wilton place, Hollywood, Calif., to schools and other training centers for speeding up training of apprentice welders.

Featuring Joe McGee, the welder, the picture, entitled "Inside of Arc Welding," consists partly of actual welding "shots" and partly of animated cartoons. Filming of this subject was accomplished by the application of new lighting methods which enabled the camera to pick up the entire welding process —some of which, it is said, is never really seen by the welder himself. Complete information regarding cost and method of distribution may be obtained by contacting the studio.

Rolling Strip Steel

(*Continued from Page* 82)

mill stands are equipped with 53 x 42-inch long backup rolls and are designed to use 18.5 to 21 x 48-inch long work rolls.

In most large steel mill installations, the apparatus is of the custom-built variety. This fact particularly is evident in the selection of motor ratings for the stands and the tension reel of a tandem mill. Extreme care was given to the determination of motor ratings and in the motor design. The lowest possible first cost consistent with the need for larger motors and higher speeds naturally was important, and since it also eliminated unit lubrication and maintenance expense, direct drive, therefore, was employed for stands Nos. 2 to 5, and the delivery reel. Even with direct drive, further reduction of inertias of stands Nos. 4 and 5, and reel motors was desirable; and this was accomplished by resorting to double-

armature construction. Armature spiders were not pressed on the motor shafts; instead, fluted shafts served as spiders, on which were pressed the armature laminations. The resulting designs were motors with long drawn-out armatures, and with ventilating air passing between the flutes of the shafts, just as though conventional armature spiders were used.

A partial list of relevant considerations include:

1. Range of Products To Be Rolled: Knowing this, the rolling schedules may be tabulated, and the mill-motor horsepowers and speed ranges may be determined. Being a tin-plate mill, the rolling schedules could be made reasonably similar, but the possibility of rolling other products could not be neglected. Therefore, in addition to the relatively wide range of 6 to 12 reductions, some margin was provided at each end of this range with 5-stand operation; also, power and controls were adapted to rolling light and medium-gage steel coils by use of stands Nos. 2 to 5 only. In any tandem mill, the range of speed on the various mill motors usually is represented by a speed cone. Fig. 5 shows the cone-shaped curve for the new mill, with full voltage on the armature and speed control by shunt field changes alone. Because all rolling schedules must fall within the speed cone area, close attention was paid to selecting motor ratings adapted to the planned rolling programs. The mill was laid out primarily to roll tin plate, but gages heavier than tin plate may be rolled. The dotted curve in Fig. 4 shows one such schedule which recently was rolled.

2. Inertia and Stored Energy in Motor Rotating Parts, Mill Pinions, Couplings, and Rolls: Inertia considerations are important if the mill is to accelerate and decelerate rapidly. In a mill of such high-delivery speeds, quick acceleration and deceleration of 6 to 8 seconds is desirable from the standpoint of minimizing the amount of off-gage rolling. Not only is attention paid to the individual motor-armature inertias, but an attempt is made to balance the inertias of all motors with respect to their torque ratings. Uniform acceleration and deceleration of all motors, therefore, is made possible.

Table I—Motor and Booster Ratings on 5-Stand Tandem Cold Mill

	Motor			Booster Generator	
Stand	H.P.	R.p.m.	Drive	No. of armatures	Kw.	volts
1	800	300/750	Gear	1	32	38
2	2000	100/250	Direct	1	100	38
3	2500	175/350	Direct	1	100	38
4	2500	275/550	Direct	2	100	38
5	3000	400/700	Direct	2	100	32
Reel	600	200/800	Direct	2	250	375

3. Gear Ratios Between Motors and Their Mill Pinions: Determination of direct or geared drive is made after a consideration of items 1 and 2. On this mill only No. 1 stand has a gear unit. On all other stands, as well as on the tension reel, the drive is direct, with the mill motor directly coupled to the stand pinions. Abnormal motor thrusts, due to the large forces resulting from breakages in roll spindles, are resisted by thrust bearings on the coupling of all direct-drive motors.

4. Duplication of Motor Parts: The double-armature motors and stators are designed so that each motor has interchangeable armatures and stator frames. Shaft extensions and couplings for No. 1 stand and the reel, stands 2 and 3, and stands 4 and 5 are interchangeable.

With the large coils already available to most mills, a first inclination is to question the practicability of fast acceleration and deceleration when these operations occupy so low a percentage of the total operating time. However, the desirability of minimizing off-gage with its associated high tensions and possibility of broken strip may be compared to the take-off and landing periods of an airplane. The most exacting demands upon mill control are those associated with limiting the rapidly changing tension "going up" and "coming down."

Booster Motor-Generator Sets: Uniform and quick acceleration of the mill motors is further aided by IR drop compensating booster generators. The generator armatures are connected in series with their respective mill-motor armatures. By compensating for a part of the motor-armature circuit resistance, the motors operate more nearly like ideal motors, with speeds closely proportional to the bus voltage. Since all motors are on a common bus, they will tend to hold the same speed relationship (for given shunt field settings) regardless of bus voltage or motor loads.

A compact construction arrangement has been obtained by mounting the main 750-volt negative bus above the booster motor-generator sets, while each booster generator is located directly behind its mill motor line panel.

Booster generators for the 5-stand motors and tension reel are grouped to form two 4-unit motor-generator sets. Each set is driven by a 350 horsepower, 440-volt synchronous motor.

(*Concluded in Next Issue*)

Mining, Metallurgical Engineers' Meeting

(*Concluded from Page 32*)

tion of an endpoint is, however, not the whole story, he said, for the final composition of the metal leaving the converter depends upon the temperature of the metal throughout the process, as well as upon the endpoint chosen. Within the past four years these questions have received more attention than during the preceding half-century, with a result that instruments and methods are being developed which will enable the bessemer operator to furnish a more uniform product.

In discussing carbides in low chromium steel, Walter Crafts and C. M. Offenhauer, research metallurgists, Union Carbide & Carbon Research Laboratories Inc., Niagara Falls, N. Y., stated it cannot be emphasized too strongly that the electrolytic extraction and x-ray examination can only demonstrate the presence—not conclusively prove the absence—of a constituent. However, with this limitation, they said their study suggested the following conclusions:

Chromium carbide is formed at sub-critical temperatures above about 500 deg. C., in chromium steels containing from one to more than 75 per cent chromium. Within this range may be formed either directly from austenite or by tempering of martensitic and cementitic structures, and the tendency toward the range may be related to the stability of austenite above the lower nose of the S-curve.

When formed below about 500 deg. C., the carbons found to be in the form of Fe_3C at all chromium contents. Hence it appeared that in these low carbon steels the form of the carbide is controlled by temperature of transformation of austenite or tempering of martensite.

A paper entitled "Effects of Eight Complex Deoxidizers on Some 0.40 Per Cent Carbon Forging Steels", was presented by George F. Comstock, metallurgist, Titanium Alloy Mfg. Co., Niagara Falls, N. Y. One of his general conclusions was that the incorporation of minute amounts of boron in fine grained 0.40 per cent carbon steels is surprisingly effective in increasing hardenability. The same small boron additions, the speaker continued, also give good ductility and superior toughness, with high strength, after hardening and drawing at low temperatures, such as 450 to 600 deg. F. When drawn at higher temperatures to hardness values below 45 Rockwell C, superiority and toughness of steel so treated over steel similarly treated, but without boron, disappears.

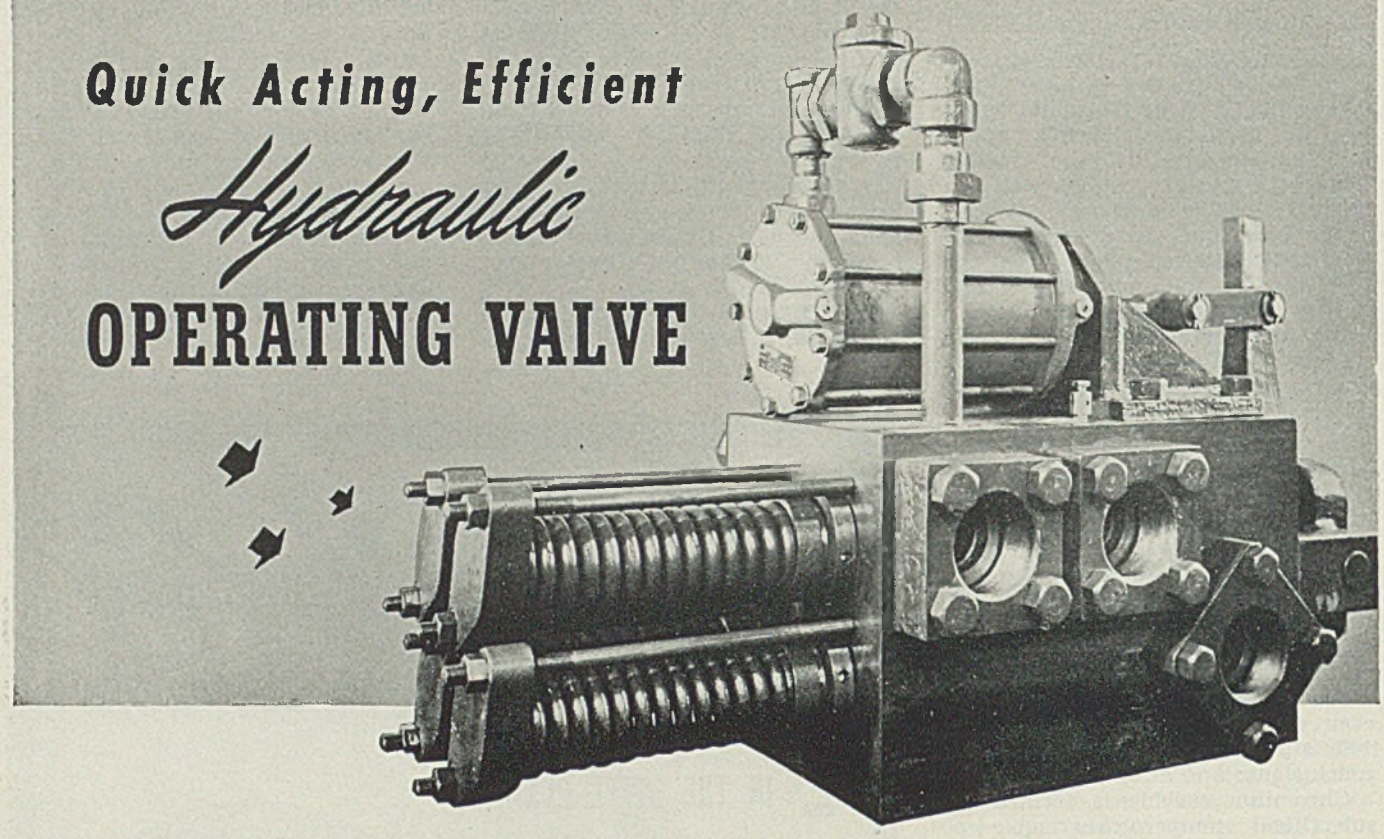
The amount of boron that should be present in these 0.40 per cent carbon steels to secure the advantages in hardenability and toughness appears to be about 0.002 to 0.007 per cent. It was further concluded that to secure a superior combination of strength and ductility, together with high hardenability, in fine grained steel of this nature, it was advantageous to add the boron in the form of a complex titanium alloy, such as "manganese-silicon-titanium" No. 3 or No. 4, rather than as ferroboron.

