Discussions of war plant problems highlight of '42 Metal Congress, p. 30

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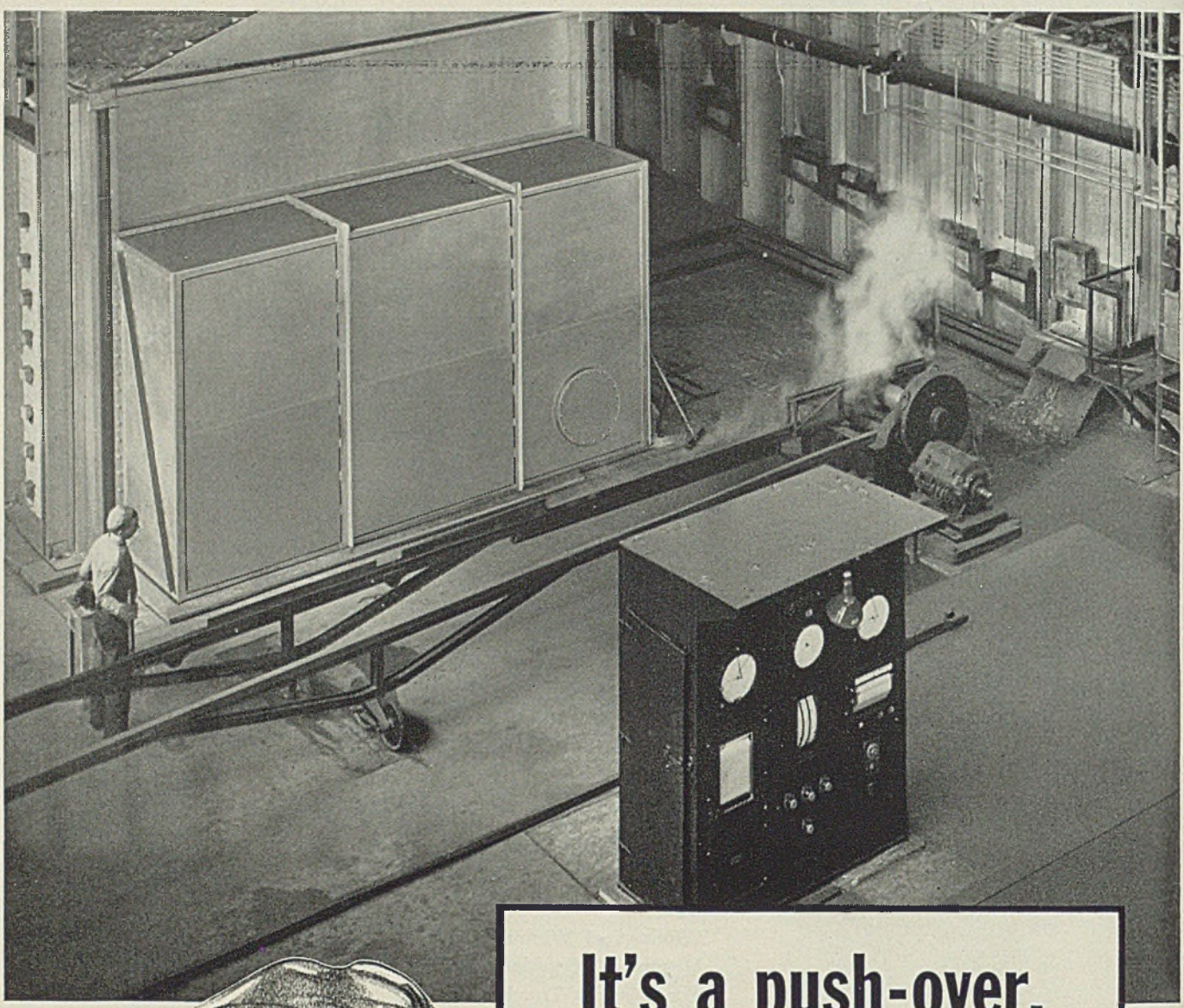


It's a push-over, Adolf!...

"Sure . . . I know you had a head start, but you never figured we'd get sore! Well, I'm good-an'-sore . . . and every 20 seconds I push out another billet that's going to keep on rolling until it lands with a bang in Berlin!"

R-106

MORGAN CONSTRUCTION COMPANY • WORCESTER, MASS.

HIGHLIGHTING

this issue of STEEL

PRODUCTION A new idea for insuring uninterrupted production took form at the plant of the National Smelting Co., Cleveland, last week when 1200 employes and officials took oath before a United States district judge and enrolled as "Production Soldiers" (p. 34). Of equal interest is the stimulating effect of a "nerve-center" at the plant of the Link-Belt Co.; this is a board with lights of different colors to denote what schedules are ahead, on time or behind. . .Encouraging in the week's news was a strong demand by a labor leader that inciters of wildcat strikes be expelled from union membership (p. 36). . .A new policy committee will advise the War Production Board on ways and means of maintaining production (p. 44).

The National Safety Council now is getting somewhere in its drive to push production by reducing the number of man-days lost as a result of industrial accidents (p. 37). Incidentally, the armed forces are solidly back of this campaign.

Steel production last week moved up half a point and now stands at 99 per cent of ingot capacity (p. 35).

INFLATION President Roosevelt's appointment of a Director of Economic Stabilization is one of his most important acts in the war to date; it places one man in supreme control of the fight against inflation (p. 42). Incidentally, his selection of James Francis Byrnes was a wise one.

Increasing adoption of industrial payroll deduction plans in order to sell more war bonds also is part of the fight against inflation and progress is being made each week (p. 51).

The Office of Price Administration continues to impose price ceilings. It has fixed a formula for ceiling prices on iron castings (p. 58). It has rolled back manganese steel castings prices to the level of Oct. 1-15, 1941 (p. 39). Ceiling prices have been set on used gas cylinders.

Maurice H. Karker, chairman of the War Department's Price Adjustment Board, urges contractors to proceed promptly in asking for reviews of their contract prices under the Contracts Renegotiation law (p. 39).

OPPORTUNITY Despite difficulties ahead due to the growing shortage of manpower, E. L. Shaner, STEEL's editor-in-chief, sees a bright side (p. 29). During the period ahead millions of workers will man war plants on a temporary basis. He urges employers to do a real job in informing these people about the full benefits we all derive from our private enterprise system. Such efforts will be well rewarded later on when these people recall what they learned in their war jobs; they will vote right.

CONSERVATION All manufacturers faced with metal finishing problems because of the shortage of metals normally in wide use for plating will do well to study the article by Dr. C. B. F. Young (p. 64) in which he analyzes the different methods of protecting and finishing metal surfaces solely through the employment of heat and of chemical treatments. This article is Section VI in STEEL's series on conservation of and substitution for critical materials in ordnance production.

Of equal importance is Charles M. Parker's discussion of the National Emergency steels (p. 66). He points out that reports based on "single-heat" test results may be more accurate than the term implies. Included is a long table of successful NE steel applications, as well as information on the standard end-quench hardenability test.

Several installations now are making commercial use of the new Kolene-Flometal method of coating rolled steel and castings with lead (p. 48).

The National Metal Congress and Exposition last week did a yeoman's job in enabling many manufacturers to get information having to do with the effective use of our metallics in prosecuting the war production program (p. 30).

A serious shortage of high-grade iron ore suitable for use in open-hearth furnaces looms ahead and it is apparent that this will require control through an allocations system still to be set up (p. 40).

WPB's recent directive aimed at conserving critical metals used in making high-speed tool steels is clarified (p. 39).

TECHNICAL One of the last articles written for STEEL by the late E. W. P. Smith goes into details on design of simple jigs and fixtures. He points out that the place to start designing the jigs and fixtures is when the work itself is being designed for welding (p. 77).

Stacking and loading corrugated shipping containers is a subject that should be well understood under conditions when packaging is so important as at present (p. 81).

Answering inquiries and handling customer problems at Ryerson.

True: Steel is Short–

But Ryerson Often Solves the Problem

IN America's vast production effort, there is some man in every company who is responsible for *getting* steel—a man who must get things *done*. In some plants he's called an "expeditor". But whether he is purchasing agent, expeditor, or plant manager, he *must get results*.

Ryerson Steel Service is built to order for his needs! When steel problems become a stone wall, Ryerson usually can come thru with some practical solution. A suitable alternate for steel that's vitally needed, but isn't in stock; a suggestion for heat-treating, machining, welding, or some other way to adapt the steel at hand; rush handling and delivery that will lay the steel down where it's needed, *when* it's needed!

It's nothing new at Ryerson to be cutting corners to help customers solve steel problems with speed. Ryerson has been doing that for a century—and the experience, the skill and the knowledge of steel and its uses, built up over that hundred years of superlative service, are standing Ryerson and Ryerson customers — in good stead under today's emergency conditions.

While this is all in the day's work for Ryerson Steel-Service men—you must keep in mind that we are entirely out of many kinds and sizes and that all must be sold in strict accordance with the WPB program.

This help in getting things done is available to your organization. Ryerson Steel-Service men are easy to reach; they'll give you prompt consideration. Joseph T. Ryerson & Son, Inc., Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Philadelphia, Buffalo, Boston, Jersey City.

RYERSON STEEL—SERVIC

STEEL
October 19, 1942

A Job for Management

In his Columbus day fireside chat the President declared that the manpower problem is "to have the right numbers of the right people in the right place at the right time. . . . To do this, we shall be compelled to stop workers from moving from one war job to another as a matter of personal preference; to stop employers from stealing labor from each other; to use older men, and handicapped people, and more women, and even grown boys and girls . . . . ; to train new personnel for essential war work; and to stop the wastage of labor in all non-essential activities."

In these statements Mr. Roosevelt emphasized the importance of the manpower problem and outlined certain ways of solving it. Most employers already know that these measures are necessary. They also realize that an expedient not mentioned by the President—the lengthening of the 40-hour week in some essential activities—is inevitable.

But no matter what measures are taken to allocate available manpower, it is certain that in the near future millions of men and women who never before were employed in industry are going to be on industrial payrolls. Most of these persons will stay on these new jobs for the duration and then go back to non-industrial pursuits.

During the time they are employed in industry they will form opinions regarding American industry—opinions as to the character of the institution we call private enterprise.

Management has an opportunity and an obligation to do everything possible to see that these newcomers gain a favorable impression of this important institution. Every employer should ask himself this question and act accordingly:

"What can I do to make these temporary employes understand and appreciate the importance of private enterprise to the American way of living to the point where they will want to preserve it with their votes after the war?"

E. L. Shaner

Editor-in-Chief

NE Steels' Applications Hold Convention's Interest

Discussions of war production problems feature sessions. Attendance large despite pressures caused by emergency. More than 300 manufacturers display products at exposition

OUTSTANDING feature of the 1942 National Metal Congress and Exposition in Cleveland's Public Hall Oct. 12-16 was the series of discussion meetings in which leaders of government and industry spoke on important phases of war production problems.

Typical were the meetings Monday afternoon and evening devoted to the NE (National Emergency) steels. Under the leadership of C. M. Parker of the American Iron and Steel Institute, such authorities as W. E. Jominy, chief metallurgist, Dodge-Chicago plant of Chrysler Corp., and Glenn C. Reigel, chief metallurgist, Caterpillar Tractor Co., gave short talks on their experience with various NE steels. Following brief presentations by eight or ten such authorities, there were general discussions. Much helpful information was given in answer to specific questions.

The 23 sessions are considered to be of great value in facilitating the war effort, since they permitted many men to consult with experts and thus solve technical problems in the shortest possible time.

With more than 300 exhibitors, and an attendance of more than 10,000 the first day, total attendance was expected to compare favorably with last year's record, although exact figures were not available at press time.

The Congress and Exposition were sponsored by the American Society for Metals in co-operation with the American Welding Society, conducting its twenty-third annual convention; American Institute of Mining and Metallurgical Engineers, with the fall meeting of its Institute of Metals and Iron and Steel Divisions; and the Wire Association, holding its annual meeting.

Speakers in the panel on NE steels emphasized a number of important steps in selecting an NE steel substitute for SAE steels. As an example, attention was called to the fact that although more carbon will give the same hardness in a metal with less alloy content, the structure of that metal is not the same, and it cannot be substituted indiscriminately for the original. Another point was that the same hardness does not mean the steels will have the same tendency toward flaking, etc.

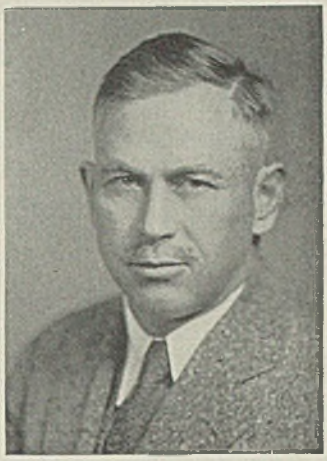
In describing one company's experience with 60 mill heats of NE steels for heavy-duty automotive parts, excellent results were reported in using NE 8620 in place of SAE 4615 and 4620; NE 8630 for SAE 4130—in fact, the latter substitution showed an increase in notch toughness obtainable. NE 8000 series is being used in place of the SAE 3100 series such as 3140; also 3240 and 2345; NE 8739 and 8744 giving excellent results, especially in gears. Notch toughness was tested from plus 75 to minus 20 degrees

General view of displays at twenty-fourth National Metal Exposition, Cleveland Public Auditorium. More than 300 exhibitors, practically all of whom are engaged in war work, showed their products and equipment

H. J. French
Technical consultant, WPB, and in charge of alloy steel and iron development, International Nickel Co., elected president, American Society for Metals

M. A. Grossman
Director of research, Carnegie-Illinois Steel Corp., elected vice president of American Society for Metals

V. N. Krivobok
Structural research engineer, Lockheed Aircraft Co., elected trustee of American Society for Metals



Earl G. Hill
Assistant general superintendent, Gary Works, Carnegie-Illinois Steel Corp., elected trustee of American Society for Metals

Fahr., and showed not more than a 25 per cent drop, usually only 10 to 15 per cent.

NE 8749 was recommended as an excellent substitute for chromium-vanadium steels for light springs. Other substitutions which have been made successfully included NE 8739 for SAE 2335, NE 9540 for SAE 3240. As with steels of higher alloy content, it was recommended not to quench NE 9400 and 9500 steels in the 500 to 600-degree Fahr. range.

In answer to a request for information of tests on NE steels in sections thicker than 3 inches, Mr. Parker stated that tests on sections up to 15½ inches had been made and would soon be available, thus affording a valuable guide for working NE steels in heavier sections.

In addition to the war production discussion meetings, the American Society for Metals program included 12 technical sessions, the Edward deMille Campbell Memorial lecture, 5-period lecture course on tool steels, the annual business meeting and the annual banquet.

James P. Gill, chief metallurgist, Vanadium-Alloys Steel Co., Latrobe, Pa., directed the series of lectures on tool steels, assisted by R. S. Rose, H. G. Johnstin, R. B. George and G. A. Roberts, all of the same company.

At the twenty-fourth annual business meeting of the American Society for Metals, a total membership of over 14,800 was reported, approximately 16 per cent more than last year. Chapters number 54, several having been added during the past year. Officers elected for 1942-1943 are:

Herbert J. French, technical consultant, War Production Board, and also in charge of alloy steel and iron development, International Nickel Co., president; M. A. Grossmann, director of research, Carnegie-Illinois Steel Corp., vice president; V. N. Krivobok, structural research engineer, Lockheed Aircraft Co., and Erle G. Hill, assistant general superintendent, Gary Works, Carnegie-Illinois Steel Corp., trustees.

The Albert Sauveur Achievement medal for 1942 was presented to B. F. Shepherd, chief metallurgist, Ingersoll-Rand Co., and a past president of the American Society for Metals, for the origination of the Shepherd fracture standards for tool steels and development of the so-called penetration-fracture (P-F) test.

John C. Garand, inventor of the Garand semi-automatic rifle adopted by the United States Army, received a special award. In 1941 he was awarded the Holley medal of the American Society of Mechanical Engineers and early this year was given the annual American Design award of Lord and Taylor.

B. F. Shepherd
Manager, Rock Drill Division, Ingersoll-Rand Co., Albert Sauveur Achievement Award for 1942 for his work in originating the Shepherd fracture standards for tool steels and development of so-called penetration-fracture (P-F) test

Henry Marion Howe medal was awarded to W. A. Schlegel, metallurgical department, Carpenter Steel Co., for his paper, "Surface Carbon, Chemistry and Grain Size of 18-4-1 High Speed Steels," published in the September 1942 *Transactions of the American Society for Metals.*

Welding Society Reviews Progress

Welding's prominent place as a production shortcut in fabricating ships, tanks and much other military equipment is well illustrated by steelmakers, fabricators and suppliers who sent more than 1000 men to the twenty-third annual convention of the American Welding Society in Cleveland, Oct. 12-15.

As part of the 1942 National Metal Congress, the society program included 57 papers, 15 technical sessions, annual business meeting, banquet and session for awards.

The Samuel Wylie Miller Memorial award was made to H. C. Boardman, research engineer, Chicago Bridge & Iron Co., for the "most conspicuous contribution to research, standardization and advancement of welded construction".

The Lincoln gold medal was awarded to George A. Ellinger, Metallurgy Division, National Bureau of Standards; A. G. Bissell, in charge of supervision of the Welding & Casting Section of the Bureau of Ships; Morgan L. Williams, assistant metallurgist, National Bureau of Standards. They co-authored the paper entitled, "The Tee-Bend Test

To Compare the Welding Quality of Steels", judged the greatest contribution to advancement and use of welding for the year and published in *The Welding Journal*.

The Resistance Welder Manufacturers' Association prizes for papers contributing to progress in resistance welding were: First prize—$500 to J. H. Cooper, Taylor-Winfield Corp; second prize—$250 to F. R. Hensel, E. I. Larsen and E. F. Holt, all of P. R. Mallory & Co. (Mr. Hensel also is associated with Westinghouse Electric & Mfg. Co.); third prize—$100 to R. P. Della-Vedowa, Lockheed Aircraft Corp.; fourth prize—$50 to L. G. Levoy, General Electric Co.; fifth prize—$50 to G. S. Mikhalapov and T. F. Falls, both of Taylor-Winfield Corp.; sixth prize—$50 to A. M. Unger, H. A. Matis and E. P. Gruca, all of Pullman Standard Car Mfg. Co.

At the annual meeting officers elected were: President, K. L. Hansen, consulting electrical engineer, Milwaukee; first vice president, David Arnott, vice president and chief surveyor, American Bureau of Ships; second vice president, Isaac Harter, vice president, Babcock & Wilcox Co. Newly elected directors-at-large are: E. V. David, assistant manager, Applied Engineering Department, Air Reduction Sales Co.; J. H. Critchett, vice president, Union Carbide & Carbon Research Laboratories Inc.; A. C. Weigel, vice president, Combustion Engineering Co.; J. D. Gordon, general manager, Taylor-Winfield Corp.; O. B. J. Fraser, director of Technical Service, International Nickel Co.

District Vice Presidents

District vice presidents are: New York-New England, E. R. Fish, chief engineer, Boiler Division, Hartford Steam Boiler Inspection & Insurance Co.; Middle Eastern, J. H. Humberstone, welding engineering department, Arcrods Corp.; Middle Western, J. D. Tebben, sales manager, Metallurgical Division, P. R. Mallory & Co.; Southern, K. B. Banks, assistant chief engineer, Black, Sivalls & Bryson; Pacific Coast, P. D. McElfish, chief materials engineer, Los Angeles Division, Standard Oil Co. of California.

Total membership of the society as of Aug. 1, 1942, was reported as 5442. This compares with 4700 a year ago and represents 2901 new members added during the past five years. A total of 42 local sections, 48 sustaining companies, and 81 sustaining members was reported.

In the president's annual report, he emphasized the great need of standards and recommended practices representative of good welding procedure. He said the society is taking the initiative in organizing standardization activities. This is its primary present obligation. Regarding censorship, it is believed as far as welding is concerned that the harm from depriving our industries of available information far outweighs any national harm from giving information to the enemy, he stated.

K. L. Hansen
Consulting electrical engineer, Milwaukee, elected president of American Welding Society

David Arnott
Vice president, American Bureau of Ships, elected first vice president, American Welding Society

Isaac Harter
Vice president, Babcock & Wilcox Co., elected second vice president, American Welding Society

Rate of progress in development of welding technique and fundamentals is high, and amounts spent on research in welding by government agencies and by industry are considerably larger than ever before. Development of war emergency steels has forced a study of weldability and rationalizing of concepts of the relation of composition, hardenability and weldability. The remarkable growth of production and use of aluminum and magnesium alloys has created a demand for new welding methods and development of controls to maintain uniform quality and higher production rates. Demands for welding engineers have exceeded the supply. Development and research personnel is most difficult to find and train. Yet it is most essential now. Thus it must not be dissipated to other uses, even in the field forces, if most effective use of our manpower is to be made, he declared.

Cemented Carbides Spurred by War

Developments are taking place in the domestic and Western hemisphere which makes the basic raw materials used in the manufacture of cemented carbide manufacture, such as tungsten, tantalum and titanium, hopeful in every respect. No difficulty is expected unless new products for uses develop that are more important and gain priority over the present uses.

This fact was made known by A. MacKenzie, vice president in charge of manufacturing, Carboloy Co. Inc., Detroit, to members and guests of the Wire Association, Hotel Carter, Cleveland, at their annual meeting last week.

The speaker pointed out that cemented carbides are now performing a national service that cannot be measured in sales for manufacturing projects as they are being universally applied throughout industry in one form or another for the purpose of speeding up much needed production. He directed attention to the fact that the cemented carbide industry, due to the impetus of war, has advanced its normal growth by a minimum of ten years. In some instances in the wire, tube and bar-drawing fields, cemented carbides are the only materials that will do the job successfully. He cited cases where cemented carbide dies are being used for drawing steel wire down to 0.010-inch in size and in a few instances as low as 0.005-inch. The speaker was of the opinion that the scarcity of diamond dies may be a factor that will

speed up transition from this type to cemented carbide dies.

Application of cemented carbides in the United States for cutting all types of steel has increased rapidly during the past few years, he asserted. One prominent manufacturer of cemented carbide will produce in 1942, in steel-cutting cemented carbides, 120 times his 1939 output.

In speaking on "Bronze and Steel Weaving Wire", L. D. Granger, treasurer, American Wire Fabrics Corp., New York, pointed out that wire must be of the proper stiffness for the type of cloth manufactured. This applies equally with spring to the softest annealed iron possible to produce. The stiffness or temper, he asserted, must be uniform, the wire must be on size and round and it must not be brittle. The old idea that a weaving mill like a nail mill was a handy place in which to use rejections has long since been exploded and weaving wire has assumed its place as a special quality product worthy of and demanding all the skill and care of the wire mill for its successful production.

America's task in the past two years has been of a marvelous character—a task never equaled before in the history of this country. Just before Pearl Harbor scarcely more than 250 airplanes were being built each month by all airplane manufacturers in the United States; today our monthly output exceeds 2500. And the remarkable thing is that the plants of four companies in which automobiles formerly were made now are given over to the manufacture solely to airplane production.

These views were expressed by Dr. Charles Copeland Smith, National Association of Manufacturers, New York, at the annual luncheon.

Safety committees composed of top supervision should meet at least once each month to discuss plant safety work, according to R. H. Ferguson, manager of safety, Republic Steel Corp., Cleveland. Along with the safety meetings he advocated the use of safety posters on bulletin boards as well as the physical protection of the plant.

The speaker emphasized that plant friendliness has a definite and vital part in accident prevention. Overhead cranes, he stated are a great source of danger if improperly operated. Co-operation between the man in the cab and the man on the ground he stressed as a fine example of teamwork.

The real job for safety is done by the foreman and when he is sold and has analyzed his job for safety and carried this analysis to the job, real safety results are forthcoming and accidents are reduced, the speaker contended.

Guest speakers at the luncheon, Tuesday, were Dr. A. J. Culler, the American Red Cross, Cleveland; Capt. M. L. Payne, War Department, Washington, who spoke on "The Progress of the War"; and Dr. C. C. Smith, National Association of Manufacturers, New York.

Bombing attacks have not seriously affected British steel output, according to Earle C. Smith, chief metallurgist, Republic Steel Corp., Cleveland, and member of an American mission which recently flew to England to study the iron and steel industry there. Mr. Smith was the principal speaker at the annual dinner of the Metals Division of the American Institute of Mining and Metallurgical Engineers, in Hotel Statler, Cleveland, Oct. 13.

The speaker praised the British for having done "a splendid job" in protecting war industries.

WINNERS OF WELDING AWARDS

H. C. Boardman

G. A. Ellinger

A. G. Bissell

M. L. Williams

J. H. Cooper

F. R. Hensel

E. I. Larsen

E. F. Holt

L. G. Levoy

T. F. Falls

Mr. Boardman received the Miller Memorial Award at the twenty-third annual meeting of the American Welding Society. Messrs. Ellinger, Bissell and Williams received Lincoln Gold Medals. Recipients of prizes offered by the Resistance Welder Manufacturers Association were Messrs. Cooper, Hensel, Larsen, Holt, Levoy and Falls. Mr. Falls was joint winner of the fifth prize with G. S. Mikhalapov, whose portrait was not available at press time

Employes of National Smelting Co., Cleveland, at a recent "Production-for-Victory" rally pledged their "hearts and hands to the country's cause on the battle line of war production." Shown above at the rally are, left to right: Federal Judge Robert N. Wilkin, General Superintendent W. H. Freiburger, President Walter M. Weil, Albert Lockhart, Vice President A. Rubin, E. Eckert, Sam Mastnardo, Paul Manalotos, Paul Humenik, Walter Dicks and Henry Porter

Workers Pledge "Hearts and Hands"

A NEW and original idea for bringing home to war plant kworkers a sense of their immediate, personal responsibility to the Nation at war was inaugurated at a giant "Production-for-Victory" rally of employes of the National Smelting Co.

In a formal ceremony of self-dedication, witnessed by 1200 employes and guests, labor and management representatives enrolled themselves as "Production Soldiers" by swearing a solemn oath pledging their "hearts and hands to the country's cause on the battle line of war production."

The oath was administered by the Hon. Robert N. Wilkin, United States District Judge. Each man received a citation certificate bearing the company seal, attesting to his having sworn the "Production Soldier's Oath".

Walter M. Weil, president; A. Rubin, vice president and W. H. Freiburger, general superintendent, pledged themselves standing shoulder to shoulder with several selected shop employes.

The "Production Soldiers" were congratulated by the guest speakers, including Lt. Col. T. H. Eickhoff, chief of the Procurement Service Division, Cleveland Ordnance district; Dr. Robert C. Weaver, chief, Negro Manpower Service, War Manpower Commission, Washington; and Reid Robinson, international president, Mine, Mill and Smelter Workers, C.I.O., Denver.

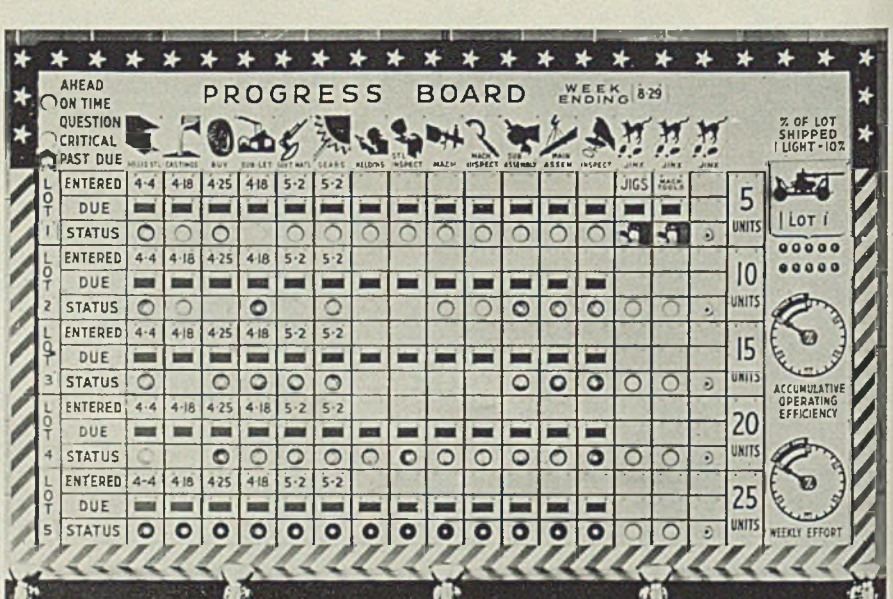
Deliveries of propulsion equipment for naval vessels and turbines for land powerhouse by Westinghouse Electric & Mfg. Co.'s Steam Division, South Philadelphia, Pa., in ten months since Pearl Harbor totaled $50,356,000, an increase of 109 per cent over the $23,998,000 worth produced in ten months prior to that date, according to A. W. Robertson, chairman of the board. Company also has equipped and put into operation the $26,000,000 Merchant Marine Division plant.

Scoreboard Spurs Ordnance Output

"NERVE CENTER" of Link-Belt Co.'s ordnance plant in Chicago, this 7 x 10-foot production scoreboard ties in all subcontractors as integral parts of the plant. The board contains electric lights which provide a visual record of production progress. A white light indicates that production is ahead of schedule, blue that it is on time, yellow that it is in question, red a critical situation, and a "doghouse," failure to meet schedule.

The board gives information on such subjects as rolled steel, castings, sublet material, gears, welding, inspection, machinery, subassembly, main assembly and final inspection. It has room for five "lot" numbers at one time, with dates entered and dates due for each class of work in each lot number. The colored lights appear in the status column. A secondary chart at the right shows accumulative operating efficiency and weekly effort.

Because of importance of the board desks in the planning department are arranged diagonally across the floor so that all are in constant view of its challenging record.



Production scoreboard erected in Link-Belt Co.'s new ordnance plant in Chicago ties in subcontractors as integral parts of the plant, stimulates deliveries on time

Steubenville Plant of Weirton Steel Closed

Steubenville, O., plant of the Weirton Steel Co. was closed last week as result of curtailment of tin mill products under WPB order. Plant normally has 1000 employes, most of whom will be transferred to other plants.

E. T. Weir, chairman, National Steel Corp. of which Weirton is a subsidiary, estimated that tin mill operations for the fourth quarter will not exceed 25 per cent of capacity.

Jones & Laughlin Plants Honored for Safety Records

In recognition of a perfect safety record for 1941, nine "Certificates of Honor" have been awarded to Pittsburgh and Aliquippa works of Jones & Laughlin Steel Corp. by the Pennsylvania Department of Labor and Industry.

In addition, both works received "Certificates of Merit" honoring a 1941 safety record better than the state average. Eighty departments in the two plants received certificates.

Gearmakers Study Production Problems

SKYTOP, PA.

Registration of 150, at least one-third more than anticipated, indicated the importance of wartime problems considered at the twenty-fifth semiannual meeting of the American Gear Manufacturers Association here Oct. 15-17.

Interest during general sessions centered on two subjects, aircraft engine gearing, and wartime substitution of materials as it affects the gear industry.

In a leading paper sponsored by Wright Aeronautical Corp., so-called peculiarities in design and specifications of aircraft engine and accessory gears were explained in detail, and thoroughly justified, thereby clearing up much misunderstanding which has existed between aeronautical and automotive engineers in connection with co-operative production efforts.

Speaking of materials, E. J. Wellauer, Falk Corp., Milwaukee, said: "Substitute we must if we are going to expedite the tremendous production required for the war effort, at the same time conserving our supplies to outlast all eventualities. However, cognizance must be given to fundamental fact that service performance of substitute materials must in every way be equal to the task to be performed. Times such as these demand generous exchange of production facts for the good of all in solution of pressing wartime problems."

Details of the meeting will be published in the Oct. 26 issue of STEEL.

U. S. Steel Reports Largest September Shipments

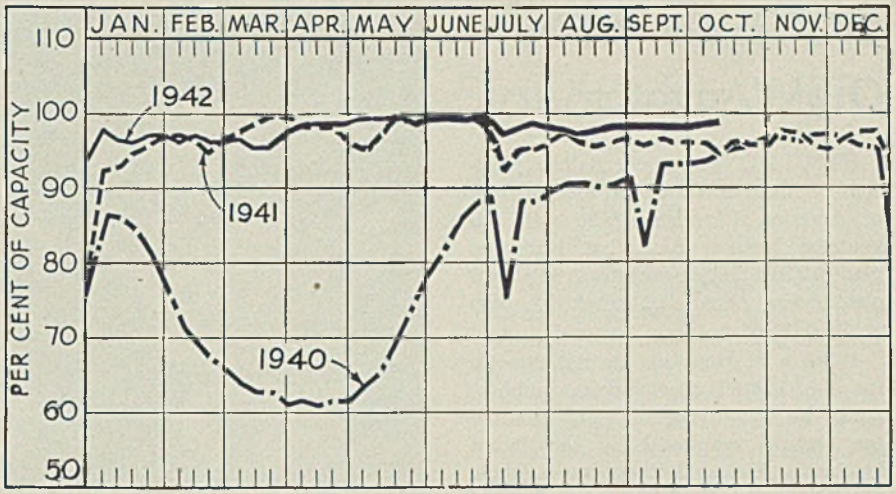
Finished steel shipments by the United States Steel Corp. in September were 1,703,570 net tons, the largest for that month in the history of the corporation. Cumulative shipments for nine months were 15,761,476 net tons, an all-time record for that period.

(Inter-company shipments not included)

Net Tons

	1942	1941	1940	1939
Jan.	1,738,893	1,682,454	1,145,592	870,866
Feb.	1,616,587	1,548,451	1,009,256	747,427
Mar.	1,780,938	1,720,366	931,905	845,108
Apr.	1,758,894	1,687,674	907,904	771,752
May	1,834,127	1,745,295	1,084,057	795,689
June	1,774,068	1,668,637	1,209,684	807,562
July	1,765,749	1,666,667	1,296,887	745,364
Aug.	1,788,650	1,753,665	1,455,604	885,636
Sept.	1,703,570	1,664,227	1,392,838	1,086,683
9 mo.	15,761,476	15,137,436	10,433,727	7,556,087
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.



STEEL . . . . . UP

PRODUCTION of open-hearth, bessemer and electric furnace ingots last week rose ½-point to 99 per cent. Six districts advanced, three declined and three were unchanged. A year ago the rate was 96½ per cent; two years ago it was 95 per cent, both computed on the basis of capacity as of those dates.

Chicago—Due in part to better scrap supply and also to completion of furnace repairs, production advanced 1 point to 103½ per cent, highest since the week ended June 30.

Detroit—Several furnaces were down last week for brief repairs, lowering the average to 87 per cent, off 7 points.

St. Louis—An open hearth was added by Granite City Steel Co. advancing the rate 3 points to 97 per cent.

Pittsburgh—Advanced 1½ points to 99 per cent, due to added open hearths.

Wheeling—Reduced 5 points to 79½ per cent as furnace repairs cut into production.

Cincinnati—Two open hearths were taken off for repairs, reducing production 3 points to 92 per cent.

Buffalo—Lighting of its only idle open hearth by Republic Steel Corp. increased production 2½ points to 93 per cent. A peak of 95½ per cent was reached for a brief period.

New England — Return of a relined open hearth advanced production 5 points to 95 per cent.

Birmingham—Unchanged at 95 per cent, with 23 open hearths active.

Cleveland—Addition of one open hearth by Republic Steel Corp. and slight changes by other interests gave a net rise of 1½ points to 96 per cent.

Youngstown, O.—With three bessemers and 75 open hearths engaged, production remained at 95 per cent, with about the same rate scheduled for this week. Carnegie-Illinois Steel Corp. will relight a blast furnace this week, after relining.

Central eastern seaboard—An easier situation prevailed in scrap and mills held production steady at 96 per cent.

District Steel Rates

Percentage of Ingot Capacity Engaged in Leading Districts

	Week ended Oct. 17	Change	Same week 1941	Same week 1940
Pittsburgh	99	+ 1.5	98	90
Chicago	103.5	+ 1	101	99
Eastern Pa.	96	None	93	93
Youngstown	95	None	98	90
Wheeling	79.5	— 5	93	98
Cleveland	96	+ 1.5	99	85.5
Buffalo	93	+ 2.5	93	90.5
Birmingham	95	None	95	97
New England	95	+ 5	90	85
Cincinnati	92	— 3	88	90
St. Louis	97	+ 3	83	82.5
Detroit	87	— 7	68	96
Average	99	+ 0.5	•96.5	•95

•Computed on basis of steelmaking capacity as of those dates.

Trophies Offered To Step Up Machine Tool Output

John S. Chafee, new president of the National Machine Tool Builders Association, Cleveland, has offered member companies two trophies for greatest fourth quarter increase in output, the association announced last week. One trophy is based upon percentage of increase over third quarter in number of machine tools shipped and the other upon percentage of increase in dollar value of shipment, thus giving all a chance to win.

Mr. Chafee, who is vice president, Brown & Sharpe Mfg. Co., Providence, R. I., said that the trophies are intended to add still one more element to the sense of urgency which must be the keynote of the industry until war is won.

CIO Leader Would Oust "Agitator"

EXPULSION of Dave Balint, president of Local 1666, United Steelworkers of America, Cleveland, who with his younger brother, Alex, has instigated many strikes and slowdowns in vital war plants, was asked last week by high union officials.

William F. Donovan, district director for the United Steelworkers, publicly stated he was "damn sick and tired of the tactics" employed by the Balint brothers. He said they have "done enough harm to the labor movement and to the war effort. I think it is high time that our government should take care of these friendly enemies."

Joseph Kanecki, international organizer for the union, immediately charged Dave Balint with three union violations and asked that he be expelled. Then came action by the United States district attorney who charged Balint with giving false information when applying for citizenship and ordered his arrest.

Dave Balint had been employed as a coremaker at the Ferro Machine & Foundry Co., Cleveland, and led a wildcat strike there Oct. 1 and 2.

Alex Balint, regional director of the Mine, Mill and Smelter Workers, has instigated many wildcat strikes, slowdowns and other obstructions to war production at the plants of the Aluminum Co. of America. He gained notoriety in June, 1941, for prolonging a strike at the company after national officers of the union had signed an agreement with the company.

Accused as Communists

Both the brothers often have been accused of being communists. Only a few days ago, Representative Joseph Starnes, Alabama, a member of the Dies committee, repeated these charges on the floor of the house.

"I am at a loss to understand why action has not been taken against the Balints at an earlier date," the congressman said.

The representative's puzzlement over why such obstructionists were permitted in the midst of an all-out war effort is shared by many labor observers. Every government agency dealing with labor or subversive activities had known of the Balints' activities for more than a year. But no action was taken until a labor leader denounced them.

This has been one of the few cases where high union officials have taken effective steps to weed out subversive elements among their membership, although

Alex Balint

hundreds of such examples have been called to their attention.

The action by Donovan and Kanecki, however, was repudiated by the leftist-dominated Cleveland Industrial Union Council which, in a tumultuous session, passed resolutions calling for dismissal of the federal charges against Dave Balint, and asked for the immediate granting of citizenship to both.

Forge Strikers Resume After Warning Deferments Will End

Power hammer operators and their helpers at the Steel Improvement & Forge Co., Cleveland, last week ended an 8-day strike after the Navy, for whom the company is doing considerable work, threatened to deprive the strikers of their draft deferments and bar them from future war work.

The strikers earlier had defied an order by the National War Labor Board to return to their jobs.

The work stoppage was caused when the men objected to the installation of chronologs, or production measuring devices, on the hammers to determine why production at the plant was less than in other plants doing similar work.

War Labor Board's Figures Show Sharp Strike Increase

Sharp increases in the number of strikes, men involved and man-hours lost in war industries since the United States became involved in the conflict

WILDCAT STRIKE HALTS MUNITIONS PRODUCTION

PICKETS stop an employe's car at the entrance to the East Alton, Ill., plant of the Western Cartridge Co., where an unauthorized strike was in progress, tying up production of vital war materiel. Plant management wired the War Labor Board: "We hold the firm belief that the war effort is being sabotaged." NEA photo

are revealed in figures of the War Labor Board. These show that officially recorded strikes increased from 27 in January to 222 in July; men involved from 11,605 in January to 80,722 in July; man-hours lost from 369,576 in January to 1,868,912 in July.

Despite these figures, however, War Labor Board officials have minimized the seriousness of strikes in the post-Pearl Harbor period by pointing out that the striking manpower represents only a small percentage of the total. This, of course, has been attacked as fallacious on the ground that a handful of men striking in a vital parts plant can disrupt the production of many other workers.

"Captive Shop" Tool and Die Workers Awarded Increase

Tool and die workers in the "captive shops" of Ford Motor Co., General Motors Corp. and Chrysler Corp. have been awarded a wage increase of 10 cents an hour by the National War Labor Board.

The increase was described as a move to "stabilize the tool and die industry" in the Detroit area.

War Labor Board Refuses Pay Advance to Ford Men

Demand for a $1 a day wage increase from Ford Motor Co. employes, members of the United Automobile Workers, CIO, was refused last week by the National War Labor Board.

Although the board officially gave no reason for the refusal, it was said privately that the labor agency could find no justification for an increase because Ford workers were generally better paid than others in the automotive industry.

U. S. Steel Subsidiaries To Intensify Safety Drive

Due to National Safety Council reports indicating loss of almost 110,000,000 man days in American industry from disabling accidents in the first seven months of 1942, B. F. Fairless, president, United States Steel Corp., New York, has announced intensification of the accident prevention and industrial safety program in all plants of subsidiary companies. Posters, plant meetings, and competition between plants and companies will feature the campaign. Mr. Fairless stated:

"The conservation of manpower is essential to the continuance of record-breaking production of steel so vital to the war program. This problem will be attacked with every degree of effort and ingenuity within our control."

War Materials Inc. Wings Clipped; Now Just "Check Signer" for WPB

ACTIVITIES of War Materials Inc., recently organized as a subsidiary of Metals Reserve Co. to salvage scrap which could not be recovered normally under OPA price ceilings, were drastically curtailed last week by a WPB directive. The agency practically has been reduced to the status of a "check signer" for WPB, it was said.

The WPB directive was reported to have resulted from conflict between the WMI and the WPB Conservation Division.

Pending clarification of the WMI's new duties, the agency is marking time. WMI President J. M. Hopwood issued the following statement:

"Activities which the War Materials Inc. was organized to perform must be substantially curtailed as result of a recent directive issued by the War Production Board."

Mr. Hopwood was reported to be considering resigning from the agency but was persuaded by a number of steel producers to continue in the post. He has intimated he is not interested in "signing checks" for the WPB.

Observers were puzzled by the directive because earlier WPB Chairman Donald M. Nelson had recommended the creation of WMI with "broad powers" in view of the serious scrap situation.

WMI was allocated $500,000,000 of RFC money to recover scrap metals from projects where the cost of demolition, preparation and transportation would push the market price above OPA ceilings.

War Metallurgy Group Reports on Salvaging Brass-Clad Steel Scrap

WAR Metallurgy Committee of the National Research Council, National Academy of Sciences, 2101 Constitution avenue, Washington, has submitted a report to the War Production Board on methods of salvaging gilding metal-clad scrap. It summarizes findings by A. J. Thompson, Battelle Memorial Institute, Columbus, O., under the supervision of John D. Sullivan of the War Metallurgy Committee.

The material involved is brass-clad steel used in place of the customary solid brass for making bullet jackets. The cladding contains 90 per cent copper and 10 per cent zinc and constitutes approximately 20 per cent of the weight of the material, the remaining 80 per cent being mild steel sheet. In its use considerable scrap will be produced; this will amount to around 20,000 tons monthly by May of 1943. Companies already producing the clad material are Superior Steel Co., Weirton Steel Co., Carnegie-Illinois Steel Corp., American Steel & Wire Co., Sharon Steel Corp., Allegheny Ludlum Steel Corp., Acme Steel Co., Republic Steel Corp., and McLouth Steel Corp.

"There is only one fully developed and practical process now available for treating gilded-steel scrap," concludes the report. "This, the cupric ammonium carbonate process, is not new and all the metallurgical operations involved have been practiced successfully for years. Good recoveries and clean separations of the copper and iron are possible and the operating costs are reasonably low. Producing plants can be put into operation as fast as labor and materials will permit. The Calumet & Hecla Consolidated Copper Co., Lake Linden, Mich., immediately can process several thousand tons per month of the existing material. The recovery of zinc, however, remains the most unknown factor and may be poor unless an additional leaching treatment is performed on the copper precipitate before smelting."

Other companies that have had experience with the leaching of gilded steel by the cupric ammonium carbonate method are the American Metals Co., Carteret, N. J., and the Copperweld Steel Co., Glassport, Pa. These companies and the Kennecott Copper Corp., New York, are giving active attention to the problem of reclaiming this scrap so that not only the copper and steel may be salvaged but also the zinc content in the gilding metal. Other companies which are looked to for help because of experience they have had are the Automatic Gas Flux Co., Cleveland, Eaton Axle Division, of Eaton Mfg. Co., Cleveland, and the DeSaulle Plating Works, Toledo, O.

PRIORITIES—ALLOCATIONS—PRICES

Weekly summary of orders and regulations issued by WPB and OPA, supplementary to Priorities-Allocations-Prices Guide as published in Section II of STEEL, July 6, 1942

M ORDERS

M-24 (Amendment): **Iron and Steel Scrap,** effective Oct. 13. Reports required under this order must now be filed by the 10th of each month. Previously they were due by the 15th.

M-24-c (Amendment): **Alloy Steel Scrap,** effective Oct. 13. Requires segregation of low-phosphorus and low-sulphur stainless steel turnings.

M-57 (Amendment): **Tung Oil,** effective Oct. 6. Requires specific authorization for use after Nov. 1, except for users of 35 lb. or less per month.

M-77 (Amendment): **Rapeseed Oil,** effective Oct. 6. Requires specific authorization for use after Nov. 1, except for users of 35 lb. or less in a month.

M-238: Oiticica Oil, effective Oct. 6. Requires specific authorization for use after Nov. 1, except for users of 35 lb. or less in a month.

M-242: Sulfamic Acid, effective Oct. 3. Requires specific authorization for use after Nov. 1, except for users of 35 lb. or less in a month.

M-212: Petroleum Coke, effective Oct. 10. Restricts delivery and use to certain essential war uses. Bans use in manufacture of calcium carbide, as an industrial fuel, in heating homes and other places where it competes with coal coke on a price basis.

M-148 (Amendment): **Exports of Critical Material,** effective Oct. 14. Establishes export quota system for producers of specific steel products. Steel producers must file with Iron and Steel Branch immediately upon shipment from the mill of material for export copy of form BEW-138, listing materials shipped, date of shipment, destination and other details.

L ORDERS

L-49 (Amendment): **Beds, Springs, Mattresses,** effective Oct. 8. Limits amount of steel used after Dec. 1 in manufacture of full sized bedsprings to 15 lb. and in single or twin size bedsprings to 9 lb. Limits use of iron and steel by manufacturers to 3.12½ per cent of total used for coil, flat and fabric types during the year ended June 30, 1941, and to 6.25 per cent of amount used during the base period for production of box bedsprings.

L-190: Scales, Balances, Weights, effective Oct. 10. Prohibits production of commercial scales for retail trade and production of household scales. Limits output of clinical, mailing, parcel post and dietetic scales to 25% of 1941 total; of industrial and scientific scales for inventory to 30 days' supply. Prohibits use of brass in major parts of industrial scales, and in all weights except small ones used for analytical balances. Restricts sales. Bans production of repair parts for household scales but allows production for all other scales up to 150 per cent of 1941 output.

L-193: Conveying Machinery, effective Oct. 7. Sets up machinery for scheduling production and makes mandatory the filing of monthly schedules with WPB. Prohibits engineering services, except with respect to authorized orders where the individual order amounts to more than $5000. Imposes restrictions upon all orders, with certain exceptions.

L-208: Gold Mining, effective Oct. 8. Prohibits gold mining operations after Dec. 7 and breaking out of new ore after Oct. 15, except by those mines having serial numbers issued under order P-56. Lode mines which produced less than 1200 tons of ore in 1941 and placer mines which treated less than 1000 cubic yards of material in that year may produce or treat up to 100 tons of ore or 100 cubic yards of material a month, respectively. Mills, machine shops or other facilities of the mines closed may continue to be used in manufacture of articles to be delivered on ratings of A-1-k or higher, or in milling ores for the holder of a serial number under P-56.

PRICE REGULATIONS

General Maximum Price Regulation (Amendments): Effective Oct. 15, sellers of tin base, lead base or tin-lead base solders containing silver may add 9.634c per fine troy ounce of silver content to maximum prices established under this regulation. Effective Oct. 13, prices charged by Harrisburg Steel Corp. for steel high pressure gas cylinders are taken as ceiling prices for used cylinders whenever seller is unable to determine ,the maximum price under other provisions of this regulation.

No. 2 (Amendment): **Aluminum Scrap,** effective Oct. 10. Sets maximum prices for aluminum drosses, skimmings, sweepings, savings and spatters at 1.2c a pound for material containing less than 15% aluminum and 8.00c a pound of metallic aluminum contained for material 15% or more of aluminum.

No. 4 (Amendment): **Iron and Steel Scrap,** effective Oct. 15. Permits inclusion of galvanized material meeting size specifications, as well as uncut bumpers, rear ends, and front axles of passenger automobiles under specifications for No. 2 heavy melting scrap. Increases maximum price for No. 2 busheling $1.50 per gross ton and liberalizes specifications. Inserts new grade of scrap in schedule as baled machine shop turnings, taking differential of $4 over unbaled turnings. Makes other changes in low phosphorous and sulphur slab and heavy plate crops specifications; in crushing charge on turnings; in preparation charge provisions; and raises price of high manganese steel scrap having dimensions greater than 12 x 24 x 8 inches.

No. 235: Manganese Steel Castings, effective Oct. 14. Sets maximum price at levels prevailing between Oct. 1-15, 1941, period.

No. 236: Heating Boiler Conversion Parts, effective Oct. 14. Sets a basic manufacturers' maximum price of 11.00c a pound, f.o.b. foundry, for boiler conversion parts; wholesaler-to-dealer or installer price at 13.75c a pound, delivered; installer-to-consumer at 18.00c per net pound. Applies only to specified eastern states.

E ORDERS

E-6 (Amendment): **Hand Service Tools,** effective Oct. 10. Limits sales and deliveries to A-9 or higher rated orders. Limits alloy steel which may be used to the following NE Series: 1300, 8000, 9200, 9400 and 9600. Permits use of any other alloy steel received by a manufacturer prior to Nov. 1, 1942.

P ORDERS

P-46 (Amendment): **Utilities,** effective Oct. 13. Cuts amount of scarce metal for maintenance, repair and for small construction jobs to about 60 per cent of amount used in corresponding quarter in 1940. Requires electric utilities to make at least 75% of wire, cable and bus bar purchases from inventories of other utilities while gas and water utilities must get at least 40 per cent of pipe and similar supplies from inventories of other like utilities. Assigns AA-5 rating for maintenance and repair supplies; AA-2 for emergency repairs.

P-56 (Amendment): **Mines,** effective Oct. 14. Assigns AA-2X for maintenance and repair supplies; A-1-a for operating supplies.

Quota System To Spread Load of Export Orders for Steel Producers

EXPORT quota system for producers of specific steel products, designed to spread the load of export orders within the industry, has been established by the WPB.

Export quotas for steel producers will be established within the quantities for which the Board of Economic Warfare has been authorized to assign preference ratings. Producers, in other words, may accept orders for export of steel products covered by the supplement only to the extent of the quota assigned by WPB.

Producers may accept orders for unlisted steel products, and distributors may accept orders for all products, when such orders bear appropriate ratings and are supported by valid export licenses, without reference to WPB.

Export licenses and preference ratings covering steel products listed by the supplement will be issued by BEW, which will continue to be responsible for determining the amounts to be exported to individual countries and individual purchasers within the assigned quota.

In addition to other reports required by Order M-148, steel producers who fill purchase orders for exports of such steel products under BEW licenses are required to file with the WPB Iron and Steel Branch, immediately upon shipment from the mill, a copy of form BEW-138 listing the materials shipped, date of shipment, destination and other details.

Export License Requirements for Canadian Shipments Removed

Export license requirements for commercial shipments from the United States to consignees in Canada and that part of Labrador under Canadian control have been removed by the Office of Exports, Board of Economic Warfare.

Exporters no longer will be required to obtain general, individual or any other kind of license to ship articles, materials, supplies and technical data to those destinations.

Until the current revision, United States commercial commodities in most cases have been shipped to Canada under general licenses, each of which authorized goods to be exported whenever purchased and for unlimited periods of time. Even this "general license" requirement has now been removed, eliminating all license controls over com-

mercial exports to Canada. This action is a further step in BEW measures to assist in promoting full and free exchange of materials across the Canadian border in the joint war effort.

Exporters and manufacturers have been notified by the Office of Exports that the general license symbol "G-1", signifying a Canadian consignee, need no longer be displayed upon their export declarations. License symbols formerly required to be shown on envelopes, wrappers, or other containers holding technical data can now be omitted.

OPA Encourages Use of Cheaper Chemical Containers

To encourage substitution of cheaper containers to replace steel and other critical materials no longer available for packaging numerous chemicals, OPA has informed the chemical industry that, except in special and unusual cases, upward adjustment of ceiling prices to permit producers to pass on to purchasers increases in container cost would not be authorized.

Although OPA will adjust the maximum prices of individual chemical manufacturers suffering "substantial hardship" due to increases in packaging costs, these adjustments will not be permitted unless the concern conclusively shows that it is unable to effect economies in container costs by use of cheaper materials, OPA officials asserted.

WPB has prohibited the use of steel drums in the packaging of approximately 90 important chemicals but many manufacturers will be able to pack certain of their products in cheaper containers made of fiber or paper, thus reducing their container costs under levels of March, 1942, the base pricing period of the General Maximum Price Regulation.

Asks Alloy Steel Users To Specify More Class A, Grade 1

WPB expects users of Class A, Grades II and III to specify Class A, Grade I to compensate for the shortage caused by the restrictions on the production of the former two types, a spokesman for the Alloy Steel Unit of the Steel Branch said last week. The unit is not seeking to increase the use of high-tungsten Class B steels, he said.

Directives were issued last month cutting production of high-moly type high-speed steels beginning with October. At the same time, WPB ordered producers to melt more Class A, Grade I (averaging 4.5 per cent moly and 5.5 per cent tungsten) to make up for the deficiency in Grades II and III.

Manganese Steel Castings Prices Rolled Back to Oct. 1-15 Levels

MAXIMUM prices for manganese steel castings and products have been rolled back to the levels prevailing between Oct. 1 and Oct. 15, 1941, by OPA. The regulation applies not only to producers but to all persons dealing in this material.

Previously ceiling prices for these castings were fixed by the General Maximum Price Regulation at the highest levels prevailing during March, 1942.

The new regulation in effect, lowers ceilings substantially, for prices had been advancing in the final 1941 and initial 1942 quarters. In the fourth quarter of 1941 average prices per pound were 4.4 per cent above the third quarter; and in the opening three months of 1942 a further increase lengthened the advance over the third quarter of 1941 to 10 per cent. A considerable portion of these increases is attributable to a change in the character of work under the war program.

Maximum Price Regulation No. 235, manganese steel castings and manganese steel castings products, effective Oct. 14, establishes prices for such castings in three categories:

1—The published price lists in effect for a seller and distributed to one or more of the seller's customers between Oct. 1 and Oct. 15, 1941, are the maximum prices for such a seller.

2—For castings or products other than those of the first category, specific maximum prices which were in use in general throughout the industry during the Oct. 1-15, 1941, period, are listed as the maximum prices.

3—For castings or products not in the first and second categories, maximum prices are those, based on Oct. 1-15, 1941, cost factors and profit margins, which are submitted to and approved by OPA.

Provision is made in the regulation for establishing maximum prices on particular classifications of castings so as to avoid the necessity of repeated filing of price data for items of the same design.