J. T. Eash and N. B. Pilling, research metallurgist and director, respectively, research laboratory of International Nickel Co., Bayonne, N. J., presented structural diagrams for cast nickel steels and cast irons at 0.25, 1.5 and 2 per cent silicon levels and containing up to 4 per cent carbon and 30 per cent nickel.

They pointed out that as a group, the alloys of iron, nickel and carbon are, in application, one of the most versatile of the ferrous alloy family, and that while many investigations have been made of their properties and structure only a few attempts have been made to show the microstructural relation over a wide range of composition.

Quick Acting, Efficient

Hydraulic OPERATING VALVE



FOR SHELL FORGING PRESSES

Designed especially for the service, this 4-way operating valve has proven itself on many shell forging press installations as well as on other hydraulic presses. The valve has a forged steel body; spindles and seats are of alloy steels. Seats are removable for regrinding or replacement.

Quick acting and efficient, it prevents loss of high pressure fluid and minimizes any tendency to water wire drawing of the seats and spindles. Shell forging operations are speeded up because it is pilot operated—employing either air or hydraulic fluid controlled by a small easily operated auxiliary valve.

A complete line of shell forging equipment is offered by Baldwin Southwark—forging and nosing presses, tools and dies, pumps, piping, valves and accumulators. Whether you need a complete plant layout or a single quick-acting operating valve it will pay you to get Southwark's recommendations *first.*

Baldwin Southwark Division, The Baldwin Locomotive Works, Philadelphia; Pacific Coast Representative, The Pelton Water Wheel Co., San Francisco.

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THE BALDWIN LOCOMOTIVE WORKS • PHILADELPHIA

B.L.W. THE BALDWIN GROUP

Steel Industry Near Complete War Footing

Distribution pattern utilizing output to best advantage. Canada given same priority as home consumers. Scrap continues scarce

MARKET IN TABLOID ★

Demand
Heavy for war purposes.

Prices
Further scrap regulations.

Production
Up 1 point to 97 per cent.

■ EACH month sees the steel industry more wholly concentrated on war preparations, with better control of production and distribution. Close co-operation of government bodies and steel producers is working out a pattern for most efficient use of resources and every ton of steel is being utilized to the utmost.

While many details remain to be adjusted the general picture has cleared and progress is much better than a few months ago. Further controls are being imposed and necessary materials thereby directed into channels of vital importance to the war effort.

To co-ordinate the war efforts of Canada and the United States the former has been placed on practically the same priority basis as the latter for all war and essential civilian supplies. Applications for priority made by Canadian steel users will be handled on the same basis as from those in the United States. Canada's greatest need is for plates for shipbuilding and mills are booked far ahead. Additional plate mills are under construction but in the meantime aid is needed from this country.

Railroads continue to place orders for rolling stock, 4300 cars being bought thus far in February, exceeding the total for all January. Locomotive orders also are heavy, both for road engines and switchers. Builders are working toward fulfillment of the promise of 36,000 new cars by May 1, deemed necessary to meet heavy traffic demands.

Steel production last week was 1 point above the preceding week, at 97 per cent. Detroit advanced 6 points to 91 per cent, Pittsburgh 1½ points to 96½, Wheeling 6½ points to 90½, New England 8 points to 100, Cleveland 2 points to 86½ and Youngstown 1 point to 89. Cincinnati lost 3 points to 84 per cent and Chicago ½-point to 102½. Rates were unchanged at Buffalo, 79½; St. Louis 78; Birmingham, 90; eastern Pennsylvania, 90.

Steel ingot and castings production in January, 7,129,351 net tons, set a new record for that month, 3 per cent above the previous record, made in January, 1941. Though slightly less than output in December, it was the fourth largest tonnage for any month in the industry's history. New ingot capacity figures have been issued by the American Iron and Steel Institute, 88,570,000 net tons, as of Jan. 1, an increase of 4,418,000 tons over Jan. 1, 1941, and 2,421,000 tons over July 1. Pig iron capacity is 60,394,000 net tons, an increase of 2,784,000 tons over Jan. 1, 1941.

Government agencies are tightening regulations on tin plate makers and can manufacturers. The latter are ordered to give full preference to Army and Navy orders and to reduce the number of sizes, almost eliminating small cans. Products for which tin cans can be used are designated. Electrolytic tin coating is seen as a solution of tin conservation as the thickness of tin can be exactly controlled.

War Production Board has asked blast furnace operators to schedule their relining work for 1942 to the end that plans may be made to avoid too many stacks being idle at the same time, which would interfere with supply and increase difficulties of allocating tonnage. Distribution under allocations has been working smoothly for several months and every effort is being made to keep production as steady as possible.

Office of Price Administration has issued further revisions in the scrap schedule to eliminate difficulties that have arisen in interpretation. Better definition of unprepared scrap is given and a differential established for hydraulic bundles containing tin-coated material, according to the percentage of the latter. Regulations governing preparation of remote scrap, delivery by motor and the ceiling on heavy melting steel in the Boston switching district are slightly changed.

Scrap supply has not improved materially and return of winter weather in northern districts has hampered collection and preparation. Various campaigns to uncover dormant supplies have not yet made appreciable headway and such as has been brought out has been absorbed quickly. Automobile wrecking yards are beginning to move their material but not sufficient has been shipped to relieve the situation.

Composite prices continue at the level of several months: Finished steel $56.73, semifinished steel $36, steelmaking pig iron $23.05 and steelmaking scrap $19.17.

COMPOSITE MARKET AVERAGES

	Feb. 14	Feb. 7	Jan. 31	One Month Ago Jan., 1942	Three Months Ago Nov., 1941	One Year Ago Feb., 1941	Five Years Ago Feb., 1937
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$55.18
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	36.20
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	22.95	19.98
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	20.05	19.40

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

	Feb. 14, 1942	Jan. 1942	Nov. 1941	Feb. 1941
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	2.225
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

	Feb. 14, 1942	Jan. 1942	Nov. 1941	Feb. 1941
Bessemer, del. Pittsburgh	$25.34	$25.34	$25.34	$25.34
Basic, Valley	23.50	23.50	23.50	23.50
Basic, eastern, del. Philadelphia	25.34	25.34	25.34	25.34
No. 2 fdry., del. Pgh., N.&S. Sides	24.69	24.69	24.69	24.69
No. 2 foundry, Chicago	24.00	24.00	24.00	24.00
Southern No. 2, Birmingham	20.38	20.38	20.38	20.38
Southern No. 2, del. Cincinnati	24.06	24.06	24.06	24.06
No. 2X, del. Phila. (differ. av.)	26.215	26.215	26.215	26.215
Malleable, Valley	24.00	24.00	24.00	24.00
Malleable, Chicago	24.00	24.00	24.00	24.00
Lake Sup., charcoal, del. Chicago	31.34	31.34	31.34	30.34
Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.17
Ferromanganese, del. Pittsburgh	125.33	125.33	125.33	125.33

Scrap

Heavy melting steel, Pitts.	$20.00	$20.00	$20.00	$20.75
Heavy melt, steel, No. 2, E. Pa.	18.75	18.75	17.75	18.50
Heavy melting steel, Chicago	18.75	18.75	18.75	19.25
Rails for rolling, Chicago	22.25	22.25	22.25	23.75
No. 1 cast, Chicago	20.00	21.12	21.50	19.875

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	H. R. 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

Tin Mill Black Plate

Pittsburgh, Chicago, Gary, base 29 gage and lighter 3.05c
Granite City 3.15c
Pacific ports, boxed 4.05c

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		Alloy	
S.A.E.	Diff.	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
½-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—S	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 ⅜-inch incl. (per 100 lbs.) $2.00
Do., over ⅜ to 41/64-in. incl. 2.15
Worcester up $0.10, Galveston up $0.25 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
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

Kearny, N. J., ovens 12.15
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. 12.25
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.... 15.00c
Toluol, two degree 28.00c
Solvent naphtha 27.00c
Industrial xylol 27.00c

Per lb. f.o.b. works

Phenol (car lots, returnable drums) 12.50c
Do less than car lots.. 13.25c
Do tank cars 11.50c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers 8.00c

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	$25.00
Do., barge	25.00
No. 2 lump	25.00

Ferroalloy Prices

Ferromanganese, 78-82%,
Carlots, duty pd., seab'd $120.00
Carlots, del. Pittsburgh 125.33
Carlots, f.o.b. So. f'ces. 140.00
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:

	Carloads	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,

	1½%	2½%
Carbon		
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	Less 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

As Kansas City, Mo., Chattanooga, Tenn., Tulsa, Okla., and Portland, Oreg., were not named in the order fixing ceiling prices they have been omitted below.

	Soft Bars	Hot-rolled Strip Bands	Hot-rolled Strip 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	3.38	4.23	4.98	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
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	....	....
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	....	5.25	5.00	4.60	....	....
Houston, Tex.	3.75	4.30	4.30	4.05	4.05	5.50	4.00	....	5.25	....	6.90	....	....
Seattle	4.35	4.35	.	4.35	4.35	6.10	4.35	6.35	5.60	....	5.75	....	....
Los Angeles	4.50	5.00	6.80	4.50	4.50	6.75	4.65	6.50	5.85	....	6.60	10.55	9.55
San Francisco	4.10	4.60	6.35	4.25	4.25	5.95	4.25	6.40	6.00	....	6.80	10.80	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	6.25	....	8.75	9.85	8.65
Los Angeles	4.80	9.55	8.55	8.40	9.05
San Francisco	5.60	9.80	8.80	8.65	9.05

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, New Orleans; 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	7.56	1	17	6
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 3s 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.) F.O.B. Rio Janeiro.	8.00c
Scheelite, Imp.	23.50-24.00

Chrome Ore

Gross ton c.i.f. Baltimore; dry basis; subject to penalties for guarantees

Indian and African, 2.8:1 lump, 48%	$39.00
South African (excluding war risk) No ratio lump, 44%	28.00
Do. 45%	29.00
Do. 48%	34.00
Do. concentrates, 48%	33.00
Do. 50%	34.00
Brazilian 2.5:1 lump, 44%	31.00
2.8:1 lump, 44%	32.50
3:1 lump, 48%	41.00
No ratio lump, 48%	35.00-35.50
Do. concentrate, 48%	33.00-33.50
Philippine No ratio lump, 45%	32.00
2.8:1 lump, 48%	40.00
Do., concentrate, 48%	39.00
2.5:1 concentrate, 48%	36.50
No ratio concentrate, 48%	34.00
No ratio lump, 48%	35.00
Rhodesian	nominal

Manganese Ore

Including war risk but not duty, cents per unit cargo lots

Caucasian, 50-52%	
S. African, 48%	65.00
Indian, 50%	66.00
Brazilian, 48%	65.00
Chilean, 48%	68.00
Cuban, 51%, duty free	81.00-83.00

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.

PRICES FOR OTHER THAN RAILROAD SCRAP

				ELECTRIC FURNACE AND FOUNDRY GRADES										
				Low Phos. Grades		Heavy Structural, Plate			Cut Auto Scrap					
	OPEN HEARTH GRADES*	Machine Shop Turnings	BLAST FURNACE GRADES*	Billet, Bloom Forge Crops	Bar Crops and smaller; Punchings, Plate	3 ft. and less	2 ft. and less	1 ft. and less	3 ft. and less	2 ft. and less	1 ft. and less	Alloy-Free Low Phos. & Sulphur Turnings	First Cut Heavy Axle & Forge Turnings	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Johnstown, Midland, Monessen, Sharon, Steubenville, Weirton, Canton, Youngstown, Warren	$20.00	$16.00	$16.00	$25.00	$22.50	$21.00	$21.50	$22.00	$20.00	$20.50	$21.00	$18.00	$19.50	$21.00
Claymont, Coatesville, Harrisburg, Conshohocken, Phoenixville	18.75	14.75	14.75	23.75	21.25	19.75	20.25	20.75	18.75	19.25	19.75	16.75	18.25	19.75
Bethlehem	18.25	14.25	14.25	23.25	20.75	19.25	19.75	20.25	18.25	18.75	19.25	16.25	17.75	19.25
Buffalo	19.25	15.25	15.25	24.25	21.75	20.25	20.75	21.25	19.25	19.75	20.25	17.25	18.75	20.25
Cleveland, Middletown, Cincinnati, Portsmouth, Ashland	19.50	15.50	15.50	24.50	22.00	20.50	21.00	21.50	19.50	20.00	20.50	17.50	19.00	20.50
Detroit	17.85	13.85	13.85	22.85	20.35	18.85	19.35	19.85	17.85	18.35	18.85	15.85	17.35	18.85
Toledo	.....	13.85	13.85	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chicago	18.75	14.75	14.75	23.75	21.25	19.75	20.25	20.75	18.75	19.25	19.75	16.75	18.25	19.75
Kokomo	18.25	14.25	14.25	23.25	20.75	19.25	19.75	20.25	18.25	18.75	19.25	16.25	17.75	19.25
Duluth	18.00	14.00	14.00	23.00	20.50	19.00	19.50	20.00	18.00	18.50	19.00	16.00	17.50	19.00
St. Louis	17.50	13.50	13.50	22.50	20.00	18.50	19.00	19.50	17.50	18.00	18.50	15.50	17.00	18.50
Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburg, Calif.	17.00	13.00	13.00	22.00	19.50	18.00	18.50	19.00	17.00	17.50	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	12.50	12.50	21.50	19.00	17.50	18.00	18.50	16.50	17.00	17.50	14.50	16.00	17.50
Seattle	14.50	10.50	10.50	19.50	17.00	15.50	16.00	16.50	14.50	15.00	15.50	12.50	14.00	15.50
Portland, Oreg.	.....	.....	.....	.....	15.50	14.00	14.50	15.00	13.00	13.50	14.00	11.00	12.50	14.00

RAILROAD SCRAP

	Heavy Melting Steel	Scrap Rails	Rails for Rolling	Scrap Rails: 3 ft. and under	Scrap Rails: 2 ft. and under	Scrap Rails: 18 in. and under
Pittsburgh, Wheeling, Steubenville, Sharon, Youngstown, Canton	21.00	22.00	23.50	24.00	24.25	24.50
Philadelphia, Wilmington, Sparrows Point	19.75	20.75	22.25	22.75	23.00	23.25
Cleveland, Cincinnati, Middletown, Ashland, Portsmouth	20.50	21.50	23.00	23.50	23.75	24.00
Chicago	19.75	20.75	22.25	22.75	23.00	23.25
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Kokomo	19.25	20.25	21.75	22.25	22.50	22.75
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00
Birmingham	18.00	19.00	20.50	21.00	21.25	21.50
Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Seattle	15.50	16.50	18.00	18.50	18.75	19.00

CAST IRON SCRAP OTHER THAN RAILROAD

(Shipping point prices in gross tons)

	Group A	Group B	Group C
No. 1 Cupola Cast	$18.00	$19.00	$20.00
No. 1 Machinery Cast, Drop Broken, 150 lbs. & Under	18.00	19.00	20.00
Clean Auto Cast	18.00	19.00	20.00
Stove Plate	14.00	15.00	16.00
Unstripped Motor Blocks	17.50	18.50	19.50
Heavy Breakable Cast	16.50	17.50	18.50
Charging Box Size Cast	17.25	18.25	19.25
Miscellaneous Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C includes states not named in groups A and B, plus Kansas City, Kans.-Mo.

***Open Hearth Grades** refer to No. 1 heavy melting steel, No. 1 hydraulic compressed black sheet scrap, No. 2 heavy melting steel, dealers' No. 1 bundles, dealers' No. 2 bundles and No. 1 busheling. **Blast Furnace Grades** refer to mixed borings and turnings, shoveling turnings, No. 2 busheling and cast iron borings. Add $3 for chemical borings, $5 when chemical borings used in manufacture of explosives.

A basing point includes the switching district of the city named. The Pittsburgh basing point includes the switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Pa. Cincinnati basing point includes the switching district of Newport, Ky. St. Louis basing point includes the switching districts of Granite City, East St. Louis and Madison, Ill. San Francisco basing point includes the switching districts of South San Francisco, Niles and Oakland, Calif.

Inferior Grades: Maximum prices of inferior grades shall continue to bear the same differential below the corresponding listed grades as existed from Sept. 1, 1940, to Jan. 31, 1941. No premium allowed on grades considered superior, unless approved by OPA. Addition of special preparation charges prohibited. Purchase of electric furnace or foundry grades for open hearth or blast furnace use permitted only at no more than price for corresponding open hearth grade. Exceptions: Low phos. billet, bloom and forge crops and electric furnace bundles may exceed open hearth price, and electric furnace bundles may exceed blast furnace price, if material is delivered to the consumer direct from the original industrial producer.

Commissions: No commission is payable except by a consumer to a broker for services rendered, the commission not to exceed 50 cents per gross ton. No commission is payable unless: The broker guarantees the quality and delivery of an agreed tonnage the scrap is purchased at a price no higher than the maximum allowed; the broker sells the scrap to the consumer at the same price at which he purchased it; the broker does not split the commission with the seller of the scrap, with another broker or sub-broker, or with the consumer. No commission is payable for preparation of scrap.

Maximum Shipping Point Price: Where shipment to consumer is by rail, vessel or combination of both, scrap is at its shipping point when it has been placed f.o.b. railroad car or f.a.s. vessel. In such cases, maximum shipping point prices are: (1) For shipping points located within a basing point, the price listed in the above table for scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point; and (2) for shipping points located outside a basing point, the price in the above table for scrap at the most favorable basing point, minus the lowest transportation charge by rail, water or combination thereof. When vessel movement is involved, dock charges shall be 50 cents at Memphis, $1 at Great Lakes ports, $1.25 at New England ports, 75 cents elsewhere. New England shipping point prices computed on most favorable basing point prices; maximum transportation charge on scrap from New England, $6.27 per ton.

Scrap shipped by motor vehicle is at its shipping point when loaded. For shipping points within basing points, maximum is price listed in table minus lowest switching charge. When outside basing point, maximum is price at most favorable basing point minus lowest established charge when hauled by common carrier. When hauled by seller charges are based on carload rate for rail shipment, minimum $1.00 per ton.

Maximum Delivered Prices: Determined by adding established transportation charges to shipping point price, not to exceed by more than $1 the prices listed in the table for the nearest basing point. Certain exceptions specified in CPA Price Schedule No. 4 (Amendment 11) apply to St. Louis district consumers, to WPB allocations, to water shipments from Duluth or Superior, Wis., to shipments of billets, blooms and forge crops from Pittsburgh and to shipments of electric and foundry grades from Michigan.

Unprepared Scrap: Above prices are for prepared scrap. Maximum prices for unprepared scrap are $2.50 less than for the corresponding grades of prepared scrap, except for heavy breakable cast. In no case shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Graveyard autos not considered unprepared scrap.

Remote Scrap: Consists of all grades, except railroad scrap, located in Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas, Oklahoma, Oregon and Utah. Delivered price may exceed by not more than $5 the price at the basing point nearest consumer's plant, provided sworn details furnished OPA. Permission required to exceed by more than $5 the nearest basing point price.

Sheets, Strip

Sheet & Strip Prices, Page 120

Perhaps never has there been a time when sheet schedules have been in a greater state of flux. In many instances schedules are not even being frozen for the period of a week. If a high priority rush order comes through, producers have no hesitancy in altering their operations and putting it in.

As a result, consumers with high priority tonnage have little assurance that even their scheduled nearby deliveries may not be upset by tonnage accepted by their suppliers with still higher priority.

Some cold-rolled sheet producers are more actively seeking high priority tonnage on which delivery is promised in four to six weeks on A-2 ratings or better. This is somewhat paradoxical in view of the fact that hot-rolled sheet mills are fully engaged on highly rated orders. It results from a number of large consuming outlets for cold-rolled sheets being arbitrarily curtailed, resulting in cold mills lacking orders with high priority. It is impossible to use A-1 or A-2 hot-rolled material to fill demand for cold-rolled with rating of A-9 or lower. Thus, for the moment, cold-rolled sheets are easier on highly-rated orders.

Larger stamping shops are in need of specialties but some smaller fabricators are not fully engaged and are seeking defense subcontracts.

Plates

Plate Prices, Page 120

Plate demand is unabated and the only relief possible seems to be increasing production of lighter plates on continuous sheet and strip mills, allowing capacity operation of plate mills on heavier material.

Plate allocation to shipyards is heavier, taking the larger part of plate production in areas near tidewater. Tonnage against high ratings for fabricators supplying shipbuilders with equipment is increasing, usually at A-2 rating. Considerable demand is backing up for projects with priority just below this classification, notably in connection with oil and fuel storage. Some of this volume is being placed without hope of early shipment, unless pressure for plates eases, which is not foreseen in view of steadily expanding ship and combat tank programs.

Floor plate demand continues to grow, both for ship and industrial use. Deliveries are more extended and subject to allocation or high rating. Boiler plate requirements are also heavy. Elevated water tanks are not being pushed, an exception being one in connection with a defense project in the East.

PLATE CONTRACTS PLACED

200 tons, 500,000-gallon tank and tower, airfield, to Darby Products & Steel Plate Co., Kansas City, Mo.

PLATE CONTRACTS PENDING

375 tons, 300,000, 200,000 and 100,000-gallon elevated tanks, Defense Public Works; bids opened.

Bars

Bar Prices, Page 121

Increase of defense contracts is reflected in greater demand for steel bars of all finishes, notably cold-finished and alloys, as well as forging stock. Practically everything is rated highly and is being bought or allocated on the basis of possible delivery. Inquiry for shell and bomb steel is growing.