The regulation provides for freight equalization with whatever foundry is situated most favorably freightwise to the point of destination and which also has the necessary physical equipment to produce the particular casting or product in question.

Ceiling Prices Established for Used Pressure Gas Cylinders

Ceiling prices for used steel high pressure gas cylinders, needed by the Army and Navy, were set by OPA last week at the already regulated price level for new cylinders.

Ordinarily there is no sale of the used cylinders, which are employed for the storage and transportation of oxygen, carbon dioxide and other gases, but the factory supply now cannot meet the demand and, because there was no ascertainable ceiling price for the used cylinders, an inflationary situation existed.

The price, set in the new order, No. 89, under Section 1499.3 (b) of the General Maximum Price Regulation, is that charged by the Harrisburg Steel Corp., largest manufacturer of the cylinders, and has remained unchanged since July 15, 1940.

War Contractors Advised To Ask for Renegotiation

CHICAGO

Corporations with large war contracts are incurring needless liability through delay in undertaking renegotiation. This was the position taken by Maurice H. Karker, chairman of the War Department price adjustment board, Washington, at a press conference here last week.

Millions of dollars of recapturable profits are being accumulated by contractors who will have to turn them back to the government later, Mr. Karker declared, and urged manufacturers to act promptly in submitting contracts for renegotiation.

The war department board, headed by Mr. Karker, will supervise the renegotiation of 90 per cent of the government contracts which are subject to the price adjustment act. The remaining 10 per cent of contracts subject to the act are being handled by the Navy and Maritime Commission.

Under the amendments to the act, sponsored by the War Department and adopted by the Senate Oct. 10, industry is assured of a fair deal, he declared. By shortening the period of liability to one year, instead of three, after the contractor has filed a certified statement, the principal objection to the original law will be eliminated. Unless the government raises a question about a contract within a year, the contractor's liability automatically ceases, Mr. Karker said.

Production of pennies has been curtailed by 50 per cent by the United States Mint in recent months, to conserve metals necessary for production of war materials.

Shortage of high-grade iron ore or sinter for use in open-hearth furnaces may become acute in 1943. Situation accentuated by increased demand and inability to import from Sweden and Brazil

A LOT of publicity has been given to the danger of a scrap shortage and to the need for more pig iron to support and increase steel production. There is another threatening bottleneck which has been less frequently publicized but which is equally serious. That is the supply of high-grade iron ore or sinter for use in open-hearth furnaces. Many keen minds are concentrating on this problem.

The average standard iron ore obtainable in North America is tending constantly toward lower iron content, while it is high in moisture, silica and phosphorus, soft and fine in structure and thus full of dust and other particles. The supply of hard or lump ore is not sufficient to go around, not only because of expanded demand but also because it no longer is possible to bring in such ore from Sweden and Brazil.

Today steelmakers are just getting by. Looking ahead, and making allowance for requirements in the steelworks expansion program now under way, something probably will have to be done to provide the full 1943 supply of charge ore, while the prospect for 1944 is discouraging.

In view of the fact that the expansion program is slated to be completed by July 1 of 1943, it now is expected that the mean open-hearth capacity for that year, not including bessemer and electric furnace capacity, will be about 84,885,000 net tons of ingots. Calculating conservatively that operations for the year will average about 96 per cent, this would indicate production of approximately 81,200,000 net tons of basic open-hearth ingots.

For the production of this amount of steel at least 10,380,000 gross tons of high-grade iron ore or equivalent will have to be charged into open-hearth furnaces, figuring on the basis of 51.5 per cent iron content.

There are rather divergent ideas as to the amount of soft or fine ore that may be charged into open-hearth furnaces without losing production or lowering quality of the product. It seems to be generally accepted, however, that the maximum is not more than 200 pounds per ton of steel, and then only if the ore is not excessively fine and the combined silica and chemical moisture present are not much above 15 pounds per ton of ingot.

AISI Committee Concurs

A committee of the American Iron and Steel Institute, with C. H. Herty as chairman, in April this year at a meeting of the Open Hearth and Blast Furnace and Raw Materials Committees of the American Institute of Mining and Metallurgical Engineers, reported experience substantially confirming the foregoing general statement. Mr. Herty reported that in one case satisfactory results were obtained by charging 165 pounds of soft ore and 130 pounds of sinter per ton of ingot. In another, the charge was made up of 90 pounds of soft ore and 146 pounds of sinter. In another instance, 170 pounds of soft ore, 82 pounds of sinter and 75 pounds of hard ore were charged. In another, 143 pounds of soft ore and 216 pounds of sinter was charged. The maximum charge of soft ore reported was 198 pounds, supplemented with 77 pounds of sinter.

On this basis not more than 7,000,000 tons of soft ore could be used toward the total requirement of 10,380,000 tons.

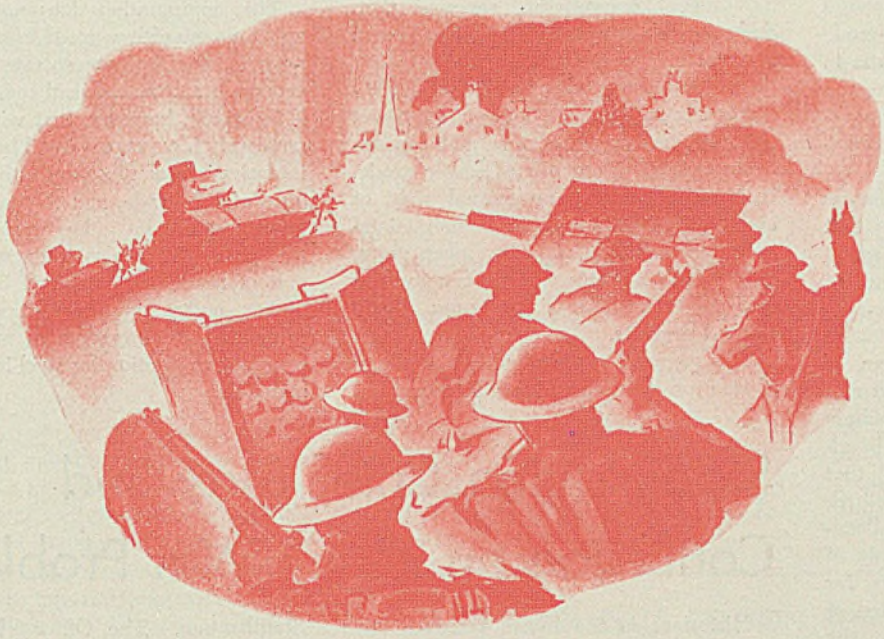
The apparent supply of hard or lump ore for 1943 is estimated at about 1,200,000 tons. The shortage will be met for a while by using sintered or nodulized ore. When new blast furnaces now under construction are lighted, however, there will not be enough sinter to go around. Potential annual production of sinter in the Adirondack, Michipicoten and Lake Superior districts is 2,800,000 tons, but the major portion of the expanded sinter production program was set up to meet blast furnace needs.

There is, of course, no accurate way of

—o—

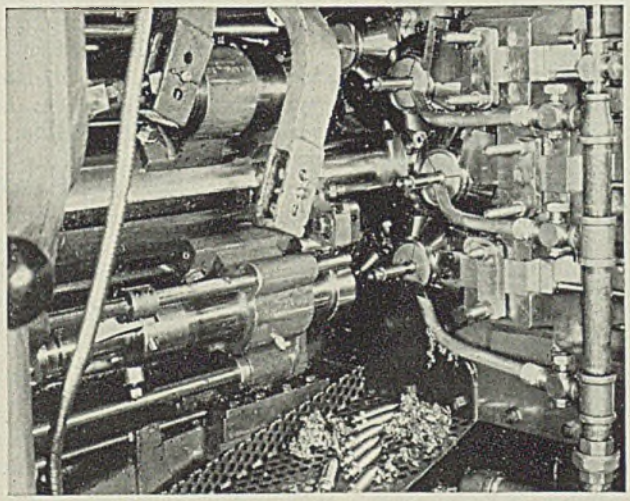
NEW ORE CARRIER GOES INTO SERVICE

VESSEL capacity and storage facilities at furnaces and lower lake ports are the chief limiting factors in moving the tremendous quantities of iron ore required for the war program. The carrying problem has been somewhat alleviated by the commissioning of several new United States Steel Corp. freighters; latest to go into service is the IRVING S. OLDS, shown here with Mr. Olds aboard, which has capacity of about 18,000 tons

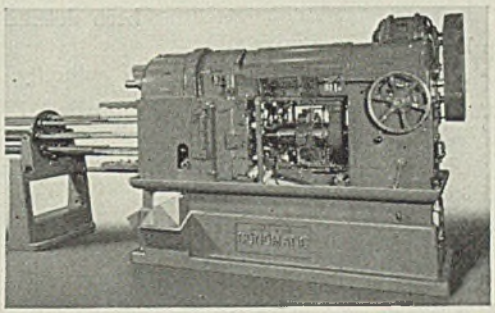


Unity, Stability, Action

WITH CONOMATIC



20 millimeter shell bodies coming from 8 spindle Conomatic.



Front view of 8 spindle Conomatic.

Write **now** for particulars and catalog.

CONE AUTOMATIC MACHINE COMPANY, INC.

WINDSOR, VERMONT, U.S.A.

estimating what the deficiency will be but a shortage of considerable size now is foreseen. In some quarters it is estimated roughly that the shortage of high-grade iron ore or equivalent material for use in open-hearth furnaces will reach some 3,700,000 tons in 1944, even after earmarking all Adirondack sinter for use in open-hearth furnaces.

This is considered by some observers as a conservative figure for the reason that if scrap collection is not maintained at least at current levels, requirements of open-hearth quality ore will increase correspondingly.

It thus is seen that the problem of utilizing our iron ore is complicated and that the point may soon be reached where careful judgment will be required in allocating the available supply so that balanced production may be maintained. Prevailing opinion is that such allocations must insure an adequate supply of charge ore for open-hearth furnaces, for iron ore, in addition to being a source of oxygen for oxidizing metalloids in the open-hearth charge, adds to the size of the heat and thus creates metallics that otherwise could not be produced.

A possible solution to the problem may be in the wider use of briquetting methods now used by certain steel companies and being investigated by others. They blend a small amount of cement with fine ore in a concrete mixer and press the resulting product into briquettes which are sufficiently heavy to sink to the bottom of the hearth.

Canadian Development Will Help

In view of this situation the Canadian government has agreed to help the development of the Steep Rock iron ore deposit in the Atikokan section of Ontario. This ore is of fine quality for open-hearth use and averages 61 to 65 per cent iron. The government is giving assistance in the form of a subsidy in the rail rate, by paying the cost of the construction of a spur into the property and by constructing a dock at Port Arthur—both spur and dock to be operated by the Canadian National Railways. Unfortunately this deposit is under a lake of substantial size so that hydraulic operations of a large scale are required to drain off the water so that the ore may be won by surface mining and open-cut methods. Eighteen months to two years are expected to elapse before ore can be shipped from this source.

While the problem of providing sufficient charge ore for open-hearth furnaces thus is of immediate concern, the iron ore situation as a whole deserves careful thought. Recently R. C. Allen, then deputy chief of the Iron and Steel Branch of the War Production Board, declared that at the existing rate of depletion our known reserves of Lake Superior iron ores will be exhausted within 15 years.

A recent computation revealed that, deducting shipments in 1942, our known reserves of iron ore in the Lake Superior district are in the neighborhood of 1,200,000,000 tons. This includes open-pit direct ore, underground direct ore and concentrates derived from ore of lower grade. It is estimated that an annual yield of about 100,000,000 tons can be maintained only over a period of six or seven years, after which the rate would have to drop due to exhaustion of the more easily worked deposits.

This means that we should have plenty of iron ore to wage and win this war, but that we must take thought for future years.

This computation does not include a vast tonnage of low-grade iron ores which now cannot be concentrated both for economic and mechanical reasons. It now is indicated, however, that within a comparatively few years we will have to begin intensive use of these and other domestic ores of sub-grade, and that we will have to import ore on a larger scale than in the past. This also suggests that the cost of producing steel will be relatively higher under these conditions than at present, thus implying a more highly competitive position for steel in the war of materials.

Stabilization Chief May End Confusion on Many War Problems

Historians in the future possibly may refer to President Roosevelt's appointment of a Director of Economic Stabilization as one of his most effective actions during the war.

Hitherto the President has hedged in extending authority to any individual or group. Now and then, when the program creaked, it has been his custom to set up a new super board or commission with more authority than the previous one—but still short of the amount of authority needed. Authority seldom has been definitely assigned, with the result that there has been much overlapping of authority.

Thus, a good many spokesmen take it upon themselves to issue statements, some of them comforting and others alarming, upon the same subject. We have had a good deal of this recently on rubber, gasoline and fuel oil rationing, the manpower situation, the food supply and many other subjects of interest to our citizens in general.

If President Roosevelt's action turns out as Washington at present expects there is to be an early end to much of the existing confusion. The new Director of Economic Stabilization is an "economic czar" who has control over all elements in the wartime economy. These include salaries, wages, purchasing power, profits, prices, rationing, rents, subsidies and so on. Under the assignment that has been given to him he may make use of the emergency powers that Congress has invested in the President. In other words, in directing and controlling our economy, he answers only to the President.

Under the new setup, the War Labor Board could not make wage or other decisions affecting the economy without approval by the Director of Economic Stabilization. The Office of Price Administration no longer could set price ceilings or establish rationing plans without such approval. The War Production Board and the War Manpower Commission would require such approval in order to transfer men and women to new jobs.

This is good news. Officials so far mobilized in government service have been unable to get policy approvals or directives without long and costly delays. Now they should be in a position to get quick action.

While many highly competent men are mobilized in the direction of the war effort their advice is not always heeded. Politics and rivalries are factors that block intelligent action in all too many cases. Many individuals connected with the government in one way or another like publicity and do not care so much about the accuracy of their statements and accusations as they do about making headlines.

Has Permitted "Politics"

It was this factor apparently that enabled the Department of Justice to use the Senate Committee on Patents as a sounding board to smear the American patent system in order to set the stage for an attempt to obtain federal licensing of corporations and thus get business under the thumb of the department.

It was the same factor that enabled the Bureau of Mines to get an appropriation of $600,000 for a sponge iron experimental program despite the fact that all the experts were agreed that such a program was not desirable and that it would hamper rather than help the war effort. Apparently the vote-getting value of the slogan "a sponge iron plant at the mouth of every mine" and of the asser-

tion that the large steel corporations have held sponge iron back in order to protect their investments in the iron ore properties of Minnesota and thus exploit the rest of the country won the day.

It is fortunate that the newly appointed Director of Economic Stabilization is a conservative, courageous and intelligent man. James Francis Byrnes, a lawyer from Spartansburg, S. C., twice elected to the Senate from that state, established a fine record as a senator until June of 1941, and as a Supreme Court justice since then. He is nobody's "yes man," has a logical mind and is not easily fooled. He fights for what he believes to be right.

At the same time Mr. Byrnes has unusual ability in getting along with people. He exercises tact and diplomacy—so that he is liked and respected even by those whose views he does not share. This qualification, of course, is going to be a great help to him in discharging his new responsibilities.

Mr. Byrnes works hard but quietly and smoothly. He never has sought the limelight. Hence it is unlikely that there will be a new high-powered publicity organization in his office similar to many now in existence in Washington. It is believed quite likely that he will do his work without fanfare, largely behind the scenes, and that most of his decisions will be issued in the form of directives by the Office of Price Administration, War Production Board, War Labor Board or other agencies that have to do with angles of the national economy.

WPB Simplifies Report Forms

Completion of a report covering all forms used by the WPB to obtain information from American business was announced last week by Chairman Donald M. Nelson. The report was prepared by the Committee for the Review of Data Requests from Industry, under the chairmanship of Joseph I. Lubin.

In announcing the report Mr. Nelson said: "Elimination of unnecessary paper work is of vital importance to the war program. This committee has made a real and important contribution to increasing war production.

"A few months ago I felt that we could save industry trouble by eliminating forms and improving others. It was for that reason that I appointed the Lubin committee. We have now brought the situation under control, and we expect to make many further improvements, while recognizing that a large amount of statistical information is absolutely essential for efficient control of war production."

The committee report covered a survey of all WPB forms. One hundred and twenty were completely eliminated and 132 were improved and simplified. The forms eliminated or improved affected nearly 150,000 respondents.

Correspondence received by the committee indicated that business has been bothered even more by the complexity of various forms and the difficulty of assembling some of the data required than by the actual number of forms. Consequently, even more beneficial results have been achieved by simplification of forms and elimination of unnecessary reports than by the number of forms completely dispensed with.

For example, the report states, "As a result of meetings of representatives of United States Steel Corp., Bethlehem Steel Co., Republic Steel Corp., and Inland Steel Co., agreements were reached with the heads of several organization units of the War Production Board which will relieve companies in the steel industry of making hundreds of thousands of entries monthly."

Another achievement of the committee in co-operation with the WPB Chemical Branch was the development of two standard forms to be used for the allocation of all chemicals, in place of the many individual forms formerly used. The standard forms also eliminate about 40 per cent of the content of those which they replace.

One of the most important reforms affected by the committee is the establishment of centralized control of the issuance of new forms. Since Sept. 1 no Division or Branch of WPB can issue a form requesting information from indus-

RUBBER CHIEF TELLS COTTON SENATORS TO SKIP POLITICS

RUBBER Czar William Jeffers emphasized the new government attitude "to get tough" when he appeared before the Senate Agriculture Committee last week to explain why he was authorizing the substitution of rayon for cotton in the manufacture of tires. Mr. Jeffers, before a critical group of cotton state senators, said "we have gambled too damn long . . ." If rayon does a better job than cotton, he said, "then I'm for rayon. Make no mistake about it, I am not influenced by anybody or anyone."

try without approval by the committee and the Bureau of the Budget. Approved forms issued since that date bear a Bureau of Budget serial number and expiration date.

After a stock of the older forms are used, an announcement will be made that no form not needed be used, unless it bears the Bureau of Budget stamp of approval.

In the meantime, a list of forms which continue in use will be published in *Priorities*, available for inspection at all WPB district and regional offices about Oct. 15. Before filling out any form not listed in *Priorities* companies should write to the Committee for the Review of Data Requests from Industry, Social Security building, Washington, to find out if use of the form is still required.

All forms now being issued are being designed or redesigned so that they will fit a standard carriage typewriter and controls have been set up through the administrative officer of the WPB, in cooperation with the public printer, to prevent issuance of any new unauthorized or "bootleg" form.

Policy Committee Will Advise WPB on Means To Sustain Output

Broadened War Production Drive Headquarters has been established in WPB and a five-man Production Drive Policy Committee appointed to advise in the setting of policies for sustained and increased war production through labor-management plant committees.

Director of the headquarters—and, accordingly, the official who henceforth will guide the far-flung organization of joint committees in war factories throughout the country—is W. G. Marshall, Pittsburgh, who is vice president of the Westinghouse Electric & Mfg. Co.

Mr. Marshall also is named chairman of the Policy Committee whose composition, like that of the plant committees themselves, symbolizes the united effort embodied in the production drive.

Under Mr. Marshall, who as chairman represents the government, are two representatives of organized labor, one nominated by the Congress of Industrial Organizations and one by the American Federation of Labor; and two representatives of organized industry, one nominated by the United States Chamber of Commerce and one by the National Association of Manufacturers.

These members are: John Green, president, Industrial Union of Marine and Shipbuilding Workers of America, CIO.

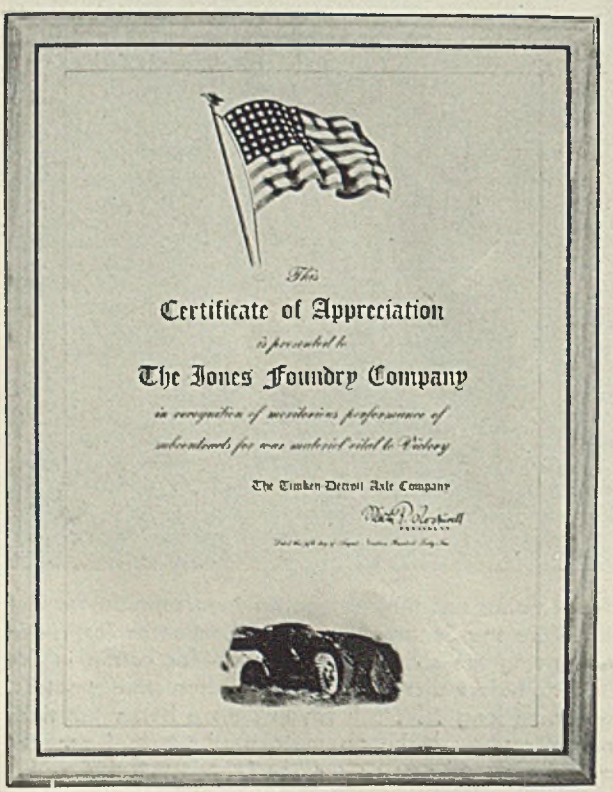
Frank Fenton, director of organization, AFL.

Harry C. Beaver, president, The Worthington Pump and Machinery Corp., New York, nominated by the National Association of Manufacturers.

Otto A. Seyferth, president, the Western Michigan Steel Foundry Co., Muskegon, Mich., nominated by the United States Chamber of Commerce.

Committee was named by Mr. Nelson following recent discussions with leaders of organized labor, who had expressed the wish that the joint committee idea might be incorporated in the very top structure of the production drive. The committee is to advise and assist its chairman in the setting of broad policies for the operation of the plant committees, and will meet in Washington at the call of its chairman to explore and handle such matters as Mr. Marshall or the other members feel should come before it.

GIVES SUBCONTRACTORS CERTIFICATE OF APPRECIATION



RECOGNITION of the efforts of the "forgotten man" in the war production program — the subcontractor — is found in the "Certificate of Appreciation," awarded by Timken-Detroit Axle Co., Detroit, to its more than 100 subcontractors for meritorious performance on war materiel orders. Typical of the reaction to the certificates is that of a large foundry and machine company which wrote: "This is the first instance in which we have had tangible expression of gratitude for the hard work and energy we have expended in fulfilling our contracts with prime contractors."

WPB Conservation Division Shifts Executive Personnel

Several changes in the organization of the WPB Conservation Division were announced last week by Lessing J. Rosenwald, director.

Howard Coonley, chairman of the Walworth Co. and formerly president of the National Association of Manufacturers, has been appointed a deputy director. He formerly was chief of the Simplification Branch.

Paul Cabot continues as a deputy director.

R. K. White, chief of the Tin Salvage Unit, has been appointed chief of the General Salvage Section, succeeding Herbert Gutterson, who becomes executive advisor on field operations. Mr. White formerly was assistant general sales manager of the Pontiac Motor Car Co. and general advertising manager for the Chevrolet Motor Co.

Robert B. Shepard has been promoted from deputy chief to chief of the Simplification Branch.

Brazil in 1941 produced 208,795 metric tons of pig iron, 154,189 tons of steel ingots and 149,928 tons of rolled products, compared with 185,300 tons of pig iron, 141,000 tons of ingots and 135,300 tons of rolled products in 1940, according to unofficial reports. Iron and steel exports in 1941 were 56,102 tons, most of which went to Argentina.

Auto Industry Urges Schedules Be Geared to Availability of Materials

DETROIT

DISTRIBUTION of basic materials to war production plants is building up to one of the most critical problems facing industry today. Realizing this, the automotive industry, through the Automotive Council for War Production, has made strong representations to the WPB and other Washington officials for a plan of basic material distribution through relating war product schedules to the availability of materials.

Alarmed over the possibility of shutdowns in war plants developing through materials shortages, the ACWP, representing 363 companies in the automotive and automotive parts industries, declares the current system of materials distribution under the PRP plan is tangled in a hopeless mass of clerical detail, and that the more recent plan proposed by Ferdinand Eberstadt, WPB materials chief, and known as the budget system of allocation, also will delay production of vital military equipment.

Essentially, the alternative plan favored by the motor industry involves monthly scheduling of war products on the basis of available material. Steel is the chief concern now, but the system would be applicable to other metals as well. When the plan was first presented to the industry here Sept. 18 by the automotive branch of WPB, industry representatives approved it and at the same time pointed out deficiencies in the PRP which raised the need for emergency steps to improve the materials picture. In a letter to Donald M. Nelson dated Sept. 22, industry representatives pointed out that even at that late date all PD-25A applications for fourth-quarter steel had not been "processed" and returned so that orders for steel might be placed. WPB was urged to make outright emergency estimates to balance material requirements with available supply of material, so that plants might revise their production schedules at once if this appeared necessary.

The original system of priorities and the succeeding PRP plan were satisfactory, according to the motor industry, as long as war production was only a minor percentage of total production, but with industry moving toward 100 per cent all-out war production, these systems began to creak under the weight of burdensome clerical detail necessary before any orders for material could be placed.

The auto industry cites as one of the fundamentals of mass production the monthly scheduling of production in direct reference to availability of raw materials. Inventories are kept to a minimum, and with the government the only customer there is no incentive to build up inventories.

It is recognized that in the transition from a system of preference rating to one of monthly scheduling of finished goods, there would have to be a temporary product code which would show the order of importance of various types of war products, but as finally operating the industry plan would be based on individual "bills of material" showing unit quantities of material going into each specific war product. Scheduling of production then would be based on the available tonnage of material, with a reserve amount set aside for such emergencies as rush production of new devices, increased production rates because of demands of military strategy, etc.

Analysts see one major difference between the Eberstadt plan of "steel budgeting" and the "product scheduling" plan—production does not have to be held up awaiting clearance of forms and applications for material through WPB. The former system would require a manufacturer to receive his order from the armed services and then not only work out the amount of material required but justify this need with the WPB before ordering the material. This is not too difficult in an individual case, but obviously if every manufacturer has to come to Washington and justify each use of material for each item of equipment produced before the material can be ordered, the whole system of materials distribution becomes so complicated as to be unworkable.

The automotive industry's views were presented in Washington Oct. 9 by a committee including C. E. Wilson of General Motors, A. M. Wibel of Ford, I. T. O'Brien of Chrysler, James Marks of Packard, E. A. Clark of Budd Wheel, Karl Ammerman of Borg-Warner, Courtney Johnson of Studebaker and George Romney of the ACWP. Representing the government were Eberstadt, E. C. Kanzler of WPB, B. M. Baruch, R. P. Patterson and James V. Forrestal.

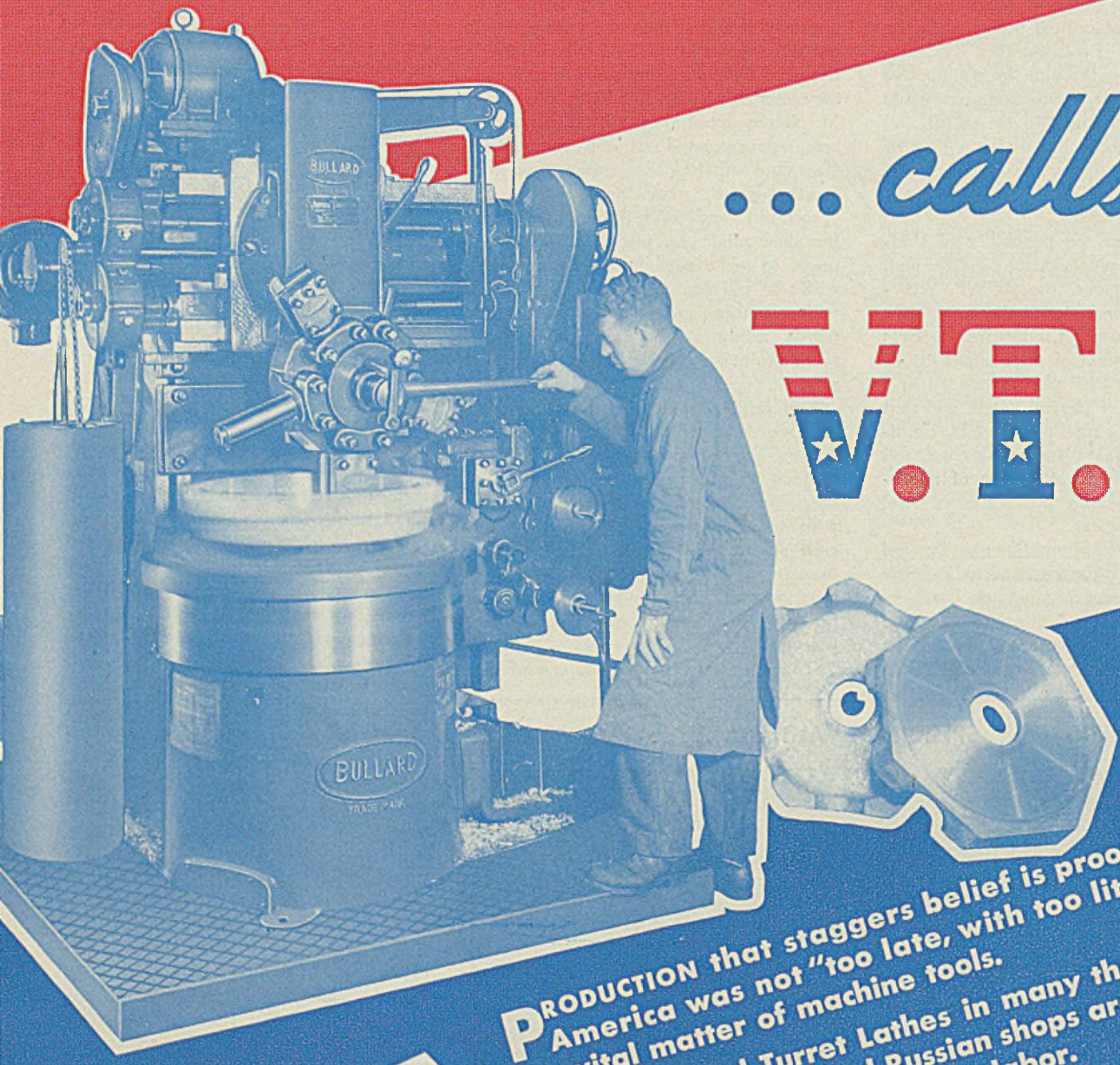
At this meeting, Eberstadt said he had decided to place the so-called "steel budget" plan into effect. This plan is said to be favored by the Army and Navy, and reportedly by the steel industry. However, after the strong protest by the motor industry, the move was apparently delayed and final decision still is pending.

The issue in effect narrows down to a question of whether the government and WPB shall police the flow of materials before orders are placed or immediately afterward.

WIN AWARDS FOR SPEEDING WAR MATERIEL PRODUCTION

THESE workers have just received honor awards from the War Production Board for their suggestions on ways to speed the production of Packard-built Rolls-Royce aircraft engines and Navy PT boat engines. NEA photo

VICTORY THROUGH LABOR



... calls for V.T.Ls

PRODUCTION that staggers belief is proof that America was not "too late, with too little" in the vital matter of machine tools.

Bullard Vertical Turret Lathes in many thousands of American, British and Russian shops are speeding the day of Victory through labor.

They cut machining time, and time between cuts. They multiply individual output, and reduce over-all time throughout the whole field of armament building.

A few of the "V" features of V.T.L.s are listed below.

FEATURES OF THE V.T.L. "V"

- Vertical Design
- Rigidity and Power for Carbide Tools
- 5-Face Turret on Main Head
- Centralized Control
- Rapid Power Traverse of Main Head
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- Simultaneous and Independent Head Action

THE BULLARD COMPANY

BRIDGEPORT, CONNECTICUT

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

MIRRORS of MOTORDOM

Article on new lead coating brings many inquiries. Reveals several other researches which have reached commercial stage. Cleaning of surface of metal to be coated important

RECENT discussion in STEEL (Sept. 14, p. 97) of a new type of processed lead coating for iron and steel, applied by pickling, fluxing and hot dipping, has stimulated inquiry from companies interested in coating materials, and also has brought to light other research on lead coating which has progressed to the commercial stage.

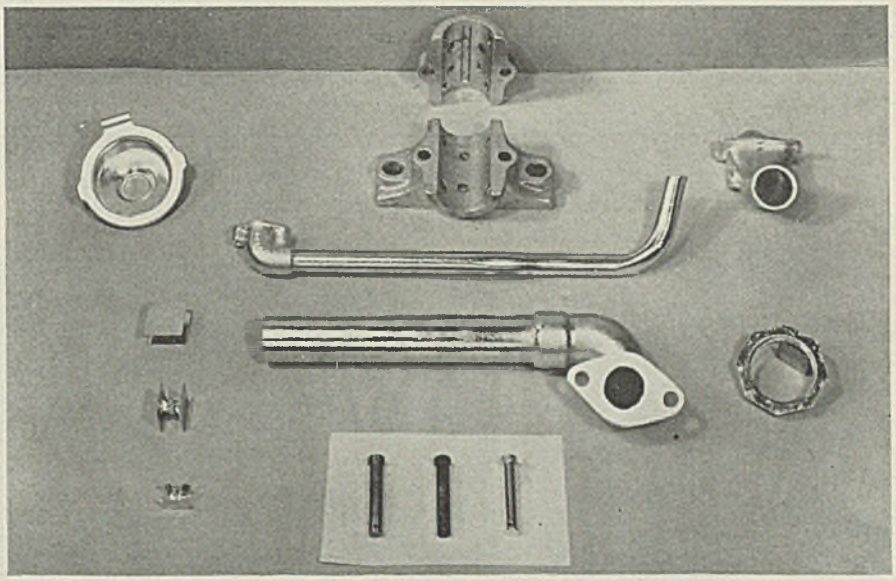
Several years ago, J. H. Shoemaker of Detroit, who, in his capacity as secretary of the Leaf Spring Institute, was casting about for some means to coat spring leaves to provide better sliding contact, began studying the possibilities of lead coating these steel springs. He took some samples, acid pickled them and then hot dipped in a lead bath after fluxing to obtain what was virtually a "tinned" steel. Tests on these springs showed them to be fairly corrosion resistant, but in service they failed in short order because of hydrogen embrittlement of the steel resulting from the pickling operation.

To overcome this deficiency, it was suggested that the springs be boiled in oil before lead coating on the theory this would remove all traces of hydrogen. However, such treatment failed to make any material difference as far as performance was concerned. Working with Mr. Shoemaker in this study was H. G. Webster, chemist and metallurgist, both of them being active in the manufacture and marketing of Kolene, a chlorinated solvent produced by the Kolene Corp., Detroit.

Concurrent with the investigation of springs were experiments in lead coating of iron and steel to provide a strongly-bonded base for subsequent tinning, babbitting or other surface coating. They experimented with various means of "processing" leads with combinations of acids, steam, gases and the like, finally concluding that such treatments meant nothing as far as obtaining a good bond between the coating and the base metal was concerned, the most important consideration being thorough cleaning of the base metal surface.

Connotation of this word "cleaning" is not simply removal of oil, dirt, scale and foreign substances, but in addition, a subsurface cleaning of the metal to remove nonmetallic inclusions, metalloids, even carbon. To accomplish, they developed a bath of catalyzed molten salts which serves to oxidize the surface of the part violently and quickly, either removing the oxidized impurities from the surface or converting them to oxides readily soluble in weak acids.

The molten salts in the cleaning bath, held at temperature around 800 degrees Fahr., are water soluble and can be washed off a part after immersion. At this stage the surface is a dark gray in appearance, resulting from the strong oxidizing action. Even rust spots are converted to the gray ferric oxides. Immersion in a 10 per cent hydrochloric acid dissolves the oxide, leaving the part bright and clean. It is then dipped in any conventional soldering flux and transported to a



Variety of iron and steel parts with lead-tin-antimony dipped coating. Long pieces in center are interesting because they represent castings welded to steel tubing and then coated. Three small pieces at left are lead coated foundry chaplets. Studs in foreground show three steps in treatment—oily untreated piece, piece after exposure to oxidizing cleaner, and finally after lead coating

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J. H. Shoemaker (left) and H. G. Webster, originators of a new method of cleaning iron and steel parts for subsequent lead coating. The three heated pots contain, from left to right, oxidizing cleaner operated at 800 degrees Fahr.; reducing cleaner for cast iron, operated at 270 degrees, and lead bath in which cleaned parts are dipped. To the rear of the lead bath is a tank holding flux, while at extreme right is barrel containing weak acid solution in which parts are dipped to remove oxide layer produced by cleaner. This is a purely experimental installation

bath of molten lead. Low surface tension of the lead bath, plus the thorough cleaning of the surface, gives a smooth, adherent coating of lead only about 0.0005-inch thick.

Seeking a suitable alloy material which would have better wetting capacity than straight lead, several mixtures were tried, final choice being a composition of 90 per cent lead, the balance tin and antimony. No attempt is made to purify this alloy beyond good commercial practice. The tin and antimony serve to increase strength of the alloy and to improve the wetting capacity (or lower the surface tension).

During the development of this process for cleaning and coating steel parts investigation turned to cast iron which had hitherto defied all efforts at "tinning," presumably because of the exposed flakes of uncombined carbon to which the coating material will not adhere. It was reasoned that the same procedure as used on steel would serve to oxidize the surface of a casting, including exposed graphite, but that subsequent acid treatment to dissolve these oxides doubtless would dissolve some base metal and expose further graphite. Experiments confirmed this conclusion.

To avoid this, a second type of cleaner was developed, a mixture of water soluble salts, highly reducing in nature and operated at a lower temperature, around 270 degrees Fahr. Thus a casting oxidized in the first bath could be rinsed in water and placed in the No. 2 or reducing bath long enough to reduce the oxide layer, then rinsed again, given a quick dip in weak acid, fluxed and lead coated. After considerable experimentation with immersion time, temperature and bath composition, this procedure proved feasible, and it is now possible to take an ordinary gray iron casting, give it the double cleaning treatment, quick acid dip, flux and lead dip, and obtain a smooth, tightly adherent coating, with no bubbles or visible porosity.

Immersion Time Varies

Time of immersion in the first cleaner varies from 30 seconds to 10 minutes on steel and from 5 to 15 minutes on cast iron. Time of immersion in the second cleaner for castings is roughly double whatever the time on the first cleaner; thus a casting held for 5 minutes in the first would be kept for 10 minutes in the second. Time in the acid solution is usually around 1 minute, the high oxides developed in the cleaner readily dissolving in even the weak acid.

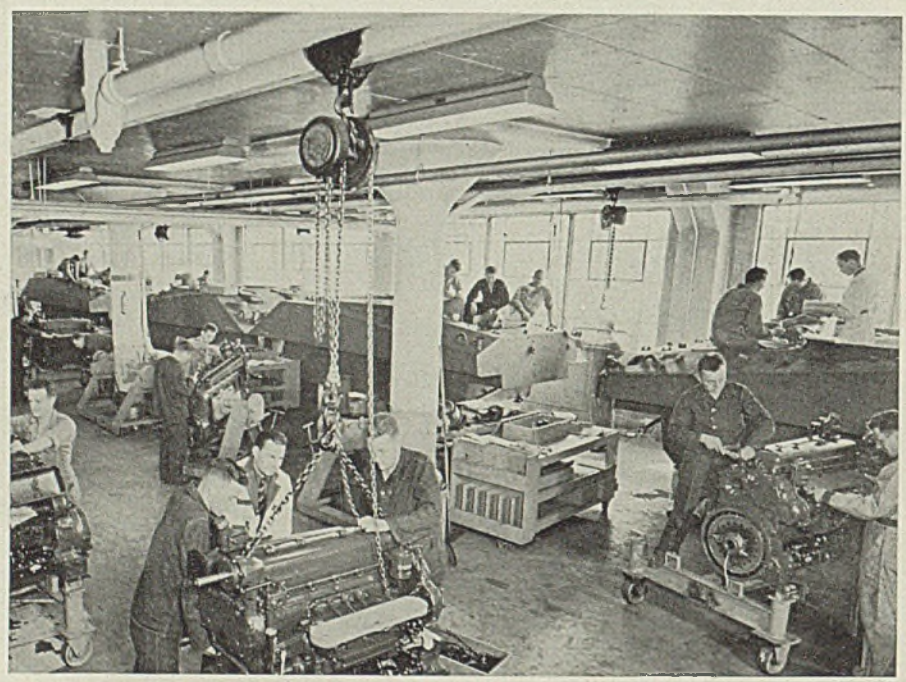
The system appears to have interesting possibilities as a means of bonding bearing surfaces to iron or steel backings. Conventional bonds use a minimum of 60 per cent tin alloy, and, of course, cannot be applied successfully to cast iron, without anchors or other mechanical locking means. By the use of Kolene cleaner and Flometal (name coined for the lead-tin-antimony alloy) it is possible to produce a bond which preliminary tests have shown to be equivalent in strength to the high-tin bonds.

No broad claims are made on the score of corrosion resistance of the lead coating. They are inclined to the view that any thin coating of this type may show pinholes and eventually develop rust spots when subjected to rigorous salt spray tests. However, an automobile muffler cleaned and coated by the process showed several times the life of a conventional terne plate muffler, and a wide variety of ordinary small parts has shown few observable effects from long periods of normal weathering.

Several commercial installations either are now in operation or are in process of being set up to use the Kolene-Flometal method of lead coating. At the moment, the fact that lead is a noncritical metal lends considerable emphasis to the desirability of replacing tin by lead in as many applications as possible.

Penetration of the lead coating alloy into the surface of parts is demonstrated by photomicrographs. In one instance, a cast iron part, the surface voids left by the oxidized graphite appear to have been completely filled by the lead alloy, and there is even a suggestion of interalloying between the iron-base material and the lead coating. How this would be possible at the comparatively low coating temperature—600 degrees—is not immediately explained. German investigators have reported that even liquid iron and liquid lead are practically mutually insoluble. Solubility of iron in lead is given by these metallurgists as on the order of 0.0002-0.0003 per cent. This would give rise to considerable doubt over alloying of the coating with the base metal. It should be pointed out, however, that iron is soluble in both tin and antimony, although at considerably higher temperatures than used in the hot dipping bath.

"SOLDIER MECHANICS" IN DIESEL ENGINE SCHOOL



"TWO MEN to an engine" is the rule of the diesel engine school operated by the Detroit Diesel Engine division of General Motors Corp. Illustrated here is the tank engine section, men in the background installing diesel engine in actual medium tank hulls. Soldier mechanics are given an intensive course covering 144 hours of study. Already 300 have completed the course and new men are enrolled at a rate of 40 a week

Shop Ideas Win $150,000 in War Bonds for G-M Workers

Since last April, General Motors employes in 31 different divisions have turned in a total of 31,777 suggestions for improving shop practice. By the end of August, 25,278 of these ideas had been reviewed and 3938, or 16 per cent, accepted. War bonds and stamps, with total face value in excess of $150,000, have been distributed to recipients of award suggestions.

FROM AN ORIGINAL DRAWING BY ORISON MACPHERSON

BLOOMING MILL MEN PACE WAR STEEL PRODUCTION

As easily and swiftly as U. S. Army men handle big tanks, steel workers at the controls of their blooming mills skilfully maneuver massive steel ingots through the rolls. In a minute of great pressure, with thundering noise and fireworks, the white-hot steel blocks weighing many tons are reduced to blooms and slabs that move on through other operations. The finished steel products are shipped to thousands of other manufacturers to become ships, shells, tanks, guns, planes, bombs.

Blooming mill men in America's steel industry are operators of great gateways through which millions upon millions of tons of steel roll on to war. They are meeting this responsibility splendidly by all-time production records.

In this industry effort, J&L men in the blooming mill departments of the Aliquippa, Otis and Pittsburgh works are rolling ingots of controlled quality war-steel at highest record rates in the history of the three works. There is no time being lost or material wasted on the steel front.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH, PENNSYLVANIA

PARTNER TO INDUSTRY IN WAR PRODUCTION

J&L STEEL

Steel Marooned by Lack of Shipping

To the Editor:

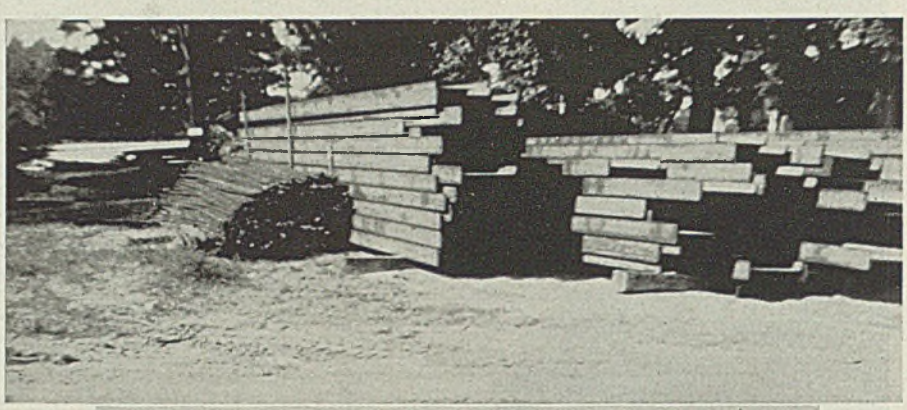
The current scarcity of steel has prompted me to send you the enclosed pictures. (Several reproduced at right).

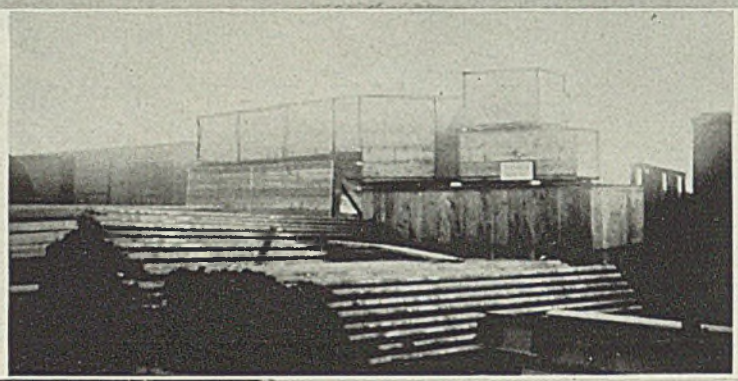
These pictures represent a portion of 450 car loads of steel and equipment unloaded in our city by the Illinois Central Railroad Co., due to lack of shipping space to South America. All of the material was consigned to a refinery in South America, shipped to New Orleans, and then shipped back to Jackson to be unloaded for lack of storage space in New Orleans.

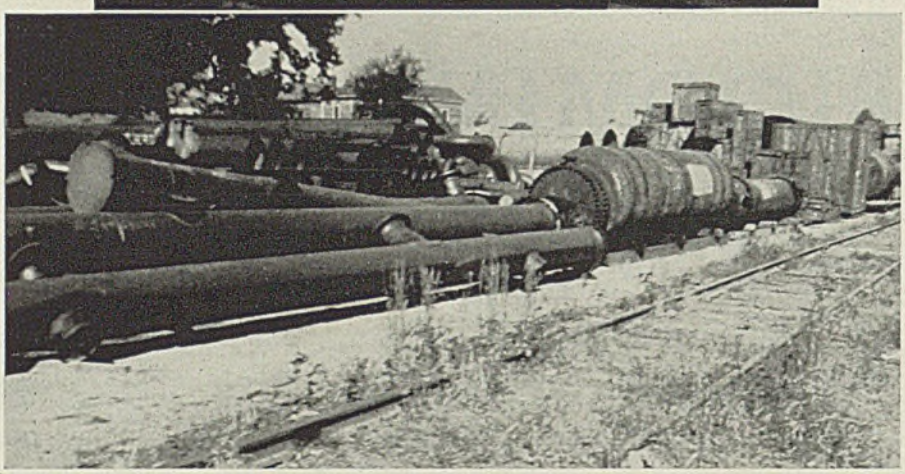
For a distance of at least three quarters of a mile, tons and tons of pipe, structurals, tanks and miscellaneous equipment are lying on the ground waiting for the time when shipping space may again be available.

When I look at the huge assortment of steel, pipe and equipment which may not be moved for some months and then consider how many businesses are having such difficulty in getting steel it makes me realize that some people are getting . . . steel, and others practically none.

GEORGE M. RITTELMEYER
General Manager
Mississippi Foundry & Machine Co.,
Jackson, Miss., Oct. 10, 1942.







Canadian Suggests "Gold Standard War"

Prompted by STEEL's account of R. C. Allen's address at the dedication of American Rolling Mill Co.'s new Bellefonte blast furnace, in which Mr. Allen stated that possession of most of the mineral wealth by the United Nations was one of the causes of the war, G. G. Complin, vice president and general manager, Metallic Roofing Co. of Canada, Toronto, Ont., in a letter to STEEL suggests the present world conflict be called "The Gold Standard Money War."

Mr. Complin says: "It was not that we, the United Nations refused to sell minerals—no, no. We were always very strong on 'selling,' but the trouble was that we would not sell for anything but gold standard money. Our bankers howled their heads off when barter was suggested, so, countries not having gold were out of luck . . ."

Mr. Complin continues:

"Let me very thoroughly agree that, right now, we MUST FIGHT AND WIN —there can be no argument on that point, between men of good-will.

"But, as for waiting until the fighting is over before setting out to correct the cause of the war—on this point I must take issue with you respectfully, but very definitely. If this war ends, with the people who caused it still in the saddle, then we have lost the peace, and we are all set for another period of misery, followed by another war.

"My studies of the past 11 years have convinced me that, the present privately-owned and controlled gold standard money system is the cause of recurring depressions, and of the paradox of poverty amid plenty.

"And, in turn, poverty amid plenty, on an international scale, is the cause of wars. 'Poverty amid plenty' is simply another way of expressing Mr. Allen's thought as to 'Unequal distribution.'

"Disraeli, one-time Premier of England, is quoted as having said, 'The world is governed by very different personages from those imagined by people who are not behind the scenes. Your country—my country—the British Empire—are not governed by those whom you and I elect to govern it, for the simple reason that the latter are governed by the money power. Therefore, if we are to avoid future wars, we must oust the money power from control of our government. . .

"The Prime Minister of Canada has said that, if the required reforms are not on their way before this war is over, we shall never attain them.

"I clearly recall that, in one of his speeches your President said 'We have ousted the money changers from the temple of our civilization, leaving us free to restore the ancient truths.'

"I shall follow, with great interest, any comments that may appear in STEEL on this subject, and may I commend it to you as one most worthy of the very serious study of all those who genuinely, and unselfishly, desire that the world of the future be a better place to live in."

Allis-Chalmers Workers Subscribe at Rate of $4,500,000 Annually

Ninety-six per cent sign up in two-week campaign. Pledge more than tenth of earnings

NINETY-SIX per cent of employes of Allis-Chalmers Mfg. Co., Milwaukee, subscribed approximately 11½ per cent of their earnings for the purchase of War Bonds during a recent two-week campaign. Employes in two of the company's plants pledged 100 per cent participation.

The workers now are buying bonds at the rate of $4,500,000 annually.

The company's campaign was directed by Joseph F. Ryan, assistant secretary-treasurer and was based on the obtaining of full co-operation in each department and shop. Department heads and shop superintendents were appointed as subchairmen and they in turn selected a number of aides so that each worker could be contacted personally. A list of the subchairmen and their aides was posted in each department to enable the employes to contact the drive leaders voluntarily with a minimum of difficulty.

Each subchairman was given a carefully prepared instruction sheet, which, among other things, definitely pointed out that no coercion was to be used. Subscription blanks, 10 per cent pins, and stickers and other campaign material were distributed to the drive workers by the subchairmen.

Posters Aided Drive

Campaign was touched off by a letter from President Walter Geist to all employes. With Mr. Geist's letter was included explanatory material of the bond program which was supplied by the Treasury Department.

The letter was followed immediately by a series of posters erected throughout the plant. Four of these were used during the two-week drive. At all entrances to the plants, large signs printed in red, white and blue were erected to urge participation in the plan. Bulletin board notices also were used.

Ninety and 100 per cent posters also were supplied for each department. The 100 per cent posters were found to be especially effective and stimulated rivalry among the various departments.

Mr. Ryan held a series of meetings with the subchairmen and also kept them informed as the drive's progress through letters. Another reminder to employes was ribbons urging the purchase of bonds worn by the uniformed

(*Please turn to Page* 52)

Signs in red, white and blue at all plant entrances urged Allis-Chalmers employes to participate in the bond-buying program. Banners worn by uniformed girl guides served as a further reminder

Allis-Chalmers employes study a poster erected as part of the War Bond campaign and appealing to workers' patriotism. Company officials stressed that there should be no coercion in the drive

girl guides who escort visitors through the plants and offices.

The company labor-management committee, established under the War Production Drive, endorsed the bond campaign before its start.

Three major factors in the campaign's success, according to company officials, were:

1. Careful planning of each step before the drive started, with all the necessary materials on hand before the drive opened.

2. Planning the drive so as to enlist full co-operation.

3. Careful timing of each step, with the constant unfolding of reminders to keep interest from lagging. This proved especially effective.

Bonds were delivered to buyers promptly by registered mail. With the first bond, each employe was sent a "Thank You" card with a detachable return slip stating that name, beneficiary and co-owner, as on the bond, were correct.

"Old Timers Club" Helps Achieve 100-17.3 Per Cent Participation

ONE HUNDRED per cent participation of employes in two of its five divisions in the War Bond Purchase Plan, and workers' subscriptions totaling 17.3 per cent of earnings have earned for Sparks-Withington Co., Jackson, Mich., the Treasury Department's "T" flag and a high place on the honor roll of companies entering the bond program.

Company's drive was built around a plan prepared by General Motors Corp. and reconstructed by E. T. H. Hutchinson, chairman of the Sparks-Withington labor-management committee, to fit into the latter firm's operations.

Twelve employes, including the chairman, formed what was termed an "S. S. V." committee with three executives who acted as counselors. Included in the group were five members, one from each manufacturing division, of the "Sparton" Old Timers Club, an organization with approximately 1200 members all of whom have been employed by the company five years or more. Being well acquainted with individual workers in their respective divisions, the Old Timers were able to give considerable support to the promotion of bond sales.

Soon after this committee had set a date for the first bond drive meeting, stenciled notices and printed signs bearing the letters "S. S. V." appeared on sidewalks, stairways, walls and in rest rooms. This aroused the curiosity of most workers, but questions as to the meaning of the letters were answered only with the admonition, "Save and Sacrifice for your Vacation."

All employes were requested to be present at the mass meeting which was held at the Jackson High School. Two bands were used, one playing outside as employes gathered, and another performing during the meeting. Printed programs with the foreword "The Voluntary Payroll Savings Plan helps workers provide for the future . . . helps store away tomorrow's buying power . . . helps defend America today, tomorrow, next year" were distributed with literature explaining the War Bond buying plan. Authorization cards printed in red, white and blue were enclosed in an envelope which bore on its face the notice to "Use This Envelope for the Return of Your War Bond Application Card to Your Foreman."

Attending the rally and present on the speaker's platform with Capt. William Sparks, president of the company, other officials and the "S. S. V." committee, were military and naval officers who were familiar with Sparks-Withington products and their use in fighting equipment. Col. Winthrop Withington, then chief of Ordnance, Cleveland district, and board chairman of the company, returned to Jackson especially for the meeting.

Following the rally, the bond campaign was vigorously pressed in all departments. The importance of unremitting sacrifice on the home front was driven home by 30 x 43-inch posters carrying somber but impressive reminders such as "We're at War," "The Situation Is Very Grave" and "Buy War Bonds for Your Son and My Son, We Must Win This War." These posters were changed once a week and put in prominent places throughout the plant.

The Sparton *Bomb Shell*, company publication, backed up the "S. S. V." committee and co-ordinated all activities in behalf of the drive with illustrations of the posters, the rally itself and of the committee at work on details of the drive. At a psychological point in the campaign, the *Bomb Shell* published a "Proclamation" from the fictitious "Head of the Military Occupation of the United States of America," representing some idea of what Nazi enslavement would mean were this country conquered.