Current allocations of hot-rolled bars for cold-drawing will be insufficient if requirements of cold-drawn stock continue to increase at the present rate. Additional batteries of screw machines are going into production, supplementing peak production of older units and potential demand exists in additional machines now on order. When all are in operation requirements of steel for processing will run to much larger tonnage.

In New England supplemental contracts for chromium-nickel bars for small arms are being placed. Close to 7000 tons for remelting will be furnished to an arsenal in that area by a Chicago mill, for delivery through third quarter. Large forge shops are practically on a 100 per cent basis of aircraft work and smaller shops are at peak on top-rated defense contracts.

Decision by WPB again to postpone establishment of the allocation system in cold-drawn bars has thrown the trade into considerable confusion, particularly so this time, because the plan was in the process of being definitely set up, as of Feb. 1.

As the system called for supplying hot-rolled steel by 1940 suppliers of cold drawers on a monthly basis, which represented the avererage for the first seven months of that year, considerable cancellation was necessary late last month, where cold mills had orders with suppliers who had not served them in 1940. This was necessary to put the allocation system into effect Feb. 1.

Pipe

Pipe Prices, Page 121

Stocks of butt-weld steel pipe are sufficient for current demand and prices are somewhat irregular. This scattered weakness results from inventories accumulated by distributors under insistence by producers that orders for galvanized pipe be accompanied by a percentage of black pipe when buying of the latter declined seasonally. The reverse is true of larger sizes of lap-weld, demand for which is active for government construction requirements. Some of this tightness is also due to competition for narrow ¼-inch plates, there being a shortage of the latter for pipe.

STEEL PIPE PLACED

1400 tons, 42 and 48-inch fabricated pipe, Prior, Okla., to Bethlehem Steel Co., Bethlehem, Pa.

Unstated tonnage, 200 sections, 16-foot lengths, 20-inch i.d. steel shore pipe, $\frac{3}{8}$-inch plates, United States engineer, Jacksonville, Fla., to The Hilyard Co., Norristown, Pa., $10,232, delivered; invitation 255.

STEEL PIPE PENDING

Unstated, 90,000 feet steel and wrought iron pipe and seamless steel tubing, Bremerton, Wash.; bids to E. J. McCall, clerk, Feb. 14.

CAST PIPE PLACED

716 tons, defense public works, allocated as follows; to United States Pipe & Foundry Co., Burlington, N. J., 463 tons of 8 to 12-inch pipe; to Pacific States Cast Iron Pipe Co., Provo, Utah, 243 tons of 12-inch pipe.

CAST PIPE PENDING

175 tons, 12-inch, East Eightieth Street improvement, Seattle; H. G. Purcell, Seattle, low, for U. S. Pipe & Foundry Co., Burlington, N. J.

100 tons, 12 inch, Thirty-Sixth Avenue west improvement, Seattle; H. G. Purcell, Seattle, low, for U. S. Pipe & Foundry Co., Burlington, N. J.

Unstated, 25,400 feet 2 to 8-inch, Bremerton, Wash.; bids to E. J. McCall, clerk, Feb. 14.

Soil Pipe Ceiling Set

Increased demand for the product in defense housing and new factory construction, which has been stimulated by war activities, has caused the issuance of Price Schedule No. 100 for cast iron soil pipe and fit-

tings by OPA. Schedule is effective Feb. 20.

Schedule establishes maximum prices for most items of pipe and fittings and governs all sales of these products by manufacturers and distributors.

While the schedule adopts the Birmingham basing point system which now is in use by the industry, the OPA has stated expressly that it is neither approving nor disapproving the single basing point pricing plan.

Ceiling prices are established in the schedule in terms of minimum discounts from the standard revised price list which the industry has been using since 1936. The minimum discount for 2-inch to 6-inch extra heavy pipe is 52½ points off list for carload shipments and 10-ton shipments by truck. Prices for other sizes of pipe and for fittings maintain the same differentials as have prevailed during the last six months. These discounts are to contractors. It is expected that wholesalers and jobbers will continue to obtain their usual discounts from the base.

The schedule allows freight from Birmingham, Ala., to be computed on the basis of ¼-point off list for every 25 cents per ton of freight. This provision preserves normal industry practices.

Both export and import sales are governed by the schedule. On export sales the seller is permitted to add to the maximum price for delivery to the export dock ocean freight and marine insurance to the extent that such charges are paid by the seller. In addition, a charge of $1 per ton of pipe and fittings may be made for wiring or bundling shipments for export.

Rails, Cars

Track Material Prices, Page 121

With more than 4300 placed, domestic freight car business so far this month already exceeds the 4253 cars placed in all of January, and some fair sized inquiries are still pending, including 2000 for the Baltimore & Ohio and a remaining 1000 for the Southern.

In addition to the Southern order, recent buying includes 250 seventy-ton flat cars for the Pere Marquette, 70 seventy-ton gondola cars and 50 seventy-ton flat cars for the Detroit, Toledo and Ironton, all going to the Greenville Steel Car Co., Greenville, Pa., and 50 seventy-ton covered hopper cars for the Nashville, Chattanooga & St. Louis. 12 fifty-ton steel box cars for the Delaware & Hudson and nine 50-ton steel flat cars for the Navy, all going to the American Car & Foundry Co., New York.

LOCOMOTIVES PLACED

Bethlehem Steel Co., one 25-horsepower diesel-electric switch engine for its Sparrows Point, Md., plant, to General Electric Co., Schenectady, N. Y.

Chicago, Rock Island & Pacific, 17 diesel-electric locomotives, including five 4050-horsepower freight engines and eight 600-horsepower switch engines to Electro Motive Corp., La Grange, Ill., and four 1000-horsepower switch engines to American Locomotive Co., New York.

Lake Champlain & Moriah, one 1000-horsepower diesel-electric switch engine, to Electro Motive Corp., La Grange, Ill.

LOCOMOTIVES PENDING

Navy, 18 diesel-electric locomotives, including 16 switch engines, four of 115 tons each, and 12 of 45 tons, one 50-ton and one 25-ton locomotive, bids on the latter two opened Feb. 11.

CAR ORDERS PLACED

Delaware & Hudson, twelve 50-ton steel box cars, to American Car & Foundry Co., New York.

Detroit, Toledo & Ironton, 70 seventy-ton gondola and 50 seventy-ton flat cars, to Greenville Steel Car Co., Greenville, Pa.

Indiana Service Corp., Fort Wayne, Ind., 40 forty-four-passenger trolley coaches, to J. G. Brill Co., Philadelphia.

Nashville, Chattanooga & St. Louis, fifty 70-ton all steel covered hoppers, to American Car & Foundry Co., New York.

Navy, nine 50-ton steel flat cars for Puget Sound navy yard, to American Car & Foundry Co., New York.

Pere Marquette, 250 seventy-ton flat cars, to Greenville Steel Car Co., Greenville, Pa.

Southern, 2500 fifty-ton coal hoppers, to Pullman-Standard Car Mfg. Co.,

Chicago, for Bessemer, Ala., shops.

BUSES BOOKED

A.c.f. Motors Co., New York: Ten 31-passenger and one 36-passenger for Wyoming Valley Autobus Co., Wilkes-Barre, Pa.; ten 43-passenger for Bureau of Supplies and Accounts, Navy Department, Washington; eight 31-passenger for Pittsburgh Motor Coach Co., Pittsburgh; seven 32-passenger for Middlesex & Boston Street Railway Co., Newtonville, Mass.; six 36-passenger for Harrisburg Railways Co., Harrisburg, Pa.; six 38-passenger for Fitchburg & Leominster Street Railway Co., Fitchburg, Mass.; five 39-passenger and one 43-passenger for A. B. & W. Transit Co., Alexandria, Va.; four 39-passenger for Penobscot Transportation Co., Bangor, Me.; three 36-passenger for Cumberland & Westernport Transit Co., Frostburg, Md.; three 33-passenger for Carolina Coach Co., Raleigh, N. C.; three 33-passenger for Sunshine Bus Lines Inc., Dallas, Tex.; three 37-passenger for Penn-Ohio Coach Lines Co., Youngstown, O.; two 36-passenger for Gary Railways Co., Gary Inc.

Tin Plate

Tin Plate Prices, Page 120

Order M-81, issued last week by WPB, drastically reduces the number of sizes of tin cans and designates products that can be packed. Small cans are virtually eliminated. The Materials Division foresees elimination of hot-dip tin plate as the weight of coating cannot be controlled closely. Several companies are installing electrolytic coating lines. Minimum coating of 0.70-pound plate is regarded as sufficient for most products. Recent restriction to 1.25 pounds allowed a variation from 0.70 to 1.50 pounds per base box. Electrolytic coatings can be held to close figures. Complete control of tin-bearing scrap is expected to be announced soon, under a plan similar to that governing copper, copper-bearing and aluminum scrap.

Can manufacturers have been advised that Army and Navy orders must be filled first.

Structural Shapes

Structural Shape Prices, Page 121

Structural steel awards bearing high priorities show an increase, though most are for comparatively small lots. Practically all are related to the war program. Most fabricators show little interest in priorities below A-4 as deliveries are uncertain.

Smaller shops are doing a good business in miscellaneous small projects, many requiring a minimum of fabrication. Inventories of light plain material to meet this demand are better than a few months ago, due to some deliveries on orders placed many weeks ago. Structural steel work requiring plates must have rating of A-1-j or better to insure deliveries of plates to maintain schedules with other steel construction materials.

SHAPE CONTRACTS PLACED

8000 to 10,000 tons, aluminum plant, Spokane, Wash., L. H. Hoffman contractor; award reported placed with Bethlehem Steel Co., Seattle.

2666 tons, two warehouses, Ogden, Utah, to Kansas City Structural Steel Co., Kansas City, Kans.; James I. Barnes, Santa Monica, Calif., contractor; bids Jan. 23.

2500 tons, aluminum plant, Tacoma, Wash., to Virginia Bridge Co., Norfolk, Va.

2500 tons, foundry and office building, Auto Specialties Mfg. Co., St. Joseph, Mich., to Indiana Bridge Co. Inc., Muncie, Ind.

1280 tons, hangar, Floyd Bennett Field, New York, to Dreier Structural Steel Co. Inc., New York, through White Construction Co. and Underpinning & Foundation Co., New York, joint contractors.

300 tons, valve building, Crane Co., Chicago, to Wendnagel & Co., Chicago; J. Emil Anderson & Son., Chicago, contractor; bids Feb. 5.

700 tons, Bethlehem-Lebanon Forge Co.,

SHAPE AWARDS COMPARED

	Tons
Week ended Feb. 14	18,856
Week ended Feb. 7	41,905
Week ended Jan. 31	13,055
This week, 1941	21,129
Weekly average, 1942	24,651
Weekly average, 1941	27,373
Weekly average, Jan., 1942	21,786
Total, 1941	255,780
Total, 1942	147,904

Includes awards of 100 tons or more.

to Bethlehem Steel Co., through J. H. Wickersham, Lancaster, Pa.

450 tons, building, Northwest Magnesite Co., Cape May, N. J., to unstated fabricator.

260 tons, viaduct W326-3, Iowa Falls, Iowa, for Illinois Central Railroad, to American Bridge Co., Pittsburgh; bids Feb. 3.

200 tons, plant addition, Foote Bros. Gear & Machine Corp., Chicago, to Rock Island Bridge & Iron Works, Rock Island, Ill.; A. L. Jackson Co., Chicago, contractor.

Unstated, Bradford Island cable crossing, Columbia river, for Bonneville Project, Tower Sales & Erecting Co., Portland, award, $64,858.

SHAPE CONTRACTS PENDING

2531 tons, plant, Amertorp Corp., Forest Park, Ill.; R. C. Wieboldt Co., Chicago, contractor; bids Feb. 11.

1200 tons, buildings for Republic Steel Corp., Port Henry, N. Y.

1200 tons, power house, Atlantic Utilities Service Corp., Johnson City, N. Y.

1000 tons, plant, Ladish Drop Forge Co., Milwaukee; Klug & Smith Co., Milwaukee, contractor; bids Feb. 4.

1000 tons or over, boiler and turbine house, Republic Steel Corp., at Youngstown, O.; bids Feb. 17.

350 tons, underground loop, Fourteenth street, Washington; bids Feb. 17.

200 tons, additional building 210, Springfield, Mass., armory.

180 tons, manufacturing building, Salisbury, Md.

175 tons, powerhouse at naval station in East.

155 tons, I-beam underpass bridge, Erie county, Pennsylvania; bids to state highway department, Harrisburg, Pa., Feb. 20.

100 tons, towers, Spec. 1608D, Odair, Wash., for Department of Interior; bids to Denver, Feb. 18.

Unstated, steel towers Willamette river crossing; bids to Bonneville Project, Portland, Feb. 16.

Unstated, Bonneville-Midway transmission line, for Bonneville Project, Portland; Fritz Ziebarth, Vancouver, Wash., sole bidder, $719,037.

Unstated, towers 440 feet high, for proposed Walker Island, Columbia river, transmission tower crossing; bids to Bonneville Project, Portland, Oreg., soon.

Reinforcing Bars

Reinforcing Bar Prices, Page 121

Reinforcing steel requirements are lower in general, although a number of long-pending jobs reached maturity at about the same time last week, involving considerable tonnage. Practically all current requirements are for war production plants or related needs and carry high priority ratings. For reasonably prompt delivery A-4 or better rating is usually necessary, although under some conditions ratings of A-8 or A-9 can be handled.

CONCRETE BARS COMPARED

	Tons
Week ended Feb. 14	6,813
Week ended Feb. 7	1,500
Week ended Jan. 31	13,891
This week, 1941	6,238
Weekly average, 1942	8,981
Weekly average, 1941	13,609
Weekly average, Jan., 1942	11,394
Total, 1941	65,962
Total, 1942	53,888

Includes awards of 100 tons or more.

REINFORCING STEEL AWARDS

3850 tons, Bureau of Reclamation, Invitation D-38,212-A-7, Odair, Wash., placed with Inland Steel Co., Chicago, Republic Steel Corp., Cleveland, Great Lakes Steel Corp., Bethlehem Steel Co., Colorado Fuel & Iron Co. and Carnegie-Illinois Steel Corp.

1288 tons, housing project No. Ill. 2-2S, Chicago, for Chicago Housing Authority, to Truscon Steel Co., Youngstown, O.; Patrick Warren Construction Co., Chicago, contractor; bids Dec. 30.

625 tons, State street subway, Con. S-8B, Chicago, for city, to Ceco Steel Products Corp., Chicago; Thomas McQueen Co., Chicago, contractor; bids Jan. 29.

300 tons, manufacturing building, Lester, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

200 tons defense projects, to Bethlehem Steel Co., Seattle.

125 tons, factory addition, Miehle Printing Press & Mfg. Co., Chicago, to Joseph T. Ryerson & Son Inc., Chicago; Niestadt & Love Co., Chicago, engineers.

125 tons, plant addition, Foote Bros. Gear & Machine Corp., Chicago, to Truscon Steel Co., Youngstown, O.; A. L. Jackson Co., Chicago, contractor.

100 tons, defense projects, to Northwest Steel Rolling Mills, Seattle.

100 tons, Thurlo Acres war housing project, Chester, Pa., Compton Construc-

tion Co., New York, general contractor.

100 tons, addition, Chain Belt Co., Milwaukee, to Youngstown Sheet & Tube Co., Youngstown, O., through Worden-Allen Co., Milwaukee; Klug & Smith Co., Milwaukee, contractor.

REINFORCING STEEL PENDING

3000 tons, aluminum plant, Spokane, Wash.; L. H. Hoffman, Portland, contractor; award soon.

2100 tons, army cantonment, for War Department; general contracts awarded as follows: Sec. A-3, 300 tons, to Consolidated Construction Co., Chicago; Sec. A-4, 205 tons, to O'Driscoll & Grove Inc., New York; Div. E, sewage treatment plant 400-500 tons, to Birmingham Contracting Co., Birmingham, Mich.; bids on Sec. A-1, 500 tons, and Sec. A-2, 555 tons, thrown out.

1255 tons, Bureau of Reclamation, Invitation B-33,075-A, Coram, Calif.; bids opened.

1000 tons, ordnance works, for E. I. du-Pont de Nemours & Co.; this tonnage only part of total.

700 tons, aluminum plant, Tacoma, Wash.; award soon.

300 tons, bridge No. 10, War Department, building-road network, Arlington county, Va.; bids Feb. 20, Federal Works Agency, Public Roads Administration, Washington.

Pig Iron

Pig Iron Prices, Page 122

Pig iron allocations continue close to preceding months, with higher priority ratings on the increase. Steel and malleable foundries are well booked on war production but gray iron foundries are not as well situated and are receiving less iron. As a result these melters are seeking war contracts to keep up production. In general the situation is becoming tighter.

War Production Board is making an effort to minimize interruption of pig iron production by furnace idleness for relining. Blast furnace operators have been asked to schedule such repairs well in advance and to procure repair materials under special high-rated priorities. The effort is to prevent too many stacks being out at one time. Scheduling of repairs for all of 1942 is asked, to assist in planning future allocation of pig iron.

Requests for March allocations are slightly heavier, mainly for consumers who have been operating on a month-to-month basis. Numerous melters who have not received shipments on the mandatory distribution order have not yet asked tonnage, but a few have requested some small lots. A number of these large consumers are still operating on inventory in hand when allocations were instituted and these will ask monthly quotas when present stocks are exhausted. Providing for these users, in addition to tonnage now being distributed, will complicate the situation materially.

New England melters are apprehensive of the situation when Mystic furnace blows out, probably during second quarter, for relining, after the longest sustained blast in years. Provision has been made for quick return to blast and efforts have been made to build some reserve to help fill the gap.

Scrap

Scrap Prices, Page 124

Office of Price Administration has announced five revisions of Schedule No. 4, clarifying regulations, effective Feb. 9. The maximum shipping point price for No. 1 heavy melting steel within the Boston switching district is $15.05 per gross ton, f.o.b. cars or f.a.s. vessel, or loaded aboard truck, when so delivered. Unprepared scrap excludes objects requiring dismantling, such as bridges, box cars and graveyard automobiles. These must be priced to permit prepared scrap to be delivered to consumer within maximum delivered price. Where delivery is solely by motor vehicle other than a public carrier, transportation charge that may be added to the shipping point price need not fall below $1 per ton, instead of $1.50 formerly provided. Former provision allowing purchase by consumers of unprepared remote scrap and designating a dealer to prepare it at a minimum of $2.50 per gross ton, is revised to limit it to rail carload lot purchases.

Maximum price for bundles containing tin-coated material is to be determined by percentage of the

coated material in the bundle. Those containing not over 50 per cent are priced at $5 per gross ton under basic open-hearth grades; those over 50 per cent at $8 under.

Effort to increase available volume of steelmaking scrap is leading to increased use of baled tin cans in the open hearth. Great Lakes Steel Co., Detroit, is accepting one car of baled tin cans with two cars of clean baled sheets, the former at a differential of $2 under the latter. When used with other scrap the tin content of the steel is kept down to 0.10 per cent, which is considered the maximum to avoid rolling difficulties. Scrap balers are handling increasing tonnage of cans and this grade of scrap is assuming increased importance. Research is being carried on to determine its availability.

Cincinnati is about to remove 1600 to 1800 tons of abandoned street railway rails and about 1000 tons will be recovered from nearby Kentucky communities.

Allocations are on the increase and indicate more melters feel the pinch. So far allocations have been to companies whose war production is threatened. others not being helped. Scrap from automobile graveyards has not appeared in sufficient quantities to help the situation appreciably, though renewed efforts are being made to loosen the tonnage. Magnetic separation of steel and iron from slag dumps is being resorted to and is yielding some return. Bureau of Mines has asked all mining companies to collect and sell all old metal material in their mines, thousands of tons of which are believed to be available for scrap.

Pacific Coast

Seattle—Defense plant projects feature the situation, calling for major tonnages of shapes, reinforcing bars and machinery. John L. Young, project manager for an aluminum sheet rolling mill, reports United Engineering & Foundry Co., Pittsburgh, will design, build and install the machinery, estimated to total 1200 carloads. The plant buildings will cover more than 50 acres. Equipment will include 36 main giant cranes. Completion is planned by October. L. H. Hoffman, Portland, Oreg., has the general contract. While plans are not yet completed it is reported between 8000 and 10,000 tons of shapes and 3000 tons reinforcing will be required.

Earl Nixon, Oregon state geological director, has recommended construction of chromite concentration plants at Grants Pass and in Grant county, similar to the $300,000 unit now under construction by the Kromite Corp., which has a three-year contract to supply the government 30,000 tons annually.

For a proposed aluminum plant, 2500 tons of shapes is reported placed with Virginia Bridge Co., Norfolk, Va., while 700 tons of reinforcing for the same project is awaiting placement. Isaacson Iron Works, Seattle, will erect 3500 tons involved in a navy project, steel awarded to Columbia Steel Co. Fritz Ziebarth, Vancouver, Wash., is the sole bidder at $719,037, to the Bonneville Project for Bonneville-Midway transmission line, tonnage of

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%	1.60
Do., 5 to 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, 1% vanadium	13.50
Turnings, millings, same basis	11.50

Mixed Scrap
(Molybdenum and Tungsten Types)

Solid scrap, each 1% contained tungsten	1.60
Solid scrap, each 1% molybdenum	.80
Millings, turnings, each 1% tungsten	1.40
Millings, turnings, each 1% molybdenum	.70

steel towers unstated. Same agency has awarded the Bradford Island crossing to Tower Sales & Erecting Co., Portland, Oreg., tonnage unstated, and sizeable tonnages are involved in the Willamette river crossing and the Walker Island project, bids soon. Local plants have backlogs which have taken them out of the current market.

Reports from Salt Lake City state that Defense Plant Corp. has taken a site and plans erection of a $3,000,000 alumina plant to be operated by the Olin Corp., production to be shipped to an aluminum plant now under construction.