In recent months materials shortages have made it necessary to cease production in some departments for two or three-day periods. Employe income being proportionately reduced, the first thing most workers did was to reduce their bond subscriptions. However, an increase in compensation retroactive to April and spread throughout the entire organization saved the record of the War Bond committee. Remittances for the increase were no sooner in the hands of employes than committee salesmen descended upon them.

More than 2600 companies and individuals are sponsoring War Bond posters like the one above. Each poster depicts a piece of military or naval equipment and ties in the city or county bond quota with the purchase of such equipment. Typical of the messages is the one above which has just been posted adjacent to the Riverdale plant of Acme Steel Co., its sponsor

Taylor-Wharton Started Making Iron Before United States Was Born

Furnished cast iron cannon balls to Washington's army. . . . Now providing high-explosive steel shells for World War. . . Pioneered high-manganese steel in this country

TAYLOR-WHARTON Iron & Steel Co. celebrated its 200th year in the iron industry and the 50th of making Hadfield's manganese steel Oct. 17. Two hundred years of productive experience similarly exemplifies the growth of this nation from early colonial struggles to the world battlefields of today.

Taylor-Wharton company and its predecessors at and near the place now known as High Bridge, N. J., were not the first makers of iron in this country and in all likelihood the company is really older than the 200th anniversary it now celebrates, but its production has been continuous and it claims 200 years now because that is borne out by documents on record and its history from the founders, Allen and Turner.

William Allen, who had studied law in London, was a member of the Philadelphia common council and the Pennsylvania provincial assembly, mayor of Philadelphia and chief justice of the Supreme Court of Pennsylvania from 1751 to 1774. His wife (married 1733) was a daughter of Andrew Hamilton, attorney general of Pennsylvania, who was the counsel for John Peter Zenger, the New York printer, the successful outcome of whose case established the American principle of freedom of the press.

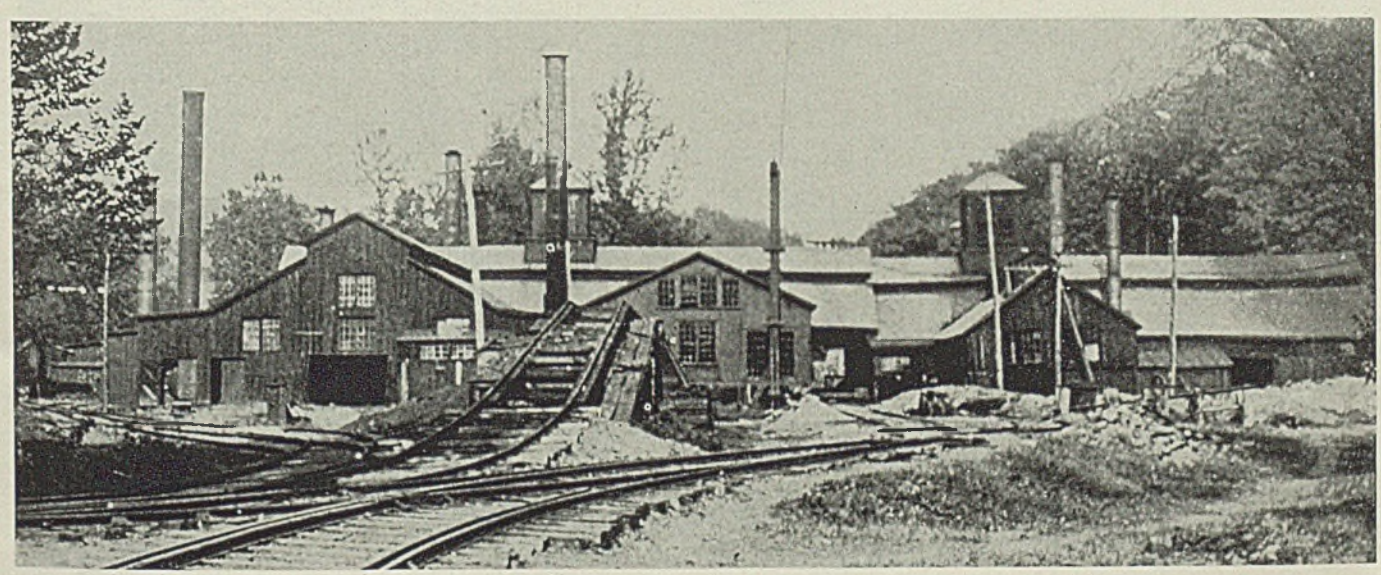
In 1730, at the request of his future father-in-law, who wished to avoid land speculators, William Allen bought, in his own name and with his own money, much of the land on which Independence Hall now stands in Philadelphia. The first public use ever made of Independence Hall (then known as the State House) was a dinner given in 1736 by William Allen in the banqueting hall on the second floor at the time of his retirement as mayor of Philadelphia. The chamber in which Allen sat as chief justice of Pennsylvania is on the first floor opposite that in which the Declaration of Independence was signed.

Joseph Turner, though less spectacular, was a member of the Philadelphia common council and also a member of the provincial assembly.

The lease of Dec. 1, 1742, whereby Allen obtained 3000 acres adjacent to a forge already in existence, is on record in the New Jersey archives. The ruins of this forge still stand on the Taylor-Wharton grounds.

Allen immediately began to build a new furnace some distance away from the forge. That he was building the

General offices of Taylor-Wharton Iron & Steel Co., (above) are in this building, erected more than 100 years ago, exact date unknown. Left to right, L. N. Aller, treasurer; George R. Hanks, president; Charles B. Andrews, assistant to president. Old forge shop of Taylor Iron & Steel Co. (below). First of these buildings was erected about 1851, since demolished



furnace is reported in the *Philadelphia Journal* of Jan. 11, 1743.

Ten years later Allen and Turner purchased the original mine and forge and the acreage upon which the new furnace had been erected. They also built a new slitting mill.

The ruins of the forge, furnace and slitting mill still remain, either on the property of the present Taylor-Wharton company or on adjacent farms. The whole plot purchased by Allen and Turner consisted of some 10,000 acres. Much of this property was later sold, since the iron ore and wood were exhausted.

Robert Taylor arrived in America from Ireland in 1758 at the age of 18, and first taught school. Then he became a bookkeeper for Allen and Turner at Union Iron Works, as the operations of mines, furnace, forge and slitting mill were known. According to legend, the excellence of a petition which he wrote on behalf of the employes attracted the attention of the management. In 1769, he became works manager at Union Furnace.

The iron works had difficult going because of restrictions placed by the British government on all manufacturing in the colonies. As a matter of fact, Allen and Turner probably did shut down their slitting mill for a short time so that they could make a statement to that effect, but it goes without saying that because of demand in the colonies for iron products they resumed operations as soon as they were able.

Allen and Turner were Loyalists, but they didn't forget that they were Americans. In 1775, for instance, Union Iron Works sent a shipment of 175 cannon balls to the Philadelphia committee of safety. These ranged from six to 32 pounds. Allen donated his half but Turner was paid for his. One of the molds used to cast these cannon balls at Union Iron Works is still in possession of the Taylor-Wharton company.

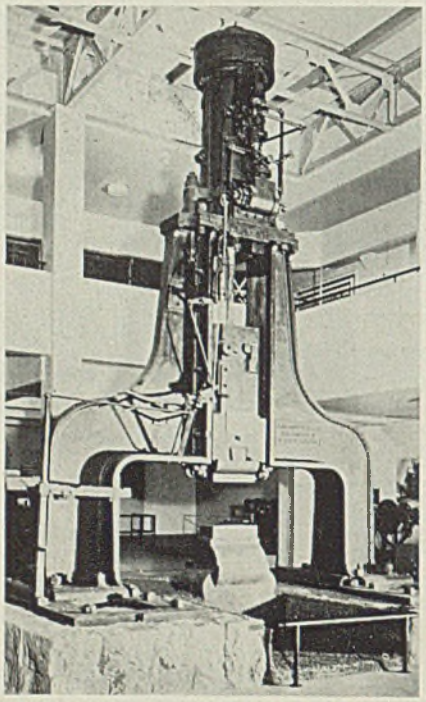
During the Revolution, John Penn, last colonial governor of Pennsylvania, and son-in-law of William Allen, and Benjamin Chew, chief justice of Pennsylvania, who had married Turner's niece, were interned at "Solitude" in the custody of Robert Taylor who then occupied the mansion. This is certainly one of the first internment camps ever established in America and probably is the only one still in existence. This mansion, which was built by Allen and which was named "Solitude" by John Penn because he was so lonely there, still stands on the grounds of the Taylor-Wharton company. Penn evidently didn't have such a bad time while interned because, when he went back to Philadelphia, he gave the name "Solitude" to his own home. This house still stands in Fairmount Park in Philadelphia.

Allen and Turner were getting old and Robert Taylor took active charge of the iron works, as is shown by an advertisement in the *New Jersey Gazette* of Dec. 6, 1780, in which he, in his own name, at the Union Iron Works, advertised nail rods of good quality and different sizes.

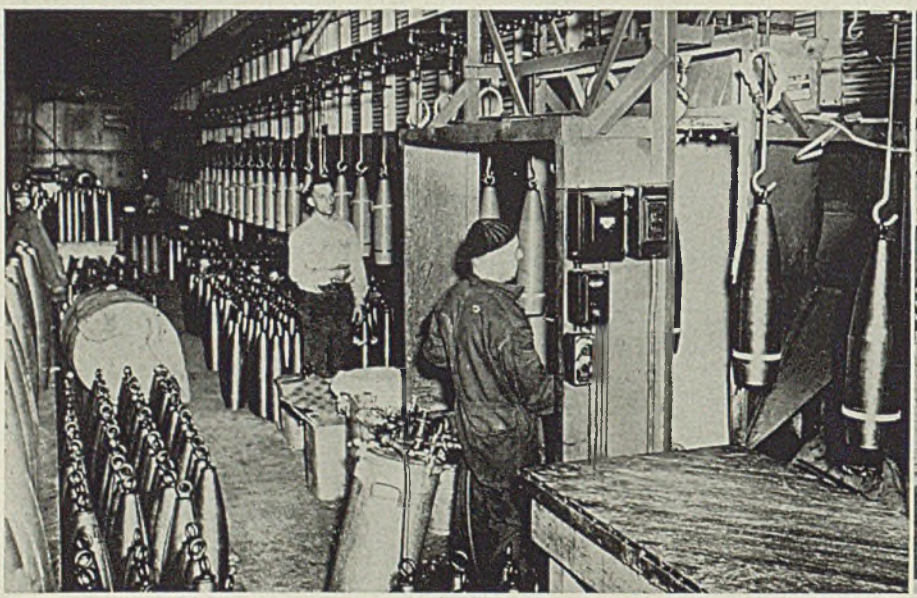
Great demand for iron during the Revolution to supply Washington's army practically exhausted the mines as well as the forests around the Union Iron Works, so that after the Revolution operations were seriously curtailed.

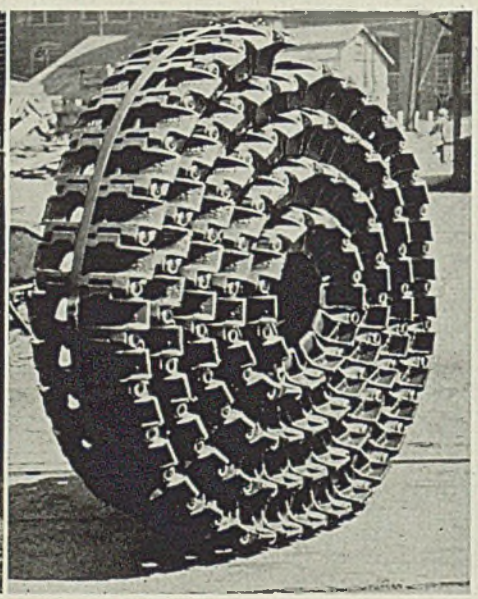
Robert Taylor continued in control of the works after the deaths of both Allen and Turner, in 1780 and 1783, respectively, and apparently had the full confidence of the heirs, since it was not until 1800 that William Allen, 3rd, petitioned for a settlement of the estate. In 1802, the property was divided among four heirs by drawing lots for the fifty-two plots into which it had been divided.

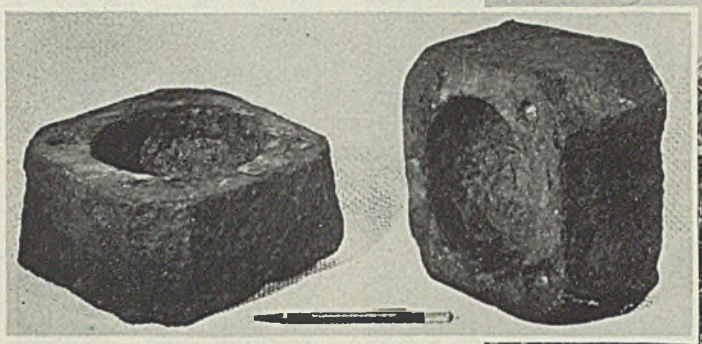
In 1803 Robert Taylor purchased for $1464 a tract of 366 acres, including the mansion "Solitude", the forge, the mines



This Nasmyth steam hammer (left) was set up at High Bridge works about 1854 and remained there until 1935, when it was given to the Rosenwald Museum of Science and Industry, Chicago. New 155-mm. high-explosive shells at a Taylor-Wharton plant (left-below) pass to a booth to be sprayed with yellow lacquer, indicating they are ready for shipment to another plant to be loaded. Manganese steel tread (right-below) for medium tank ready for shipment to a tank plant







This mold (above) was used to make cast iron cannon balls for Washington's army in the War for Independence, 1775-1781. Ruins of Union Forge (right) on grounds of Taylor-Wharton plant at High Bridge. This forge was built prior to 1742, as it is mentioned in a lease made in that year by William Allen for adjacent land on which he built a furnace. This furnace, with a forge and other facilities, formed the Union Iron Works, original predecessor of Taylor-Wharton Iron & Steel Co.

and much of the land now within the town of High Bridge, a name adopted with the coming of the Jersey Central railroad in 1852. Previously the site had been known only as Union Furnace, or Taylor's, or Taylor's Forge.

The works made supplies for the Army during the war of 1812 as well as farming equipment and fittings for the famous Conestoga wagons which were instrumental in opening up the West.

Robert Taylor died in 1821 and was succeeded by his son, Archibald Stewart Taylor.

Although not able to turn out as much as they had previously, the Taylor works again supplied *materiel* to the United States Army for the Mexican War. Expanded activities were not possible until building of the Jersey Central railroad enabled the works to obtain anthracite coal and to bring iron ore from distant mines. Not only did the railroad provide transportation but it gave business to the Taylor works for rails, coupling links and pins, car wheels, axles and other railroad equipment.

Archibald Stewart Taylor died in 1860 and was succeeded by his son, Lewis H. Taylor, who operated the works as a private business and then as the partnership of Taylor & Large until it was incorporated in 1868 as the Taylor Iron Works.

In 1851 there was only a forge, a hammer and a furnace. The following year another furnace was added. In 1854 a scrap furnace and another hammer were installed.

This second hammer is significant. It was the first Nasmyth steam hammer imported into this country from England and was originally ordered by Horatio Ames in 1850 for his works in Connecticut. Later it was moved to High Bridge, where it remained in operation for many years. In 1935, it was donated to the Julius Rosenwald Museum of Science and Industry in Chicago, where it is now on exhibition, ready to operate.

By 1877 the Taylor works was producing 50 axles, 100 car hooks and 100 car wheels a day. By that time the plant had five trip hammers and two turbine wheels, the latter operated by the south branch of the Raritan river.

The great contribution of the Taylors to American metallurgy came in 1892 when they obtained the American rights for the manufacture of manganese steel which had been invented by Robert Hadfield, of England. Consequently, this year is not only the two-hundredth anniversary of the Taylor-Wharton company but also the fiftieth anniversary of the manufacture in this country of manganese steel.

Since the Taylors had so much railroad business, they thought originally that manganese steel would be suitable for railroad car wheels. But strange as it may seem, while manganese steel cannot be used in the car wheels, it is the best known metal for rails, frogs, switches, crossings and the like. Manganese steel stands up under blows, knocks and sudden impact such as rails and frogs must undergo.

The first manganese steel casting was poured Oct. 29, 1892, at High Bridge and so far as is known this is the first casting of any alloy steel in the United States.

In association with William Wharton Jr. & Co., Philadelphia, the Taylor Iron & Steel Co., as the High Bridge works was then known, on Aug. 28, 1894, installed the first railroad frog with a cast manganese steel plate in its center. This was set in place at Fulton street and Boerum place in Brooklyn. It stood up perfectly under traffic averaging one car every 27 seconds throughout the day. This was the first use of manganese steel in trackwork. Some months later, the first curved manganese steel rail was installed at Delaware avenue and Market street, Philadelphia. An ordinary rail in this installation wore out in three weeks. The manganese steel rail lasted for months.

These two installations had been on electric rails. The steam railroads held back. It was not until Jan. 22, 1900, that the Pennsylvania railroad and the Philadelphia & Reading installed a manganese steel crossing at Twelfth street and Washington avenue in Philadelphia. This was the first time that manganese steel had been used for steam railroad tracks under locomotive traffic.

At about the same time the Pennsylvania railroad installed a manganese steel frog at its Broad Street station in Philadelphia. This frog was transferred some time later to another location to replace an ordinary steel frog which on the average lasted about three months. The manganese steel frog lasted 75 months, giving 25 times the service of those previously in use.

With this success, William Wharton Jr. & Co. became the Taylor Iron & Steel Co's. best customer. Manganese steel became the accepted metal for railway equipment.

In the meantime, the United States

(*Please turn to Page* 104)

MEN of INDUSTRY

Russell Davis

Selden H. Gorham

Robert C. Sessions

W. T. Cushing

RUSSELL G. DAVIS has been elected vice president, Foote Bros. Gear & Machine Corp., Chicago. He will continue as general manager of the industrial gear division.

The following promotions have been made in the corporation's sales department: **F. A. Emmons** is now assistant general manager; **R. B. Moir** is manager of sales and engineering; **W. H. Ostring**, special representative; **Galen Butterbaugh**, speed reducer sales; **T. F. Hill**, gear sales; **Charles Look**, assistant gear sales.

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Selden H. Gorham, associated with Allis-Chalmers Mfg. Co., Milwaukee, since 1933, the past six years in charge of sales and production, feed water treating department, has been appointed manager of dealer sales. He succeeds **Stanley J. Retzlaff**, who has taken over the company's trade relations department.

—o—

J. C. Vandermast has been appointed manager of pipe sales, Pittsburgh Tube Co., Pittsburgh.

—o—

G. L. Ouellette has been named general purchasing agent, L. A. Young Spring & Wire Corp., Detroit.

—o—

A. J. Miller, who has been in the Detroit office of Norton Co., Worcester, Mass., for a number of years, has been named field engineer for that territory.

—o—

George F. Wright, president and treasurer, G. F. Wright Steel & Wire Co., Worcester, Mass., has been elected a trustee of Boston University, Boston.

—o—

Whitney C. Collins has been appointed vice president in charge of sales policy, Elastic Stop Nut Corp., Union, N. J. Mr. Collins resides in Beverly Hills, Calif., and has been a director of the company since 1940. In 1932 Mr. Collins formed Collins-Powell Co., Beverly Hills, representing the Elastic Stop Nut Corp. as sales engineers.

—o—

Robert C. Sessions, of the consulting engineering firm of Sessions & Sessions, Cleveland, has been appointed chief engineer, Brown Fintube Co., Elyria, O. Before entering consulting work, Mr. Sessions was in charge of the engineering and experimental division of Steel & Tubes Inc. The firm of Sessions & Sessions is being continued under direction of **Frank L. Sessions**, senior partner.

—o—

A. E. Hitchner, former manager of the Los Angeles office of Westinghouse Electric & Mfg. Co., has been appointed assistant to the manager of the company's industry sales department, with headquarters at East Pittsburgh, Pa.

—o—

John P. Davey has been appointed assistant general manager of the Curtiss-Wright Corp. Airplane Division plant at Columbus, O. He has been assistant director of manufacturing for the company at St. Louis since 1940.

—o—

V. A. Fox has been elected president and general manager, Young Bros. Co., Detroit. **C. G. Lisch** has been made vice president; **C. H. Lisch Sr.**, secretary and treasurer; **R. B. Reed**, sales manager; **P. A. Meyer**, chief engineer; and **J. A. Tretherway**, shop superintendent.

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Joseph DeJure has been appointed representative in eastern Pennsylvania, southern New Jersey, Delaware, Maryland and District of Columbia for American Swiss File & Tool Co., Elizabeth, N. J. Mr. DeJure has covered this territory many years. His headquarters are 410 Commerce street, Philadelphia.

—o—

Louis H. Brendel, manager of jobber distribution, Manning, Maxwell & Moore Inc., Bridgeport, Conn., has entered the Navy as a lieutenant commander in the newly formed Incentive Division. Mr. Brendel served eight years in the United States Navy, including four years at the United States Naval Academy.

—o—

W. T. Cushing has been appointed Detroit branch manager, Bay State Abrasive Products Co., Westboro, Mass., with headquarters at 105 Baltimore avenue. Mr. Cushing has had 25 years of sales experience in the grinding wheel business, the greater part of which time was spent in Michigan.

—o—

H. L. Watson, since 1934 executive vice president and director, De Laval Steam Turbine Co., Trenton, N. J., has been elected president, succeeding the late Francis J. Arend. From 1913 to 1934 Mr. Watson was general sales manager.

—o—

Merrill Cox has been appointed sales manager, iron and steel division, Arthur G. McKee & Co., Cleveland. He succeeds George B. Garrett, who was killed in a recent train wreck while enroute to Washington. Mr. Cox formerly was assistant chief engineer in the company's iron and steel division, and previously had served both as service and sales engineer in that division.

—o—

George Rentschler, president, General Machinery Corp., Hamilton, O., has been named a director, Bendix Aviation Corp., Detroit. **William H. Houghton**, comptroller of the Bendix Aviation since 1929, also has been elevated to the board of directors.

—o—

E. E. Lundberg, vice president in charge of engineering, Briggs Mfg. Co., Detroit, has been named to the board of directors, succeeding the late Howard Bonbright.

F. W. Hoffman, assistant factory manager of Briggs plants and lately in charge of aircraft production activity, has been appointed a vice president. He has served with Briggs since 1932 and before

that spent 19 years with Ford. Mr. Lundberg started with Briggs in 1923, being named chief engineer in 1929 and vice president in 1937.

—o—

R. A. Ornberg, the past three years associated with Curtis Lighting Inc., has become associated with American-Marietta Co., Chicago, as advertising manager. He succeeds **Z. H. Mischka,** who has joined the staff of Russell T. Gray Inc.

—o—

Charles G. Maier, noted research metallurgist for nearly 20 years associated with the United States Bureau of Mines, has been named to the supervisory staff of Battelle Memorial Institute, Columbus, O. He will direct and correlate an enlarged program of fundamental research and will serve as advisor and consultant to the institute's war research for the government and industry. Before joining Battelle Mr. Maier was supervising research engineer, Pacific Experiment Station, United States Bureau of Mines, Berkeley, Calif.

—o—

R. S. Reynolds, head of Reynolds Metals Co., has been elected president, Richmond Radiator Co., Uniontown, Pa. **Henry L. Charlton** has been elected executive vice president, and **C. C. Adams,** vice president in charge of sales of Richmond Radiator.

—o—

Stanley J. Ryan, traffic manager, Cleveland Fisher Body Division, General Motors Corp., has been commissioned a major in the Army Specialist Corps.

—o—

F. M. Hoefler, former vice president and general manager, has been made president, Harvil Aircraft Die Casting Corp., Los Angeles. **Warren Stratton,** Los Angeles attorney, has been elected a director.

—o—

Stephen J. Benn, formerly mechanical engineer, Brunner Mfg. Co., Utica, N. Y., has been appointed chief engineer, Globe Hoist Co., Philadelphia.

—o—

Herbert J. Burgess, superintendent of the feeder division at Westinghouse Electric & Mfg. Co.'s East Springfield, Mass., plant, has been promoted to general superintendent in charge of all manufacturing at the plant. He joined the company in 1917.

—o—

Dr. Frederick W. Sullivan Jr., since 1940 manager of chemical research, Barrett Division, Allied Chemical & Dye Corp., Edgewater, N. J., has been appointed technical director of the Institute of Gas Technology of Illinois, Chicago.

—o—

Harold A. Wilson, former sales representative for Drive-All Mfg. Co., Chicago, has recently been advanced to the position of manager for the Chicago district. He succeeds **J. Ralph Griffith,** who has been made general sales manager for the factory and the Detroit office.

—o—

Sara Southall, a member for 21 years of the personnel relations staff, International Harvester Co., Chicago, has been named consultant to **Brig. Gen. Frank J. McSherry,** director of operations of the War Manpower Commission at Washington. She has had long experience with problems concerning employment of women.

—o—

Warren K. Lee, associated with Wilkening Mfg. Co., Philadelphia, over ten years, has been elected vice president, with headquarters in the Lexington building, Detroit. He has been in charge of the sale of piston rings to the manufacturing or original equipment market.

—o—

Herbert E. Smith has been elected president and chairman of the executive committee, United States Rubber Co., New York. **Harry E. Humphreys Jr.** has been made vice chairman. Mr. Smith, **Bernard W. Doyle** and **Lamot D. Copeland** have been elected to finance committee.

—o—

W. G. Davis, general manager of manufacturing, Lamp Department, General Electric Co., Cleveland, has been named general supervisor of company's new Electronics Branch at Nela Park. Four others appointed with him to supervise manufacture and sale of electronic products include **Z. G. Taylor,** manager, Jackson, Miss., works; **W. H. Robinson,** assistant manager, South Pacific lamp division; **William B. Gillen,** assistant manager, East Cleveland Lamp Works; and **Harold M. Haase,** manager, East Cleveland works.

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Armour Research Foundation of Illinois Institute of Technology has announced appointment of four new staff members as follows:

Dr. Howard T. Francis, formerly assistant to supervisor of chemistry, Engineering Defense Training Program, Pennsylvania State College, State College, Pa., as physical chemist in the metallurgical division. **Anton Novy,** formerly junior metallurgist, Fansteel Metallurgical Corp., North Chicago, Ill., to the ceramics staff of the metallurgical division. **E. B. Penrod,** formerly professor of physics, Hillsdale College, Hillsdale, Mich., as research engineer in the experimental engineering division. **Dr. Joseph R. Spraul,** formerly associated with American Can Co., as a member of the chemical engineering staff.

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Carroll L. Wilson, director, Bureau of Foreign and Domestic Commerce, has been granted a leave of absence to assist in the organization of the Committee for Economic Development. **Paul Hoffman,** president, Studebaker Corp., South Bend, Ind., is chairman of the voluntary body of businessmen who will collaborate with the Department of Commerce in exploring economic areas of public interest for the post-war period.

OBITUARIES . . .

Albert M. Ford, 70, treasurer, Geneva Metal Wheel Co., Geneva, O., died Oct. 10. Mr. Ford served as treasurer continuously since 1901. He directed sales from 1906 to 1932 when he was elected to the presidency, from which office he retired last January.

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Edwin J. Hedlund, 50, vice president, Urick Foundry Co., Erie, Pa., died Oct. 4.

—o—

Clarence O. Ostenso, 33, the past 12 years purchasing agent, Pioneer Engineering Works, Minneapolis, died Sept. 18.

—o—

William Williamson, president, Williamson Metal Treating Co., Milwaukee, died Sept. 23. He was associated with the Thurner Heat Treating Co., Milwaukee, for 20 years before organizing his own firm a year ago.

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C. A. Holmgren, 95, for over 60 years in active service as an iron ore and coal inspector with Cleveland-Cliffs Iron Co., Cleveland, before his retirement in 1929, died Oct. 13.

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Harry J. Ward, 64, assistant secretary and assistant treasurer, National Malleable & Steel Castings Co., Cleveland, died recently. He had been associated with the company 42 years.

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Robert K. Jeffrey, 40, vice president in charge of engineering design and a director, Jeffrey Mfg. Co., Columbus, O., died Sept. 29. He was the elder son of R. H. Jeffrey, chairman of the board, and a grandson of J. A. Jeffrey, founder of the company.

Gray Iron Group in Annual Meeting Told of New Ceiling Price Schedule

CEILING prices for iron castings will be based on the maximums quoted between Aug. 1, 1941, and Feb. 1, 1942, Donald H. Kennedy, price executive of the OPA Iron and Steel Branch, told delegates to the fourteenth annual meeting of the Gray Iron Founders' Society, Hotel Cleveland, Cleveland, Oct. 9. A new regulation will be issued soon.

If no quotations for that period are available, prices will be based on price determination methods in effect on Feb. 1 and on costs prevailing on that date. The new schedule will apply on gray iron, white iron, high-test iron and various irons sold under trade names, Mr. Kennedy said.

Mr. Kennedy was one of four WPB and OPA officials who addressed the meeting which was attended by more than 200 foundry executives. Presiding at the sessions were A. C. Denison, president of the society, and of the Fulton Foundry & Machine Co. Inc., Cleveland, and W. W. Rose, executive vice president of the society, with headquarters in Washington.

The new price regulation will apply only to commercial sales, affecting about 2000 foundries. There are about 1000 "captive" plants in the gray iron foundry industry. Appeals for exception from the regulation are expected to be simplified by a decentralized method which will direct relief requests through regional offices of WPB. A minimum of reports will be required under the regulation, Mr. Kennedy indicated.

Foundries should not be too fastidious in the specifications of iron they order because fewer analyses are being produced, William Kerber, chief of the WPB Pig Iron Unit, warned the delegates. Pig iron production is being aided by simplification of the variety of analyses and it is up to the consumers to adapt their requirements to what is available.

Mr. Kerber also urged the founders to give as much end-use information as possible in requests for iron in the lower ratings to assist WPB in ruling on such requests.

Keep Check on Blast Furnaces

The war board is trying not to disturb former consumer-producer relationships, Mr. Kerber said. The occasion may arise when a user is supplied iron by a producer other than the one with whom the order was placed, but this occurs only when it is in the interest of overall distribution for the transfer to be ordered.

The Pig Iron Unit, Mr. Kerber said, is attempting to prevent sharp fluctuations in iron supplies which would be reflected in the operations of foundries and steelworks. Close check is kept on the time at which blast furnaces must go down for relining, and an attempt is made to space such shutdowns evenly over the year. If too many furnaces were blown out simultaneously, serious dislocations in iron allocations system might result.

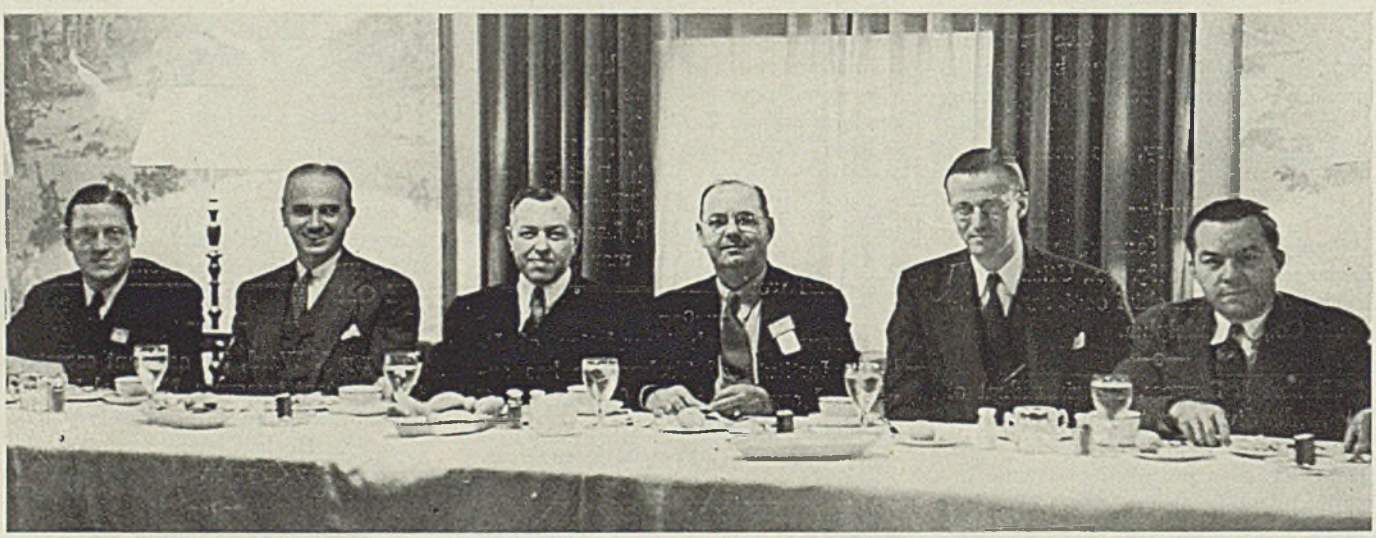
C. D. Scully Jr., chief of the OPA Scrap Section, stated that no general increase in scrap prices is in prospect. He indicated that as long as old material continues to be made available under present procurement programs and pricing methods, there will be no lifting of present ceilings.

Supply of cast scrap should be sufficient for iron foundries' needs as long as this group of consumers gets first call on such material, Mr. Scully said.

Tightness in steel scrap has required foundries to revise scrap buying practices, but this has not proved an undue hardship, according to D. J. Reese, WPB Metallurgical and Specifications Section. Short rails, for instance, no longer are available, but some foundries have been able to obtain cut structural scrap as a substitute.

He recommended close check on metallurgical practice to conserve critical materials. Coke charge should be weighed accurately, he stated, suggesting a charge of 7½ pounds per square foot of cupola area.

Industry's production record since Pearl Harbor has been a remarkable performance, declared E. L. Shaner, president, Penton Publishing Co., and editor-in-chief, STEEL. The magnificent showing is illustrated by the WPB munitions production index, which now is three and a half times what it was last November. The munitions production in-



Speakers at the fourteenth annual meeting of the Gray Iron Founders' Society Inc., Hotel Cleveland, Oct. 9, Cleveland, left to right: C. D. Scully Jr., chief, Scrap Section, Office of Price Administration; William Kerber, chief, Pig Iron Unit, War Production Board; E. L. Shaner, president, Penton Publishing Co., and editor-in-chief of STEEL; *A. C. Denison, president, Gray Iron Founders Society Inc., and president, Fulton Foundry & Machine Co. Inc.; Donald D. Kennedy, price executive, Iron & Steel Branch, Office of Price Administration; D. J. Reese, technical consultant in charge of iron and steel castings, Metallurgical Specifications Section, War Production Board*

crease was in addition to the building and expansion program and the tremendous tooling up necessary.

Mr. Shaner cited various reasons why this outstanding record was possible. For one thing, the major job of tooling up was accomplished in remarkably short time, as shown by the record of machine tool production. Performance of the railroads was another factor, while the conversion of peace-time industry to war goods production contributed to putting industry on a war-time basis in much shorter time than had been expected.

To considerable extent the record of production is attributable to the technological advances made by industry before the war, the speaker continued. Today industry is in a position to chew up raw materials much faster than they can be produced with the result that an unbalanced condition in the matter of supply now exists. Correction of this unbalance now is a major problem.

Society elected the following directors to serve for three years: W. B. Crawford, president, Atlas Foundry Co., Detroit; J. H. Diedrich, vice president and general manager, Blackhawk Foundry & Machine Co., Davenport, Iowa; H. L. Edinger, vice president, Barnett Foundry & Machine Co., Irvington, N. J.; F. H. Rayfield, vice president, Potter & Rayfield Inc., Atlanta; E. B. Sherwin, president, Chicago Hardware Foundry Co., North Chicago, Ill.; and H. S. Washburn, president, Plainville Casting Co., Plainville, Conn.

Expedite Machine Tools for War Production Program, Dealers Urged

CROWDING into a single day what in normal times would have been at least a two-day convention, the Associated Machine Tool Dealers of America, meeting at Hotel Pennsylvania Wednesday, Oct. 7, mapped their program in line with the drive now on to clear up the heavy backlog of machine tool orders.

In his opening address at the general session, Fred B. Scott, president, Spracuse Supply Co., Syracuse, N. Y., retiring as president of the association after serving two extremely busy terms, urged the members—as recognized tooling and service experts—to do two important things to further the war production effort. The first is to do everything possible to get machine tools, now on order, into action. This can be done by expediting the orders themselves by every possible means, then—following delivery—by seeing to it that the machines are properly set up and properly tooled.

The other phase brought out by Mr. Scott is that of machine tool conservation. By looking closely into the end use to which customers intend to put machine tools, dealers often can recommend smaller, simpler and fewer machines than the customer has assumed will be required. By thus forestalling over-ordering—which has been all too common throughout war industries—vital machine and tooling equipment is made available to other customers who otherwise would have to wait long for delivery.

Another angle to conservation in which the dealers were urged to participate actively is that affecting the copper situation. Mr. Scott pointed out that there has been a marked tendency in America to "overpower" machine tools, thereby needlessly tying up quantities of copper in overly heavy electrical equipment. Through end-use analysis, the dealers often can recommend smaller and simpler motors which will be entirely capable of handling the demands and at the same time release quantities of copper for shell banding, etc.

Dan Harrington
Elected president, Associated Machine Tool Dealers

Mason Britton, vice president, McGraw-Hill Publishing Co., New York, who was a guest speaker, decried the destructive criticism which has been leveled at men in Washington—including officers of the services of supply—who in reality are doing a marvelous job in the face of great difficulties. He also decried the loose talk about no more machine tools being needed. Never, he said, were more machine tools ever needed more than right now and he urged the dealers to throw their weight behind the drive to hasten the clearing up of backlogs of orders.

An important activity in which many members of the dealers' association now are participating are the so-called Machine Tool Panels which have been organized in co-operation with the Ordnance Department. N. P. Lloyd, Lloyd & Arms Inc., Philadelphia, explained that until these panels were set up, there was no effective way to gage the machine tool needs of the thousands of contractors and subcontratcors who have come into the war production picture within the last two years.

Honor guest at the luncheon meeting of the Association was Brig. Gen. H. F. Safford, chief, Production Service Branch, Industrial Division, Office of the Chief of Ordnance, Washington.

General Safford, who had many years of production experience at Watervliet Arsenal prior to his Wasington assignment, made it clear that Army *materiel* constantly is being redesigned to conserve scarce metals and alloys. In this direction, and also in the direction of producing better arms and ammunition, the Ordnance Department is constantly on the alert for suggestions. To this end, a special department, called the Suggestion and Conservation Unit, has been set up in connection with the Production Service Branch to gather and weigh suggestions.

The general pointed out that changes in ordnance *materiel* are more difficult than in the case of civilian goods, for a number of reasons. The main reason is that there can be no compromise with perfection in *materiel* which goes to the firing line. There, if it fails once, there is no redress. If it fails, a battle is lost.

New officers of the association who took office at the close of the meeting:

President, Dan Harrington, vice president and general manager, Wilson-Brown Co., New York. First vice president, Albert M. Stedfast, vice president, Stedfast & Roulston, Inc., Boston. Second vice president, A. B. Einig, general manager, Motch & Merryweather Co., Cleveland.

Secretary-Treasurer, George Habicht Jr., assistant general manager, Marshall & Huschart Machinery Co., Chicago.

New members of executive committee: G. S. Bradeen, vice president, Canadian Fairbanks-Morse Co., Montreal; Leo H. Gorton, partner, Machine Tool & Supply Co., Tulsa, Okla.; Tracey W. Harron, president, Harron, Rickard & McCone Co., San Francisco.

$150,000,000 Utah Steel Plant May Be in Production by Late Spring

MORE than 8000 men are now at work on $150,000,000 Geneva Works, near Provo, Utah, one of the nation's largest steel plants. Columbia Steel Co., subsidiary of United States Steel Corp., is constructing the plant for Defense Plant Corp. To help alleviate the housing shortage in the area, 10 barracks, housing 100 men each, have been built and 20 more units are under construction. Restaurants and canteen facilities are in operation, with a seating capacity of 1600 at one time.

Geneva Works is scheduled to produce pig iron by next April. However, the first material increase in Utah pig iron production will occur as early as December of this year, when a second blast furnace, now being installed for Defense Plant Corp. at Columbia's Ironton Works, near Provo, will go into production. This furnace was recently shipped from Joliet, Ill., to Ironton, and is now being enlarged and modernized. It had been inoperative at Joliet for several years.

Columbia Steel officials said that the new construction at Geneva Works and development of the Geneva coal mine were well ahead of schedule. Actual production of steel is expected to commence in May, when the first open-hearth furnace will be completed and lighted. Additional open-hearth furnaces will be in operation shortly thereafter.

Rolling Mills Well Advanced

The plant's structural mill will be in operation by June, as will be the big slabbing mill, and steel plates for the nation's shipbuilding industry will be rolling off the plate mill by June.

Most of the 60 miles of spur track within the plant site has been completed. Foundations for the large blast furnaces, coke ovens, and other permanent installations are complete.

Geneva coal mine, which will supply coal to the new plant, will start production this month. Six and one-half miles of railroad, to haul coal from the mine to the plant, have been completed. This railroad, built through the wildest and roughest part of the Great Divide in the Wasatch Mountain Range, was completed in 60 days. Most of the road was cut out of solid formation of slate and rock. Movable camps, such as are being utilized in the building of the Alaskan Highway, were used in construction of the railroad. The vehicle highway, from Columbia, Utah, to Geneva mine in Forest Canyon, built under similar conditions, has been finished. Facilities for increased production of iron ore at Iron Mountain, Utah, have also been completed.

Republic Lights Second DPC Blast Furnace

The second unit to be completed in the Defense Plant Corp.'s blast furnace expansion program was lighted at Republic Steel Corp.'s Youngstown, O., division, Oct. 12, 367 days after the contract with DPC was signed. This was the first stack to be built in Youngstown in 20 years.

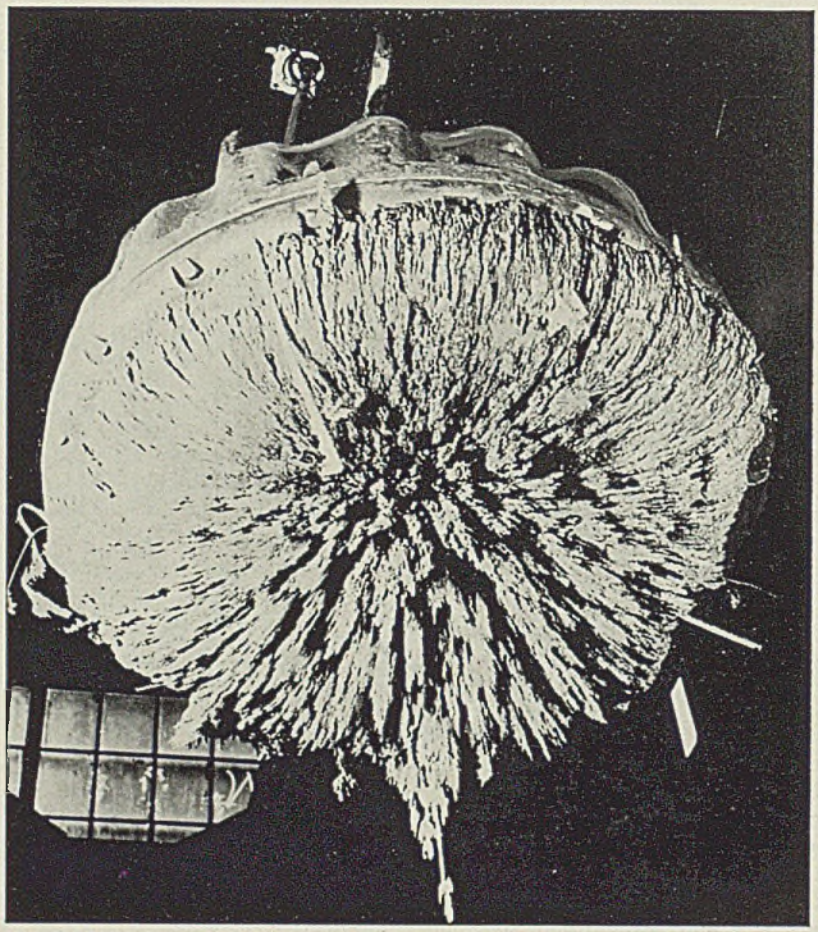
John W. Bricker, governor of Ohio, lighted the stack. R. J. Wysor, Republic president, in addressing officials, employes and guests pointed out that every Republic plant and mine is being operated "to their fullest extent." Those plants whose products did not at first fit into the war effort, he stated, were re-equipped and now are turning out material for our fighting forces at "unbelievable speed."

Capacity of the new stack is rated at 1100 tons daily, and will provide a substantial increase in Republic's steel production, according to R. L. Leventry, Republic's Youngstown district manager.

The first blast furnace for DPC, also a Republic unit, was completed in Gadsden, Ala., May 28. In addition to the Gadsden and Youngstown furnaces, Republic has two more under construction.

Germany will salvage 3000 metric tons of copper from coins called in early this year, according to an unofficial report. Due to losses, wear and similar reasons it is not possible to regain all of the 3980 tons of pure copper estimated to be contained in coins. German coins now are of zinc, silver, aluminum or aluminum-bronze.

SCRAP RECOVERED BY ELECTRIC MAGNET



METAL splattered in welding operations in East Pittsburgh, Pa., plant of Westinghouse Electric & Mfg. Co. is gathered at rate of 100,000 pounds per month and used for scrap. Here is a "sample" of ferrous metal picked up by an electric magnet

Activity Index Moves Upward

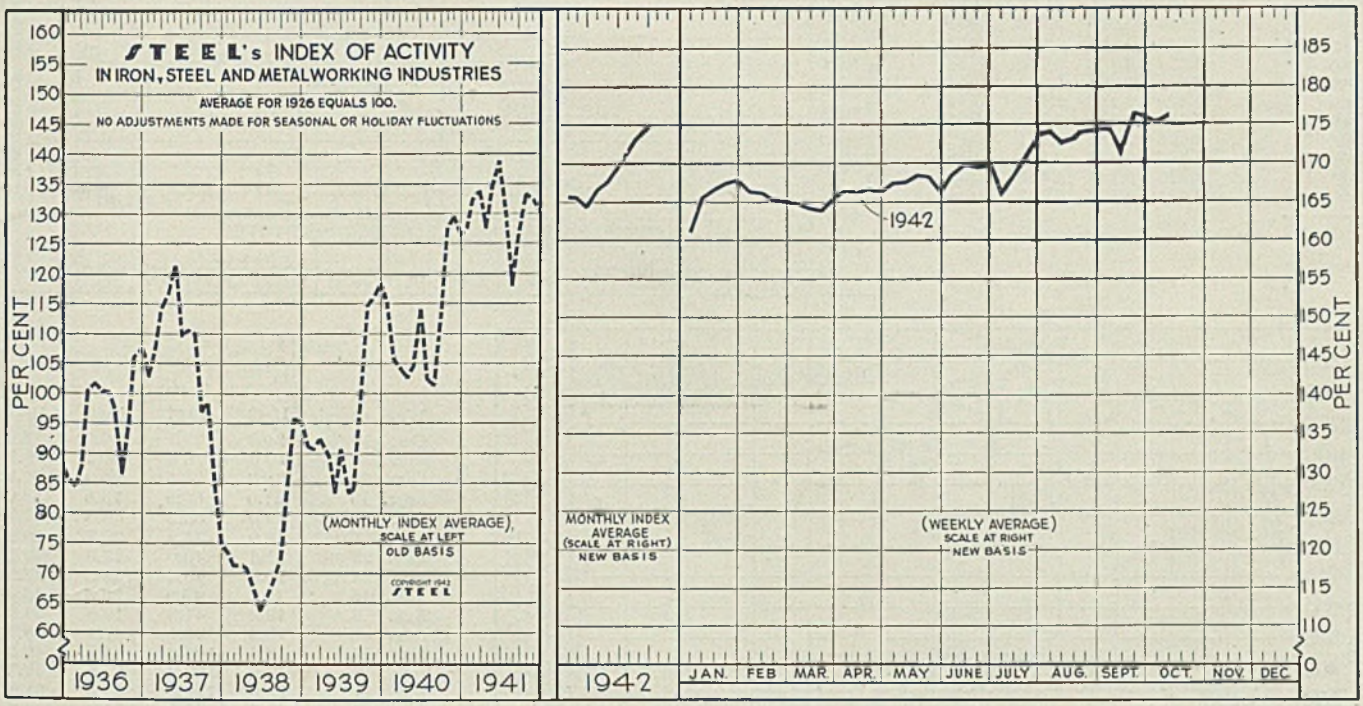
OUTPUT of military goods is expanding rapidly, but remains somewhat below projected schedules due to raw material and manpower shortages. The general underlying trend of industrial production continues to move steadily upward. With many new war plants scheduled to come into operation through the balance of this year and early next, volume of industrial output is expected to reach a new high plateau.

During the week ended Oct. 10, STEEL's index of activity climbed one point to 176.5. This compares favorably with the highest level recorded by the index of 176.8.

The national steel rate stood at 98.5 per cent of capacity during the week ended Oct. 10. In the preceding week ingot production was 98 per cent, while in the like 1941 period it was 94.5. Completion of necessary repairs to open hearth furnaces at some centers and general improvement in the steel scrap supply situation are the chief factors behind the recent upturn in steel operations. Despite record steel production in recent months, steel producers have not been able to make headway against the huge backlog of high priority orders accumulated.

Early estimate of revenue freight carloadings for the latest period indicates a slight decline to about 903,000. In the preceding week freight traffic had risen to the highest level recorded this year of 907,607 cars.

Electric power consumption in the week of Oct. 10 rose slightly to about 3,710,000,000 kilowatts. This represents a gain of 11.9 per cent over that recorded in the like 1941 week. Power output is expected to reach a new all time peak during the closing months of this year.



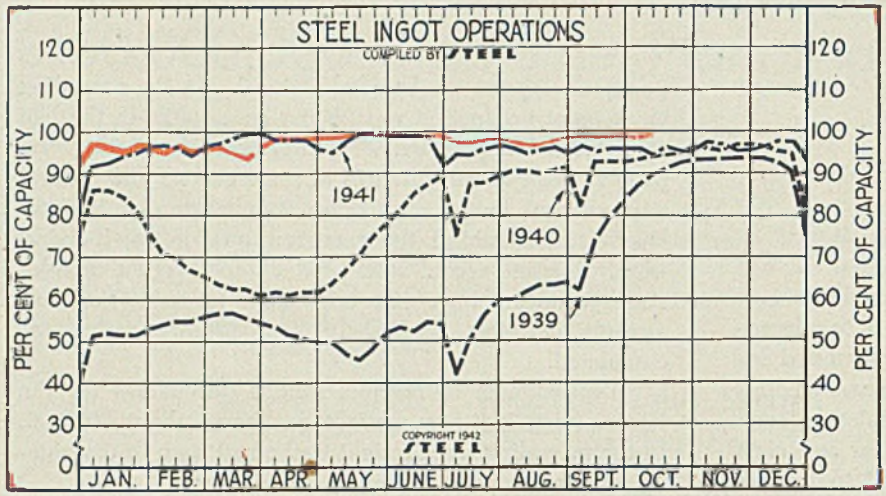
STEEL's index of activity gained 1 point to 176.5 in the week ending Oct. 10:

Week Ended	1942	1941
Aug. 8	172.8	117.5
Aug. 15	173.3	118.2
Aug. 22	174.0	118.5
Aug. 29	174.5	118.2
Sept. 5	174.8	111.8
Sept. 12	171.2	131.3
Sept. 19	176.8	130.6
Sept. 26	176.0	132.0
Oct. 3	175.5	132.7
Oct. 10	176.5†	132.3

†Preliminary.

Mo. Data	1942	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931
Jan.	165.7	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1
Feb.	165.6	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5
March	164.6	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2	80.4
April	166.7	127.2	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81 0
May	167.7	134.8	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6
June	169.4	138.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1
July	171.0	128.7	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3
Aug.	173.5	118.1	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4
Sept.	174.8	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 4

Note: Weekly and monthly indexes for 1942 have been adjusted to offset the forced curtailment in automobile production and to more accurately reflect expanding steel production.



Steel Ingot Operations

(Per Cent)

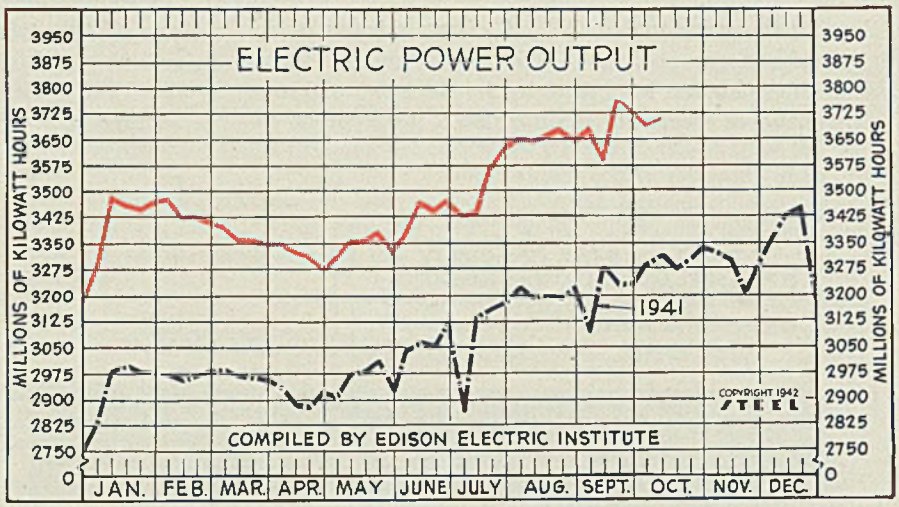
Week ended	1942	1941	1940	1939
Oct. 10	98.5	94.5	94.5	89.5
Oct. 3	98.0	96.0	93.5	87.5
Sept. 26	98.0	96.0	93.0	84.0
Sept. 19	98.0	96.0	93.0	79.5
Sept. 12	98.0	96.5	93.0	74.0
Sept. 5	98.0	95.5	82.0	62.0
Aug. 29	98.0	96.5	91.5	64.0
Aug. 22	97.5	96.0	90.5	63.5
Aug. 15	97.0	95.5	90.0	63.5
Aug. 8	97.5	96.5	90.5	62.0
Aug. 1	98.0	97.5	90.5	60.0
July 25	98.5	96.0	89.5	60.0
July 18	98.0	95.0	88.0	56.5
July 11	97.5	95.0	88.0	50.5
July 4	97.5	92.0	75.0	42.0
June 27	98.5	99.5	89.0	54.0
June 20	99.0	99.0	88.0	54.5

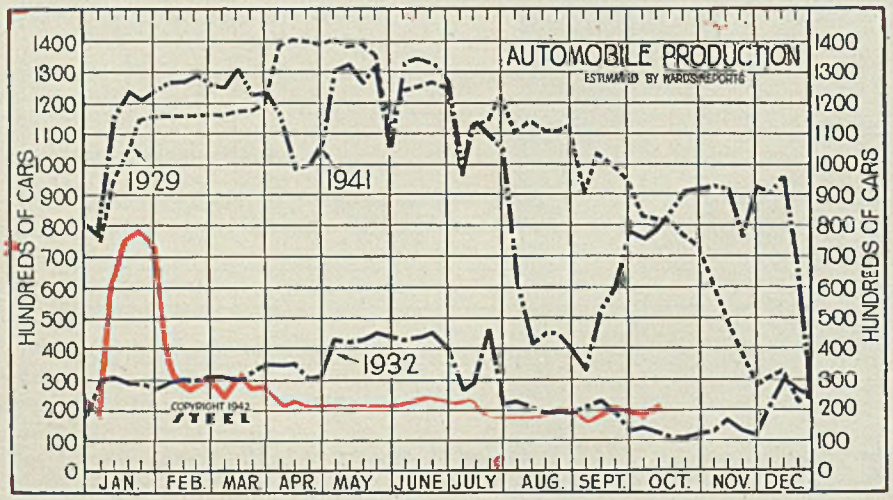
Electric Power Output

(Million KWH)

Week ended	1942	1941	1940	1939
Oct. 10	3,710†	3,315	2,817	2,583
Oct. 3	3,683	3,290	2,792	2,554
Sept. 26	3,720	3,233	2,816	2,559
Sept. 19	3,757	3,232	2,769	2,538
Sept. 12	3,571	3,281	2,773	2,532
Sept. 5	3,673	3,096	2,592	2,376
Aug. 29	3,640	3,224	2,736	2,442
Aug. 22	3,674	3,193	2,714	2,434
Aug. 15	3,655	3,201	2,746	2,454
Aug. 8	3,649	3,196	2,743	2,414
Aug. 1	3,649	3,226	2,762	2,400
July 25	3,626	3,184	2,761	2,427
July 18	3,565	3,163	2,681	2,378
July 11	3,429	3,141	2,652	2,403
July 4	3,424	2,867	2,425	2,145

†Preliminary.