The scrap situation is becoming increasingly acute. While rolling mills have ample inventories for present needs, receipts continue less than consumption and shortages are expected. Dealers complain that present ceilings do not permit them a reasonable profit. Washington Toll Bridge Authority has sold 1000 tons of scrap from the Narrows bridge and a quantity of steel cables and girders. Additional tonnages await sale. Seattle has completed negotiations to furnish the government 16,000 tons of street car rails, WPA agreeing to dismantle trackage and repair streets.

San Francisco—Demand, generally, continues strong with most inquiries confined to national defense projects. The reinforcing steel bar market was the most active and 6096 tons were placed, bringing the aggregate to date to 12,223 tons, compared with only 9015 tons for the corresponding period in 1941. The Bureau of Reclamation awarded, on various schedules, 3850 tons for delivery at Odair, Wash., distributed among Inland Steel Co., Carnegie-Illinois Steel Corp., Bethlehem Steel Co., Colorado Fuel & Iron Corp., Republic Steel Corp. and Great Lakes Steel Corp. The Bureau of Reclamation has taken bids on 1255 tons for delivery at Coram, Calif.

No large inquiries for cast iron pipe for municipalities have come into the market for figures. Awards totaled 716 tons and brought the aggregate for the year to 949 tons, compared with 4871 tons for the same period a year ago. United States Pipe & Foundry Co. booked 473 tons and Pacific States Cast Iron Pipe Co. 243 tons for Defense Public Works in California.

Practically all plate business is going into ship construction and tank projects. Darby Products & Steel Plate Co. booked 200 tons for a 500,000-gallon elevated tank for an airfield in New Mexico. So far this year 821,981 tons have been booked, compared with 206,541 tons for the corresponding period in 1941.

While a number of large inquiries for structurals are pending, awards were light. To date this year 260,157 tons have been placed, compared with 118,217 tons for the same period last year. Bids have been taken on 3250 tons for a floating drydock in Washington and on 2000 tons for a navy shop building. Pending business includes 800 tons for a shop extension at Seattle for the Pacific Car & Foundry Co.

Movement of steel products by water has practically ceased and all material must be moved by rail. Only products actually produced on the Pacific Coast are quoted under Pacific Coast ports. Consumers now do not know what the delivered price will be until they receive an invoice from the mill that makes the shipment.

Canada

Toronto, Ont.—With the government practically commandeering all output of iron and steel produced in Canada for the war program, supplies to civilian manufacturers have been largely eliminated. Even some branches of war industry are faced with steel shortage. Wire and wire products, which up to a couple of weeks ago were understood to be fairly plentiful now are hard to get and some large producers are unable to fill pressing orders, due to shortage of wire rods. In the heavier lines of steel, war production is taking approximately 90 per cent of production and an additional 2,000,000 tons will be required before the end of this year to feed the war industry.

The United States has been Can-

ada's resource in supplying steel not available in this country. Canada's primary steel industry is operating at capacity, now well above what formerly was considered rated capacity, and will continue to do so as long as scrap and other raw materials are available.

With the change in enemy war tactics that has drawn numerous submarines to this side of the Atlantic and resulted in the sinking of a large number of vessels in recent weeks, C. D. Howe, minister of munitions and supply, announced that Canada has changed its ship production program. Building of war ships will be placed in abeyance and most of the Dominion's shipyards are to concentrate on merchant ships. Already orders have been placed that will keep all Canadian yards at capacity for the next couple of years. Large additions are being made to shipbuilding plants and other orders for ship construction are pending. With all Canadian output of plates already going for ship construction, tank building and other essential war production, new arrangements have been made in the United States for speeding deliveries of plates to this country and demand continues to exceed supply. Sheets also are in specially heavy demand with practically no supply available for other than war industry.

In structural steel demand is developing on a broadening scale despite the fact that civilian construction is barred. Building of new war projects is getting into full swing and plans are under way which will involve war plant construction, largely financed by the government, involving outlay of upwards of $75,000,000. These undertakings alone will require about 25,000 tons of steel. Lettings during the past week totaled close to 10,000 tons.

Merchant pig iron demand continues to mount, with more pressure on blast furnace operators to speed deliveries to foundries and other consumers to offset shortage of cast scrap, which has practically disappeared from the market. Foundry and malleable iron sales rose to better than 9000 tons for the week, while demand was more pronounced in basic iron.

Iron Ore

Iron Ore Prices, Page 123

Reduction of $2 in the ocean freight rate from India has resulted in a drop in the nominal price of 50 per cent Indian manganese ore, from a range of 68-70 cents per unit, before duty, to 66 cents. This follows recently noted revision in Brazilian and South African manganese ore as a result of the reduction of $1.50 in the Brazilian freight rate and $2 in the South African rate. The reductions were made at the request of the United States Maritime Commission and will be subject to review later. Reduction in the Cuban and Chilean rates is said to be under consideration.

Steel in Europe

Foreign Steel Prices, Page 123

London—(*By Cable*)—Steel and iron production trend in Great Britain continues, with expanding demand for plates and special steels for armaments. Sheet mills are busy, with galvanized sheet production officially restricted. Tin plate mills are well engaged, with oil plate, which is the only grade released for export. Coke price has been advanced 9d.

Nonferrous Metals

New York—Plans for increased production have changed frequently since outbreak of war in Europe and are now on the basis of maximum prices for bulk of the output and premiums for the balance. Under the new plan consumers are assured of a steady raw material price and producers are assured an equable price for their output.

Copper—OPA has issued amendment No. 4 to price schedule No. 20 establishing maximum prices for red metal scrap, effective Feb. 27.

Lead—Many small miners who cannot operate with a 6.50-cent refined lead price or whose operations are limited, as well as large miners, have been asked to go ahead with plans to increase production even though OPA quotas for the pre-

Nonferrous Metal Prices

Feb.	Copper Electro, del. Conn.	Copper Lake, del. Midwest	Copper Casting, refinery	Straits Tin, New York Spot	Straits Tin, New York Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
1-13	12.00	12.12½	11.75	52.00	52.00	6.50	6.35	8.25	15.00	14.00	35.00

F.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	9.75
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	9.25
Cleveland	9.00
Chicago	9.00
St. Louis	9.00

Heavy Copper and Wire

New York, No. 1	10.00
Cleveland, No. 1	9.50-10.00
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	7.50-8.00
Chicago	8.00
St. Louis	8.00

Light Brass

Cleveland	5.75
Chicago	5.75
St. Louis	5.75

Lead

New York	5.25-5.60
Cleveland	5.40-5.50
Chicago	5.25-5.60
St. Louis	5.25-5.35

Old Zinc

New York	5.00-5.25
Cleveland	5.25-5.50
St. Louis	4.50-5.00

Aluminum

Old castings	10.50
Segregated borings	8.50
Old sheet	10.50
Clips, pure	9.50

SECONDARY METALS

Brass ingot, 85-5-5-5, l.c.l	13.25
Standard No. 12 aluminum	14.50

mium price of 9.25c have not been prepared.

Zinc—E. V. Gent, secretary of American Zinc Institute, estimates supply at 1,000,000 tons in 1942 and 1,074,000 in 1943 with further expansion contemplated. Mr. Gent estimates that supplies will be more than sufficient for war needs this year.

Tin—Consumption has been reduced drastically following reverses by the United Nations in the Far East. Plans for the Texas City, Tex., smelter have been revised to provide a capacity of 52,000 tons of metal annually compared with the original plan for 18,000-ton capacity.

DIED:

■ **William Irving Dithridge,** 74, retired executive of the former Carnegie Steel Co., at his home in Sewickley, Pa., recently. Until his retirement in 1937 he was cashier and assistant treasurer of the Carnegie company.

♦

W. Woodard Williams, California representative of Babcock & Wilcox Co. and Pittsburgh Crucible Division, Crucible Steel Co. of America, in Los Angeles, Feb. 10. Mr. Williams formerly had been general manager of Babcock & Wilcox, and at one time was associated with Reading Iron Co., Bourne Fuller Co. and Pittsburgh Gauge & Supply Co.

♦

Harlow Dow Savage, 61, first president of Refractories Manufacturers Association, Feb. 9, in White Plains, N. Y. He is said to have designed and installed the first completely electrified refractory plant in the world, at Ashland, Ky. Mr. Savage had served in various executive capacities with numerous companies including Ashland Firebrick Co., Ashland, Ky.; Combustion Engineering Corp., New York, now Combustion Engineering Co. Inc.; Coshocton Iron Works, Monongahela, Pa.; Dry Quenching Equipment Corp., New York; and Hedges-Walsh-Weidner Co., Chattanooga, Tenn.

♦

George E. Howard, 84, retired vice president and sales manager, Commonwealth Steel Corp., now the General Steel Castings Corp., Granite City, Ill., at his home in St. Louis, recently.

♦

Walter Davidson, 65, president and general manager and one of the founders, Harley-Davidson Motor Co., Milwaukee, Feb. 7.

Leads Scrap Program

■ Leonard G. Feldman, correspondent for STEEL, at Buffalo, recently conducted a roundtable discussion on the scrap industry over radio

station WGR. Other participants were Daniel A. Roblin, chairman of the Buffalo salvaging committee, recently appointed by Governor Lehman as a member of the state salvaging committee, and Max Pressler, president of the Western New York chapter of the Institute of Scrap Iron and Steel Inc. Purpose was to inform the public of the importance of scrap, arouse interest in its collection, from patriotic motives.

Vanadium Output To Be Nearly Doubled in 1942

■ Production of vanadium in the western Colorado-eastern Utah area will be nearly doubled in 1942, according to the United States Geological Survey. Increases will result from completion of two new mills, a 200-ton mill being constructed at Rifle, Colo., by United States Vanadium Corp., and a 100-ton mill a Monticello, Utah, by the Vanadium Corp. of America.

Steel Corp. Shipments Set January Record

■ Finished steel shipments by the United States Steel Corp. in January totaled 1,738,893 net tons, establishing a record for that month but falling 107,143 tons below 1,846,036 tons in December. Shipments were 56,439 tons greater than 1,682,454 tons in January, 1940.

(Inter-company shipments not included)

Net Tons

	1942	1941	1940	1939
Jan.	1,738,893	1,682,454	1,145,592	870,866
Feb.	.....	1,548,451	1,009,256	747,427
Mar.	.....	1,720,366	931,905	845,108
Apr.	.....	1,687,674	907,904	771,752
May	.....	1,745,295	1,084,057	795,689
June	.....	1,668,637	1,209,684	807,562
July	.....	1,666,667	1,296,887	745,364
Aug.	.....	1,753,665	1,455,604	885,636
Sept.	.....	1,664,227	1,392,838	1,086,683
Oct.	.....	1,851,279	1,572,408	1,345,855
Nov.	.....	1,624,186	1,425,352	1,406,205
Dec.	.....	1,846,036	1,544,623	1,443,969
Total, by Mos.	.....	20,458,937	14,976,110	11,752,116
Adjustment	.....	.....	†37,639	*44,865
Total	.....	.....	15,013,749	11,707,251

†Increase. *Decrease.

Britain's Steel City Greets Russian Ally

LONDON

■ A stainless steel casket designed by a Sheffield craftswoman, containing greetings from Britain's greatest steel city to Stalingrad (steel city) has been sent to the latter as a gesture of friendship.

The message pledges the British city to play its part in achieving a maximum output and to insure the fullest use of its resources to speed the victory over Hitlerite Germany. Thousands of Sheffield signatures, from bishops to steel workmen, were appended to the message. The casket was produced under the auspices of Sheffield's Anglo-Soviet Union, whose object is friendship between the two nations. It bears the city's arms, flanked by the British lion and the Soviet hammer and sickle, in silver and enamel, with inscriptions in English and Russian.

Doehler Die Casting Awarded Navy Pennant

■ Doehler Die Casting Co., New York, has received the Navy "E" pennant and Bureau of Ordnance flag in recognition of its production of ordnance material for the Navy. It is reported to be the first company in the die casting industry to be so honored.

Presentation took place Feb. 15 in

the Civic Auditorium, Toledo, O., at a gathering of employes, company officials and Navy representatives. The firm recently perfected a "no strike" plan for the duration. At present the company is producing more than 1500 items for the Navy, Army and Air Corps.

Construction and Enterprise

Michigan

BATTLE CREEK, MICH.—Bids will be opened Feb. 23 or 24 for construction of sludge filter and dryer building, part of the $302,000 FWA project to expand facilities and capacity of sewage treatment works.

DETROIT—Vickers Inc., 1400 Oakman boulevard, has awarded general contract to Turner Construction Co., New York, for factory building to be erected on Eight Mile road, estimated to cost $3,500,000. Austin Co., Detroit, architects and engineers.

DETROIT—American Mouldings & Mfg. Co. has been organized to manufacture plastic mouldings. Correspondent Henry T. Holmes, 1628 Union Guardian building.

DETROIT — Atlas Engineering Co., 11725 Strathmore, is having plans prepared by Paul R. Sewell, Detroit architect, for factory addition.

DETROIT—Arrow Tool & Reamer Co., 422 North Livernois, has awarded contract to A. W. Kutsche & Co., 2111 Woodward avenue, for manufacturing plant on Eight Mile road. Paul R. Sewell, architect.

DETROIT—Michigan Tool Co., 7171 East McNichols street, will build a 180 x 281-foot factory at Eight Mile road and Reid highway. Reid M. Freier, Detroit, architect.

DETROIT—Wheel Trueing Tool Co., 13931 Oakland avenue, has let contract to Henry M. Martens Co., Detroit, for an addition to its factory.

GRAND RAPIDS, MICH.—H. D. Ilgenfritz, 468 Prentis, has completed plans for 300 x 900 foot plant to be erected at Wyoming Park here for Extruded Metals Inc., Belding, Mich. (Noted Nov. 17).

MONTAGUE, MICH.—Michigan Public Service Co., 148 East Front street, Traverse City, Mich., will erect 2000-horsepower diesel power plant here. Cost $200,000.

MORENCI, MICH. — Parker Rust-Proof Co., 2177 East Milwaukee, Detroit, has awarded general contract to R. E. Dailey & Co., Detroit, for construction of manufacturing building here, to cost $120,000. Smith, Hinchman & Grylls, 800 Marquette building, Detroit, architects.

MUSKEGON HEIGHTS, MICH.—C. W. C. Crankshaft Corp., care of Campbell, Wyant & Cannon Foundry Co., Muskegon Heights, has been organized to do manufacturing business. Correspondent: Clint G. Dederick, 208 South LaSalle street, Chicago.

SAGINAW, MICH.—Frantz & Spence, architects, Saginaw, are preparing plans for machine shop addition here for Wickes Bros.

ST. JOSEPH, MICH.—Lambert Brake Corp. has been incorporated with $5000 capital to manufacture brakes for tractors. Correspondent J. W. Tiscernia, St. Joseph.

ST. JOSEPH, MICH.—Auto Specialties Mfg. Co., St. Joseph, has plans by Giffels & Vallet, 1000 Marquette building, Detroit, for one-story 250 x 500-foot factory, 60 x 140-foot office building and steel transformer station. Cost about $1,000,000.

Connecticut

WEST HARTFORD, CONN.—Pratt & Whitney Division, Niles-Bement-Pond Co., has let contract for factory extension to Wadhams, May & Carey Co., 15 Lewis street, Hartford. Cost over $40,000. Albert Kahn Inc., 345 New Center building, Detroit, engineer.

Massachusetts

SPRINGFIELD, MASS.—Van Norman Machine Tool Co., 3640 Main street, has plans completed and will soon let contract for one-story 60 x 300-foot factory addition. Cost estimated at $70,000.

WESTFIELD, MASS.—American Abrasive Co. will erect one-story 40 x 42 foot machine shop. M. B. Harding, 6 Main street, architect.

WORCESTER, MASS.—Johnson Steel & Wire Co., 53 Wiser avenue, will build one and three-story 30 x 68 x 284-foot factory addition. Estimated cost $45,000.

New York

BROOKLYN, N. Y.—Department of Public Works, Municipal building, New York, plans constructing Newton Creek

sewage treatment plant. Cost $6,600,000.

NEW YORK—Department of Hospitals, 125 Worth street, plans power plant expansion at Fordham hospital, Bronx Boro. Cost $825,000.

New Jersey

CAPE MAY, N. J.—Northwest Magnesite Co., Farmers Bank building, Pittsburgh, has let contract for design and construction of one-story 200 x 300-foot and three 3-story 50 x 60-foot buildings; also one-story power plant, to MacDonald Engineering Co., 1 North LaSalle street, Chicago. Estimated cost $1,000,000.

ELIZABETH, N. J.—American Gas Accumulator Co., 1029 Newark avenue, has awarded contract for one-story 80 x 100-foot factory addition to Wilhelms Construction Co., 119 Division street. Cost $40,000. R. Kruger, 11 Hill street, Newark, architect.

HARRISON, N. J.—Hyatt Bearing Division, General Motors Corp., 427 Middlesex street, plans one-story 200 x 300-foot roller bearing manufacturing plant.

JERSEY CITY, N. J.—Public Service Electric & Gas Co., 80 Park place, Newark, N. J., will erect boiler house and install boilers at cost of over $40,000.

Ohio

BELLAIRE, O.—Ohio Public Service Co., Hanna building, Cleveland, will build power plant here, including unloading docks and pump house. Estimated cost between $7,000,000 and $8,000,000.

CLEVELAND—Cleveland Diesel Engine Division of General Motors Corp., 2160 West 106th street, George D. Corrington, general manager, will soon start erection of plant near West Seventy-third street, south of Denison avenue.

CLEVELAND—Aluminum Corp. of America, Allen B. Norton, manager of casting division, 2200 Harvard avenue, is planning two additions totaling 22,000 square feet of floor space.

CLEVELAND—City, Division of Water and Heat, Department of Public Utilities, John A. Hickey, director, will take bids Feb. 20, for one truck-type crane complete with tools, accessories and auxiliary equipment.

CLEVELAND—Standard Alloy Co. Inc., H. M. Smith, president and treasurer, and Paul G. Lutz, general manager, plans expansion of facilities, if adequate supply of chromium can be assured by government.

CLEVELAND—American Fork & Hoe Co., 1910 Keith building, will install special machinery and start production soon in 50,000-square foot building on State road, Ashtabula, O., recently completed by Ashtabula Industrial Corp.

CLEVELAND—E. F. Hoffman Pattern Works, Edward F. Hoffman, 2539 East Seventy-ninth street, is adding 2400-square foot pattern shop at 7302 Woodland ave.

ROSCOE, O.—Village, Arthur D. Howe, clerk, will take new bids soon for pumps and pump house. Advertisement for bids Feb. 10 has been withdrawn.

Pennsylvania

NEW BRIGHTON, PA.—Wm. Leard Co., Wm. Leard Jr., president, Fifth avenue and Sixteenth street, plans one-story 100 x 400-foot factory, to cost $400,000. M. Baker Jr., 122 Penn Beaver Hotel, Rochester, Pa., engineer.

Illinois

CHICAGO—Hubbard Oven Co., 1134 West Belden avenue, sustained severe damage by fire Feb. 8 to its two-story plant.

CHICAGO — Arrow Tools Co., 514 South Laflin street, has let contract for one-story 120 x 140-foot factory at 1870 Kostner avenue to Patterson & Hartrich, 105 West Adams street. Cost $50,000. L. E. Russell, 105 West Adams street, architect.

CHICAGO—Diamond T. Motor Co., 4517 West Twenty-sixth street, will erect one and two-story 200 x 500-foot plant addition, and has let contract to J. W. Snyder Co., 307 North Michigan avenue. Estimated cost $325,000. Armstrong, Furst & Tilton, 11 South LaSalle street, architects.

CHICAGO—Oak Mfg. Co., 1256 North Clybourn avenue, has awarded contract to W. H. Lyman Construction Co., 140 South Dearborn street, for three-story 50 x 240-foot factory addition. Estimated cost $175,000. L. A. Bailey, 1100 North Dearborn street, engineer.

CHICAGO—Metro Tool & Gage Co., 564 West Randolph street, has acquired a site of several acres on which it will erect a 50,000-square foot building.

Indiana

AUBURN, IND.—Rieke Metal Products Co., G. Rieke, vice president, is considering plant addition to cost about $40,000.

WINCHESTER, IND. — Overmyer Mould Co. will construct plant to cost $40,000 or more, with equipment.

Tennessee

MEDINA, TENN.—Improvements to waterworks system and construction of sanitary sewage system have been ap-

proved by President Roosevelt. Estimated cost $88,000.

Georgia

ATLANTA, GA.—City, Mayor LeCraw, Atlanta, and Mayor L. M. Blair, Marietta, are interested in a $1,000,000 extension of Atlanta waterworks to supply Marietta and a proposed manufacturing plant.

HOGANSVILLE, GA.—United States Rubber Co., H. Gordon Smith, general manager, New York, plans erection of factory here for manufacture of asbestos yarns and fabrics.

SAVANNAH, GA.—Frederic R. Harris, 27 William street, New York, consulting engineer, is preparing plans and bids will be taken from his office for expansion program of Savannah Machine & Foundry Co., Shipbuilding Division, P. O. Box 590, Savannah.

Louisiana

PATTERSON, LA.—Town voted $30,000 bonds for improvement and extension to waterworks and erection of filter plant. WPA will supply $24,000.

RUSTON, LA.—Attapulgus Clay Co., C. M. Schaeffer, vice president, 260 South Broad street, Philadelphia, will soon begin work on $200,000 clay plant here, costing $200,000, including machinery.

North Carolina

WILMINGTON, N. C.—City has purchased site for erection of two 750,000 gallon storage tanks. J. A. Loughlin, city engineer.

WILMINGTON, N. C.—City will take bids Feb. 26 for extension to waterworks; has DPW grant of $735,600. Total cost of project estimated at $1,226,000.

Missouri

WELLSTON, MO.—Wellston sewer district, William J. Becker, attorney, 50 South Central avenue, Clayton, Mo., will vote Feb. 25 on $395,000 bonds for sanitary and storm water sewer system.