Auto Production

(1000 Units)

Week ended	1942	1941	1940	1939
Oct. 10	20.3	79.1	108.0	75.9
Oct. 3	19.9	76.8	105.2	76.1
Sept. 26	20.9	78.5	96.0	62.8
Sept. 19	21.0	60.6	78.8	54.0
Sept. 12	19.6	53.2	66.6	41.2
Sept. 5	16.9	32.9	39.7	26.9
Aug. 29	21.1	40.0	27.6	25.2
Aug. 22	20.2	45.5	23.7	17.5
Aug. 15	19.2	45.6	20.5	13.0
Aug. 8	19.2	41.8	12.6	24.9
Aug. 1	18.3	62.1	17.4	28.3
July 25	18.3	105.6	34.8	40.6
July 18	17.9	109.9	53.0	47.7
July 11	23.0	114.3	65.2	61.6
July 4	22.7	96.5	52.0	42.8

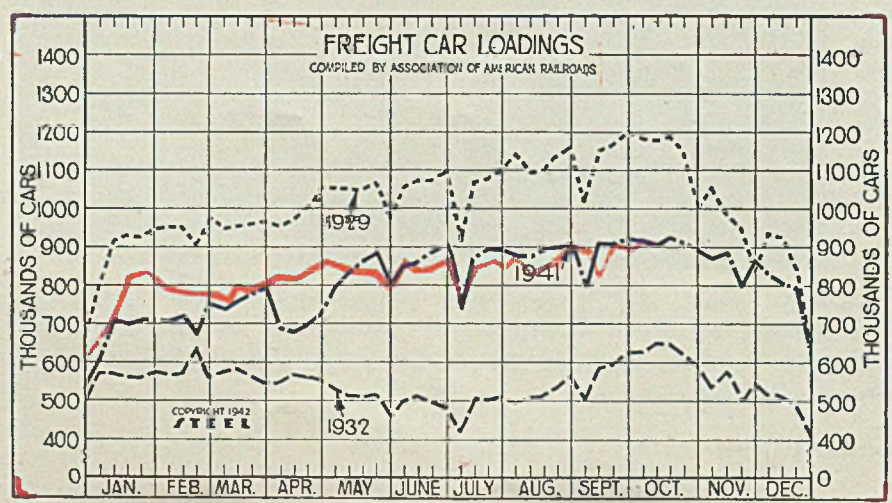
Figures since Feb. 21 last include Canadian trucks and automobiles and United States trucks.

Freight Car Loadings

(1000 Cars)

Week ended	1942	1941	1940	1939
Oct. 10	903†	904	812	845
Oct. 3	908	918	806	835
Sept. 26	898	920	822	835
Sept. 19	903	908	813	815
Sept. 12	815	914	804	806
Sept. 5	888	798	695	667
Aug. 29	899	913	769	722
Aug. 22	869	900	761	689
Aug. 15	869	890	743	674
Aug. 8	850	879	727	665
Aug. 1	864	883	718	661
July 25	856	897	718	660
July 18	857	899	730	656
July 11	855	876	740	674

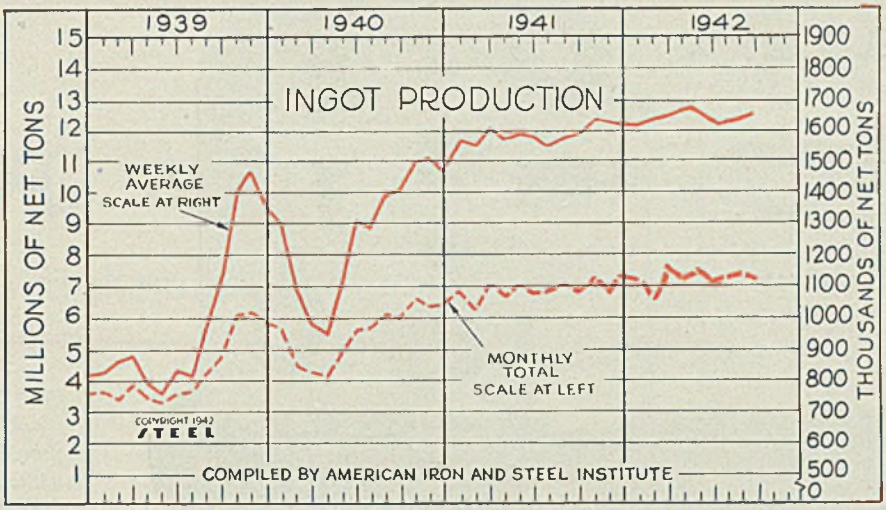
†Preliminary.

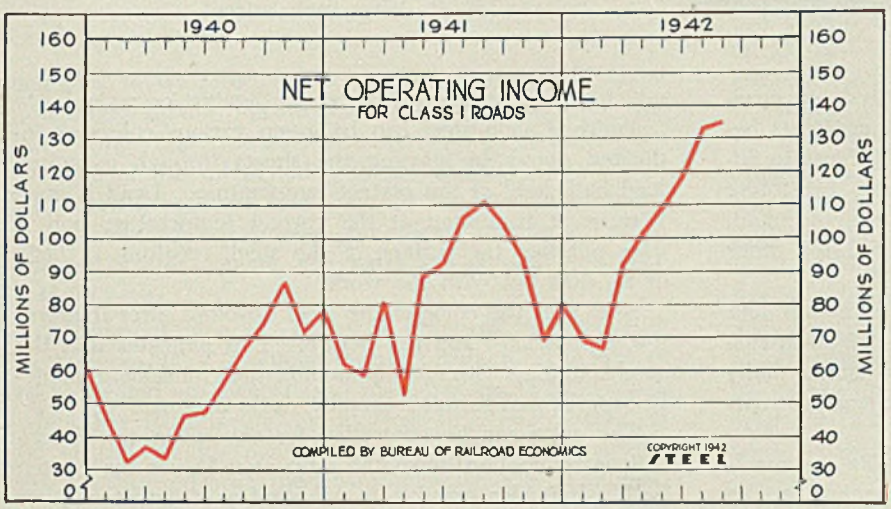


Steel Ingot Production

(Unit 100 Net Tons)

	Monthly Total		Weekly Average	
	1942	1941	1942	1941
Jan.	7,124.9	6,922.4	1,608.3	1,562.6
Feb.	6,521.1	6,230.4	1,630.3	1,557.6
Mar.	7,392.9	7,124.0	1,668.8	1,608.1
April	7,122.3	6,754.2	1,660.2	1,574.4
May	7,386.9	7,044.6	1,667.5	1,590.2
June	7,022.2	6,792.8	1,636.9	1,583.4
July	7,148.8	6,812.2	1,617.4	1,541.2
Aug.	7,233.5	6,997.5	1,632.8	1,579.6
Sept.	7,067.1	6,811.8	1,651.2	1,591.5
Oct.	.....	7,236.1	.....	1,633.4
Nov.	.....	6,960.9	.....	1,622.6
Dec.	.....	7,150.3	.....	1,617.7
Total	.....	82,836.9	.....	1,588.7





Class I Railroads
Net Operating Income

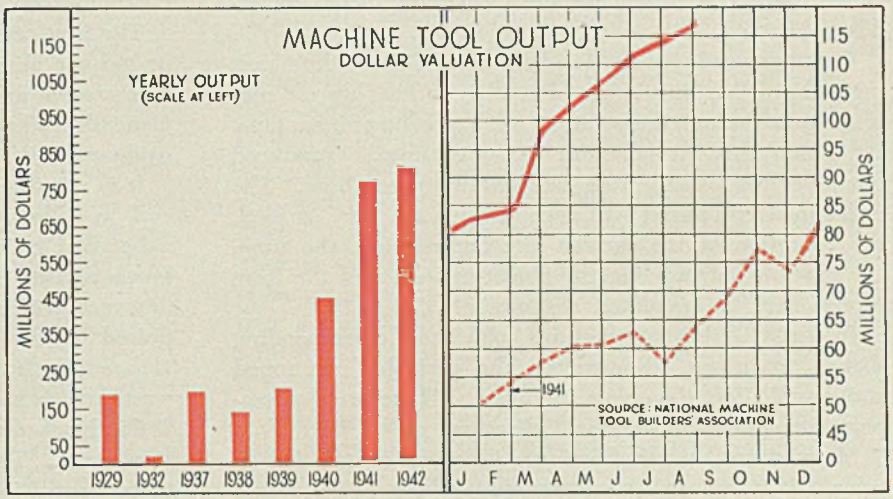
(Unit: $1,000,000)

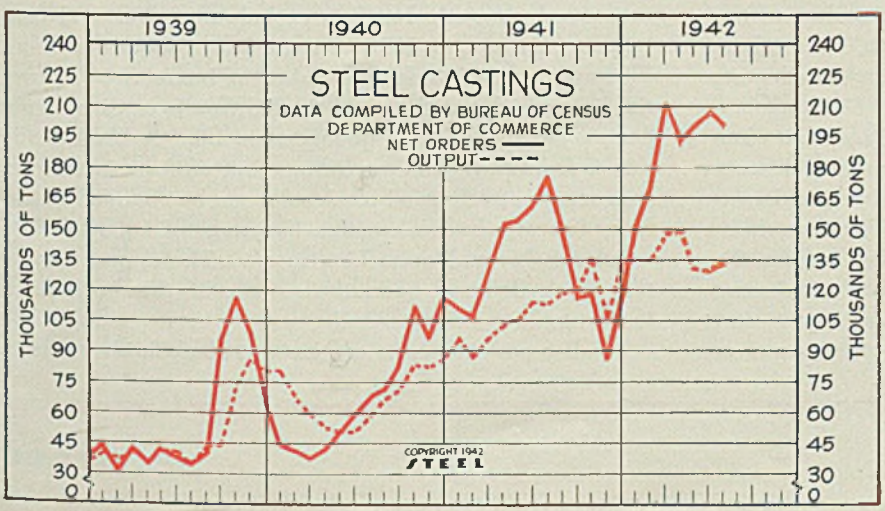
	1942	1941	1940	1939
Jan.	$68.97	$62.02	$46.01	$32.95
Feb.	66.49	58.48	32.86	18.64
Mar.	92.39	80.63	37.03	34.38
April	102.03	52.57	34.12	15.32
May	109.63	88.63	47.41	25.17
June	118.73	93.26	48.09	39.17
July	133.00	106.31	57.73	49.00
Aug.	135.30	111.32	66.53	54.57
Sept.	.....	104.07	74.72	86.53
Oct.	.....	93.66	87.64	101.72
Nov.	.....	68.76	72.00	70.41
Dec.	.....	80.55	78.79	60.95
Average	.....	$83.29	$56.84	$49.02

Machine Tool Output

(000 omitted)

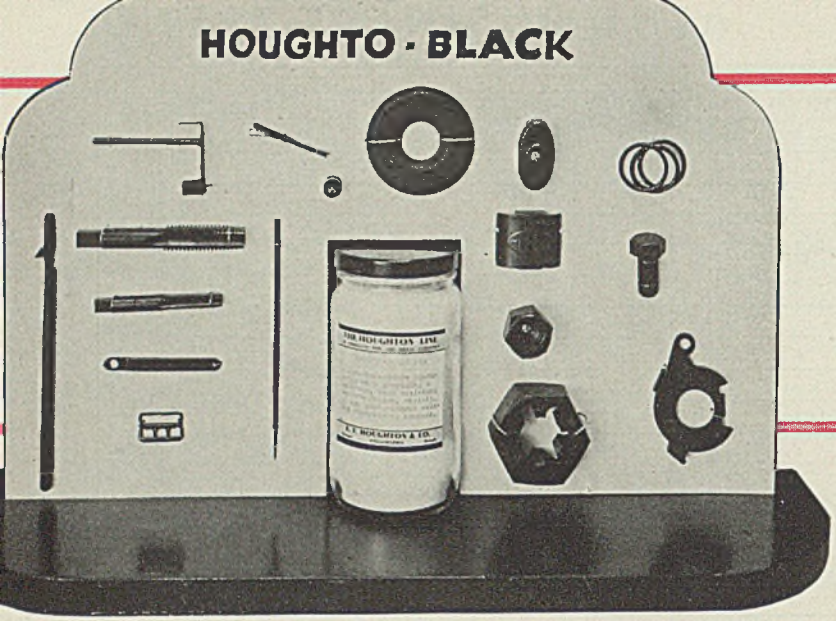
	1942	1941
Jan.	$83,547	$50,700
Feb.	84,363	54,000
Mar.	98,358	57,400
April	103,364	60,300
May	107,297	60,800
June	111,147	63,000
July	113,600	57,900
Aug.	117,420	64,300
Eight Months	819,100	468,400
Sept.	.....	68,400
Oct.	.....	77,200
Nov.	.....	74,600
Dec.	.....	81,435
Year		
1942 est.	.....	1,500,000
1941	.....	775,300
1940	.....	450,000
1939	.....	210,000





Steel Castings

	—Net Orders—		—Production—	
	1942	1941	1942	1941
Jan.	150,551	110,579	134,778	94,409
Feb.	179,880	105,125	133,726	84,492
Mar.	211,081	126,140	146,507	95,185
Apr.	191,195	152,007	149,625	101,977
May	199,619	153,143	131,492	104,971
June	208,243	161,512	131,458	113,988
July	201,679	175,892	133,800	112,364
Aug.	.....	147,316	.....	117,703
Sept.	.....	115,066	.....	118,543
Oct.	.....	117,516	.....	135,272
Nov.	.....	84,534	.....	104,605
Dec.	.....	113,034	.....	131,518
Tot.	.....	1,561,864	.....	1,316,027



How To Avoid Use of

PROTECTING

Fig. 1—Typical articles finished by Houghto-Black, a low-temperature blackening bath said to provide a lustrous, rust resistant surface finish without causing dimensional changes in the work. It employs a chemical reaction and heat

AS MORE and more materials are required for products for our armed forces, metal finishing ingredients become scarcer because, first, there are more surfaces to finish; and second, the materials which have heretofore been used for finishes (namely, copper, nickel, cadmium, brass, tin, bronze, zinc, etc.) are being used for other more important purposes.

Thus arises the question, "How can base metals and alloys be finished without using strategic metals, lacquers, paints, varnishes, etc.?" It is possible to finish many metals and alloys by giving them heat or chemical treatments.

Quite a few of these processes are applicable and available on a commercial basis. Here we will point out the general aspects and then analyze specific commercial methods available.

Coatings Produced by Temperature: One of the oldest methods of finishing iron and steel is to heat up the material to a desired temperature for a predetermined time. By doing this an adherent oxide coating is produced having colors ranging from pale yellow to dark blue. The exact shade produced will depend upon the type of steel, the condition of the surface, the temperature, the time, the medium surrounding the object treated, and the form of the steel (strip, plates, castings, etc.).

In Table I the temperatures with their corresponding shades are given. Remember, the variables mentioned above will affect the colors produced. Therefore the temperatures given are only an indication.

Many times uneven heating will cause a variation in color. This unevenness of temperature can be overcome by immersing the object to be treated in a molten metallic bath, a hot sand bath, molten salt bath, etc. These treatments produce a very even temperature in all parts of the work.

All metals treated should be chemically clean. Degreasing by any of the well-known processes such as a vapor degreasing rinse using a chlorinated hydrocarbon—namely, trichlorethylene—are satisfactory. Further cleaning in an alkali wash, or electrocleaning by making the work the cathode or anode in a suitable solution using 6 to 12 volts direct current, may also be necessary. Improper cleaning results in unattractive mottled coatings which do not offer good protection against corrosion.

Polished strip steel can be given various colors as indicated above by passing the sheets through a molten lead bath held at the correct temperature. Lead is good because it is molten at the correct temperature and it does not wet the surface of the steel, resulting in little or no drag-out with the work.

Note that the color of the steel develops after it leaves the molten bath and not before. This indicates that the steel is uniting with a component of the atmosphere, namely oxygen, and forming thereby oxide coatings.

The color can be controlled for any given set of conditions by cooling down the strip as it leaves the molten bath. It is also possible to use sand as a bath for either continuous or batch processing.

The iron oxide coatings produced will absorb oil, paint or lacquer films. The resulting coating is more resistant to corrosion and abrasion than either type applied alone. Generally when an oil or clear lacquer is added to the oxide coating, the color of the coating is made darker.

It is possible to color steel articles over a bed of charcoal as follows: The highly polished work is placed in a hot bed of charcoal approximately 2 feet deep. The lower portion of the fuel should be in a state of incandescence with the upper portions at the temperature required for the coloring desired. After the color has developed, the work is removed and rubbed vigorously with waste which has been dipped into raw sperm oil.

Oil blackening is used many times to treat polished steel parts. This is accomplished by packing the articles to be treated in a carburizing box, using spent carburizing compound, properly luted to exclude air. Box and contents are heated to 1200 degrees Fahr., requiring about 1½ hours. At 1200 degrees Fahr. the box may be drawn, the lid opened and the parts riddled free from carburizing compound and at once quenched in oil. A black oxide skin is formed, dull in appearance but uniform in texture.

A comparatively good black color can be obtained quickly by heating the work within the range of 1000 to 1200 degrees Fahr. and quenching in oil. The appearance of this finish depends upon the surface of the work prior to heating.

Small typewriter parts are given a black finish by heat-

Critical Materials by

(Section VI in a Series on Conservation and Substitution of Critical Materials in Ordnance Work)

and FINISHING METAL SURFACES

. . . . using heat and chemical treatments only

By C. B. YOUNG, Ph. D.
Electrometallurgist
Flushing, Long Island, N. Y.

ing in a rotary retort furnace to a temperature of about 750 degrees Fahr. After the work has reached the desired temperature, a small quantity (about 1 ounce) of linseed oil or fish oil is added to the charge in the retort. The work is revolved from 3 to 10 minutes longer, when it is taken from the furnace and spread in pans to cool in the air. After cooling, the parts are dipped in a rust-retarding oil.

A different type of coating is obtained by producing magnetic oxide of iron upon the steel surface. The articles to be treated are cleaned and placed in an air-tight oven, which has a connection introducing superheated steam at 60 to 100 pounds per square inch. When the articles reach a dull red heat, the steam is introduced. The coating produced, as one would expect, is resistant to heat. These coatings can be dyed and treated with oil or wax to increase their moisture resistance. The natural appearance before sealing is a light bluish slate color which darkens when oil or wax coatings are applied. These coatings, incidentally, prevent finger marking.

The above is applicable to any metal or alloy which will oxidize in the atmosphere at elevated temperatures and form thereby a colored adherent coating. Copper can be colored a deep black; chromium can be colored an apple green; etc.

In the baths above most of the coating has been produced by elevating the temperature of the object and allowing it to react with oxygen of the atmosphere. Let us consider the case where a molten liquid is used and which has its own oxidizing agent present. One of these is the well-known niter bath, which consists of equal parts of sodium and potassium nitrate with some manganese dioxide added. This mixture is melted in cleaned cast iron pots of the desired shape and depth. As rust[1] (all references at end of article) from any source affects the color of the work, the pot should be cleaned prior to putting in the saltpeter. The niter is melted, superheated to a temerature of about 900 degrees Fahr. and manganese dioxide added in the ratio of about 1 part oxide to 50 parts of niter by volume. The manganese gives the molten salt a greenish-black tinge, and causes all suspended matter to settle to the bottom of the pot.

The addition of potassium nitrate increases the cost of the process. Potassium sales are deemed necessary when low-temperature operation is desired. Potassium salts may usually be omitted from the bath, however. Sodium nitrate or Chile saltpeter is an excellent bluing medium, although higher operating temperatures are imperative.

As bluing by this process forms an iron oxide film on the work, consumption of the manganese dioxide would be expected. Replacement at the rate of 1 pound of manganese dioxide every 3 hours to a 300-pound batch of saltpeter keeps the bath in condition. While the exact function of the manganese dioxide is doubtful, this much has been observed: If it is omitted from the pot, the melt does not produce good work. Baths found upon analysis to be charged with iron oxide gave bad results, whereas no excess iron was found in solution in any bath containing an excess of manganese dioxide. (Manganese dioxide has been omitted from some baths with satisfactory results.)

In a niter bath a peacock blue or temper blue can be consistently obtained in the following manner: The articles to be blued are first cleaned and polished. The higher the polish the brighter will be the blue color. A thin coating of oil is then applied and the articles immersed in the hot niter at 600 to 650 degrees Fahr. The pieces can be suspended individually on wires. Screws, nuts and other small articles can be dipped, enclosed in a wire basket. The parts are held in the niter for a few minutes and then raised to note the depth of coloring attained. They are then replaced in the molten salt until they reach the desired color. The time required varies with the temperature and with the size of the pieces but is never over 4 or 5 minutes.

The reaction is nothing more than obtaining a uniformly colored oxide film. If left in the niter too long—say, 10 minutes—the film produced is no longer a temper blue or a gun-metal blue but becomes a dirty gray.

After the right blue is obtained, the articles are quenched in cold, clean water to strike the color, then immersed in boiling water and finally in hot oil. A hot oil dip is necessary in treating small screws or other tiny parts as it removes all moisture from them. Any moisture left on the blued article will form a spot of red oxide rust, a defect which has a tendency to form at the roots of threads or any re-entrant angle. A darker gun-metal blue can be obtained by using temperatures up to 1000 degrees Fahr.

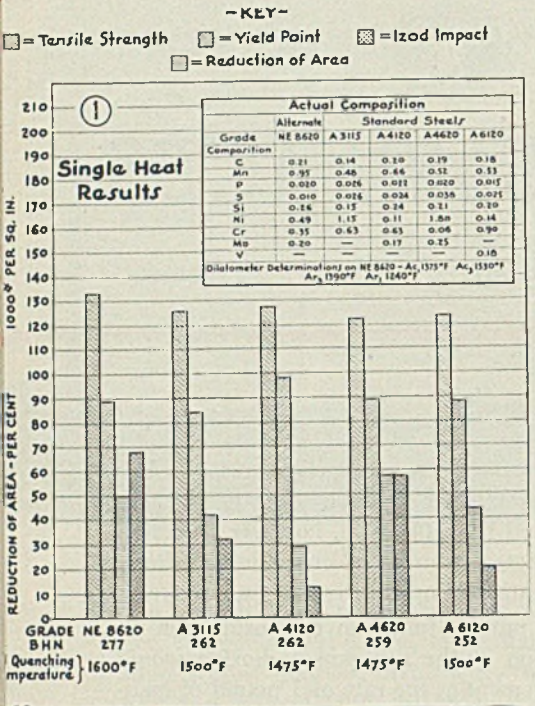
Care should be taken not to dip articles after adding

(Please turn to page 84)

NE (National Emergency) ALLOY

. . . . their preparation and

By CHARLES M. PARKER
Secretary, General Technical Committee
American Iron and Steel Institute
New York



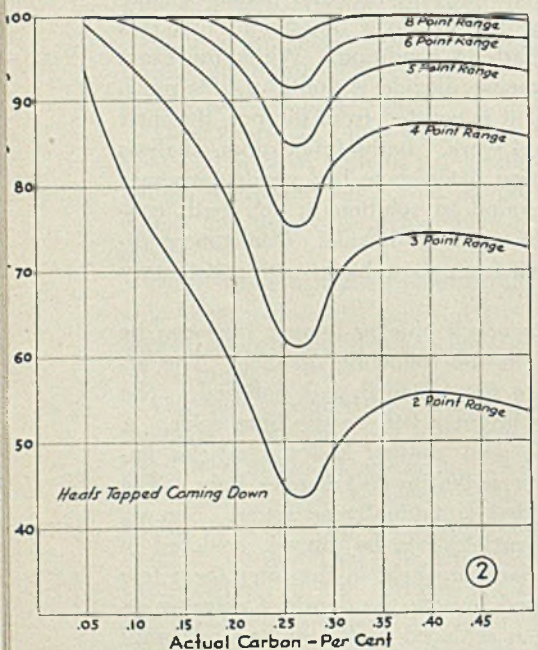


Fig. 1—Comparative physical property data of carburizing grades, reheated to optimum physical properties

Fig. 2— Off-heat expectancy—carbon

INDUCING steel to harden throughout its cross-section is done by the use of the alloying elements manganese, nickel, chromium, silicon and molybdenum. All those elements lower the critical cooling rate (although not all are effective to the same degree) and permit the steel to harden to greater depths.

The influence of the alloying elements in performing this most useful function is probably threefold. They change the distribution of the carbides in the ferrite matrix by reason of difference in volume. They change the properties of the ferrite by dissolving in it. They change the quality or type of carbide as compared with iron carbide or cementite.

This elementary explanation is given simply to point out the fact that NE steels follow rigidly the pattern set by nature for all other types of constructional steels.

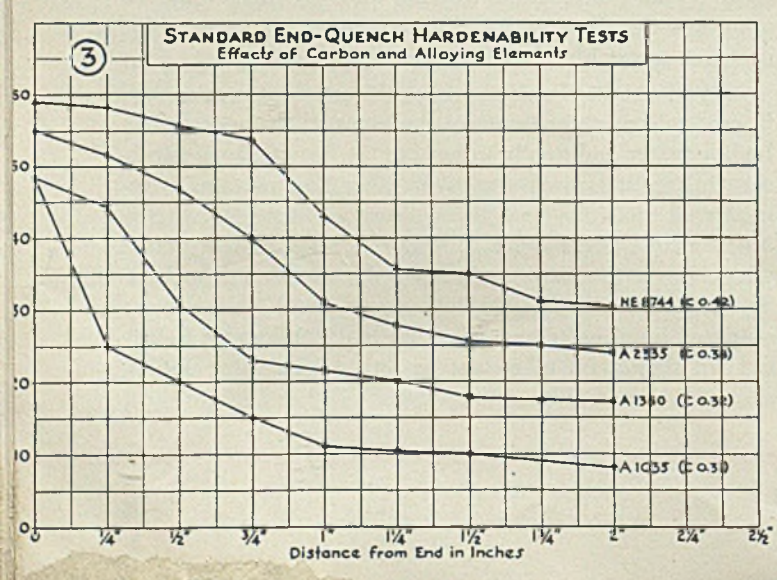
Excellent data exist from which those desired mechanical properties can be calculated within reasonable limits of precision. Before presenting the data from which such calculations can be made, let us discuss physical property data in general.

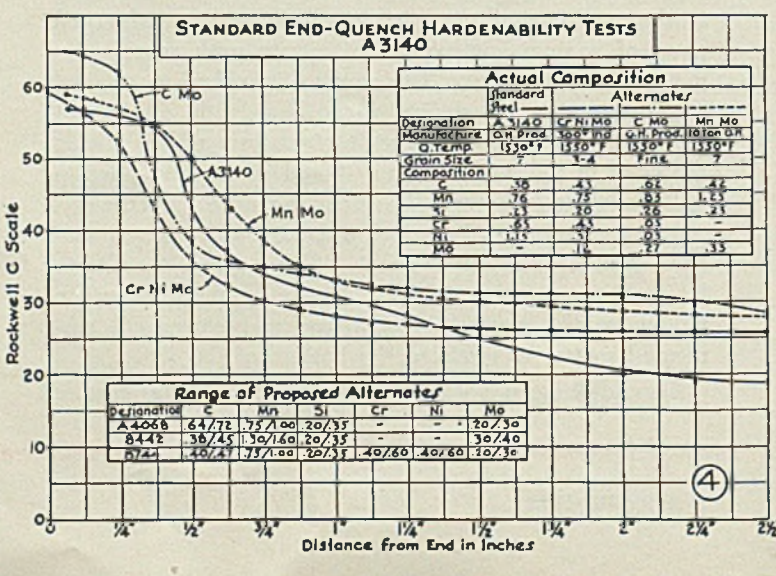
Disappointment has been expressed because conventional physical property charts were not immediately available for all NE steels. When single heat results became available, there was some criticism because average results were not available. Hardenability data were discounted by many because they didn't know how to use them, in spite of the fact that their usefulness and reliability have been known for a long period of time and adequate literature relative to them exists.

The conventional physical property charts in common use give information relative to tensile strength, yield point, reduction of area, elongation and hardness. Quenching and drawing temperatures are usually included and the quenching medium—oil or water; specimen size is generally stated; and sometimes impact values are given.

Charts such as these have been used for many years and with considerable success by designing engineers, metallurgists and others interested in the application of the various grades of steel to specific jobs. The charts are used with considerable confidence, too, in spite of their many limitations.

In presenting such data as have been outlined above, the full standard or specification chemical composition range is generally stated and the mechanical values given purport to be averages. The effect of small quantities of incidental alloying elements such as nickel, chromium, molybdenum and copper is well known, *but the presence of such elements is rarely reported.* The presence of distinctly harmful elements such as arsenic and tin is never reported, even though small quantities exert a powerful influence on the physical properties of steel. The deoxidizing practice employed in the manufacture of the steel is likewise important, but such practice is never reported in connection with





STEEL DATA

how to use them intelligently

physical values.

The mechanical treatment which the steel has received in its processing from liquid metal to finished bar is always ignored in giving physical property values, yet ingot size, discard, speed and amount of reduction from ingot to bloom, from bloom to billet, and from billet to bar all have an important bearing on the mechanical values of the finished product.

Other factors which affect mechanical values in greater or lesser degree and which are rarely, if ever, reported are: Incidence and character of nonmetallic inclusions, grain size at time of quench, speed of quench, exact definition of quenching media, and temperature of quenching media.

Although the size of test samples is commonly given, the location from which such samples were taken and the size of the section from which they were taken is not usually reported. Additional details which have important effects upon physical property values, and which are rarely, if ever, reported are the degree of surface finish of the test specimen, the speed of the crosshead, and the temperature of the specimen at the time of test.

From the foregoing it is evident that existing physical property data leave much to be desired and that reports of single heat results may not be as inaccurate as the term "single heat" might imply. At best, any physical property chart is simply a guide post which gives a general level of properties rather than precise values.

Fig. 1 gives single heat results of a National Emergency steel compared with single heat results of standard steels. The comparability of results needs no comment.

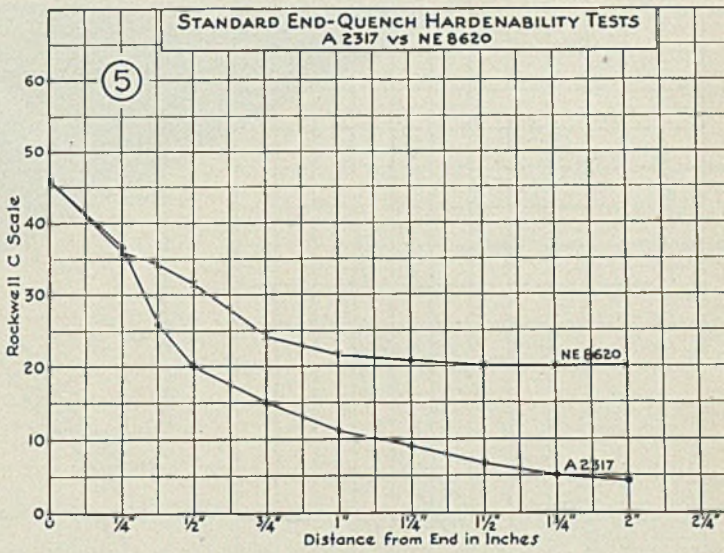
American specifications commonly give ranges or minimums for mechanical properties which are sufficiently wide to permit of physico-economic leeway in melting. This is both desirable and necessary, because steel manufacture is still an art and not a precise science. Although a consistent relationship exists between carbon content and manganese content on the one hand, and tensile strength and brinell hardness on the other, the difficulties which exist in melting steel to exact limits impede our ability to achieve precision in manufacturing practices.

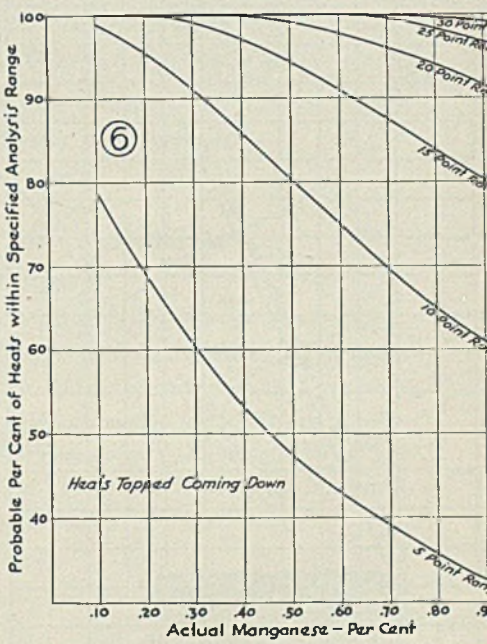
For example, if steel must be melted to a range of 5 points of carbon in the 0.20 to 0.30 per cent carbon range, the manufacturer must be prepared to lose 10 per cent of his heats if working for 0.20 to 0.25 per cent carbon; and 15 per cent of his heats if working for 0.25 to 0.30 per cent carbon. On the other hand, the consumer must be prepared to relinquish his place in the rolling schedule, or accept an off-heat, when he specifies such close limits.

If a manganese content of 0.40 to 0.60 per cent is desired, the probable loss of heats is 2 per cent; but if the range is narrowed to 0.45 to 0.55 per cent, the probable loss of heats is 20 per cent.

The inescapable condition of melting practice is reflected in the physical property values of steel because it is a fundamental fact that the maximum hardness which a given steel can attain by proper heat treatment is dependent almost entirely on its carbon content, while depth of hardness is largely dependent upon its content of alloying elements.

In this respect the NE steels react precisely the same as do the standard steels of the past. Fig. 15 shows the hardness of 45 NE steels at 1/16-inch on the Jominy bar plotted as a function of carbon content. It is significant that the curvilinear relationship of theory and research is maintained even though the data were taken from commercial tests which were run on commercial heats,





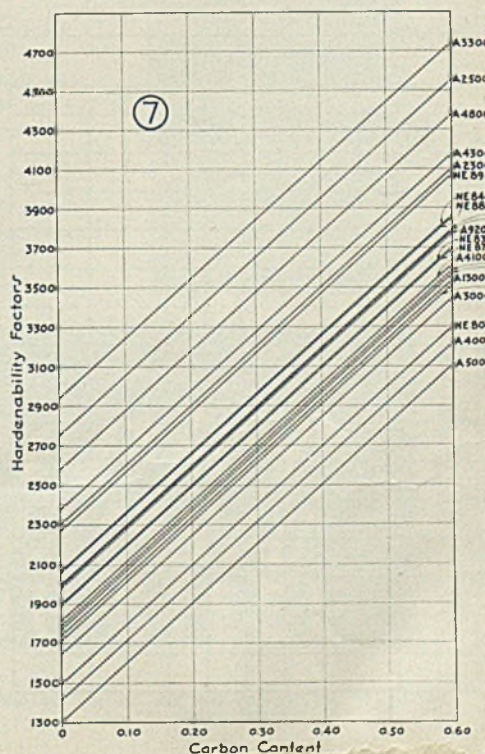
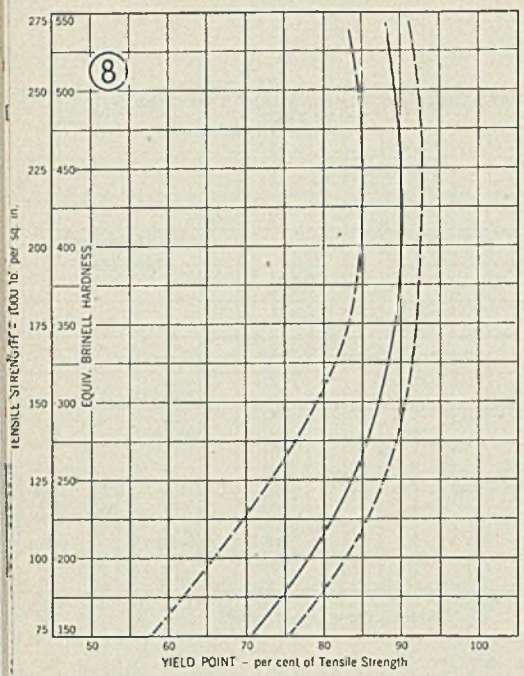
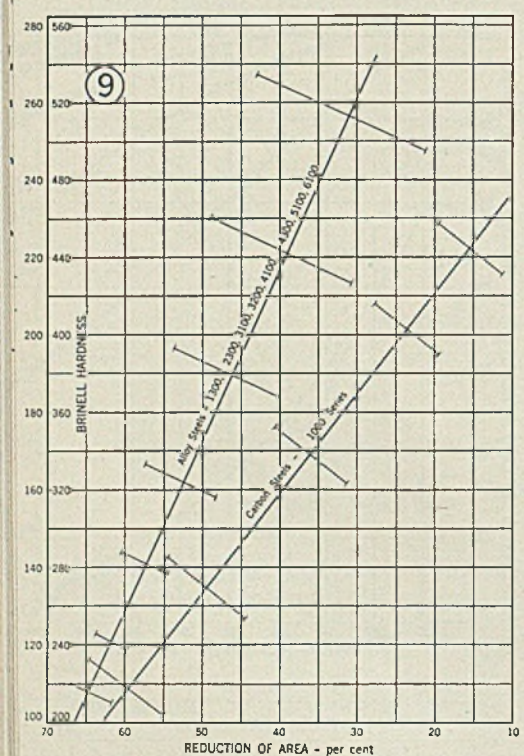
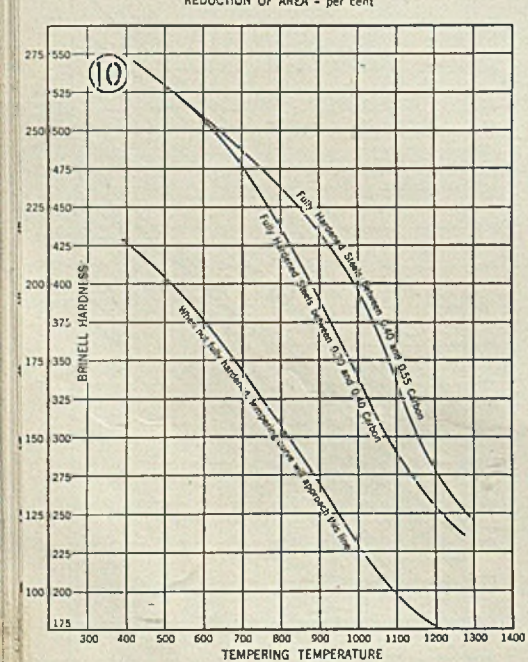
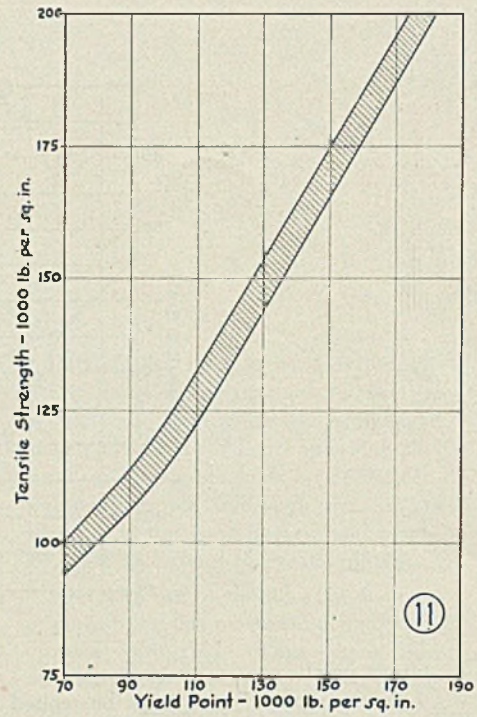


Fig. 3—Effects of carbon and alloying elements on hardenability. Fig. 4—Hardenability comparison between A 3140 and NE 8442 steels. Fig. 5—Hardenability comparison between A 2317 and NE 8620 steels. Fig. 6—Off-heat expectancy—manganese. Fig. 7—Approximate hardenability levels









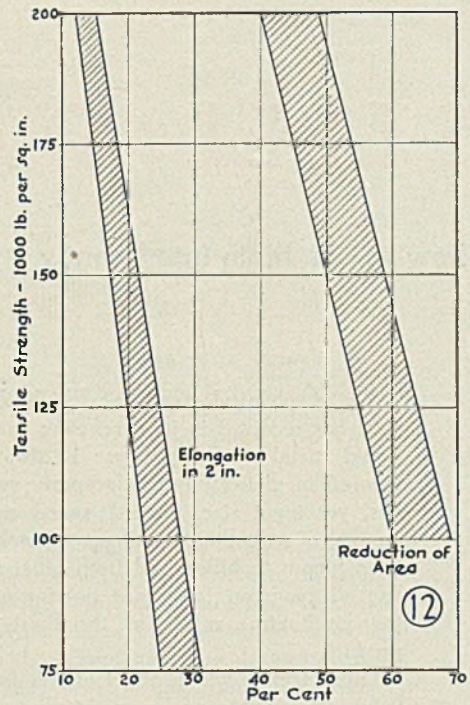


Fig. 8—Relationship between tensile strength and yield point, in per cent of tensile strength (1942 SAE Handbook)

Fig. 9—Relationship between tensile strength and reduction of area (1942 SAE Handbook)

Fig. 10—Relationship between hardness and tempering temperature (1942 SAE Handbook)

Fig. 11—Relationship between tensile strength and yield point for NE 8000 steels

Fig. 12—Relationship between tensile strength, reduction of area and elongation

and that all types of NE steels are represented.

The standard end-quench hardenability tests given in Fig. 3 illustrate clearly the principles that maximum hardness is a function of carbon, that depth of hardness is a function of alloying elements, and that small quantities of several properly selected elements are more effective in influencing hardenability than a large quantity of a single element.

The curve for A 1035 is typical of a carbon steel; it identifies a shallow-hardening steel by reason of the low rockwell values at ¼-inch and beyond. The curve for A 1330 illustrates first, the maximum hardening power of carbon uninfluenced by alloying elements and, second, the influence of an alloying element, in this case manganese, in increasing depth of hardness. The manganese content of the A 1035 was 0.78 per cent while that of the A 1330 was 1.82 per cent; the carbon contents of the two steels were practically identical.

The curve for A 2335 illustrates the increased maximum hardness due to increased carbon and the increased depth of hardness due to 3.5 per cent nickel. The curve for NE 8744 further illustrates maximum hardness due to carbon and also shows the hardening power of small quantities of several properly selected alloying elements. The alloy content of the NE 8744 was manganese 0.85 per cent, nickel 0.50 per cent, chromium 0.51 per cent and molybdenum 0.23 per cent.

Those facts are further attested by the curves in Fig. 17 which give typical hardenability characteristics of two NE steels compared with standard steels.

Because of the influence of the chemical composition of steel on its physical properties in the heat-treated condition, a specification or a statement of limits or ranges must be factual, in that it is related to physical property levels and mass-production heat-treatment prac-

TABLE I—Composition Hardness Comparison

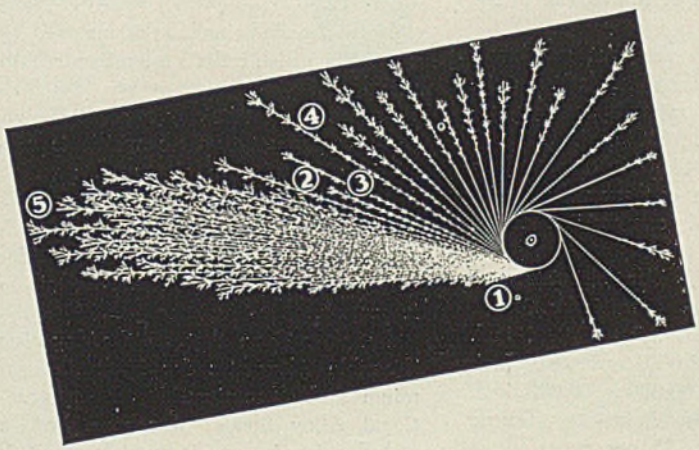
	A 3140				NE 8442			
Element	Content X100		Hardening Factor	Value	Content X100		Hardening Factor	Value
Carbon	40	×	30	1,200	42	×	30	1,260
Manganese	80	×	8	640	145	×	8	1,160
Phosphorus	4	×	40	160	4	×	40	160
Sulphur	4	×	10	40	4	×	10	40
Silicon	28	×	5	140	28	×	5	140
Nickel	125	×	4	500	...	×	..	...
Chromium	65	×	5	325	...	×	..	...
Molybdenum	...	×	..		35	×	16	560
Comparison Number				3,005				3,320

HERE'S A WAY TO SEPARATE Your TOOL STEEL SCRAP!

With a serious shortage of steel scrap actually curtailing armament production —you do not have to be told *why* every pound must be put to work, *now!*

In your tool room, machine shop and throughout the plant there are worn or obsolete dies, tools, jigs and fixtures that *should* be helping to make more fighting equipment for our soldiers. Dig them out. They are the *start* of more war weapons. Then separate your tool steel scrap. It is worth more to you, and to your country, when it is properly sorted.

To help you separate your tool steel scrap for salvage, our Testing Department has developed the *Spark Testing Guide* offered below. This 21" x 30" wall chart will be helpful to your men in learning more about *Spark Testing* to quickly classify tool steel scrap.



USE SPARK TESTING

- to separate miscellaneous tool steel scrap, your broken tools, worn dies, etc.
- to classify tool steel that has lost its identity in stock.

IN TOOL ROOMS, many hours and precious pounds of metal are saved when tools are always made from the right tool steels. Let your tool makers use the Carpenter *Spark Testing Guide* to help them classify tool steel that has lost its identity.

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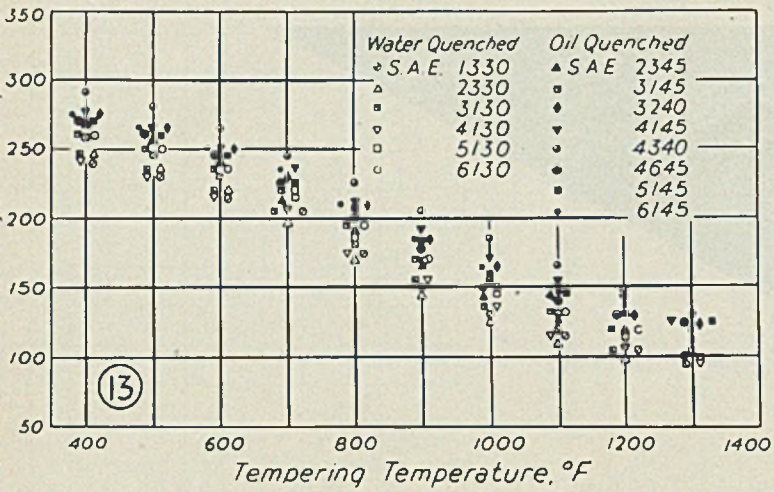
SPARK TEST FOR No. 11 SPECIAL

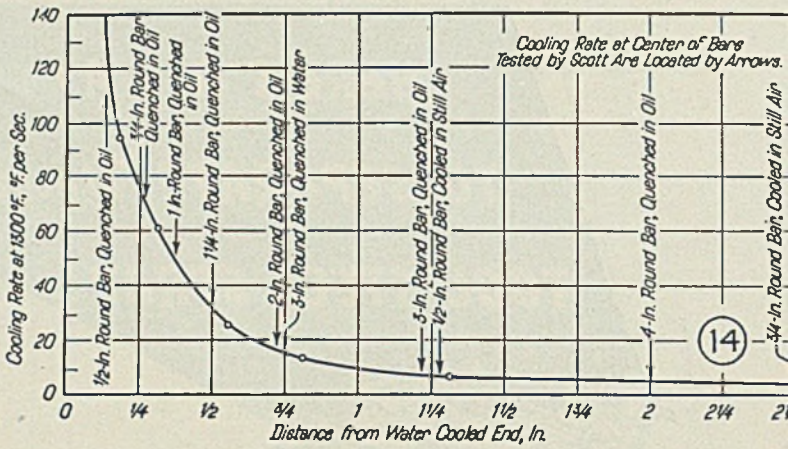
Straight Carbon Tool Steel

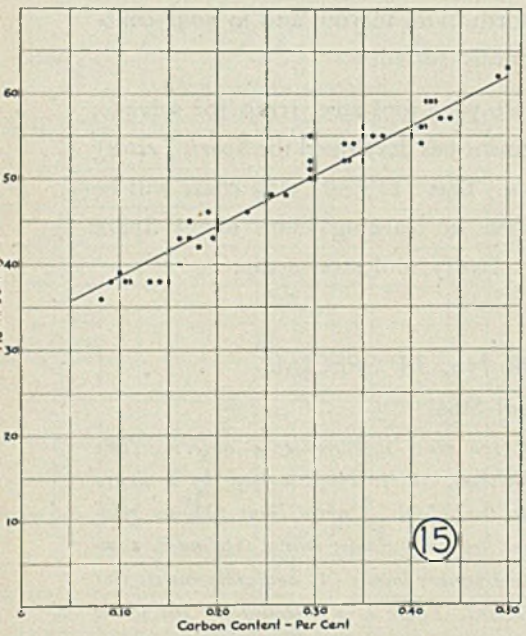
This spark is one of the most spectacular to observe. The stream is full and brilliant. It is characterized by a dense stream (1) adjacent to the wheel. Carrier lines (2) are relatively long, continuous, brilliant, almost white. Stream is composed of sprigs (3), preliminary bursts (4) and main bursts (5) —none of them suppressed. There is a tendency for the spark to be carried around the periphery of the wheel.

A note on your company letterhead will bring you this new wall chart. From it your men can learn the spark patterns caused by the major elements in tool steel. Instructions are also given for Spark Testing procedure; wheel speeds, effects of wheel grain size, dressing the wheel and pressure required. Write today for your Guide for Spark Testing Tool Steels.

Carpenter MATCHED TOOL STEELS







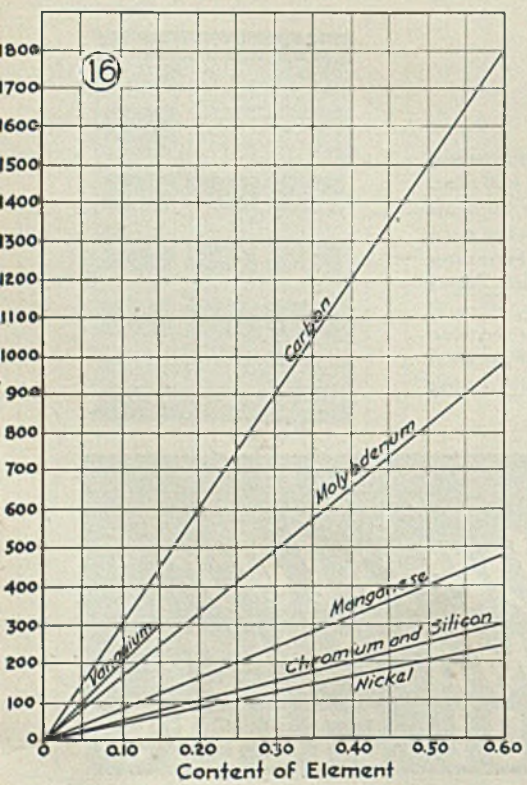


Fig. 13—Tensile strengths of various quenched SAE steels as a function of tempering temperature (Janitzky and Baeyertz)

Fig. 14—Data which relates cooling rate of various size rounds to distance from water-cooled end of standard end-quench test bar

Fig. 15—Relationship between subsurface hardness of NE steels and their carbon content

Fig. 16—Hardenability factors

tices, and as precise as good manufacturing practice permits. In addition to the paramount objective of securing consistently reproducible results, the limits must provide the happy medium of maximum ease of use to the consumer and maximum ease of production to the steelmaker.

Let us establish the fact previously stated that American specifications commonly give ranges or minimums for mechanical properties which are sufficiently wide to permit of technical economy in melting and which can properly be related to chemical composition limits and ranges.

Tensile range, lb.	For tensile strength minimums, psi
10,000	To 62,000, incl.
13,000	Over 62,000 to 66,000, incl.
15,000	Over 66,000 to 80,000, incl.

Ration of Yield Point to Tensile Strength, minimum 55 per cent.

In the field of alloy steels the standards in most common use today are contained in government specifications. The following example is typical of many such specifications:

Tensile strength, min	125,000 psi
Yield point, min	100,000 psi
Brinell hardness	250-300-psi
Elon. (2 in.)	17 per cent

Note tensile-brinell relations TS = 500 BHN which reflects a tensile strength range of 25,000 psi.

It is evident that any method of calculating property values which is sufficiently accurate to give results which fall within the foregoing commercially accepted limits is a useful tool which should be employed, particularly under emergency conditions when speed is so important.

Let us assume that on the day that "Possible Alternates for Nickel, Chromium and Chromium-Nickel Constructional Alloy Steels" was published, a metallurgist in an industrial plant is faced with the problem of selecting an alternate for A 3140. Let us make the

TABLE II—Comparison Number Breakdown

Element	Content X100		Hardening Factor	Value
Carbon	42	×	30	1,260
Manganese	125	×	8	1,000
Phosphorus	2	×	40	80
Sulphur	1.9	×	10	19
Silicon	23	×	5	115
Molybdenum	33	×	16	528
			Comparison Number	3,002

TABLE III—Physical Properties

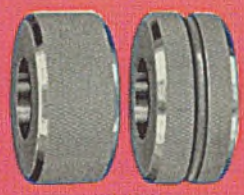
	Actual Properties* A3140	Calculated Properties NE 8442
Tensile strength, psi	145,000	158,000
Yield point, psi	120,000	137,000
Reduction of area, per cent	58	54

**Possible Alternates for Nickel, Chromium, and Chromium-Nickel Constructional Alloy Steels—page 78.*

How TO ORDER GAGES

When an order for fixed size gages fails to include complete gage specifications, the missing information must be gotten by further correspondence before the order can be put in production. This delays procurement of these vital tools and it also puts an extra burden on the time of procurement personnel. Both can be prevented by including all the following information on gage orders.

PLAIN PLUGS and RINGS



1 Size (Go and Not Go).

2 Class of gage makers' tolerance.

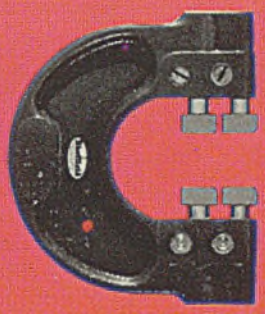
3 Members desired—Go, Not Go, Handle.

4 Length of member—standard or extra long.

5 If progressive member is wanted, so state.

6 Complete marking instructions.

SNAP GAGES



1 Frame size.

2 Frame model.

3 Range.

4 Stipulate whether gage is to be set and sealed.

5 Complete marking instructions.

THREAD GAGES

1 Size (Go and Not Go).

2 Threads per inch.

3 Class of fit for the work part.

4 Class of gage makers' tolerance and pitch diameter.

5 Members wanted—Go, Not Go, Handle.

6 Complete marking information.

7 Whether or not a setting plug is to accompany a ring gage.

8 If setting plug is ordered, whether ring gage is to be set and sealed.

It is always strongly recommended and good practice to order a setting plug for every thread ring gage purchased because there is no other good way of accurately checking ring gage wear or of resetting the ring gage to compensate for that wear.

The gage maker does not set and seal a thread ring gage unless he also furnishes a setting plug. He cannot do this because of the three variables involved, pitch diameter, lead, and thread angle. Every one of these is interrelated and every one may vary within its own tolerance zone. Thus, a thread plug and a thread ring made at different times or by different manufacturers may both be well within their tolerance limits in every element and still, because of these small cumulative differences, the two might not fit together precisely. When both the ring and the setting plug are made together, these differences can be adjusted, but not otherwise.

SHEFFIELD GAGES
MASTER GAGEMAKERS

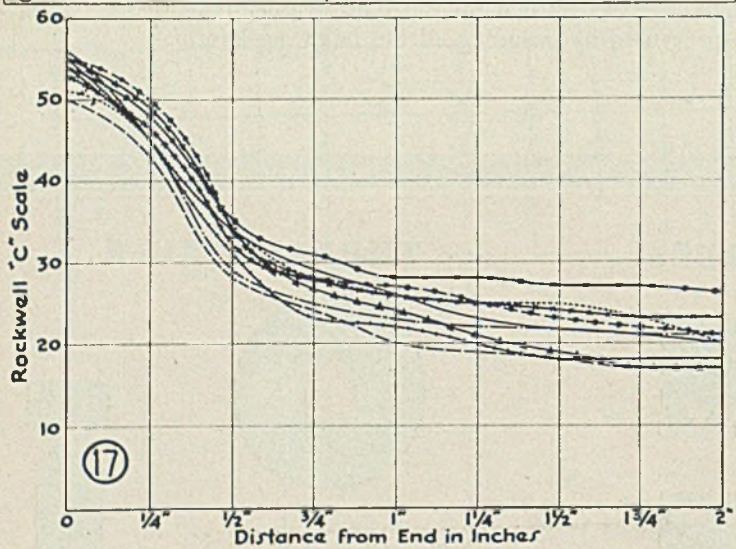
THE SHEFFIELD CORPORATION

DAYTON, OHIO, U. S. A.

Actual Compositions

Designation	E4130	A4037	A3130	NE8235	A1330	A5130	SAE6130	NE 8630	A2330
Symbols	———	— — —	·····	—·—·—	———	—•—•—	———	———	———
Manufacture	E.F.*	O.H.	O.H.	E.F.*	O.H.	O.H.	E.F.	E.F.	O.H.
Grain Size	Fine	Fine	Fine	Fine	—	3-5	Fine	Fine	Fine
Q. Temp.	1600°	1540°	1550°	1575°	—	1550°	1575°	1575°	1550°
C	.27	.40	.31	.38	.32	.35	.32	.33	.31
Mn	.50	.80	.77	1.26	1.67	.75	.60	.87	.66
Si	.11	.28	.25	.33	.25	.21	.22	.28	.24
Ni	—	—	1.20	—	(13)	(12)	(20)	.48	3.44
Cr	1.00	—	.55	—	(14)	1.01	.98	.70	(09)
Mo	.25	.21	(03)	.16	—	—	—	.20	—
V	—	—	—	—	—	—	.19	—	—

○=Incidental Elements *=Experimental Induction Furnace Heats



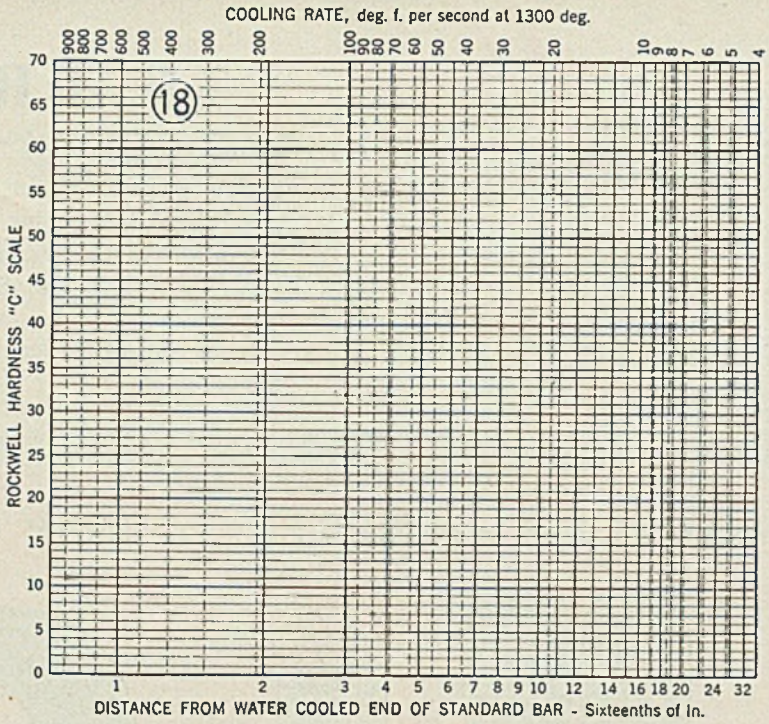
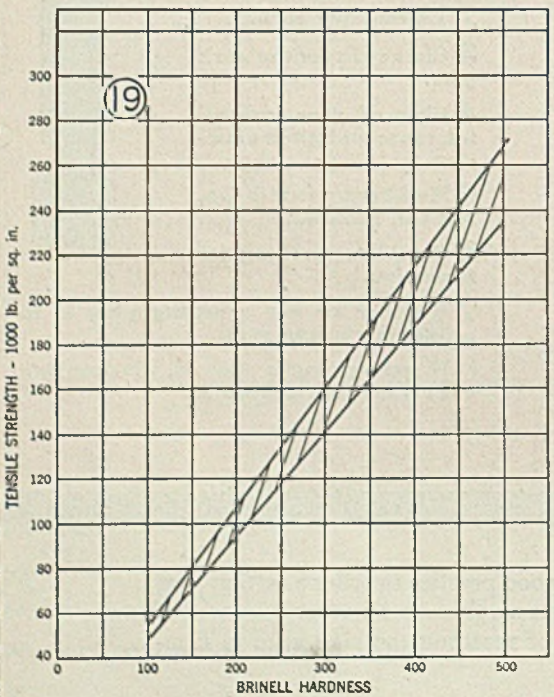
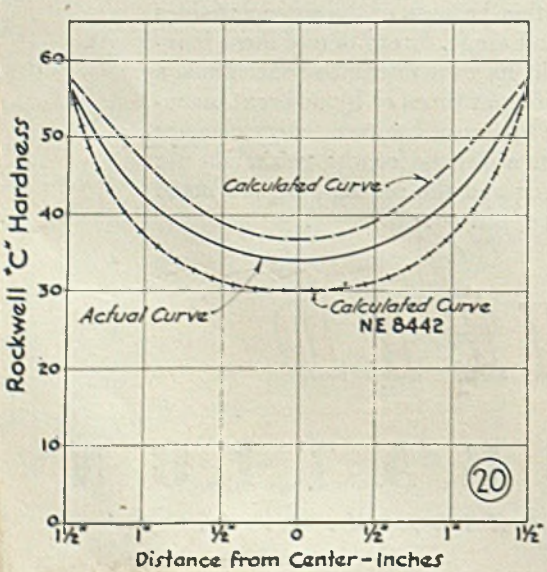


Fig. 17—Standard end-quench hardenability data on semi-thorough hardening grades. Fig. 18—Standard form for plotting hardenability curves. Fig. 19—Relationship between hardness and tensile strength (1942 SAE Handbook). *Fig. 20—U-curve hardness characteristics of A 3140, water quenched from 1500 to 1550 degrees Fahr. compared with calculated curve for NE 8442*





further time-saving assumption that because he had heard of English experience with manganese-molybdenum steels he selected NE 8442 from the table of compositions as one which might do the job. No physical property data were available to him, except the hardenability curves published in the "alternate" book. How is he to get sufficient information to justify his use of NE 8442?

First, he might compare composition hardness values derived from data published in many steel handbooks. A comparison based on one such system (Bethlehem Alloy Steels, page 164) and using the means of the composition ranges given for the two steels is as shown in Table I.

The comparison numbers, which are simply hardness level gages and not exact limits, indicate that the manganese-molybdenum steel will have a higher hardness than the nickel-chromium and therefore a higher tensile strength. If the comparison number of the alternate steel fell below that of the standard steel by an amount equal to or greater than the hardening value of one-half the carbon range—120 in this case—plus one-half the difference in the composition hardness levels without influence of carbon—128 in this case—then another alternate should be examined.

Fig. 16 shows graphically the hardenability relationships among certain of the alloying elements and Fig. 7 gives the approximate hardenability levels of standard and NE steels.

Referring now to the book of "alternates" a standard end-quench hardenability curve is found (Possible Alternates for Nickel, Chromium and Chromium-Nickel Constructional Alloy Steels, American Iron and Steel Institute, N. Y., January, 1942, p. 118) which compares the hardness characteristics of the two steels and it is found that the curves compare favorably—the manganese-molybdenum curve being somewhat higher than the curve for the nickel-chromium steel—as was indicated by the composition hardness computations. The manganese-molybdenum steel data are from a 10-ton open-hearth experimental heat (grain size 7) which has the composition, and composition hardness rating shown in Table II.

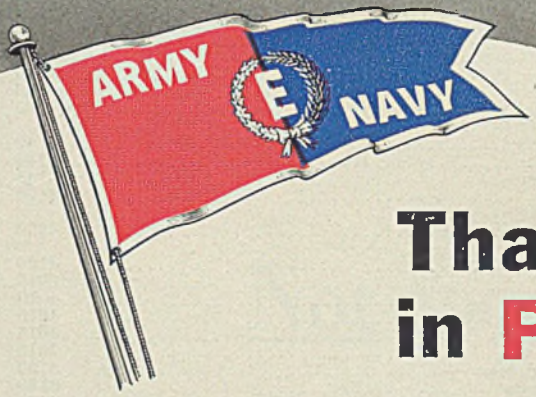
The comparison number gives an almost exact check with the composition hardness value of A 3140.

On consulting a chart which relates hardness to tensile strength, it is found

TABLE IV—Composition Hardness Comparison

	A 3140				NE 8739			
Element	Content X100		Hardening Factor	Value	Content X100		Hardening Factor	Value
Carbon	40	×	30	1,200	39	×	30	1,170
Manganese	80	×	8	640	88	×	8	704
Phosphorus	4	×	40	160	4	×	40	160
Sulphur	4	×	10	40	4	×	10	40
Silicon	28	×	5	140	28	×	5	140
Nickel	125	×	4	500	50	×	4	200
Chromium	65	×	5	325	50	×	5	250
Molybdenum		×			25	×	16	400
Comparison Number				3,005				3,064

POWER with Economy



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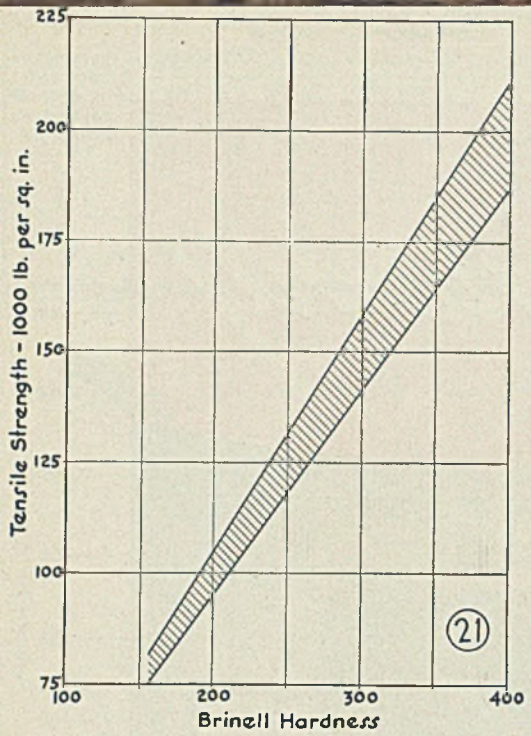


Fig. 21—Relation between brinell hardness and tensile strength for NE 8000 series steels, normal expectancy

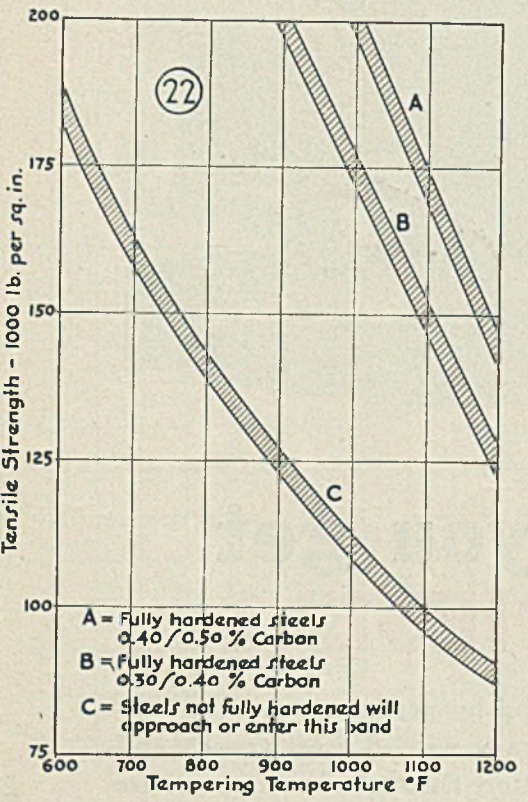


Fig. 22—Relationship between tensile strength and tempering temperature, NE 8000 series

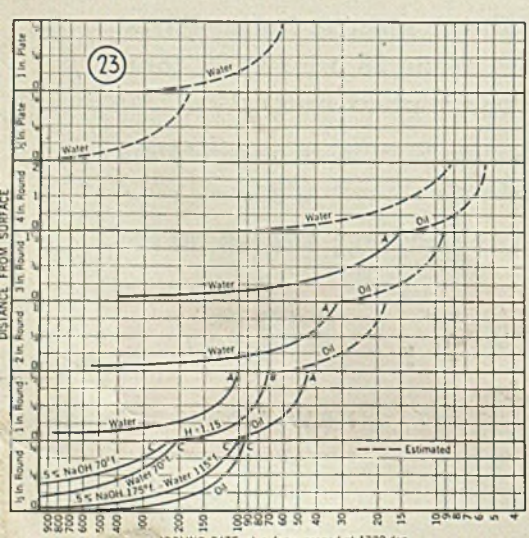


Fig. 23—Chart for using hardness-cooling rate curve

that 310 brinell, the approximate hardness level at which the steel is used, is equivalent to a tensile strength of 158,000 pounds per square inch. On consulting Fig. 8, which shows the relationship between tensile strength and yield point in per cent of tensile strength, it is found that a yield point of 137,000 pounds per square inch (0.87 T.S.) is indicated.

The indicated tensile strength reflects a reduction of area of 54 per cent, with a probability of a range of 48 to 58 per cent. This property is predictable only when the steel has been tempered to below 400 brinell (Functions of the Alloying Elements in Steel, Edgar C. Bain. American Society for Metals, 1939, Cleveland.) Fig. 9.

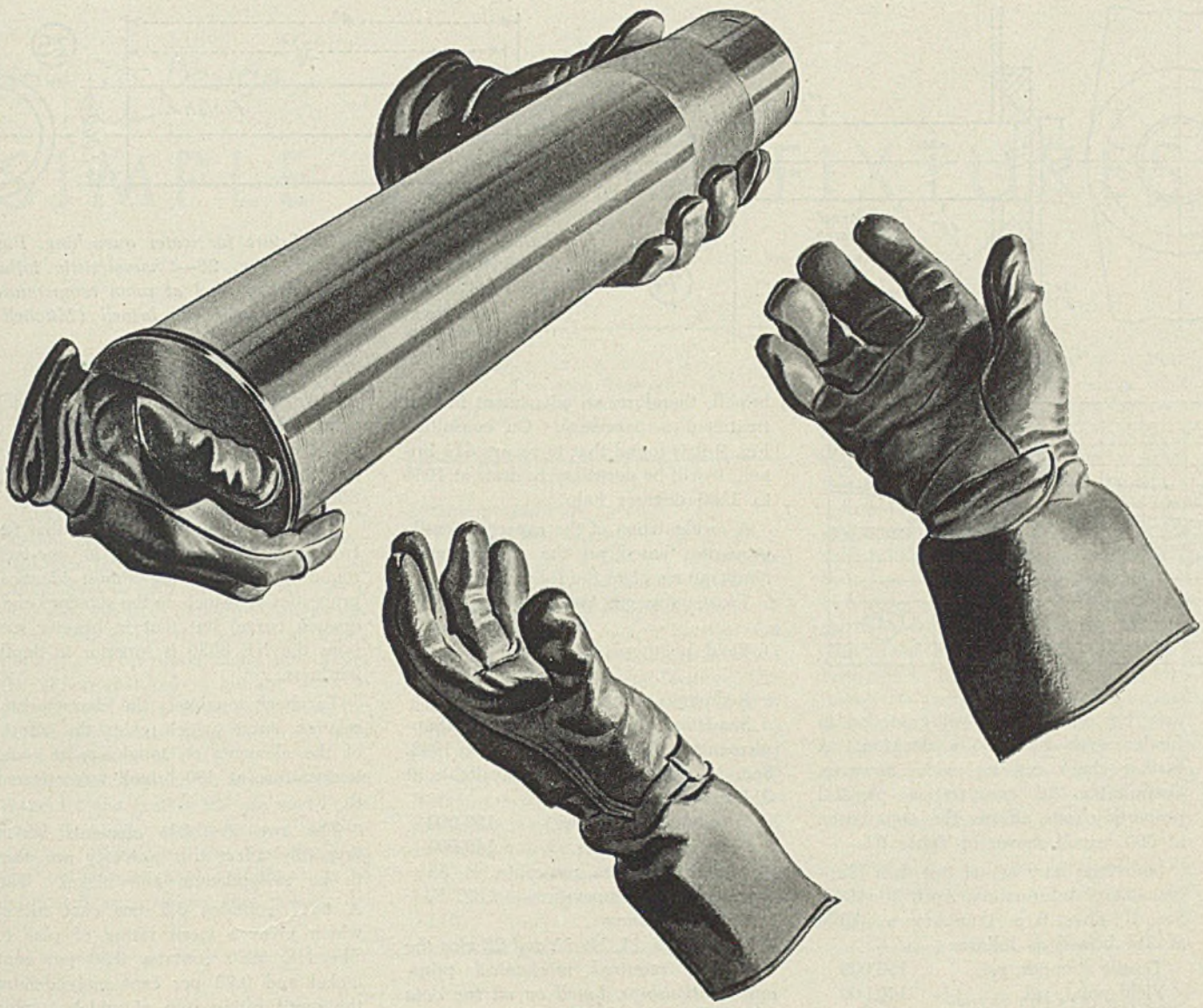
Reference to a chart, Fig. 10, which gives the relationship between hardness and tempering temperature indicates that the steel should be tempered at approximately 1150 degrees Fahr.

In this connection, Bain states that "when the several steels are carefully compared at the same hardness by the choice of appropriate tempering temperatures, the tensile properties are amazingly similar."

Sufficient information is now avail-

TABLE V—Actual NE Steel Applications

NE Steel in Use	Application	Standard Steel Replaced
8024	Ball studs	3115
	Machine tool shafts	4620
	Steering gear worms	4120
8339	Steering arm studs	3045
	Connecting rod bolts	2340
	Brake adjustment bolts	3140
	Chain links	3140
	Truck gears	4140
	Seamless tubing	Special
8442	Oil well tool joints	3140
	Socket wrenches	4140
	Wrenches	6140
	Chain pins	5150
	Die inserts	4140
	Drill shanks	4140
	Low temperature studs	4142
	Locomotive side rods	Special
	Locomotive piston rods	Special
	Locomotive crank pins	Special
8447	Steering knuckles	3140
	Lever holders	4140
	Tractor shafts and gears	4145
	Truck axles	4150
8547	Gears	4150
8620	Transmission gears	4120
	Air drill parts	2315
	Ring and pinion gears	4620
	Chuck jaws	4615
	Coal cutting chain blushings	4615
	Machine tool gears	2315
	Roller bearing cups and cones	3120
	Transmission spline shafts	3120
	Rear axle drive pinions	4320
	Differential spiders	6120
8630	Steering arms	4130
	Cutter bitt holders and wedges	6135
	Hand tools	4130
8724	Bearing cones	4620
	Tractor gears	4820
	Transmission gears	6120
8739	Bolts	3130
	Mining machinery parts	4137
	Transmission gears	5140
	Truck transmission gears	4640
8744	Machine tool parts	3140
	U-bolt	4142
	Tractor gears and shafts	2345
	Set screws (heavy duty)	3145
	Engine bolts and studs	4140
	Seamless tubing	Special
8749	Pins	3250
	Machine tool parts	2350
	Pneumatic tool parts	4640
	Machine tool gears	4150
	Transmission gears	5150
8817	Coal cutting chain straps	4320
	Carburized transmission gears	3115
	Machine tool parts	3115
8949	Axle shafts	3240
	Truck clutch parts	3240
	Gas engine connecting rods	4340
	Milling machine transmission gears	2345
	Oil well machinery parts	3145



Not too Hot to handle

Hot shell-cases are no fun to handle. Workmen treat them gingerly when they pack them for shipment . . . or wait to let them cool.

In one factory, shell-case "butterfingers" became a bottleneck. So engineers installed industrial refrigeration to cool the shells. Output speeded up enormously. *And* . . . the temper of the shell-cases was found to be improved.

This industrial refrigeration . . . provided by General Electric . . . is only one example of the many interesting applications of mechanical cooling in today's war effort.

To meet the requirements of war industry, air conditioning and refrigeration have been made far more precise. Now, temperature and humidity are controlled more exactly. Required climates are accurately reproduced. Equipment is more compact . . . more flexible. General Electric has played a leading part in developing air conditioning and industrial refrigeration to make them more useful for war production.

After the war, the general public will benefit from these improvements. Soggy, ill-controlled air will become a memory of the past in theatres and public buildings. The new air conditioning will have *humidity* control as well as more exact temperature control. More economical . . . it will become available to the small home-owner and more store owners. Cars . . . planes . . . boats will be air conditioned.

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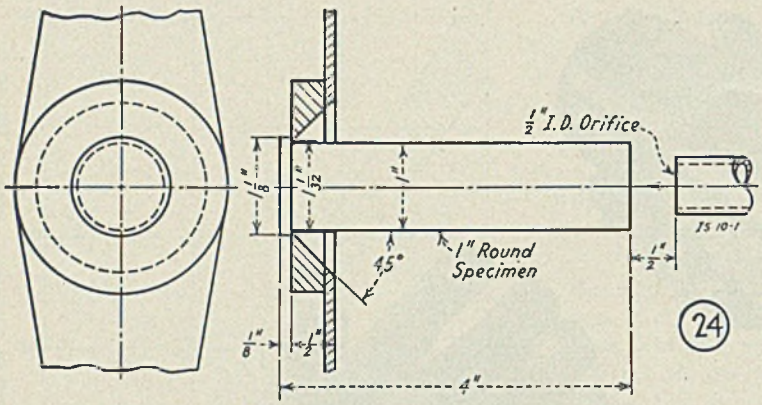


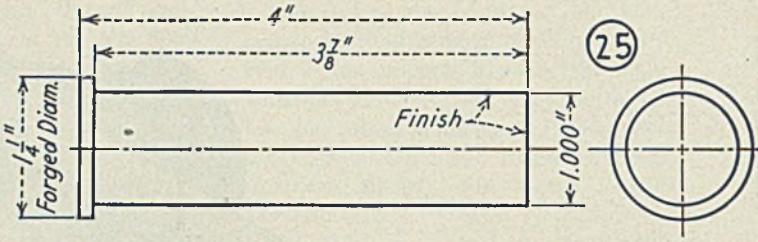
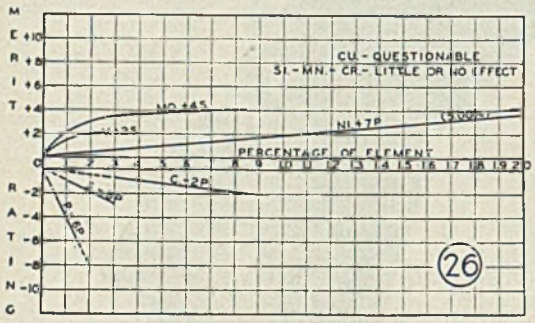


Fig. 24—Test specimen in fixture for water quenching. Fig. 25—Preferred test specimen. Fig. 26—Characteristic influence of elements on toughness of steel at room temperature when heat treated to a hardness of 400 brinell (Mitchell)



able for one who is well-grounded in fundamentals to make a decision. A further check can be made, however. Consultation of comparative physical property charts affords the comparison at 300 brinell shown in Table III.

Sometime later actual test data (Supplementary Information, April 30, 1942. Sec. 10, Sheet 9, p. 1) became available at 311 brinell as follows:

Tensile strength, psi	156,000
Yield point, psi	140,000
Reduction of area, per cent	56

The U-curves which give the hardenability characteristics of a bar across its diameter are given in Fig. 20. To construct a diagram it is necessary to have a standard end-quench curve of the steel and the diagrams shown in the appendix which give cooling rates between the center and the surface of various size sections.

If another metallurgist had elected to use NE 8739 the computations would have been as shown in Table IV, to secure 311 brinell.

The comparison numbers indicate that the nickel-chromium steel will be of the same degree of hardness as the more richly alloyed nickel-chromium steel and, therefore, of equivalent tensile properties.

The nickel - chromium - molybdenum steel has the following tensile properties calculated from 277 brinell:

Tensile strength, psi	136,200
Yield point, psi	117,100
Reduction of area, per cent	62
Tempering temperature	1150°F.

It is evident that the steel will not meet desired physical properties at 277 brinell; therefore, an adjustment in heat treatment is necessary. On consulting Fig. 9 it is found that to secure 311 brinell, it will be necessary to draw at 1050 to 1100 degrees Fahr.

A recalculation of the expected tensile properties based on the new drawing temperatures gives the following:

Tensile strength, psi	148,000 to 157,000
Yield point, psi	128,700 to 138,100
Reduction of area, per cent	56 to 54

Sometime later, actual test data (Supplementary Information May 18, 1942. Sec. 10, Sheet 55) became available at 311 brinell as follows:

Tensile strength, psi	155,000
Yield point, psi	140,000
Reduction of area, per cent	55
Tempering temperature	1100°F.
Brinell Hardness	311

Charts Figs. 11, 12, 21 and 22 give the commonly required mechanical property relationships, based on all the data which are available up to now for the NE 800 series steels. It is to be noted that they deviate to a negligible degree from the previously exhibited curves of the same relationships for other grades of steel.

Reference has been made to qualitative data which serve as guide posts, and to some extent as milestones. Let us explore a typical example of how such data was used in assisting to set the specification limits for the NE 800 series steels, and how it is now being used in the field to select alternates for standard steels in applications where considerations other than the ordinary mechanical properties of tensile strength, yield point, elongation and reduction of area are of importance.

A manufacturer of air drills was using A 2317 for certain parts in which maximum toughness at 400 BHN was a prime consideration. An examination of hardenability curves indicated that NE 8620 would do the job.

The hardenability data shows that the two steels are equivalent in one-inch round sections (having almost identical properties at ¼-inch on the standard end-quench curve) but that in heavier sections the NE 8620 is superior in depth hardness.

To check toughness the characteristic relation curve which gives the effects of the elements on toughness at room temperature at 400 brinell was referred to.

The two available elements which favorably affect this property are seen to be molybdenum and nickel. The A 2317 contains 3.5 per cent nickel which gives a merit rating of plus 6. The NE 8620 contains 0.50 per cent nickel and 0.20 per cent molybdenum the merit rating sum of which is plus 3.5. Consideration of section size and heat treatment procedure clearly showed that NE 8620 would perform satisfactorily if it was tempered at a lower temperature than the A 2317.

Actual test results on psuedo-carburized test pieces were as follows:

	A 2317	NE 8620
Direct quench, °F.	1,680	1,700
Temper in oil, °F	400	300
Tensile strength, psi	135,000	135,000
Yield point, psi	110,000	110,000
Izod value, ft.-lb.	45	52

Clearly, the NE 8620 is the tougher material as measured by the Izod value, for the conditions imposed. Economically, all the nickel, 60 per cent of the chromium and 30 per cent of the molyb-

(*Please turn to Page* 95)

TABLE VI—Distances in End-Quench Hardenability Test

Distance on cross-section	Cooling Rate	Distance from quenched end
Surface	400°F.	1¼ sixteenths
⅜ in.	60°	4¾ sixteenths
¾ in.	28°	7¼ sixteenths
1⅛ in.	18°	11 sixteenths
Center	15°	12½ sixteenths

How To Design . . . . .

SIMPLE JIGS and FIXTURES

(Section 15 in a Series on How To Get the Most from Arc Welding)

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

THE MAIN consideration in designing jigs and fixtures to hold parts in place for welding is to reduce the total cost of production of the weld. One of the most effective ways to lower welding costs is to speed production.

Let's see what makes up total production time on a welded job. Production time per unit produced (sometimes called floor-to-floor time) equals setup time plus arc time plus dismantling time —arc time being the period in which the arc is in operation, setup time being the period required to get the work in position, and dismantling time being the period required to clear the work from the fixture after welding.

Arc time obviously is a matter of arc speed for the greater the arc speed, the lower the time required per unit of production. Therefore, the best designed jigs and fixtures hold the object to be fabricated in a position that permits the highest possible arc speed.

To stress the importance of properly designed fixtures, a few arc speeds for different positions are hereby given:

Consider first the flat weld made on an upper horizontal surface such as the top of a table. Such a weld can be made with the greatest speed and facility. The flat weld for a butt joint, using 3/16-inch steel plate, can be made at about 13 feet per hour, and for a lap joint, using the same stock, the speed is about 47 feet per hour. For ½-inch plate, the speeds for the two joints are about 4 and 10 feet per hour respectively.

While welds on top of a flat, horizontal plane are the fastest that can be made, those on the under surface of a horizontal plane, such as the ceiling of a room, are the slowest. Speed for overhead butt joints in 3/16-inch stock is about 7 feet per hour, while on lap joints it is about 15 feet per hour.

Speeds for different types of welded joints on vertical surfaces, such as the side wall of a cabinet, are in between those for the upper and under surfaces of horizontal planes. On a vertical plane the down-weld is faster than the up-weld. The speed of a horizontal weld for a butt joint on a vertical surface is approximately 90 per cent of that for a vertical down-weld. For a butt joint in 3/16-inch stock, the vertical down-weld speed is about 12½ feet per hour and for a lap joint, about 18 feet. The vertical up-weld, using the same stock for a butt joint is about 9 feet per hour.

All the speeds mentioned here are for normal production in a good shop. Be-

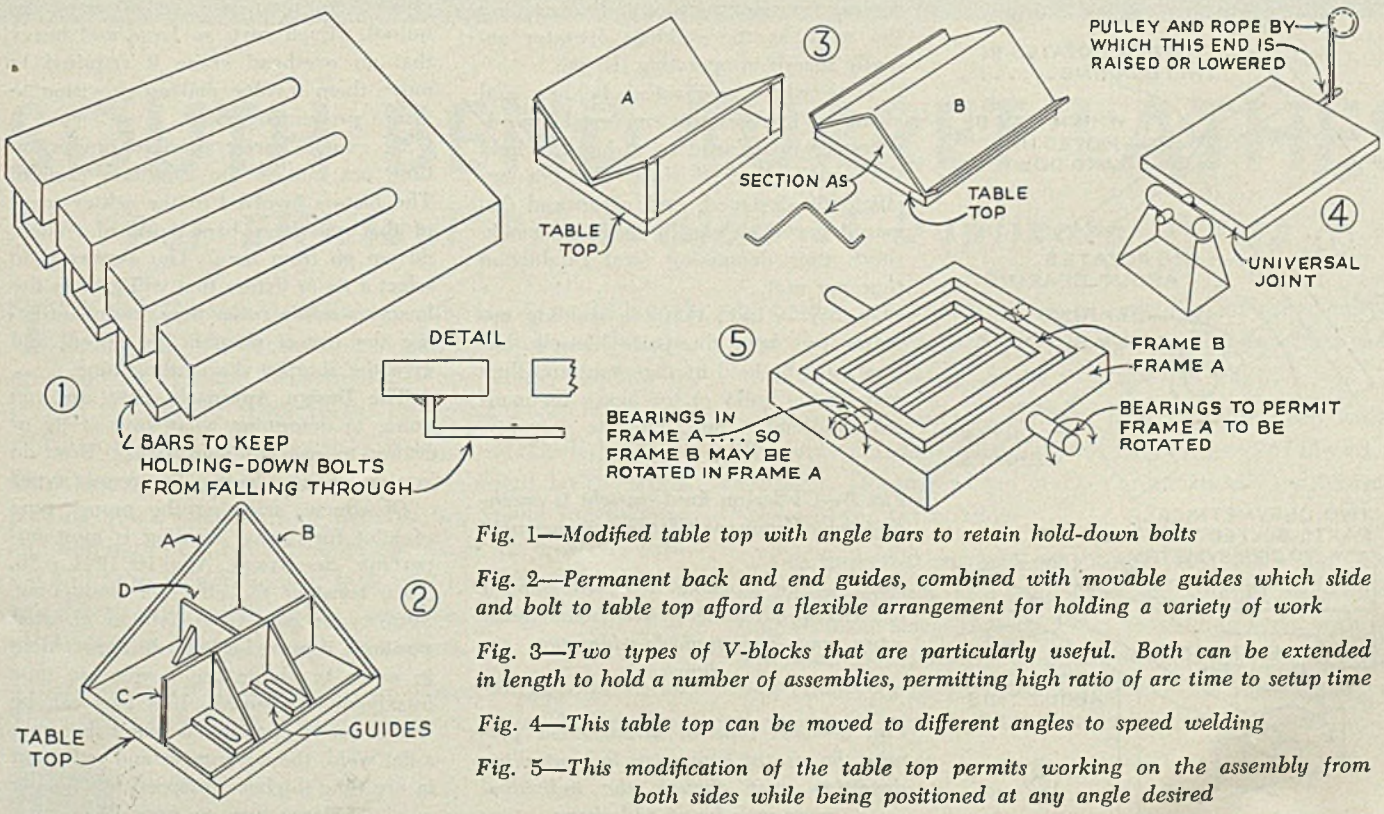


Fig. 1—Modified table top with angle bars to retain hold-down bolts

Fig. 2—Permanent back and end guides, combined with movable guides which slide and bolt to table top afford a flexible arrangement for holding a variety of work

Fig. 3—Two types of V-blocks that are particularly useful. Both can be extended in length to hold a number of assemblies, permitting high ratio of arc time to setup time

Fig. 4—This table top can be moved to different angles to speed welding

Fig. 5—This modification of the table top permits working on the assembly from both sides while being positioned at any angle desired

E. W. P. Smith Dies Of Heart Attack

Edward W. P. Smith, consulting engineer for Lincoln Electric Co., Cleveland, and a nationally known authority on arc welding, died Sept. 19 aboard a train enroute to Cleveland from Indianapolis. He was 56 years old.

A veteran of more than 20 years' service with Lincoln Electric, Mr. Smith traveled extensively in the last year in the interests of the war production program.

Visiting many war industry centers, he had been conducting welding courses and giving lectures on latest welding techniques. He advised many war concerns utilizing welding in the construction of war equipment. Shortly before his death, Mr. Smith addressed a meeting of the American Welding Society at Indianapolis, boarding the train immediately after the meeting. He also was known widely as a technical writer, contributing many articles to the trade press.

E. W. P. Smith

Mr. Smith was born in Cleveland, and was graduated from Colorado college, Colorado Springs, Col., with a degree in electric engineering.

Before joining the Lincoln Electric organization as a tester he had worked in the electrical inspection department of the city of Cleveland, and for Westinghouse Electric & Mfg. Co. in Pittsburgh.

Each month at the Lincoln plant he gave special courses on designing for welding. He developed several original methods of demonstrating stresses in metals, and was scheduled to be chairman of a number of technical sessions at the American Welding Society convention held in Cleveland the week of Oct. 12.

Besides being a member of the AWS, Mr. Smith belonged to the American Society of Mechanical Engineers, American Society for Testing Materials and the Cleveland Engineering Society.

Mr. Smith is survived by his wife, Mary, and six children.

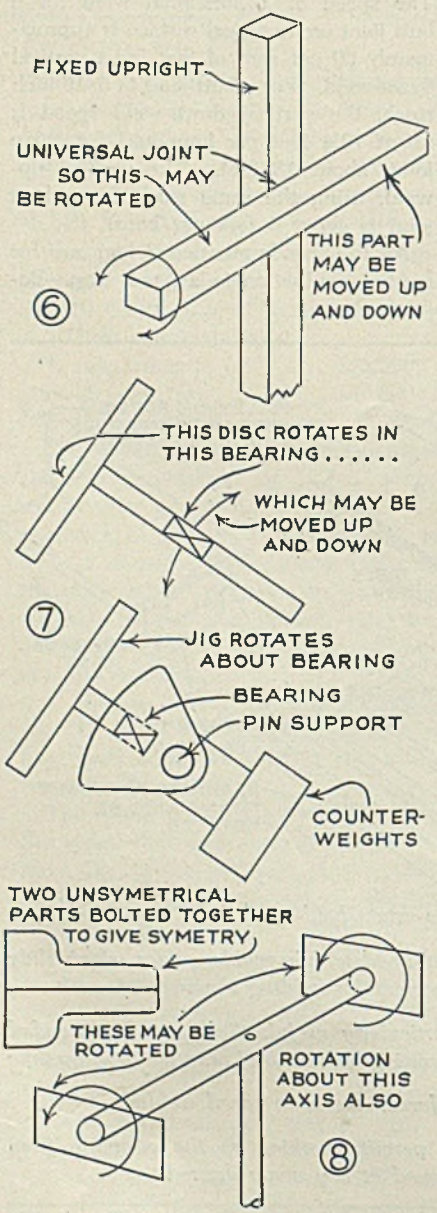


Fig. 6—Girder on fixed upright is another type of universal fixture arrangement

Fig. 7—The movable disk arrangement has several advantages. The fundamental setup and one typical adaptation are shown

Fig. 8—This type of arrangement permits the use of symmetry in controlling distortion even though the individual parts may be of odd shape

downhand position, it is obvious that jigs and fixtures are more nearly ideal when they make that position possible.

Setup and dismantling time include the time for making the necessary arrangements to hold the pieces in position for welding and then for releasing them from that position. Obviously if no mechanical holding or clamping facilities are employed, the work must be held in position manually. If a second worker must be at hand to hold the work, it is easy to see how that worker could spend several times as long a period in handling the work as the welding operator actually spends in operating the arc.

Thus when mechanical holding and clamping facilities are employed, no additional worker need be at hand to hold the work. And if these facilities are efficiently designed, both setup and dismantling periods can be made extremely short, thus decreasing total production time per unit.

It may be said that the welding operator can hold the parts himself, but they must be held in alignment and they may be too bulky or too heavy for manual handling. Thus there are very few welding jobs in which it is practicable for the operator to hold the work and run the arc at the same time. Proper fitup is always an essential. See STEEL Sept. 15, 1941, p. 88. A jig or fixture is required to give the proper fitup and to support bulky or heavy work.

Accuracy of alignment of parts is extremely important in many assemblies, even small ones such as those made from short sections of aluminum tubing. Although they could easily be held in place by hand for welding, it would never be possible to approach the accuracy required. Even parts so large and heavy that an overhead crane is required to move them involve making provision to assure proper alignment.

Of course lowest possible production time per unit is the condition desired. The factors involved in the achievement of that end have been outlined. Where do we go from here? The answer is to select a jig or fixture that will give us the lowest possible setup time, permit utilizing the fastest possible arc speed, and give the shortest dismantling time.

The Design Approach: How are you going to determine what kind of jig or fixture to use for your work? How do you go about selecting the proper type?

Of course, selecting the proper type of joint for easiest welding is most important. See STEEL, Aug. 18, 1941, p.86. Then consider the effect of positioning. Study your part to determine in what positions it must be held during welding in order to obtain the lowest arc time (maximum arc speed). If a part can be moved so a horizontal weld becomes a flat weld, the advantages and reduction in arc time (higher arc speed) obtainable

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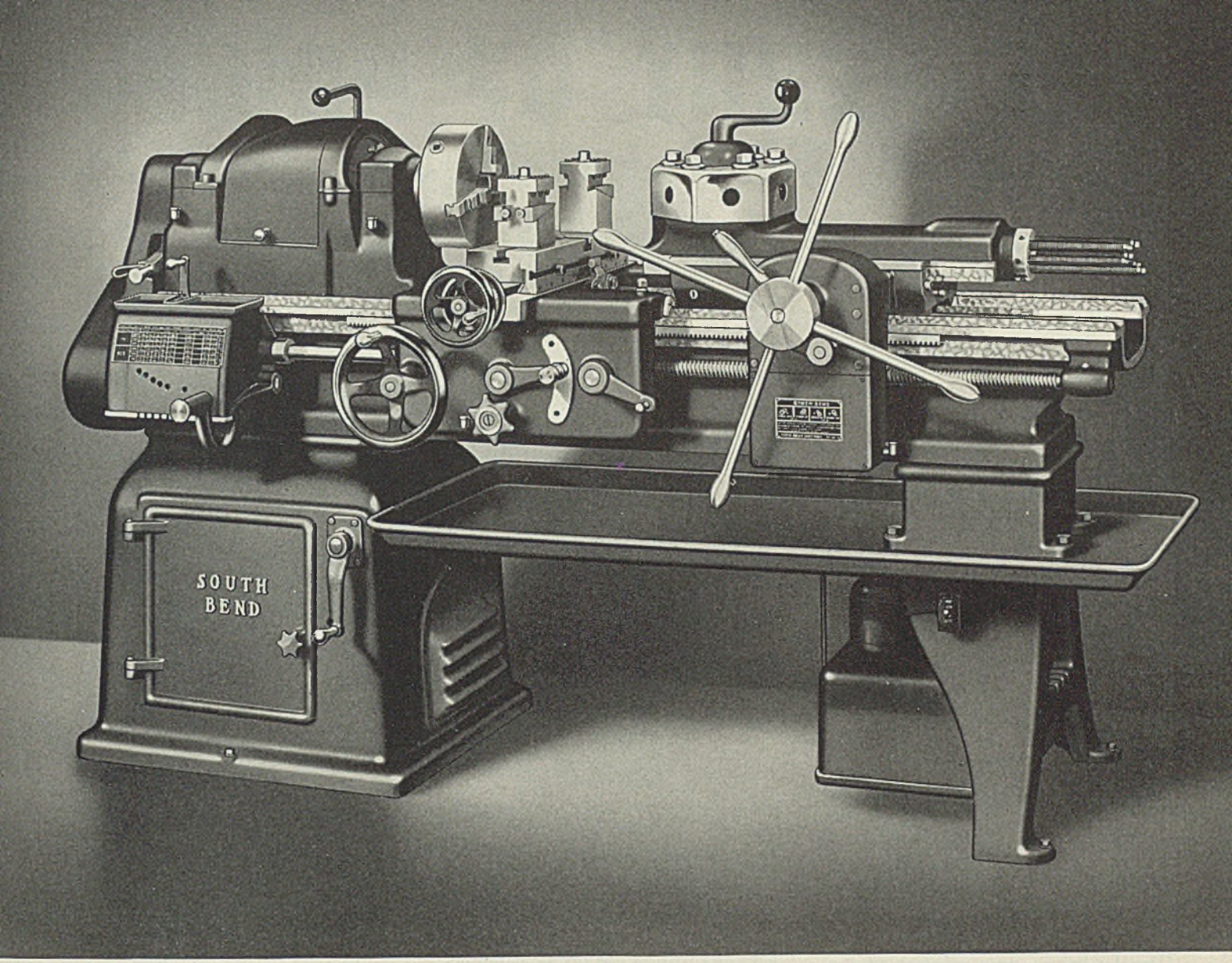

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Bar work up to 1″ round may be passed through the collet. The spindle hole has a capacity for stock up to 1⅜″ in diameter when a universal chuck is used. Maximum capacity for chucking operations is 6⅞″ swing over the universal saddle cross slide and 16¼″ swing over the bed ways.

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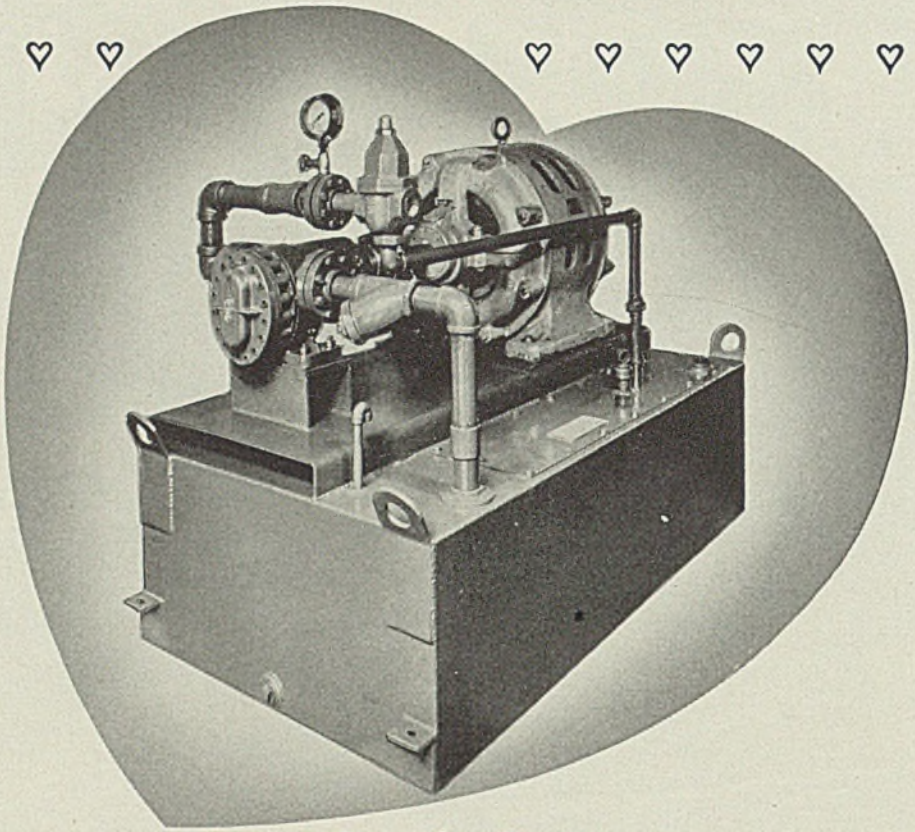

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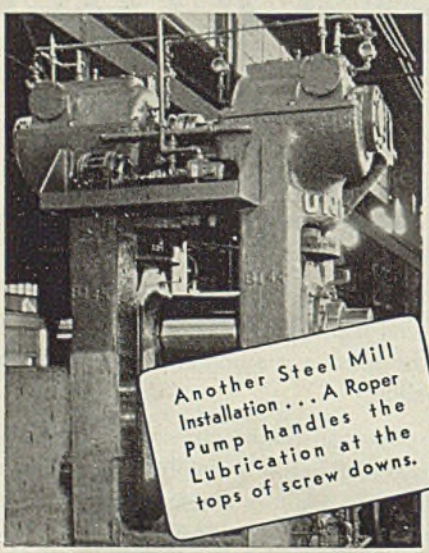

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HOW TO STACK

And Load Corrugated Shipping Boxes

TO CUT DOWN the waste on your distribution lines, trim your handling costs to the bone, then streamline your stacking and loading methods. You'll find it makes a big difference—in time, in costs, in profits. It is indeed the little things that count—*up*, points out the Hinde & Dauch Paper Co., Sandusky, O., through whose courtesy the following information is presented.

You save money by reducing loss on damaged merchandise when both stacking and loading operations are carried out efficiently. Corrugated shipping boxes are as strong and sturdy as modern engineering skill can build them. However, the advantage this rugged construction gives you can be dissipated unless precautions are taken to make full use of that strength. Proper storing and stacking can minimize damage losses by helping you capitalize on sturdy, corrugated construction.

With warehouse and freight space at a premium, it is imperative in the interests of economy that stacking and loading methods make full use of every cubic foot—not square foot—of storage space. A number of additional boxes in every carload may not appear in the profit and loss statement, but these boxes over a period of time add up to real money. A little care and planning in stacking and loading will expand storage space at no cost—provide "free" freight car and warehouse space.

Saves Time: Greater speed in loading and unloading from warehouse to freight cars and return is another by-product of efficient stacking and loading. As handling speed increases, automatically storage space is increased and costs are reduced. The easiest, most simple way to increase that speed is to stack and load efficiently. It's a matter of methods as well as machines.

Advertises: By proper stacking and loading you gain full advantage of the colorful designs, neat typography and clear-cut printing which advertise your product on its corrugated shipping boxes. Your stacks of merchandise become billboards — your freight loads become traveling salesmen. You advertise in transit.

There are eight rules for efficient stacking and loading. Let's discuss them in order of their appearance in Table I:

Load in Clean Space: Before loading freight cars or warehouse, pools of oil and water should be removed or covered with sheets of protective paper to keep merchandise clean.

Estimate Space: More economical use of space and easier loading are obtained by estimating the number of boxes that available space will hold. When loading boxes of uniform size, the easiest, quickest method of estimating is to place one row of boxes lengthwise in the space, then another row crosswise. Multiplying the number of boxes in the long row by those in the cross row and dividing this figure into the total number of boxes to be loaded will give the number of rows high you must stack to accommodate the boxes. See Fig. 1. Conversely, multiplying the figures obtained by laying one row lengthwise, one row crosswise and piling one stack as high as possible quickly determines how many boxes a given space will contain.

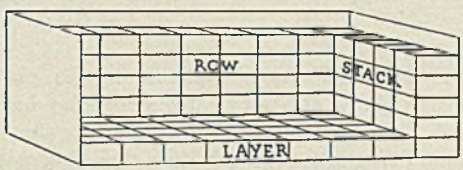
When lengthwise or crosswise boxes do not fill space from end to end and side to side, alternate rows should abut at same end or side so that rows are staggered to fill the space as shown in Fig. 2. Likewise, incomplete layers of boxes should be held in place by an "incomplete-layer brace" supporting crosswise rows of boxes, as illustrated in Fig. 3. Thus, incomplete layers remain in position, shifting of load and consequent damage to merchandise are prevented.

Line Up Stacks Vertically: Tipping concentrates weight on one edge of the bottom box and can cause collapse of entire stack with consequent damage to merchandise, confusion and jamming up of space. It can be avoided by stacking vertically so that weight of each box is supported evenly by the box be-

(*Please turn to Page* 100)

TABLE I—Eight Rules for Efficient Stacking and Loading

1—Clean space before loading or storing.
2—Estimate space: 1 row lengthwise, 1 row crosswise, then vertically.
3—Keep boxes stacked straight up and down.
4—Interlock or stagger boxes to prevent tipping.
5—Stack right side up.
6—Group same size boxes.
7—Load cars from end to center—tightly.
8—Barricade and weatherstrip openings.



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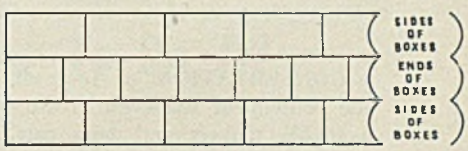

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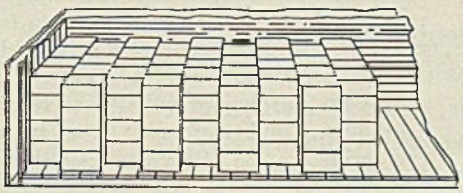

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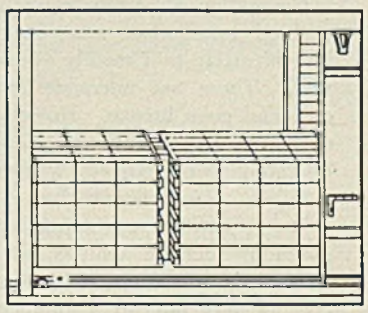

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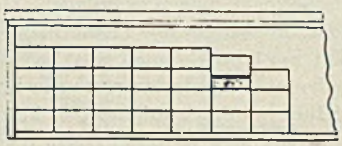

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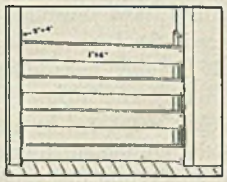

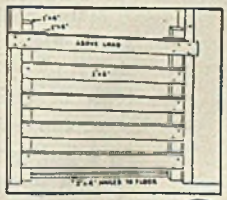

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Fig. 1—By figuring the number of units in layers, rows and stacks, estimates can be made of storage capacity

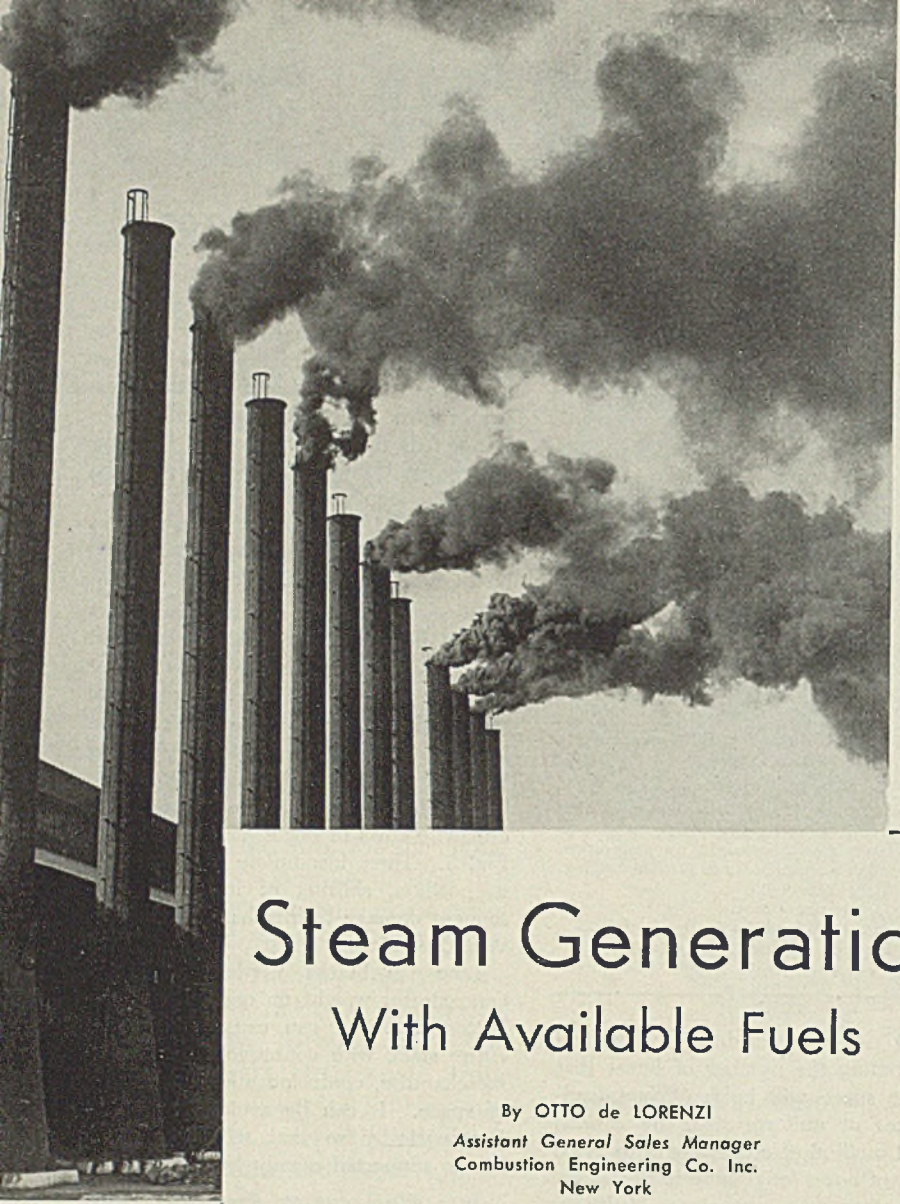
Fig. 2—Stacks should be staggered where full width is not used

Fig. 3 — An incomplete-layer brace serves to hold unfilled layers in place and prevents shifting

Fig. 4—Interlocking is an accepted method of "locking" entire load sections into stable units

Fig. 5—A center bulkhead will "anchor" entire freight-car load

Fig. 6—Barricades of boards should be nailed across door openings



Smoke belching from stacks may become a familiar sight in districts where fuel oil is rationed

Steam Generation
With Available Fuels

By OTTO de LORENZI
Assistant General Sales Manager
Combustion Engineering Co. Inc.
New York

CONSERVATION of fuel oil, with the consequent reduction in the use of available tankers and tank cars, is a war "must".