Arkansas

CABOT, ARK.—President Roosevelt has approved construction of $42,000 sewage disposal plant.

Oklahoma

MUSKOGEE, OKLA. — City, Roger Tucker, city manager, votes Feb. 25 on $445,000 bonds as city's share of $1,000,000 waterworks improvement program.

Wisconsin

GREEN BAY, WIS.—Wisconsin Public Service Corp. will install second 30,000-kilowatt turbogenerator unit at Bayside steam plant. Estimated cost $2,780,000.

WEST ALLIS, WIS.—Universal Unit Power Shovel Corp., 6401 West Becher place, has let contract for design and construction of one-story 101 x 361 factory to Klug & Smith Co., 111 East Wisconsin avenue, Milwaukee. Cost $100,000.

Texas

ARLINGTON, TEX.—City, W. F. Altman, mayor, has plans near completion for water and sewer improvements to cost approximately $125,000. Myers & Noyes, consulting engineers, Tower Petroleum building, Dallas, Tex.

BURKBURNETT, TEX.—City, C. J. Brannon, Waggoner building, has applied for $52,600 DPW funds for waterworks and sewers. Joe E. Ward, engineer, Harvey-Snider building, Wichita Falls, Tex.

MINERAL WELLS, TEX.—City, John C. Miller, mayor, takes bids Feb. 24 for sewer extension to cost $50,000 and waterworks improvements to cost $211,000. Joe J. Rady, Majestic building, Fort Worth, Tex., and Julian Montgomery, Littlefield building, Austin, Tex., engineers.

Iowa

DAVENPORT, IOWA—Uchtorff Co., Second and Howell streets, has acquired a 30-acre tract at the foot of Howell street, for future expansion.

Utah

SALT LAKE CITY—A $3,000,000 alumina plant will be erected here to be operated by Olin Corp. Alunite will be processed and the output shipped to the Tacoma, Wash., aluminum plant. Defense Plant Corp. will finance.

California

BERKELEY, CALIF. — A. Latham, Third and Camelia streets, will erect machine shop and miscellaneous buildings at cost of about $40,000.

FRESNO, CALIF. — Southern California Edison Co. plans to construct a dam and power house on the San Joaquin river below Big Creek, at cost of between $8,000,000 and $9,000,000.

LOS ANGELES—Byron-Jackson Co.,

2301 Vernon avenue, pump manufacturer, will erect factory addition and office building to cost approximately $190,000.

LOS ANGELES—Harvey Machine Co., 6200 South Avalon boulevard, will build addition to factory, 90 x 165 feet and 38 x 86 feet, to cost about $19,500.

LOS ANGELES—Norris Stamping & Mfg. Co. will erect an addition to factory building at 5215 South Boyle avenue. Estimated cost $20,000.

PERMANENTE, CALIF. — Interests represented by H. J. Kaiser, Latham Square building, Oakland, Calif., plan magnesium plant expansion here. Estimated cost $11,000,000.

WEST LOS ANGELES, CALIF.—H. W. Houston Co., Olympic boulevard and Granville street, will soon take bids on factory addition, costing over $40,000. S. C. Lee, 1648 Wilshire boulevard, Los Angeles, architect.

Oregon

HERMISTON, OREG. — Bonds have been voted for proposed $73,000 sewer system and water system improvement, including wells, pumping equipment, chlorinating plant and distribution mains.

Washington

POMEROY, WASH. — Blue Mountain Canneries Inc., Dayton, Wash., has purchased a 20-acre site here for erection of canning plant.

VANCOUVER, WASH.—Incorporation papers have been filed for Stewart Minerals & Metals Development Corp., D. Earl Stewart, Portland, president, a holding company for proposed smelter project. Plans include an electric pig iron reduction plant to be incorporated as the Bonneville Iron & Steel Corp.

Canada

WINNIPEG, MAN.—Defense Industries Ltd., a government owned company, will build addition to chemical plant to cost about $50,000, with equipment.

HAMILTON, ONT.—Dominion Foundries & Steel Ltd., Depew street, has called bids through Prack & Prack, industrial engineers, Pigott building, for addition to machine shop and universal mill. Estimated cost, including equipment, $200,000.

ORILLIA, ONT.—Fahralloy Canada Ltd., 95 Barrie road, is considering plant addition to cost about $50,000, with equipment.

ORILLIA, ONT. — Canada Electric Castings Ltd., Barrie road, has let general contract to J. R. Carson, 62 Jarvis street, for plant addition to cost about $80,000, with equipment.

OTTAWA, ONT.—Board of control is receiving bids for supply and installation of hydraulic turbine driven pumping equipment for Queen street pumping station. W. E. MacDonald, 202 Transportation building, is waterworks engineer.

SAULT STE. MARIE, ONT.—Algoma Steel Corp. Ltd., Wilde street, has called bids for construction of cable-splicer building through S. V. McLeod, purchasing agent. Company is proceeding with general plant expansion, financed by government, to cost about $17,000,000.

ST. CATHARINES, ONT.—St. Catharines Steel Products Ltd., Vine street, has given general contract to J. R. Stork, R. R. No. 4, third unit to its plant. A. E. Nicholson, 46 Queen street, architect.

HALIFAX, N. S.—Department of Munitions and Supply, Ottawa, Ont., H. H. Turnbull, secretary, has given general contract to J. P. Porter & Sons Ltd., 1010 St. Catharine street West, Montreal, Que., for construction of berth for ship repairs at Halifax Shipyards Ltd., here, to cost about $60,000, equipment extra.

MONTREAL, QUE.—Canadian Car & Foundry Co. Ltd., 621 Craig street West, has awarded general contract to Foundation Co. of Canada Ltd., 1538 Sherbrooke street West, for plant addition to cost $125,000, equipment extra.

MONTREAL, QUE.—Canadian Marconi Co. Ltd., 2440 Trenton avenue, Mount Royal, has received bids and awards will be made soon for plant addition, to cost about $150,000, with equipment. James C. Meadowcroft, 1154 Beaver Hall square, architect.

MONTREAL, QUE.—Dominion Bridge Co. Ltd., associated with Department of Munitions and Supply, Ottawa, has started preliminary work in connection with shipbuilding plant to be erected on Montreal harbor at cost of about $2,500,000. Various plant buildings, covering an area of about 30,000 feet, include steel hull construction shop and outfitting shops. Fraser Brace Engineering Co. Ltd., 360 McGill street, has general contract.

MONTREAL, QUE.—Montreal Locomotive Works Ltd., 215 St. James street West, has started work on $100,000 plant addition. Equipment to be installed includes ten-ton electric traveling crane, 6000-pound steam hammer and five-ton pillar crane.

ALSASK, SASK. — Natural Sodium Products Ltd., Moose Jaw, Sask., has started preliminary work on plant here to cost $30,000, and equipment $40,000, including diesel engines, salt processing machinery, etc.

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1—	4" x 4" Std. flanged reducing valve from 100 lbs. to 5.	$55.00
1—	10" x 5" type 11A finished reducing valve	$125.00
1—	3" Webster pump strainer.	$7.50
1—	3" McLear pump strainer.	$7.50
1—	4" Stop Check Angle type 250 lbs.	$50.00
1—	8" Stop Check Angle type 250 lbs.	$100.00

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Lathe, Roll 42" x 20' United, M.D.
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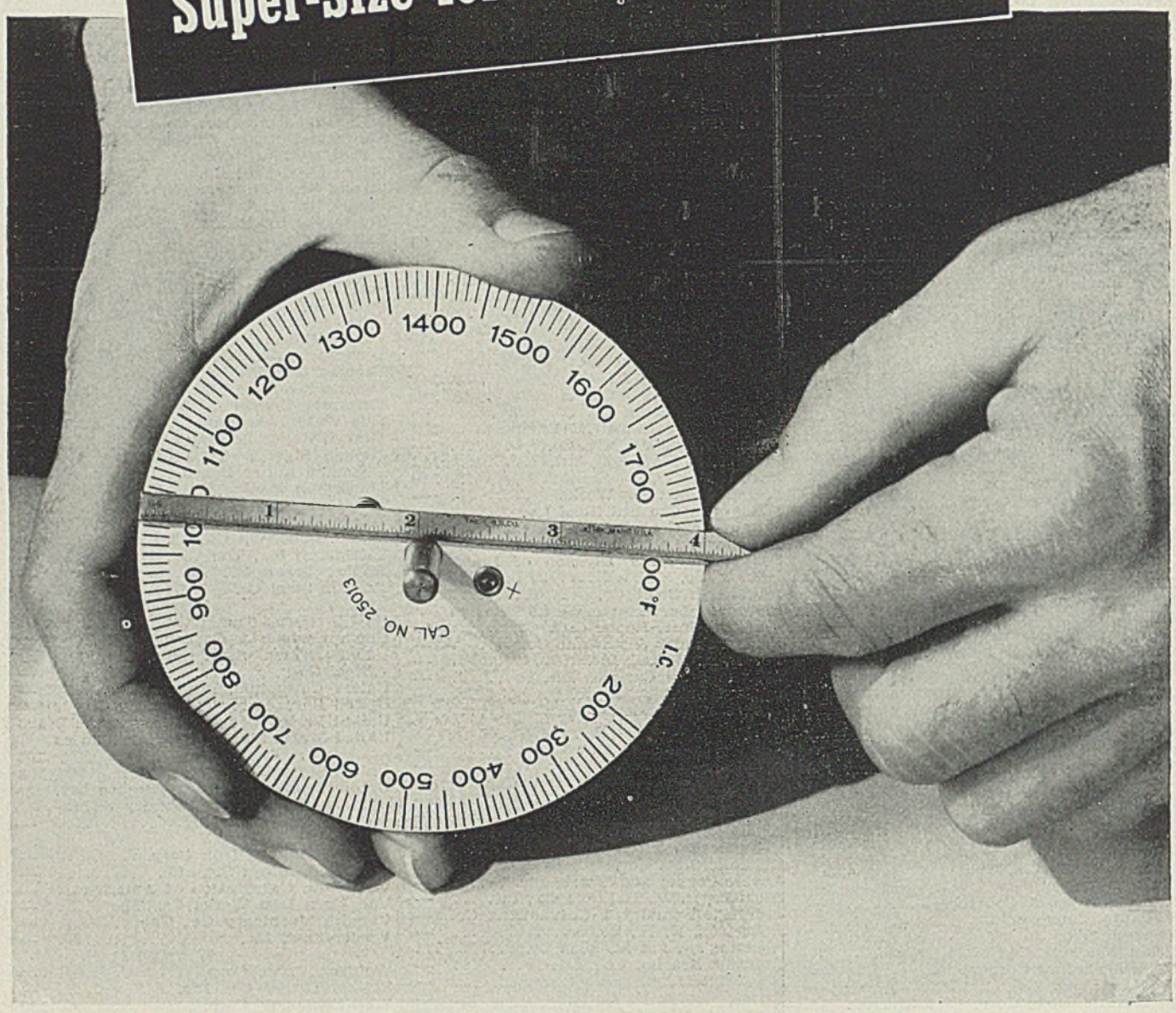

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