Generation of steam in many present oil-fired installations may be continued by converting to a readily available solid fuel. There are adequate supplies of coal and coke breeze. However, to secure comparable capacity at reasonable operating cost requires a careful and detailed engineering analysis. Relative values of various governing factors, exposed by such an analysis, should form the basis for adapting the most suitable type of fuel burning equipment to the existing conditions.

Many installations now burning oil were originally coal fired or were designed to be easily changed over to some form of coal firing. The majority of these can be quickly converted by using modern types of the equipment formerly used or planned on. While this type of change-over is a simple one it may not now be the correct or most economical solution. Coals available in the plant vicinity, at a reasonable price, may have burning characteristics that require a different method of firing than originally contemplated. Perhaps one of the more recent designs of stoker will better provide the means for taking care of the changed fuel characteristics. A rearrangement of boiler baffling may assist in increasing the effectiveness of the available furnace volume. The application of "over fire" air may provide the necessary turbulence and increased flame travel to overcome an otherwise intolerable condition of smoke. The installation of water-cooled surfaces in the form of clinker chills, walls or arches may make possible high sustained output without undue maintenance or outage. The foregoing are only a few of the many factors that must be assigned relative values to arrive at a conclusion as to the best type of fuel burning equipment to install.

In the case of installations where the original designs are based on the use of liquid or gaseous fuel only, the problem of conversion may have additional complications. Furnace volumes are smaller because high rates of heat liberation are permissible due to the absence of ash. As a result, furnaces are of the flat bottom construction. The boiler units are frequently set at grade level without any provision for basements. It is therefore difficult and costly to properly provide for the necessary ash disposal systems that are required when solid fuels are burned. Furthermore, the limitation in available furnace volume may immediately dictate the use of stokers instead of pulverized fuel. Because of these conditions, coupled with the fact that outage required to effect installation of the new equipment must be minimized, it may be necessary to accept a reduction in steam output. If, on the other hand, the plant load can be carried on other units during the construction period it may be possible to make more extensive changes and rearrange the equipment so as to provide as much capacity with the new fuel as with the old.

The selection of the most suitable type of fuel burning equipment will depend on the burning characteristics of the coal most economically available to the plant. This factor in itself will, in all probability, vary over a wide range. Furthermore, as the war effort progresses it may be necessary to burn poorer grades of fuel than now obtainable. Thus the equipment installed must be flexible to a greater extent now than when conditions are normal. The characteristics of coal having the greatest influence on equipment selection are:

1.—**Moisture:** The moisture content of a coal is in two forms, inherent and surface. It is the surface moisture that exercises the greatest influence in the choice of equipment.

Where stokers are used, if the coal is too wet some difficulty may be encountered in securing a uniform flow of fuel through the hopper to the grate. This is particularly noticeable in those spreader stokers employing a reciprocating or table type of feed. In the case of Illinois and Indiana coals it is possible to modify their burning characteristic by so-called "tempering". This tempering consists in adding sufficient surface moisture to the coal so that its rapid evaporation, when exposed to furnace temperature, will assist in liberating the volatile matter quickly. This action, when accompanied by the addition of relatively large quantities of air through the fuel bed will reduce the tendency to "coke" thus giving a "free burning" coal that is well suited to chain and traveling grate types of stokers.

The shipment of freshly mined lignites,

(*Please turn to Page* 100)

HELP FOR MEN WITH VALVES TO REPAIR

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Not only does Bulletin No. 5 tell *how to do it,* but illustrates modern valve repair methods with actual photographs. It's a valuable reference for any piping man—*veteran* or *beginner;* ideal for employee training school use. It serves a dual purpose: (1) to help get renewed life from valves, (2) to conserve critical materials.

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Protecting and Finishing Metal Surfaces

(*Continued from page* 65)

manganese dioxide to a niter bath until the suspended oxide has sunk, as otherwise dirty spots will appear on the blued article. Cast iron, if highly polished, will take on a gun-metal blue corresponding to that given to polished steel, but it requires about 20 minutes' immersion at 1000 degrees Fahr.

In most of these processes the temperature employed is high, running from 500 to 1000 degrees Fahr., and drag-out losses are high, necessitating replenishment of the bath. This is objectionable in many cases for it is

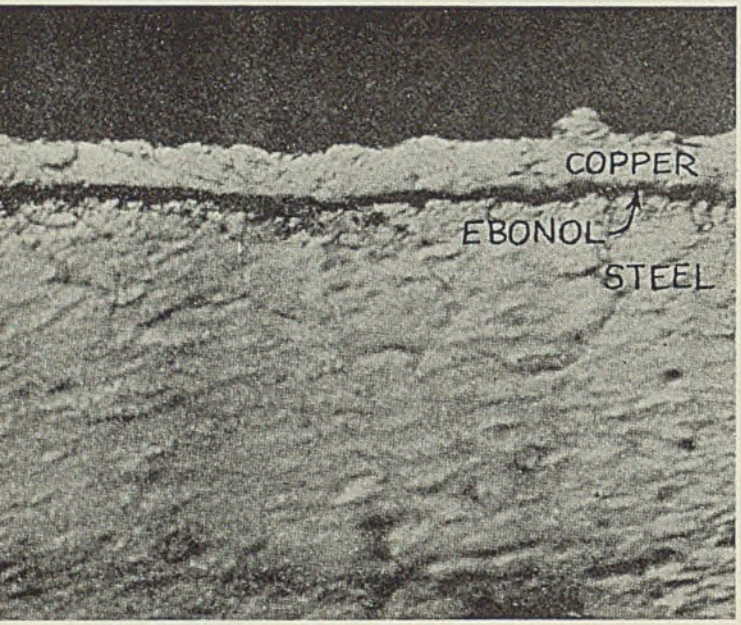

Fig. 2—Section through steel object with application of Ebonol and copper as seen at a magnification of 1500 *diameters*

expensive. Such temperatures also may destroy the heat treating which has gone before.

These objections have been overcome in the last few years by using aqueous solutions and employing much lower temperatures—from 280 to 400 degrees Fahr. Drag-out loss is much less due to the lower concentration of the salt. Ordinarily the solutions used are concentrated caustic or sodium hydroxide baths having a boiling point from 275 degrees Fahr. up. Such a solution will contain about 5 pounds or so of caustic per gallon.

A piece of cold-rolled highly polished steel immersed in such a solution at a temperature of 300 degrees Fahr. for 10 minutes will develop an attractive black color. Nothing else is required to give this coating except an acqueous solution of sodium hydroxide and a temperature of 300 degrees Fahr. It is believed the necessary oxygen is furnished by the water, the caustic producing the high pH and the active boiling of the acqueous solution—both essential to the process.

Although any caustic and a high temperature will produce a black coating on highly polished steel, it should be pointed out that an improved product can be obtained in a shorter time and at a lower temperature if small amounts of certain materials are added. Such materials seem to act in one of several different ways: An oxidizing agent aids the oxidation of the iron to the oxide state; an acid agent has a tendency to reduce the pH of the solution; a satalytic agent seems to aid the reaction.

TABLE I—Temperature-Produced Colors

Degrees Fahr.	Color Produced
428	Pale yellow
469	Straw yellow
490	Brown yellow
530	Purple
550	Pale blue
600	Dark blue

Below is a list of salts which have been added to a strong caustic solution by the author with apparently improved results: Potassium nitrate, sodium nitrate, potassium nitrite, sodium nitrite, potassium cyanide, sodium cyanide, potassium chromate, sodium chromate, chromic acid, manganese dioxide, potassium permanganate and lead oxide (litharge). The last is the only one which would be questioned. However, it seems to produce a beneficial result.

Chromic acid is added instead of sodium chromate because the chromic acid reduces the pH of the solution somewhat, usually desirable. The quantities of these materials is comparatively small, being of the order of several ounces per gallon. These compounds are well worth while as they produce coatings which are blacker in color, deeper in depth and which improve the corrosion resistance of the coat. While the list above is by no means complete, it will serve as a guide to those interested.

It is possible to produce different colored deposits by varying the concentration of caustic, temperature, addition salts, etc., of the bath. The author has been able to produce from a caustic bath coatings which varied from deep black to dark blue to brown to brown red. As a general rule the temperature was the variable which had the most effect. This should be kept in mind by those interested in producing different colored deposits to indicate different types of steel, etc.

On withdrawing the metal from the caustic it will be necessary to use a thorough water rinse—followed by careful drying. At this point the material can be stored or it can be given a lacquer application or an oil dip to increase its corrosion resistance and appearance. The lacquer can be applied as a spray or dip.

Life of the oxide coating is increased materially by addition of lacquer or oil. Ordinarily the salt spray life of any oxide coating is under 10 hours. One such test has just come to the attention of the writer. A steel unit for a gas mask assembly sprayed with lacquer failed in less than 5 hours on salt spray testing. The same material was treated in a caustic solution and then lacquered and the salt spray test was stopped at 20 hours with the coating still in good condition.

Oil applied to black oxide coatings also increases their life. These oils can be of any type which will be absorbed by the coating. They produce an adherent, nonporous coating. Parker and Graham[2] have used straight mineral oils, straight mineral oils with added compounds, straight mineral oils with inhibitors, fatty acid type oils, antitrust compounds of the Stoddard solvent type, water-soluble oils. Sperm oil proved to be one of the best.

Salt spray testing of such coatings has been used a great real. However, different operators have had trouble reproducing or checking the data of others. Graham[3] recommends the following procedure: Oil; place in rack in vertical position if possible; allow to drain or dry over-

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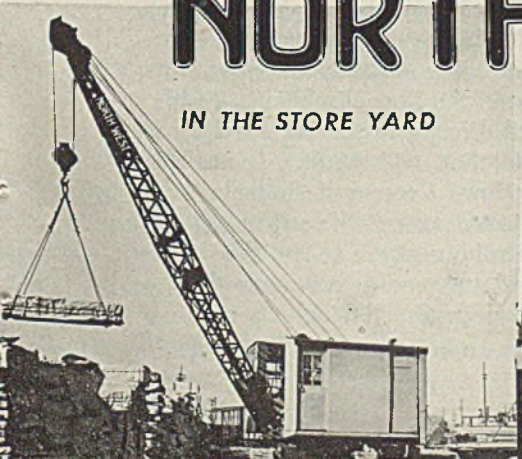


night; use 4 to 8 samples located in different parts of the cabinet.

For many organizations the above procedure may appear tedious and boresome. For those interested there are commercial establishments which market prepared salts which produce excellent finishes of these types. These companies have been contacted and asked for information. An attempt has been made by the author to present the information thus made available. The products below have been arranged alphabetically according to the name of the product and divided into two general groups—namely, iron oxide and phospate coatings.

Iron Oxide Coatings

Black Magic: This process, owned by the Mitchell-Bradford Chemical Co. of Bridgeport, Conn., is applied to steel in one application. It is believed that this bath is a concentrated alkali solution containing one or more

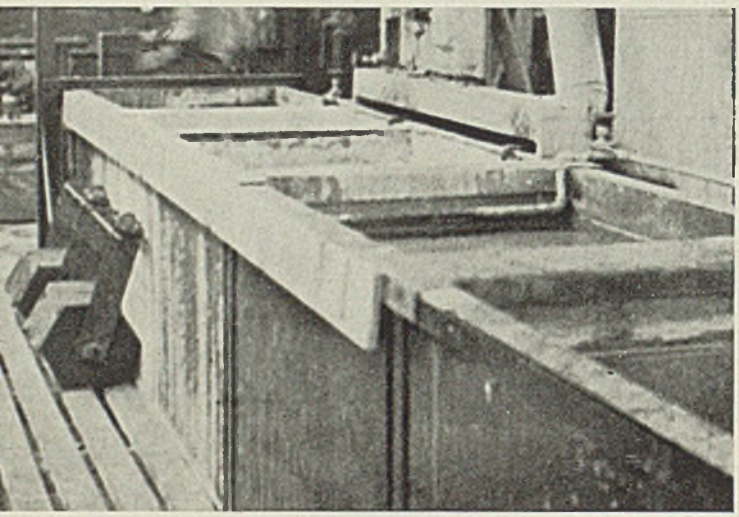


Fig. 3—Simple setup of equipment is suitable for application of the Houghto-Black finish

oxidizing agents. The reaction undoubtedly is the uniting of oxygen with the iron to produce an iron oxide. The concentration of the salts should be 8 pounds per gallon. This produces a solution having a boiling point of 300 degrees Fahr. The temperature should not be allowed to go above 310 degrees Fahr.

The thickness of the coating is said not to have been excelled by any other process, even though most of these are dual systems. The cost of the application is in the range of ½ to 1 cent per pound of metal treated, which, according to the company, includes labor, material and fuel. The process can be carried out in four steps. If an oil or lacquer is to be applied, it will be five steps. They are: Hot alkali cleaner; hot water rinse; Black Magic; cold-water rinse; soluble oil.

If the bath becomes slightly weak and if the color goes off, more salt is added direct. The parts to be treated can be strung on wires or placed in baskets on racks. After cleaning, they are immersed in the Black Magic solution for the required time—generally from 2 to 20 minutes.

The tank for holding the blackening solution is ordinary sheet steel which can be heated by gas, steam or electricity.

During the operation the operator should wear goggles to protect his eyes from the strong caustic solution. Do not introduce cyanides and other salts into the bath by using tongs, baskets, etc., which have been contaminated by other processes. Do not use brass, copper, galvanized or zinc-lined containers. The process is an approved government finish.

This salt when used as a molten bath at 950 degrees Fahr. will color cast iron in 1 to 3 minutes. The objects so treated should be quenched in a mixture containing one part soluble oil and eight parts water. This molten bath, it is stated, will also color copper, brass and bronze in the same manner.

A rather interesting point having to do with etched surfaces should be mentioned here. When these are blackened, the result is a matte or flat finish which gives a "non-lint" surface for use in government arms, etc.

Ebonol: This process, owned by the Enthone Co. of New Haven, Conn., is applied by dipping. It employs a strong sodium hydroxide solution containing an oxidizing agent. The reaction can be represented as shown below:

$$3Fe + 2\,O_2 \rightarrow Fe_3O_4$$

It appears that the formation of ferroferric oxide is dependent upon temperature and partial pressure of oxygen. A strong alkali is required to obtain the necessary temperature and to obtain a solution which has a slow solvent action on iron. The concentration of the solution is 7½ pounds per gallon. It is used at 275 to 285 degrees Fahr. while new. After a few square feet of steel per gallon of solution have been treated the range stabilizes itself from 286 to 295 degrees Fahr. Cast iron and steel steels require treatment with a maximum of 290 degrees Fahr.

Too high a temperature causes an olive green coating instead of the usual black. The higher the temperature, the greater is the depth of penetration and the more rapid the coating is produced. The thickness of the coating has been found, by microscopic examination, to be 0.000030 to 0.000038-inch. Fig. 1 is a view of the coating. No intergranular attack of the base metal due to the solution can be found. It is generally assumed that intercrystalline penetration lowers the fatigue life of a metal or alloy and therefore it is better to have transcrystalline penetration such as shown in Fig. 2.

The process can be carried out in nine steps. These are: Alkaline clean; water rinse; acid pickle; water rinse; Ebonol treatment; hot reclaim from Ebonol treatment; warm rinse; warm rinse; oil treatment.

All tanks except that used for pickling should be made of cold-rolled steel welded inside and out. The pickle tank can be made of lead-lined steel or ceramic materials. Heating can be done with high pressure steam, gas or electricity. Keep lead, tin, zinc, aluminum, copper and other nonferrous metals out of the Ebonol solution. Evaporated water can be added directly to the bath, but care should be exercised or spotting will result. It is best to let the water run gently down a corner of the tank.

Workers should be protected against the strong caustic solution with goggles and rubber gloves. Also the dried salts should not be allowed to come in contact with organic materials such as wood, paper, clothing, etc.

To summarize the information given by the manufac-

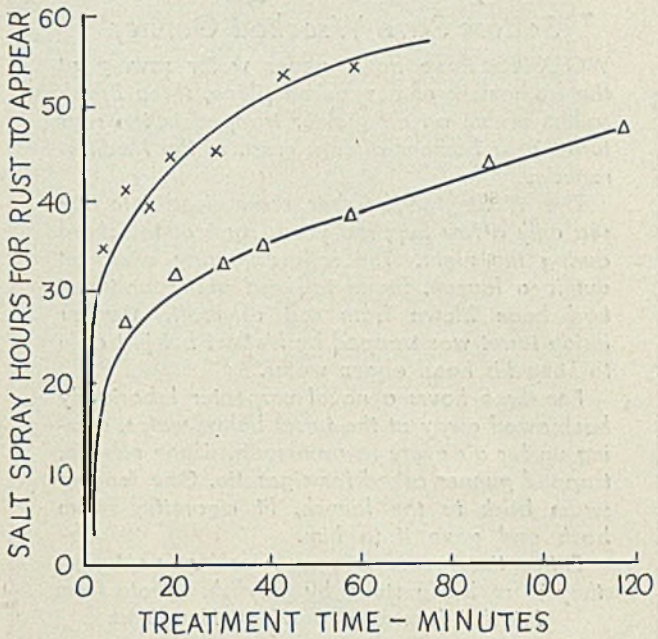


Fig. 4—Comparison of high temperature Jetal and nitrate baths; protective value of oil coatings. Shown by plotting results of salt spray tests—time for rust to appear on test versus treatment time. Data: Jetal at 315 degrees Fahr., using 5-minute predip at 290 degrees Fahr.; nitrate, equal times at 290 and 315 degrees Fahr.

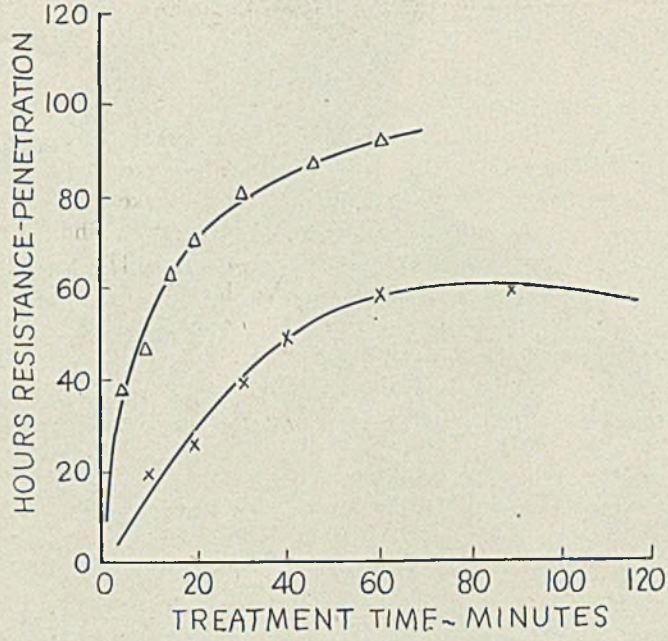


Fig. 5—Similar comparison of wear resistant properties of the two types of finishes in Fig. 4

turer, it may be said that the process produces on steel a jet-black corrosion-resistant oxide coating which is adherent, hard and has a lower coefficient of friction than steel. It will reduce die and bearing surface wear. The coating will withstand continuous temperatures up to 650 degrees Fahr. and can be substituted for many electroplated deposits on steel or act as a good base for paints, lacquers, etc. The coating can be applied to rack or basket work. This process has been approved by the government as an oxide coating.

Houghto-Black: This process, owned by E. F. Houghton & Co., Philadelphia, uses a strong caustic solution which contains oxidizing salts. Concentration of the bath is such as to give a solution which boils at 290 degrees Fahr. This is approximately 10 pounds of the salt to 1 gallon of water. If the bath is allowed to go to 275 degrees Fahr. or lower, or if allowed to go above 300 degrees Fahr., the coating produced will be brown instead of black.

The process can be carried out in six stages: Alkali cleaner; hot-water rinse; Houghto-Black; cold-water rinse; hot-water rinse; soluble oil.

All tanks should be of welded low-carbon or mild steel (SAE 1010 or 1020), and insulated where needed. Tank No. 3 should be equipped with thermometer and temperature control apparatus. Heating can be accomplished with gas, steam or electricity.

The bath will have a tendency to become discolored after it has been used. However, this will not affect its blackening power. Be sure that the work is free from oil otherwise spotty coatings will result. In Fig. 1 some articles which have been treated by this process are shown. Fig. 3 is a view of a Houghto-Black process setup.

The process has been used to blacken dies, tools, rules, etc., and serves as a good base for lacquer and paints. From the standpoint of reducing friction this process helps to "break in" wearing surfaces by holding the lubricant in place and preventing rupture of the oil film. The government has approved this process.

Jetal: This process, owned by the Alrose Chemical Co., Providence, R. I., involves immersing the work to be blacked from 5 to 60 minutes, depending on the concentration of the Jetal salts. The bath is a strong caustic solution containing a strong oxidizing agent. The reaction is one of oxidizing the iron to a black oxide. The Jetal system has two baths, one containing 7 pounds of salts to 6 pounds of water and boiling at 285 to 290 degrees Fahr., producing a good black in 1 to 5 minutes. No appreciable thickness of coating occurs after 10 minutes. The high-temperature bath uses 8 pounds of salts to 5½ pounds of water and boils at 310 to 320 degrees Fahr. The higher temperature bath penetrates deeper and in less time than the less concentrated one.

The process can be carried out as follows: Alkali cleaner; water rinse; weak Jetal; Jetal; still-water rinse; fresh-water rinse; soluble oil. The coating thus produced can be resistance or spot welded and soldered. It does not easily chip, peel, crack, etc. No appreciable dimensional change is produced. It is a good base for lacquer, enamels, etc.

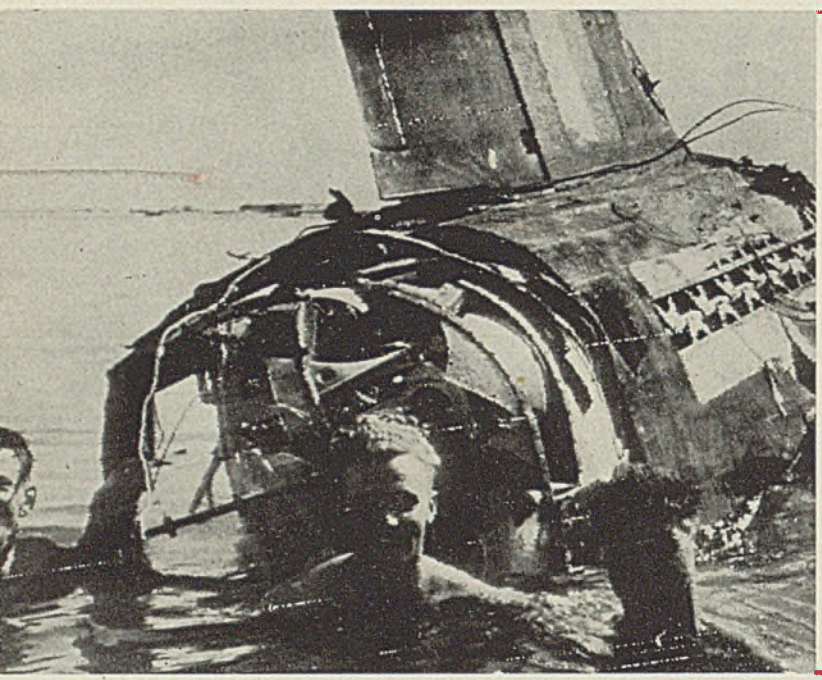
The protection against corrosion and wear is better than that of coatings produced by the nitrate baths. See Figs. 4 and 5[3]. The coefficient of friction of the coating is less than for steel. The process is therefore useful in roller bearings, pistons, stamping and drawing operations.

Pentrate: This process, owned by the Heatbath Corp., Springfield, Mass., is a strong caustic solution also containing oxidizing agents. The steel to be treated is immersed for a definite time. The chemical reaction taking place can be represented by the equation:

$$3\,Fe + 2\,O_2 \rightarrow Fe_3O_4$$

This is accomplished in two steps. The first bath is less concentrated and boils at 285 degrees Fahr., while the second boils at 310 degrees Fahr.

The process can be represented: Hot alkali clean; water



Sailors Save Wrecked Gunner

WORKING three hours under water sawing at the framework of a wrecked plane, three British sailors rescue an air gunner trapped in the rear turret of a bomber after a crash in the Mediterranean.

The Wellington bomber crash-dived into the sea only a few hundred yards short of the shore during the night. The sailors hearing cries, set out in a launch, found tail end and rear turret had been blown from rest of craft. Gunner inside turret was trapped by his feet but just able to keep his head above water.

For three hours a naval carpenter laboriously hacksawed away at the turret below water, coming up for air every few moments. Upon release, trapped gunner asked for cigarette. One seaman swam back to the launch, lit cigarette, swam back and gave it to him.

Entire time rescuers were working on turret, they were being stung by jellyfish. Photo from British Information Services, New York

rinse; Pentrate at 310 degrees Fahr.; water rinse; soluble oil or lacquer.

The thickness of the coating is from 0.00035 to 0.00045-inch.

It is claimed that the two dips produce a coating which is thicker, more rust resistant and with less friction. The hardness of the base metal is not affected by the treatment. The tanks can be constructed of sheet steel and should be insulated where necessary. The bath is not toxic.

The process can be applied to work on racks or in baskets. The cost of the process is 40 to 60 cents per 100 pounds of work treated. This includes the cost of materials and fuel only. Either gas, steam or electricity can be used as a source of heat.

The friction-reducing properties of the coating are attractive and are finding application. Literature is available. This company has a new black for stainless steel which they hope to place on the market shortly.

Ebonol "C": This process, also owned by the Enthone Co. of New Haven, Conn., is used for blackening copper, brasses and bronzes. The tin content of bronzes can be up to 8 per cent, while zinc in brass can be up to 35 per cent. The process converts the copper to cupric oxide. This being a part of the metal, it will withstand light buffing. The coating can be heated to 600 degrees Fahr. without any ill effects. The surface can be produced as a jet black which can be lacquered or wiped with a cloth containing a soluble oil.

Small parts can be blackened in baskets or barrels and used "as is". If a shiny black is desired, a soluble oil is applied and the parts are then given a short tumble with sawdust or corn-cob drying agent. The coating does not alter the dimensions of the work appreciably.

The cost of materials is less than 1 cent per square foot. The cost for labor, heat and salts for blackening work in baskets ranges from $1.00 to $1.50 per 100 pounds.

The solution is composed of strong oxidizing agents present in amounts of 1½ pounds per gallon. The temperature is 190 to 215 degrees Fahr. The solution should be discarded when the copper content becomes too high and makes operation difficult.

The process can be represented as follows: Clean; cyanide dip; water rinse; Ebonol C; lacquer or soluble oil. The time of immersion is 2 to 20 minutes.

Phosphate Coatings

For some time, at least one company has specialized in the production of phosphate coatings on steel surfaces. Several others have entered the field recently. Solutions are available for treating copper, brass, bronze and zinc. It is known that organic acid phosphates will produce dark colored coatings on the metals and alloys mentioned above. However, no attempt will be made to analyze these prepared baths. For the sake of simplicity, the baths will be classified as phosphate solutions.

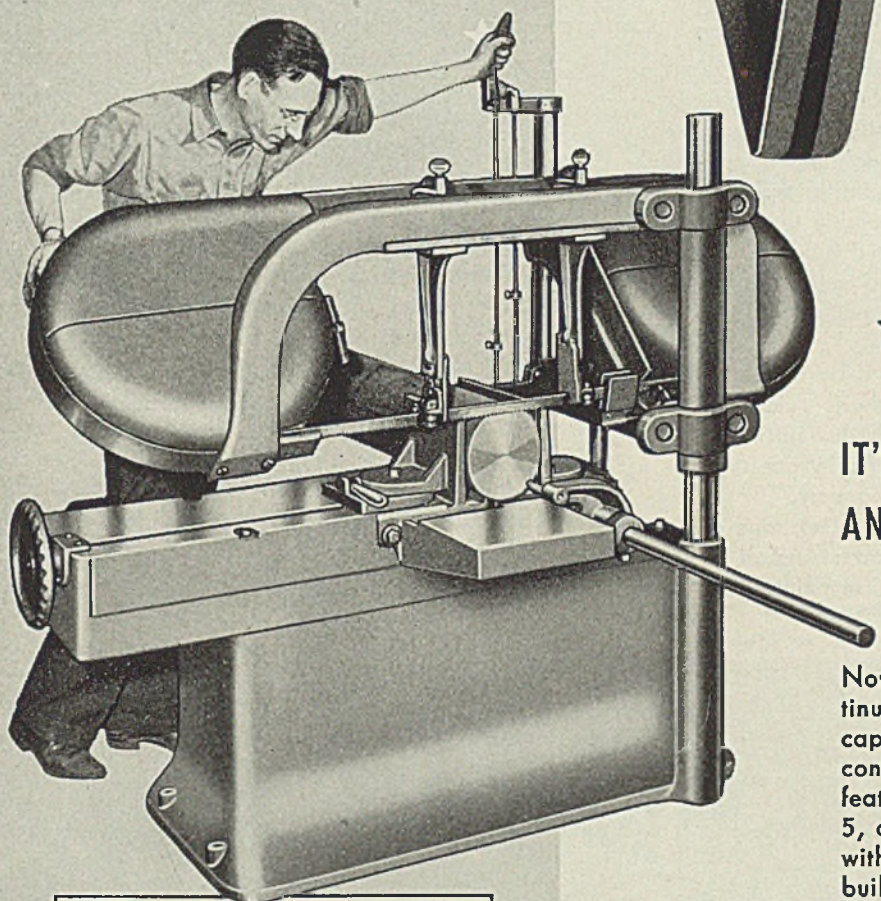
Bonderite: The Parker Rust Proof Co., Detroit, has two processes used for treating steel against corrosion. They are known as Bonderizing and Parkerizing. The first is designed to hold paint to steel and resist rust, while the second is a rust preventative.

The steps are as follows: Alkali cleaner; hot water; hot water; phosphate solution; rinse.

Darsey has explained the process as follows:[4] "The solution used for rust proofing is prepared by dissolving zinc or manganese dihydrogen phosphate in water. A solution of a given free phosphoric acid content will hold in solution a definite amount of either iron, manganese, or zinc, and is commonly referred to as a balanced solution. Since iron, manganese, or zinc is not soluble in water, it must be held in solution by phosphoric acid.

"In the coating operation, a metal article is treated with the solution; the phosphoric acid of the solution immediately reacts with the metal surface; this consumes or takes some of the acid out of the solution to cause supersaturation of the solution at the surface of the article. Result is that zinc, or manganese, and iron phosphate precipitate as a coating. In that reaction, zinc and iron phosphates, or manganese and iron phosphates, are formed on

The New WELLS SAW V-12



IT'S A LARGE CAPACITY, FAST AND ACCURATE MACHINE FOR HEAVY DUTY JOBS

Now you can have the advantages of continuous metal cutting in a heavier, more capable band saw—the new hydraulic-controlled Wells V-12. Many important features proved in the Wells No. 8 and No. 5, are part of this new machine, together with special additional advantages that are built into the V-12. Feed and lift are hydraulically controlled, vise is new and quick action—capacity is 13" diameter rounds and 13" x 16" rectangles . . . the base is solid and . . . But write today for full details on this new Wells machine. You will find it can give you the continuous metal cutting results you like.

A large stock of blades is available at all times

CHECK THESE SPECIFICATIONS of the NEW Wells V-12

Capacity:	
Rectangle	13" x 16"
Round	13" dia.
Speeds: ft. per min.	50, 90, 150
Guides	Adjustable
Feed	Hydraulic-Controlled
Vise	New quick acting type

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Wells

METAL CUTTING BAND SAWS

the article being coated and some iron phosphate dissolves into the solution."

The combined reaction produces on metal objects in the phosphate rust-proofing bath a coating composed chiefly of the normal and secondary phosphates of iron and manganese. The metals present as phosphates in the coating depend entirely on the metals present in the processing bath, and these are generally iron in combination with manganese or zinc. It is essential in these fast processes to eliminate the hydrogen which is formed and which retards coating action. For this purpose nitrate is used in the solution, and a fast, continuous coating operation results.

The application of mineral oils to the treated surfaces produces a darker finish than the natural medium gray color. This company has a stain which, when applied, produces a jet black coating. This increases the rust resistance and improves the appearance of the surface.

Irco-Izing: This process, owned by the International Rustproof Corp., Cleveland, involves immersing the cleaned iron or steel articles in a concentrated solution of zinc dihydrogen phosphate. The iron replaces the hydrogen and a coating of zinc and iron phosphates is formed on the surface. The iron phosphate in the solution is controlled by the addition of zinc dihydrogen phosphates. This is due to the fact that zinc is more soluble than iron phosphates. Thus, when the former material is added, the iron phosphates are precipitated out and settle to the bottom of the tank and are removed periodically as a sludge.

The zinc dihydrogen phosphate is formed by dissolving different physical forms of zinc in phosphoric acid. By the combination of the different compounds thus obtained, a faster acting solution is produced than if only one type of zinc were employed, according to the company.

The process can be employed over iron, steel, zinc or cadmium and can be illustrated as follows: Alkali or suitable cleaner; Irco-Izing; water rinse; oil or paint. The clean work is immersed in the bath at 180 to 190 degrees Fahr. for either 5 or 30 minutes. The 5-minute period is used when the finish is to serve as a paint base, and the 30-minute period is used when the coating is to be oiled. The concentration of the bath is one part of prepared solution to 100 parts of water.

If the bath starts to slow down or the metal processed has a small quantity of zinc white dust on the surface, remove the sludge in the bottom of the tank and add one quart of the concentrate for each 100 gallons of working solution.

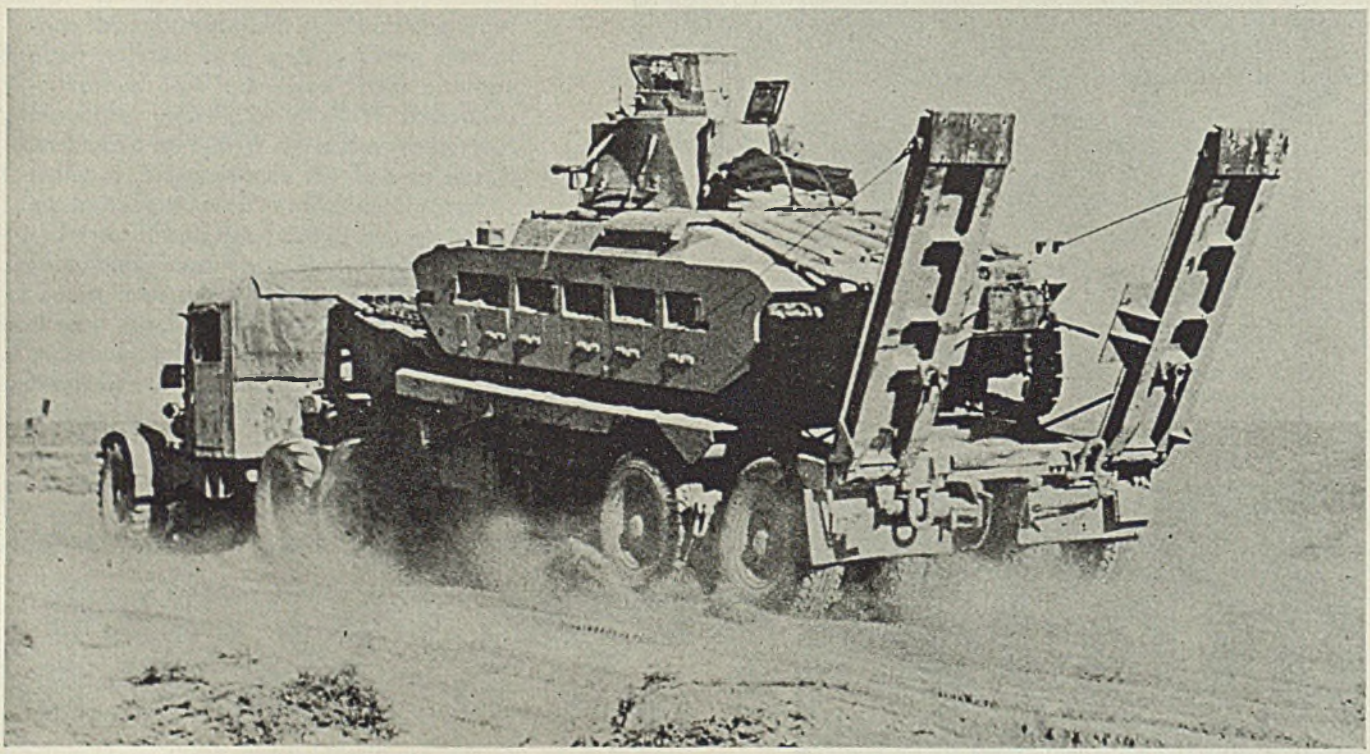
The work can be processed by means of racks, tumbling barrels, baskets, or other suitable devices. The rinsing and dipping can be handled by hand, hoist or conveyor.

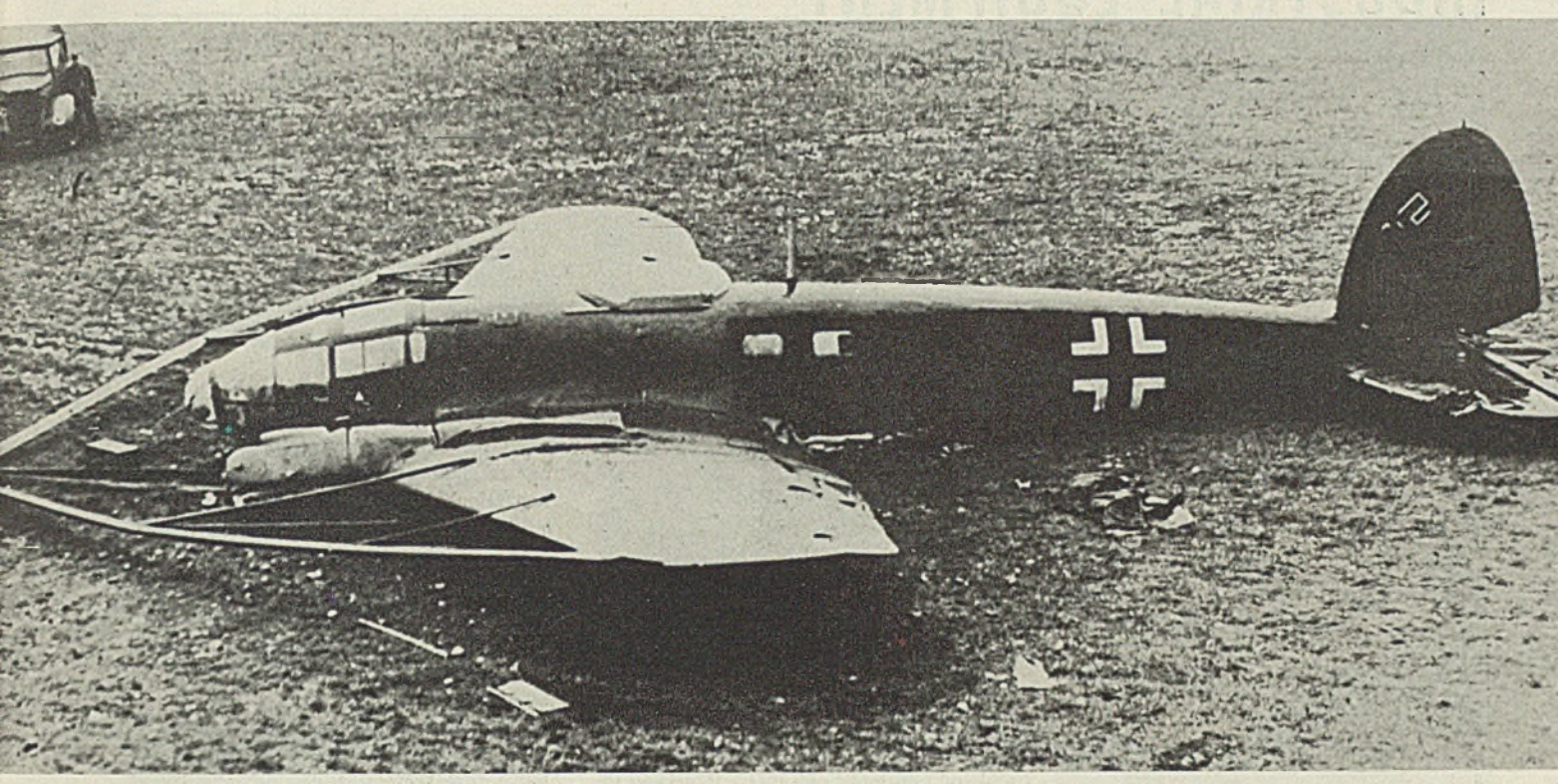
In using the method for producing a final finish, the work should be oiled after rinsing. This can be done by dipping in a hot water soluble oil (used at temperatures recommended by the manufacturer), the dilution to be determined by the oil film desired. Or a light dipping oil can be applied and the excess either allowed to drain or be centrifuged off. In cases where increased rust resistance may be desired, boiled linseed oil or special oils can be employed.

Irco-Izing work to give a wear-resistant finish should be followed after rinsing by dipping in a solution of one part soluble oil in 20 to 25 parts of water to which should be added 1¼ ounces of "Aquadag" (colloidal graphite) per gallon of mixture.

Trouble in operating of this process is most often caused by improper cleaning, operation below the pre-

SALVAGE goes on right at the battlefront. Here in this battle picture from the Libyan war a British tank has been run up a ramp and is being carried at a good speed to a nearby workshop for overhauling. Quick repair of vital equipment is thus made, keeping it in effective use. British Press Service photo





CRASHED German Heinkel bomber is fitted with "bumper" device—an attempt to cope with cables of balloon barrage. Added weight of "bumper" greatly reduces speed and bomb carrying capacity of the aircraft. British Official photo from OEM

scribed temperature, or failure to remove sludge and replenish when necessary.

Black Magic: The Mitchell-Bradford Co., mentioned before, has on the market a black for diecast zinc which is a solution used at room temperature to produce a black on zinc in 5 to 15 minutes. The process slightly hardens the surface, inhibits oxidation and is a good bond for paints and lacquers.

Pieces to be colored are treated as follows: Alkali cleanser; water rinse; 50 per cent muriatic acid; water rinse; Black Magic; water rinse; oil.

Ebonol "A" and "Z": These are also owned by the Enthone Co., were developed to treat aluminum, copper and its alloys, and zinc and its alloys.

Ebonol "A" solution has been developed to produce a black deposit on aluminum and its alloys by dipping the work into a complex zinc solution and thereby producing a coating of zinc on the aluminum. The zinc thus formed is then treated to produce a black coating.

The steps are as follows: Clean in soda ash solution; Ebonol "A"; water rinse; Ebonol "Z"; water rinse; oil. Concentration of the Ebonol "A" should be 4 pounds 11 ounces per gallon of water. The work should be immersed for 1 to 5 minutes at room temperature. The container used can be an ordinary steel tank.

Ebonol "Z" is an immersion process for blackening zinc and its alloys. It can also be used for blackening stainless steels, nickel, silver and other metals by immersing them in the solution in contact with a piece of zinc. The adhesion on highly polished brass and chromium is poor.

The dimensions of a piece are generally unaffected as the coating is relatively thin. This coating does not protect zinc against outdoor corrosion, but this property is improved if the surface is oiled.

The solution is composed of 1 pound of the prepared salts per gallon of water. One pound of salts will blacken approximately 150 square feet of zinc surface. It is generally better to discard the solution when the reaction stops. These solutions are believed to be organic acid phosphates. Monel, stainless and ceramic tanks are generally used. Nonresinous wood tanks are also suitable.

The process layout can be described as follows: Alkaline cleaning; water rinse; acid dip (1 part acid to 9 parts water); water rinse; Ebonol "2"; oil. Time of immersion in "Ebonol Z" is from 3 to 10 minutes, with the temperature of the solution being 180 to 200 degrees Fahr. If batch work is treated, shake so that all areas are in contact with the solution. Before the final coating is produced, the finish goes to yellow to orange to red-blue to black. If objects are allowed to remain in the bath too long, heavy deposits are produced which have a tendency to peel or chip on bending.

W.O. No. 1: This process, owned by Turco Products Inc., Los Angeles, is a substitute for anodizing aluminum, especially where the metal and its alloys will be painted. The metal is introduced into a phosphate solution, one part W.O. No. 1 to three parts water for 15 minutes. The material is then removed, water rinsed and dried. No special precleaner is essential unless the parts to be treated have a very heavy coating of oil or grease. The solution is kept in working order by adding more of the W.O. No. 1. This process has been approved by the government.

References:

(1) "Coloring Steel", C.B.F. Young, *Metals Handbook*, 1936, pp. 855-856.

(2) *Metal Finishing*, Vol. 40, No. 7, July, 1942, pp. 363-364.

(3) "The Jetal Process", Parker and Graham, *Metal Finishing*, Vol. 40, No. 6, June, 1942.

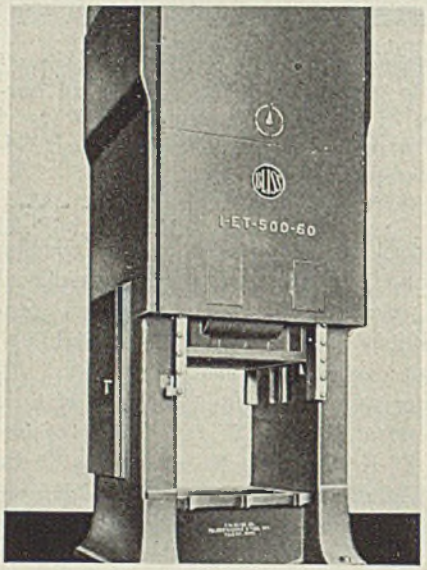
(4) "Preparation of Automobile Bodies Before Painting", *Industrial & Engineering Chemistry*, Vol. 33, p. 222, February, 1941.

Toggle Press

E. W. Bliss Co., Brooklyn, N. Y., announces a new line of enclosed one-point double-action toggle drawing presses which features the latest ideas in design and construction. Units are being offered with practically any pressure capacity stroke or die space that may be required.

Press frame of the units are of the conventional 4-piece steel tie-rod construction which consists of a base, two uprights and a crown held together by four large steel tie-rods which are shrunk into place.

Construction of presses is such that provision can be made for conveniently disconnecting the toggle mechanism from the blank holder and attaching the outer slide to the inner slide which is operated in the usual manner, thereby converting the presses into single-action



machines, and adapting them for such blanking and forming operations as may be within their capacity.

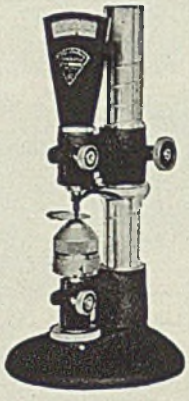
Easy conversion also can be made to triple-action machines by fitting pressure attachments into the bed of these presses. They also can be fitted with synchronized mechanical third motion in the bed for work that requires a machine of this character.

Ball Measuring Anvil

George Scherr Co., 128 Lafayette street, New York, is offering a new ball measuring anvil for use on its Comparitol to speed up, simplify and guarantee accuracy for the measurement of thin work.

With the ball anvil work is placed between the flat feeler point and the round ball surface. Absolutely dependable results are said to be obtained regardless of which part of the thin piece under inspection is being measured.

Another feature is instrument also may

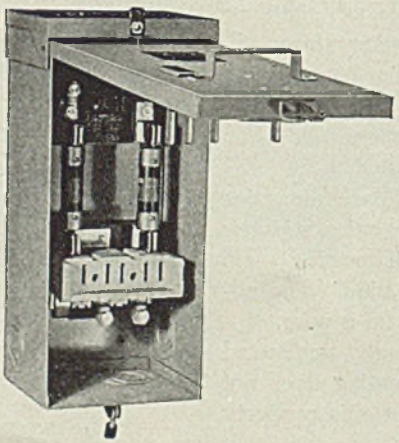


be used to check the flatness or parallelism of long thin pieces in all positions and on all parts of the work. The Comparitol column when used with this ball anvil is provided with an index line so that the ball point and feeler point can be lined up accurately from left to right as to center distance.

Shock-Proof Switch

Square D Co., 6060 Rivard street, Detroit, is now producing a new line of shock, and drip-proof switches for naval and marine applications. Three features are offered by devices in the line: Switch blade hinge jaws have been eliminated to conserve copper; a special barrier arrangement prevents fuses from vibrating out of contact due to gun-fire or shock, and the switches are reduced in size, providing saving in steel and permitting smaller mounting space. The 100-ampere unit is contained in a cabinet only 7¾ x 17¼ x 6¼ inches.

A special catch is provided at the top of each of the cabinets to hold the



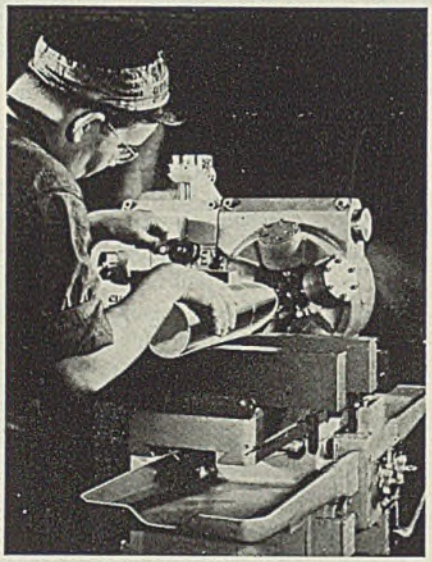
switches in the "off" position while replacing fuses or making repairs. When the switch is "on" (door closed) it may be secured by a hexagon nut treaded on a swivel bolt.

All devices in the line have standard 250-volt fuse spacings. They are available for either 2-pole, 250-volt direct current or 3-pole, 575-volt alternating current services with capacities ranging from 30 to 100 amperes.

Spindle Head

Kent-Owens Machine Co., Toledo, O., has introduced a new multiple spindle head for simultaneously milling a number of staking notches in shell noses. Illustration shows a 5-spindle head which mills all five staking notches in a typical shell at the same time.

This method is reported to multiply production over the former method of milling one notch at a time. Both actual machining time and handling time are



reduced to a fraction of that formerly required, it is said.

Fixture shown is designed so shell is rolled upon it from an adjoining conveyor, completely notched, and then rolled back on the conveyor. Unit can be adapted for use on either a Kent-Owens No. 1-8 machine with hydraulic feed to the table or the No. 1-M with hand feed to the table.

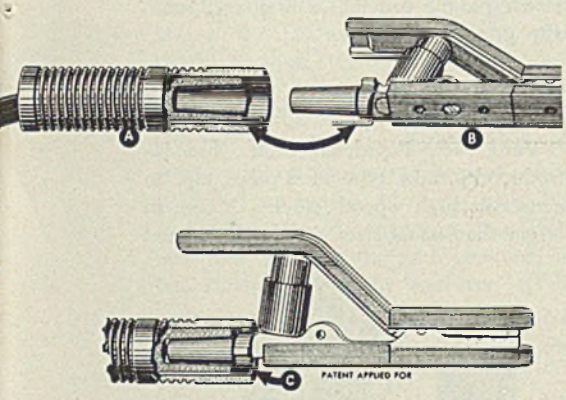
Electrode Holder

Jackson Products, Detroit, announces a new Quik-Trik insulated welding electrode holder with detachable "stinger" which is reported to eliminate waste of time in changing cable connections and does away with loose cable ends kicking about when the "stinger" end is detached.

The female section of the cable connector is permanently soldered to the cable lead and remains in the insulated

handle (A). The detachable jaw section —the "singer" (B)—is snapped into the female section by a quick twist of the operator's wrist and is ready for business.

The actuating cam mechanism that



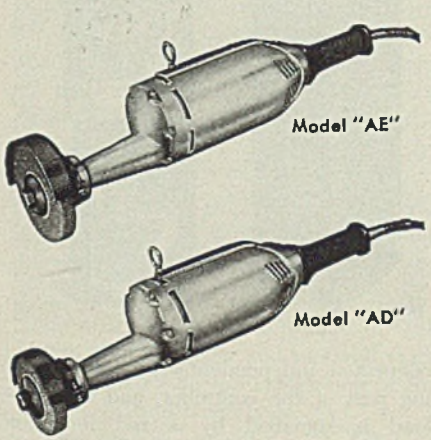
locks male and female sections together is shown at (C). When necessary, the handle (A) and the cable may be pulled through a small hole and the "stinger" then connected, saving time and cable extensions.

Electrode is being offered in three models, all insulated,—model TA-1, 300 amperes with stationary jaws; model TA-2, 300 amperes with replaceable jaws; and model TA-3, 500 amperes also with replaceable jaws.

Portable Grinders

Skilsaw Inc., Chicago, has introduced two new portable grinders to meet high speed requirements on all grinding, wire brushing, polishing and buffing operations. They are known as models AD and AE being 4 and 5-inch grinders respectively.

The first is 22 inches long and operates at no-load speed of 4500 rotations per



minute. The second operates at 4200 rotations per minute and is 22⅝ inches long.

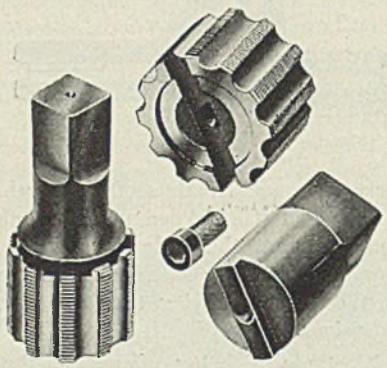
In these grinders ball bearings

mounted in steel inserts on armature and extreme ends of wheel spindle absorb thrust, eliminate vibration and insure cool operation.

Both commutator of the units and switch are fully enclosed. A rubber sleeve handle provides a firm, cool, non-slip grip.

Two-Piece Tap

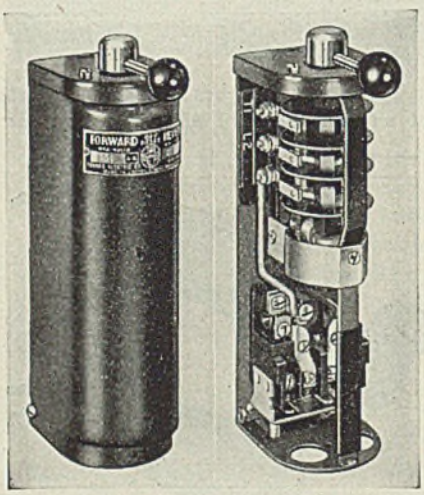
Vard Inc., Pasadena, Calif., has introduced a new type of 2-piece tap, to conserve high speed steel. Made in larger than usual sizes, its shank, ground



of mild steel, is interchangeable with several types of taps. The tap proper is ground of high-speed steel. Units are offered in sizes over 2 inches.

Drum Controller

Furnas Electric Co., 300 McKee street, Batavia, Ill., is offering a new reversing drum controller with a built-in polyphase thermal overload unit. In case of an overload in any phase, power is dis-



connected independently of the reversing part of the controller, and an overload is signalled by a red indicator which projects through the top of the controller housing. The unit is of the solder-pot type and is trip-free. It cannot be reset and power reconnected until the drum handle has been returned to the "off" position.

NE Alloy Steel Data

(*Continued from Page 76*)

denum present in the alternate steels were derived from scrap; thus 0.20 per cent molybdenum and 0.50 per cent nickel replaced 3.50 per cent nickel—a saving of 60 pounds of nickel for each ton of finished steel.

From the foregoing it is evident that the resourceful man has tools at his disposal to assist him in selecting alternate steels without danger of serious error. Already production of NE steels has reached a rate of something over 180,000 tons per month, and bookings of NE steels are on the increase.

Some of the specific jobs which NE steels are now doing are shown in Table V.

Standard End-Quench Hardenability Test: The following brief description of the standard end-quench hardenability test is adapted from the 1942 *Handbook of the Society of Automotive Engineers:*

The Jominy test, or standard end-quench hardenability test consists in water-quenching under closely controlled conditions, one end of a one-inch diameter cylinder of the steel under test. The properly prepared and heated bar is placed in a fixture as shown in Fig. 24 and subjected to quenching by a controlled flow of water.

The test bar must be machined all over to ensure freedom from decarburization, and the sample must be normalized. The test bar is heated for 30 to 40 minutes at the proper quenching temperature for the steel under test, and held at that temperature for 20 minutes. The test bar must be heated in such a manner as to prevent decarburization and the formation of scale.

The quenching water must be at a temperature of 75 degrees Fahr. plus or minus 5. The orifice which is ½-inch in diameter and ½-inch from the bottom face of the test specimen is actuated by a quick-opening valve which releases a jet of water which would rise to 2½ inches were it not impeded by the test specimen.

The quenched test bar is held in the water jet for 10 minutes, after which it may be cooled by quenching entirely.

Two flats 0.015-inch deep, 180 degrees apart are carefully ground the full length of the test bar and rockwell readings are taken on the center line of the flats at 1/16-inch intervals.

The data so secured are plotted on a standard test form which relates distance from the quenched end to the cooling rate in degrees Fahr. per second at 1300 degrees Fahr.

Because, in this test, only one cross-

sectional face of the test bar is subjected to the action of the rapidly moving quenching water, various rates of cooling prevail along the length of the bar as the heat flows from the hotter to the cooler areas. In effect, the test is a depth of hardening test and its values can be and have been correlated with the cooling rates and hardness values of various size rounds when oil or water quenched.

Fig. 14 summarizes the experiments of Scott in making the correlation. See Fig. 23.

In addition to its usefulness in comparing steels of dissimilar compositions hardenability data are also useful in predicting the hardness obtainable in any steel when used in machine parts not yet in production and not similar to any parts on which production experience is available.

In drawing a U-curve such as is given, Fig. 20, one refers to the curves of section Fig. 23 which suit the size of section under examination, and the method of quenching. In this case we have dealt with a 3-inch round, water quenched. From Fig. 23 we find the cooling rates at various distances across the cross-section of the bar, and from Fig. 18 we find the distances in sixteenths of an inch which correspond to the cooling rates, thus enabling us to construct Table VI.

Now referring to the standard end-quench hardenability curve for the steel (NE 8442) we find rockwell-C values as follows:

Distance from quenched end	Rockwell C
1¼ sixteenths	57
4¾ sixteenths	40
7¼ sixteenths	33
11 sixteenths	30
12½ sixteenths	30

From this latter table we can now construct the U-curve given in Fig. 20 for NE 8442.

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Publishes Safety Manual For Women Workers

A health and safety manual devoted exclusively to the problems of women in industry is being distributed by Allis-Chalmers Mfg. Co., Milwaukee. It is written and styled with the women's point of view in mind.

One unusual feature is a section devoted to the proper attire for women in the shop, dealing particularly with the new safety clothing designed by the health and safety division of the company from existing slack suits for sale by national retail organizations.

In addition, the manual outlines proper exercises necessary for the maintenance of good physical condition. Other sections discuss hazards to be avoided in the various occupations, including the office workers.

Simple Jigs, Fixtures

(*Continued from Page* 78)

are obvious. See STEEL, Sept. 1, 1941, p. 74.

Then study your part to determine the sequence of placing the parts as regards good welding procedure to avoid distortion. See STEEL, Oct. 13, 1941, p. 122. After this sequence has been determined, then determine what mechanical facilities are needed to follow this sequence and give best welding position (lowest production time).

Flat Table Top: The simplest of all fixtures, obviously, is a flat table top or the usual operator's bench. The effectiveness of the flat top as a fixture may easily be increased by several modifications. For example, T-slots can be cut into the table. They provide a means of holding down the parts to be welded. Such T-slots can be constructed in various ways, usually with some sort of angle bars underneath the slots to keep the holding-down bolts from falling through, as shown in Fig. 1.

To increase the usefulness of this very general type of jig, the top can be equipped with various guides, either set on or bolted down, as in Fig. 2. Now it can be classed as a universal jig for its many possible variations enable it to accommodate a wide range of work.

Fig. 2 shows an extremely flexible yet simple arrangement. Plates A and B are welded to back and one end of the table top. Plates C and D are movable. The unit at D may be one of several different widths to accommodate different work ranges. Both C and D members may be clamped to the T-slots in the table top by means of a bar bent into a hairpin shape and welded to the gussets as shown in Fig. 2.

Angle frames, rectangular or box assemblies of all kinds can be held in such a fixture. Of course plates A, B, C and D can be made with holes or slots in them or built up as frames to allow welding into the inside of the assembly as it is held in the fixture.

Plates C and D also can be hinged at the bottom to allow assembly of cone-shaped parts or other odd-shaped assemblies. Likewise, they can be clamped at other than 90 degrees with plates A and B to accommodate other assemblies.

This jig is suitable for use when there are a number of parts to be welded. The parts can be moved about in relation to each other. It serves as a variable size box jig. As can readily be seen the parts to be welded can be attached to the various surfaces of the jig, which can be used in aligning surfaces when modifications are more or less self-evident.

Modified Table Top: The table top can be modified still further by V-blocks, shown in Fig. 3. The blocks can be used as in A or inverted as in B.

Block A can be a formed section as indicated in the illustration, or it can be made up of welded plates or various types of similar construction. An easy method is to weld flat plates and add the supporting gussets shown to position the unit upright on the table top.

The V-blocks permit the placing of a number of parts on either one or both sides. They thus permit continuous welds when ordinarily there would be a series of individual welds. For instance, with a single block of this sort one assembly could be welded. But suppose the block were long enough to accommodate a number of assemblies. Then all of them could be welded in rapid succession as they lay side by side in the fixture.

Universal-Joint Table Top: Still other alterations of the table top can be made. As shown in Fig. 4, one end can be supported by a universal joint and the other by a cable attached to a pulley. The top, thus, can be set at any angle with respect to one horizontal axis or the other. As a further refinement the universal joint can be equipped with a notched wheel to hold the top in any particular position. With this type of jig,

it is possible to make a number of downhand welds in different parts of a structure in rapid succession without the need of changing the work in the jig or removing it to another jig.

Or the table can be constructed as in Fig. 5 to give practically the same results as the universal joint attachment in Fig. 4. The top can consist of a rectangular plate and a frame. The frame is mounted on one set of bearings, and the plate is attached to the frame by means of bearings situated at 90 degrees with respect to the first set. Thus the work being welded can be rotated in two directions.

This table fixture can be equipped with suitable racks or notches so that the welding work can be held stationary. Quite frequently section B, as shown in the illustration, is made on a frame or a plate with access holes in it so downhand welding can be done from both sides. Thus when a part is clamped to the frame, it can be welded on top and then turned over while still in the fixture for downhand welding on what previously was the bottom side, thus avoiding overhead welding.

Universal Joint: Another interesting fixture can be constructed from a fixed upright and a box girder. The girder is attached to the upright as shown in Fig. 6 and attached in such a way that it can be moved freely up or down. It can be joined to the upright by means of a universal joint so the girder can be rotated.

The material to be welded is attached to the girder, and the motion of the girder will make it possible to weld upward or downward on any of the guide's faces without removing it from the fixture.

The idea of a rotating fixture can be carried still farther. The table can be in the form of a disk supported by a bar, which is inserted in a bearing carried by a sector mounted on a second bearing as shown in Fig. 7. To change its height the disk can be moved up and down. To make this table more flexible, it can be mounted on a pin and bear a counterweight. Such an arrangement is exceptionally flexible for the plane of rotation can be set at any angle to permit downhand welding of all joints regardless of their position in the structure.

A modification of this can be made when the welder has two rather unsymmetrical pieces that can be placed on the opposite ends of a shaft and thus permit the center of gravity to go through the center of the support and make a nicely balanced section. Sometimes such unsymmetrical pieces are bolted directly together so their contractural stresses counteract each other, thus reducing and controlling distortion.

The jigs and fixtures discussed here are the expression of some basic ideas with reference to motion of the various parts to be welded. When the engineer designs the welded fabrication, he should always bear in mind the sequence of assembly so that designing proper jigs and fixtures will be relatively simple. Much of the difficulty of laying out proper jigs and fixtures comes from disregarding this consideration.

The best possible result is obtained when the jig is designed along with the planning of the welds. Otherwise there is likely to be a compromise which slows production.

New Cleaning Solution Retards Corrosion

Rust, scale and burn marks can be removed easily by use of Corrosol 26, recently developed by International Rustproof Corp., Cleveland. Not only does the product remove these blemishes, but it also is said to rustproof the metal on which it is applied. It is used in a cold solution leaving the metal in a clean, passive, condition. The product is harmless to workmen and is noninflammable.

How To Stack Boxes

(*Concluded from Page* 81)

low, with the center of balance of the entire stack distributed to make full use of the corrugated boxes' ruggedness.

Interlock and Stagger: To minimize danger of crushing bottom boxes, heavy loads can be distributed by interlocking rectangular shaped boxes or staggering square boxes. In addition, these simple devices automatically "tie" stacks into stable units. To interlock, place one row of boxes end to end; the row above, side to side. See Fig. 4. The same effect is achieved by staggering square boxes so that boxes in the second row are centered at the juncture of the two boxes immediately below and above.

Stack Right Side Up: Both identification convenience and advertising value are attained by stacking boxes right side up so that both name and content marks can be easily read.

Keep Same Size Boxes Together: As much as possible, the same size boxes should be stacked and loaded together in sections. So doing speeds handling; permits full, efficient utilization of space; and simplifies identification of merchandise.

Load from End to Center—Tightly: In loading freight cars, operations are speeded by loading from ends to center *tightly*. Use of jacks will help keep loads tight against ends, while center bulkheads should be used to fill any space remaining in the center (Fig. 5). These precautions will give you tightly packed loads with a minimum of shifting.

Barricade and Weatherstrip Openings: Boxes filling door space on freight cars or at openings in warehouses should be protected by barricades of boards nailed securely across openings (Fig. 6). Inside faces of boards should be set flush with inside of door posts; boards should be spaced so that each board helps to hold two layers of boxes. For weatherstripping, use several thicknesses of heavy water-resistant paper and tack firmly into position so that all boxes are protected against weather and dirt.

Steam Generators

(*Continued from Page* 82)

without too much "weathering" and consequent dust loss, is made possible by their high initial surface moisture content. As this surface moisture is evaporated the lump gradually disintegrates, making this fuel extremely dusty and difficult to handle. This characteristic of "weathering" exercises considerable influence in the selection of stoker types. The rapid breaking down and dusting of the fuel means that it must either be left undisturbed during the burning process or be rapidly projected with the furnace so as to burn as much of it in suspension as possible. Either the traveling grate or the spreader type of stoker will satisfactorily operate with lignite provided correct furnace designs are used.

The capacity of a pulverizer is a direct function of the surface moisture content of coal. When the percentage of this moisture exceeds a certain definite value, it is necessary to pass preheated air through the mill so as to accomplish drying during the pulverizing process. The maximum permissible surface moisture content, before mill drying is necessary, has been determined for the commercially available coals by the various manufacturers of pulverizers. This differs with the various mill designs. When drying in the mill is required the necessary air temperature is also a function of mill design.

2.—Volatile Content: The promptness with which a fuel will ignite, when entering a hot furnace, depends to a large extent on its volatile matter content. The speed of ignition is then a factor which exercises considerable influence on furnace design as well as on the method by which fuel is supplied to the furnace.

A low-volatile matter content is char-

acteristic of anthracite, semianthracite and coke breeze. All of these fuels are extremely slow to ignite even when exposed to refractories whose surface temperatures may be as high as 2800 to 3000 degrees Fahr. It is therefore necessary to properly arrange refractory arches so that maximum quantity of radiant heat is concentrated on the incoming green fuel bed. The fuel bed itself should be undisturbed, relatively thin and moving as fast as possible without pulling the ignition point away from the hopper gate. The air supply to the fuel bed should be zoned and accurately controllable. The traveling grate type of stoker is best suited to these low-volatile content coals. Practically all of the combustion reaction occurs in the fuel bed, and by exercising the proper control over furnace draft stable ignition is assured.

Because the fuel bed is thin and undisturbed, it is possible to burn out the fixed carbon content of the coal without an excessive ash pit loss. Apparent furnace heat liberation may be high since there is practically no suspension burning except for the relatively small amount of volatile matter.

The coals ranging from semibituminous to lignite have a volatile content roughly varying from 16 to 40 per cent. The "flashiness" with which ignition occurs increases as the volatile content rises. This characteristic makes its possible to simplify furnace design by the omission of refractory arch with certain stoker types. The coals best suited for underfeed stokers are in this classification—they are also equally well adapted to spreader stokers and pulverized fuel firing. The selection of the fuel burning equipment type will be influenced by this "flashiness" but may actually be dictated by some other combination of characteristics.

3.—Ash in Coal: Coal quality may be roughly defined by its refuse content since the heating value, on a dry basis, is a direct function of ash percentage. The usual range is from 4 to 20 per cent, although it may be as low as 3 and as high as 40 per cent.

The quantity as well as the quality of ash has a direct influence on the selection of fuel burning equipment. A high-quality ash may be considered as one in which the iron-oxide content is less than 15 per cent and the fusion temperature above 2300 degrees Fahr. A poor quality of ash is one in which the iron oxide content may vary from 15 to over 25 per cent and the fusion temperature ranges from 2200 degrees Fahr. down. In some cases a variation in either the iron oxide content or the fusion temperature of ash from the foregoing limits can be sufficient to change the ash from one quality classification to the other.

Where the ash content of coal is below 6 per cent, it is well to use pulverized coal firing. The reason is that a sufficiently thick protective layer of ash must be quickly provided to cover grate surfaces so as to avoid overheating and keep outage and maintenance at a reasonably low level.

The selection of correct equipment with coals having ash contents above 6 per cent will be greatly influenced by the quality of ash and also other inherent characteristics. Where the quality of ash is high the coal will be suited to all types of stokers as well as pulverized coal. The selection of the best stoker type then will be governed almost entirely by other factors. If the quality of ash is poor the fuel burning equipment is usually limited to either the traveling grate stoker, the spreader type stoker, or pulverized coal firing. The quantity of ash in coal in conjunction with its quality also exercises considerable influence on equipment selection. If the ash in coal is high the combustion rates, particularly on stokers, must be maintained at a reasonably low point. If this is overlooked, in the determination of stoker area, it may be necessary to dump the accumulated refuse at too frequent intervals. This will make it extremely difficult to carry the load with

any uniformity of steam pressure or capacity. The use of clinker chills and water cooling of wall areas will minimize refractory erosion and the deposition of ash or slag that may otherwise interfere with continuity of service.

5.—**Coking Coal:** This grade may be roughly defined as coal which possesses the quality of swelling when exposed to furnace temperature. Actually the coal particles when heated become plastic and expand. This swelling action is due to the heating of the gaseous volatile matter. Eventually these gases break out and leave a porous shell of carbon and ash from which practically all plasticity has disappeared. In this condition it may be readily broken down by agitation. Coals of this character are well suited to underfeed stokers since these are definitely based on the principle of fuel bed agitation. This coking characteristic is almost totally absent with spreader stoker firing, and has no particular influence when pulverized firing is used.

6.—**Caking Coals:** Coal particles or fuel beds, when heated, mat over and form into large masses. Usually there is only a slight tendency to swell or cake. This caking resists agitation and frequently, as the combustion process continues, large fissures occur. The majority of air will flow through the cracks and, as a result, the fuel bed must be hand worked if good results are to be obtained. Underfeed stokers, selected on a basis of low combustion rates, perform fairly well if supplemented with a reasonable amount of hand trimming. Spreader stokers and pulverized coal firing require no additional manipulation with coals having this characteristic.

7.—**Free Burning Coals:** Fuel beds do not swell or mat. They are burned best on stokers having no means of fuel bed agitation. Those falling in the bituminous or lignite classification may be handled on traveling grate and spreader type stokers as well as in pulverized forms. Anthracite, a low-volatile free burning coal, is almost entirely burned on traveling grate stokers. Coke breeze, a by-product fuel available in some areas, is similar to anthracite in its ignition and combustion characteristics. It is also burned almost exclusively on traveling grate stokers.

8.—**Sizing:** Fuel size is assuming increasing importance in the eyes of the combustion engineer. The "friability" of a coal will govern, to a large extent, the size—consist of either raw or washed screening. This consist must be maintained within reasonable limits if uniform performance results are to be obtained. For single and multiple retort stokers the commercially available 2-inch nut and slack may be used. For travel-

ing grate, spreader stoker and pulverizers the ¾-inch nut and slack is preferable. In either case approximately 30 per cent of the fuel should be of the larger sizes.

9.—Grindability: The relative effort required to pulverize a coal to a given size specification is its grindability. The capacity of a mill is a direct function of the coal grindability. The total power input to a pulverizer at full capacity is constant. Therefore, if the grindability is high the capacity is high and the power consumption in, say kilowatts per ton, is relatively low. On the other hand if, using the same size mill as above, the grindability is low the power consumption will be relatively high because the output is reduced but the total power input remains the same. Stoker selections are in no way influenced by coal grindability.

(To be Concluded)

Develops New System To Handle PD 25A Forms

Ninety per cent of critical materials must be scheduled through the government's Production Requirement Plan and filed through form PD-25A. Securing of these materials by a manufacturer next year will be based largely on the reliability and completeness of the facts and figures he can offer the government.

To aid the manufacturer to get his bookkeeping system geared to handle end-use symbols and other requirements of the P.R.P., Visible Index Corp., New York, is offering a newly designed system which makes it possible to trace material from purchase to end-use. It is reported to facilitate preparation of necessary government reports, provide positive control, and verify accuracy.

Called the Visirecord P.R.P. unit, the development simplifies P.R.P. by breaking it down into three divisions—with a card for each.

New Silver Solder Flux Has Low Breaking Point

A new SS silver flux which becomes completely fluid at approximately 1065 degrees Fahr. is announced by American Products Corp., 422 South Dearborn street, Chicago. Its composition according to the manufacturer, is so balanced it will not crystallize, and when diluted with the proper amount of water it remains uniform.

During brazing operations it throws off a soft green transparent flame, permitting full vision of the work. The flux is especially adapted for use on stainless iron and stainless steel and also works on brass, copper, bronze, nickel alloys, monel metal, etc.

Taylor-Wharton Steel Co. Marks Bicentennial

(*Continued from Page* 55)

Army and Navy adopted the high carbon cast steel projectiles made by the Taylor works under Hadfield patents. Many eight, ten and twelve-inch projectiles were manufactured at High Bridge and were used during the Spanish-American War. Several of these old twelve-inch shells are still on exhibit as souvenirs in High Bridge. One of them went clear through the CRISTOBAL COLON when that pride of Spain's Navy was driven on the rocks at the battle of Santiago Bay.

As has been said, manganese steel is ideal under conditions involving blows and impact, such as in the dippers on excavating machinery. The Taylor-Wharton company developed the "Panama dipper teeth", and these were fitted on practically all the steam shovels digging the Panama canal, so that the canal was dug to a great extent by power shovels fitted with Tisco manganese steel made at High Bridge.

Lewis H. Taylor died in 1908 at the age of 97 and was succeeded by his son, William J. Taylor.

In 1912 the Taylor Iron & Steel Co. absorbed William Wharton, Jr. & Co., and became the Taylor-Wharton Iron & Steel Co., under the presidency of Knox Taylor.

New Plant Serves World War I

In 1915 a new plant at Easton, Pa., was built. Here, during the first World War, the company produced 538,136 shell forgings and also made forgings for four-inch naval guns, tank treads, helmets, railroad and marine equipment and much other material for war purposes.

Knox Taylor continued as President until his death in 1922. He was the last of the Taylors by name, the fifth generation, to guide the firm. He was succeeded by his cousin, Percival Chrystie, who served until 1929, when he was succeeded by George R. Hanks, the present president.

One of the company's principal products before Pearl Harbor was manganese steel dredge buckets. Thousands of these buckets, some weighing over two tons each, were produced at High Bridge, especially for tin dredging in Malaya and the Netherlands East Indies, as well as for gold and platinum dredges in this country and throughout the world. Prior to occupation of these Far Eastern lands by the Japanese, many of these dredges, numbering about 200, were purposely wrecked.

Another of the principal products of the company is drawn and seamless steel cylinders for hydrogen, oxygen and

other gases. Thousands of these cylinders are turned out every year and facilities are now being expanded to fill increased military requirements.

Taylor-Wharton is also manufacturing 155-mm. high explosive shells in large volume; manganese steel tank treads, and special manganese steel rail equipment for Army camps and Naval bases and railroads. It continues to manufacture special manganese steel equipment for essential industries, such as mines, ore crushing plants, cement and paper mills and quarries.

Thus, once again, as in every conflict in which the country has been engaged, the company is supplying the armed forces with essential supplies to insure victory.

Because of transportation restrictions by rail and motor, the company commemorated its 200th birthday in only a modest way. It was confined to the afternoon of Oct. 17 when representatives of the Army and Navy and George R. Hanks, president of the company, spoke. Faculty and pupils of the High Bridge high school staged a pageant based on the company's history, with music by two bands. Scheduled to participate in the observance were Lieut. Commander John R. Craig, representing the Navy and Lieut. Col. L. A. Codd for the Army.

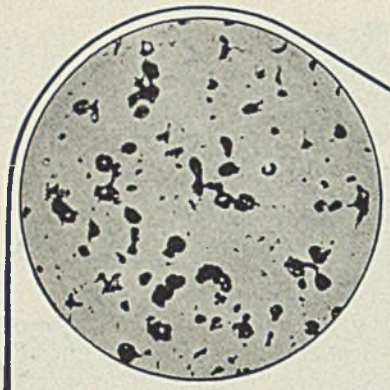
Powdered Metals Institute Formed To Show War Uses

Twelve companies manufacturing parts from powdered metal have formed the Powdered Metals Institute, with headquarters in Saginaw, Mich. It is to serve as an advisory council and aid to the Army and Navy in adapting powdered metal to war production, according to A. J. Langhammer, president of the Amplex Division of Chrysler Corp., and vice chairman of the Institute.

Officers of the Institute are: Chairman, L. E. Field, vice president, United States Graphite Co., Saginaw; vice chairman, Mr. Langhammer; and secretary, E. S. Patch, sales manager, Moraine Products Division, General Motors Corp., Dayton, O.

The following companies are members: United States Graphite Co., Saginaw, Mich.; Bound Brook Oil-Less Bearing Co., Bound Brook, N. J.; Amplex Division, Chrysler Corp., Detroit; Moraine Products Division, General Motors Corp., Dayton, O.; Johnson Bronze Co., Newcastle, Pa.; Stackpole Carbon Co., St. Marys, Pa.; Keystone Carbon Co., St. Marys, Pa.; Henry Crowley Inc., West Orange, N. J.; P. R. Mallory & Co., Indianapolis; General Laminated Corp., New York; Powder Metallurgy Inc., Long Island City, N. Y.; and American Sinteel Corp., Yonkers, N. Y.

FIGHT FRICTION
WITH
N-B-M "TIGER" BRONZE



Notice how evenly the lead is distributed!

Making "TIGER" Bronze for bushings and bearings is an art. During the last 68 years, we have developed a special method of pouring and blending copper, tin and lead into one homogeneous structure. It is this even distribution of the ingredients, especially of lead, that makes "TIGER" Bronze so highly anti-frictional and gives it the strength to endure severest conditions.

Write for our "Tiger" Bronze Chart — showing the hundreds of sizes of cored and solid bars available — rough and machined.

Also send us your prints on miscellaneous bearings and castings — for prompt estimates.

Proudly the "E" Pennant waves over our plant, awarded to us and our fellow workers by the U. S. Navy for the production of naval ordnance.

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WPB Exerts Closer Control To Improve Distribution

Plate output held below capacity to improve bar and sheet supply. . . Scrap drive bringing out large tonnage. . . Bar demand assumes first place with sheet needs also pressing mills

DEMAND
War needs growing.

PRODUCTION
Advanced ½-point to 99 per cent.

PRICES
Slight scrap revisions.

REFINEMENTS in steel distribution are being made by the War Production Board, to serve most needed purposes and avoid supplying more than necessary for any at the expense of others.

Although facilities are available for producing at least 1,250,000 tons of steel plates per month, apparently the disposition of WPB has been to limit plate output to about 1,100,000 tons and this rate is expected to hold for the remainder of this year. This plate production suffices for all urgent requirements and the unused capacity releases steel for other products where pressure is heaviest, particularly for bars and sheets, the latter having suffered over recent months by diversion of strip capacity to light plates.

Plate allocations for November are awaited and if the pattern of the past few months is followed 70 to 75 per cent will be for the Maritime Commission, the Army and the Navy, the former taking most.

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Results of the scrap salvage drive cannot be evaluated for another week but a large quantity of miscellaneous scrap is being uncovered, a great deal of which has not yet been picked up from its concentration points and carried to yards. When this is added to accumulations already there a heavy backlog will be provided for preparation and shipment through succeeding weeks. A direct result of the drive is a better supply of current scrap for steelmaking, which is reflected in larger production in various areas. Most steelmakers now have sufficient for as near capacity production as furnace conditions will allow and in some cases reserves are being laid down for winter use. An unusual proportion of light and low-grade scrap is included in contributions from households, which is difficult to sort and grade. Lack of experienced labor is also a delaying factor in moving accumulations from yards to steel furnaces.

Office of Price Administration has made a number of amendments to the scrap price schedule, mainly in specifications and differentials, designed to give a more equitable relation between grades and to route specialties to their proper users. The base prices of representative grades have not been changed.

Demand for steel bars, both carbon and alloy, continues to mount and some producers find the situation tighter than in plates. In most cases deliveries can not be promised definitely for priorities below AA-2. As a result of this situation some AAA priorities and directives are appearing, applying to most-needed tonnages. Large war demands are in the offing, promising to make the situation even worse. Some bar users usually obtaining their supply from warehouse are unable to get delivery and are seeking tonnages from mills direct.

After a period of slow buying sheet orders are increasing and this adds to shortage attributed to directives and to restrictions on sheet bars. Deliveries on top ratings vary from eight to twelve weeks. Cold-rolled sheets are in better demand for war purposes and some producers are able to take on tonnage in lighter gages but supply of hot-rolled sheets for processing is far from sufficient. Even under high priority deliveries extend into first quarter.

Orders for reduction of tin plate production are expected, in keeping with restrictions placed on its use. Enlargement of the program for salvage of tin from tin plate scrap is under way, contracts being let for several detinning plants, additions to others and establishment of a number of shredding plants. Collection of tin cans is bringing better results and material for detinning is on the increase.

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Steelworks operations advanced ½-point last week, to 99 per cent, as the scrap situation eased and several open hearths were returned to service after repairs. Chicago advanced 1 point to 103½ per cent and Pittsburgh 1½ points to 97 per cent. Other increases were at St. Louis, 3 points to 97; Cleveland, 1½ points to 96; Buffalo, 2½ points to 93 and New England 5 points to 95. Detroit dropped 7 points to 87 per cent because of furnace repairs, Wheeling 5 points to 79½ and Cincinnati 3 points to 92. Birmingham and Youngstown were unchanged at 95 per cent and eastern Pennsylvania at 96

Finished steel shipments by the United States Steel Corp. in September were 1,703,570 net tons, highest for that month in the history of the Corporation, and the total for nine months, 15,761,476 tons, was an all-time record for that period. The September total was 85,080 tons less than in August, because of the shorter month, but 39,343 tons greater than in September, 1941.

Steel and iron composites are unchanged, controlled by ceiling prices, in which no change has been made. Finished steel composite is $56.73, semifinished steel $36.00, steelmaking pig iron $23.05 and steelmaking scrap $19.17.

COMPOSITE MARKET AVERAGES

	Oct. 17	Oct. 10	Oct. 3	One Month Ago Sept., 1942	Three Months Ago July, 1942	One Year Ago Oct., 1941	Five Years Ago Oct., 1937
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$62.18
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	40.00
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	23.05	22.84
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	16.00

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

	Oct. 17, 1942,	Sept. 1942	July 1942	Oct. 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	2.49	2.49	2.49	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.22	2.22	2.22	2.22
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pittsburgh	2.60	2.60	2.60	2.60
Tin plate, per base box, Pittsburgh	$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, Pittsburgh	2.00	2.00	2.00	2.00

Pig Iron

	Oct. 17, 1942,	Sept. 1942	July 1942	Oct. 1941
Bessemer, del. Pittsburgh	$25.19	$25.19	$25.19	$25.34
Basic, Valley	23.50	23.50	23.50	23.50
Basic, eastern, del. Philadelphia	25.39	25.39	25.39	25.34
No. 2 fdry., del. Pgh., N.&S. Sides	24.69	24.69	24.69	24.69
No. 2 foundry, Chicago	24.00	24.47	24.47	24.22
Southern No. 2, Birmingham	20.38	20.38	20.38	20.38
Southern No. 2, del. Cincinnati	24.30	24.30	24.30	24.06
No. 2X, del. Phila. (differ. av.)	26.265	26.265	26.265	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	31.54	31.54	31.54	31.34
Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.19
Ferromanganese, del. Pittsburgh	140.65	140.65	140.65	125.33

Scrap

Heavy melting steel, Pitts.	$20.00	$20.00	$20.00	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.75	17.75
Heavy melting steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00

Coke

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

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942 The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. All seconds and off-grade products also are covered. Exceptions applying to individual companies are noted in the table.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill.)

Alloy Steel Ingots: Pittsburgh base, uncropped, $45.00.

Rerolling Billets, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34.00; Detroit, del. $36.25; Duluth (bil.) $36.00.
(Wheeling Steel Corp. allocated 21,000 tons 2" square, base grade rerolling billets under lease-lend during first quarter 1942 at $37, f.o.b. Portsmouth, O.; Andrews Steel Co. may quote carbon steel slabs $41 gross ton at established basing points.)

Forging Quality Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40.00; Detroit, del. $42.25; Duluth, $42.00.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points.)

Open Hearth Shell Steel: Pittsburgh, Chicago, base 1000 tons one size and section: 3-12 in., $52.00; 12-18 in., $54.00; 18 in. and over, $56.00.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54.00.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34.00.
(Empire Sheet & Tin Plate Co., Mansfield, O. may quote carbon steel sheet bars at $39 gross ton, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Pt., Youngstown, Coatesville, lb., $1.90.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—9/32 in., inclusive, per 100 lbs., $2.00.

Do., over 9/32—47/64-in., incl., $2.15. Worcester add $0.10 Galveston, $0.27. Pacific Coast $0.50 on water shipment.

Bars

Hot-Rolled Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Detroit, del. 2.27c; New York del. 2.51c; Phila. del. 2.49c; Gulf Ports, dock 2.52c, all-rail 2.59c Pac. ports, dock 2.50c; all rail 3.25c.
(Phoenix Iron Co., Phoenixville, Pa., may quote 2.35c at established basing points.)
Joslyn Mfg. Co. may quote 2.35c, Chicago base. Calumet Steel Division, Borg Warner Corp., may quote 2.35c, Chicago base, on bars produced on its 8-inch mill.)
Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c Detroit, del. 2.82c.

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.35	5100 Spr. flats	0.15
2100	0.75	5100 80-1.10 Cr	0.15
2300	1.70	6100 Bars	1.20
2500	2.55	6100 Spr. flats	0.85
3100	0.70	Carb., Van.	0.85
3200	1.35	9200 Spr. flats	0.15
3300	3.80	9200 Spr. rounds, squares	0.40
3400	3.20	T 1300, Mn, mean 1.51-2.00	0.10
4100 .15-25 Mo. 46.00 .20-.30 Mo. 1.50-2.00; Ni	0.55 1.20	Do., carbon under 0.20 max.	0.35

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70.
Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.47c.
Turned, Ground Shafting: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base (not including turning, grinding, polishing extras) 2.65c; Detroit 2.72c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.27c; Gulf ports, dock 2.52c, all-rail 2.61c; Pacific ports, dock 2.80c, all-rail 3.27c.
Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, base 2.15c; Detroit, del. 2.27c; Gulf ports, dock 2.52c, all-rail 2.61c; Pacific ports, dock 2.80c, all-rail 3.25c.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill.
Iron Bars: Single refined, Pitts. 4.40c, double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, common, 2.15c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.10c; Granite City, base 2.20c; Detroit del. 2.22c; Phila. del. 2.28c; New York del., 2.35c Pacific ports 2.65c.
(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)
Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.17c; New York del. 3.41c; Phila. del. 3.39c; Pacific ports, 3.70c.
Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c; Granite City, base 3.60c; New York del. 3.74c Phila del. 3.68c; Pacific ports 4.05c.
(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)
Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.
Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh 4.25c.
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 grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	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. 2.22c; Pacific ports 2.75c. (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.92c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Worcester base 3.35c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

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, Chicago, Gary, No. 24 unassorted 3.80c.

Manufacturing Ternes: (Special Coated) 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; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16.00; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.10c; New York, del., 2.30-2.55c; Phila., del., 2.15c; St. Louis, 2.34c; Boston, del., 2.42-67c; Pacific ports, 2.65c; Gulf Ports, 2.47c.
(Granite City Steel Co. may quote carbon plates 2.35c, f.o.b. mill. Central Iron & Steel Co. may quote plates at 2.20c, f.o.b. basing points.)

Floor Plates: Pittsburgh, Chicago, 3.35c; Gulf ports, 3.72c; Pacific ports, 4.00c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c.

Wrought Iron Plates: Pittsburgh, 3.80c.

Shapes

Structural shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del., 2.28c; Phila., del., 2.22c; Gulf ports, 2.47c; Pacific ports, 2.75c.
(Phoenix Iron Co., Phoenixville, Pa. may quote carbon steel shapes at 2.30c at established basing points and 2.50c, Phoenixville, for export.)

Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester):

Bright basic, bessemer wire	2.60c
Galvanized wire	2.60c
Spring wire	3.20c

Wire Products to the Trade:

Standard and cement-coated wire nails, polished and staples, 100-lb. keg	$2.55
Annealed fence wire, 100 lb.	3.05
Galvanized fence wire, 100 lb.	3.40
Woven fence, 12½ gage and lighter, per base column	67
Do., 11 gage and heavier	70
Barbed wire, 80-rod spool, col.	70
Twisted barbless wire, col.	70
Single loop bale ties, col.	59
Fence posts, carloads, col.	69
Cut nails, Pittsburgh, carloads	$3.85

Pipe, Tubes

Welded Pipe: Base price in carloads to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

	Steel			Iron	
In.	Blk.	Galv.	In.	Blk.	Galv.
⅛	56	33	½	24	3½
¼ & ⅜	59	40½	¾	30	10
½	63½	51	1-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

	Steel			Iron	
In.	Blk.	Galv.	In.	Blk.	Galv.
2	61	49½	1¼	23	3½
2½-3	64	52½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-10	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet, f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O. D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	.....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $40.00.
Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $40.00.
*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $28-$30.
Supplies: Angle bars, 2.70c; tie plates, 2.15c; track spikes, 3.00c; track bolts, 4.75c; do. heat treated, 5.00c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.: Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

High Speed Tool Steels:

Tung.	Chr.	Van.	Moly.	Pitts. base, per lb.
18.00	4	1	..	67.00c
18.00	4	2	1	77.00c
18.00	4	3	1	87.00c
1.5	4	1	8.5	54.00c
.....	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
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
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
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
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
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
STAINLESS CLAD STEEL (20%)					
304	.....	§§18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price, plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price. **Emergency basing point** is the basing point at or near the place of production or origin of shipment.

Seconds or off-grade iron or steel products cannot be sold at delivered prices exceeding those applying to material of prime quality.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941. Domestic or export extras may be used in case of Lease-Lend tonnage.

Bolts, 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 ⅞ 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
Step bolts	56 off
Plow bolts	65 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.

Nuts

Semifinished hex.	U.S.S.	S.A.E.
⅞-inch and less	62	64
⅛-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	..

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	71 off
Headless, ¼-in., larger	60 off
No. 10, smaller	70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural	3.75c
⅞-inch and under	65-5 off
Wrought washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*$6.00
Connellsville, foundry	7.00- 7.50
Connellsville prem. fdry.	7.25- 7.60
New River, foundry	8.00- 8.25
Wise county, foundry	7.50
Wise county, furnace	6.50

By-Product Foundry

Kearny, N. J., ovens	12.15
Chicago, outside delivered	11.50
Chicago, delivered	12.25
Terre Haute, delivered	12.00
Milwaukee, ovens	12.25
New England, delivered	13.75
St. Louis, delivered	†12.25
Birmingham, ovens	8.50
Indianapolis, delivered	12.00
Cincinnati, delivered	11.75
Cleveland, delivered	12.30
Buffalo, delivered	12.50
Detroit, delivered	12.25
Philadelphia, delivered	12.38

Operators of hand-drawn ovens using trucked coal may charge $6.50, effective Aug. 12, 1942.
† $12.75 from other than Ala., Mo., Tenn.

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	$29.20

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 40, effective June 10, 1941. Exceptions indicated in footnotes. Allocation regulations from WPB Order M-17, expiring Dec. 31, 1942. Base prices bold face, delivered light face.

	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$25.00	$24.50	$26.00	$25.50
Newark, N. J., del.	26.62	26.12	27.62	27.12
Brooklyn, N. Y., del.	27.65	..	..	28.15
Birdsboro, Pa., del.	25.00	24.50	26.00	25.50
Birmingham, base	†20.38	†19.00	.....	.....
Baltimore, del.	25.67	....	.....	.....
Boston, del.	25.12	.....	.....	.....
Chicago, del.	‡24.47	.....	.....	.....
Cincinnati, del.	24.30	22.92	.....	.....
Cleveland, del.	24.12	23.24	.....	.....
Newark, N. J., del.	26.24	....	.....	.....
Philadelphia, del.	25.51	25.01	.....	.....
St. Louis, del.	‡24.12	23.24	.....	.....
Buffalo, base	24.00	23.00	25.00	24.50
Boston, del.	25.50	25.00	26.50	26.00
Rochester, del.	25.53	....	26.53	26.03
Syracuse, del.	26.08	.....	27.08	26.58
Chicago, base	24.00	23.50	24.50	24.00
Milwaukee, del.	25.17	24.67	25.67	25.17
Muskegon, Mich., del.	27.38	..	.....	27.38
Cleveland, base	24.00	23.50	24.50	24.00
Akron, Canton, O., del.	25.47	24.97	25.97	25.47
Detroit, base	24.00	23.50	24.50	24.00
Saginaw, Mich., del.	26.45	25.95	26.95	26.45
Duluth, base	24.50	.....	25.00	24.50
St. Paul, del.	26.76	.....	27.26	26.76
Erie, Pa., base	24.00	23.50	25.00	24.50
Everett, Mass., base	25.00	24.50	26.00	25.50
Boston	25.50	25.00	26.50	26.00
Granite City, Ill., base	24.00	23.50	24.50	24.00
St. Louis, del.	24.50	24.00	.....	24.50
Hamilton, O., base	24.00	23.50	.....	24.00
Cincinnati, del.	24.68	24.68	.....	25.35
Neville Island, Pa., base	24.00	23.50	24.50	24.00
§Pittsburgh, del., No. & So. sides	24.69	24.19	25.19	24.69
Provo, Utah, base	22.00	.....	.....	.....
Sharpsville, Pa., base	24.00	23.50	24.50	24.00
Sparrows Point, Md., base	25.00	24.50	.....	.....
Baltimore, del.	26.05	.....	.....	.....
Steelton, Pa., base	.	24.50	.....	25.50
Swedeland, Pa., base	25.00	24.50	26.00	25.50
Philadelphia, del.	25.89	25.39	.....	26.39
Toledo, O., base	24.00	23.50	24.50	24.00
Mansfield, O., del.	26.06	25.56	26.56	26.06
Youngstown, O., base	24.00	23.50	24.50	24.00

*Basic silicon grade (1.75-2.25%), add 50c for each 0.25%. †For phosphorus 0.70 and over deduct 38c. ‡Over 0.70 phos. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

High Silicon, Silvery

6.00-6.50 per cent (base) $29.50

6.51-7.00	$30.50	9.01- 9.50	$35.50
7.01-7.50	31.50	9.51-10.00	36.50
7.51-8.00	32.50	10.01-10.50	37.50
8.01-8.50	33.50	10.51-11.00	38.50
8.51-9.00	34.50	11.01-11.50	39.50

F.o.b. Jackson county, O., per gross ton. Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling irons, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn. $28.00
Chicago, del. 31.54

Southern

Semi-cold blast, high phos, f.o.b. furnace, Lyles, Tenn..$28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn.. 33.00

Gray Forge

Neville Island, Pa. $23.50
Valley, base 23.50

Low Phosphorus

Basing points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50 base; $30.81, delivered, Philadelphia.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorous Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorous content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Ceiling prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Pittsburgh Coke & Iron Co. (Sharpsville, Pa. furnace only) and Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic, Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton, effective April 20, 1942. Chester, Pa., furnace of Pittsburgh Coke & Iron Co. may exceed basing point prices by $2.25 per ton, effective July 27, 1942.

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
Ohio	43.00

Second Quality

Pa., Ill., Md., Mo., Ky.	46.55
Alabama, Georgia	38.00
New Jersey	49.00
Ohio	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, f.o.b. Ill., Ky., net ton, carloads, all rail	$23.00-25.00
Do., barge	23.00-25.00
No. 2 lump	23.00-25.00

(OPA May 11 established maximum at Jan. 2, 1942, level.)

Ferroalloy Prices

Ferromanganese: 78-82%, carlots, gross ton, duty paid, Atlantic ports, $135; Del. Pittsburgh $140.65; f.o.b. Southern furnaces $135; Add $6 per gross ton for packed carloads $10 for ton, $13.50 for less-ton and $18 for less than 200-lb. lots, packed.

Spiegeleisen: 19-21%, carlots per gross ton, Palmerton, Pa. $36.

Electrolytic manganese: 99.9% plus, less ton lots, per lb. 42.00c. Ton lots 40.00c. Annual contracts 38.00c.

Chromium Metal: Per lb. contained chromium in gross ton lots, contract basis, freight allowed, 98% 80.00c, 88% 79.00c. Spot prices 5 cents per lb. higher.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, f.o.b. Niagara Falls, N. Y. $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: 66-70%; per lb. contained chromium in carloads, freight allowed, 4-6% carbon 13.00c; ton lots 13.75c; less-ton lots 14.00c; less than 200-lb. lots 14.25c. 66-72%, low carbon grades:

	Car loads	Ton lots	Less ton	Less 200 lbs.
2% C.	19.50c	20.25c	20.75c	21.00c
1% C.	20.50c	21.25c	21.75c	22.00c
0.20% C.	21.50c	22.25c	22.75c	23.00c
0.10% C.	22.50c	23.25c	23.75c	24.00c

Spot is ¼c higher

Chromium briquets: Contract basis in carloads per lb., freight allowed 8.25c; packed 8.50c; gross ton lots 8.75c; less-ton lots 9.00c; less 200-lb. lots 9.25c. Spot prices ¼-cent higher.

Ferromolybdenum: 55-75%, per lb. contained molybdenum, f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Calcium Molybdate (Molyte): 40-45%, per lb. contained molybdenum, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, 80.00c.

Molybdic Oxide Briquets: 48-52%, per lb. contained molybdenum, f.o.b. Langeloth, Pa., any quantity 80.00c.

Molybdenum Oxide: 53-63%, per lb. contained molybdenum in 5 and 20 lb. molybdenum contained cans, f.o.b. Langeloth and Washington, Pa., any quantity 80.00c.

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

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrophosphorus: 23-26%, based on 24% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Mt. Pleasant, Tenn.; contract price $75, spot $80.

Ferrosilicon: Contract basis in gross tons per carload, bulk, freight allowed; unitage applies to each 1% silicon above or below base.

	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

Spot prices ¼-cent higher.

Silicon Metal: Contract basis per lb., f.o.b. producers' plants, freight allowed; 1% iron; carlots 14.50c, ton lots 15.00c, less-ton lots 15.25c, less 200 lbs. 15.50c.

Silicon Metal: Contract basis per lb.; 2% iron; carlots 13.00c, ton lots 13.50c, less-ton lots 13.75c, less 200 lbs. 14.00c. Spot prices ¼-cent higher.

Silicon Briquets: Contract basis; in 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 per lb. 4.25c. Spot ¼-cent per lb. higher on less-ton lots; $5 per ton higher on ton lots and over.

Silicomanganese: Contract basis freight allowed. 1½% carbon; in carloads per gross ton $135; ton lots $147.50. Spot $5 per ton higher.

Silico-manganese Briquets: Contract basis in carloads per pound, bulk freight allowed 5.80c; packed 6.05c; ton lots 6.30c; less-ton lots 6.55c; less 200-lb. lots 6.80c. Spot prices ¼-cent higher.

Ferrotungsten: Carlots, per lb. contained tungsten, $1.90.

Tungsten Metal Powder: 98-99%, per lb. any quantity $2.55-2.65.

Ferrotitanium: 40-45%, f.o.b. Niagara Falls, N. Y., per lb. contained titanium: ton lots $1.23; less-ton lots $1.25. Spot 5 cents per lb higher.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20%. Contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Ferrovanadium: 35-40%, contract basis, per lb. contained vanadium, f.o.b. producer's plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Vanadium Pentoxide: Technical grade, 88-92 per cent V_2O_5; contracts, any quantity, $1.10 per pound V_2O_5 contained; spot 5 cents per pound higher.

Zirconium Alloys: 12-15%, contract basis, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot $5 per ton higher.

Zirconium alloy: 35-40%, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼-cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) Contract basis, f.o.b. Niagara Falls, N. Y., per lb. 7.50c; ton lots 8.00c. Spot ½-cent higher.

Simanal: (Approx. 20% each silicon, manganese, aluminum) Contract basis, freight allowed, per lb. of alloy: carlots 10.50c; ton lots 11.00c, less ton lots, 11.50c.

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials. As of April 16, 1942

	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	4.68	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	....	4.04	....	...
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	3.43	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	4.37	4.92	3.45	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	....	...
Chattanooga*	3.80	4.00	4.00	3.85	3.85	5.80	3.75	....	4.50	....	4.39	....	....
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	4.20	4.25	5.45	4.75	4.45	6.50	4.65	7.60	5.70	....	5.75	....	....
Los Angeles	4.35	4.90	6.70	4.90	4.60	7.15	4.95	7.15	5.95	....	6.60	10.55	9.55
San Francisco	3.95	4.50	6.25	4.65	4.35	6.35	4.55	6.40	6.10	....	6.80	10.80	9.80

*Not named in OPA price order.

	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	...	8.00	7.85	8.65
Los Angeles	4.80	9.55	8.55	8.40	8.80
San Francisco	5.45	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; 300-10,000 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, 500-999, Los Angeles, 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.

NATIONAL EMERGENCY STEELS (Hot Rolled)

Extras for Alloy Content

Designation	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Nickel	Chromium	Molybdenum	Basic Open-Hearth: Billets, Bars & Strip	Basic Open-Hearth: Blooms, & Slabs	Electric Furnace: Billets, Bars & Strip	Electric Furnace: Blooms, & Slabs
NE 8024	.22-.28	1.00-1.30	.040	.040	.20-.35			.10-.20	.45c	$9.00	.95c	$19.00
NE 8124	.22-.28	1.30-1.60	.040	.040	.20-.35			.25-.35	.85	17.00	1.35	27.00
NE 8233	.30-.36	1.30-1.60	.040	.040	.20-.35			.10-.20	.65	13.00	1.15	23.00
NE 8245	.42-.49	1.30-1.60	.040	.040	.20-.35			.10-.20	.65	13.00	1.15	23.00
NE 8339	.35-.42	1.30-1.60	.040	.040	.20-.35			.20-.30	.75	15.00	1.25	25.00
NE 8442	.38-.45	1.30-1.60	.040	.040	.20-.35			.30-.40	.90	18.00	1.40	28.00
NE 8447	.43-.50	1.30-1.60	.040	.040	.20-.35			.30-.40	.90	18.00	1.40	28.00
NE 8547	.43-.50	1.30-1.60	.040	.040	.20-.35			.40-.60	1.25	25.00	1.75	35.00
NE 8620	.18-.23	.70- .95	.040	.040	.20-.35	.40-.60	.40-.60	.15-.25	.75	15.00	1.25	25.00
NE 8630	.27-.33	.70- .95	.040	.040	.20-.35	.40-.60	.40-.60	.15-.25	.75	15.00	1.25	25.00
NE 8724	.22-.28	.70- .95	.040	.040	.20-.35	.40-.60	.40-.60	.20-.30	.80	16.00	1.30	26.00
NE 8739	.35-.42	.75-1.00	.040	.040	.20-.35	.40-.60	.40-.60	.20-.30	.80	16.00	1.30	26.00
NE 8744	.40-.47	.75-1.00	.040	.040	.20-.35	.40-.60	.40-.60	.20-.30	.80	16.00	1.30	26.00
NE 8749	.45-.52	.75-1.00	.040	.040	.20-.35	.40-.60	.40-.60	.20-.30	.80	16.00	1.30	26.00
NE 8817	.15-.20	.70- .95	.040	.040	.20-.35	.40-.60	.40-.60	.30-.40	.90	18.00	1.40	28.00
NE 8949	.45-.52	1.00-1.30	.040	.040	.20-.35	.40-.60	.40-.60	.30-.40	1.20	24.00	1.70	34.00

Extras are in addition to a base price of 2.70c, per 100 lb., on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semifinished. No prices quoted on vanadium alloy.

Ores

Lake Superior Iron Ore

Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.75
Old range nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.50

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	13.00

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$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 (nominal)	
2.5:1 lump, 44%	28.50
3:1 lump, 48%	38.00

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										
	OPEN HEARTH GRADES*	Machine Shop Turnings	BLAST FURNACE GRADES*	Billet, Bloom Forge Crops	Bar Crops and smaller; Punchings, Plate	Heavy Structural, Plate 3 ft. and less	Heavy Structural, Plate 2 ft. and less	Heavy Structural, Plate 1 ft. and less	Cut Auto Scrap 3 ft. and less	Cut Auto Scrap 2 ft. and less	Cut Auto Scrap 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	18.00
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

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	17.00	18.00	19.00
Unstripped Motor Blocks	17.50	18.50	19.50
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
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. No. 1 chem. borings, 1 per cent oil, $1 under. No. 2, 1.5 per cent oil, $2 under heavy melting steel. No. 3 bundles, $2 under No. 1 heavy melting; cast steel, $2.50 over, No. 2 busheling, $2.50 under No. 1 heavy melting steel, auto springs, crankshafts, $1 over No. 1 heavy melting. **Blast Furnace Grades** prices refer to mixed borings and turnings, shoveling turnings, and cast iron borings.

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. Commissions must be shown as separate item on invoice.

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, $6.65 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 (plus freight rate increase March 18, 1942) the prices listed in the table for the nearest basing point. Certain exceptions specified in Revised Price Schedule No. 4 (Amendment 1) 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; to shipments of turnings to ferroalloy producers and of borings to chemical users. Delivered prices of scrap shipped under WPB allocations may exceed prices at nearest basing point by more than $1, if most economical transportation is used.

Unprepared Scrap: Above prices are for prepared scrap. Maximum prices for unprepared scrap are $2.50 less (railroad grades $3.50 less; material from which Nos. 1, 2 and 3 bundles made is $4 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 grades of prepared scrap." Graveyard autos not considered unprepared scrap.

Remote Scrap: Consists of all grades, except railroad scrap, in Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas, Oklahoma, Oregon, Washington, Louisiana, 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. Colorado scrap is remote scrap for Colorado consumers only.

Sheets, Strip . . .

Sheet & Strip Prices, Page 108

Sheet sales are more active, following a period when orders were small and scattered. Recent orders have not been large but are much more numerous. This situation adds to shortage of sheets, which has been especially pronounced for more than a month, due not only to continued rerating, though this is decreasing, but to directives from Washington and restrictions in allocations of sheet bars.

Deliveries on tonnage with top ratings are at least eight weeks in most cases and as far as 12 weeks in some. Some tonnages against old contracts at fairly low ratings are being worked off under the mill quota system, which sets up minimum production quotas for various grades and products.

Fabricators of ship fittings are leading users of sheets, particularly in New England and other coastal areas, their orders mainly bearing AA-1 and high end-use symbols.

Purchases of cold-finished sheets have increased moderately for new war contracts. Several producers are able to take on cold-rolled tonnage, notably in lighter gages, but restricted supplies of sheet bars under mill quota limits the volume of production. Directives and AA-1 orders account for most new business, with deliveries for the most part extending into first quarter. Supplies of special and trade-named alloy sheets are meager.

Hot strip allocations to cold mills are based on end-use importance of rerolled material and little semifinished will be available for anything rated below AA-4 with the trend steadily upward as to priority requirements. Cold-rollers are being assigned definite tonnages and hope for a better balance between hot strip deliveries in relation to high rated orders. Incoming volume, although uneven, in the aggregate is maintained. Shipments are below capacity, due to the unbalanced backlog, high carbon predominating, with annealing a frequent choke-point. On some war contracts deliveries extend into second quarter and beyond on a monthly release basis. Considerable material held up by delays experienced by fabricators in securing dies and tooling is being released.

Plates . . .

Plate Prices, Page 109

While facilities are available for producing at least 1,250,000 tons of plates per month the apparent disposition of the War Production Board of late has been to limit plate output to about 1,100,000 tons. This rate may hold over the remainder of the year in the opinion of some leading trade interests. Demand is for much more than this but it appears that all urgent requirements are being met and as it is increasingly desirable to devote as much steel as possible to other products, it is believed the present rate will be maintained for a while.

Steel is needed for bars, in particular, and for sheets in somewhat less degree, as sheets have suffered in recent months by diversion of much strip capacity to plate production. Plate sellers are awaiting word from Washington on November allocations. If the trend is anything like that of the past two months at least 70 to 75 per cent will be for by prime contractors with top ratings. the Maritime Commission, the Navy and the Army, with the former getting the heaviest proportion, with the Navy second and the Army last.

More importance is being laid on end-use in plate allocations, requests covered by lower symbols being more frequently reduced. Shipyard inventories, with few exceptions, are in better balance. Delinquent tonnage is in smaller volume, due to occasional mill failure or rejects, passed material being shipped at once, with the remainder following on the next rolling.

Fabricating shops with war equipment contracts are using more plates, subcontractors being supplied frequently. Demand for wrought iron plates has diminished materially.

Bars . . .

Bar Prices, Page 108

Demand for carbon and alloy bars continues to expand and deliveries are lengthening. With large war needs expected to appear in the near future the situation promises to become tighter. War contracts have increased bar sales five times those of sheets with some producers. Some AAA ratings and directives are appearing, the latter applying more to hot-rolled bars, with cold finishers, starting Nov. 1, to be allocated definite tonnages.

With most producers carbon bars now are tighter than plates and definite deliveries can not be promised on any rating under AA-2. Numerous inquiries

are appearing from consumers usually buying from warehouses, some with top ratings.

Forging shops are booked to capacity for months ahead and orders are being reduced by many.

Despite the fact that shell requirements are said to be less urgent, no relief is noted in demand for bar delivery. Hot-rolled carbon bars with ratings under AA-2 are not being scheduled and those already scheduled are not being promised before first quarter, regardless of size or specification. Main stringency is in larger rounds, 1¼-inches and larger, and in flats. Small rounds are next tightest and medium rounds in best supply. Alloy bar deliveries run 30 weeks and beyond. Exceptions to this situation are found in allocations of carbon bars to cold drawers under the system in effect this month, which will be extended to include alloy bars Nov. 1.

A number of consumers who have received PRP authorizations for fourth quarter find they have been granted ratings which appear inadequate to obtain reasonably prompt delivery on many steel products.

Such ratings range down to AA-5, the lowest assigned by WPB on any PRP authorization, and AA-5 frequently is too low to make an impression on mill order books now. However, WPB has answered protests against the ineffectiveness of these ratings by stating that it expects steel producers to be able to fill all orders this quarter for tonnages which have been authorized.

It is pointed out that mill backlogs will be altered as soon as PRP units adjust their orders in line with quantities they have been authorized to purchase. Such revisions only now are being made as the last PRP authorizations were mailed during the past few days. Many consumers have had their material requests scaled down to bring total authorizations in balance with indicated supply. Pending receipt of certificates buyers were permitted to place orders up to 70 per cent of their estimated fourth quarter requirements.

Pipe . . .

Pipe Prices, Page 109

To provide relief for maintenance and repair work merchant pipe distributors will be allocated tonnage which can be applied to ratings down to A-10. For the year beginning Oct. 1 larger distributors will be allocated quarterly, it is understood, 6¼ per cent of tonnage received from mills in 1940. Distributors who receive annually 320 tons or less will receive one minimum carlot of 20 tons where receipts in 1940 were not more than 80 tons, two carloads where they ranged from 81 to 160 tons, three carloads up to 240 tons and four carloads up to 320 tons. None can receive more than one carload per quarter.

Heretofore the resellers' A-3 rating has not been sufficiently high for stock replacements and most had relied on PD-83G extensions carrying higher ratings. As a result stocks suffered seriously in supplying tonnage at low priorities, such as A-10, maintenance and repair.

Current merchant pipe inventories with most distributors are low, both in butt and lap-weld as replacements for some time have been confined to re-extended higher ratings. Most pipe required in prefabricated work is bought on priorities in the AA classification. Restricted allocations of semifinished limit pipe production.

Cast iron pipe foundries are booking some A-1-k orders but with production mainly on AA-3 or higher, deliveries are uncertain. Two projects in Rhode Island require 4000 tons. Warren Foundry & Pipe Corp., Everett, Mass., has booked 330 tons of 10 and 12-inch for the Federal Works Agency, Boston.

For government installations, depots, airfields, housing and miscellaneous projects, demand for cast pipe is heavy, accounting for most production and pig iron allocations at higher priority ratings, little is left for municipal or utility requirements. Only a fraction of the pipe placed last February by New York City, a 10,000-ton contract, has been delivered, ratings, even though revised upward once, still too low. An outstanding inquiry by a New York contractor is 18,400 tons of 30-inch, for a North Carolina depot.

Open inquiries for boiler tubes frequently fail to bring out quotations and more important inquiries are sometimes negotiated as was the case with the Navy recently, a $54,795 contract going to Babcock & Wilcox Tube Co., Beaver Falls, Pa.

Wire . . .

Wire Prices, Page 109

Wire and wire products are being directed into war requirements in heavy volume with estimated needs pared under PRP for less essential end-use. Ratings are being revised frequently, users

getting smaller tonnage than requested on higher priority. Rope mills continue to press for wire to maintain stranding equipment engaged at capacity. Landing mats and clips account for substantial inquiry. While the volume earmarked for lend-lease is unchanged, deliveries extend over longer periods, June on some products.

Fabricators of wire novelties are getting less wire except for goods fitting into the war program and in converting shops are handicapped in getting new special equipment. Aircraft accounts for a substantial portion of alloys; inquiry and pressure for deliveries are mounting. There is much shopping around for rods with AA-1 needed for reasonably prompt delivery. In most instances users of screw stock, as a rule buying rods and finishing their own tonnage, are now purchasing finished wire. New volume is confined largely to AA-2 or better and fine wire equipment is heavily loaded.

Rails, Cars . . .

Track Material Prices, Page 109

Railroad inquiries for 1943 supply of track materials are beginning to reach mills, though the carriers are holding down their orders to a minimum to save steel. Under heavy traffic brought about by the war track repairs are heavy and requirements for material are of considerable volume. Railroads are paying much attention to reclaiming steel which under ordinary circumstances would be scrapped, returning to service every piece which can be made usable.

Structural Shapes . . .

Structural Shape Prices, Page 109

Structural fabricators are buying a minimum of plain material, and more plates than shapes are required for much of the work being fabricated. Backlogs for construction in many instances have been worked off and the new line of work taxes some equipment while other tools are idle. Welding equipment is especially busy.

A New England shipyard which came into production recently is subletting heavily. For gun emplacements close to 600 tons of heavy beams, requiring little shop work, has been awarded. In that area shipbuilding is by far the largest consumer of structural steel, with deliveries slightly improved.

While in spots deliveries have improved, eight weeks being possible on AA-2 with some mills, shipyards and shops engaged in subcontracting for miscellaneous equipment continue to specify substantial tonnage. Ratio of rollings are higher on smaller sizes, more pieces per ton, much of which bypasses structural shops. Backlogs of orders for regular fabricated work are declining steadily and unless shops are successful in closing on miscellaneous contracts, some are confronted with sharply curtailed schedules. Synthetic rubber building program is requiring less structural steel than estimated, several inquiries having been reduced, 60 per cent on one project; one oil company is remodeling old refineries for new rubber plants. Airplane and blimp hangars are being specified wood. More structural tonnage is available to warehouses, although the latter are experiencing smaller demand.

Some large eastern shops have obtained war assembly work, especially barge construction, which is helping their operations, while others in the East have sufficient backlog of high-rated structural work to assure high operations into first quarter.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 109

Suppliers of reinforcing bars feel the effect of curtailed building construction and their volume is much reduced, only war construction offering new tonnage. The latter has been reduced as much as possible, timber being substituted wherever possible. It is difficult for reinforcing bar producers to fit into the war production picture.

Demand has dropped to the extent some mills seek tonnage to fill reduced quotas, production cut back to conserve semifinished for other products. Mills turning down volume several months ago are now quoting on the few inquiries appearing, rail steel being specified in some. While small tonnage is open on AA-3 ratings, most orders, to command fairly early delivery, are covered by higher priorities. Buying of mesh, except for landing fields, has practically halted.

Pig Iron . . .

Pig Iron Prices, Page 110

Requests for pig iron for November

allocation are about the same as for October and other recent months. Conversion to war work has brought about a static condition in which few fluctuations are apparent. A recent slight letup in machine tool demand proved temporary and was not reflected in the volume of castings for this purpose.

Important melters on stoves and sanitary equipment have converted products carrying high priority for war needs and continue to require iron in usual volume. In occasional instances war work has not been obtained and no requests are made for pig iron allocation.

By utilizing the entire production of the district furnace, supplemented by deliveries from the Buffalo and Cleveland districts, pig iron requirements are well covered in the New England area.

Allocations apply more to ratings in the higher range, although shops producing castings in the lower priority range are getting some iron, although requisitions are sometimes reduced. Much detail is involved in minor substitution of analysis; fewer grades are being produced and slight changes in silicon and other specifications are frequently made.

Scrap . . .

Scrap Prices, Page 112

Gratifying results are being obtained in the country-wide salvage effort and substantial tonnages are being drawn from hitherto hidden sources. No accurate estimate can be made of total tonnage as the process of collecting accumulations by civic bodies, schools and neighborhood organizations is slow and a great deal of material is yet to be gathered and counted.

Yards are receiving large tonnages, which is accumulating faster than it can be prepared and shipped. This will form a reserve from which prepared scrap will flow in later months. In the material salvaged from households an unusual proportion is light and of inferior grade, which requires much time for handling.

Operations of government agencies charged with financing salvage where expense is greater than can be recovered at market prices have developed some overlapping. War Materials Inc., recently formed as a subsidiary of Metals Reserve Co., is in conflict with the conservation division of War Production Board and a directive from WPB has halted organization plans of the former until the situation is clarified. Large tonnages of steel are involved in projects falling into this classification.

A number of adjustments have been made by OPA in the scrap price schedule, mainly relating to differentials and specifications, details of which will be found in another column. These are designed to give a more equitable return and to expedite handling for the proper class of consumers.

It is estimated about 80 per cent of the scrap collected in the New York area will require bundling. There are not over 15 baling presses in the district with average capacity of 20 to 25 tons per day capacity, indicating yard equipment, in addition to labor, will be a bottleneck. Requests for first bids on scrap went to 135 dealers, including many unable to handle the offerings. Probably less than 49 yards can actually aid in processing. Some contracts have been placed for Queens scrap at $4.48 to $5.26 per ton. No bids were received on Staten Island scrap. Following a conference between Mayor LaGuardia, Paul C. Cabot, assistant to director of the WPB conservation division, and E. C. Barringer, president, Institute of Scrap Iron and Steel Inc., it was announced: "Collected scrap metal will be taken by all scrap metal dealers in the city jointly." A form of contact and details are being worked out. Tonnage estimates are

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

exaggerated and one lot from the World's fair grounds claimed to be 4950 tons actually yielded 1200 tons. Not for 30 days will this public scrap move smoothly and in volume. WPB will pass on each application involving use of federal funds for salvage and will clear projects to the War Materials Inc. Confusion over War Materials Inc. in removal of scrap has brought about the resignation of Robert Moses as director of the New York industrial scrap metal drive.

Collections from country and city in the St. Louis area exceed estimates. In the first six days of the drive 12,130 tons was gathered in the city, 7700 tons representing the school contribution. Missouri in the same period produced 49,981 tons of non-commercial material. As a result of increased flow some melters are able to make small additions to reserves and none is taking scrap from stock. St. Louis Terminal railroad is removing 50 tons of old rails from the Eads bridge.

In the Cincinnati district the situation is characterized as the best since Pearl Harbor and current needs are fully supplied, with some stocks being built. Most melters have much less scrap in stock than usual at this season and continued scrap collection is imperative to bridge the winter. Numerous projects requiring government aid in salvaging are under way and others have not been started. Yards are accumulating large backlogs of material which will require much labor in sorting and labor supply is far below normal.

In the Chicago district the situation shows a complete reversal and where shortage threatened closing of some furnaces only a short time ago, sufficient scrap is being received now to allow some reserves to be built, ranging from two to three weeks. Material is also accumulating in dealers' yards for future use. Reports from western rural districts are that an increase may be expected in country collections, farmers now having more time from their regular work.

Buffalo dealers are hard pressed by lack of labor and considerable accumulations at curbside are not yet picked up, due to lack of trucks for the purpose. Yards are working at 75 to 80 per cent of capacity.

OPA Makes Many Minor Scrap Schedule Changes

Office of Price Administration has issued amendment No. 8 to price schedule No. 4, iron and steel scrap, effective Oct. 15. This includes new specifications for No. 2 heavy melting steel scrap by permitting inclusion of galvanized material meeting size requirements, and uncut bumpers, rear ends and front axles of passenger automobiles.

Other changes and additions include an increase of $1.50 per ton to the maximum for No. 2 busheling and increase of maximum dimension from 8 to 12 inches, establishing a better relationship between No. 2 busheling and No. 2 bundles; a new grade, baled machine shop turnings, has been established, hydraulically compressed to not less than 75 pounds per cubic foot, with a differential of $4 per gross ton over unbaled; specifications for billet, bloom and forge crops have been amended to include low phosphorus and sulphur slab and heavy plate crops of not less than two inches thickness.

The special preparation charge for crushing turnings has been changed to exclude any premium for crushing heavy turnings, on the ground crushing does not substantially increase value to the consumer; a new provision requires prior approval for any preparation charge arising out of preparation of scrap by a dealer after the scrap has arrived for unloading at the consumer's plant; provisions of the schedule governing unlisted grades have been amended to allow OPA to adjust the price.

A provision has been made covering preparation in transit for allocated unprepared scrap to consumers lacking preparation facilities, the maximum to be the usual schedule differentials, $2.50 per gross ton for No. 1 heavy melting steel, $3.50 per ton for cut automotive steel one foot or under, and $4 per ton for No. 1, No. 2 and No. 3 bundles; price of high manganese steel scrap larger than 12 x 24 x 8 inches, containing at least 10 per cent manganese, has been set at $3 per ton above that for No. 1 heavy melting steel. Heretofore, high manganese steel requiring no further preparation for electric furnace use has carried a premium of $7 above the price of No. 1 heavy melting steel, while larger dimensions have been treated as ordinary heavy melting steel, carrying no premium for the manganese.

Iron Ore . . .

Iron Ore Prices, Page 111

Maximum prices on manganese and chrome ores are expected to be announced within a short time as schedules

are understood to have been determined and now await printing for distribution.

Warehouse . . .

Warehouse Prices, Page 111

Most jobbers believe directives will improve their replacements before the end of the quarter. Those selling mainly to the machine tool industry have had high priorities to extend but receipts in many instances have been considerably less than quotas.

Predicated on top-rank and extended date of priorities steel warehouses with higher ranges of ratings to extend should benefit first by the directive allocations of 80 per cent of quotas on numerous products starting Nov. 1 and extending through the remainder of the year. Jobbers selling largely to the machine tool industry are in this category; most have high enough ratings on materials to warrant replacements by extensions under the directive.

Higher rated orders will be shipped first, in order of extension dates; hot and cold-rolled sheets, hot carbon bars, plates, structurals, cold-finished bars and alloys are covered by the directive. Warehouses are still forced to fill some war tonnage at ratings too low to assure replacements, selling at A-1-a with replacements possible only on AA-2 or AA-3. Whether the 80 per cent will allow any tonnage to be replaced below the AA classification is a matter of conjecture.

Plant of the Scully Steel Products Co., Cambridge, Mass., is being taken over by the Navy for storage needs, as are several of the larger automobile display rooms in the Boston area, and private contractors, including shipyards, have taken additional storage space in many instances.

Tin Plate . . .

Tin Plate Prices, Page 109

Rumors are current that tin plate production will be reduced during November and December. No orders have been issued yet but such a move would be in line with numerous restrictions which have been imposed on use of this material.

Contracts have been let by Defense Plant Corp. to H. K. Ferguson Co., Cleveland, for detinning plants which will almost double capacity by next summer. New plants will be built at New York, Buffalo, Chicago, Birmingham, Dallas and Los Angeles and additions to plants at Carteret, N. J., East Chicago, Ind., Neville Island, Pa., and Baltimore. Shredding plants will be built in approximately 17 metropolitan areas, including Cleveland, Philadelphia, Washington, Syracuse, Cincinnati, Detroit, Toledo, Boston, Providence, Milwaukee and St. Louis.

Steel in Europe . . .

London (*By Cable*)—Demand for structural steel is increasing in Great Britain and armaments are requiring increasing tonnages of special alloys. Foundries producing heavy engineering material are consuming larger tonnages of pig iron.

Canada . . .

Toronto, Ont. — Notwithstanding announced curtailment in shipments of steel into Canada from the United States, which will total about 175,000 tons to the end of the year, plans are under way for further expansion in Canadian war production. The government, however, is taking more drastic measures toward curtailing use of steel and other metals in nonessential and less essential industry and it is understood that even essential war production, in materials where there is no urgent need, may be temporarily suspended.

Demand for plates and sheets continues to expand, and it is believed that curtailment in war vehicle production here will throw a substantial tonnage of these materials into the shipbuilding industry. Canadian plate mills continue at maximum production and there is still urgent need for large tonnages from the United States. It also is understood that deliveries to rolling stock builders will be further curtailed to provide ship steel.

Scrap iron and steel receipts by dealers in various parts of Ontario and Quebec are well in excess of their handling capacity, with the result that substantial tonnages are being stock piled for later sorting. Dealers report shortage of labor for scrap handling. Improvement in scrap deliveries is almost entirely due to the flood of materials from the rural districts, where farmers are gathering and shipping before winter sets in. Some scrap also is coming down from the northern Ontario and Quebec mining center.

Nonferrous Metal Prices

Oct.	Copper, Electro, del. Conn.	Copper, Lake, del. Midwest	Copper, Casting, refinery	Straits Tin, New York Spot	Straits Tin, New York Futures
1-15	12.00	12.12½	11.75	52.00	52.00

Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
6.50	6.35	8.25	15.00	14.50	35.00

F.o.b. mill base, cents per lb. except as specified. Copper and 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, l.c.l.	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
(In cents per pound, carlots)

Copper

No. 1 heavy	9.25-10.00
Light	7.25- 8.00

Brass

No. 1 composition	8.50- 9.00
Yellow brass castings	5.50- 6.00
Auto radiators	6.12½-6.62½
Red brass, borings & turnings	8.00- 8.50

Zinc

Old	4.75- 5.00
New clippings	6.00- 6.50

Aluminum

Clippings	9.75-10.25
Cast	8.75- 9.25
Pistons	8.50- 8.75
Sheet	8.75- 9.25

Lead

Heavy	4.75- 5.25
Mixed babbitt	5.35- 5.50
Electrotype shells	5.00- 5.50
Stereotype, Linotype	6.00- 6.75

Tin and Alloys

Block tin pipe	44.00-46.00
No. 1 pewter	32.00-36.00
Solder joints	7.75- 8.50

SECONDARY METALS

Brass ingot, 85-5-5-5, l.c.l.	12.50
Standard No. 12 aluminum	14.50

MAGNESIUM

(12 pound rod, 4 in. diam.)

99.8% ingot, carlots	22.50
100 lb. to carlots	24.50
Extruded sticks, ¼ to 2 lb.	
Carlots	32.00
100 lb. to carlots	34.00

Nonferrous Metals . . .

New York—Although no new important government regulations affecting the nonferrous metal industry directly were issued last week, interest still centered in Washington developments.

Copper and brass warehouse interests are anxious to have formed a committee of representative members who would consult with the WPB Copper Branch on technical operating details. Warehouse stocks are now only about 25 per cent of those held a year ago. Under present regulations warehouses must accept orders for material on ratings down through A-1-k while mills are not allowed to deliver any metal on ratings lower than A-1-a.

Lead contracts covering tonnages to be sold in 1943 have not yet been concluded. Among uncertainties to be considered this year is the effect on the price of lead of the projected $1 per day wage increase to western miners.

Members of the zinc trade are awaiting information on the supply situation for November which will be discussed by producers, WPB and other government officials in Washington on Oct. 20. Considerable attention will be directed to the matter of reserves held by MRC and other interests for emergency use.

OPA has revised the aluminum scrap price schedule providing a maximum price of 1.2 cents a pound for aluminum drosses, skimmings, grindings, sweepings, savings, and spatters containing less than 15 per cent by weight of metallic aluminum. The price, delivered to the buyer's receiving point, is the equivalent of $24 a ton of material.

Lead Contracts Are Let

Metals Refining division, Glidden Co., Hammond, Ind., has been awarded the contract for 7,332,000 pounds of grade B lead for the Portsmouth, N. H., navy yard at $538,682.04, bidding 7.347c, delivered Portsmouth. Nassau Smelting & Refining Co. has been awarded 510,000 pounds by negotiated contract at $32,640, no bids having been submitted on the second lot Sept. 15.

Steel Warehousemen Form New Association

Steel warehousemen from Cleveland, Detroit, Chicago, the Ohio valley and New England completed plans for an organization known as the Steel Warehouse Association at a gathering in Cleveland, Oct. 9. The membership will be mainly warehouses concentrating on distribution of secondary steel. Other districts will be added as conditions warrant.

Pending local organization work and selection of permanent representation a temporary steering committee has been elected, including the following: William G. Weiss, Midland Steel & Equipment Co., Chicago; J. E. Lavine, Union Steel Supply Co., Warren, O.; Joseph Gendelman, National Sheet Steel Co., Detroit; Sol Friedman, Reliance Steel Corp., Cleveland; George W. Kreer, Lafayette Steel Corp., Chicago.

Among purposes of the association are reform of abuses in warehouse practice, diffusion of reliable statistics, uniformity in customs and usages in such trade, adjustment of differences between members, improvement in service to members of the industry and maintenance of sound relations between the industry, its sources of supply, customers, employes, the public and the government.

Canada Takes New Steps To Save War Materials

TORONTO, ONT.

To conserve brass and other metals urgently needed for war purposes no more brass will be released for hat badges, buttons, buckles and belt equipment for the Canadian forces, the Department of Munitions and Supply announces. Enough brass will be saved to make 26,000,000 cartridges cases per month. Hat badges of plastic will be made standard and web equipment will be steel with black finish. Officers may provide themselves with gold insignia at their own expense if they desire.

Canadian production interests met at Toronto Oct. 17 to open a drive to effect national saving of critical materials, machine tools and labor in war industry by means of substitutions and improved manufacturing methods. The first step was an exhibit showing savings already made in materials and man-hours. This represented annual savings of more than $10,000,000. Potential savings for 1943 are estimated at $100,000,000.

New controls have been imposed on all construction, effective Oct. 9, placing lower limitations on cost of various types of construction which may be undertaken without license. The maximum for constructing or repairing a house has been reduced from $5000 to $500; for such work on a plant from $5000 to $2500.

Price of tungsten scheelite ore has been increased to $26.50 per 20-pound unit. This is in line with that recently established in the United States for purchase of foreign tungsten ores. For this price the ore must contain not less than 60 per cent of tungsten trioxide. A market also exists for low-grade tungsten ore, which may be sold to the Metals Reserve Corp. for treatment at its plant at Salt Lake City, Utah.

Aluminum Fabricating Films Released by Bureau of Mines

A new series of instruction films on the fabrication of aluminum is being released by the Bureau of Mines. Films are in 16-millimeter sound and describe and depict by action shots and animation the fundamental techniques of the various operations of machining, riveting, and welding aluminum.

The titles of the three films are "Machining Aluminum," "Riveting Aluminum," and "Welding Aluminum." Copies are available for educational exhibition. They may be obtained from the Bureau of Mines, 4800 Forbes street, Pittsburgh.

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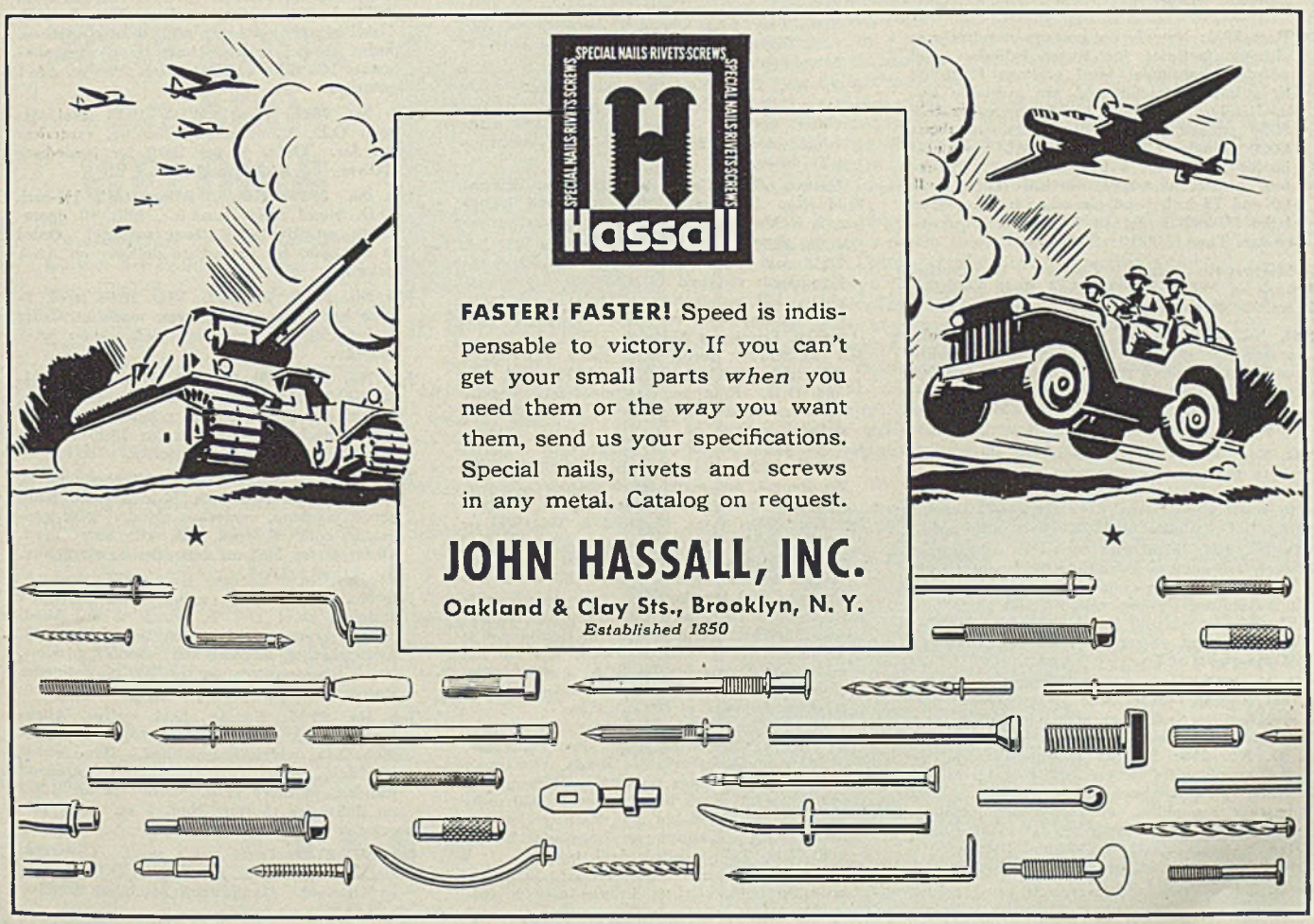

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NEW BUSINESS

Plant Expansion, Construction and Enterprise, Government Inquiries, Sub-Contract Opportunities, Contracts Placed and Pending

SUB-CONTRACT OPPORTUNITIES

Data on subcontract work are issued by regional offices of the War Production Board. Contact either the office issuing the data or your nearest field office. Write, don't telephone, and mention key letters and numbers appearing before each item to assure prompt attention and avoid delay.

Philadelphia Office, Contract Distribution Branch, Production Division, WPB, Broad Street Station building, reports the following subcontract opportunities:

Chase-45-1: New York manufacturer seeks subcontracting facilities for magneto parts: Distributor gear axles up to approximately 1½-inch diameter by $\frac{13}{16}$-inch long; breaker cam shafts up to ⅞-inch diameter by 6 inches long. Tolerances, close. Quantities varying up to 7000 per month. Equipment or equivalent required: I.D., O.D., surface and cam grinding, drilling, milling, lapping, hob shaping and splining, thread grinding, profiling, turret lathes, automatic screw machines. Contract by negotiation. Prints and information at Philadelphia office.

Cruse-51-1: Pennsylvania concern seeks subcontracting facilities to machine and heat treat 6½-inch O.D. ball bearings; ½-inch balls and race stock furnished by prime contractor. Tools and fixtures to be built by subcontractor and purchased by prime. Material, SAE 1010. Minimum production 50 bearings per day. Sample and drawing at Philadelphia office.

O'Hara-53-1: New Jersey concern requires machining facilities for water cylinders and powder containers. Steel castings furnished by prime contractor and are available immediately. Cylinders weigh approximately 8020 pounds and powder containers about 6030 pounds. Machines required, horizontal boring mills with 5 to 7-inch bar and six-foot horizontal travel; vertical boring mill 60 and 72-inch head clearance or an engine lathe 60-inch swing by 72 inches center to center. Time, 3000 to 5000 hours.

Minneapolis office, Contract Distribution Branch of WPB, 334 Midland Bank building, is seeking contractors for the following:

S.O. No. 279: Local prime contractor seeks source for manufacture of various bakelite molds and molded parts. Drilling and tapping required on some. Parts are small and require high accuracy. Drawings at Minneapolis office.

S.O. No. 254: Three operations on small brass parts, two operations require automatic screw machines. Quantities, 500,000 each. Delivery to start immediately. Contractor will furnish material. Samples at Minneapolis office.

S.O. No. 238: Local firm desires to subcontract work on micrometer adjustable spacing collars for milling machine cutter arbors. Operations require turning, tapping and threading. Threads are class 3 fit; sizes from ⅞-inch to 2-inch arbor. Samples and blueprints at Minneapolis office.

S.O. No. 275: Army Air Corps requires 1,500,000 aircraft turnbuckle assemblies. Prints, specifications and operation breakdown at Minneapolis office.

S. O. No. 270: Sources required for manufacture of wide variety of generator parts, gears, pinions, bushings, housings, shafts, bearing assemblies, etc., requiring turning, boring and drilling capacity. Deliveries start this month, extend to March, 1943. Parts and drawings at Minneapolis office.

S. O. No. 273: Source to manufacture various ring and plug thread gages, urgently required. Largest size 2½ inches.

S.O. No. 260: Sources needed for manufacture of aircraft engine parts, including valve tappets, studs, piston pins, bushings, etc. Grinding operation required on most parts. Tolerances close. Samples at Minneapolis office.

S.O. No. 281: Minneapolis firm wants 7000 hours on 10 or 12-inch engine lathes, highly accurate precision work; also 14,000 hours on hand millers, 8 or 10-inch, for accurate precision work on small parts.

S.O. No. 271: Cleveland prime contractor wants forging capacity, production basis, large quantity of shifting levers. Drawing at Minneapolis office.

S.O. No. 276: Minneapolis manufacturer needs capacity on 4 or 6-spindle automatic to machine 150,000 trunnions from 1¼-inch round stock, tolerance, .001.

S.O. No. 277: Several very small screw machine parts in quantities from 2000 to 50,000. Material, brass. Closest tolerance is .001. Sizes vary from .09-inch diameter to .75-inch diameter. Prints and sample parts at Minneapolis office.

S.O. No. 261: Eastern manufacturer wants to sublet considerable automatic screw machine work on commutator parts in sizes from ¼-inch to 2⅝-inch. Prints at Minneapolis office.

Detroit office, Contract Distribution Branch, Production Division, WPB, Boulevard building, is seeking contractors for the following:

Job No. 2256: Piston nut. Material is WD No. 1335 steel and is furnished (17/32-inch O.D.) Equipment required is automatic screw machine, mill, six operations. Order is for 100,000 on deliveries of 10,000 to 20,000 per month. Priority is A-1-a.

Job No. 2257: Recoil plate screw. Material is WD1080, X1335, 1095 or 1035 steel, $\frac{5}{16}$-inch O.D. Equipment required is automatic screw machine, mill. Order is for 50,000 for delivery in October.

Job No. 2258: Recoil plate escutcheon. Material is WD1112 or X1112 steel, 13/32-inch O.D. Equipment, automatic screw machine, tapper. Order is for 50,000 for delivery in October.

Job No. 2259: Gear. Material is WD1080 or 1095 steel, which is furnished. Equipment, mill, six operations; sensitive drill, four operations; broach. Order is for 50,000 on delivery of 500 per day.

Job No. 2389: Hexagon standard nut blanks. Material is SAE1112 hex, ⅜-inch. Equipment is automatic screw machine with pick up attachment, Davenport or B & S screw machine. Order is for 500,000 on A-1-a priority. Prints and sample at Detroit office.

Job No. 2391 to 2394: Prime contractor seeks machining sources on four jobs, crankcase, cylinder and two cylinder heads. Furnishing of cast iron castings optional with prime or subcontractor. Each order is for 18,000 units on delivery of 350 per day, starting Oct. 15. Priority AA-2. Equipment, horizontal boring mill, H.D. drill, sensitive drill, tapper.

Job No. 2519: Lower stop collar, machining operations. Material is bronze and is furnished. Equipment, hand screw machine or lathe, and mill. Order is for 100 pieces per month from Jan. 2, 1943, to June 30 and 200 pieces per month thereafter. Priority AA-1.

Job No. 2558: Push rod ball end. AMS 6290 steel, SAE 4615, ⅝-inch O.D. Automatic screw machine, copper plate, hand screw machine, heat treating, cadmium plate, centerless and surface grinders. On peak production requirements will be 2800 per day. Priority AA-1.

Job No. 2560: Pin valve. AMS 6294 steel bar, SAE 5260, ½-inch O.D. Automatic screw machine, heat treating, centerless and internal grinders, colleted speed head. Peak production 1500 per day. AA-1 priority.

Job No. 2561: Socket valve tappet ball. AMS 6290 nickel-moly steel, SAE 4615, ⅞-inch O.D. Automatic screw machine, hand screw machine two operations, centerless grinder, heat treating speed lathe, magnaflux. Requirements 1300 per day at peak production. Priority AA-1.

Job. No. 2564: Sleeve and nut impeller shaft, front oil seal. AMS 6470 nitralloy steel bar, 2½-inch O.D. Turret lathe, lathe, heat treating, internal, surface and external grinders, sensitive drill, slotter, mill, thread mill, nitride. Requirements for 39 daily at peak production on AA-1 priority.

Job. No. 2565: Body oil pressure relief. AMS 4650 beryllium-copper alloy, $\frac{13}{16}$-inch O.D. Hand screw machine, mill four operations, lathe, thread grinder, heat treat. Requirements 100 daily at peak production on AA-1 priority.

Job No. 2605: Pivot. WDX 1335 steel, $\frac{31}{32}$-inch O.D. Hand screw machine, centerless grinder. Order is for 1900 for immediate delivery on AA-1 priority.

Job No. 2606: Guide. Alloy steel, 1¾-inch O.D. Hand screw machine, mill 10 operations, sensitive drill, heat treating. Order is for 1900 for immediate delivery on AA-1 priority.

Job No. 2607: Bushing. WD 1045 steel, 2-inch hex O.D. Hand screw machine. Order is for 1900 for immediate delivery on AA-1 priority.

Job No. 2608: Shaft. WD 6150 steel, $1\frac{11}{32}$-inch O.D. Hand screw machine, oil groover, sensitive drill, centerless grinder, thread on screw machine. Order is for 1900 for immediate delivery, AA-1 priority.

Job No. 2732: Spray whirler. Allegheny metal, 18-8-EZ-type No. 303, ¼-inch O.D. hand screw machine, centerless grinder, gear generator, colleted work, mill with index head. Order is for 500 on deliveries to start Nov. 1. Priority AA-1.

Job No. 2734: Check valve seats. Carpenter stainless steel No. 2, which is furnished. Hand screw machine, sensitive drill, mill, heat treating, internal and external grinders, hone. Requirements are for 500 on deliveries starting Nov. 1, AA-1 priority.

Job No. 2735: Nozzle check valves. Allegheny metal, 18-8-EZ-type No. 303, 1¼-inch O.D., which is furnished. Hand screw machine, mill two operations, external grinder, sensitive drill. Order is for 1000 on deliveries to start Nov. 1 on AA-1 priority.

Job No. 2736: Inner valve seats. Carpenter stainless steel No. 2, ⅞-inch O.D., which is furnished. Hand screw machine, sensitive

drill, heat treatment, internal and external grinders, hone. Order is for 500 on deliveries starting Nov. 1, on AA-1 priority.

Job No. 2737: Injection pump cylinder. Carpenter stainless steel No. 2, 2⅛-inch O.D., which is furnished. Hand screw machine, heat treatment, internal and external grinders, hone. Order is for 50 on deliveries to start Nov. 1, on AA-1 priority.

Job No. 2738: Injection pump plungers. Carpenter stainless steel No. 2B, 1⅜-inch O.D., which is furnished. Lathe, lathe with collet, heat treating, external grinder, external tapper. Order is for 50, deliveries to start Nov. 1, AA-1 priority.

Job No. 2773: Commutator sleeve. Steel is B-50-F-111, 1⅛-inch O.D. Screw machine, H.D. drill, anneal. Deliveries are for 200 per week starting Nov. 1, increasing to 700 per week by June, 1943, for total of 15,500.

Job No. 2774: Bearing sleeve. Steel is B4B-CRS-SAE 1112, 1⅞-inch O. D. Screw machine, lathe with collet, sensitive drill, external grinder, cadmium plate. Deliveries are 200 per week, starting Nov. 1, increasing to 700 per week by June, 1943, for total of 15,500.

Job No. 2775: Sleeve plug. Steel is B50F85C, SAE 4140, 1⅜ O.D. Screw machine, lathe, hand mill five operations, H.D. drill (rethread), cadmium plate. Order is for 15,500, deliveries 200 per week starting Nov. 1, increasing to 700 per week by June, 1943.

Job No. 2776: Clamping ring. Steel is B451, SAE 1112, 1¼-inch O.D. Screw machine, lathe. Order is for 32,000 of deliveries of 300 per week starting Nov. 1, increasing to 1000 per week by June, 1943.

Job No. 2777: Brush holder tube. Dural brass, ⅛-inch O.D. Screw machine, broach. Order is for 62,000, deliveries 500 per week starting Nov. 1, increasing to 2500 per week by June, 1943.

Job No. 2778: Insert. Brass, B11H18C, ⅛-inch O.D. Screw machine, lathe with collet, mill. Order is for 57,000 on delivery of 400 per week starting Nov. 1 and increasing to 2200 per week by June, 1943.

Chicago office, Contract Distribution Branch of WPB, 20 North Wacker Drive, is seeking contractors for the following:

Exhibit No. 190: Elevating screw, diameter 1.125-inch, length 21¼ inches. Turret lathe and lathe turning, deep hole drilling, threading, thread milling and grinding. Material, steel, WDX 1335, furnished by prime. Tolerance, close. Quantity, 4500. Production, 250 per week. Number of parts, three. Prime will furnish jigs and fixtures, gages and any special tools.

Exhibit No. 264: Retainer. Equipment, 3¾-inch bar size capacity turret lathe, ½-inch capacity drill press. Material, SAE 1112 screw stock, furnished by prime. Tolerance, .007. Quantity, 2250.

Exhibit No. 275: Bushing. Equipment, 1¼-inch bar size capacity 6-spindle automatic screw machine. Material, WD 1020 cold-rolled steel, furnished by prime. Tolerance, .003. Quantity, 1,000,000. Production, 100,000 per month. Number of parts, three.

Exhibit No. 57: Stator yoke. Equipment, 5¼-inch bar capacity turret lathe first and second operation, sensitive bench drill press. Material, steel tubing, furnished by sub. Tolerance, .0015. Quantity, 15,500. Production 200 per week, increasing to 700 per week. Requires annealing, plating and painting.

STRUCTURAL SHAPES . . .

SHAPE CONTRACTS PLACED

1075 tons, Danbridge bridge superstructure, French Broad river, Tennessee, to Nashville Bridge Co., Nashville, Tenn.; Tennessee Valley Authority req. 337081, bids Aug. 24.

100 tons or more, two 25-ton dry dock cranes, Terminal Island, Calif., to Pennsylvania Iron & Steel Co., Los Angeles, $289,275; one 25-ton crane, Brooklyn, to Anthony M. Meyerstein, Brooklyn, $154,830; two 25-ton cranes, Terminal Island, Calif., to Clyde Iron Works, Duluth, Minn., $167,680.

SHAPE CONTRACTS PENDING

830 tons, four regulating gates, Spec. 1045, Keswick dam, Redding, Calif., for Bureau of Reclamation, American Bridge Co., Pittsburgh, low; bids to Denver Oct. 12.

300 tons, government work, Lewes, Del.; White Construction Co., New York, and George & Lynch, Wilmington, Del., contractors.

115 tons, Fort Mifflin, Pa.; John A. Robbins Co., Philadelphia, contractor.

REINFORCING BARS . . .

REINFORCING STEEL AWARDS

146 tons, water supply, army training center, Illinois, for United States engineer, to Laclede Steel Co., St. Louis; MacDonald Engi-

SHAPE AWARDS COMPARED

	Tons
Week ended Oct. 17	1,175
Week ended Oct. 10	1,128
Week ended Oct. 3	3,900
This week, 1941	10,231
Weekly average, 1942	18,146
Weekly average, 1941	27,284
Weekly average, Sept., 1942	3,290
Total to date, 1941	1,161,278
Total to date, 1942	762,130

Includes awards of 100 tons or more.

CONCRETE BARS COMPARED

	Tons
Week ended Oct. 17	366
Week ended Oct. 10	2,853
Week ended Oct. 3	873
This week, 1941	11,103
Weekly average, 1942	8,169
Weekly average, 1941	13,609
Weekly average, Sept., 1942	4,708
Total to date, 1941	609,087
Total to date, 1942	343,105

Includes awards of 100 tons or more.

neering Co., Chicago, contractor.

120 tons, bureau of reclamation, E38186A, Odair, Wash., to Colorado Builders Supply Co., Denver.

100 tons, sewage plant, army camp, Arkansas, to Truscon Steel Co., Youngstown, O.; J. J. Duffy, Chicago, contractor.

PIPE . . .

CAST PIPE PLACED

330 tons, 10 and 12-inch, for Federal Works Agency, Boston, to Warren Foundry & Pipe Co., Everett, Mass.

100 tons or more, steel tubing, navy east and west yards, Neg. 1880, to National Tube Co., Pittsburgh; bids Sept. 8.

RAILS, CARS . . .

CAR ORDERS PLACED

Pittsburgh & West Virginia, 1350 tons, to Carnegie-Illinois Steel Corp., Pittsburgh.

CONSTRUCTION AND ENTERPRISE

OHIO

ALLIANCE, O.—Alliance Engineering Co. is being organized to operate a machine shop. J. B. Blumenstiel, 203 Alliance First National Bank building, is agent for the firm.

CINCINNATI—American Oak Leather Co., Kenner and Dalton avenues, will build addition to boiler house at tannery. Boiler unit, pumps and auxiliary equipment will be installed. A. M. Kinney Inc., Enquirer building, consulting engineer.

CLEVELAND—S. K. Wellman Co., 1381 East Forty-ninth street, has leased 58,000 square feet of space at East Forty-ninth street and Harvard avenue, and is installing machinery for expansion of production facilities.

CLEVELAND—Wellman Bronze & Aluminum Co. is planning two small additions to its plant at 6017 Superior avenue for heat treating and metal smelting. H. G. Wellman is vice president and secretary.

CLEVELAND—Bishop & Babcock Mfg. Co., Fred N. Mizen, president, 4901 Hamilton avenue, will spend about $6000 for alterations to its No. 2 building at 1204 East Fifty-fifth street.

CLEVELAND—Lincoln Tool & Supply Co. is being incorporated through Attorney Bertram A. Robbins, Engineers building. Agent for the firm is Louis Bernstein, 10226 Superior avenue.

CLEVELAND—Euclid Metal Products Co. is opening general machine shop at 21601 Euclid avenue, Euclid, O. Attorney R. Harry Koppich, Engineers building, will be president of the firm. Lathes, drill presses and other machinery will be installed and work started as soon as possible.

CLEVELAND—Valley Mold & Iron Corp., which recently took over the site of the former Newburgh works of American Steel & Wire Co., is erecting plant buildings, including ladle, hot metal, casting, ramming, sand, and finishing buildings, power house and service station.

CRAFTON, O.—Filco Electric Motor Co., 145 West Bradway avenue, Medina, O., will soon occupy 7000-square foot plant here for manufacture of electric motors used on blowers on Navy ships.

WOOSTER, O.—Acme Welding Co., Canton, O., J. W. Moorehead, president, has acquired the Buckeye Aluminum Co. plant here to manufacture electrical equipment.

MAINE

SOUTH PORTLAND, ME.—South Portland Shipbuilding Corp. is asking bids and will soon let contract for plant addition costing $40,000. A. J. Harriman, South Portland, engineer.

MASSACHUSETTS

HINGHAM, MASS.—Air Reduction Sales Co., 60 East Forty-second street, New York, has given contract for two-story 40 x 70-foot acetylene plant to J. S. Mozzicato, 168 Mystic street, Medford, Mass. Estimated cost $40,000.

HUDSON, MASS.—Light and power department has authorized immediate construction of addition to municipal light and power plant, with installation of equipment for increased capacity. Arthur Nelson, 31 St. James avenue, Boston, consulting engineer.

WORCESTER, MASS.—Wyman-Gordon Co., 105 Madison street, will install electric power equipment in two additions to plant. Estimated cost $180,000.

CONNECTICUT

GLENBROOK, CONN.—Perkins-Elmer Corp. has awarded contract for factory addition to Vuono Construction Co., Stamford, Conn. (Noted Sept. 14).

STAMFORD, CONN.—Electric Specialty Co. has let contract for factory addition to Karl O. Haugen, 328 Atlantic street. Estimated cost $40,000. J. Chapman, Glenbrook road, architect.

NEW YORK

FARMINGDALE, N. Y.—Francisco & Jacobus,

architects, 511 Fifth avenue, New York, will soon let contract for two-story addition and five one-story units for an industrial company. Estimated cost over $50,000.

KENMORE, N. Y.—Eastern States Milling Corp. will build warehouse addition and loading shed costing approximately $80,000.

SCHENECTADY, N. Y.—Walter Kidde Constructors Co., 140 Cedar street, New York, affiliated with Walter Kidde Co., manufacturer of fire extinguishers, has contracted with government for construction and operation of plant in Schenectady county, comprising power substation and boiler house. Cost over $2,000,000, with financing through Defense Plant Corp.

NEW JERSEY

CHATHAM, N. J.—Chatham Building Material Co., 116 Summit avenue, has let contract for plant to Simonsen & Emerson, 101 Park avenue, New York. Cost estimated at $50,000.

NEWARK, N. J.—U. S. Industrial Chemical Co., 340 Doremus avenue, has awarded contract to Damon G. Douglas Co., 605 Broad street, for three-story mill and dryer building costing approximately $55,000.

PORT READING, N. J.—Reading Co., Twelfth and Market streets, Philadelphia, has awarded contract to Calabro Construction Co., 527 Fourth avenue, Elizabeth, N. J., for boiler house addition. Estimated cost $50,000.

RINGWOOD, N. J.—Alan Wood Steel Co., Conshohocken, Pa., has let contract for design and construction of new buildings and rehabilitating existing iron mining buildings and facilities to George H. Flinn Corp., 551 Fifth avenue, New York.

PENNSYLVANIA

PHILADELPHIA—Heintz Mfg. Co., Front street and Olney avenue, will install electric power equipment in one-story addition estimated to cost over $175,000.

MICHIGAN

DETROIT—Austin Co., Detroit, has been awarded contract for the $266,000 Dow Chemical Co. factory to be erected in Bay City, Mich.

DETROIT—Detroit Common Council has approved construction of a salvage plant to cost approximately $300,000.

DETROIT—Barton-Malow Co., general contractor, Detroit, is awarding subcontracts for a warehouse to be built on Runn road for Aluminum Co. of America.

DETROIT—Lelock Corp., 4229 Cass avenue, has been organized to manufacture tools, dies, jigs, gages and machine products. Agent, I. Michael Bloch, Detroiter hotel.

DETROIT—Cody Tool & Die Co., 19149 Lahser road, has been organized to operate machine shop, by Walter A. Cody, 5725 Woodward avenue.

HAZEL PARK, MICH.—Acorn Nut & Screw Corp., 24033 Stephenson highway, Hazel Park, has been incorporated with $50,000 capital to manufacture machined parts, tools, gages and machinery of all kinds. Agent, Nelson E. Rice, 1931 Oxford road, Grosse Pointe Woods, Mich.

HIGHLAND PARK, MICH.—Park Tool & Machine Co., 17050 Hamilton avenue, has been formed to engage in sales and manufacturing business. Agent, Harry B. Park, 2299 Clairmont street, Detroit.

JACKSON, MICH.—Temperature Control Inc., 1504 National Bank building, has been organized with $25,000 capital to deal in machinery, tools and temperature control equipment. Agent, Francis E. Johnson, 732 Elmwood avenue.

MARLETTE, MICH.—Theo. Diber Co., 3495 South Main street, has been incorporated with $16,000 to manufacture tools, dies and machinery, by Theo. Diber, Marlette.

MARYLAND

BALTIMORE—H. K. Ferguson Co., Hanna building, Cleveland, has contract to design and construct addition to can preparation equipment at existing detinning plant here for Defense Plant Corp.

BALTIMORE—Consolidated Engineering Co., 20 East Franklin street, has contract for alterations to building for Crown Cork & Seal Co. Inc. Lucius R. White Jr., 10 West Chase street, architect.

GEORGIA

ATLANTA, GA.—A. Farnell Blair, Decatur, Ga., has contract for boiler plant building at Marietta Aircraft Assembly plant, Marietta, for area engineer, costing between $100,000 and $200,000.

VIRGINIA

PORTSMOUTH, VA.—City has Presidential approval for addition to waterworks system, including $635,000 for 6,000,000-gallon filtration plant. Total cost is estimated at $835,000.

MISSOURI

ST. LOUIS—Kloster Co., 5215 South Grand street, has contract for $15,000 factory for Porbeck Mfg. Co., 2019 North Broadway. J. E. Tarling, 414 West Kossuth street, architect.

ARKANSAS

JACKSONVILLE, ARK.—Town is having survey made for water and sewer systems, cost-

ing $82,750 and $29,500 respectively. Marion L. Crist, Little Rock, Ark., engineer.

OKLAHOMA

ENID, OKLA.—Champlin Refining Co. will install power equipment, pressure stills, steel storage tanks, pipe lines and other equipment in connection with rebuilding portion of local refinery destroyed by fire.

ROGERS COUNTY, OKLA.—Long Construction Co., Philtower building, Tulsa, Okla., has contract for buildings, repair work, etc. at plant here for Defense Plant Corp., Charles Draper Faukner, 307 North Michigan avenue, Chicago, architect.

WISCONSIN

MILWAUKEE—Permit for $540,000 in new construction and alterations at the old Ford Motor Co. plant, 2185 North Prospect avenue, has been issued to Defense Plant Corp. The plant will be operated by A. O. Smith Corp.

MINNESOTA

ST. PAUL—Armour & Co., South St. Paul, has approved plans for addition to boiler house at local plant. Estimated cost $40,000, including boiler unit and auxiliary equipment.

TEXAS

DALLAS, TEX.—Big West Drilling Co., National Bank building, Dallas, plans natural gas absorption plant in Louisiana.

ORANGE, TEX.—City, Abe Sokolski, mayor, plans sewage disposal plant costing $61,000. Charles F. Smith is engineer.

SAN ANTONIO, TEX.—City, C. K. Quin, mayor, has grant of $68,500 for sewage plant improvements. H. R. F. Holland, engineer, Frost National Bank building.

TEXARKANA, TEX.—City, W. V. Brown, mayor, plans sewage disposal plant costing $100,000. J. J. Rady, Insurance building, Fort Worth, Tex., is engineer.

TEXAS CITY, TEX.—Pan-American Refining Co. will install power equipment, steel storage tanks, pumping machinery and other mechanical equipment in connection with rebuilding local oil refining plant recently destroyed by fire.

CANADA

NANAIMO, B. C.—Newcastle Shipbuilding Co. Ltd. has been formed and will start work immediately on construction of shipbuilding plant.

BELLEVILLE, ONT.—Reliance Aircraft & Tool Co., Water street, will start work soon on plant addition to cost about $50,000 with equipment.

HAMILTON, ONT.—Hamilton Bridge Co. Ltd., Bay street North, is receiving bids for general contract and separate trades, through Alex. Love, plant engineer, for addition estimated to cost about $100,000 with equipment.

LEASIDE, ONT.—Canada Wire & Cable Co. Ltd., Laird drive, has extended contract given to R. J. Hibbs Construction Co. Ltd., to include boiler house costing $15,000.

MALTON, ONT.—National Steel Car Corp. Ltd., Kenilworth avenue, Hamilton, Ont., N. Wagner, chief engineer, is receiving bids for addition to aircraft plant here estimated to cost about $150,000 with equipment. Harry H. Angus, 1221 Bay street, Toronto, mechanical engineer.

OTTAWA, ONT.—Northern Tool & Gauge Ltd., McArthur road, Eastview, has given general contract to Baker Bros., 66 Booth street, for plant addition to cost about $60,000 with equipment.

OTTAWA, ONT.—Department of Munitions and Supply, H. H. Turnbull, secretary, has given millwork contract to P. W. Gardiner & Son Ltd., 30 Harris street, Galt, Ont., in connection with construction of $710,000 ordnance building. Alex. I. Garvock, Regent Theatre building, has general contract.

TORONTO, ONT.—James Morrison Brass Mfg. Co. Ltd., 276 King street West, is receiving bids through Murray Brown, architect, Confederation Life building, for plant addition to cost about $30,000 with equipment.

TORONTO, ONT.—Wright Industries Ltd., 37 McCaul street, is receiving bids for plant addition, through architect, Percy R. Wright, 18 St. Mary's street. Estimated cost, with equipment, about $20,000.

TRENTON, ONT.—Benedict-Proctor Mfg. Co. Ltd., Ontario street, has plans for addition to silverplate manufacturing plant to cost about $40,000 with equipment.

WATERLOO, ONT.—Canada Barrels & Kegs Ltd., Shantz street, Leo Henhoeffer, manager, has given general contract to Ball Bros. Ltd., 49 King street East, Kitchener, for plant addition and installation of equipment, to cost about $20,000.

WESTON, ONT.—Massey-Harris Co. Ltd., 915 King street West, Toronto, has let three subcontracts and others are pending in connection with addition to aircraft plant here to cost about $1,500,000 with equipment. A. W. Robertson Ltd., 57 Bloor street West, Toronto, has general contract.

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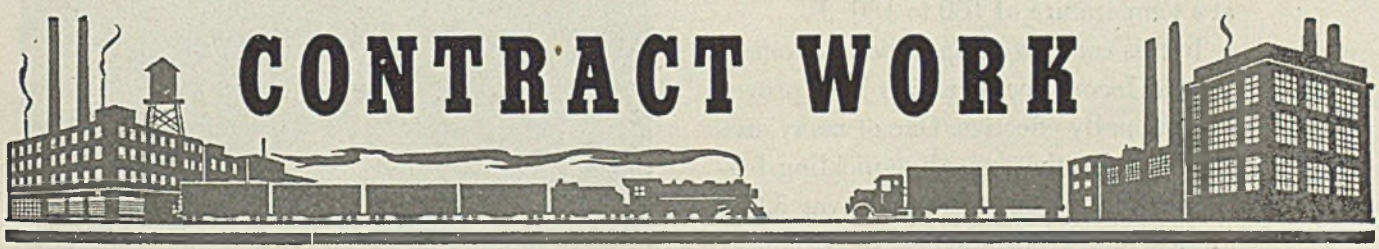

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The details of this case history have been published in the belief that they will be of interest and value to engineers and designers who are working on similar problems, as well as for those who are planning for the future.

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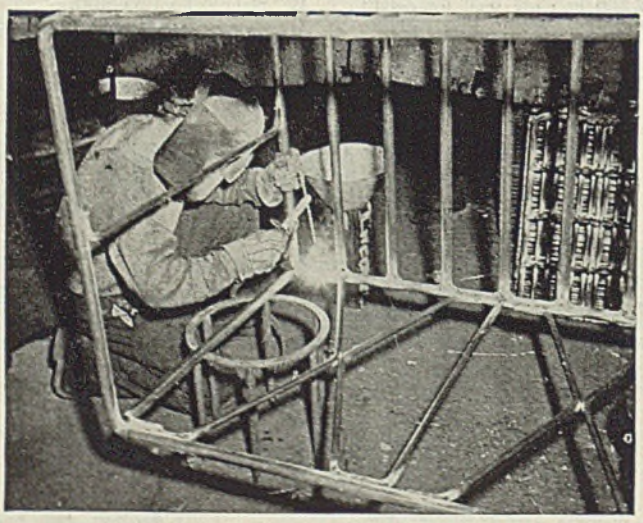

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